

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-346/85035(DRS)

Docket No. 50-346

License No. NPF-3

Licensee: Toledo Edison Company
Edison Plaza
300 Madison Avenue
Toledo, OH 43652

Facility Name: Davis-Besse Nuclear Power Station, Unit 1

Inspection At: Bechtel Power Corporation, Gaithersburg, MD (Bechtel)
Davis-Besse Site, Oak Harbor, OH

Inspection Conducted: November 12-14 and December 4-6, 1985 at Bechtel
November 19-21, 1985 at Site

Inspector: *D. H. Danielson*
for I. T. Yin

12/27/85
Date

D. H. Danielson
for J. R. Fair
(November 12-14, 1985 only)

12/27/85
Date

Approved By: *D. H. Danielson*
D. H. Danielson, Chief
Materials and Processes Section

12/27/85
Date

Inspection Summary

Inspection on November 12 through December 6, 1985 (Report No. 50-356/85035(DRS))

Areas Inspected: Special, announced inspection of the auxiliary feedwater pump turbine steam supply (AFPTSS) piping modifications, the Facility Change Request (FCR) system, implementation of Region III (RIII) Confirmatory Action Letter (CAL) 85-13 actions, engineering evaluations for Nonconformance Reports (NCRs) issued as a result of the reinspection program, and followup on previous inspection findings. The inspection involved a total of 72 inspector-hours onsite and at the A-E's office by two NRC inspectors.

Results: Of the areas inspected, one violation was identified: (failure to follow NCR evaluation procedure by Bechtel staff, Paragraph 5.c.(1)).

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DETAILS

1. Persons Contacted

Toledo Edison Company (TED)

- *J. K. Wood, Nuclear Plant Systems Director
- *J. F. Helle, Nuclear Facility Engineering Director
- *S. M. Quennoz, Group Director, Nuclear Engineering
- *C. T. Daft, QA Director
- *G. L. Lillman, Engineering Administration Supervisor
- +*P. H. Straube, Senior Engineer
- °*T. J. Bloom, Licensing Engineer
- *S. G. Wideman, Senior Licensing Specialist
- °*R. Kies, Nuclear Facility Engineering Manager
- S. J. Osting, Senior Assistant Engineer
- C. C. Mekbel, Civil and Structural Systems Engineer
- S. C. Jain, Senior Nuclear Engineer
- C. Ackerman, Engineer
- G. Tureson, Group Supervisor
- R. Ackerman, Assistant Engineer
- M. Shepherd, Code Inspection Supervisor
- M. Hurley, Mechanical QC Inspector
- D. Rhodes, QC Supervisor

Bechtel Power Corporation (Bechtel)

- +M. H. Franzen, Deputy Civil Group Supervisor
- C. H. Abutaa, Senior Engineer
- °V. Marathe, Assistant Project Engineer
- T. A. Mckearney, Material and Quality Services Manager
- °+D. L. Gill, Project Quality Engineer
- °S. A. Bernsen, Manager of QA
- +E. J. Ray, Project Engineer
- +W. C. Lowery, Project QA Engineer
- +J. M. Ogle, Civil Engineering Supervisor
- °T. I. Gillespie, QA Manager, Projects
- M. Zucofski, Civil Engineer
- R. Lee, Engineering Supervisor
- M. S. Wasserman, Mechanical Engineering Supervisor
- N. Tolani, Stress Engineer
- M. L. Murphy, Mechanical Engineer
- D. P. O'Reilly, Mechanical Engineer
- R. Zeigler, Civil Engineer
- F. Hinzman, Civil Engineer

Stone and Webster Engineering Corporation

J. Nicholson, Engineer

USNRC

*W. G. Rogers, Senior Resident Inspector

+Denotes those attending the management exit meeting on November 4, 1985 at Bechtel.

*Denotes those attending the management exit meeting on November 21, 1985 at site.

°Denotes those attending the management exit meeting on December 6, 1986 at Bechtel.

2. Licensee Action on Previous Inspection Findings

(Closed) Unresolved Item (346/79-11-05): Licensee actions to service the snubber ball bushings that should not have been greased. A followup inspection is documented in RIII Inspection Report No. 50-346/83-17. To date the licensee has replaced bushings on 63 snubbers. The work was prescribed in site Maintenance Work Order (MWO) 1-83-4626-00, issued on September 1, 1985, and signed off on February 5, 1985. The remaining affected bushings will be replaced and the grease fittings will be removed during regular snubber maintenance using site procedure MP 1410.02, "Maintenance of Hydraulic Snubbers", Revision 4, dated October 24, 1985. In addition, ball bushings that are found to be stiff or tight will be reworked as soon as they are identified.

