TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401

5N 157B Lookout Place

SEP 21 1989

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

Gentlemen:

In the Matter of the Application of) Docket Nos. 50-390
Tennessee Valley Authority) 50-391

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - CFR 50.55a(a)(3) - PROPOSED ALTERNATIVE ACCEPTANCE TO AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION III

This letter requests NRC approval in accordance with 10 CFR 50.55a(a)(3) of an alternative to ASME Section III requirements.

In December 1986, TVA committed to reviewing the radiographs provided by certain vendors. Pittsburgh-Des Moines (PDM), the supplier of the refueling water storage tanks (RWSTs), was one of these vendors.

The RWSTs are ASME Section III Class 2 manufactured to the requirements of ASME Section III 1974 edition up to and including the winter 1975 addenda. There were 635 weld sectors radiographed for each RWST. TVA has rereviewed the radiographs for both units. Radiograph technique deficiencies were identified in 61 sectors for Unit 1 and 58 sectors for Unit 2. Weld defects were identified in 34 sectors for Unit 1 and 38 sectors for Unit 2.

Except as discussed below, all discrepant sectors which did not comply with the requirements of ASME Section III for radiographic or weld quality were reradiographed and, where necessary, repaired.

The purpose of this letter is to request an exception to the ASME Section III requirement to radiograph the RWST vortex nozzle assembly welds (piece 8B). These vortex nozzle assemblies located in the bottom of each RWST are fabricated from SA 240 type 304 stainless steel. Each assembly consists of a cone subassembly (piece 14A) formed from 4 segments of 5/16 inch thick plate welded with vertical seam welds, and a pipe subassembly (piece 8H), which is seam-welded 3/8 inch thick rolled plate. The cone and pipe subassemblies are joined with a full-penetration groove weld (see Enclosure 1).

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Subsubarticle NC-5280 of ASME Section III requires Class 2 butt joints of nozzles to be fully radiographed. Our review identified the following discrepancies:

1. The seam welds in the cone subassemblies (14A) for both units were not radiographed, nor was radiography specified on the PDM drawings. This discrepancy has been documented on Condition Adverse to Quality Reports (CAQRs) WBP 890317 and WBP 890318 for Units 1 and 2, respectively.

2. The radiographic techniques for the Unit 1 circumferential weld, attaching the cone to the pipe, and the pipe seam weld, do not fully comply with the requirements of ASME Section III for the film quality and coverage.

   NOTE: The quality of the radiographs for Unit 2 is acceptable.

3. Weld defects which do not meet the acceptance criteria of ASME Section III have been identified in both vortex nozzle assemblies (see Enclosure 2).

   a. In the Unit 1 assembly, lack of fusion, approximately 3 inches long, exists in one of the cone subassembly's seam welds. This weld defect was identified in the radiograph of the circumferential weld attaching the cone subassembly to the pipe subassembly. Consequently, the entire length of the weld is not included on the radiograph (3 of 14 inches are shown). No other defects are apparent in the circumferential or seam welds.

   b. In the Unit 2 assembly, unacceptable slag, approximately 3/8 inch long, and two linear indications which are transverse to the weld, each approximately 1/4 inch long, exist in the circumferential weld. Unacceptable slag, approximately 1/4 inch long, exists in one of the cone subassembly's seam welds, and 6 indications, each approximately 1/8 inch long, exist adjacent to the circumferential weld (3 of 14 inches are shown). The latter indications appear to be surface.

The operating pressures of the RWSTs are atmospheric pressure. Design temperature is 200°F, with an operating temperature of 60°F minimum. The RWSTs fulfill 2 basic requirements:

1. Provide an adequate supply of borated water for use during refueling operations; and

2. Provide an adequate source of borated water to the Chemical and Volume Control System (CVCS) pumps, the Safety Injection System (SIS) pumps, the Residual Heat Removal System (RHR) pumps, and the Containment Spray System (CSS) pumps in the event of a loss of coolant accident.

The cone subassembly, a portion of the pipe subassembly, and the attaching circumferential weld are embedded in concrete (see Enclosure 1). Except for the portion of pipe extending beyond the concrete's surface into the pipe tunnel, these welds would be extremely difficult to make accessible for reradiography or repair. For this reason TVA has performed fracture mechanics

analyses of the subject welds. The calculation, identified by TVA as WBP-MTB-001, is included as Enclosure 3. The calculations do not consider the structural support provided by the concrete backing. The calculations were performed using the method described in ASME Section XI, paragraph IWB-3640 and Appendix C, and Code Case N-436.

