WATTS BAR NUCLEAR PLANT

SURVEILLANCE INSTRUCTION

TI-50B

ASME SECTION XI PRESERVICE INSPECTION PROGRAM

UNIT 2

CURRENT REVISION LEVEL 3

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PORC Review Date 11/3/82

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Date Approved 11/3/82

1C	Document Control Unit, 1520 CST2-C
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1C	Nuclear Safety Review Staff
1C	Plant Master File
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	Asst. Plant Supt. (Maintenance)
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	Management Svs. Supervisor
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1C	Mechanical Unit Supervisor
1C	Operations Supervisor
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	Plant Services Supervisor
	Plant Training Officer
1U	Plant Training Shift Engineer
1C	Power Stores Unit Supervisor
	Preop Test Supervisor
	Public Safety
	QA Manager, QA and Audit Staff
1C	Quality Assurance Supervisor
	Reactor Unit Supervisor
	Safety Engineer
1C	Shift Engineer's Office
	Stationary Equipment Group
	Technical Support Center
1C	Unit 1 Control Room
1C	Unit 2 Control Room
1U	Supv. Reactor Systems Group-C
1C	Baseline Inservice Inspection Group-C
1C	Programs and Procedures Section-C

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HISTORY OF REVISION/REVIEW

REV. NO.	DATE	REVISED PAGES	REASON FOR CURRENT REVISION (INCLUDE ALL TEMPORARY CHANGE NUMBERS)
3	11/03/82	51, add 79A-79P	Add weld location drawings to Appendix A
4	03/22/83	Page 1	Change WB7.3.8 to AI-9.7
5	10/17/83	Pages 32, 33, 50	Incorporated the changes in N-OQAM, Part II, Section 5.1

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Revision 2

PRESERVICE INSPECTION PROGRAM

COVER SHEET

Owner:	Tennessee Valley Authority
Address of Corporate Office:	Knoxville Office Complex 400 Commerce Avenue Knoxville, Tennessee 37902
Name and Address of Nuclear Power Plant:	Watts Bar Nuclear Plant P.O. Box 2000 Spring City, Tennessee 37381
Applicable Nuclear Power Units:	Watts Bar Nuclear Plant, Unit 2

PUNCH LIST

1. Incorporate Scan Plan Data Upon Completion of PSI, Appendix G
2. Add Appendix E
3. Add Appendix F
4. Complete Appendix A

Signature 5-6-82 Date

APPENDIX A - Tables 33

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APPENDIX G- Scan Plan Data --

1.0 STATEMENT OF APPLICABILITY

This Technical Instruction supersedes Surveillance Instruction 4.4.10.1.

This program outlines details for performing the preservice nondestructive examinations of the Watts Bar Nuclear Plant ASME Code Class 1, 2, and 3 components (and their supports). The program has been organized to fulfill examination requirements of the Watts Bar Operational Quality Assurance Manual, Part II, Section 5.1 and comply as practical with the requirements of Section XI of the ASME Boiler and Pressure Vessel Code.

The requirements of ASME Section XI are in effect when the requirements of ASME Section III have been satisfied. Criteria for determining that ASME Section III requirements have been satisfied are as follows:

Item	When ASME Section III Requirements are Satisfied
Pressure Vessels and Pumps	When "N" stamped
Valves	When "N" stamped
Piping System	When the hydrostatic pressure test is complete and the N-5 data form is completed

Specifics concerning performance of nondestructive examinations are not a part of this program, but are included in nondestructive examination procedures (DPM N80E3 and ~~WB7.3.6~~ AI 9.7). ←

2.0 PURPOSE

The Preservice Inspection Program (hereinafter PSI) is preliminary in nature and is employed to obtain detailed information for inclusion in the Inservice Inspection Program. The examinations required by this program will establish acceptance of components for service.

The PSI Program serves as a means of determining built-in limitations caused by original plant design, geometry, materials of construction of the components, and the current technology or state-of-art of nondestructive testing. The PSI Program will also permit verification of the examination methods selected, finalization of detailed procedures, and will establish preservice examination data to be used as a reference for later inservice examinations.

3.0 CODES OF RECORD AND CODE CASES

This program was prepared to meet the requirements of the 1974 Edition, Summer 1975 Addenda of Section XI of the ASME Boiler and Pressure Vessel Code. Criteria for determining Class 2 pressure-retaining bolting subject to examination is in accordance with the 1977 Edition, Summer 1978 Addenda of Section XI. The repair and replacement program is in

accordance with the Summer 1978 Addenda of Section XI. Technique for ultrasonic examination of piping welds shall be in accordance with IWA-2232(b) and IWA-2232(c) or the Summer 1978 Addenda of Section XI. Standards for Examination Evaluation (IWA-3000) shall be in accordance with the Summer 1978 Addenda.

Procedures for eddy current examination of heat exchanger tubing, which the Summer 1975 Addenda of ASME Section XI has no provisions for, meets the requirements of the 1974 Edition, Summer 1976 Addenda of ASME Section XI. Steam generator tubing examination requirements are in accordance with Regulatory Guide 1.83, Revision 1.

The use of Code Cases N-234 and N-235 have been approved for TVA use by NRC.

4.0 METHOD OF IMPLEMENTATION AND RESPONSIBILITIES

Preliminary weld maps and other pertinent component drawings and tables are included in Appendix A of this program to define areas subject to examination (in addition to sections 5.0, 6.0, 7.0, and 8.0). The preliminary piping weld maps should be established by NUC PR from CONST's latest revision weld maps.

Prior to performance of the examinations, each system shall be walked down by the Programs and Procedure Section of the Nuclear Central Office QA Staff (hereinafter NCO QA Staff) to verify that the NUC PR drawings depict field configurations. Any drawing revisions that are necessary as a result of the walkdown will be made before the drawings are included in this program.

The NCO QA Staff shall prepare scan plans using component drawings for systems or components requiring examinations. The plans should include as a minimum references to components to be examined, methods of examination, examination procedures, and calibration standards. Prior to performing examinations on a system or component, the scan plans shall be established and submitted to the Plant Superintendent for information, and system or component weld maps incorporated in Appendix A of this program.

If variations in piping configurations are discovered or modifications or repairs to piping are made during the course of the PSI, these changes shall be marked on field copies of drawings. This information shall be communicated to the Programs and Procedure Section which shall be responsible for revising the original drawings. The Inspection Section Group scan plan shall also be revised to reflect these changes. Following completion of each system examination, the revised drawings shall be incorporated into this program as a reference for inservice inspections. All latest revision scan plan information and other pertinent information (i.e., as built calibration block drawings) shall be incorporated in this program as a reference for inservice inspections when all examinations required by this program have been completed.

The preservice examinations will be performed by either Inspection Section personnel or outside contractors. Contract preparation, administration, and supervision will be the responsibility of the Inspection Section. Inspection plans and/or Quality Assurance Programs submitted by outside contractors shall be reviewed and approved by the Inspection Section prior to use. All specific NDE procedures used during the inspection program shall be reviewed and approved in accordance with OQAM Part II, Section 6.3.

Certain ASME Section III examinations performed in shop and/or by CONST will be identified by the Programs and Procedure Group and employed to serve for the ASME Section XI PSI. When in shop examination procedures are employed, the examination data sheets and the applicable data package form, with the ANI sign-off, shall be obtained by the Programs and Procedure Group. When CONST examination records are employed, CONST examination procedures shall be obtained by the Inspection Section for reference (excluding pressure test procedures).

Whenever inspection requirements are being accomplished under the jurisdiction of NUC PR, an Inspection Section representative shall be responsible for coordinating activities or obtaining inspection data. He will be the designated TVA representative to ensure contract compliance and to ensure proper disposition of needed procedure changes to both TVA and/or contractor procedures in accordance with approved vendor QA program and Section 6.3, Part II of the OQAM.

Additionally, the Inspection Section representative will be responsible for notifying the Plant Superintendent of all unacceptable indications as soon as practical. Whenever an unacceptable indication is discovered, the procedure and form in Appendix D shall be utilized. In those cases where an outside contractor is furnishing preservice examination services, the contractor will normally initiate the form in Appendix D under the supervision of the Inspection Section representative. See section 16.0 of this program.

As examinations are completed, the Inspection Section representative shall sign for completion the appropriate sections of Data Sheet 2 in Appendix C of this program. When all examinations of this program have been completed, Data Sheet 1 shall be signed for completion by the Inspection Section representative and reviewed by the Supervisor, Inspection Section Supervisor In the event system or component alterations or repairs are made which require component reexamination, or components are reexamined for other reasons, following sign-off of Data Sheet 1, the appropriate sections of Data Sheet 2 in Appendix C shall be completed and signed by the Inspection Section representative.

All preservice examinations shall be completed prior to initial plant startup (Operational Mode 2). Prior to initial plant startup, Data Sheet 2, in addition to Data Sheet 1, in Appendix C shall be signed by the Inspection Section representative and reviewed by the Supervisor, Baseline and Inspection Section Supervisor, and the Programs and Procedures Supervisor. The supervisor of the Baseline and Inservice Inspection Group.

shall approve the data package (Data Sheets 1, 2, and 3). These data sheets shall be filed at the plant site with PSI examination data and final reports discussed in Section 15.0 of this program.

PSI program preparation is the responsibility of Programs and Procedures Section of the QA and Compliance Branch. Any revisions initiated by other groups shall be submitted to the Programs and Procedures Section for approval prior to incorporating the revisions into this program.

5.0 ABBREVIATIONS AND DEFINITIONS

5.1 AIA - Authorized Inspection Agency

5.2 AI - Authorized Inspector (may denote an ANI or ANII)

5.3 ANI - Authorized Nuclear Inspector

5.4 ANII - Authorized Nuclear Inservice Inspector

5.5 Components - Denotes items in a nuclear plant such as pressure vessels, piping systems, pumps, valves, and component supports.

5.6 Examination - Denotes the performance of all visual observation and nondestructive testing such as radiography, ultrasonic, eddy current, liquid penetrant, and magnetic particle methods.

5.7 Inspection - Denotes verifying the performance of examinations and tests by an Inspector representing an Authorized Inspection Agency.

5.8 Maintenance - Routine servicing or work on a component undertaken to correct or prevent an unsatisfactory condition. Maintenance does not include welding, heat treating, or defect removal which affects the pressure boundary. Maintenance includes operations such as lapping of valve seats, adjustment of stem packing, pump seal maintenance, and replacement of nonpressure-retaining pump parts. Maintenance does not require the presence of or verification by the Authorized Inspector.

5.9 Normal Operation - Normal plant operation conditions include reactor startup, operation at power, hot standby, and reactor cooldown to cold shutdown conditions. Test conditions are excluded.

5.10 Pressure-Retaining Material - Applies to items such as vessel heads, nozzles, pipes, tubes, fittings, valve bodies, bonnets, disks, pump castings, covers, and boltings which join pressure-retaining items.

5.11 Repair - Those operations involving welding, heat treatment, or defect removal which are required to restore a component or piping system to a safe and satisfactory operating condition. The replacement of pressure-retaining items with like items also constitutes a repair.

5.12 Replacement Replacments include spare and renewal components, or parts of a component. It also includes the additional or components such as valves and system changes such as rerouting or piping. It does not include the additional of complete systems.

6.0 COMPONENTS SUBJECT TO EXAMINATION - TVA SAFETY CLASS A

The Class A (ASME Class 1) components to be examined for the PSI are outlined in the following paragraphs. The entire length of each weld described will be examined for the PSI.

All Class A components are subject to volumetric and/or surface examination except component connections, piping, and associated valves (and their supports) that are one-inch nominal pipe size and smaller (see section 6.7). Class A vessels shall not be examined prior to shop or field hydrostatic tests.

When examinations have been completed on the various components, the data sheet(s) in Appendix C shall be completed.

Table A in Appendix A supplies additional information such as reference drawing numbers and Section XI, Table IWB-2600, examination categories.

6.1 Reactor Vessel

6.1.1 Reactor Vessel Seam Welds

6.1.1.1 Circumferential Shell Welds - Beltline Region

There is one circumferential weld in the vessel cylinderical shell located behind the thermal shield. This weld will be ultrasonically examined using remote inspection devices from the vessel I.D. with the core internals removed.

The vessel shell sections are machined forgings fabricated of A-508, Class 2, manganese-molyedenum steel and are clad with weld deposited austenitic stainless steel.

6.1.1.2 Circumferential Shell Weld

There are three circumferential welds in the vessel cylinderical shell located outside of the

beltline region. These welds will be ultrasonically examined using remote inspection devices from the vessel I.D. with the core internals removed.

The vessel shell section material is identified in section 6.1.1.1.

6.1.1.3 Lower Head Welds

There are six meridional welds and one circumferential weld in the lower head. The welds will be ultrasonically examined using remote inspection devices from the vessel I.D. with the core internals removed.

Base metal below the lower head circumferential weld is inaccessible for examination from the vessel I.D. due to instrumentation penetrations (weld No. WOl-02). A manual ultrasonic examination of this area will be conducted from the vessel O.D. (see Request for Relief ISI-6).

The bottom head sections are fabricated of A-533, Gr. B, Class 1, manganese-molybdenum steel, and are clad with weld deposited austenitic stainless steel.

6.1.1.4 Closure Head Circumferental Weld

The head cap weld will be manually ultrasonically examined from the head O.D. The closure head does not include any meridional welds.

The closure head ring is fabricated of A-508, Class 2, manganese-molybedenum steel. The closure head hemispherical section is fabricated of A-533, Gr. B, Class 1, manganese-molybdenum steel. Both sections are clad with weld deposited austenitic stainless steel.

6.1.1.5 Vessel-To-Flange And Head-To-Flange Weld

The vessel-to-flange weld will be ultrasonically examined from the vessel I.D. with remote inspection devices. The head-to-flange weld will be manually ultrasonically examined from the head O.D.

The vessel and closure head flange sections are fabricated of A-508, Class 2, manganese-molybdenum steel and are clad internally and on the gasket face with weld deposited austenitic stainless steel.

6.1.2 Reactor Vessel Nozzle-To-Vessel Welds And Inside Radiused Sections

There are four inlet nozzles (27.441 inch I.D.) and four outlet nozzles (28.937 inch I.D.). The nozzle-to-vessel welds and nozzle inside radiused sections (including outlet nozzle integral extensions) will be ultrasonically examined from the I.D. using remote inspection devices.

In addition to the above examinations, all vessel nozzles cladding will be ultrasonically examined at the end of each 10-year inspection interval using techniques at least as sensitive as those used to conduct the supplemental examinations performed prior to fuel loading. The results of this examination shall be reported to NRC.

The nozzle forgings are fabricated of A-508, Class 2, manganese-molybdenum steel and are clad with weld deposited austenitic stainless steel.

6.1.3 Reactor Vessel Penetrations And Attachments

The control rod drive, upper head injection, vent pipe, and instrumentation penetrations shall be visually examined by CONST for leakage during the ASME Section III hydrostatic pressure test.

6.1.4 Reactor Vessel Nozzle-To-Safe End Welds

The nozzle-to-safe end welds shall be ultrasonically examined from the I.D. using remote inspection devices. In addition, these welds will be liquid penetrant examined (from O.D.).

6.1.1.5 VesselToFlange And HeadToFlange Weld (Continued)

The nozzle ends include a buttered safe-end of 309 and 308L and are extended with a stainless steel ring of SA-182, Type 304.

6.1.5 Reactor Vessel Closure Studs, Nuts, Ligaments, And Washers

The vessel flange studs and nuts shall be ultrasonically and magnetic particle examined. The vessel flange ligaments between threaded stud holes shall be ultrasonically examined, and closure washers shall be visually examined. Threads in base material do not require additional examination.

There is no additional pressure-retaining bolting associated with the vessel.

Studs, nuts, and washers are fabricated of SA-540, Gr. B24, nickle-chrome-molybdenum steel with a manganese-phosphate surface treatment.

6.1.6 Integrally-Welded Reactor Vessel Supports

There are no integrally-welded vessel supports. The vessel is supported by four support pads located on the bottom of two outlet nozzles (15 and 17) and two inlet nozzles (13 and 14, Reference Drawing CN-M-2547-B).

6.1.7 Reactor Vessel And Closure Head Cladding

There are six clad patches (36 square inches each) in the vessel cladding that shall be visually examined. There are six clad patches (36 square inches each) in the closure head cladding which shall be visually and liquid penetrant examined. Color photographs, video tapes, or other recording systems of the inspection areas may be used for comparison with inservice inspections.

