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## Washington Public Power Supply System

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Docket Numbers 50-508 and 50-509

October 15, 1982  
G03-82-1053

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: NRC INSPECTION AT WNP-3/5  
IE REPORT NO. 50-508, 509/81-14/01  
NONCOMPLIANCE (50-508, 509/81-14/01)

- References:
- a) NRC Letter, dated February 22, 1982, Mr. B. H. Faulkenberry to Mr. R. S. Leddick, same subject.
  - b) Letter, G03-82-389, dated April 15, 1982, Mr. R. S. Leddick to Mr. T. W. Bishop, same subject. *82-38*
  - c) Letter, G03-82-679, dated July 2, 1982, Mr. R. S. Leddick to Mr. T. W. Bishop, same subject. *(82-61)*

Reference a) outlined NRC questions concerning the corrective/preventive actions taken for the subject violation (Failure to assure containment penetrations 23, 24 and 44 are tested in accordance with Code requirements.). The resultant Supply System response was forwarded to your office by reference b). It was subsequently determined that additional clarification to NRC Concern #3 of reference b) was required. Therefore, reference c) was submitted by the Supply System to amend reference b) accordingly.

With regard to NRC Concern 3c, reference c) reported that Ebasco's New York Office was performing additional investigations to: (1) assure adequacy of penetration design review, and (2) determine testability of the penetrations to reconcile different design pressures between component parts of the penetrations. These issues, as well as whether testing requirements were considered in the design phase, are responded to in the attached report. The Supply System has reviewed the attached report in detail and believes that, upon clarification of testing in the next ASME III Code Addenda, the testability of the three penetrations and allied concerns will be satisfactorily answered.

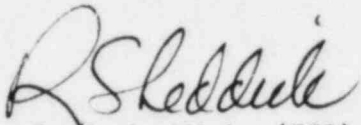
As a separate matter, because of our commitment to ANSI N45.2.11 and to assure that Ebasco is in compliance with that requirement, our QA and Engineering Departments jointly conducted an in-depth audit of Ebasco's

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design processes for a selected system during the week of August 16-20, 1982. Ebasco has responded to that audit including explanation of corrective measures and preventive actions. Their response is currently under review.

Should you have any questions or need further information, please contact me directly.



R. S. Leddick (760)  
Program Director, WNP-3

DRC:nj

Attachments

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

EBASCO INVESTIGATIONS OF  
MECHANICAL CONTAINMENT PENETRATION DESIGN AND TESTING

Design Evolution of Penetrations 23, 24 and 44

With regard to NRC Concern 3c of reference a), the Ebasco New York Office has completed its review of the design control and testability of Penetrations 23, 24 and 44. The following is a sequence of events associated with the design review for these penetrations.

The G-1300 series penetration drawings were developed first. Revision "0" was issued on August 4, 1975. Since it was uncertain at that time if the process lines of these three penetrations would be subjected to pipe rupture criteria, it was conservatively assumed that this would be the case. Therefore, the guard pipes were designed for the same pressure as process pipes, namely, 50 psig for Penetrations 23 and 24 and 200 psig for Penetration 44.

Specification 3240-054 was developed next. It was issued on January 19, 1976. The design pressures for guard pipes are shown in Paragraph 6.04 of the specification. This paragraph referenced the G-1300 drawing as the source of this information. Design pressures for guard pipes, as well as the bellows expansion joints attached to them, are shown on the G-1300 drawing under the column heading "Penetrations". From this, it is evident that it was Ebasco's design intent to have the bellows expansion joints for Penetrations 23 and 24 designed to a pressure of 50 psig and for Penetration 44 to a pressure of 200 psig.

During March of 1979, Ebasco performed a design review and certification of Ishikawajima Harima Heavy Industries (IHI) stress report for the bellows expansion joints. It was discovered that IHI used a design pressure of 5 psig for the bellows on Penetrations 23, 24 and 44. IHI used 5 psig based on Specification Paragraph 8.01 c.iii which defines secondary bellows design requirements. Paragraph 8.01 c.ii identifies secondary bellows as those "located between the shield wall and the flued head", and whose function is to "seal the penetrations where they pass through the containment vessel and shield wall, permitting the annulus between the containment and shield building to be maintained at a negative pressure." Due to the unique nature of Penetrations 23, 24 and 44 in that they do not pass through the annulus between the containment and shield building, it was not intended that these bellows be designed for 5 psig differential pressure. Subsequent evaluation by Ebasco, however, found this design pressure acceptable as final pipe rupture criteria had been established by this time and no rupture was postulated for these three process lines. In addition, Ebasco has determined that based on their evaluation of NURIG 0138 and SRP 6.3 there was no requirement for a guard pipe around the containment sump recirculation lines.

A SAR change request was not generated at that time to reflect the revised design criteria for the Type IV penetrations because in PSAR Amendment Number 36 Ebasco committed that "limited leakage passive failure" of the containment sumps would not affect Emergency Core Coolant System performance.

Subsequent design development has satisfied this commitment through the provision of recirculation sump isolation valves fitted with two (2) full sets of packing separated by a lantern ring and a leakoff connection. Accordingly, it has been determined, as a result of the Ebasco investigation, that there is no regulatory requirement for a bellows expansion joint on Penetrations 23, 24 and 44.

