U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
REGION VI

Report No 99900519/80-02 Program No. 51200

Company: Bechtel Power Corporation
Gaithersburg Power Division
15740 Shady Grove Road
Gaithersburg, Maryland 20706

Inspection Conducted: July 21-24, 1980

Inspectors: R. H. Brickley — 8/15/80
R. H. Brickley, Principal Inspector — Date
Program Evaluation Section
Vendor Inspection Branch

for R. H. Brickley — 8/15/80
D. G. Anderson, Principal Inspector — Date
Program Evaluation Section
Vendor Inspection Branch

for R. H. Brickley — 8/15/80
I. T. Yin, Reactor Construction Inspector — Date
Region III

Other Personnel: for R. H. Brickley — 8/15/80
R. C. Li, Mechanical Engineer — Date
MEB/NRR

Approved by: C. J. Hale — 8-21-80
C. J. Hale, Chief — Date
Program Evaluation Section
Vendor Inspection Branch

Summary

Inspection on July 21-24, 1980 (99900519/80-02)

Areas Inspected: Special inspection concerning seismic analysis of as-built safety related piping systems; two (2) regional requests for follow-up; implementation of 10 CFR 50 Appendix B in the area of failure mode and effects analysis of high energy line breaks outside containment; and action on previous inspection findings. The inspection involved seventy-two (72) inspector-hours onsite by three (3) NRC inspectors.

Results: In the areas inspected one deviation and one unresolved item were identified.

Deviation: Seismic analysis - failure to follow procedures during evaluation of as-built configuration of nuclear safety related piping components. (See Notice of Deviation enclosure).

Unresolved: The Licensee has not required that the piping cross sections be verified by examination of QA records because IE Bulletin 79-14 did not specify that particular requirement. (See Details Section I, paragraph C.3.c.)

DETAILS SECTION I

(Prepared by R. H. Brickley)

A. Persons Contacted

Bechtel

W. R. Dilling, Stress Group
*J. W. Fax, Project Engineer
C. M. Foltyn, Engineering Supervisor
N. Kalyanam, Staff Supervisor
R. D. Kies, Group Leader
N. L. Lee, Stress Group Leader
*J. C. Ventura, Assistant Project Engineer

Toledo Edison Co.

*C. L. Mekbel, Senior Engineer
*D. J. Mominee, QA Representative

*Denotes those in attendance at the exit interview.

B. Action on Previous Inspection Findings

(Closed) Deviation (Report No. 79-03) Project instructions do not require retention of records of internal interface reviews. The inspector verified implementation of the commitments made in the letter of response dated April 7, 1980, i.e. EDPI-4.46-01 (Project Engineering Drawings) Rev. 14 and EDPI-4.49-01 (Project Specifications) Rev. 10 now require retention of internal interface reviews.

C. Seismic Analysis for As-Built Safety-Related Piping Systems

1. Objectives

This was a special inspection of the Bechtel Power Corporation/Gaithersburg Power Division (BPC/GPD) activities with respect to IE Bulletin 79-14 for Davis Besse-1. The objectives of this area of inspection were to select piping systems and determine that:

a. These activities are being conducted in a documented, planned and systematic manner.

b. The inputs to the seismic analysis for a piping system can be readily identified.

c. Identified nonconformances are properly analyzed and documented.

d. Personnel conducting these activities meet the qualification requirements of their assigned positions.

e. BPC/GPD sub-contractors had been audited for compliance with applicable elements of their QA program with respect to these activities.