Reactor vessel and closure head cladding is of weld deposited austenitic stainless steel.

6.1.8 Reactor Vessel Interior And Removable Core-Support Structures

The space above and below the reactor core that is made accessible for visual examination by the removal of components during normal refueling outages shall be visually examined.

Visual examinations shall also be performed on removable core support structures of the vessel. The examinations shall include 100 percent of the visually accessible attachment welds and visually accessible surfaces of the core support structure. The structures shall be removed from the vessel for these examinations.

6.1.9 Reactor Vessel Control Rod Drive Housings

The pressure-retaining welds in the peripheral control rod drive housings shall be ultrasonically examined.

6.1.9 Reactor Vessel Control Rod Drive Housings (Continued)

The housings consist of a 6-inch O.D. adapter of A-182, 304SS and a 4-inch O.D. body of SB-167.

6.1.10 Reactor Vessel Auxiliary Head Adapters

The pressure-retaining welds in the four auxiliary head adapters shall be ultrasonically examined. The dissimilar metal welds shall also be liquid penetrant examined.

The adapters consist of SA-182, 304 stainless steel (upper portion), SB-166 (lower portion), and a weld buildup from the vessel head. The weld buildup is considered an integral part of the vessel head and does not require examination.

6.2 Pressurizer

6.2.1 Pressurizer Longitudinal And Circumferential Welds

There are four longitudinal welds and five circumferential welds in the shell cylinderal region. These welds shall be ultrasonically examined. There are no circumferential or meridional head welds.

All shell and head sections are fabricated of SA-533, Gr. A, Class 2, manganese-molybdenum steel and are clad with austenitic stainless steel.

6.2.2 Pressurizer Nozzle-To-Vessel Welds And Inside Radiused Sections

There are four 6-inch nozzles, one 4-inch nozzle, and one 14-inch nozzle. The nozzle-to-vessel welds and nozzle inside radiused sections will be ultrasonically examined.

The nozzles are fabricated of SA-508, Class 2, manganese-molybdenum steel.

6.2.3 Pressurizer Heater Penetrations

The pressurizer lower head heater penetrations shall be visually examined by CONST for leakage during the ASME Section III hydrostatic pressure test.

6.2.4 Pressurizer Nozzle-To-Safe End Welds

Each nozzle includes a welded forging safe end. The nozzle-to-safe end welds shall be ultrasonically and liquid penetrant examined.

Safe-end connections are SA-182, Gr. F-316L forgings.

6.2.5 Pressurizer Pressure-Retaining Bolting

The bolting on the pressurizer manway shall be visually examined. The bolting may be examined either in place under tension or when the bolting is removed.

6.2.5 Pressurizer PressureRetaining Bolting (Continued)

The manway includes 16 bolts at 1.88 inches in diameter. The bolts are fabricated to SA-193, Gr. B7.

6.2.6 Pressurizer Integrally-Welded Vessel Support

The pressurizer support skirt-to-vessel weld shall be ultrasonically examined. The support skirt is fabricated of SA-516, Gr. 70, carbon steel plate.

6.2.7 Pressurizer Cladding

A clad patch (36 square inches) in the pressurizer interior cladding near the manway shall be visually examined.

Interior cladding is of austenitic stainless steel.

6.3 Steam Generators (4)

6.3.1 Steam Generator Primary Longitudinal And Circumferential Welds

The primary head-to-tube sheet weld on each generator shall be ultrasonically examined. There are no primary longitudinal welds.

The tube plate is a SA-508, Class 2, steel forging, clad on the primary side with NiCrFe alloy (Inconel). The hemispherical chamber is a SA-216, Gr. WCC, casing, clad with austenitic stainless steel.

6.3.2 Steam Generator Primary Nozzle-To-Head Welds And Inside Radiused Sections

The steam generator primary nozzles are integrally cast with the hemispherical chamber. The nozzles inside radiused sections cannot be ultrasonically examined and achieve meaningful results due to limitations of examining integrally cast material (see Request for Relief ISI-7).

The nozzles are fabricated to SA-216, Gr. WCC.

6.3.3 Steam Generator Primary Nozzle-To-Safe End Welds

The steam generator primary nozzle-to-safe end welds shall be ultrasonically and liquid penetrant examined.

The nozzles have buttered 308L safe ends.

6.3.4 Steam Generator Primary Pressure-Retaining Bolting

The bolting on the manway covers (2) on the primary side of all the generators shall be visually examined. The bolting may be examined either in place under tension or when the bolting is removed.

Each manway has 16 bolts at 1.88 inches in diameter. The bolts are fabricated to SA-193, Gr. B7.

6.3.5 Steam Generator Integrally-Welded Vessel Supports

There are no integrally-welded vessel supports. The four main support pads are secured to the steam generator field support system by high strength bolts.

6.3.6 Steam Generator Vessel Cladding

A clad patch (36 square inches) in the steam generator interior cladding near each generator manway shall be visually examined.

The hemispherical chamber is clad with austenitic stainless steel.

6.3.7 Steam Generator Tubing

Each steam generator tube bundle consists of 4,674 NiCrFe alloy (Inconel SB-163) U-tubes of 0.750 O.D. by 0.042 average wall thickness.

All tubes shall undergo a preservice inspection by eddy current examination. The preservice examination shall be performed in accordance with Appendix IV of the 1974 Edition, Summer 1976 Addenda of Section XI and Regulatory Guide 1.83, Rev. 1.

6.3.7.1 Acceptance Criteria

6.3.7.1.1 As used In This Section:

6.3.7.1.1.1 Imperfection means an exception to the dimensions, finish or contour of a tube from that required by fabrication drawings or specifications.

Eddy-current testing indications below 20 percent of the nominal tube wall thickness, if detectable, may be considered as imperfections.

6.3.7.1.1.2 Degradation means a service-induced cracking, wastage, wear, or general corrosion occuring on either inside or outside of a tube.

6.3.7.1.1.3 Degraded Tube means a tube containing imperfections ≥ 20 percent of the nominal wall thickness caused by degradation.

6.3.7.1.1.4 Percent Degradation means the percentage of the tube wall thickness affected or removed by degradation.

6.3.7.1.1.5 Defect means an imperfection of such severity that it exceeds the plugging limit. A tube containing a defect is defective.

6.3.7.1.1.6 Plugging Limit means the imperfection depth at or beyond which the tube shall be removed from service because it may become unserviceable prior to the next inspection and is equal to 40 percent of the nominal tube wall thickness.

6.3.7.1.1.7 Unserviceable describes the condition of a tube if it leaks or contains a defect large enough to affect its structural integrity

in the event of a seismic occurrence greater than the Operating Basis Earthquake, a loss-of-coolant accident requiring actuation of the engineered safeguards, or a steam line or feedwater line break.

6.3.7.1.1.8 Tube Inspection means an inspection of the steam generator tube from the point of entry (hot leg side) completely around the U-bend to the top support of the cold leg.

6.3.7.1.1.9 Preservice Inspection means a tube inspection of each steam generator tube performed by eddy current techniques prior to service to establish a baseline condition of the tubing. This inspection shall be performed prior to initial power operation using the equipment and techniques expected to be used during subsequent inservice inspections.

6.3.7.1.2 All defective tubes and tubes containing through-wall cracks shall be plugged.

6.4 Piping

All Class A piping systems to be examined are fabricated of stainless steel. The reactor coolant main loop piping straight lengths are centrifugal cast and the elbows are static cast. The upper head injection auxiliary head adapter is included in Section 6.1.10. Specific material specifications for each piping system are included in weld map isometrics in Appendix A.

The following Class A piping systems are subject to examination:

Reactor Coolant
Chemical and Volume Control
Residual Heat Removal
Safety Injection
Upper Head Injection

6.4.1 Circumferential And Longitudinal Pipe Welds

The entire length of each circumferential and longitudinal pipe weld shall be ultrasonically examined as practical.

6.4.2 Branch Pipe Connection Welds

All branch pipe connection welds exceeding six inches in diameter shall be ultrasonically examined. Each branch pipe connection weld six inches in diameter and smaller shall be liquid penetrant examined.

6.4.3 Piping Socket Welds

Each socket weld shall be liquid penetrant examined. as practical. CONST Section III examination data will be used for liquid penetrant examination of field welds. (Complete Data Sheet 2 in Appendix C when CONST Examination Procedure(s) obtained).

6.4.4 Piping Integrally-Welded Supports

All piping integrally-welded external support attachments shall be ultrasonically examined. Integrally-welded external support attachments include those supports which have attachment welds to the piping pressure-retaining boundary.

6.4.5 Piping Support Components

All piping support components shall be visually examined. This examination includes integrally-welded and nonintegrally-welded support components. The support settings of constant and variable spring type hangers, snubbers, and shock absorbers shall also be verified.

6.4.6 Piping Pressure-Retaining Bolting

There is no Class A pressure-retaining bolting 2 inches in diameter or larger. Class A bolting less than 2 inches in diameter shall be visually examined. These examinations shall include bolts, studs, and nuts. (See Weld Map Isometrics in Appendix A for location of bolted connections).

The bolting may be examined either in place under tension, when the connection is disassembled, or when the bolting is removed.

6.4.7 Piping Safe-End Welds

There are no piping safe-end welds other than those discussed in Sections 6.1.4, 6.2.4, and 6.3.3.

6.5 Reactor Coolant Pumps (4)-RCP

6.5.1 RCP Pressure-Retaining Bolting

The main flange on each pump includes 24 bolts at 4-1/2 inches in diameter. The lower seal housing on each pump includes 12 socket head cap screws at 2 inches in diameter.

The bolts and screws shall be ultrasonically examined and shall be surface examined if removed. Threads in the base material and flange ligaments between threaded stud (screw) holes shall be visually examined if the connection is disassembled.

Pressure-retaining bolting less than two inches in diameter shall be visually examined (No. 1, 2, and 3 seal assembly bolting). The examinations shall include bolts or studs and nuts.

All bolting may be examined either in place under tension, when the connection is disassembled, or when the bolting is removed.

The main flange bolts are fabricated to SA-540, Gr. B24 and the socket head cap screws are fabricated to SA-193, Gr. B7.

6.5.2 RCP Integrally-Welded Supports

There are no integrally-welded supports associated with the RCP.

6.5.3 RCP Support Components

Each RCP includes three support components bolted to pump feet, which are integrally cast with the pump. Each support component shall be visually examined.

6.5.4 RCP Casing Welds

Each pump includes a two-piece welded type 304SST casing. The casing welds cannot be ultrasonically examined and achieve meaningful results due to limitations of examining integrally cast material. In lieu of this requirement the casing welds shall be surface examined (see Request for Relief ISI-9).

6.5.5 RCP Casings

The internal pressure boundary surfaces of each pump shall be visually examined. In shop visual examinations will be used.

6.5.6 RCP Flywheel

Each RCP flywheel shall undergo a complete ultrasonic examination and shall also be surface examined in accordance with Regulatory Guide 1.14.

Shop examination data will be used to satisfy examination requirements.

The flywheel consists of two plates, approximately 5-inches and 8-inches thick, bolted together. Each plate is fabricated from vacuum degassed A-533, Gr. B, Class 1 steel.

6.6 Valves

6.6.1 Valve Pressure-Retaining Bolting

There is no Class A pressure-retaining bolting two inches in diameter or larger. Class A bolting less than two inches in diameter shall be visually examined. These examinations shall include bolts, studs, and nuts. (See Weld Isometric in Appendix A for location and identification of valves.)

The bolting may be examined either in place under tension, when the connection is disassembled, or when the bolting is removed.

6.6.2 Valve Integrally-Welded Supports

All valve integrally-welded external support attachments shall be ultrasonically examined.

Integrally-welded external support attachments include those supports which have attachment welds to the valve pressure-retaining boundary.

6.6.3 Valve Support Components

All valve support components shall be visually examined. This examination includes integrally-welded and nonintegrally-welded support components. The support settings of constant and variable spring type hangers, snubbers, and shock absorbers shall also be verified.

6.6.4 Valve Body Welds

There are no Class A valves with body welds.

6.6.5 Valve Bodies

The internal pressure boundary surfaces of one valve in each group of valves of the same constructional design (i.e., globe, gate, check), manufacturing method, and manufacturer that performs similar functions in the system shall be visually examined. The examinations shall include valves exceeding 4-inch nominal pipe size.

6.7 Exempted Components

All components exempted from examination in accordance with IWB-1220 of ASME Section XI shall be visually examined for leakage during system hydrostatic pressure tests. See Section 9.0. Components exempted from examination include component connections, piping, and associated valves (and their supports) that are 1-inch nominal pipe size and smaller.

7.0 COMPONENTS SUBJECT TO EXAMINATION - TVA SAFETY CLASS B

The Class B (ASME Class 2) components to be examined for the PSI are outlined in the following paragraphs. All components to be examined for inservice inspections during the service life of the plant will be examined for the PSI. Selection of areas for examination will be in accordance with paragraph IWC-2411 and Table IWC-2520 of ASME Section XI. The Programs and Procedures Section shall select areas to be examined or the Inspection Section may assist in selecting areas to be examined.

Components that are exempted from examination in accordance with IWC-1220 of ASME Section XI are discussed in Section 7.6 of this program.

Class B vessels shall not be examined prior to the field hydrostatic tests.

Where examinations specify a percentage of the total length of weld be examined, the area(s) examined shall be physically marked on the component and documented in the examination report. Where a percentage of weld length is not referenced, the entire weld length shall be examined.

When examinations have been completed on the various components, the data sheet(s) in Appendix C shall be completed.

Table B in Appendix A supplies additional information such as reference drawing numbers and ASME Section XI Table-2520 examination categories.

7.1 Steam Generators (4)

7.1.1 Steam Generator Secondary Circumferential Welds

There are five circumferential shell welds located at structural discontinuities on the secondary side of each steam generator. A total of five welds, all at different locations from the four generators, will be selected for ultrasonic examination and shall be distributed among the four generators. The examinations shall cover at least twenty percent of each weld selected for examination, uniformly distributed among three areas around the vessel circumference.

One of the five welds selected for examination is partially inaccessible due to the upper steam generator support arrangement (weld nos. SG-4B-5-1, 2, 3, or 4; see Request for Relief ISI-5). The weld selected for examination will be ultrasonically examined on a best effort basis.

The vessel shell and head sections are fabricated of SA-533, Gr. A, Class 1 steel plate.

7.1.2 Steam Generator Secondary Nozzle-To-Vessel Welds

There is one feedwater nozzle (16-inch I.D.), one feedwater by-pass nozzle (6-inch I.D.), and one main steam nozzle (32-inch I.D.) per generator. A total of three nozzle-to-vessel welds from the four generators will be ultrasonically examined and shall be distributed among three of the generators (one feedwater, one feedwater by-pass, and one main steam nozzle).

The nozzles are fabricated of SA-508, Class 2, steel.

7.1.3 Steam Generator Integrally-Welded Supports

There are no integrally-welded vessel supports.

7.1.4 Steam Generator Pressure-Retaining Bolting

Bolting on the two manway covers on the secondary side of each generator is not greater than two inches in diameter (see Request for Relief ISI-6). Each manway has 20 bolts at 1-1/4 inches in diameter.

7.2 Residual Heat Removal Heat Exchangers (2) - RHRHX

7.2.1 RHRHX Circumferential Welds

There are two circumferential welds located at structural discontinuities on the tube side of each RHRHX. A total of two welds from the two heat exchangers will be selected for ultrasonic examination and shall be distributed among the two RHRHX. The welds selected shall be located at different areas. The examinations shall cover at least twenty percent of each weld selected for examination, uniformly distributed among three areas around the vessel circumference.

The welds include the channel cylinder section to channel flange weld and the channel cylinder section to channel head weld. The channel flange is fabricated from SS, SA-336-F8. The channel cylinder section and channel head are from SS, SA-240, TP-304.

7.2.2 RHRHX Nozzle-To-Vessel Welds

The channel cylinder section of each RHRHX includes one inlet nozzle (14-inch I.D.) and one outlet nozzle (14-inch I.D.). A total of two nozzle-to-vessel welds from the two RHRHX will be ultrasonically examined and shall be distributed among the two heat exchangers (one inlet nozzle and one outlet nozzle).

The nozzles are fabricated from SS, SA-336-F8.

7.2.3 RHRHX Integrally-Welded Supports

There are two integrally-welded support attachments on each RHRHX. A total of two support pad-to-vessel welds from the two heat exchangers will be liquid penetrant examined and shall be distributed among the two heat exchangers (a different support on each heat exchanger).