The results of the calculations demonstrate that the cone subassembly can withstand a longitudinal through-wall flaw up to 48.9 inches and still maintain structural integrity. The cone subassembly-to-pipe weld can withstand a through-wall flaw up to 70 percent of circumference and still maintain structural integrity. Enclosure 4 provides various fabrication checklists and nondestructive examination reports including hydrostatic test reports. These document fabrication and inspection activities including inspection reports certifying surface examinations were performed. The acceptable results of these examinations demonstrate that the welds do not contain through-wall flaws. Based on these examinations and the calculations, TVA concludes that the flaws will not result in failure of the nozzle assemblies.

Full compliance with ASME Section III requirements for radiographic acceptance of these welds would, as stated in 10 CFR 50.55a(a)(3), "result in hardship and unusual difficulties without a compensating increase in the level of quality and safety." Therefore, TVA requests NRC's approval in accordance with 10 CFR 50.55a(a)(3) of utilizing a calculation and existing inspections as an alternative to ASME Section III requirements. After receiving approval for this proposed alternative, TVA will add a paragraph to the WBN Final Safety Analysis Report (FSAR) Section 9.2.7 to document TVA's deviation from ASME Section III and to provide justification for acceptance of this condition.

Enclosure 5 lists the new commitments made in this report.

If there are any questions, please telephone G. R. Ashley at (615) 365-8527.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

M J Ray for

Manager, Nuclear Licensing
and Regulatory Affairs

Enclosures
cc: See page 4

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cc (Enclosures):
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NRC Resident Inspector
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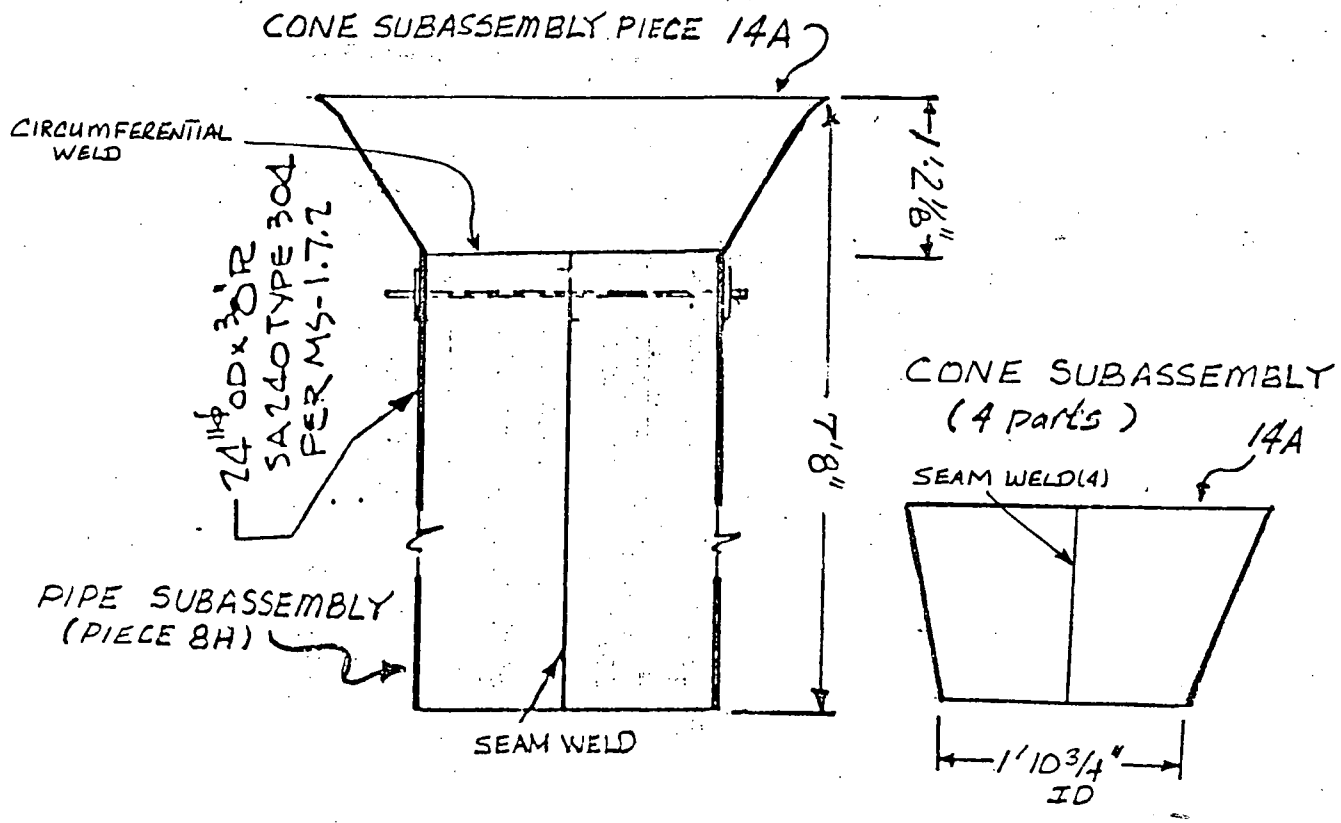
Spring City, Tennessee 37381

