Washington Public Power Supply System
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Docket No. 50-508

February 11, 1983
G03-83-135

U. S. Nuclear Regulatory Commission, Region V
Office of Inspection and Enforcement
1450 Maria Lane, Suite 260
Walnut Creek, California 94596-5368

Attention: Mr. D. M. Sternberg, Chief
Reactor Projects Branch No. 1

Subject: POTENTIAL 10CFR50.55(e) DEFICIENCY
COMPRESSIBLE MATERIAL - EMBEDDED
CONTAINMENT PENETRATIONS (D/N #44)

Reference: Letter, G03-82-1090, Docket No. 50-508, Mr. R. S. Leddick to Mr. D. M. Sternberg, same subject, dated October 25, 1982.

The referenced letter reported that Ebasco and Chicago Bridge and Iron had not completed their analysis of the subject deficiency. Specifically, the evaluation of one of the load cases had not been completed. The analysis has since been completed with results confirming that the subject deficiency is not reportable in accordance with 10CFR50.55(e).

Attached is the Supply System approved final report for the subject condition. The report details a description of the deficiency, corrective actions taken and analysis of the safety implications. Should you have any questions or desire further information, please contact me directly.

R. S. Leddick (761)
Program Director, WNP-3

DRC:nj

Attachments

cc: J. Adams - NESCO
D. Smithpeter - BPA
Ebasco - New York
WNP-3 Files - Richland

WASHINGTON NUCLEAR PROJECT NO. 3

DOCKET 50-508

POTENTIAL 10CFR50.55(e) DEFICIENCY
FINAL REPORT

COMPRESSIBLE MATERIAL - EMBEDDED CONTAINMENT PENETRATIONS
D/N NO. 44

Description of the Deficiency

On October 14, 1981, Ebasco Site Engineering observed that concrete had been placed inside the containment vessel up to approximately El. 365', apparently embedding the inboard ends of penetration nozzles #23, #24, and #44 located in the vessel bottom head. Penetration nozzles #23 and #24 are 40 inches in diameter, located at El. 353'-6 and penetration #44 is 8 inches in diameter located at El. 356'-0.

A subsequent inspection established that only the inboard ends of nozzles #23 and #24 had been directly embedded in the concrete and nozzle #44 had been blocked out. Direct embedment without the benefit of compressible material between the nozzle and the concrete was not consistent with normal construction practice for such nozzles. CB&I construction documents and stress reports were reviewed, but no requirements for compressible material around these nozzles could be found. However, in reviewing the CB&I bid proposal documents the following excerpt was discovered:

> "Before embedment of any penetrations in the bottom head, a 2" thick compressible material will be placed around the outside of the penetration neck. Also, a strip of compressible material will be placed around the periphery of the insert plate. The purpose of this compressible material is to eliminate any shear forces being transferred to either the penetration neck or the insert plate in case the head is strained below the point of embedment."

Based on this statement and conversations with CB&I, it was determined that CB&I's original intent was that these penetrations not be directly embedded in concrete without inclusion of compressible material.

Corrective Actions Taken

On November 11, 1981, Ebasco formally requested CB&I to perform the following:

a) An analysis of the vessel to determine the existence and magnitude of the shear forces at the embedded penetration nozzles and insert plates. This analysis should consider shear friction of the concrete to the vessel as a means of reducing the shear transfer to the nozzles.

Corrective Actions Taken (Continued)

b) Develop detail drawings showing the methods to accommodate the subject shear forces. These methods may include the use of compressible material, shear lugs, etc. Regardless of the method used, sufficient information must be provided to allow construction to purchase, install and inspect the necessary material.

c) Update the Stress Report to include all pertinent design data necessary to adequately address the subject design/loading condition.

In April, 1982, CB&I responded by issuing their analytical report for Ebasco's review and acceptance. Ebasco's review questioned the validity of the analytical technique used to solve a nonlinear 3-dimensional problem.

At a joint meeting held in May, 1982, Ebasco and CB&I agreed that Ebasco would perform an independent analysis using the ANSYS computer program.

The Ebasco analysis was based on the absence of compressible material at the interior concrete/vessel interface and the presence of compressible material on the outboard side of embedded penetrations #23 and #24. The analysis determined the extent of relative displacement between the embedded nozzles and adjacent concrete. In addition, shear forces acting on the nozzles due to displacement were generated. In October, 1982, Ebasco completed the analysis of the penetrations and transmitted the loads derived from the computer output to CB&I to enable them to evaluate the stress levels induced in the vessel and the two penetration nozzles in question. In January, 1983, CB&I completed its evaluation of the loads established by Ebasco and concluded that the stresses on the vessel and these penetration nozzles are within code allowables without compressible material on the inside. Ebasco has reviewed the CB&I analysis and has concurred therewith.

Based on the results of Ebasco's and CB&I's analysis as described above, which confirmed that the as-installed conditions of penetrations #23 and #24 are acceptable, no corrective actions need to be taken for these penetrations. Although penetrations #23 and #24 require no corrective action, the accessible areas of all penetrations (i.e., the outboard sides of #23, #24 and both inboard and outboard sides of #44) will be wrapped with compressible material prior to embedment.

Analysis of the Safety Implications

As previously stated, Ebasco and CB&I's analysis confirmed that the stresses on the vessel and the penetration nozzles in question were within code allowables and the present design of the containment vessel and penetrations

Analysis of the Safety Implications (Continued)

is acceptable. Based on this, were the deficiencies to have remained uncorrected, they would not have adversely affected the safety of operations of the plant at anytime throughout the expected lifetime of the plant. Therefore, the deficiency is not reportable in accordance with criteria of 10CFR50.55(e).