

JULY 25, 2007

10 CFR 50.55a

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of)
Tennessee Valley Authority)

Docket No. 50-390

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - AMERICAN SOCIETY OF
MECHANICAL ENGINEERS (ASME) INSERVICE INSPECTION (ISI) PROGRAM
REQUEST FOR RELIEF PDI-2 - RESPONSE TO REQUEST FOR ADDITIONAL
INFORMATION (TAC No. MD4448)

The purpose of this letter is to respond to the NRC's request for additional information dated July 9, 2007, concerning the subject request for relief. TVA submitted the request for relief on February 7, 2007.

There are no regulatory commitments associated with this submittal. If you have any questions concerning this matter, please call me at (423) 365-1824.

Sincerely,

ORIGINAL SIGNED BY

J. D. Smith
Manager, Site Licensing
and Industry Affairs (Acting)

Enclosure
cc: See Page 2

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JDS:

Enclosures

cc (Enclosures):

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**WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
INSERVICE INSPECTION (ISI) PROGRAM REQUEST FOR RELIEF PDI-2
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

By letter dated February 7, 2007, TVA submitted for staff review and approval the proposed Request for Relief (RR) PDI-2. This request was seeking relief from the requirements of ASME Code, Section XI, for the second 10-year inservice inspection (ISI) interval to WBN Unit 1. In order to complete the review, the staff has requested the following additional information by letter dated June 7, 2007.

QUESTION 1

The "Justification For Granting Relief," states that "the examination volume required by [ASME Code, Section XI, Figures] IWB-2500-7(a) and (b) for the pressure retaining nozzle-to-vessel welds extends far beyond the weld and the heat effected zones into the base metal, and is unnecessarily large."

Question 1a:

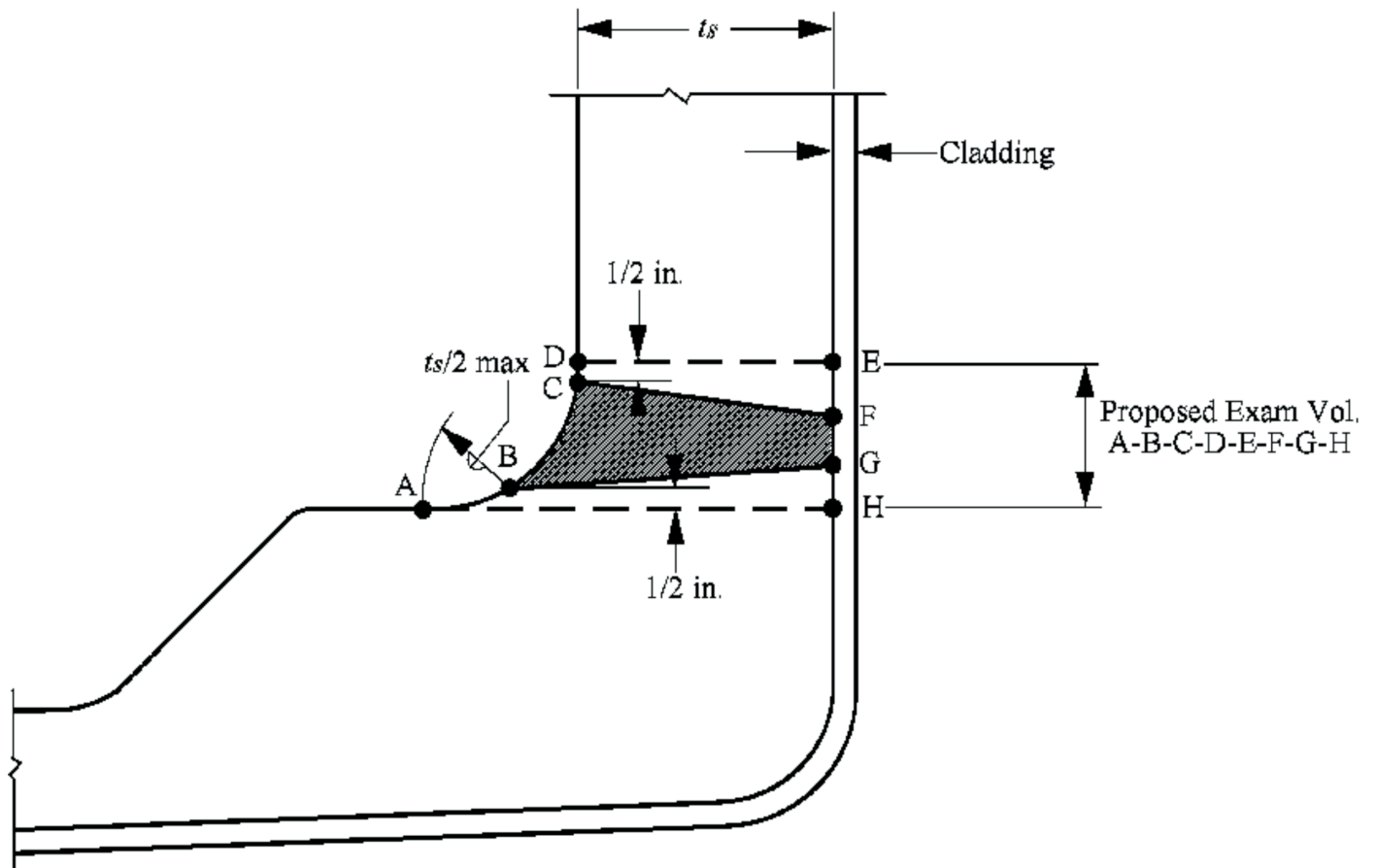
Provide supplemental sketches showing the specific configuration nozzle-to-vessel weld and revised examination volume (including dimensions).

