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AUTH.NAME AUTHOR AFFILIATION
BOUCHEY,G.D. Washington Public Power Supply System
RECIP.NAME RECIPIENT AFFILIATION
SCHWENCER,A. Licensing Branch 2

SUBJECT: Forwards addl info re containment out-of-roundness,per 830419 telcon request.AE evaluaiton concluded that localited reductions in structual & shielding capacity of biological shield wall insignificant.

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Washington Public Power Supply System
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June 1, 1983
G02-83-480

Docket No. 50-397

Director of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Schwencer:

Subject: NUCLEAR PROJECT NO. 2
ADDITIONAL INFORMATION ON
CONTAINMENT OUT-OF-ROUNDNESS

Reference: (a) G02-82-967, G. D. Bouchey (SS) to A. Schwencer (NRC), same subject, dated December 8, 1982
(b) G02-83-103, G. D. Bouchey (SS) to A. Schwencer (NRC), same subject, dated February 8, 1983

Attached is additional information relating to the subject issue, as requested by the NRC during a telephone conversation on April 19, 1983. This information should be sufficient to complete your review. Please advise us if we can be of further assistance.

Very truly yours,

G. D. Bouchey
Manager, Nuclear Safety and Regulatory Programs

EAF:kjt

cc: R. Auluck - NRC
WS Chin - BPA
A. Toth - NRC Site

B001

1 1 1

ATTACHMENT

(A) NRC Question:

"What documentation exists to confirm that the Architect-Engineer evaluated reductions in structural and shielding capacity of the biological shield wall, due to as-built containment geometry, and concluded that the effects were not significant"?

Response:

The Contractor constructing the biological shield wall requested direction on how to accommodate the as-built condition of the containment shell via RFI (Request For Information) No. 209, dated May 16, 1974. The Architect-Engineer's response was given August 7, 1974, which provided formal engineering direction in accordance with Project Procedures, to allow the inner surface of the biological shield wall to vary to accommodate the as-built location of the containment shell, and to hold the outside radius of the biological shield wall to its design dimension. Based on as-built dimensions of the containment shell submitted to the Architect-Engineer, the resulting maximum localized reduction in the biological shield wall thickness was 3-5/8 inches in the cylindrical portion (below elevation 501') and 3-7/8 inches in the conical portion (above elevation 501'). The nominal thickness of the biological shield wall is 5'-0" below elevation 501', and ranges from 5'-0" to 6'-0" above elevation 501'.

This issue was referred to the Architect-Engineer's home office engineering organization by the site organization for evaluation and disposition. The Architect-Engineer's evaluation concluded that the localized reductions in structural and shielding capacity of the biological shield wall were not significant, which was the basis for the formal response to RFI-209. Formal documentation of this evaluation in the form of calculations or an engineering report was not made. Subsequent conversations with the Architect-Engineer, however, indicate that the reduction in structural capability at these locations was found to be on the order of 4% for the governing load, and well within design margins provided, and that the reduction in shielding capacity was also checked, and concluded to be negligible.

(B) NRC Question:

"Did the Contractor's QA program require documentation of template measurements per ASME Section III, NE 4221.2 requirements?"

Response:

The Contractor's QA program did not require documentation of deviations from design geometry, as determined by template measurements. The Contractor's QA program did, however, require measurements of the deviation from design geometry of the edges of the shell plates, i.e. at locations of field-welded joints, to tolerances substantially more restrictive than required by NE 4221.2. For plates ranging from 3/4 inch to 1-1/2 inches in thickness, the Contractor's limitation on offset from true circular shape was 1/8 inch at longitudinal weld joints, and 3/16 inch at circumferential weld joints. NE 4122.2 requirements applied to the WNP-2 containment vessel effectively limit deviations from design geometry to the actual shell plate thickness, which ranges from 1-1/2 inches in the wetwell to 13/16 inch in the drywell. The Contractor's QA program required that QA inspectors check the as-built geometry of the completed shell plate sections for compliance with the limitations on offset at weld joints, and that this inspection be documented on inspection forms signed off by the inspector.

Although documentation of compliance with NE 4122.2 requirements does not exist, compliance with the Contractor's more stringent limitations on offset at weld joints was documented in accordance with QA program requirements.

(C) NRC Question:

"Address compliance with tolerance requirements of Specification 213, Section 13A, paragraph 4.4."

Response:

Besides ASME tolerance requirements, Contract 213 tolerances for containment construction were as follows:

(1) Penetrations:

(Tolerance: ± one inch vertical location, ± 1/2 inch horizontal location, ± 1° alignment).

Out of 165 drywell and wetwell penetrations, nine exceeded the one-inch vertical tolerance in centerline location, all by less

than one inch, and 18 exceeded the 1^{o} tolerance on vertical alignments all by less than 1^{o}. No as-built information on horizontal location of penetrations was provided by the contractor. None of these conditions are related to containment out-of-roundness, and as-built penetration geometry is accommodated in final design, fabrication, installation, and stress analysis of piping systems.

(2) Containment Plumbness:

(Tolerance: For the overall vessel height, out-of-plumbness of the vertical centerline of the shell shall not exceed 1:800).

The actual out-of-plumbness of the containment vessel was determined to be 1:1400 (1-9/32" in 149'-9" of vessel height).

(D) NRC Question:

Explain why non-contact reinforcing bar splices were used in the biological shield wall. What bar size, spacing, and criteria were used? How is structural capacity affected?

Response:

The reason non-contact reinforcing bar splices were used at Elev. 446' in the biological shield wall construction has nothing to do with containment out-of-roundness. Non-contact splices were used because, in order to accommodate interferences with the reinforcing bar grid in the containment base mat, two extra vertical dowels were provided for each vertical reinforcing bar curtain in the biological shield wall. These extra bars were carried up from the dowels at Elev. 422'-3" to Elev. 446'-0", so that each vertical curtain contained 362 equally spaced bars instead of 360. At Elev. 446'-0", the bar pattern was changed back to 360 equally spaced bars. This resulted in spacing between projecting and continuing bars ranging from 0 to a maximum of five inches, center to center. The vertical bar size is No. 11. ACI 318 (1971) paragraph 7.5.4, permits non-contact top splices spaced not further apart than one-fifth the required lap length (8'-5") or six inches. No reduction in structural capacity is required to be assumed for non-contact lap splices which comply with ACI 318.

WNP-2 COMMITMENT(s) MADE TO THE NRC

LETTER NO: _____ DATE: _____

TO: A. Schwencer LOCATION: NRC - Washington, D. C.

SUBJECT: Additional Information on Containment Out-of-Roundness

REFERENCE(s): (a) G02-82-967, GD Bouchey to A. Schwencer, same subject, dated December 8, 1982

(b) G02-83-103, GD Bouchey to A. Schwencer, Same subject, dated February 8, 1983

COMMITMENT(s) (description)	ACTION
None	