(Closed) Unresolved Item (346/83-17-01): Some of the small bore pipe supports with complex configurations were improperly designed using cookbook type methods. TED identified a total of 806 non-standard small bore pipe supports, among which 724 required calculations to determine adequacy. As a result of the evaluations, 49 supports were modified and 2 were deleted. The inspector reviewed the following work packages and had no adverse comments:

- TED FCR 85-0176, dated September 14, 1985 including Supplement 1, dated September 18, 1985 and Supplement 2, dated September 25, 1985.
- TED NCR 85-096, dated August 29, 1985 including Addendum 1, dated October 16, 1985.

(Open) Unresolved Item (346/83-17-02): During the NRC inspector's previous observation of small bore piping suspension systems, unusual arrangement conditions were identified. The licensee stated that they would evaluate the generic effects of small bore support/restraint interactions between snubbers, loose guides, tight guides, rigid restraints, and rigid supports. The NRC inspector reviewed the TED evaluation and indicated additional clarification was required to resolve this matter.

(Closed) Unresolved Item (346/83-17-03): The functionability of snubber No. 30-GCC-8-H8 was questionable since it was installed close to rigid restraint No. 30-GCC-8-H7. The inspector reviewed Teledyne Engineering Services report TR-5639-2, "Analysis and Evaluation of the Safety/Relief Valve Discharge System Per NRC NUREG 0737", Revision 0, dated January 1983 and observed the design loading for the strut to be 1440 pounds and for the snubber to be only 371 pounds. The thermal displacement at the common location was 0.009". The licensee's technical staff stated that snubber No. 30-GCC-8-H8 will be replaced by a rigid sway strut during the next refueling outage.

(Open) Unresolved Item (346/83-17-04): Several new vintage ITT-G hydraulic snubbers with Miller cylinders, including PSP-1-H4 and PSP-1-H6 installed on Pressurizer Spray Piping System, were observed without fluid reservoir breather and filter units. There are both the new type and old type ITT-G snubbers installed in the plant systems. The new type comes with an air filter installed on the fluid reservoir. Some of these filters were observed to have been replaced by the old type snubber reservoir plugs with a small drilled hole. The NRC inspector emphasized that equipment should be restored to its original design condition.

(Closed) Unresolved Item (346/84-28-11): Snubber No. PSU-H1 installed on the 10" pressurizer surge line was found broken at the piston rod. The inspector reviewed the licensee's corrective actions stated in a letter to RIII (No. 1-494), dated January 18, 1985 including: (1) calculations to demonstrate postulated failure mechanism, (2) calculations to demonstrate the adequacy of the Nuclear Class 1 stanchion to pipe weld, and (3) reinspection of pressurizer surge line restraints and surrounding areas to assure adequate clearance. The inspector stated that he had no further questions regarding the matter.

(Closed) Unresolved Item (346/85033-01): Design concerns raised by the NRC inspector during pipe walkdown included adequate modeling of rigid pipe whip restraints (WRs) and penetration anchors in piping stress analyses and adequacy of hanger location (HL) drawings to record all seismic restraints. During the inspection conducted at Bechtel, the NRC inspector reviewed:

- Stress isometric drawing M-233E, Revision 5, dated November 6, 1985.
- Computer output for stress problem No. T-004(1b)(02), "High Pressure Injection System Run", dated June 24, 1980.

Both drawing M-233E, and stress problem T-004 showed correct WR and penetration locations.

To ensure that HL drawings will include WR locations and to re-verify the piping system dimensional measurements, the licensee revised TED Nuclear Facility Engineering Procedure (NFEP) No. IP-M-002, "The Piping Support Inspection and Verification Program: Verification of Support/Component Location and Quantity". Revision 1, dated November 9, 1985. The revised procedure included provisions for piping dimensional measurements, documentation, and engineering evaluation for deviations.