The support pad is fabricated from SS, SA-240, TP-304.

7.2.4 RHRHX Pressure-Retaining Bolting

The channel flange bolting on each vessel is less than 2 inches in diameter (see Request for Relief ISI-8).

Each flange includes 52 studs with nuts at 1-1/8 inches in diameter. The studs and nuts are fabricated from SA-193, Gr. B7 and SA-194, Gr. 2H respectively.

7.3 Piping

Material specifications for each piping system are included in weld map isometrics in Appendix A. The following Class B piping systems are subject to examination:

Residual Heat Removal
Safety Injection
Main Steam
Feedwater
Auxiliary Feedwater
Containment spray

7.3.1 Piping Circumferential Welds

Circumferential welds subject to examination shall include those welds at structural discontinuities and welds within three pipe diameters of the centerline of rigid pipe anchors, or anchors at the penetrations of primary containment, or at rigidly anchored components. Selection of areas to be examined shall be in accordance with IWC-2411 and Table IWC-2520 of ASME Section XI.

The entire length of each weld selected shall be ultrasonically examined.

7.3.2 Piping Longitudinal Welds

Areas subject to examination include longitudinal welds in fittings (i.e., tees, elbows, reducers). The entire length of each weld selected for examination in accordance with IWC-2411 and Table IWC-2520 of ASME Section XI shall be ultrasonically examined.

7.3.3 Branch Pipe Connection Welds

The entire length of all branch pipe connection welds selected for examination in accordance with IWC-2411 and Table IWC-2520 of Section XI will be ultrasonically examined.

7.3.4 Piping Pressure-Retaining Bolting

There is no pressure-retaining bolting larger than 2 inches in diameter (see Request for Relief ISI-8).

7.3.5 Piping Integrally-Welded Supports

All piping integrally-welded external support attachments shall be surface examined. Integrally-welded external support attachments include those supports which have attachment welds to the piping pressure-retaining boundary.

7.3.6 Piping Support Components

All piping support components shall be visually examined. This examination includes integrally-welded and nonintegrally-welded support components. The support settings of constant and variable spring type hangers, snubbers, and shock absorbers shall also be verified.

7.4 Residual Heat Removal Pumps (2) - RHRP

7.4.1 RHRP Casing Welds

The RHRP casing does not include any casing welds. The casing is a one piece forging fabricated to SA-182 F304.

7.4.2 RHRP Pressure-Retaining Bolting

The stuffing box extension to pump casing connection bolting is not greater than two inches in diameter (see Request For Relief ISI-8).

The connection includes 24 studs at 2-inches in diameter with nuts and washers. The studs are fabricated to SA-453, Gr. 660, and the nuts to SA-194, Gr. 6.

7.4.3 RHRP Integrally-Welded Supports

There are no integrally-welded supports associated with the RHRP.

7.4.4 RHRP Support Components

Each RHRP includes three support components bolted to the pump feet, which are integrally forged with the pump.

Each support component shall be visually examined.

7.5 Valves

7.5.1 Valve Body Welds

There are no Class B valves with body welds.

7.5.2 Valve Pressure-Retaining Bolting

There is no Class B pressure-retaining bolting greater than 2 inches in diameter (See Request for Relief ISI-8).

7.5.3 Valve Integrally-Welded Supports

All valve integrally-welded external support attachments shall be surface examined. Integrally-welded external support attachments include those supports which have attachment welds to the valve pressure-retaining boundary.

7.5.4 Valve Support Components

All valve support components shall be visually examined. This examination includes integrally welded and nonintegrally welded support components. The support settings of constant and variable spring type hangers, snubbers, and shock absorbers shall also be verified.

7.6 Exempted Components

All components exempted from examination in accordance with IWC-1220 of ASME Section XI shall be visually examined for leakage during system hydrostatic pressure tests. See Section 9.0 and Table 7.6.

Components exempted from examination include (1) components in systems where both the design pressure and temperature are equal to or less than 275 psig and 200 F, respectively; (2) components in systems or portions of systems, other than emergency core cooling systems, which do not function during normal reactor operation; (3) component connections, piping, and associated valves, and vessels (and their supports), that are 4-inch nominal pipe size and smaller.

8.0 COMPONENTS SUBJECT TO EXAMINATION - TVA SAFETY CLASS C AND D

8.1 Hydrostatic Pressure Tests

In accordance with 10 CFR 50, Section 50.55a(g)(2), a a preservice examination of TVA Class C and D (ASME Class 3) components is not required. However, components will be visually examined for leakage by CONST during the system hydrostatic pressure tests required by ASME Section III.

11.4 Volumetric Examination (Radiographic)

Radiographic techniques, employing penetrating radiation such as X-rays, gamma rays, or thermalized neutrons, may be utilized with appropriate image recording devices such as photographic film or papers, electrostatic systems, direct-image orthicons, or image converters. For radiographic examinations employing either X-ray equipment or radioactive isotopes and photographic films, the procedure shall be as specified in Article 2, Section V, of the ASME Code.

11.5 Volumetric Examination (Ultrasonic)

Ultrasonic examination shall be conducted in accordance with the provisions of Appendix I of Section XI of the ASME Code. Where Appendix I (I-1200) is not applicable, the provisions of Article 5 of Section V of the ASME Code shall apply except as noted in Section 3.0 of this program.

11.6 Volumetric Examination (Eddy Current)

Eddy current examination of heat exchanger tubing shall be conducted in accordance with the provisions of Appendix IV of Section XI of the ASME Boiler and Pressure Vessel Code (Summer 1976 Addenda).

12.0 QUALIFICATIONS OF NONDESTRUCTIVE EXAMINATION PERSONNEL

Personnel performing nondestructive examination operations shall be qualified in accordance with IWA-2300 of ASME Section XI (DPM N75C01 for NUC PR).

13.0 ACCEPTANCE CRITERIA

All acceptance standards for Class A and B components shall be in accordance with IWA-3000 of ASME Section XI, except where ASME Section III examinations are employed to satisfy ASME Section XI requirements.

14.0 REPAIRS

This section provides requirements for repair of the pressure retaining boundary of TVA Safety Class A, B, C, and D (ASME Class 1, 2, and 3) components (and their supports). The repair program is included in OQAM Part II, Section 2.1.

Repairs shall be performed in accordance with the Design Specification and Construction Code of the component or system. Later editions of the Construction Code or Section III, either in its entirety or portions thereof, may be used. If repair welding cannot be performed in accordance with these requirements, the repair may be made in accordance with IWA-4000 and IWB-4000, IWC-4000, or IWD-4000 as applicable. Material shall conform to the requirements of either the original design specification or ASME Section III.

After repairs by welding on the pressure-retaining boundary of components, a hydrostatic pressure test shall be performed in accordance with IWA-5000 and IWB-5000, IWC-5000, or IWD-5000 as applicable of ASME Section XI. The following may be exempted from these pressure tests exclusive of those repairs employing a temper bead technique:

(1) Cladding repairs,

(2) Heat exchanger tube plugging,

(3) Piping, pump, and valve repairs that do not penetrate through the pressure boundary,

(4) Pressure vessel repairs where the repaired cavity does not exceed 10 percent of the minimum design wall thickness, and

(5) Component connections, piping, and associated valves that are one inch nominal pipe size and smaller.

Repaired areas shall be examined in accordance with applicable nondestructive methods to establish a preservice record (See Sections 6.0, 7.0, and 8.0). These examinations shall include the method that detected the flaw. If the repair is performed in accordance with the provisions of the code applicable to the construction of the component, any additional nondestructive examinations required by the Construction Code shall be performed (excluding pressure test requirements). The requirements are not applicable if the repair includes the complete removal or isolation of the item bearing the flaw, such as heat exchanger tube plugging.

The services of an Authorized Inspection Agency shall be used when making a repair. The ANI shall assure that the repair welding procedures and welders are qualified in accordance with IWA-4000 of ASME Section XI. (See Section 10.0).

The records and reports of Section 16.0 shall be completed for all repairs.

15.0 REPLACEMENTS

This section provides requirements for replacements of TVA Safety Class A, B, C, and D (ASME Class 1, 2, and 3) components (and their supports). Additional requirements are included in OQAM, Part II, Section 3.0.

Replacements shall meet the requirements of the edition of the Construction Code to which the original component or part was constructed (the Code Edition and Addenda shall be specified). Replacements ordered as spares for future use at an unspecified time should meet the requirements of the Construction Code Edition

used for the original part or component that is intended to be replaced. DPM N76A10 shall be used as applicable. Replacements for parts or components originally constructed without code requirements shall be in accordance with the original design, fabrication, and inspection requirements for the part or component being replaced.

Alternatively, replacements may meet all or portions of the requirements or later editions of the Construction Code, provided that the following requirements are met:

(1) The requirements affecting the design, fabrication, and examination of the replacement are reconciled with TVA's specification.

(2) Mechanical interfaces, fits, and tolerances that provide satisfactory performance are not changed by the later edition of the Construction Code.

(3) Modified or altered designs are reconciled with TVA's specifications through the Stress Analysis Report, Design Report, or other suitable method which demonstrates the satisfactory use for the specified design and operating conditions, whichever is applicable.

(4) Materials are compatible with the installation and system requirements.

Prior to authorizing the installation of a replacement, an evaluation of the suitability of the replacement shall be conducted. If a replacement is required because of failure of a part or component, the evaluation shall consider cause(s) of failure of the existing part or component to assure that the selected replacement is suitable. If cause of failure appears to be a deficiency in the specification for the existing part or component, the specification for the replacement shall reflect appropriate corrective provisions. Any such corrective provisions shall be consistent with relevant requirements of the Construction Code in effect at the time of specification revision. The report of the evaluation shall be made a part of the replacement record.

Welding required for the installation of a replacement shall be performed by welders who are qualified in accordance with ASME Section IX, and by using procedures that are qualified in accordance with ASME Section IX, and the additional heat treating and impact tests required by IWB-4000 of ASME Section XI.

The application of the ASME NA symbol stamp is neither required nor prohibited for the installation of replacements.

The following items and parts are exempt from the requirements of this section:

(a) gaskets;

(b) instruments;

(c) electrical conducting and insulating material;

(d) piping, valves, and fitting 1 in. nominal pipe size and less, except that materials and primary stress levels shall be consistent with the requirements of the applicable Construction Code. Detailed stress analysis and consideration of secondary stress is not required.

(e) nonstructural pump and valve internals except when the original equipment was constructed in accordance with a Construction Code or Code Case;

(f) pump seal package and valve packing.

The following reports and records shall, to the extent required by the Construction Code and this section be maintained by TVA as applicable:

(1) Certified Design Specification

(2) Certified Stress Report

(3) Design Report

(4) Overpressure Protection Reort

(5) Manufacturer's Data Report

(6) Material Certification

(7) Evaluation Report of Replacements

Revisions to existing reports, records, and specifications may be shown as an amendment, or as a supplement, and attached to the original record or report to provide an up-to-date record of the replacement.

A preservice inspection shall be made in accordance with IWB-2100, IWC-2100, and IWD-2100 of ASME Section XI for the component and part replaced, as applicable, and including the joints that connect the replaced component or part to the system, prior to return of the plant to service.

ASME Section XI repairs and replacements may be coordinated as necessary with the Metallurgy and Standards Group of the Technical Services. Repairs and replacements which require NDE shall be coordinated with the Inspection Section.

15.1 Installation of Replacements - TVA Safety Class A

Flanged joints may be used in piping systems. Expanded joints shall not be used in piping systems.

Threaded joints in which the threads provide the only seal shall not be used in pipe joint configurations. If a seal weld is employed as the sealing medium, the stress analysis of the joint shall include the stresses in the weld resulting from the relative deflections of the mated parts.

Flared, flareless, and compression-type tubing fittings may be used for tubing sizes not exceeding 1 in. O.D. within the limitations of applicable standards and requirements (2) and (3) below. In the absence of such standards or specifications, the cognizant engineer shall determine that the type of fitting selected is adequate and safe for the design conditions in accordance with the following requirements:

(1) The design pressure or pressure ratings shall be reconciled with the TVA's specifications.

(2) Fittings and their joints shall be suitable for the tubing with which they are to be used in accordance with the minimum wall thickness of the tubing and method of assembly recommended by the manufacturer.

(3) Fittings shall not be used in services that exceed the manufacturer's maximum pressure-temperature recommendations.

(4) Fittings shall be installed in accordance with the manufacturer's recommendations.

The methods of ASME Section III, Appendix E, shall be used to determine bolt size and torquing loads, unless mating parts built to other requirements make this impractical.

The rules and requirements of Section 14.0 shall apply to the attaching of replacements to the system where such attachment is by welding.

Materials shall comply with the requirements to which the original component or part was constructed. As an alternative, materials may comply with the requirements of ASME Section III, NB-2000 provided the requirements of Section 15.0 are met.

15.2 Installation of Replacements - TVA Safety Class B

Nonwelded piping joints shall meet the requirements of NC-3671 or ASME Section III.

The methods of ASME Section III, Appendix E, shall be used to determine bolt size and torquing loads, unless mating parts built to other requirements make this impractical.

The rules and requirements of Section 14.0 shall apply to the attaching of replacements to the system where such attachment is by welding.

Materials shall comply with the requirements to which the original component or part was constructed. As an alternative, materials may comply with the requirements of ASME Section III, NC-2000 provided the requirements of Section 15.0 are met.

15.3 Installation of Replacements - TVA Safety Class C and D

Nonwelded piping joints shall meet the requirements of ND-3671.

The methods of ASME Section III, Appendix E, shall be used to determine bolt size and torquing loads, unless mating parts built to other requirements make this impractical.

The rules and requirements of Section 14.0 shall apply to the attaching of replacements to the system where such attachment is by welding.

Materials shall comply with the requirements to which the original component or part was constructed. As an alternative, materials may comply with the requirements of ASME Section III, ND-2000 provided the requirements of Section 15.0 are met.

16.0 RECORDS AND REPORTS

16.1 Recording of and Report of Examinations

A detailed report of all examinations shall be prepared by the performing or responsible organization and shall contain but not be limited to the following information:

(1) Date and time of examination

(2) Identification of part examined including wall thickness, type material, part temperature, and unit identification

(3) Identification of TVA's or contractor's examiner and personnel certification

(4) Type of examination (PT, UT, etc.) and specific NDE procedure used

(5) Certification of NDE materials such as penetrant, couplant, etc

(6) Results of examination

(7) Corrective action and repairs

(8) M&TE and inspection equipment used and their calibration due dates

(9) For eddy current examination of heat exchange tubing, the report shall include a record indicating the tube(s) examined (this may be marked on a tube sheet sketch or drawing), the extent to which each tube was examined, the location and depth of each reported indication, and the identification or the operator(s) and data evaluator(s) who conducted each examination or part thereof.

All procedures and equipment shall be identified sufficiently to permit duplication of the examination at a later date. This shall include initial calibration data for the equipment and any significant changes.

A marked drawing or sketch shall indicate the weld or part examined. Information should also include all other pertinent data that would later permit duplication or relocation of a flaw, such as transducer type, size, shape, frequency, beam angle, couplant, and distances from some given reference points.

All required and pertinent information will be recorded on the appropriate data sheets by the performing organization. When portions of the inspection work are contracted, a detailed report will be submitted to TVA by the contractor with all pertinent and required information. TVA will retain the original copies of all raw data taken. The Inspection Section shall prepare detailed reports for the remaining inspection work.

The Inspection Section shall prepare and/or review and approve the final report. The final report shall be submitted to the Plant Superintendent for retention at the plant site. Alternatively, final reports may be submitted as portions of the PSI are completed (i.e., final report of reactor vessel examination). These final reports shall be filed at the plant site with the Data Sheets of Appendix C of this program as discussed in Section 4.0 of this program.

16.2 PSI Report for Class A and B Components

A PSI report(s) for Class A and B components shall be prepared and submitted to NRC within ninety days after completion of the PSI. The report shall be prepared by the NCO QA Staff and submitted to the Regulatory Staff for submittal to NRC.

The PSI report shall have a cover sheet providing the following information:

(1) Date

(2) Name of owner and address of corporate offices

(3) Name and address of nuclear generating plant in which the nuclear power unit is located

(4) Name or number assigned to the nuclear power unit by TVA

All reports shall have a summary providing the following information:

(1) National Board Number assigned by the manufacturer to the pressure vessel or component

(2) Names of the components or parts of the components for which this is a record, including such information regarding size, capacity, material, location, and drawings as may aid accurate identification.

