TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

July 30, 1982

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Ms. Adensam:

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

In your letter dated January 22, 1982 to H. G. Parris TVA was requested to provide information concerning the Watts Bar Nuclear Plant Preservice Inspection Program. Enclosed are responses to NRC questions Q 121.21 and Q 121.23.

If you have any questions concerning this matter, please get in touch with D. P. Ormsby at FTS 858-2682.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

D S Kammer

D. S. Kammer
Nuclear Engineer

Sworn to and subscribed before me
this 30th day of July 1982
Paulette H. White
Notary Public
My Commission Expires 9-5-84

Enclosure
cc: U.S. Nuclear Regulatory Commission (Enclosure)
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

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Q PDR

ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
PRESERVICE INSPECTION PROGRAM

Q 121.21 Question

General Design Criterion 32 requires that the reactor coolant pressure boundary shall be designed to permit periodic inspection and testing of important areas and features to assess their structural and leaktight integrity.

We have recently identified a problem concerning the effectiveness of ultrasonic examination techniques to examine the primary piping system. Certain ultrasonic techniques may not be adequate to consistently detect and reliably characterize service-induced flaws during the inservice inspection of thick-wall cast stainless steel components to acceptance standards of Paragraph IWB-3500 of Section XI.

Discuss the technical basis for determination that your preservice ultrasonic examination is capable of detecting and characterizing crack-like indications in the reactor coolant boundary piping.

When using Appendix III of Section XI for inservice examination of either ferritic or austenitic piping welds the following should be incorporated:

A. Any crack-like indication, 20 percent of DAC or greater, discovered during examination of piping welds or adjacent base metal materials should be recorded and investigated by a Level II or III examiner to the extent necessary to determine the shape, identity, and location of the reflector.

B. The Owner should evaluate and take corrective action for the disposition of any indication investigated and found to be other than geometrical or metallurgical in nature.

Response

The primary piping welds were radiographically examined during fabrication and ultrasonically examined using nominal 1.5-MHz, dual-element, 45-degree refracted longitudinal search units during preservice inspection. Ultrasonic examination calibration was performed using 1/4T, 1/2T, and 3/4T holes in a calibration block fabricated of centrifugally cast stainless steel. Data generated during a vendor-sponsored study indicates that, by utilizing these ultrasonic examination techniques, it is possible to detect fatigue cracks of 15- to 25-percent through-wall depth. This technique represents existing state-of-the-art ultrasonic examination technology.

Based on the above, we believe that the preservice ultrasonic examination coupled with fabrication radiography provides an inspection which meets the requirements of ASME Section XI.

Should there [illegible] no change in the inspection re[illegible]irements or improvements in state-of-the-art ultrasonic examination techniques, in-service inspection will be by another volumetric technique, and alternate technique per IWA-2240, or a request for relief will be established.

Q 121.23 Question

To complete our evaluation of the preservice examination of the Units 1 and 2 reactor vessel, we will require the following information:

a. Electronic Gating of the Vessel Inner Surface. Discuss the extent of electronic gating that was used and estimate the weld volume that was not examined. Provide a description of the automated examination including calibration parameters.

b. Vessel Welds that were not Examined. Identify the specific welds that did not receive a 100-percent ultrasonic examination and estimate the extent of examination on a sketch of the vessel welds. Indicate the welds that received an examination from only one side of the weld. State the primary reason that the specific examination was impractical, e.g., support or component restricts access or the automated scanning tool was not capable of reaching area. Discuss the type and extent of fabrication examination that was performed on the welds where the preservice examination was impractical.

c. Unit 2 Vessel Calibration Blocks. Provide a drawing or sketch of one of the calibration blocks for the shell welds. Indicate whether the calibration block cladding process and surface finish are identical to the vessel being examined, i.e., the vessel was clad before the nozzle drop-outs were removed. Discuss the technical bases for concluding that the acoustical properties of the calibration blocks are representative of the vessels being examined.

d. Underclad Cracking Examination. Provide a description of augmented examination to determine whether underclad cracking was present. Identify the location and extent of crack indications and describe any metallurgical confirmation of the ultrasonic examination results.