3. Licensee Actions on IE Bulletins

(Closed) IE Bulletin 79-07 (331/79-07-BB): "Seismic Stress Analysis of Safety-Related Piping," dated April 14, 1979. The NRC inspector reviewed the following documentation:

- TED letter to RIII, Serial No. 1-62, dated April 24, 1979.
- Babcock and Wilcox (B&W) letter to TED, DB-79-25, dated April 23, 1979.
- Bechtel letter to TED, BT:8723, dated April 23, 1979.

As a result of the investigations conducted by B&W and Bechtel, piping analysis computer programs were found not to use algebraic summation (with predicted loads in the negative direction offsetting predicted loads in the positive direction) of the seismic loads in either horizontal or vertical directions. Based on these investigations, no further action was required.

4. TED Implementation of RIII CAL Action Items

a. CAL 85-03 (Closed)

RIII Inspection Report No. 50-346/85013, Paragraph 10, documented closeout for CAL 85-03 Items 1, 2, 4, and 5. Item 3 involved an inservice testing program for the AFPTSS piping system to determine the cause and the nature of the system transient that resulted in degradation of pipe restraints. Since the AFPTSS system has been modified extensively (see Paragraph 6), the licensee made a request to RIII in a letter (Serial No. 1-569, dated September 10, 1985) to delete CAL 85-03 Item 3. To replace the above testing, TED agreed to conduct confirmatory tests on the AFPTSS piping system following the completion of system modification and prior to Mode 3 operation. RIII concurred with the licensee's request. Followup of TED confirmatory test program is planned. This is an Open Item (346/85035-01).

b. CAL 85-13 (Open)

As a result of a meeting conducted at the site on October 9, 1985 (RIII Inspection Report No. 50-346/85033, Paragraph 4) RIII CAL 85-13 was issued on October 17, 1985.

The licensee implementation of the CAL was reviewed by the NRC inspector. The status of CAL Item 1 (action items prior to plant restart) is as follows:

Item 1.a(1) (Open)

2,365 pipe supports will require reinspection prior to restart. The reinspection status as of December 4, 1985, is as follows:

Reinspections

- All 2365 hangers had been inspected
- 2152 NCRs were issued

Engineering Evaluation of NCRs

- 659 NCRs were determined to be "Use-As-Is"
- 172 NCRs required corrective actions

Item 1.a(2) (Open)

Upon completion of Item 1.a(1), all the new NCRs that require rework and approximately 250 old NCRs which could affect system safety will be forwarded to Bechtel for system operability evaluation. The Bechtel evaluation is to be based on TED procedure NFEP-060, "Processing NCRs, SDRs, and SDDRs", Revision 4, dated October 22, 1985, Exhibit X, "Program for Conducting Seismic Category I Piping System Operability Evaluations and Use of Interim Allowables at Davis-Besse Nuclear Power Station Unit No. 1". The NRC inspector reviewed the above program and considered the provisions to be appropriate and adequate.

Item 1.a(3) (Closed)

The procedural provision for screening any NCRs for safety-related piping system supports inside containment not listed in Item 1.b but determined to be significant relative to system operability is included in TED procedure NFEP-060, Exhibit X (refer to Item 1.a(2) above). The NRC inspector's review of the TED disposition of NCRs generated as a result of the reinspection program concluded that the licensee actions taken were adequate.

Item 1.a(4) (Open)

The FCRs that could impact safety-related piping system operability include:

<u>FCR No.</u>	<u>General Description (No. of Supports Involved)</u>	<u>Status (As of 12/05/85)</u>
77-213	Install time meters (3)	Work in progress
77-398	Isolation valve and bypass valves (6)	Work in progress
78-126	Upgrading 4"-EBD-61 (138)	Work completed, in closeout
78-360	Redirect discharge RC769 (5)	Work in progress
79-421	AFW pump turbine modification (15)	Work completed, in closeout

80-276	Install seal return line (13)	Work completed, in closeout
80-221	Change relief setpoint (3)	Work in progress
83-136	Replace FW pump governor (2)	Work in progress
83-138	Change of 14 valves (4)	Work in progress
83-151	SWS valve modification (2)	Work in progress
85-025	Motor driven FW pump (103)	Work in progress
85-086	Modify Support 3A-EBD-19-H147 (1)	Work completed, in closeout
85-010	Modify Support GC-EBD-4-H11 (1)	Work in progress
85-126	Floodwall penetration - Room 237 (3)	Plan in development
85-143	Relocate steam admission valves (6)	Work in progress
85-163	Install one pipe whip restraint (1)	Work in progress
85-160	PORV loop seal drain (8)	Work in progress
85-176	Small bore pipe support modification (51)	Work in progress
85-224	Add snubber to MSSV 2 (1)	Plan in development

Item 1.a(5) (Open)

TED will provide RIII a summary report in sufficient advance prior to plant restart (presently scheduled for February 1986), to document: (1) reinspection findings and subsequent evaluations, (2) resolution of adverse findings that required rework, and (3) basis for not performing inspections/walkdowns and resolution of resulting NCRs for all safety-related piping system supports not listed in Item 1.b.