2. Method of Accomplishment

The preceding objectives were accomplished by an examination of:

a. Documents No. PDP-21 (Inspection Procedure for As-Built Configuration of Nuclear Safety Related Piping Components) Revision 4 dated May 3, 1980, and PDP-3 (Evaluation Procedure for As-Built Configuration of Nuclear Safety Related Piping Components) Revision 0 dated November 8, 1979, and Revision 1 dated July 22, 1980.

b. Inspection Data Package No. 31 for the DHR System-CTMT-Aux. Bldg., Normal Cooldown.

c. Calculation No. T-010A (ME-101 Computer Program) for the DHR System and its associated documents e.g. stress isometric, valve drawings, and support drawings.

d. Calculation No. 10A (ME-101 Computer Program) for the Main Steam System-CTMT Bldg to Steam Generator 1-1 and its associated documents e.g. stress isometric, valve drawings, and support drawings.

e. BPC/GPD position descriptions for the Stress Group Leader, Stress Group Engineer, Stress Group Technician, Pipe Support Group Engineer, and Pipe Support Group Designer.

f. The resumes of five (5) personnel assigned to the aforementioned positions.

g. Reports of Bechtel's audit of ITT Grinnell on December 4, 1979, and of NUS Corp. on October 23-24, 1979.

3. Findings

a. General

The examination of the documents identified in C.2.c and [redacted].d above revealed several areas wherein the inspectors questioned the BPC/GPD methods used in their evaluation. These methods were discussed with MEB/NRR personnel and the following NRC staff positions were obtained:

(a) Item: Is the use of actual values obtained from the pipe material test reports to determine the allowable stress acceptable to the staff?

Position: The staff will consider the use of material test values in lieu of Code values on a case by case basis.

(b) Item: Is the use of a manufacturers recommended stress intensification factor (SIF) in lieu of the Code SIF acceptable to the staff?

Position: The use of manufacturers recommended SIF will be allowed if the Licensee presents sufficient justification to the staff.

(c) Item: Clarify the evaluation requirements with respect to OBE and/or SSE for interim operability.

Position: The primary stress for SSE conditions should be less than $2.4S_h$ and any modification of the piping support system should bring the pipe stress levels within the Code requirement rather than interim operating requirements.

(2) The examination of the documents identified in C.2.e and C.2.f above and discussions with engineering management revealed that personnel were qualified for their assigned position.

(3) The examination of the documents identified in C.2.g above revealed that Bechtel had audited the IEB 79-14 activities of their sub-contractors, identified deficiencies, and obtained the necessary corrective action.

b. Deviations

One deviation was identified in this area of the inspection (see enclosure, Notice of Deviation).

c. Unresolved Items

The August 15, 1979, supplement to IE Bulletin 79-14 states that where physical inspection is not practicable, e.g., for valve weights and materials of construction, the Licensee is expected to verify conformance by inspection of quality assurance records. Since this supplement did not specifically identify the cross sections of piping (a piping system parameter which was an input to the seismic analysis), the conformance of this item

has not been verified by inspection of quality assurance records. The inspectors feel that the intent of IEB 79-14 is that all parameters that were used as input to the seismic analysis must be verified. This item will be referred to NRC HQ for resolution.

D. Exit Interview

An exit interview was held with management representatives on July 24, 1979. In addition to those individuals indicated by an asterisk in each Details Section, those in attendance were:

J. M. Amaral, Manager, Division QA
M. W. Brobst, Acting Chief, Quality Engineering (QE)
T. I. Gillespie, Project QA Manager
B. K. Kanga, Manager, Division Engineering
B. L. Meyers, Project Manager
J. H. McCarty, QA Supervisor
W. M. Turner, Project QE

The inspector summarized the scope and findings of the inspection. Management comments were generally for clarification only, or acknowledgement of the statements by the inspector.

DETAILS SECTION II

(Prepared by D. G. Anderson)

A. Persons Contacted

J. Arbaiza, Quality Engineer
E. H. Borda, Project Engineer
*P. R. Britnell, Project Quality Engineer
*E. C. Fratz, Lead Quality Assurance Engineer
B. C. Gruber, Pipe Support Group Leader
C. M. Herbst, Assistant Mechanical Group Supervisor
L. Jha, Plant Design Engineering Supervisor
N. Kalyanam, Stress Group Supervisor
*D. C. Kansal, Project Quality Assurance Manager
*L. F. Sirianni, Quality Assurance Supervisor
J. H. Smith, Project Engineering Manager

*Indicates attendance at the exit meeting.