(3) Name of the manufacturer of the components or parts for which this is a record, including the manufacturer's component or part numbers and such information regarding the manufacturer's corporate office or manufacturing plant locations as may aid in gaining access to the manufacturer's records regarding the components or parts that the manufacturer is maintaining in accordance with requirements of ASME Section III.

(4) Date of completion of the preservice inspection

(5) Name or names of the Inspector(s) when required

(6) Name and mailing address of the employer(s) of the Inspector(s)

(7) Abstract of examinations performed, conditions observed, corrective measures recommended and taken

(8) Signature of Inspector, when required

The PSI Report shall have an owner's data report for inservice inspection, Form NIS-1 as shown in Appendix II of ASME Section XI.

16.3 Records for Class A, B, C, and D Components

The following records shall be available for review:

(1) Examination Plans

(2) Examination Results and Reports

(3) Examination Methods and Procedures

(4) Evaluation of Results

(5) Corrective Actions and Repairs

16.4 Records of Hydrostatic Pressure Tests

Records of the visual examinations conducted in accordance with IWA-5000 of ASME Section XI during system hydrostatic tests as required by Section 9.0 of this program should include an itemization of the number and location of leaks found in a system and the corrective actions taken.

*17.0 NOTIFICATION OF INDICATION

Plant management shall be formally notified of the presence of unacceptable indications detected during the performance of nondestructive examinations. Unacceptable indications are defined by the applicable NDE procedure. Formal notification shall consist of completing and submitting to the Plant Superintendent the "Notification of Indication" form in Appendix D of this program.

Part I of the "Notification of Indication" shall be completed and signed by the NDE Level II or III examiner detecting the indication. The NDE Section representative shall assign a sequential number and review and sign the form. If the indication is detected by an outside contractor, the contractor's field supervisor shall review and sign the form. The original shall be sent to the plant superintendent and a copy to the ISI Programs Section.

The plant superintendent or his assistant shall designate the organization (Field Services, Plant Maintenance, or the Office of Engineering Design and Construction-OEDC) responsible for preparing a disposition in Part II of the form and performing the associated corrective action. If the organization assigned responsibility for disposition is unable to determine a satisfactory disposition then the form should be sent to the Mechanical Branch for disposition.

The individual responsible for preparation of the disposition shall sign and date Part II of the form. The cognizant supervisor of the appropriate organization shall review and approve the disposition and sign and date Part II of the form. Copies of the form shall be distributed to the plant superintendent and the ISI Programs Section. The original shall be returned to the NDE Section Representative. One copy shall be filed with the examination report.

If the organization assigned responsibility for corrective action is within NUC PR, they shall evaluate the unacceptable condition and process, as appropriate, in accordance with the requirements of N-OQAM, Part III, Section 7.2. Dispositions to correct the condition under the plant maintenance program shall be processed in accordance with N-OQAM, Part II, Section 2.1. Dispositions other than restoring to original requirements shall be processed as modifications in accordance with N-OQAM, Part II, Section 3.0. Repair and replacement, activities, including coordination with the Authorized Inspection Agency (AIA), shall be performed in accordance with the requirements of N-OQAM, Part II, Section 2.3. Dispositions to accept the condition as-is shall include in Part II of the form the basis for the disposition. In addition for dispositions to accept the condition as-is, a USQD shall be prepared by the appropriate organization in accordance with established procedures. If Construction is responsible for corrective action, it shall be performed in accordnace with the disposition on the Notification of Indication form and to organization responsible for corrective action shall include preservice examination requirements in the repair or replacement work instruction described in N-OQAM, Part II, Section 2.3.

Upon completion of corrective action the NDE Section Representative shall verify completion of corrective action, enter the work instruction and/or DCR numbers on the Notification of Indication form, enter the examination report number if re-examination was performed, and sign and date the form, Part III. The signed form shall remain with the examination report for use as a quality assurance record. If re-examination was performed, a copy of the signed form shall also remain with the re-examination report. Copies of the form shall also be distributed to the plant superintendent and the ISI Programs Section.

18.0 CALIBRATION BLOCKS

Calibration blocks will be used for ultrasonic examinations (a calibration tube will be used for eddy current examination of steam generator tubing). The blocks will be fabricated to the general requirements of ASME Section V and ASME Section XI. The blocks shall be fabricated of the material to be examined or equivalent P numbers. Mill test reports shall be obtained and retained by the NCO QA staff for all calibration blocks. The blocks shall employ drilled holes and/or notches for calibration reflectors (see Request For Relief ISI-1).

The Inspection Section shall maintain as built calibration block drawings, copies of the original drawings and any revisions shall be submitted to the Programs and Procedures Section. The calibration blocks shall be stored at the plant site and maintained by the plant.

19.0 REQUESTS FOR RELIEF

Where TVA has determined that certain code requirements or examinations are impractical, TVA will submit written requests for relief to NRC with information to support the determinations with any proposed alternate examinations. The impractical code requirements or examinations shall be identified in this program, and references to particular requests for relief shall be included.

When impractical examination requirements are identified in the field, the Inspection Section shall notify the Programs and Procedures Section such that the information may be included in this program and requests for relief may be prepared if necessary. The Inspection Section shall submit sketches to the Programs and Procedures Section to identify areas which cannot be examined in accordance with code requirements.

20.0 AUGMENTED INSPECTIONS

20.1 Steam Generator Cold Leg Tubes

The augmented eddy-current test requirements of the steam generator cold leg tubes are TVA imposed and are included in C.E. Cantrell's memorandum to R.C. Parker (L26811215858). This is an inspection of the steam generator tubes from the point of entry (cold leg side) to the top support of the cold leg. This inspection will establish base-line data for future inservice examinations. Report to be submitted with final inservice report. (Section 16.0)

21.1 REFERENCES

21.1 ASME Boiler and Pressure Vessel Code - Section XI through Summer 1975 addenda, Summer 1976 addenda.

21.2 ASME Boiler and Pressure Vessel Code - Section V through Summer 1975 addenda.

21.3 Instruction Manual - 173-inch I.D. Reactor Pressure Vessel - Rotterdam Dockyard Company, Contract No. 71C62-54114-1, N3M-2-3.

21.4 Watts Bar Nuclear Plant Administrative Instruction 3.

21.5 Watts Bar Nuclear Plant Final Safety Analysis Report.

21.6 Westinghouse Technical Manual - Pressurizer, TM 1440-C225, Contract No. 71C60-54114-1, N3M-2-6.

21.7 Westinghouse Technical Manual - Vertical Steam Generators, TM 1440-C254, Contract No. 71C62-54114-1, N3M-2-4.

21.8 Westinghouse Instruction Manual - Auxiliary Heat Exchangers, Contract No. 71C62-54114-1, N3M-2-30.

21.9 Westinghouse Instruction Book - Reactor Coolant Pump, Contract No. 71C62-54114-1, N3M-2-5.

21.10 Ingersoll-Rand Instruction Manual - Residual Heat Removal Pumps, Contract No. 71C62-54114-1, N3M-2-30.

21.11 Watts Bar Nuclear Plant Operational Quality Assurance Manual, Part II, Section 5.1.

21.12 Division Procedure Manual N80E3, N75C01, and N76A10.

TABLE 7.6

TVA Safety Class B Components Exempt From Examination

System	Reference Drawings	Boundary of Exempted Components	Basis for Exemption
CVC (62)	47W809-1	All components from the 8" RWST pump supply line to the centrifugal charging pump 1A-A and 1B-B and up to the 4" line leading to the reciprocating charging pump 1C.	1
SIS (63)	47W811-1 47W810-1 47W812-1	All components from and including the refueling water storage tank, FCV-63-8 and FCV-63-11 to LCV-62-135, LCV-62-136, to the supply side of the SIS pumps 1A-A and 1B-B, FCV-63-1, HCV-74-34, FCV-72-21, and FCV-72-22.	1
		All components from the containment sump to FCV-63-72, FCV-63-73, FCV-72-44, and FCV-72-45.	1
CS (72)	47W812-1	All components from valves FCV-72-2, 39, 40, and 41 to and including the ring headers.	1
		All components from valves 72-503 and 72-504 through the containment spray test line to the RWST.	1
CS (72)	47W812-1	All components from valves FCV-72-21, 22 44, and 45 to the suction side of the containment spray pumps 1A-A and 1B-B.	1
		All components from the discharge of the containment spray pumps 1A-A and 1B-B to valves FCV-72-2, FCV-72-39, 72-503 and 72-504.	2

NOTES:

(1) Components in systems where both the design pressure and temperature are equal to or less than 275 psig and 200 F, respectively,

(2) Components in systems or portions of sytems, other than emergency core cooling systems, which do not function during normal reactor operation;

TABLE A

WATTS BAR PRESERVICE INSPECTION PROGRAM - CLASS A COMPONENTS

Component	[1]Program Reference Section	Item No. From Table IWB-2600, Section XI	Examination Category From Table IWB-2600, Section XI	Method of Inspection	Reference Drawing No.
A. Reactor Vessel					
1. Circumferential Shell Welds-Beltline Region	6.1.1.1	B1.1	B-A	UT	
2. Circumferential Shell Weld	6.1.1.2	B1.2	B-B	UT	
3. Lower Head Welds	6.1.1.3	B1.2	B-B	UT	
4. Closure Head Circumferential Weld	6.1.1.4	B1.2	B-B	UT	
5. Vessel-to-Flange and Head-to-Flange Welds	6.1.1.5	B1.3	B-C	UT	
6. Nozzle-to-Vessel Welds and Inside Radiused Sections	6.1.2	B1.4	B-D	UT	
7. Vessel Penetrations and Attachments	6.1.3	B1.5	B-E	VT	
8. Nozzle-to-Safe End Welds	6.1.4	B1.6	B-F	UT, PT	
9. Closure Studs and Nuts	6.1.5	B1.8	B-G-1	UT, MT	
10. Ligaments Between Threaded Stud Holes	6.1.5	B1.9	B-G-1	UT	
11. Closure Washers	6.1.5	B1.10	B-G-1	VT	
12. Closure Head Cladding	6.1.7	B1.13	B-I-1	PT, VT	

[1]See Section 6.0 for additional information.

TABLE A
WATTS BAR PRESERVICE INSPECTION PROGRAM - CLASS A COMPONENTS

Component	[1]Program Reference Section	Item No. From Table IWB-2600, Section XI	Examination Category From Table IWB-2600, Section XI	Method of Inspection	Reference Drawing No.
A. Reactor Vessel (Continued)					
13. Vessel Cladding	6.1.7	B1.14	B-J-1	VT	
14. Vessel Interior	6.1.8	B1.15	B-N-1	VT	
15. Removable Core-Support Structures	6.1.8	B1.17	B-N-3	VT	
16. Control Rod Drive Housings	6.1.9	B1.18	B-O	UT	
17. Auxiliary Head Adapter	6.1.10	B4.1, B4.5	B-F, B-J	UT, PT	
B. Pressurizer					
1. Longitudinal and Circumferential Welds	6.2.1	B2.1	B-B	UT	
2. Nozzle-to-Vessel Welds and Inside Radiused Sections	6.2.2	B2.2	B-D	UT	
3. Heater Penetrations	6.2.3	B2.3	B-E	VT	
4. Nozzle-to-Safe End Welds	6.2.4	B2.4	B-F	UT, PT	
5. Pressure-Retaining Bolting	6.2.5	B2.11	B-G-2	VT	
6. Integrally-Welded Vessel Support	6.2.6	B2.8	B-H	UT	
7. Vessel Cladding	6.2.7	B2.9	B-I-2	VT	

[1]See Section 6.0 for additional information.

TABLE A
WATTS BAR PRESERVICE INSPECTION PROGRAM - CLASS A COMPONENTS

Component	[1]Program Reference Section	Examination Category Item No. From Table IWB-2600, Section XI	From Table IWB-2600, Section XI	Method of Inspection	Reference Drawing No.
C. Steam Generators					
1. Primary Head-to-Tube Sheet Weld	6.3.1	B3.1	B-B	UT	
2. Primary Nozzle Inside Radiused Sections	6.3.2	B3.2	B-D	N/A	
3. Primary Nozzle-to-Safe End Welds	6.3.3	B3.3	B-F	UT, PT	
4. Pressure-Retaining Bolting	6.3.4	B3.10	B-G-2	VT	
5. Vessel Cladding	6.3.6	B3.8	B-I-2	VT	
6. Tubing	6.3.7	N/A	N/A	ET	
D. Piping					
1. Circumferential Welds	6.4.1	B4.5	B-J	UT	
2. Longitudinal Welds	6.4.1	B4.5	B-J	UT	
3. Branch Pipe Connection Welds	6.4.2	B4.6	B-J	UT	
4. Branch Pipe Connection Welds	6.4.2	B4.7	B-J	PT	
5. Socket Welds	6.4.3	B4.8	B-J	PT	
6. Integrally-Welded Supports	6.4.4	B4.9	B-K-1	UT	

[1]See Section 6.9 for additional information.

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Revision 2

TABLE A
WATTS BAR PRESERVICE INSPECTION PROGRAM - CLASS A COMPONENTS

Component	[1]Program Reference Section	Examination Category Item No. From Table IWB-2600, Section XI	From Table IWB-2600, Section XI	Method of Inspection	Reference Drawing No.
D. Piping (Continued)					
7. Support Components	6.4.5	B4.10	B-K-2	VT	
8. Pressure-Retaining Bolting	6.4.6	B4.12	B-G-2	VT	
E. Reactor Coolant Pumps					
1. Pressure-Retaining Bolting	6.5.1	B5.1	B-G-1	UT	
2. Pressure-Retaining Bolting	6.5.1	B5.2	B-G-1	UT, PT or MT	
3. Pressure-Retaining Bolting	6.5.1	B5.3	B-G-1	VT	
4. Pressure-Retaining Bolting	6.5.1	B5.9	B-G-2	VT	
5. Support Components	6.5.3	B5.5	B-K-2	VT	
6. Casing Welds	6.5.4	B5.6	B-L-1	PT	
7. Casings	6.5.5	B5.7	B-L-2	VT	
8. Flywheel	6.5.6	N/A	N/A	UT, PT	
F. Valves					
1. Pressure-Retaining Bolting	6.6.1	B6.9	B-G-2	VT	

[1]See Section 6.0 for additional information.

TABLE A
WATTS BAR PRESERVICE INSPECTION PROGRAM - CLASS A COMPONENTS

Component	[1]Program Reference Section	Examination Category Item No. From Table IWB-2600, Section XI	From Table IWB-2600, Section XI	Method of Inspection	Reference Drawing No.
F. Valve (Continued)					
2. Integrally-Welded Supports	6.6.2	B6.4	B-K-1	UT	
3. Support Components	6.6.3	B6.5	B-K-2	VT	
4. Valve Bodies	6.6.5	B6.7	B-M-2	VT	
G. Exempted Components	6.7	B1.19 B2.10 B3.9 B4.11 B5.8 B6.8	B-P	VT	

[1]See Section 6.0 for additional information.

TABLE B

WATTS BAR PRESERVICE INSPECTION PROGRAM - CLASS B COMPONENTS

Component	[1]Program Reference Section	Item No. From Table IWC-2600, Section XI	Examination Category From Table IWC-2600, Section XI	Method of Inspection	Reference Drawing No.
A. Steam Generators					
1. Circumferential Welds	7.1.1	C1.1	C-A	UT	
2. Nozzle-to-Vessel Welds	7.1.2	C1.2	C-B	UT	
B. Residual Heat Removal Heat Exchangers					
1. Circumferential Welds	7.2.1	C1.1	C-A	UT	
2. Nozzle-to-Vessel Welds	7.2.2	C1.2	C-B	UT	
3. Integrally-Welded Supports	7.2.3	C1.3	C-C	PT	
C. Piping					
1. Circumferential Welds	7.3.1	C2.1	C-F, C-G	UT	
2. Longitudinal Welds	7.3.2	C2.2	C-F, C-G	UT	
3. Branch Pipe Connection Welds	7.3.3	C2.3	C-F, C-G	UT	
4. Integrally-Welded Supports	7.3.5	C2.5	C-E-1	PT or MT	
5. Support Components	7.3.6	C2.6	C-E-2	VT	

[1]See Section 7.0 for additional information.