Response

The examination volumes for the nozzle to vessel welds are provided in Figures 1 and 2. Specific configurations and dimensions of the shell (t_s), nozzles, and cladding are shown in figures 3 and 4.

Figure 1

INLET NOZZLE INSPECTION DETAIL



EXAMINATION REGION

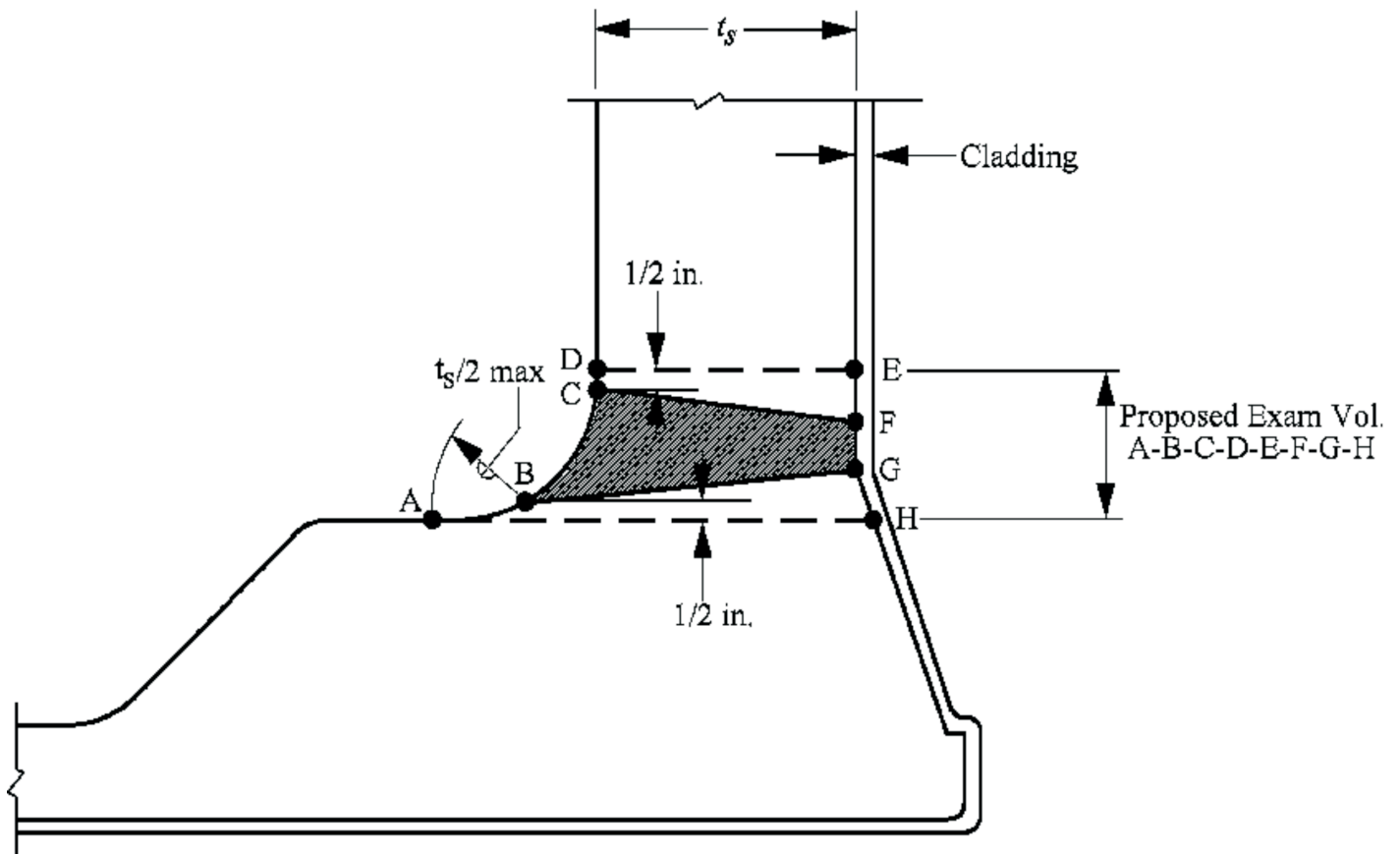
Shell (or head) adjoining region
Attachment weld region
Nozzle cylinder region