B. Followup on Regional Requests

In this area of the inspection, two (2) regional requests related to items identified as 10 CFR 50.55(e) or as 10 CFR Part 21 reportable events and applicable to Bechtel were reviewed and evaluated by the inspector. In reviewing these items, the inspector assured that the following objectives were accomplished:

1. Objectives

a. Determination of how the item was identified.

b. That followup actions were conducted under the requirements and procedures of the Bechtel Quality Assurance Program.

c. Determination of the status of corrective action and preventive action to assure that the item is satifactorily resolved.

d. Determination of the generic effects on other plants and notification of the affected utilities.

e. Determination of the accuracy, applicability, and timeliness of reporting to the NRC.

2. Method of Accomplishment

The inspector reviewed the following Bechtel procedures which establish the requirements that implement the activities related to the identifi-

cation, evaluation, notification and reporting of items which are tracked as either nonconformance reports (NCR) or management corrective action reports (MCAR):

a. Instruction 14-01, Reporting of Defects and Non-compliance to the Nuclear Regulatory Commission, April 1979.

b. Nuclear Quality Assurance Manual:

QG-16.1, Corrective Action Program, August 1977.

QG-16.2, Significant Reportable Deficiencies, February 1980.

QA Department Procedure 2.8, Management Corrective Action Report, March 1979.

The inspector verified the implementation of these procedures during the review of the following items, assuring the above noted objectives are accomplished

3. Results

a. Error in Natural Frequency of Valves

This item was identified by Bechtel during a review of pipe stress analyses submitted by Powell (William Powell Company) to Bechtel. This item has been previously reviewed by the NRC (IE Inspection Report 99900057/79-02) during an inspection of 10 CFR Part 21 reporting by Powell. Powell subcontracted the analysis to Midwest Technical Services who determined the natural frequency of the valves being supplied to the Grand Gulf Nuclear Station (Mississippi Power and Light Company). In their analysis, Midwest neglected to include the valve operators in the determination of the natural frequency of the valves. The Bechtel specification 9645-M-242.0 specified all valves must have a natural frequency greater than 33 hz. Reanalysis by Action Environmental Testing Corporation indicated that thirty (30) of the valves had natural frequencies less than 33 hz.

The inspector reviewed the following documentation related to this item:

(1) Report # 14987, Technical Report-Natural Frequency determination of Three (3) Powell Valves, Item Nos. 7.19A, 13.01B, and 21.07A Bechtel Job No. 9645 for Grand Gulf Nuclear Station, Action Environmental Testing Corporation, July 5, 1979.

(2) MCAR 52, Incorrect Natural Frequencies of William Powell Valves, September 4, 1979.

(3) NRC Notification Potential 50.55(e) to Region II from Mississippi Power and Light, October 4, 1979 (Telephone notification dated September 4, 1979).

(4) Bechtel Specification 9645-M-242.0, Technical Specification for Nuclear Service Valves 2½" and larger-Mississippi Power and Light, Grand Gulf Nuclear Stations, Units 1 and 2, July 15, 1980 (Section 5.2.3, requirement for greater than 33 hz).

(5) Report No. D-67761, Design Analysis Report for 10"-900 lb OSY Gate Valve, Figure No. 19023 WE Motor Operator for Mississippi Power and Light Company, Grand Gulf Nuclear Station, Unit 1, September 14, 1976.

(6) The following memoranda:

8/14/79, New Loads Adequacy Evaluation-Plant Design Stress Analysis.

8/28/79, Valve Natural Frequency.

8/29/79, Action Environmental Finite Element Analysis.

9/04/79, Valve Natural Frequency Potential Reportability.

9/04/79, FQA-79/116, Transmittal MCAR 52 to Project Engineering (Grand Gulf).

9/19/79, MCAR 52.

10/04/79, NRC Notification-Region II.

11/09/79, MCAR-52, Valve Natural Frequency Below 33 hz.

11/12/79, Powell/NRC, 10 CFR Part 21.