TABLE B

WATTS BAR PRESERVICE INSPECTION PROGRAM - CLASS B COMPONENTS

Component	[1]Program Reference Section	Item No. From Table IWC-2600, Section XI	Examination Category From Table IWC-2600, Section XI	Method of Inspection	Reference Drawing No.
D. Residual Heat Removal Pumps					
1. Support Components	7.4.4	C3.4	C-E-2	VT	
E. Valves					
1. Integrally-Welded Supports	7.5.3	C4.3	C-E-1	PT or MT	
2. Support Components	7.5.4	C4.4	C-E-2	VT	
F. Exempted Components	7.6	N/A	N/A	VT	

[1]See Section 7.0 for additional information.

DATA SHEET 1

The Nuclear Power QA Staff Baseline and Inservice Inspection Section representative shall sign-off the applicable portions of this data sheet when the examination requirements of Sections 6.0, 7.0, 8.0, and 9.0 of this program have been completed.

EXAMINATION SECTION	QA STAFF REPRESENTATIVE	DATE
Class A Components		
Reactor Vessel		
6.1.1.1		
6.1.1.2		
6.1.1.3		
6.1.1.4		
6.1.1.5		
6.1.2		
6.1.3		
6.1.4		
6.1.5		
6.1.7		
6.1.8		
6.1.9		
6.1.10		
Pressurizer		
6.2.1		
6.2.2		
6.2.3		
6.2.4		
6.2.5		
6.2.6		
6.2.7		
Steam Generators		
6.3.1		
6.3.2		
6.3.3		
6.3.4		
6.3.6		
6.3.7		

DATA SHEET 1 (Continued)

EXAMINATION SECTION	QA STAFF REPRESENTATIVE	DATE

Class A Components (Continued)
Piping

6.4.1
6.4.2
6.4.3
6.4.4
6.4.5
6.4.6

RCP

6.5.1
6.5.2
6.5.3
6.5.4
6.5.5
6.5.6

Valves

6.6.1
6.6.2
6.6.3
6.6.5

Class B Components
Steam Generators

7.1.1
7.1.2

RHRHX

7.2.1
7.2.2
7.2.3

PIPING

7.3.1
7.3.2
7.3.3
7.3.5
7.3.6

DATA SHEET 1 (Continued)

EXAMINATION SECTION	QA STAFF REPRESENTATIVE	DATE

Class B Components (Continued)
RHRP

7.4.4

Valves

7.5.3
7.5.4

All examinations required by the referenced sections of this data sheet have been performed and acceptance criteria has been satisfied.

Inservice Inspection Representative _____ Date _____

Reviewed By: Inservice Inspection Supervisor _____ Date _____

Reviewed By: Supervisor, Programs and Procedures Section _____ Date _____

Approved By: Supervisor, Baseline and Inservice Inspection Group _____ Date _____

DATA SHEET 2

In the event system or component alterations or repairs are made which require reexamination or components are reexamined for other reasons following sign-off of all or portions of Data Sheet 2, this Data Sheet shall be used to reflect these additional examinations. Each area requiring reexamination shall be documented on a continuation sheet of this Data Sheet.

Additional examinations were required to be performed as noted above (check appropriate space):

_____ Yes _____ No

All additional examinations requiring use of this data sheet, if any, have been performed and all acceptance criteria has been satisfied. If additional examinations were performed, all continuation sheets have been completed, signed, and attached to this data sheet.

_____ _____
Inspection Section Representative Date

Reviewed By: _____ _____
Supervisor, Inspection Section Date

Reviewed By: _____ _____
Supervisor, Programs and Procedures Section Date

Approved By: _____ _____
Supervisor, Baseline and Inservice Inspection Group Date

DATA SHEET 2 CONTINUATION SHEET

Component:

Component Identification:

Reference Drawing:

Program Section:

Examination Method:

Reason for Reexamination:

Reexamination complete and acceptance criteria has been satisfied.

Inspection Section Representative

Date

* APPENDIX D

NOTIFICATION OF INDICATION

PART I - FINDINGS

NOI No. _____ Plant/Unit _____

Examination Report No. _____ Component ID _____

Drawing No. _____

Description of Indication: (Sketch/Photograph if needed)

_____

_____

_____

Signature of Examiner/Certif. Level _____ Date

Signature of Field Supervisor (Contractor) _____ Date

NDE Section Representative _____ Date

PART II-DISPOSITION

_____

_____

_____

Disposition Prepared By _____ Date

Disposition Approved By _____ Date

PART III-VERIFICATION

Verification of Completed Corrective Action and/or Examination By NDE Section Representative

_____

_____

_____

Signature _____ Date _____

TABLE C
LIST OF DRAWINGS - UNIT #2

REACTOR VESSEL

DRAWING NO.	TITLE	APPENDIX A PAGE NO.
CH-M-2549-A	Reactor Vessel Closure Head	2
CH-M-2551-A	Reactor Vessel	3-9
CH-M-2684-C	Upperhead Penetrations	10
CH-M-2685-B	Auxiliary Head Adapter	11
1S1-0012-A	Control Drive Housing	12

PRESSURIZER

DRAWING NO.	TITLE	APPENDIX A PAGE NO.
CH-M-1574-A	Pressurizer	13-16

STEAM GENERATORS

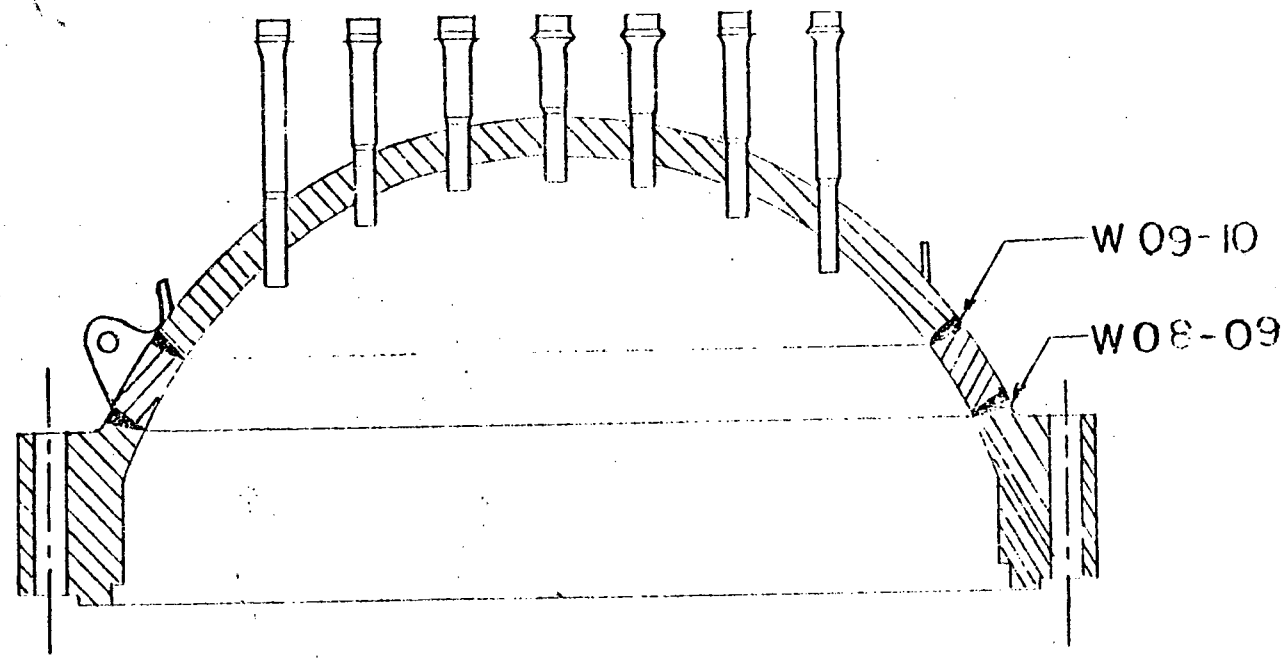
DRAWING NO.	TITLE	APPENDIX A PAGE NO.
CH-M-2660B	Steam Generator	17-18

RESIDUAL HEAT REMOVAL HEAT EXCHANGERS

DRAWING NO.	TITLE	APPENDIX A PAGE NO.
CH-M-2662-A	Residual Heat Removal Heat Exchanger Channel Welds	19

PIPING AND VALVE WELD MAPS

DRAWING NO.	TITLE	APPENDIX A PAGE NO.
CH-M-2566	Reactor Coolant Piping	20
ISI-0051-C	Residual Heat Removal System Weld Locations	71
ISI-0052-C	Safety Injection System Weld Locations	79A
ISI-0061-C	Upper Head Injection Weld Locations	79L



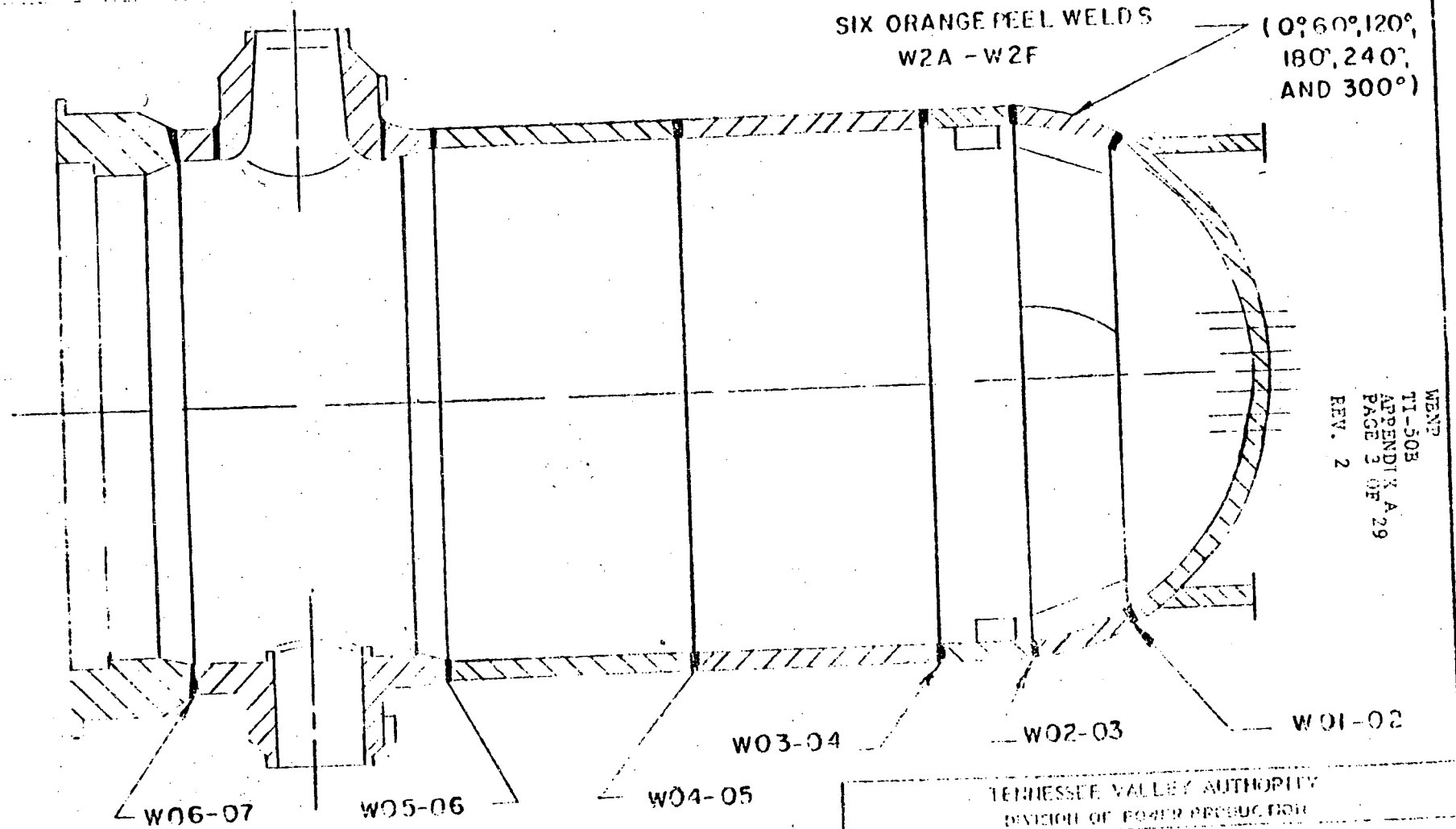
TENNESSEE VALLEY AUTHORITY
DIVISION OF POWER PRODUCTION

WATTS BAR NUCLEAR PLANT
UNITS #1 & #2
REACTOR VESSEL
CLOSURE HEAD

NTS

10-9-78

chm 2519 A

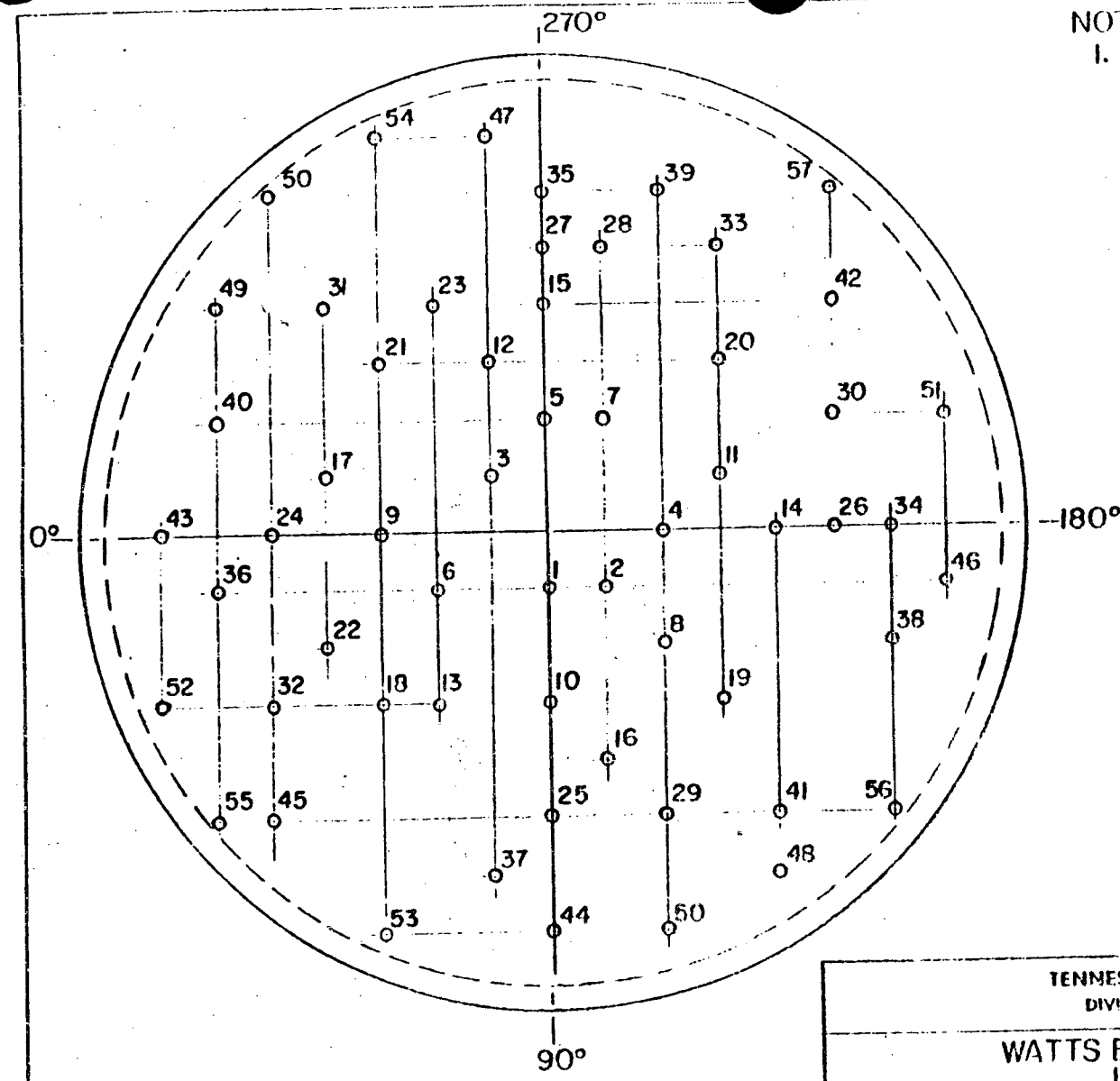


TENNESSEE VALLEY AUTHORITY
DIVISION OF POWER PRODUCTION

WATTS BAR NUCLEAR PLANT
UNITS #1 & #2
REACTOR VESSEL
(SEAM WELDS)