EXAMINATION VOLUME

C - D - E - F
B - C - F - G
A - B - G - H

Figure 2

OUTLET NOZZLE INSPECTION DETAIL



EXAMINATION REGION
 Shell (or head) adjoining region
 Attachment weld region
 Nozzle cylinder region

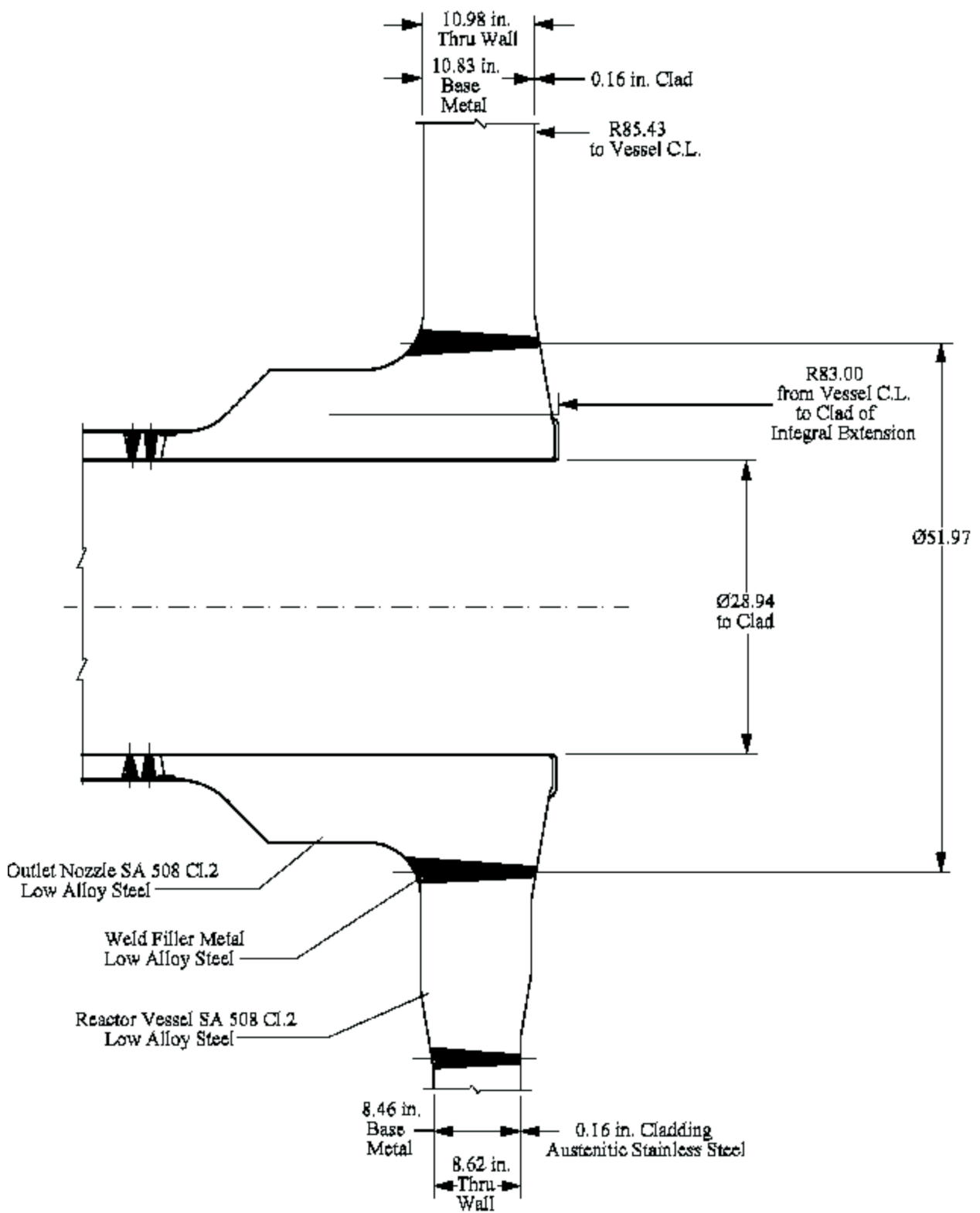
EXAMINATION VOLUME
 C - D - E - F
 B - C - F - G
 A - B - G - H