11/14/79, MCAR 52, Interim Response, Valve Natural Frequency-William Powell Valves.

11/20/79. MCAR 52, Interim Response.

12/18/79, NRC-Request Additional Time (Region II).

3/28/80, NRC Extension to June 13, 1980, Final Report.

4/24/80, Bechtel/NRC Notification 10 CFR Part 21.

5/07/80, MCAR 52 Evaluation for Part 21 Reportability.

Findings: This item is generic only to Grand Gulf and the valves will be redesigned by strengthening the yoke/support for the valve operators in order to increase the natural frequency of the valves above the 33 hz value as specified. Bechtel originally noted this item, and processed it through their Quality Assurance Program. In this area of the inspection, no items of noncompliance, deviations or unresolved items were identified.

b. Pipe Support Sway Strut Manufacturing Deficiency

This item was identified by the constructor, Daniel, at the site (Callaway, Unit 1). During fabrication of the sway struts at Corner and Lada, the holes for the bushings were drilled in excess of the minimum specified tolerences. Since the bushings are a press fit, the sway strut paddle became completely disengaged from the bushing thus resulting in a possible safety concern relating to overstressing during a seismic event.

The inspector reviewed the following documentation related to this item:

(1) Specification and Purchase Order # 10466-M-218c, November 9, 1978.

(2) Nonconformance Report, NCR# 1SN-1422-M, Dislocated Ball Bearings (Bushings) on Sway Struts, November 8, 1979.

(3) Drawing: Corner and Lada, A 3205, N631 through N637, March 12, 1979.

(4) Test Report BLSE 7961, Results of Strike Tests, December 12, 1979.

(5) Report BLSE 7842, Dislocated Ball Bearings on Sway Struts, December 5, 1979. (Indicates 50% rejection rate).

(6) Surveillance Report, Kansas Gas and Electric, Discrepancies in Hole Tolerences, December 15, 1979.

(7) Report BLSE 8435, Wolf Creek Sway Strut Bearing Test (Summary).

(8) Bechtel Pipe Stress Analysis including:

ME 101 Computer Code Users Manual, G1/1, November 1979. SNUPPS Drawing M-06EM04, Pipe Supports High Pressure Coolant Injection System-Reactor Building, August 22, 1978. SNUPPS Piping Isometric M-04EM04(Q), High Pressure Coolant Injection System, Reactor Building, March 27, 1978. SNUPPS Hanger

Location Drawing M-05EM04(Q), High Pressure Coolant Injection System, Reactor Building, February 20, 1980. Problem # 260 Computer Run (ME 101) #T00126, Input cards Sequence # 53 and 55, Rigid Support.

(9) The following memoranda:

11/29/79, Inspection/Rework Procedure.

12/05/79, Revised Inspection/Rework Procedure.

12/07/79, Revised Inspection/Rework Procedure.

12/19/79, BLSE 7879, Acceptance of Revised Inspection Rework Procedure.

03/20/80, Revised Inspection/Rework Procedure.

05/07/80, Revised Inspection/Rework Procedure.

05/15/80, SNUPPS Telecon Reporting 50.55(e) to NRC.

06/12/80, SNUPPS Written Report to NRC.

05/15/80, Message #618, Corner and Lada determination of nonreportability to NRC under 10 CFR 21.

07/18/80, BLSM 80/0284, Inspection Report of Busings During Fabrication of Corner and Lada Sway Struts.

Findings: The inspector considers this item to be failure of the manufacturing process during fabrication of the sway struts at Corner and Lada. In particular, in the drilling of the holes which accommodate the bushings (Torrington Type SF Bearing) the hole sizes were drilled in excess of the specified tolerences. Daniel identified the discrepancy at the site and 50% of the sway struts were rejected. Corrective Action has been taken by staking the bushings and testing them for attachment. Failure after staking was approximately 1% with those failing being replaced. Bechtel Computer Code ME 101 assumes sway struts to be rigid supports and therefore immobile during seismic event. The inspector determined this item to be generic to Callaway Unit 1 and Wolf Creek Unit 1. Corner and Lada does not agree that this item is a failure of their manufacturing process and, when notified by Bechtel, did not report this item under the requirements of 10 CFR Part 21. The appropriateness of actions taken by Corner and Lada concerning this item will be considered further.