SCALE NTS	SUBMITTED	APPROVED	DATE 10-3-78
RAS			SHEET 1 OF 7 SHEETS
			CHEM 2551 A

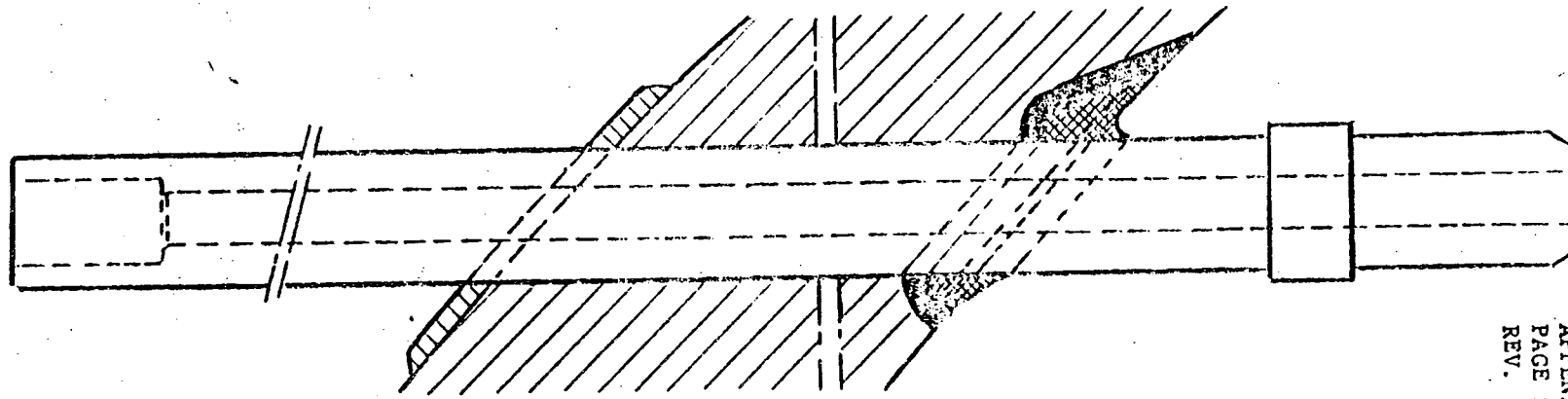
NOTES:
1. FOR PENETRATION DETAIL SEE SHEET 3



TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNITS #1 & #2
REACTOR VESSEL
(BOTTOM HEAD PENETRATIONS)

SCALE: N/S DRAWN: [illegible] TRACED CHECKED	SUBMITTED	APPROVED [illegible]	DATE 12/23/80 SHEET 2 OF 7 SHEETS CH-M-2551-A



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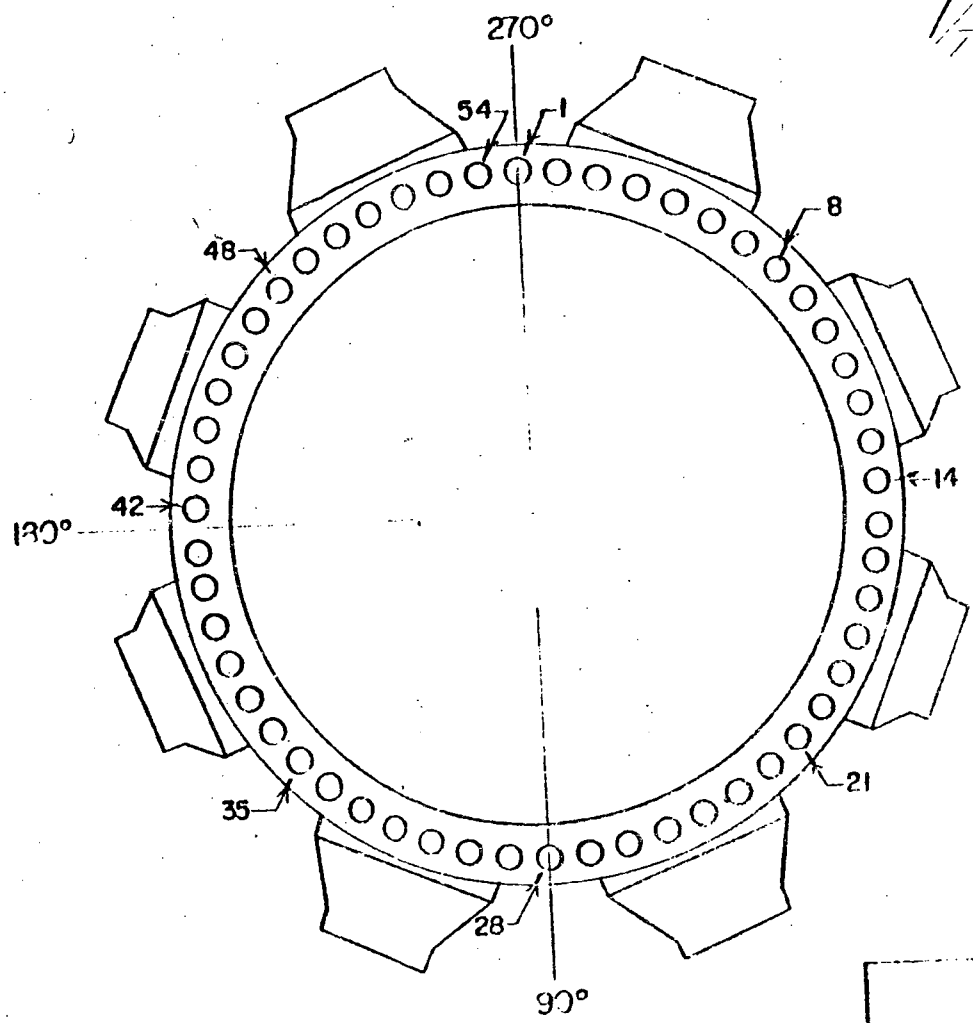
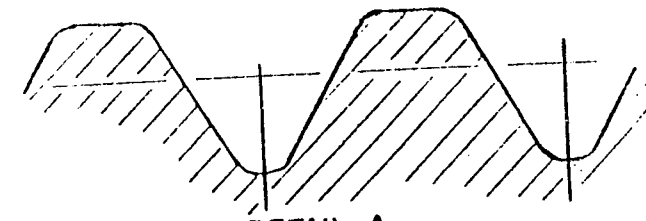
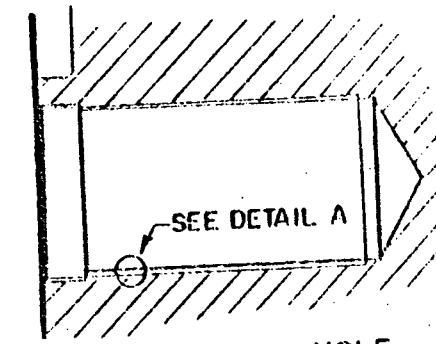
TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNITS #1 & #2
REACTOR VESSEL
(BOTTOM HEAD PENETRATION DETAIL)

SCALE: NTS DRAWN TRACED RLV CHECKED	SUBMITTED	APPROVED	DATE 12/24/80 SHEET 3 OF 7 SHEETS CH-M-2551-A







DETAIL OF STUD HOLE

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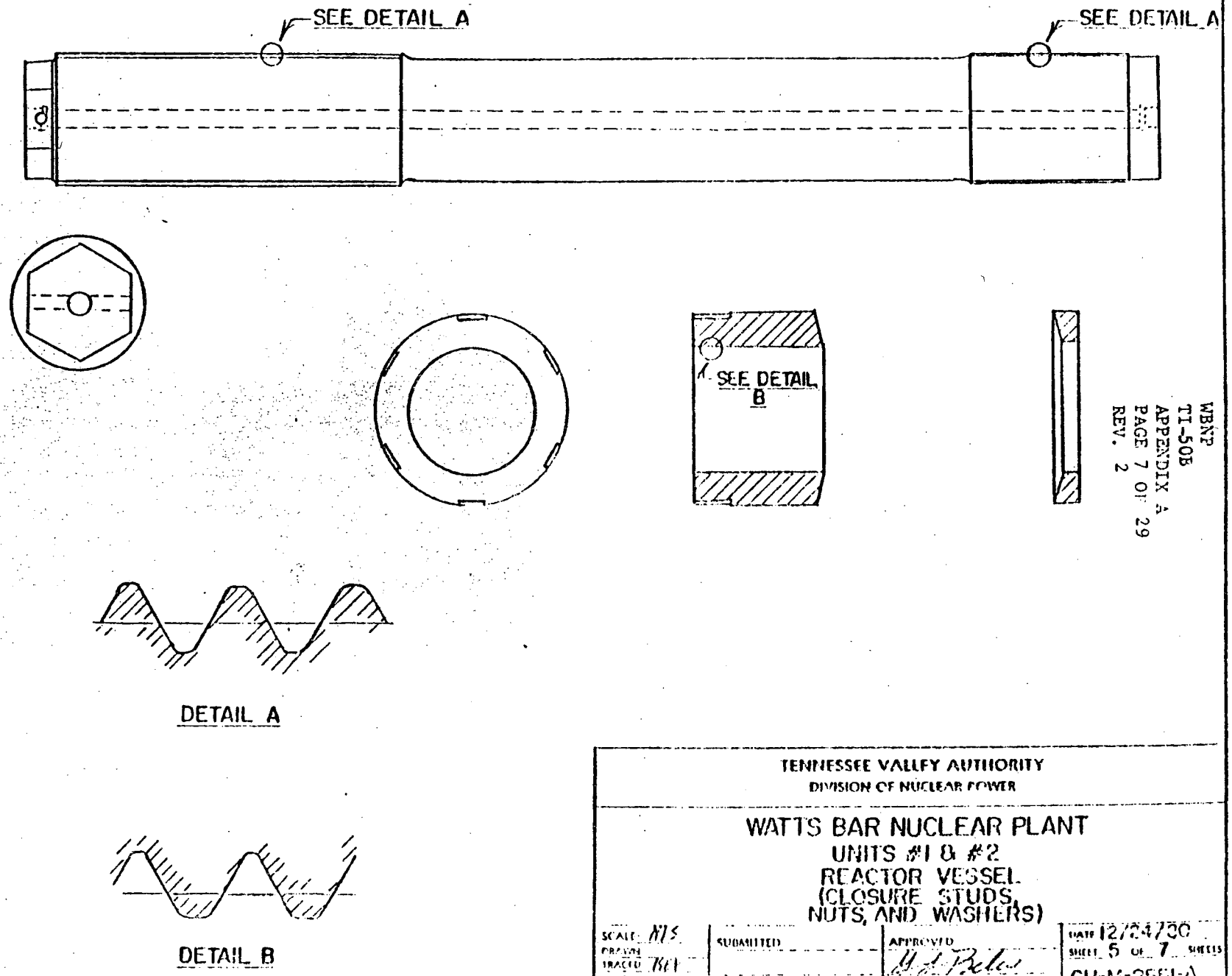
TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNITS #1 & #2
REACTOR VESSEL
(BOLTING PATTERN)

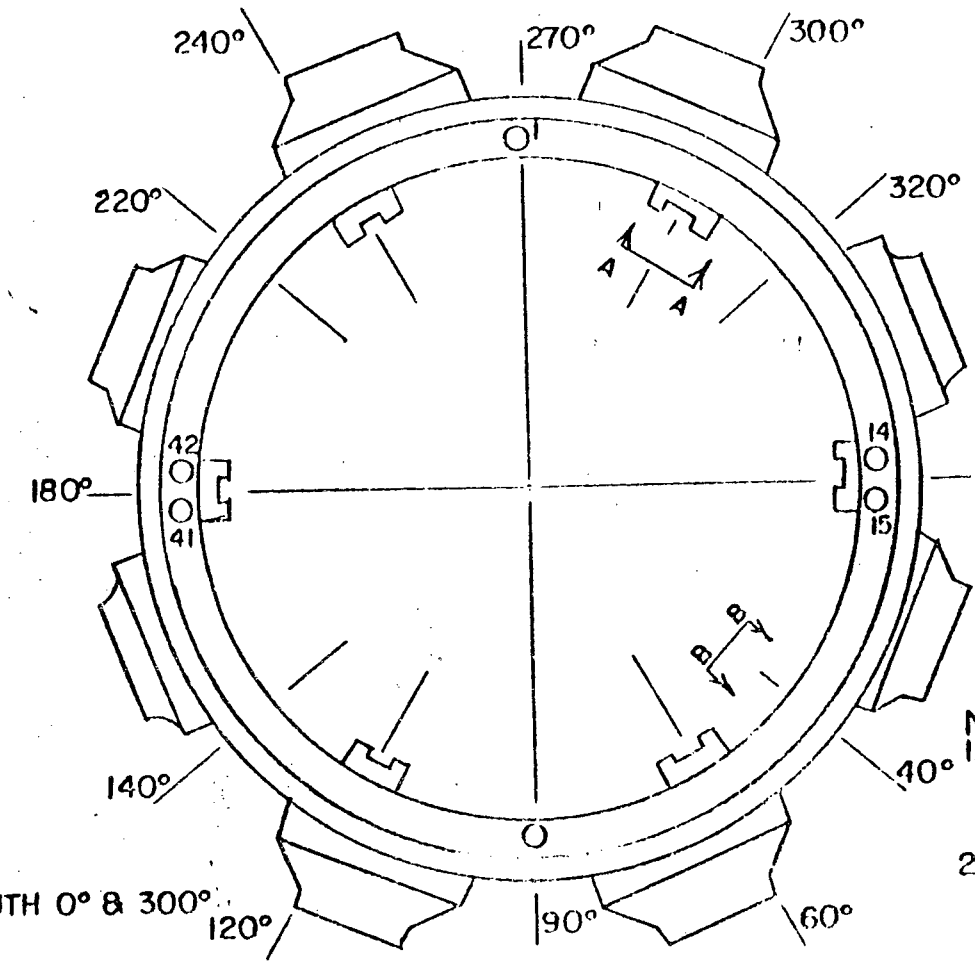
SCALE: N/A	SUBMITTED	APPROVED	DATE 12/24/80
			SHEET 4 OF 7 SHEETS
			CH-M-2505-A

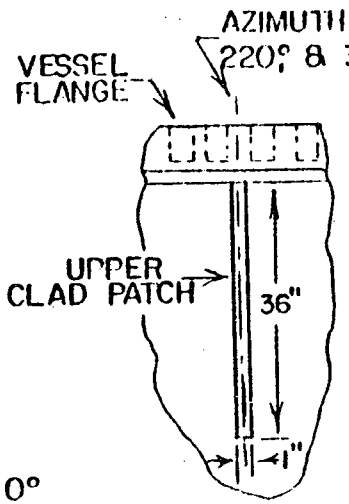


TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNITS #1 & #2
REACTOR VESSEL
(CLOSURE STUDS,
NUTS, AND WASHERS)

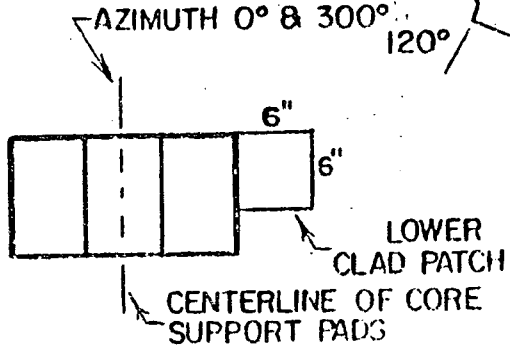
SCALE NTS DRAWN TRACED CHECKED	SUBMITTED	APPROVED	DATE 12/24/80 SHEET 5 OF 7 SHEETS CH-M-2551-A





SECTION B-B

NOTES:
1. UPPER CLAD PATCH EXAMINATIONS SHALL BE DONE THROUGH THE RADIATION SPECIMEN ACCESS PORTS.
2. AZIMUTHS ARE TAKEN OFF OF REACTOR CENTERLINE.