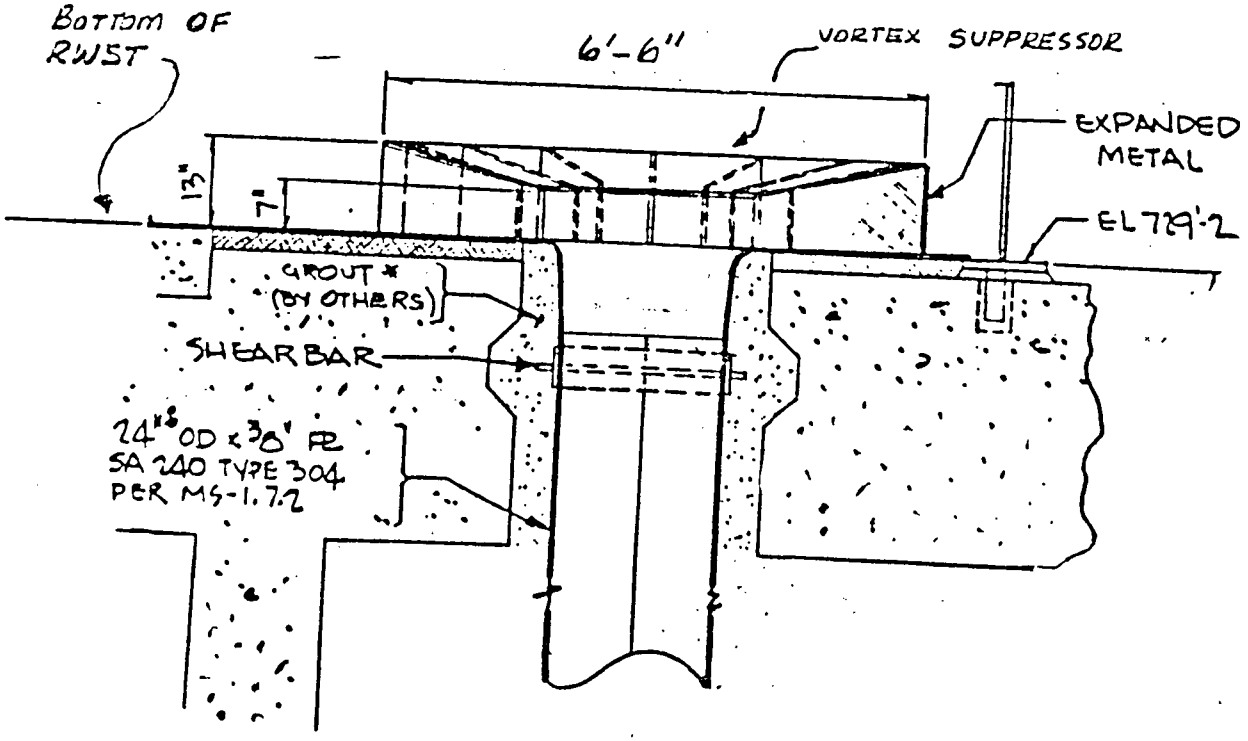
ENCLOSURE 1

REFUELING WATER STORAGE TANK (RWST) VORTEX ASSEMBLY

VORTEX NOZZLE ASSEMBLY
(PIECE 8B)