The failure of the design review process to disclose conflicting design pressures for two (2) connecting parts of these penetrations (namely guard pipe and bellows expansion joint), was a singular circumstance. This circumstance is attributable to the unique design requirements of the Type IV and IVA penetrations. Their design differs considerably from the other containment mechanical penetrations in that (1) these three penetrations have a guard pipe directly connected to a non-secondary bellows expansion joint and (2) due to their service they are located at an elevation such that they are partially embedded in the reactor building base mat and therefore, do not pass through the annulus. Although it is evident that good engineering judgment was used in the evaluation of the change to the original Ebasco design that reclassified the bellows as nonsafety related, the follow-up revision to design documents was not fully implemented.

All other containment mechanical penetrations have been carefully reviewed again by Ebasco's Design Department for any discrepancy in design pressures between guard pipe and secondary bellows. This review has shown that the discrepancy cited is limited to Penetrations 23, 24 and 44 only.

As no other containment mechanical penetrations have the unique pipe-within-a-pipe design of the Types IV and IVA penetrations, all field welds made by the installing contractor are accessible for visual examination during ASME code pressure testing and can therefore be tested in full compliance with ASME testing requirements without consideration of the Engineer making special provisions for the performance of these tests.

#### Pressure Testing of Penetrations 23, 24 and 44

An Ebasco review of the ASME Section III Code requirements has determined that for the WNP-3 Project these penetrations will be tested in accordance with ASME Section III, Article NE-6000. Inspection will be in accordance with Article NE-5000 and inaccessible welds will be treated in accordance with the provisions of NE-5211.2. It is considered that the basic intent of the Code is to test the welds that join the penetration assemblies to the containment vessel in accordance with the rules of Articles NE-6000 and NE-5000. This is evidenced by Article NE-4730(a) which states, "Electrical and mechanical penetration assemblies except those portions performing an electrical conducting or insulating function shall be constructed in accordance with the rules for containment vessels."

In order to apply the Articles note above, certain exceptions and options need to be addressed for the treatment of inaccessible welds. Specifically, NE-5111.2(b) specifies that inaccessible welds must be: (1) double butt welded, and (2) prior to being covered, tested for leak tightness using a gas medium test. In those instances where WNP-3 design configuration or installed conditions are not compatible with these requirements, (see attached sketch, "Type IV Penetration") the following alternatives will be employed:

- (1) Double butt welded joints - The penetration assembly-to-vessel nozzle welds are full penetration joints. Discussions with ASME III Code Committee Members disclosed that the intent of the code is that the weld be full penetration and not necessarily double butt welded. This will be clarified in the next ASME III Code Addenda. The Supply System will review and pursue approval of this Addenda and direct the actions required to assure implementation.
- (2) Testing for leak tightness using a gas medium - After discussions with members of the Subcommittee on Nuclear Power, it has been determined that the intent of this subparagraph is to allow testing of the weld after it has been rendered inaccessible. A formal code interpretation has been requested. The subject will be discussed in the November 1982 committee meeting.

Testing will be accomplished by separate gas (air) pressure decay testing. The precedence for this alternative testing method is well established for containment vessels and containment systems. Appropriate test procedures will be submitted by the installing contractor as directed by the Engineer.

As a follow-up to the design and testing changes which are being made to the Type IV and IVA penetrations, the following action is being taken by the Supply System and the Engineer:

- (1) The SAR is being reviewed for the need to make any changes to reflect that the outboard bellows expansion joint and outside containment guard pipe are nonsafety related.
- (2) The containment mechanical penetration design specification will be revised to indicate the design function of the penetration consistent with the SAR.
- (3) The DCN, issued to clarify the design intent (i.e. deleted reference to combined ILRT and over pressure test), will be revised to delete the cautionary note that would assure the bellows expansion joints were not over pressurized. The note is no longer required.
- (4) The original NCR will be redispositioned accordingly.

ATTACHMENT TO: Letter, G03-82-1053  
Dated October 15, 1982

The NRC (Region V) also raised questions concerning the pressure testing of field welds in mechanical containment penetrations other than types IV and IVA. To address these concerns, Ebasco Engineering is presently developing a program to implement testing (as previously detailed in this report) for these other mechanical penetrations.

# SKETCH

DIRECTION OF LOCA PRESSURE AND  
DIRECTION OF NE-6000 TEST PRESSURE

INSIDE FACE  
OF STEEL  
CONTAINMENT  
VESSEL

OUTSIDE  
OF SHIELD  
BLDG WALL

SEE DETAIL A

DIRECTION OF GAS MEDIUM  
LEAK TIGHTNESS TEST

FIELD  
WELD

CONTAINMENT  
NOZZLE

PROCESS  
PIPE

GUARD  
PIPE

FIELD WELDS

CONTAINMENT PRESSURE BOUNDARY

## TYPE IV PENETRATION

(THE TYPE IV A PENETRATION IS SIMILAR)

INSIDE SURFACE OF  
CONTAINMENT PRESSURE  
BOUNDARY WELD

OUTSIDE SURFACE OF  
PRESSURE BOUNDARY WELD

DETAIL A

ATTACHMENT TO:

Letter G03-82-1053  
dated October 15,  
1982.