5. Review of TED NCR Evaluations

a. Review of NCR Packages

In conjunction with RIII Inspection Report No. 50-346/85033, Paragraph 5, the NRC inspectors selected the following TED NCR evaluations and dispositions for review at Bechtel and at the site:

<u>NCR. No. (System)</u>	<u>Hanger No. and (Load in Lbs. and Ft-Lbs, and Direction</u>	<u>Nonconformance(s)</u>	<u>Inspector's Comments</u>
85-0256 (HPI)	A-47 (232 Fx, 231 Fy, 408 Fz, 200 Mx, 1285 My, and 1787 Mz)	Undersize weld on pipe saddle	See Paragraph 5.C.(1)
85-0254 (HPI)	A-46 (158 Fx, 725 Fy, 237 Fz, 6861, Mx, 473 My, 878 Mz)	Undersize weld on pipe saddle	See Paragraph 5.C.(1)
85-0598 (CS)	34-HCB-9-H10 (large bore pipe 463 Fx and 1208 Fy; small bore pipe 100 design)	<ul style="list-style-type: none"> • Weld not all around per design • seam weld in lieu of fillet • violation of bolt distance 	Bechtel Calcu- lation No. 19D-6, Rev. 1 dated 10/25/85 was acceptable
85-0365 (HPI)	33C-HCC-91-H9 (300 Fx, 300 Fy)	Missing and undersize welds	Bechtel Calcu- lation No. 56D-01, Rev. 0, dated 9/25/85 was acceptable
85-0277 (HPI)	33C-CCB-2-H25 (500 Fx and 900 Fy)	<ul style="list-style-type: none"> • Notch found on beam flange • Missing and undersize welds 	Bechtel Calcu- lation No. 56A-03, Rev. 1, dated 9/23/85 was acceptable
85-0443 (LPI)	33B-GCB-10-H6 (1358 Fy)	<ul style="list-style-type: none"> • Excessive base plate gaps • Weld design deficiency • Restrictive strut bushing movement • Staked threads on U-bolt 	Bechte? Calcu- lation No. 18F-06, Rev. 0, dated 10/7/85 was acceptable
85-0696 (DHR)	33A-GCB-8-H8 (1496 Fy)	<ul style="list-style-type: none"> • No base plate bearing shims • undersize welds 	Bechtel Calcu- lation No. 32B-15, Rev. 1, dated 10/10/85 was acceptable

85-0442 (LPI)	33B-GCB-10-H9 (680 Fy)	<ul style="list-style-type: none"> • Welding deviated from design • Missing lock nut • Strut bushing not moveable by hands 	<ul style="list-style-type: none"> • TED Calculation No. C-ME-49.02-006, dated 9/28/85 was acceptable • Acceptable • Acceptable
85-0662 (LPI)	33C-HCB-9-H14 (1796 Fx)	<ul style="list-style-type: none"> • Stripped jam nut on anchor bolt • Missing Lock nut on clamp • Shim weld on clamp 	<ul style="list-style-type: none"> • Acceptable • Acceptable • Acceptable
85-0355 (HPI)	33C-CCB-2-H17 (354-Fz)	Weld and structural member configuration deviated from design	TED Calculation No. C-ME-52.01-033, dated 10/22/85 was acceptable
85-0581 (SW)	41-HBC-35-H50 (700 Fx)	Excessive weld on support member	Acceptable
85-0283 (AFW)	6C-EBD-14-H8 (1400 Fz)	<ul style="list-style-type: none"> • Clamp space deviation • Staked threads • Missing lock nut • Weld deviation 	<ul style="list-style-type: none"> • Acceptable • Acceptable • Acceptable • TED Calculation No. C-ME-50.03-053, dated 10/22/85 was acceptable
85-0502 (AFW)	6C-EBD-14-H21 (1400 Fx)	<ul style="list-style-type: none"> • Loosened Strut • Pin-to-pin not shown on drawing 	<ul style="list-style-type: none"> • Tightening nuts required Acceptable • Acceptable

b. Verification of Support Design Loads

A number of hanger loads documented in RIII Inspection Report No. 50-341/85033, Paragraph 5, and some of the hanger loads listed in Paragraph 5.a above were selected to verify that correct or conservative support design loads were used during NCR evaluations. The following hanger loads were compared with the latest piping stress analysis computer output:

Hanger No.Bechtel Piping Stress Analysis No.