C. Failure Modes and Effects Analysis (FMEA)

Section I.C.3.b. of IE Inspection Report 99900519/80-01 noted that due to time limitations, the FMEA for Protection Against High Energy Line Ruptures in Fluid Systems Outside Containment could not be completed. The two (2) high energy line (HEL) systems which were inspected during that inspection were the Steam Generator Blowdown System and the Chemical and Volume Control System (CVCS) for the SNUPPS project. Since all subsystems of the CVCS for SNUPPS are separated physically and completely redundant, the inspector selected the Steam Generator Blowdown System (SGBS) for the FMEA.

1. Objectives

The objectives in this area of the inspection are to assure consideration of the following that are extracted from IEEE Standard 352-1975 and applied, where appropriate, to HEL piping systems.

a. How can each component conceivably fail.

b. The mechanisms that might produce these modes of failure.

c. What the effects could be if the failures did occur.

d. Whether the postulated failure is in the safe or unsafe direction.

e. How the failure is detected.

f. The inherent provisions provided in the design to compensate for the postulated failure.

g. For piping sytems (HEL), what impact the failure of a line, component, other proximate systems would have on other safety related systems.

h. The effect of compartment environment on other safety related systems.

2. Method of Accomplishment

The inspector reviewed the following documents to assure that the objectives stated above had been evaluated for HEL breaks associated with the SGBS:

a. Final Safety Analysis Report, (FSAR), Standardized Nuclear Unit Power Plant System (SNUPPS), Volume 1, Section 3.6, Protection Against the Dynamic Effects Associated with the Postulated Rupture of Piping. The requirements for performing a FMEA are contained in FSAR Sections 3.6.1.3, 3.6.2.5, and Appendix 3B.

b. FSAR Figure 3.6-1, High Energy Pipe Break Isometric, Main Steam System Inside Containment.

FSAR Figure 3.6-1, High Energy Pipe Break Isometric, Steam Generator Blowdown System Inside Containment.

c. Effects Analysis-Steam Generator Blowdown System-Room 1412 FSAR Appendix 3B, Section 3B.4.2.

d. Westinghouse Standard Information Package (SIP), Steam water Chemistry Control Specifications, Volume 5-4, Figure 8-6, Secondary Volume versus Height above Tube Sheet in D series Steam Generator, January 1975.

e. Calculations:

525-27-10466, YY-17, Pressure Calculation, Main Steamline Break in Auxiliary Building-Steam Tunnel, August 13, 1976.

525-27A-10466, YY-18, Temperature Calculation, Main Steamline Break in Auxiliary Building-Steam Tunnel, June 24, 1977.

03-27-20F-10466, Auxiliary Building Areas-Feedwater Line Break, November 17, 1977.

AE-2-10466, Main Feedwater Line Break-Rate of Flooding, August 19, 1978.

525-28-10466, YY-16, Main Steamline Break in the Auxiliary Building-Steam Tunnel-Calculational Model, July 6, 1976.

f. Drawing 10466-SK-C-250, Study 1, Area, 5 Venting For Main Steam Break, July 23, 1976.

Findings: The SNUPPS-FSAR considers the following items in their pipe break FMEA: pipe whip, jet impingement, room pressurization, temperature and humidity, and flooding.

The inspector assured by review of documents that the information contained in FSAR Table 3.6-4 relating to rooms 1411 and 1412 (SGBS) had been generated from design input supplied from Westinghouse on the NSSS. The inspector noted that pressure, temperature, humidity, and flooding data were indicated in the FSAR as being "Under Review." Even though the FSAR is considered as a final design document, this information has yet to be submitted.

In this area of the inspection, no deviations or unresolved items were identified.