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Docket Nos. 50-397

MEMORANDUM FOR: Robert L. Tedesco, Assistant Director for Licensing, DL

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

SUBJECT: SAFETY EVALUATION REPORT FOR THE WPPSS NUCLIEAR PROJECT NO. 2, SECTIONS 3.2.1, 3.2.2, 5.2.1.1 AND 5.2.1.2

Plant Name: WPPSS Nuclear Project No. 2
Docket Numbers: 50-397
Licensing Stage: OL
Responsible Branch: LWR 2
Project Manager: R. Auluck
Requested Completion Date: February 26, 1982
Review Status: Complete

The WPPSS Nuclear Project No.2 has been evaluated by the Mechanical Engineering Branch including the additional information presented in Amendments 1 through 20 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 components which are part of the reactor coolant pressure boundary, other fluid systems important to safety, and mechanical components which perform a safety function. 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 the WPPSS plant. Our detailed comments on this review were transmitted in a memorandum from R. J. Bosnak (MEB) to W. P. Haass (DAB) dated May 14, 1981.

A final SER evaluation of the material within the scope of our review is enclosed.

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

Original Signed By:
James P. Knight

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

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ENCLOSURE

Mechanical Engineering Branch Safety Evaluation Report

WPPSS Nuclear Project No. 2

Docket No. 50-397

3.2 Classification of Structures, Systems, and Components

3.2.1 Seismic Classification

General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena," of 10 CFR Part 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. These plant features are those necessary to assure (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, or (3) the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to 10 CFR Part 100 guideline exposures. The earthquake for which these plant features are designed is defined as the safe shutdown earthquake (SSE) in 10 CFR Part 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 important to safety are designed to remain functional. Those plant features that are designed to remain functional if an

SSE occurs are designated seismic Category I in Regulatory Guide 1.29. Regulatory Guide 1.29, "Seismic Design Classification," is the principal document used in our review for identifying those plant features important to safety which, as a minimum, should be designed to seismic Category I requirements. The July 1981 edition of the "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," (SRP, NUREG-0800) includes Section 3.2.1, Seismic Classification. WPPSS-2 was reviewed in accordance with Standard Review Plan 3.2.1. The results of this review are contained in this Safety Evaluation Report.

The structures, systems, and components important to safety of WPPSS-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 Table 3.2-1 of the Final Safety Analysis Report. Table 3.2-1, in part, identifies the major components in fluid systems, mechanical systems, and associated structures designated as seismic Category I. In addition, piping and instrumentation diagrams in the Final Safety Analysis Report identify the interconnecting piping and valves and the boundary limits of each system classified as seismic Category I. We have reviewed Table 3.2-1 and the fluid system piping and instrumentation diagrams, and we conclude that the structures, systems, and components important to safety of WPPSS-2 have been properly classified as seismic Category I items in conformance with Regulatory Guide 1.29, Revision 2.

In our review of Section 3.9 of the Final Safety Analysis Report, we 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 which are not required to perform a safety function.

We conclude that the structures, systems, and components important to safety of WPPSS-2 are properly classified as seismic Category I items in accordance with Regulatory Guide 1.29 and constitute an acceptable basis for satisfying, in part, the requirements of General Design Criterion 2, and is, therefore, acceptable.

3.2.2 System Quality Group Classification

General Design Criterion 1, "Quality Standards and Records," of 10 CFR Part 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 fluid system pressure-retaining components are part of the reactor coolant pressure boundary 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 reactor coolant pressure boundary, (2) to permit shutdown of the reactor and maintain it in a safe shutdown condition, and (3) to retain radioactive material. Regulatory Guide 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 our review for identifying on a functional basis the components of those systems important to safety that are Quality Groups B, C, and D. Section 50.55a of 10 CFR Part 50 identifies those American Society of Mechanical Engineers (ASME) Section III, Class 1 components that are part of the reactor coolant pressure boundary (RCPB). Conformance of these RCPB components with Section 50.55a of 10 CFR 50 is discussed in Section 5.2.1.1 of this Safety Evaluation Report. These RCPB components are designated in Regulatory Guide 1.26 as Quality Group A. Certain other RCPB components which meet

the exclusion requirement of footnote 2 of the rule are classified Quality Group B in accordance with Regulatory Guide 1.26. The July 1981 edition of the "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," (SRP, NUREG-0800) includes Section 3.2.2, System Quality Group Classification. WPPSS-2 ~~were~~ WAS reviewed in accordance with Standard Review Plan 3.2.2. The results of this review are contained in this Safety Evaluation Report.