33B-FCB-2-H1
33C-CCB-2-H44
33C-HCC-124-H4
33C-CCB-2-H11
33C-HCC-91-H10
33B-GCB-10-H13
A-47
34-HBC-9-H10
33C-HCC-91-H9
33C-CCB-2-H25
33B-GCB-10-H6
33A-GCB-8-H8

T-007(b), Rev. 1, dated 4/28/81
T-004(1b), Rev. 2, dated 8/7/80
56F, Rev. 1, dated 3/18/85
56A, Rev. 5, dated 3/18/85
56D, Rev. 1, dated 11/8/72
18F, Rev 2, dated 4/12/80
45A, dated 6/1/80
19D, dated 4/18/80
56D, dated 11/8/72
56A, dated 6/1/30
18F, dated 4/12/80
32B, dated 12/13/79

No deficiencies were identified as a result of the review/verification.

c. Inspection Findings

(1) Procedure Implementation

The NRC inspector reviewed Bechtel Calculations No. 1-46, Volume R-1, Revision 8, dated August 25, 1985 for NCR No. 85-0254, and No. A-47, Volume R-1, Revision 5, dated September 26, 1985 for NCR No. 85-0256 and concluded that the allowable stress criteria prescribed in the Bechtel evaluation procedure MGP-04, "Procedure for Control of Interim/Short Term Allowable Stress Criteria for Seismic Category I Piping Systems", Revision 1, dated September 27, 1985 were not utilized. The MGP-04, Table 1, "Design Criteria", Section 3.3.(b), set SSE stress allowable for ASME welds at 0.3 Sy. To the contrary:

- The allowable stress for the weld attachment to pipe for NCR No. 85-0254 used the criteria from Section NF of the ASME Code which set through wall tension of 0.3 Sy, base material shear of 0.4 Sy, and weld throat of 21 ksi to be stress allowables.
- The allowable stress for the weld attachment to pipe for NCR No. 85-0256 considered only base material shear and used 0.4 Sy as stress allowable.

After corrections were made to the calculations, the affected supports were still within the procedural stress allowables. In review of MGP-04, certain clarification was determined to be helpful for future review understanding. The failure to follow the approved procedure is a violation of 10 CFR 50, Appendix B, Criterion V requirements (346/85035-02).

(2) Minimum Weld Size

The present NCR evaluation for weld deficiencies designed to AISC specification (7th Edition) did not include AWS D1.1 criteria for minimum weld sizes corresponding to base material thicknesses. During a discussion at Bechtel on November 14, 1985, the licensee stated that they will provide either specific case by case or generic/worst case metallurgical evaluations for accepting weld design deviations from the AWS minimum weld size requirement. This is an unresolved item (346/85035-03).

6. AFPTSS System Modification

The AFPTSS system excessive steam condensation caused (1) support damage due to line vibration, and (2) the pump to trip due to condensate flashing to steam at the Terry turbine thus causing it to overspeed. These problems are discussed in RIII Inspection Report No. 50-346/85013.

To minimize condensation build up, the admission valves for the steam turbines (several hundred feet away from the turbine) were relocated to a short distance from the turbine inlet nozzles. The system modification includes: (1) addition of two pneumatically operated isolation valves for the two turbines (Valve HV 5889A to be installed approximately 14 feet from Turbine 1-1 nozzle, and Valve IV 5889B approximately 5 feet from Turbine 1-2), and (2) open up isolation valves 106A and 107A on the two crossover legs during normal plant operation. The system modification requires: (1) installation of high pressure steam traps, (2) a high energy line break (HELB) analysis, (3) equipment qualification (EQ) studies for adverse operating environmental conditions, (4) pipe support, WR, and conduit support modifications, and (5) replacement of pressure switches.

a. Review of FCRs

The NRC inspector reviewed the TED proposed system changes documented in the following FCRs, and had no adverse comments. The need for TED to improve its control of FCRs and the associated MWOs, is discussed in Paragraph 7.

