UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

OCT 23 1984

Docket No.: 50-412

MEMORANDUM FOR: Thomas M. Novak, Assistant Director
for Licensing
Division of Licensing

FROM: James P. Knight, Assistant Director
for Components & Structures Engineering
Division of Engineering

SUBJECT: SAFETY EVALUATION REPORT FOR BEAVER VALLEY NUCLEAR POWER STATION UNIT 2, SECTIONS 3.2.1, 3.2.2, 5.2.1.1 AND 5.2.1.2

Plant Name: Beaver Valley Power Station Unit 2
Docket No.: 50-412
Licensing Stage: OL
Responsible Branch: LB No. 3
Project Manager: M. Ley
MEB Reviewer: R. Kirkwood
Requested Completion Date: October 26, 1984
Review Status: Complete (See Sections 3.2.2 and 5.2.1.2)

The Mechanical Engineering Branch, Division of Engineering, has completed its review of Beaver Valley Unit 2 FSAR Sections 3.2.1, 3.2.2, 5.2.1.1 and 5.2.1.2. This review was conducted in accordance with the applicable sections of the "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," (NUREG-0800, July 1981). The acceptance criteria used in the review were in accordance with each applicable SRP. The results of the review are in the enclosed SER. The Beaver Valley Unit 2 FSAR review included the additional information presented in Amendments 1 through 8 to the FSAR.

The scope of this SER is limited to compliance by the applicant with the Codes and Standards Rule Section 50.55a of 10 CFR Part 50 (FSAR Sections 5.2.1.1 and 5.2.1.2), Seismic Classification (FSAR Section 3.2.1), and System Quality Group Classifications (FSAR Section 3.2.2) of the following mechanical systems, components, and equipment which are important to safety and safety-related: (a) reactor coolant pressure boundary, (b) other fluid systems and components, and (c) mechanical equipment. As part of its review responsibility, MEB has previously reviewed FSAR Section 3.2, in order to determine the applicability of 10 CFR 50, Appendix B to the structures, systems and components of Beaver Valley Unit 2. Detailed comments on this review were transmitted

in a memorandum from R. J. Bosnak (MEB) to G. T. Ankrum (QAB) dated May 3, 1983.

A final SER evaluation of the material within the scope of the review is enclosed for SER Sections 3.2.1, 3.2.2, 5.2.1.1 and 5.2.1.2. Our evaluation of Section 3.2.2 is contingent upon the applicant's revision of FSAR Table 3.2-1. In addition, our evaluation of Section 5.2.1.2 is contingent upon the applicant supplying a list of ASME Code Cases used in the construction of Section III, Class 1 components within the reactor coolant pressure boundary

Other areas of review for which the MEB has primary responsibility are reported separately from this SER evaluation.

Enclosed with this memorandum is the SALP input as now required per NRR Office Letter No. 44.

James P. Knight, Assistant Director
for Components & Structures Engineering
Division of Engineering

Enclosures: As stated

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ENCLOSURE

Mechanical Engineering Branch Safety Evaluation Report

Beaver Valley Nuclear Power Station Unit 2

Docket No. 50-412

3.2 Classification of Structures, Systems, and Components

3.2.1 Seismic Classification

GDC 2, "Design Bases for Protection Against Natural Phenomena," of 10 CFR 50, Appendix A, in part, requires that nuclear power plant structures, systems, and components important to safety be designed to withstand the effects of earthquakes without loss of capability to perform their safety function. Certain of these plant features are necessary to ensure (1) the integrity of the reactor coolant pressure boundary, (2) the capability to shut down the reactor and maintain it in a safe shutdown condition, and (3) the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to 10 CFR 100 guideline exposures. The earthquake for which these safety-related plant features are designed is defined as the safe shutdown earthquake (SSE) in 10 CFR 100, Appendix A. The SSE is based upon an evaluation of the maximum earthquake potential and is that earthquake which produces the maximum vibratory ground motion for which structures, systems, and components are designed to remain functional. Those plant features that are designed to remain functional if an SSE occurs are designated seismic Category I in RG 1.29, "Seismic Design Classification". RG 1.29 is the principal document used in the NRC staff review for identifying those plant features that, as a

minimum, should be designed to seismic Category I requirements. Beaver Valley 2 was reviewed in accordance with SRP Section 3.2.1 (NUREG-0800, July 1981).

The structures, systems, components and equipment of Beaver Valley 2 that are required to be designed to withstand the effects of an SSE and remain functional have been identified in an acceptable manner in FSAR Table 3.2.-1 and 3.2-2. These tables in part, identify major components in fluid systems, mechanical systems, and associated structures designated as seismic Category I. In addition, piping and instrumentation diagrams in the FSAR identify the interconnecting piping and valves and the boundary limits of each system classified as seismic Category I. The NRC staff has reviewed Tables 3.2.-1 and 3.2-2 and the fluid system piping and instrumentation diagrams, and concludes that the structures, systems, and components of Beaver Valley 2 have been properly classified as seismic Category I items in conformance with RG 1.29, Revision 3.