VORTEX ASSEMBLY EMBEDDED IN GROUT



Attachment D

CIRCUMFERENTIAL WELD

TVA-WBNP

VENDOR WELD RADIOGRAPHIC REEVALUATION DATA SHEET

TVA Class NA ASME Class 2 Acceptance Criteria PDM ET-10 Weld No.: SH-1Na, Unit 1

Design Pipe Size NA Diameter x NA Wall DWP NA Cut No: NA Repair No: NA

Drawing PDM Thickness .312"-.375" Measurement Method NA Welder Identifier: NA

Material Specification Type and Grade NA to NA

X-Ray Machine: MFG _____ Model _____ | Radioisotope: Type _____ S/N _____
Actual KV _____ MA _____ | Size _____ Curies _____
Focal Spot Size _____ |

Film Size: _____ Mfg: _____ Type: _____ Exposure Time: _____

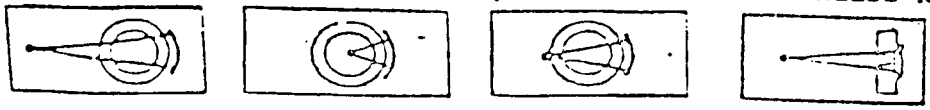
Exposure Technique: _____ Blocking or Masking _____

Penetrameter: Designation _____ Grade _____ Film Side / / Source Side / /

Shim Thickness _____ Screens _____ Source to Film Distance _____

Radiographer _____ ASNT Level _____ Exposure Date _____

Sector Id	Cass ID	Film NO.	Interpretation Remarks	Results A/R	Codes Used in Remarks Column
0-1	NA	NA	Yellowed, FA, Scratches, PO, SU	Reshoot	BT - Burn Through
—			Second 0-1 double exposed, does not	—	CC - Crater Cracks
—			matter.	—	CR - Cracks
1-2			Missing	Reshoot	CV - Concave Root
2-3			Too Light, UC, FA, PO	Reshoot	IF - Incomplete
3-4			Too Light, PO, SL*, IP in Ad; SCRM	E*/Reshoot	Fusion
—			weld	—	IP - Incomplete
4-0			FA, PM, PO, SU/SL*	E*/Reshoot	Penetration
					OX - Oxidation
LOCATION MARKER' 1/2" EACH SIDE OF WELD.			TECHNIQUES FILM HOLDER IN CONTACT WITH PART UNLESS NOTED		PO - Porosity
					SL - Slag
					SU - Surface
					TN - Tungsten
					UC - Undercut
					FA - Film Artifacts
					PM - Processing Marks
					LL - Light Leak
					UF - Undercut
					CM - Clamp marks in Base M
					ID - Identification Correct.



Inspected in accordance with ASME Section III

Persons Consulted (If None so Indicate) None

Primary Acceptance Reviewer NA ASNT Level II Date NA Accept / / Reject / /

Final Acceptance Reviewer [illegible] ASNT Level III Date 6/20/89 Accept / / Reject X

Attachment D

PIPE SEAM WELD

TVA-WBNP

VENDOR WELD RADIOGRAPHIC REEVALUATION DATA SHEET

TVA Class NA ASME Class 2 Acceptance Criteria PDM ET-10 Weld No.: SH-SH, Unit 1

Design Pipe Size NA (Diameter) x NA (Wall) DWP NA Cut No: NA Repair No: NA

PDM Drawing Thickness .375 in. Measurement Method NA Welder Identifier: NA

Material Specification Type and Grade NA to NA

X-Ray Machine: MFG _____ Model _____ | Radioisotope: Type _____ S/N _____
Actual KV _____ MA _____ | Size _____ Curies _____
Focal Spot Size _____ |

Film Size: _____ Mfg: _____ Type: _____ Exposure Time: _____

Exposure Technique: _____ Blocking or Masking _____

Penetrameter: Designation _____ Grade _____ Film Side / / Source Side / /

Shim Thickness _____ Screens _____ Source to Film Distance _____

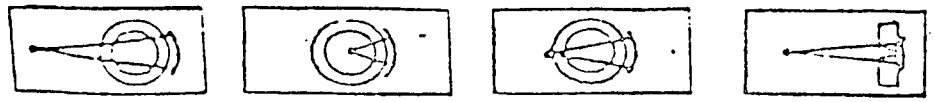
Radiographer _____ ASNT Level _____ Exposure Date _____