- FCR-0143, "Relocation of AFPT Main Stream Admission Valves", dated September 18, 1985; Revision A, dated October 1, 1985, and Revision B, dated October 10, 1985.

Supplement 1, dated September 18, 1985: redesign of piping (Bechtel letter to TED, No. BT-15691, dated September 12, 1985).

Supplement 2, dated September 25, 1985: redesign of electrical system (Bechtel letter to TED, No. BT-15692, dated September 14, 1985).

Supplement 3, dated October 2, 1985: (1) installation of new pneumatic operated isolation valves, (2) installation of new hangers, (3) modification of existing hangers, and (4) relocation and replacement of pressure switches (Bechtel letter to TED, No. BT-15737, dated September 26, 1985).

Supplement 4, dated October 18, 1985: (1) revision on steam and feedwater rupture control system logic and (2) changes on pressure switch locations and mounting details (Bechtel letter to TED, No. BT-15792, dated October 10, 1985).

Supplement 5, dated November 9, 1985: (1) revise steam trap data sheets, and (2) provide details for isolation barriers and cover plates on main steam control board (Bechtel letter to TED, No. BT-15878, dated October 29, 1985).

- FCR 85-0163, "Installation of Pipe Whip Restraints and Jet Impingement Barriers on AFPTSS System", dated September 17, 1985; and Revision A, dated September 18, 1985.

Supplement 1, dated September 20, 1985: (1) WR details, (2) reroute conduits, and (3) provide additional conduit supports (Bechtel letter to TED, No. BT-15690, dated September 12, 1985).

Supplement 2, dated September 20, 1985: provide design package for WR-32 construction (Bechtel letter to TED, No. BT-15712, dated September 19, 1985).

Supplement 3, dated October 2, 1985: (1) provide details for pipe encapsulation construction, (2) provide details for rerouting conduits, and (3) provide design for new conduit supports (Bechtel letter to TED, dated September 26, 1985).

Supplement 4, dated October 7, 1985: (1) additional conduit reroute, and (2) additional conduit supports (Bechtel letter to TED, BT-15763, dated October 3, 1985).

Supplement 5, dated October 9, 1985: (1) additional conduit reroute, and (2) additional conduit supports (Bechtel letter to TED, BT-15767, dated October 4, 1985).

The scope of the system modification will also include: (1) updating P & IDs, (2) system description in USAR, (3) revision to system surveillance, (4) updating the EQ material lists, (5) revisions in piping support and WR drawings, and (6) updating in-service inspections.

b. Condensate Removal

Since the system modification involved filling the AFPTSS lines with non-moving steam, the condensate removal at high pressure was a design concern. During his review of the TED program, the NRC inspector noted that a total of 12 Yarway series 460 and series 515 steam traps (STs) will be utilized at various low points in the system. The STs were designed to provide continuous operation at pressure up to 1500 psig. The AFPTSS condensate will be piped to condensate storage. The NRC inspector reviewed the Yarway specification including design data and component selection charts and had no adverse comments.

c. EQ Evaluation

Modification of the AFPTSS system to resolve the condensate buildup up problem, resulted in the system being subjected to continuous pressurization during normal plant operation. TED contracted Impell Corporation, New York Regional Office, to perform environmental studies, including the effects to EQ during and after the HELB event. The following Impell reports were reviewed by the NRC inspector:

- No. 02-1040-1334, "Evaluation of Environmental Conditions From AFPTSS Line Rupture", Revision 0, dated November 8, 1985.
- No. 02-1040-1335, "Evaluation of Equipment Qualification Concerns Associated with AFW Line Break Study", Revision 1, dated November 13, 1985.

The reports recommended pressure switches in the auxiliary feedwater pump rooms No. 237 and No. 238 be replaced by environmentally qualified equivalents. The EQ reports were forwarded to NRC - NRR in a TED letter, Serial No. 1208, dated November 16, 1985. The NRC inspector stated that he had no further questions in this area.

d. Review of Piping Stress Analysis

(1) Scope of Piping Modification

- (a) Delete five stress analyses (Problem Nos. 40A, 40B, 120F, 120G, and 120H). A new Problem 40A, Revision 2 replaced these five analyses.
- (b) Problem 41A, the remaining piping stress analysis, was not changed.
- (c) Modification of pipe anchors:
 - A-3 on Train 1-2, now M-1181-H6, a 3 way restraint.
 - A-282 on Train 1-2, now M-1181-H1, a 2 way restraint.