Response

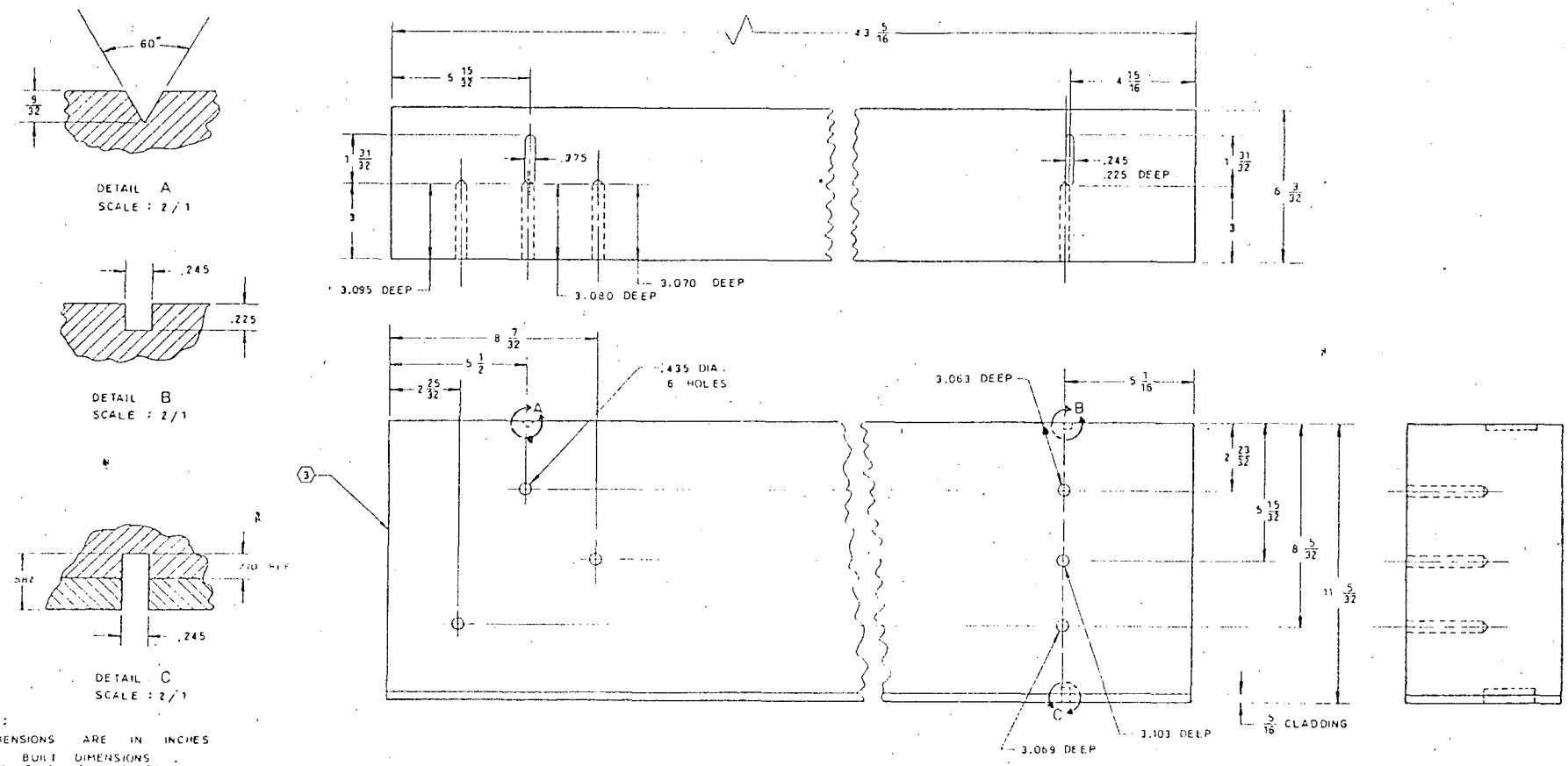
Paragraphs A and B--The requested information has been prepared by Southwest Research Institute (SwRI) and is attached.

Paragraph C--A representative calibration block drawing is attached (Figure Q 121.23-1). Two vessel calibration blocks (a nozzle-to-shell block and a nozzle inner radius block) were fabricated for TVA by SwRI. The remaining blocks were supplied by Rotterdam Nuclear from unit 1 nozzle dropouts.

The Rotterdam-supplied blocks were cut from the vessel ring forging nozzle dropouts before cladding. The nozzles were subsequently clad using a manual technique which results in configuration similar to the back clad areas of the circumferential welds. These blocks and the remaining shell rings met ASTM specification A508, Cl-2, whereas the vessel lower head and closure head were fabricated from material meeting A533, GR-B, CL-1. We do not believe this product form difference will result in a significant difference in acoustical properties.

Based on a review of industry-generated data, we have concluded that no viable technique exists to quantify the acoustical differential of a calibration block to vessel shell comparison under field conditions using clad components.

Paragraph D--This information was provided by letter dated March 20, 1981 from L. M. Mills to A. Schwencer.



NOTES :

1. DIMENSIONS ARE IN INCHES
2. AS BUILT DIMENSIONS , REF. DWG. 2414 SHEET 8 , ROTTERDAM NUCLEAR .
3. STEEL STAMP IDENTIFICATION MARK , U.T. BLOCK 03 , FOR RING 06 , MAT. ASME SA 508 Cl. 2 , DWG. 2414 SH. 8 , RUM ORDER 30749 , PROJECT WAT .

SOUTHWEST RESEARCH INSTITUTE QUALITY ASSURANCE SYSTEMS AND ENGINEERING DIVISION SAN ANTONIO, TEXAS			
UT. CALIBRATION BLOCK 03 FOR RING 06 WATIS BAR 1			
SCALE 1/2	C	D-5420 025	

Figure Q121.23-1