INLET NOZZLE OVERVIEW



Figure 4

OUTLET NOZZLE OVERVIEW



QUESTION 1b

Provide a listing of components for which relief is being requested.

Response

RR No. PDI-2 requests relief for the items in Examination Category B-D, Full Penetration Welded Nozzles in Vessels - Inspection Program B, Item No. B3.90, Reactor Vessel Nozzle-to-Vessel Welds. This inspection and the subject RR applies specifically to the following locations and ISI weld inspection numbers.

Loop 1 Hot Leg Nozzle-to-Vessel Weld	ISI Weld No. N18
Loop 1 Cold Leg Nozzle-to-Vessel Weld	ISI Weld No. N14
Loop 2 Hot Leg Nozzle-to-Vessel Weld	ISI Weld No. N17
Loop 2 Cold Leg Nozzle-to-Vessel Weld	ISI Weld No. N12
Loop 3 Hot Leg Nozzle-to-Vessel Weld	ISI Weld No. N16
Loop 3 Cold Leg Nozzle-to-Vessel Weld	ISI Weld No. N13
Loop 4 Hot Leg Nozzle-to-Vessel Weld	ISI Weld No. N15
Loop 4 Cold Leg Nozzle-to-Vessel Weld	ISI Weld No. N11

QUESTION 1c

Identify the ultrasonic technique (manual or automated), nominal pipe diameters, and weldment material (ferritic, austenitic stainless steel, Inconel) that TVA is proposing to inspect.

Response

For the eight welds within the scope of RR No. PDI-2, Watts Bar currently plans to perform future inspections using the same examination methods used during the Cycle 6 refueling outage. This method of examination utilizes two automated ultrasonic inspection processes. The first examination uses an Appendix VIII qualified bi-directional examination technique, requiring four search units for the clockwise/counterclockwise scans and three search units for the toward/away scans. This multi-high angle, multi modal, and multi directional ultrasonic technique is performed from the inside of the reactor vessel shell to cover the cladding and innermost 10% of the weld and adjacent base material. This examination for detection of radial flaws also includes a technique to interrogate the remaining weld and base metal thickness. The second examination uses an Appendix VIII qualified multi angle, phased-array technique performed from the nozzle bore to detect circumferentially oriented reflectors located within the full examination volume.

Figures 3 and 4 depict the applicable nozzle configuration, dimensions, and weldment materials.

QUESTION 1d

Since TVA is complying with Title 10 Code of Federal Regulations (10 CFR) 50.55a(b) (2) (xv) (K) (1), and 10 CFR 50.55a(b) (2) (xv) (K) (2), will TVA be performing any examinations from the outside surface of the subject nozzles?

Response

Watts Bar does not currently plan to perform any examinations of the reactor vessel nozzle-to-vessel weld from the outside surface of the vessel. As stated in the response to question 1c, inspections are to be performed from the vessel inside surface and nozzle bore.