- A-309 on Train 1-2, now M-1181-H5, a 3 way restraint.
- A-310 on Train 1-1, now M-1181-H2, a 3 way restraint.

The modification retained the existing baseplates and portions of structural steel welded on the baseplates.

(d) To improve system operations, seven rigid restraints and snubbers were disconnected:

- EBB-2-H29 (y direction restraint)
- EBD-19-H117 (x direction restraint)
- EBD-19-H127 (z direction restraint)
- EBD-19-H145 (y direction restraint)
- EBD-19-H84 (x direction restraint)
- EBD-19-H143 (z direction snubber)
- EBD-19-H146 (x direction snubber)

(e) Modification of rigid restraints:

- EBD-19-H103 (x direction only, x and y before)
- EBD-19-H113 (x direction only, x and y before)

(f) Addition of supports:

- Restraint M-1181-H3 replaced EBD-19-H145
- Snubber M-1181-H4 replaced EBD-19-143

(g) Some piping rerouting and removal of portions of piping including valves near Turbine 1-2.

(2) Review of Analysis

The NRC inspector reviewed the following Bechtel piping stress analysis:

(a) Problem 40A, "Main Steam", Revision D2, dated September 25, 1985.

Due to the volume of the documentation related to the analysis, particular attention was given by the NRC inspector to verify the accuracy of the piping configuration model. No deficiencies were identified as a result of the review. The disconnection of many rigid restraints resolved the NRC inspector's previous concern relative to possible high thermal lockup stresses that may exist between some of the closely spaced restraints. A maximum thermal stress of 17,871 psi was checked at data point No. 68 (a tee), which is comfortably below the Code allowable of 22,500 psi.

(b) Problem 41A, "Main Steam", Revision 5, dated August 20, 1982.

A maximum thermal stress of 21,722 psi was checked at data point No. 61 (an elbow). The NRC noted that this stress is close to the Code allowable stress of 22,500 psi, and suggested some system relief be provided.

e. Review of HELB Analysis

(1) Scope of Piping Modification

- (a) Installation of one new WR. Design details were shown on Drawing Change Notice (DCN) C-628-3, dated September 19, 1985, for Bechtel Drawing No. 7749-C-628, Revision 2.
- (b) Installation of one new pipe encapsulation. Design details were shown on DCN C-679-3, dated September 26, 1985, for Bechtel Drawing No. 7749-C-679, Revision 8.
- (c) Installation of one jet impingement shield. Design details were shown on DCN C-679-2, dated September 19, 1985, for Bechtel Drawing No. 7749-C-679, Revision 8.
- (d) 16 conduits required rerouting to avoid direct jet impingement.
- (e) 52 new conduit supports will be added to the existing suspension system, among which some only require beefing up of the existing supports.

(2) Design Basis

The NRC inspector reviewed the Davis-Besse 1 USAR, Section 3.6.2, "Dynamic and Environmental Effects Protection Criteria", Revision 0, dated July 1982 and Revision 3, dated July 1985. Use of the NRC-NRR Standard Review Plan, Section 3.6.1, "Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment", and Section 3.6.2, "Determination of Rupture Locations and Dynamic Effects Associated With the Postulated Rupture of Piping" was referenced in the USAR.

(3) Review of Calculations

The NRC inspector reviewed the following Bechtel component calculations, and had no adverse comments.

- No. 8 File:F16, "FCR 85-165 Main Steam Line Pipe Whip Restraint WR-32," Revision 3, dated October 30, 1985.
- No. 10 File:F16, "Design of Pipe Encapsulation Device, Problem No. 3, 85-165", Revision 1, dated November 20, 1985.

- No. 7 File:F16, "Design of Jet Impingement Barrier for Junction Box JT5811, Problem No. 1, FCR 85-163, Reference Drawing C-679", Revision 0, dated September 17, 1985.

(4) Review of Bechtel Design Control

A number of unresolved matters relative to the Bechtel design control provisions for the HELB analysis and the associated component design were raised.