SECTION A-A

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNITS #1 & #2
REACTOR VESSEL
(CLAD PATCHES)

SCALE: N/S	SUBMITTED	APPROVED	DATE 12/24/80
DRAWN			SHEET 6 OF 7 SHEETS
TRACED			CH-M-2561-A

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APPENDIX A
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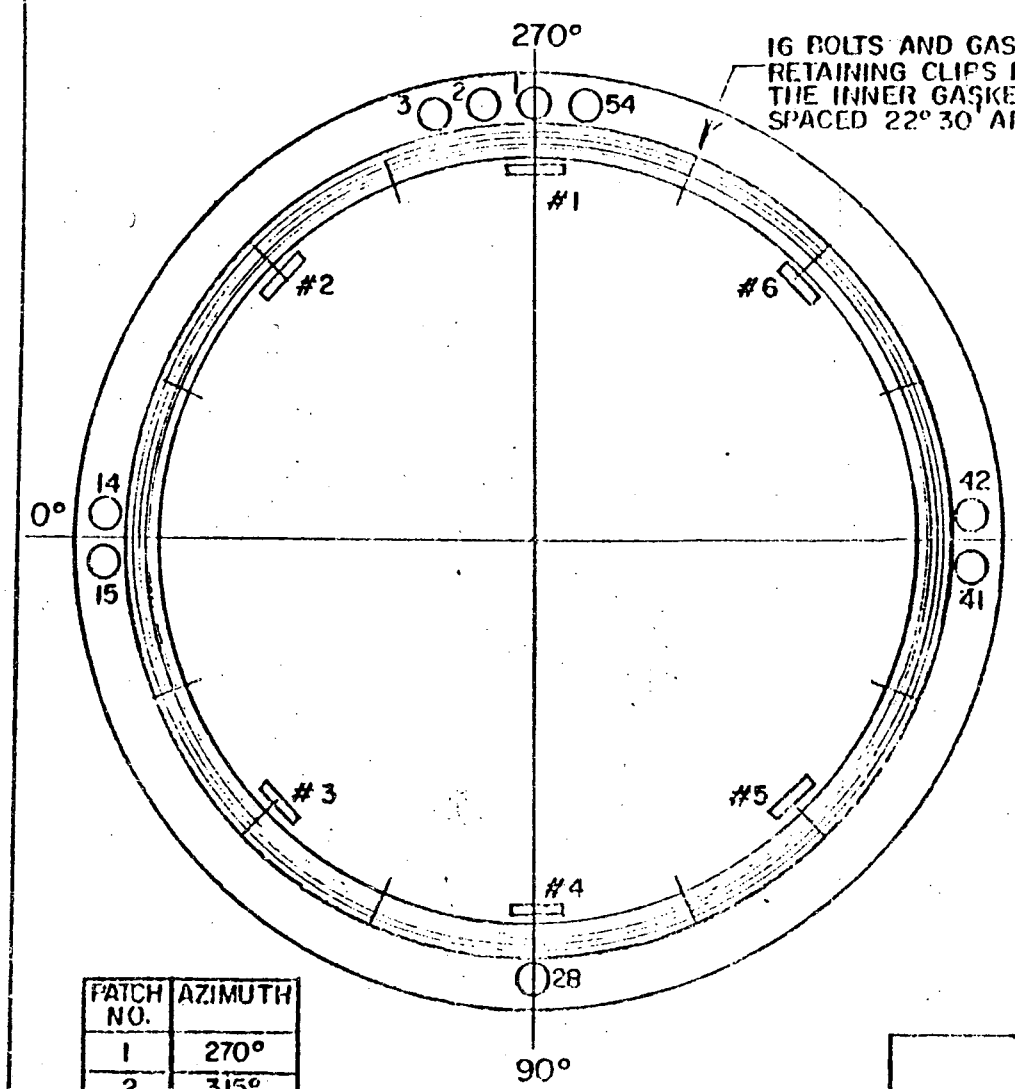
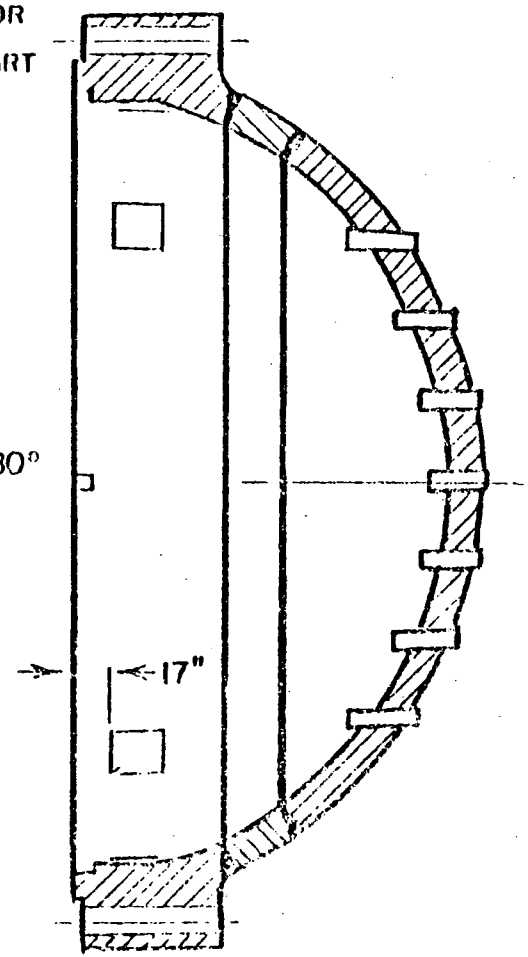


16 BOLTS AND GASKET RETAINING CLIPS FOR THE INNER GASKET SPACED 22° 30' APART



PATCH NO.	AZIMUTH
1	270°
2	315°
3	45°
4	90°
5	135°
6	225°

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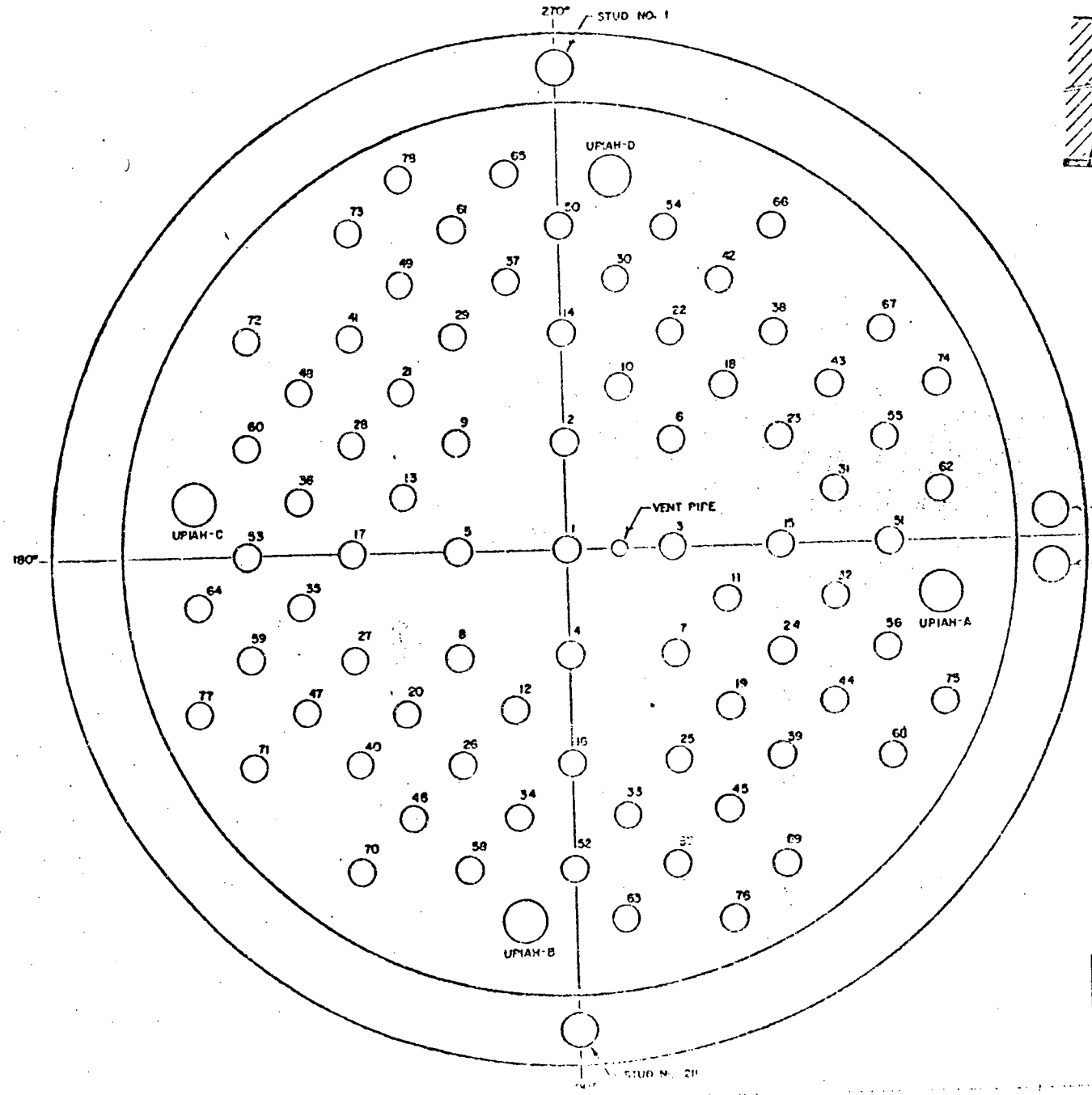
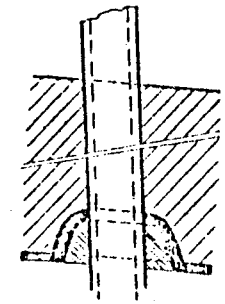
TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNITS #1 & #2
REACTOR VESSEL
(CLOSURE HEAD CLADDING PATCHES)

SCALE: NTS	SUBMITTED	APPROVED	DATE 12/5/81
DRAWN			SHEET 1 OF 1 SHEETS
TRACED			2H-M-2051-A





VENT PIPE PENETRATION DETAIL

NOTES:
1. ALL CRDM NUMBERS ARE PRECEDED BY CRDW FOR THE WELD NUMBERS
2. FOR BOTTOM HEAD PENETRATIONS SEE DRAWING NO. CH-M-2551-A
3. FOR AUXILIARY HEAD ADAPTER AND CONTROL ROD DRIVE PENETRATION DETAILS SEE DRAWING NOS. CH-M-[illegible]-B AND ISI-0012-A RESPECTIVELY

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER
WATTS BAR NUCLEAR PLANT
UNIT #1
UPPER HEAD PENETRATIONS

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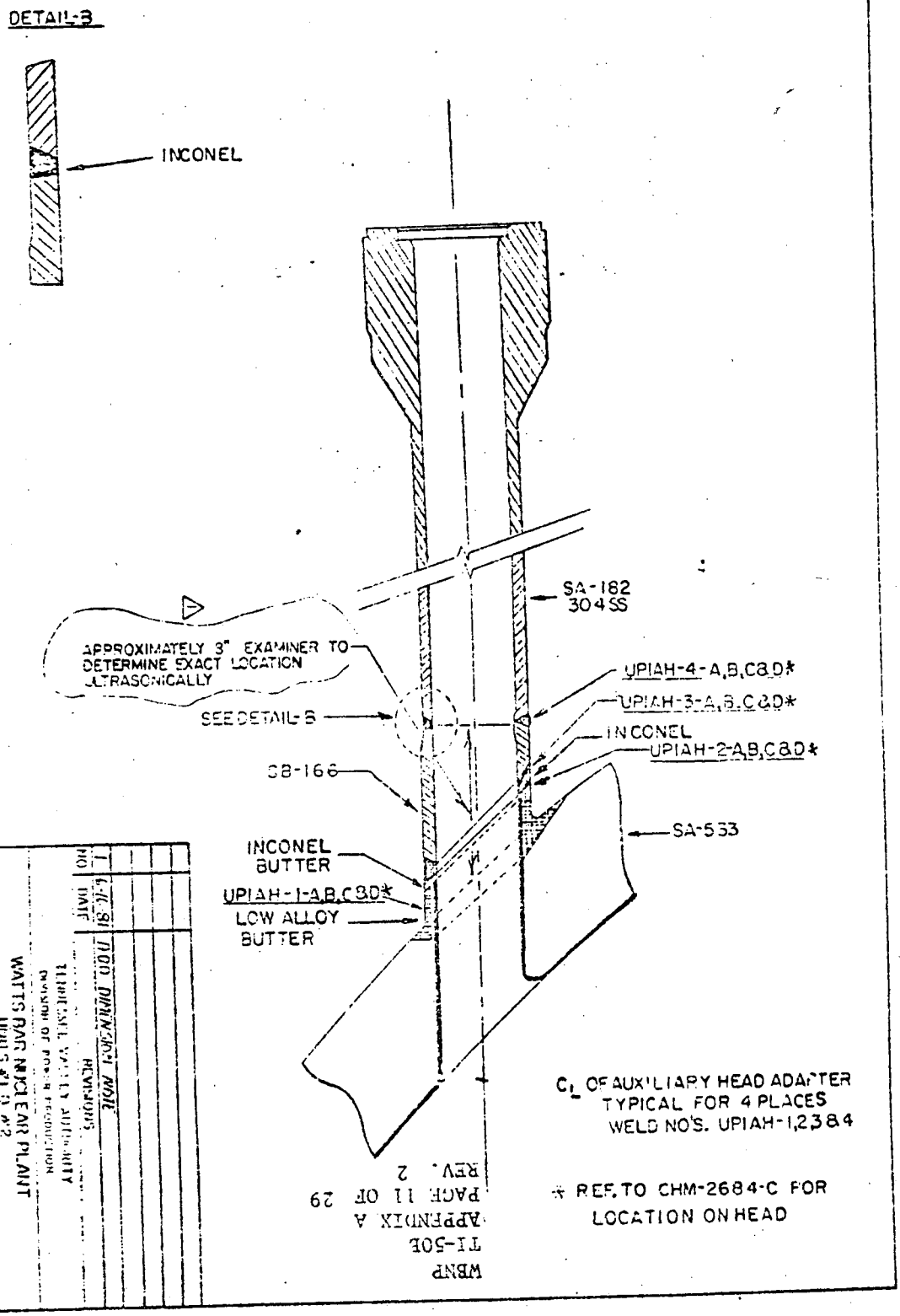

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WATTS BAR NUCLEAR PLANT
UNITS #1 & #2
CONTROL ROD
DRIVE HOUSING

NTS

12-22-80

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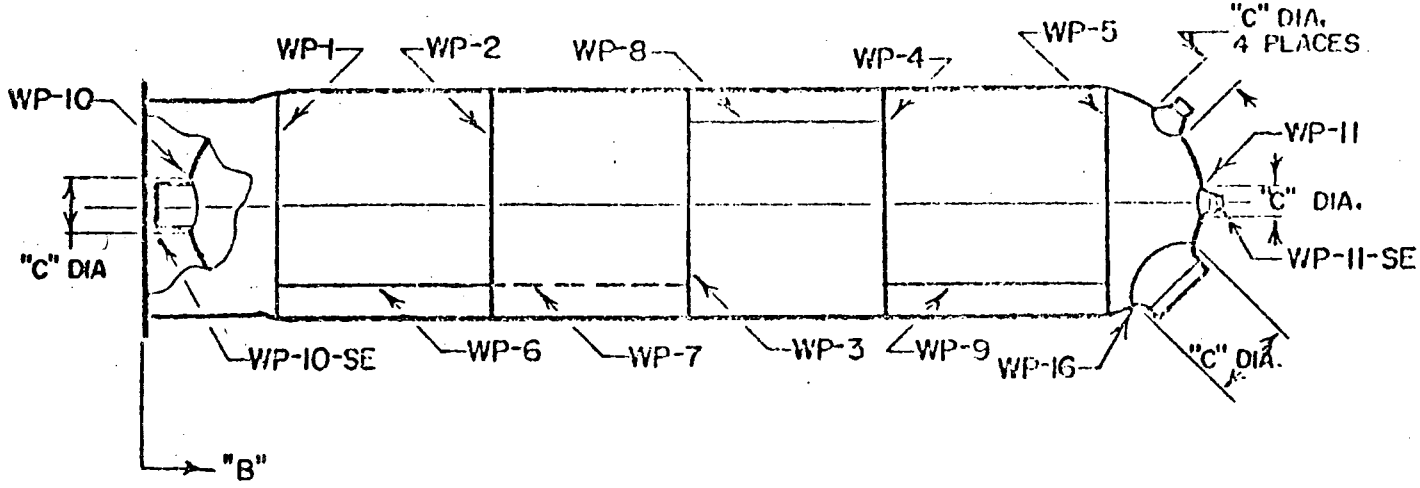
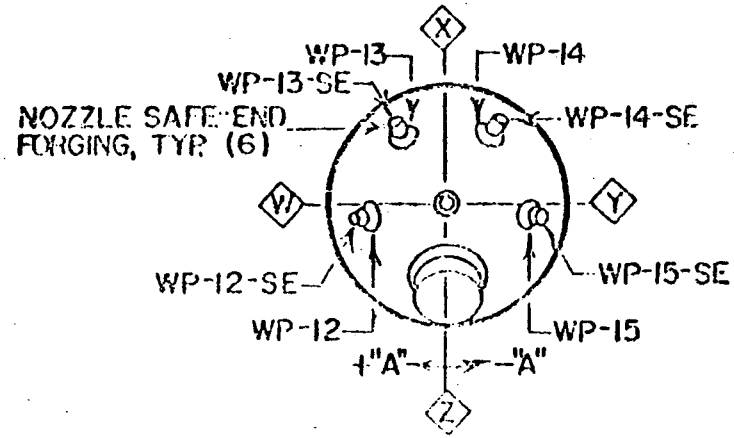