The systems and components important to safety of WPPSS-2 have been identified in an acceptable manner in Table 3.2-1 of the Final Safety Analysis Report. Table 3.2-1, in part, identifies the major components in fluid systems such as, pressure vesssels, heat exchangers, storage tanks, pumps, piping, and valves and mechanical systems, such as cranes, refueling platforms, and other miscellaneous handling equipment. In addition, the piping and instrumentation diagrams in the Final Safety Analysis Report identify the Quality Group classification boundaries of the interconnecting piping and valves. We have reviewed Table 3.2-1 and the fluid system piping and instrumentation diagrams and we conclude that pressure-retaining components have been properly classified as Quality Group A, B, C or D components in conformation with Regulatory Guide 1.26, Revision 3. The codes and standards used in the construction of Quality Group A, B, C or D components are identified in Table 3.2-2 and 3.2-3 of the Final Safety Analysis Report.

We find this summary list of codes and standards used in the

construction of components to be acceptable. The applicant has also utilized the American Nuclear Society (ANS) Safety Classes 1, 2, 3 and "GENERAL" as defined in ANS-22, "Nuclear Safety Criteria for the design of Stationary Boiling Water Reactor Plants," in the classification of system components considered by the applicant to be beyond the scope of Regulatory Guide 1.26. Safety Classes 1, 2, 3 and "GENERAL" correspond to the Commission's Quality Group A, B, C and D in Regulatory Guide 1.26 and have been used by the applicant to supplement the Commission's Quality Group classification system. A summary of the relationship of the NRC Quality Group and ANS Safety Classes is as follows:

NRC Quality Group	WPPSS-2 BWR Safety Class
A	1
B	2
C	3
D	GENERAL

We have reviewed the use of ANS Safety Classes in Table 3.2-1 and we find the classification of components to be acceptable. We conclude that construction of the components in fluid systems important to safety in conformance with the ASME Code, the Commission's regulations, and the guidance provided in Regulatory Guide 1.26 and ANS-22, provides assurance that component quality is commensurate with the importance of the safety function of these systems and constitutes an acceptable basis for satisfying the requirements of General Design Criterion 1 and is, therefore, acceptable.

5.2.1 Compliance with Codes and Code Cases

5.2.1.1 Compliance with 10 CFR Part 50, Section 50.55a

The components of the reactor coolant pressure boundary (RCPB) as defined by the rules of 10 CFR Part 50, Section 50.55a, "Codes and Standards," have been properly classified in Table 5.1-1 of the Final Safety Analysis Report as American Society of Mechanical Engineers (ASME) Section III, Class 1 components for WPPSS-2. The July 1981 edition of the Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," (SRP, NUREG-0800) includes Section 5.2.1.1, Compliance with the Codes and Standards Rule, 10CFR Part 50.55a. WPPSS-2 was reviewed in accordance with Standard Review Plan 5.2.1.1. The Section 5.2.1.1 review was limited to the Class 1 components of the RCPB. The results of this review are contained in this Safety Evaluation Report.

These components are designated Safety Class 1 (Quality Group A) in conformance with Regulatory Guide 1.26 in Table 3.2-1 of the Final Safety Analysis Report. The ASME Section III Code Editions and Addenda used in the construction of these Quality Group A components are those that were required at the time of procurement of the components or are, where appropriate, later editions or addenda to the code to assure compliance with 10CFR Part 50, Section 50.55a except for those components identified in Table 5.2-5 of the Final Safety Analysis Report. These components for WPPSS-2 are: (1) reactor recirculation pumps, (2) main steam safety/relief valves, recirculation gate valves, recirculation flow control valves and recirculation diaphragm valves, and (3) reactor recirculation piping.

The reactor recirculation pumps are constructed to ASME Section III, Class 1, 1971 Edition, whereas, in order to be in compliance with Subsection (e)(2) of Section 50.55a these components should be constructed to ASME Section III, 1971 Edition, through the Summer 1971 Addenda. We reviewed the differences in these Code Addenda as applicable to the reactor ~~coolant~~ RECIRCULATION pumps and we have identified no major differences except with respect to fracture toughness testing requirements for materials which were extensively revised in the Summer 1972 Addenda to the Code. Our bases for acceptance of the reactor recirculation pumps with respect to fracture toughness testing requirements for materials are discussed in Section 5.3.1 of this Safety Analysis Report.

Valves of the RCPB, identified above, are constructed to ASME Section III, Class 1, 1971 Edition, whereas, in order to be in compliance with Subsection (f)(2) of Section 50.55a these components should be constructed to ASME Section III, Class 1 1971 Edition, through the Summer 1971 Addenda. We reviewed the differences in these Code Addenda as applicable to valves of the RCPB and we have identified no major differences except with respect to fracture toughness testing requirements for materials which were extensively revised in the Summer 1972 Addenda to the Code. Our bases for acceptance of the valves of the RCPB with respect to fracture toughness testing requirements for materials are discussed in Section 5.3.1 of this Safety Analysis Report.