Sector Id	Cass ID	Film NO.	Interpretation Remarks	Results A/R	Codes Used in Remarks Column
1-2	NA	NA	Fogged, Tunderg Scrs., Too Light	Reshoot	BT - Burn Through
2-3			Too Light, UC, FA	Reshoot	CC - Crater Cracks
3-4			FA, PM, Too Light at edges, SC, PO	Reshoot	CR - Cracks
4-5			Too Light, PM, FA, Tunderg Scrs.	Reshoot	CV - Concave Root
5-6			Too Light, PM, FA,	Reshoot	IF - Incomplete Fusion
6-7			Too Light, Tunderg Scrs, FA	Reshoot	IP - Incomplete Penetration
					OX - Oxidation
					PO - Porosity
					SL - Slag
					SU - Surface
					TN - Tungsten
					UC - Undercut
					FA - Film Artifacts
					PM - Processing Marks
					LL - Light Leak
					UF - Undercut
					CM - Clamp Marks in Base M
					ID - Identificatio Correct

LOCATION MARKER 1/2" EACH SIDE OF WELD.

TECHNIQUES

FILM HOLDER IN CONTACT WITH PART UNLESS NOTED



Inspected in accordan : with ASME Section III

Persons Consulted (If None so Indicate) None

Primary Acceptance Reviewer NA ASNT Level II Date NA Accept / / Reject / /

Final Acceptance Reviewer [illegible] ASNT Level III Date 3/22/89 Accept / / Reject X

ENCLOSURE 2

Attachment D

PIPE SEAM WELD

TVA-WBNP

VENDOR WELD RADIOGRAPHIC REEVALUATION DATA SHEET

TVA Class NA ASME Class 2 Acceptance Criteria PDM ET-10 Weld No.: 8h-8h Unit 2

Design Pipe Size NA (Diameter) x NA (Wall) DWP NA Cut No: NA Repair No: NA

PDM Drawing Thickness .375" Measurement Method NA Welder Identifier: NA

Material Specification Type and Grade NA to NA

X-Ray Machine: MFG _____ Model _____ | Radioisotope: Type _____ S/N _____
Actual KV _____ MA _____ | Size _____ Curies _____
Focal Spot Size _____ |

Film Size: _____ Mfg: _____ Type: _____ Exposure Time: _____

Exposure Technique: _____ Blocking or Masking _____

Penetrameter: Designation _____ Grade _____ Film Side / / Source Side / /

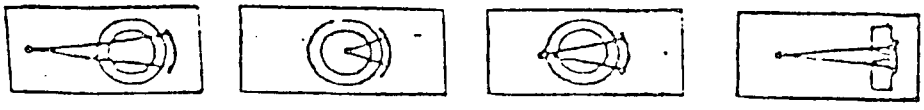
Shim Thickness _____ Screens _____ Source to Film Distance _____

Radiographer _____ ASNT Level _____ Exposure Date _____

Sector Id	Cass ID	Film NO.	Interpretation Remarks	Results A/R
0-1	NA	NA	FA, PD, SL, PM	A
1-2			FA, PM, SL	A
2-3			FA, PM,	A
3-4			FA, PM, PD	A
4-5			FA, PM, PD	A
5-6			FA, PM, PD	A

LOCATION MARKER 1/2" EACH SIDE OF WELD.

TECHNIQUES



FILM HOLDER IN CONTACT WITH PART UNLESS NOTED

Codes Used in Remarks Column
BT - Burn Through
CC - Crater Cracks
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IF - Incomplete Fusion
IP - Incomplete Penetration
OX - Oxidation
PO - Porosity
SL - Slag
SU - Surface
TN - Tungsten
UC - Undercut
FA - Film Artifacts
PM - Processing Marks
LL - Light Leak
UF - Undercut
cm - clamp marks in Base M
ID - Identification Compact

Inspected in accordance with ASME Section III

Persons Consulted (If None so Indicate) NONE

Primary Acceptance Reviewer NA ASNT Level II Date NA Accept / / Reject / /

Final Acceptance Reviewer JOE [illegible] ASNT Level III Date 6/13/89 Accept X / Reject / /