In its review of FSAR Section 3.9, the NRC staff confirmed that acceptable design interfaces exist between seismic Category I and nonseismic portions of piping systems. All other structures, systems, and components that may be required for operation of the facility are not required to be designed to seismic Category I requirements, including those portions of Category I systems such as vent lines, fill lines, drain lines, and test lines on the downstream side of isolation valves and portions of these systems that are not required to perform a safety function.

The NRC staff concludes that the structures, systems, and components of Beaver Valley 2 are properly classified as seismic Category I items in accordance with RG 1.29. This constitutes an acceptable basis for satisfying, in part, the requirements of GDC 2, and is, therefore, acceptable.

3.2.2 System Quality Group Classification

GDC 1, "Quality Standards and Records," of 10 CFR 50, Appendix A requires that nuclear power plant systems and components important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety function to be performed. These pressure-retaining components of fluid systems are part of the reactor coolant pressure boundary (RCPB) and other fluid systems important to safety, where reliance is placed on these systems: (1) to prevent or mitigate the consequences of accidents and malfunctions originating within the RCPB, (2) to permit shutdown of the reactor and maintain it in a safe shutdown condition, and (3) to retain radioactive material. RG 1.26, "Quality Group Classification and Standards for Water-, Steam-, and Radioactive- Waste-Containing Components of Nuclear Power Plants," is the principal document used in the NRC staff review for identifying on a functional basis the components of those systems important to safety as NRC Quality Groups A, B, C or D. 10 CFR 50.55a identifies those American Society of Mechanical Engineers (ASME) Section III, Class 1 components that are part of the RCPB.

Conformance of these RCPB components with 10 CFR 50.55a is discussed in Section 5.2.1.1 of this report. These RCPB components are designated in RG 1.26 as Quality Group A. Certain other RCPB components that meet the exclusion requirement of footnote 2 of 10CFR50.55a are classified Quality Group B in accordance with RG 1.26. Beaver Valley 2 was reviewed in accordance with SRP Section 3.2.2 (NUREG-0800, July 1981).

The applicant used the American Nuclear Society (ANS) Safety Classes 1, 2, 3 AND NonNuclear Safety (NNS) as defined in ANSI N18.2-1973, "Nuclear Safety Criteria for the Design of Stationary Prerssurized Water Reactor Plants," and ANSI N18. 2a-1975, "American National Standard Revision and Addendum to Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants," in the classification of system components as an alternate acceptable method of meeting the guidance of RG 1.26. Safety Classes 1, 2, 3 and NNS correspond to the Commission's Quality Group A, B, C and D in RG 1.26.

A summary of the relationship of the NRC Quality Groups and ANS Safety Classes are as follows:

NRC Quality Group	Beaver Valley 2 PWR Safety Class
A	1
B	2
C	3
D	NNS

The NRC staff has reviewed the use of ANS Safety Classes in FSAR Table 3.2-1 and finds the classification of components to be acceptable. Quality Group A (Safety Class 1) components of the RCPB are constructed 1/ in accordance with the ASME Boiler and Pressure Vessel Code,

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1/ Constructed, as used herein, is an all-inclusive term comprising materials certification, design, fabrication, examination, testing, inspection, and certification required in the manufacture and installation of components.

Section III, Division 1, Class 1. Components in fluid systems that are classified Quality Group B (Safety Class 2) are constructed in accordance with the ASME Boiler and Pressure Vessel Code, Section III, Division 1, Class 2. Components in fluid systems that are classified Quality Group C (Safety Class 3) are constructed in accordance with the ASME Boiler and Pressure Vessel Code, Section III, Division 1, Class 3. The NRC staff finds these codes and standards used in the construction of components acceptable.

The safety-related systems and components which are important to safety have been identified in an acceptable manner in FSAR Table 3.2-1. As noted above, this table, in part, identifies major components in fluid systems such as pressure vessels, heat exchangers, storage tanks, pumps, piping, and valves, and mechanical systems such as cranes, refueling platforms, and other miscellaneous handling equipment. In addition, piping and instrumentation diagrams in the FSAR identify the classification boundaries of interconnecting piping and valves. The staff has reviewed FSAR Table 3.2-1 2/ and the fluid system piping and instrumentation diagrams and concludes that pressure-retaining components have been properly classified in conformance with RG 1.26, Revision 3.

2/ Our acceptance is contingent upon the applicant revising FSAR Table 3.2-1 in response to inquiries 210.44 through 210.50.

The NRC staff concludes that construction of components in fluid systems identified in FSAR Table 3.2.-1 is in conformance with the ASME Code and industry standards, the Commission's regulations, and the guidance provided in RG 1.26 and provides assurance that component quality is commensurate with the importance of the safety function of these systems. This constitutes an acceptable basis for satisfying the requirements of GDC 1, and is, therefore, acceptable.