The reactor recirculation system piping is constructed to ASME Section III, Class 1, 1971 Edition, through the Summer 1971 Addenda, whereas, in order to be in compliance with Subsection (d)(2) of Section 50.55a this piping

should be constructed to ASME Section III, 1971 Edition, through the Winter 1971 Addenda. We reviewed the differences in these Code Addenda as applicable to the reactor recirculation system piping and we have identified no major differences except with respect to fracture toughness testing requirements for materials which were extensively revised in the Summer 1972 Addenda to the Code. Our bases for acceptance of the reactor recirculation system piping with respect to fracture toughness testing requirements for materials are discussed in Section 5.3.1 of this Safety Evaluation Report.

Except for the fracture toughness testing requirements for materials as applicable to the components of the RCPB identified above, we conclude that updating these components to meet the requirements of Subsections (d)(3), (e)(2) and (f)(2) of 10CFR Part 50, Section 50.55a, would not be compensated by an increase in the level of safety. Therefore, we find that the ASME Code used in the construction of: (1) reactor recirculation pumps, (2) main steam safety/relief valves, recirculation gate valves, recirculation flow control valves, and recirculation diaphragm valves, and (3) reactor recirculation piping is acceptable and provides adequate assurance of component quality.

In addition to the Quality Group A components of the RCPB, certain lines that perform a safety function and which meet the exclusion requirements of footnote 2 of the rule are classified Safety Class 2 (Quality Group B) in accordance with the guidance provided in Regulatory Position C.1 of Regulatory Guide 1.26 and are constructed as ASME Section III, Class 2 components.

We conclude that construction of the components of the reactor coolant pressure boundary 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 reactor coolant pressure boundary and constitutes an acceptable basis for satisfying the requirements of General Design Criterion 1 and is, therefore, acceptable.

5.2.1.2 Applicable Code Cases

In Table 5.2-1, the applicant has identified specific Code Cases of the American Society of Mechanical Engineers (ASME) ~~in~~ whose requirements have been applied in the construction of pressure-retaining ASME Section III, Class 1, components within the reactor coolant pressure boundary (Quality Group A). We have reviewed these Code Cases. The July 1981 edition of the "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants", (SRP, NUREG-0800) includes Section 5.2.1.2, Applicable Code Cases. WPPSS-2 was reviewed in accordance with Standard Review Plan 5.2.1.2. The Section 5.2.1.2 review was limited to those Code Cases that have been used in the construction of Class 1 components of the reactor coolant pressure boundary. The results of this review are contained in this Safety Evaluation Report.

The basis for acceptance in our review has been the Code Cases found to be acceptable in Regulatory Guide 1.84, "Code Case Acceptability-ASME Section III, Design and Fabrication," and Regulatory Guide 1.85, "Code Case Acceptability-ASME Section III, Materials," and the Code Cases previously found to be acceptable by the staff for plants similar to WPPSS-2 prior to publication of the Regulatory Guides. We conclude 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 reactor coolant pressure boundary and constitutes an acceptable basis for satisfying the requirements of General Design Criterion 1 and is, therefore, acceptable.

BIBLIOGRAHPY

General References

1. 10 CFR Part 50, Appendix A, General Design Criterion 1, "Quality Standards and Records."

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

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

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

5. Regulatory Guide 1.26, "Quality Group Classifications and Standards."

6. Regulatory Guide 1.29, "Seismic Design Classification."

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

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

9. ASME Boiler and Pressure Vessel Code, 1971 Edition, Section III, "Nuclear Power Plant Components," American Society of Mechanical Engineers.

10. ASME Boiler and Pressure Vessel Code, 1971 Edition, Section VIII, Division 1, "Pressure Vessels," American Society of Mechanical Engineers.

11. ANSI B31.1.0, "Power Piping," American National Standards Institute.

12. API Standard 620, "Recommended Rules for Design and Construction of Large, Welded, Low-Pressure Storage Tanks," American Petroleum Institute.

13. API Standard 650, "Welded Steel Tanks for Oil Storage," American Petroleum Institute.

14. Standards of Tubular Exchanger Manufacturers Association.

15. ANSI/AWWA D100, "AWWA Standard for Welded Steel Tanks, for Water Storage".

16. ANSI B96.1, "Specification for Welded Alluminum-Alloy Field-Erected Storage Tanks".

17. 10CFR Part 50, Section 50.55a, "Codes and Standards Rule."