Based on the results of the reactor vessel examinations performed during RFO6 by IHI Southwest Technologies, Inc. the following are the maximum obtainable coverages for the hot-leg and cold-leg nozzle-to-vessel welds utilizing the inspection requirements of ASME Section XI, Appendix VIII.

Outlet nozzles - ISI Weld No. N18, N17, N16, and N15 76%

Inlet nozzles - ISI Weld No. N14, N13, N12, and N11 99%

As a result of the coverage limitations for the outlet nozzle-to-vessel weld examination from inside the reactor vessel and nozzle bore, and the lack of coverage obtainable from the vessel outside surface, RR 1-ISI-19 was submitted to the NRC to formally request the inspection coverage be limited to the "maximum extent practical given the physical limitations present". RR 1-ISI-19 was approved by the NRC in a safety evaluation dated October 27, 2006.

In performing past and future inspections in accordance with Examination Category B-D, Item No. B3.90, Watts Bar Nuclear (WBN) has and will fully comply with the requirements of Title 10 Code of Federal Regulations 10 CFR 50.55a (b) (2) (xv) (K) (1). Additionally, WBN has and will comply with the requirements of 10 CFR 50.55a (b) (2) (xv) (K) (2) except as allowed by the NRC based on approval of RR 1-ISI-19.

QUESTION 1e

Clarify how TVA's personnel will be able to locate the widest portion of the nozzle-to-vessel weld precisely. It is unclear how repaired areas extending beyond the ideal weld cross-sectional area are identified and how these areas will be examined. If personnel are to identify widest sections of the nozzle-to-vessel weld, specify what positive means of examination will be used to identify the weld extremities. Will the extremities be identified on both the inside and outside diameters of the nozzle to ensure complete coverage of the welds?

Response

The location of the widest portion of the nozzle-to-vessel weld is determined from the as-built vessel fabrication drawings; and the automated ultrasonic equipment is programmed accordingly. Since the inside of the nozzles and vessel are clad, the location of the weld can not be seen from the vessel ID. Since the examinations have been performed from the vessel ID and nozzle bore, identification of the weld from the vessel OD does not provide any practical information to positively identify the weld extremities.

The construction code NDE performed in accordance with ASME Section III, NB-5000, required radiography of the weld volume and a surface examination of the weld plus 1/2" of adjacent base material. Had there been indications identified in this volume, which required repair, the repaired area would still be interrogated by the examination volume proposed in relief request PDI-2. In addition, all eight nozzle welds were examined utilizing the greater volume ($1/2t$) specified in ASME Section XI during preservice; and the four outlet nozzle welds were examined again inservice in 1999 to the greater ($1/2t$) volume with no unacceptable indications.

The phased array examinations performed from the nozzle bore have electronic gates extending $1/2$ " of metal path past the required examination volume. This extended gate allows an additional $1/2$ " buffer zone beyond the $1/2$ " of base material.

QUESTION 1f

Have the subject welds been previously ultrasonically examined using the examination volumes of ASME Code, Section XI, Figures IWB-2500-7(a) and (b)?

Response

Preservice examination of the eight RPV inlet and outlet nozzles was performed in 1978 by Southwest Research Institute. The examination was performed to the requirements of ASME Section XI, 1974 Edition, Summer 1975 Addenda for the Code specified volume.

Inservice examination of the four outlet RPV nozzles (N-15, N-16, N-17, and N-18) was performed in 1999 by Southwest Research Institute. The examination was performed to the requirements of ASME Section XI, 1989 Edition for the Code specified volume.

Inservice examination of the eight RPV inlet and outlet nozzles was performed in 2005 by Southwest Research Institute to the requirements of ASME Section XI, 1995 Edition, 1996 Addenda, for a modified inspection volume including the weld plus 1/2" on both sides, in accordance with Request for Relief PDI-2. Utilizing the modified inspection volume, essentially 100% coverage was not obtained for the outlet nozzles and Request for Relief 1-ISI-19 was submitted to the NRC for approval. Relief was granted in a safety evaluation issued October 27, 2006 (Accession number ML062480232).

The preservice and inservice inspections of the subject nozzle-to-vessel welds have shown the ASME Code volume to be free of unacceptable indications.