- (a) The following design criteria are in desktop design guides and not in the design procedures:
 - Pipe Break Protection, issued by Bechtel, San Francisco office in July 1982.
 - Pipe Whip Details, issued without signoffs and date.
- (b) Pipe Whip Details, Paragraph 7, stated, "A pipe will hinge about the second elbow or the next fitting if it is beyond the hinge distance and there are no other rigid structures to cause the hinge." Engineering justification was not available to backup this statement. This statement is also in conflict with Pipe Break Protection, Paragraph B.1, "Circumferential Break" design requirements.
- (c) Design tables "High Energy Line Jet Impingement" developed by the civil engineering group, and "Critical Crack Jet Characteristics" developed by the mechanical engineering group, had not been reviewed and approved for generic applications.
- (d) The NRC inspector reviewed the determination of break points and had not adverse comments; however, measures did not appear to be established to carry out the design and review requirements systematically.
- (e) There appeared to be a lack of delegation of specific disciplinary responsibilities, and a description of coordinating task interfaces among the responsible departments (mechanical, civil, electrical, field walkdown, and etc.)

Due to the limited inspection time it is the NRC inspectors view that the Bechtel engineers were not given sufficient opportunity to address his concerns and to present all available evaluation and backup documentation. A followup inspection of the Bechtel design control for the HELB analysis and the associated component design is planned. This is an unresolved item (346/85035-04).

7. Licensee Control of FCRs

a. Review of Procedures

The inspector reviewed the following TED and Bechtel FCR procedures including Maintenance Work Order (MWO) procedures for performing system modification:

- TED NFEP-010, "Processing Facility Change Requests", Revision 4, dated October 15, 1985.
- TED Administrative Procedure AD1844.00, "Maintenance", Revision 14, dated July 25, 1985.
- Bechtel EDPI-3.16-11, "Processing Facility Change Request", Revision 7, dated August 29, 1985.

b. The NRC Inspector's Comments

As a result of the (1) procedure review; (2) followup inspection for the AFPTSS modification involving review of FCRs 143 and 163; (3) review of licensee's disposition of NCRs issued during hanger and component location reinspections, and (4) inquiry into the outstanding piping and pipe support FCRs required to be closed prior to plant restart, the NRC inspector considers the present licensee effort to improve plant system operability and reliability to be substantial. However, to ensure a continuation of the same degree of personnel attention, the inspector noted that the licensee should evaluate the following comments and consider revising the present MWO and FCR system provisions in the near future.

- (1) Contrary to the present requirement that QC inspections including witness and hold points be determined by the QC/Code reviewer, the NRC inspector notes that all safety-related MWO work including installation of new hangers and WRs and modification, repair, and readjusting of any exiting supports should require mandatory QC inspection/verification.
- (2) Contrary to the present requirement that QC inspections for hanger configuration including location, dimension, and orientation not be initiated until all work within the MWO has been completed, the NRC inspector notes that inspections for individual supports should be conducted in a timely manner, as soon as the installation or rework has been completed by the craft.
- (3) The inspector notes that the FCR system should receive additional revision to improve its effectiveness. Consideration should include elements such as: (1) classification should be assigned denoting importance to system safe operation and license commitments, to improve personnel sensitivity in restoring equipment and components to the FSAR/USAR conditions;

(2) careful planning and scheduling of work prior to the issuance of an FCR to minimize the number of changes; (3) subdivision where possible should be provided for FCRs for easier management and closeout, and (4) integration of formal project and QA technical and programmatic audits and surveillances into the FCR system to ensure effective program implementation.

Due to the limited inspection time and plant management personnel availability, the matter will be discussed further during a future inspection. This is considered to be an open item (346/85035-05).

8. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which will involve some action on the part of the NRC or licensee or both. Two open items disclosed during the inspection are discussed in Paragraphs 4.a, and 7.

9. Unresolved Items

An unresolved item is a matter about which more information is required in order to ascertain whether it is an acceptable item, an open item, a deviation, or a violation. Two unresolved items disclosed during this inspection are discussed in Paragraphs 5.c.(2), and 6.e.(4).

10. Exit Interview

The NRC inspectors met with licensee representative (denoted in Paragraph 1) at the conclusion of each segment of the inspections. The inspectors summarized the scope and findings of the inspection. The inspectors also discussed the likely informational content of the inspection report with regard to documents reviewed by the inspectors during the inspection. The licensee representatives did not identify any such documents as proprietary.