5.2.1 Compliance with Codes and Code Cases

5.2.1.1 Compliance with 10 CFR 50.55a

The pressure-retaining components of the reactor coolant pressure boundary (RCPB) as defined by the rules of 10 CFR 50.55a, "Codes and Standards," have been properly classified in FSAR Table 3.2.-1 as American Society of Mechanical Engineers (ASME) Section III, Class 1 components. These Section III, Class 1 components are designated Quality Group A in conformance with RG 1.26. The Quality Group A RCPB components were reviewed in accordance with SRP Section 5.2.1.1 (NUREG-0800, July 1981), and the results of this review are in this section of the report. The review of other pressure retaining components, such as those constructed to ASME Section III, Class 2 and Class 3 is in Section 3.2.2.

The ASME Section III Code Editions, Addenda used in the construction of these Quality Group A components, are identified in FSAR Table 5.2-1 and are those that are required to assure compliance with 10CFR50.55a.

In addition to the Quality Group A component of the RCPB, certain lines that perform a safety function and that meet the exclusion requirements of footnote 2 of 10CFR50.55a are classified Quality Group B in accordance with the guidance provided in Regulatory Position C.1 of RG 1.26 and are constructed as ASME Section III, Class 2 components. Valve leakage monitoring system lines that do not perform a safety function and that meet the exclusion requirements of footnote 2 of 10CFR50.55a are classified Quality Group D on the downstream side of the isolation valves.

The NRC staff concludes that construction of components of the RCPB in conformance with the appropriate ASME Code Editions and Addenda and the Commission's regulations provides assurance that component quality is commensurate with the importance of the safety function of the RCPB. This constitutes an acceptable basis for satisfying the requirements of GDC 1, and is, therefore, acceptable.

5.2.1.2 Applicable Code Cases

The applicant has identified specific Code Cases [3/] of the American Society of Mechanical Engineers (ASME) whose requirements have been applied in the construction of pressure-retaining ASME Section III, Class 1, components within the RCPB (Quality Group A). The NRC staff has reviewed these Code Cases in accordance with SRP Section 5.2.1.2 (NUREG-0800, July 1981) with the following exception. The revised SRP includes a new requirement for the review of ASME Code Cases that are used in the construction of Class 2 and Class 3 components. Because the revision of 10 CFR 50.55a under which Beaver Valley 2 is reviewed is applicable only to those ASME Code Cases used in the construction of Class 1 components, the NRC staff has limited its review in accordance with this revision of the regulation. The results of this review are contained in this section of the report.

The basis for acceptance in the NRC staff review has been the Code Cases found to be acceptable in RG 1.84, "Code Case Acceptability-ASME Section III, Design and Fabrication," and RG 1.85, "Code Case Acceptability-ASME Section III, Materials," and the Code Cases previously found to be acceptable by the NRC staff for plants similar to Beaver Valley 2 before

3/ Our acceptance is contingent upon the applicant supplying a list of ASME Code Cases used in the construction of Section III, Class 1 components within the reactor coolant pressure boundary.

publication of RGs 1.84 and 1.85. The NRC staff concludes that compliance with the requirements of these Code Cases will result in a component quality level that is commensurate with the importance of the safety function of the RCPB. This constitutes an acceptable basis for satisfying the requirements of GDC 1, and is, therefore, acceptable.

BIBLIOGRAPHY

General References

1. 10 CFR 50, Appendix A, GDC 1, "Quality Standards and Records."

2. 10 CFR 50, Appendix A, GDC 2, "Design Basis for Protection Against Natural Phenomena."

3. 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants."

4. 10 CFR 100, Appendix A, "Seismic and Geologic Siting Criteria and Nuclear Power Plants."

5. RG 1.26, "Quality Group Classification and Standards."

6. RG 1.29, "Seismic Design Classification."

7. RG 1.84, "Code Case Acceptability ASME Section III Design and Fabrication."

8. RG 1.85, "Code Case Acceptability ASME Section III Materials."

9. ASME Boiler and Pressure Vessel Code, Section III, "Nuclear Power Plant Components," American Society of Mechanical Engineers.

10. ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, "Pressure Vessels," American Society of Mechanical Engineers.

11. 10 CFR Part 50, Section 50.55a, :"Codes and Standards Rules."

SALP INPUT

Plant: Beaver Valley Power Station Unit 2

A. Functional Areas: Licensing Activities

1. Management Involvement in Assuring Quality

The utility management played a capable role and assigned a reasonable priority in the resolution of the matters under review.

Rating: Category 2

2. Approach to Resolution of Technical Issues From a Safety Standpoint

The utility management provided an adequate response to all of our inquiries except one. The one case where there is not yet an adequate response is dependent upon input from Westinghouse.

Rating: Category 2

3. Response to NRC Initiatives

The utility responded in a timely manner except for one instance, as discussed above.

Rating: Category 2

4. Staffing (including Management)

Not applicable

5. Reporting and Analysis of Reportable Events

Not applicable

6. Training and Qualification Effectiveness

Not applicable