AS BUILT DIMENSIONS				
TITLE	SEAM NO.	"A"	"B"	"C" DIA.
GIRTH WELDS	1		57.00"	
	2		193.00"	
	3		322.00"	
	4		449.50"	
	5		588.00"	
LONGITUDINAL WELDS	6	+18°		
	7	-27° 30'		
	8	+135° 30'		
	9	+53°		
SURGE NOZ.	10	0°		24.50"
SPRAY NOZ.	11	0°		12.75"
SAFETY NOZ.	12	+61° 30'		15.00"
SAFETY NOZ.	13	+151° 40'		15.00"
SAFETY NOZ.	14	-152° 23'		15.00"
RELIEF NOZ.	15	-82°		15.00"
MANWAY	16	0°		32.50"

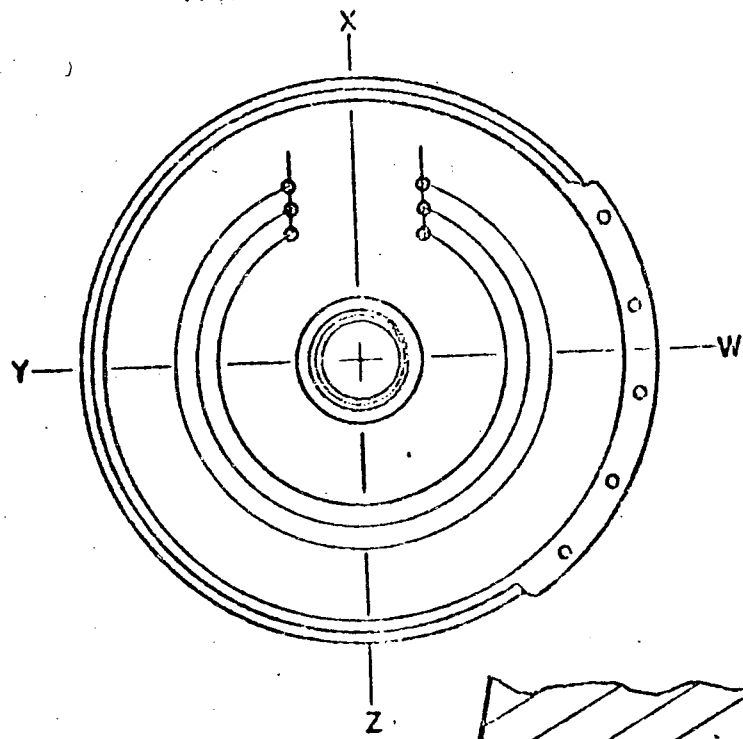


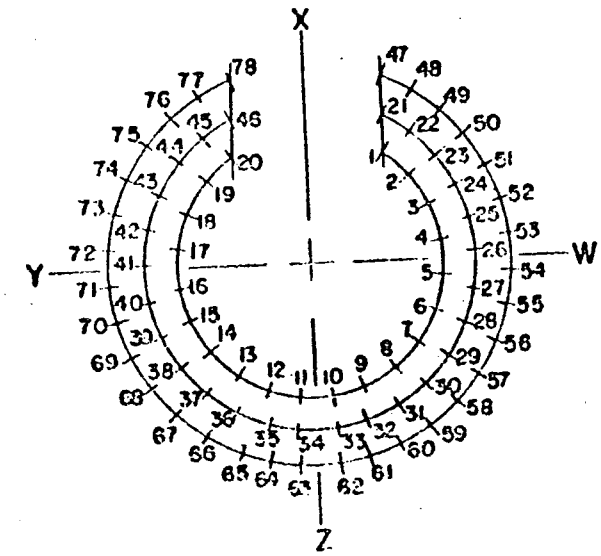
TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

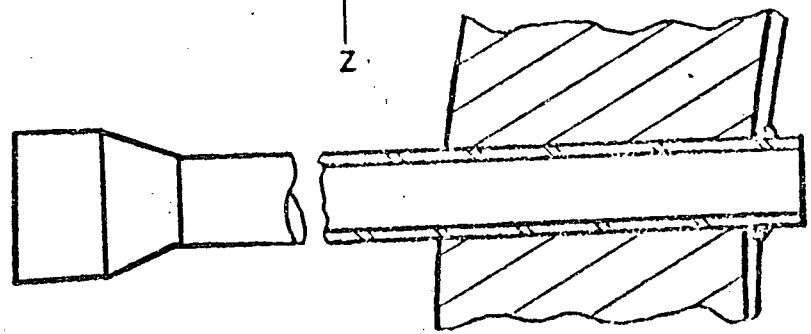
WATTS BAR NUCLEAR PLANT
UNIT #2
PRESSURIZER
(WELDS)

SCALE: NTS	SUBMITTED	APPROVED	DATE 1/7/81
DRAWN			SHEET 4 OF 4 SHEETS
TRACED TAV			CH-M-2574-A
CHECKED			

PARTIAL BOTTOM VIEW





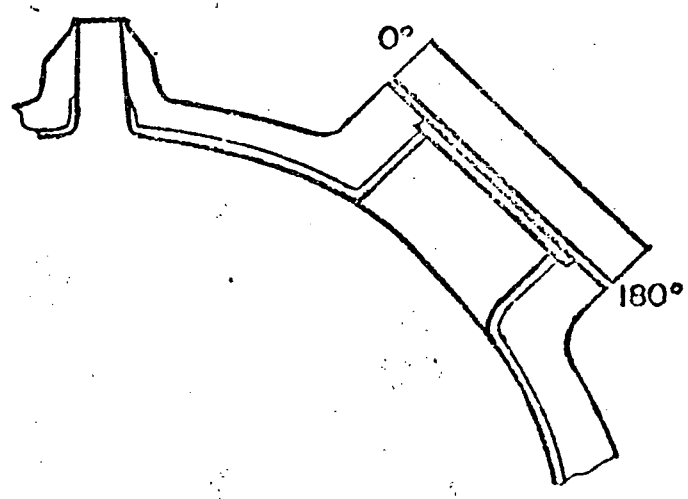


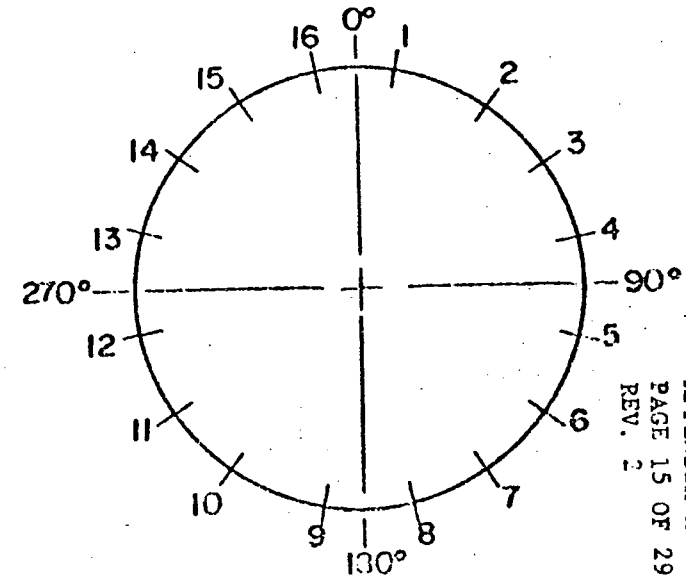
HEATER PENETRATION DETAIL

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNIT #2
PRESSURIZER
(HEATER PENETRATIONS)

SCALE: NTS	SUBMITTED	APPROVED	PAGE 1 of 1
DRAWN: TRACED: CHECKED:			SHT 2 OF 4 SHEETS
			01-M-2571-A





NOTE:
TO DO THE CLAD PATCH INSPECTION, PLACE THE CLAD PATCH FRAME (SEE DRAWING NO. CH-M-2525-A) ON STUDS #8 AND #9.

WBNP
TI-50B
APPENDIX A
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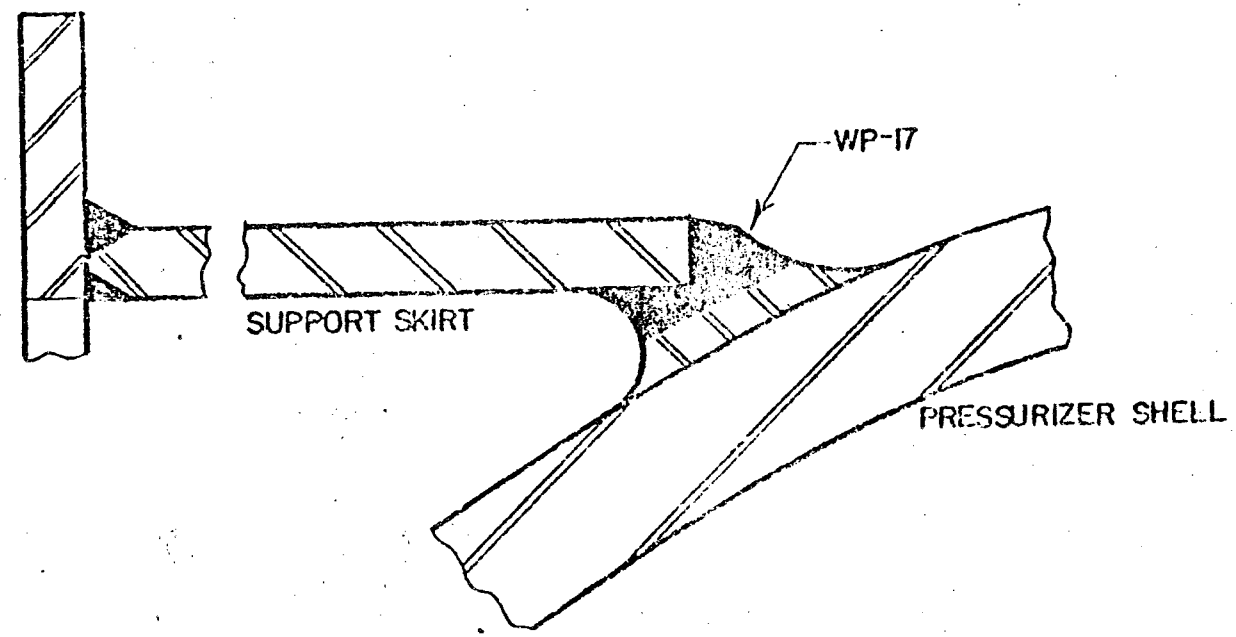
TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNIT #2
PRESSURIZER
(MANWAY BOLT PATTERN)

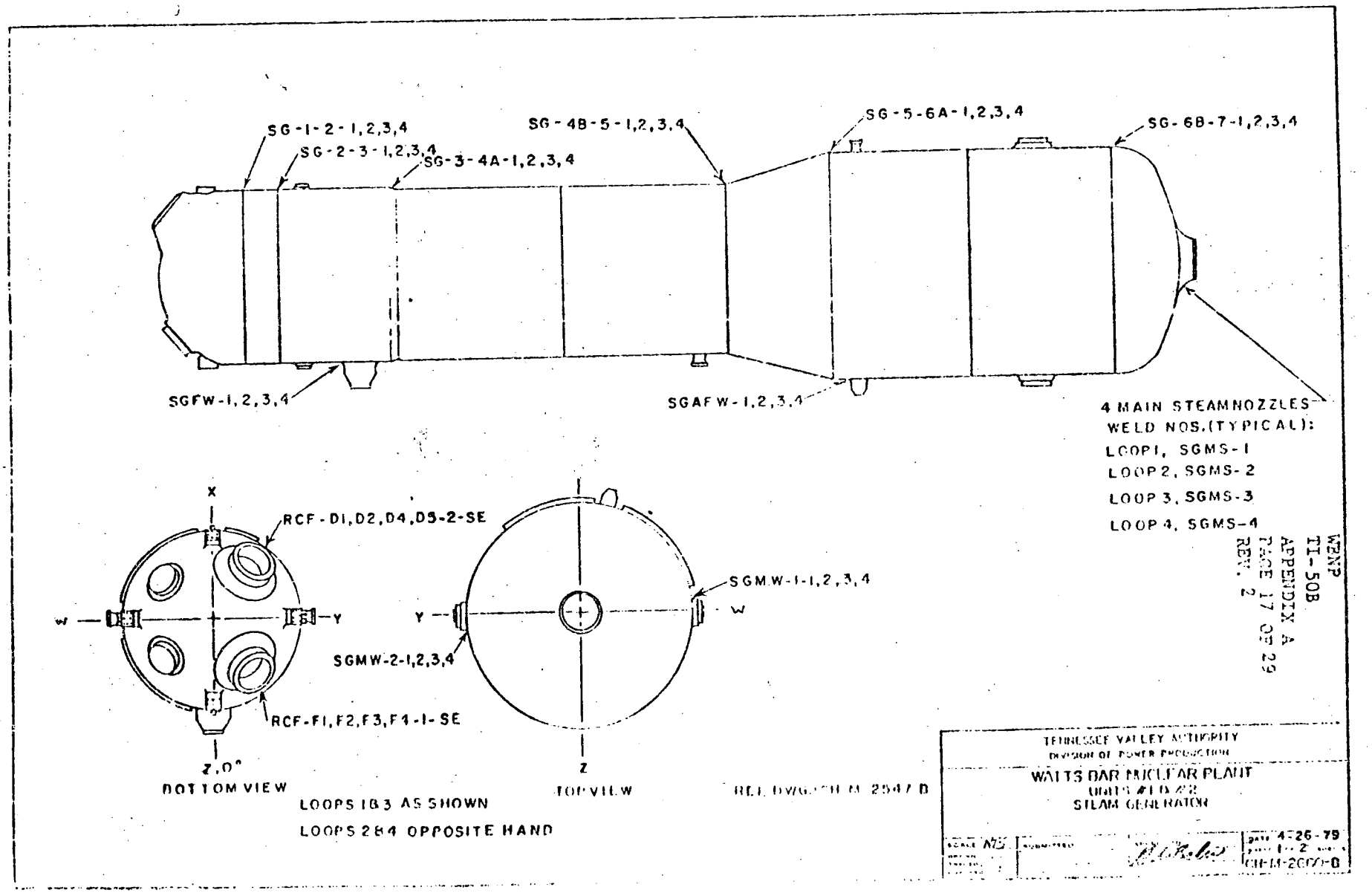
SCALE NS	SUBMITTED	APPROVED	DATE 1/78
DRAWN			SHEET 3 OF 4 SHEETS
TRACED			CH-M-2574-A
CHECKED			



TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNIT #2
PRESSURIZER
(SUPPORT SKIRT WELD)

SCALE N/A	SUBMITTED	APPROVED	DATE 1/7/81
DRAWN			SHEET 4 OF 4 SHEETS
TRACED RV			CH-M-2571 A
CHECKED			



WBNP
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APPENDIX A
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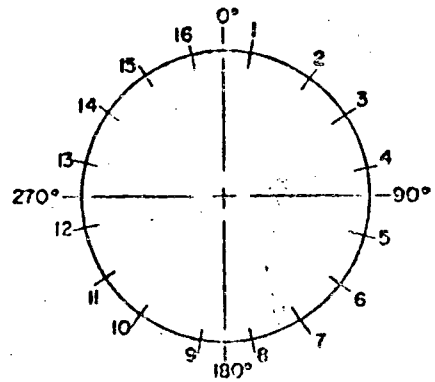
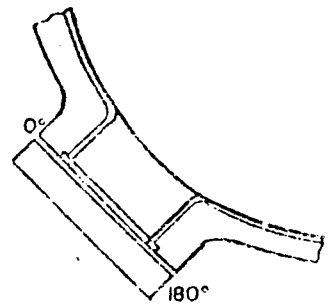
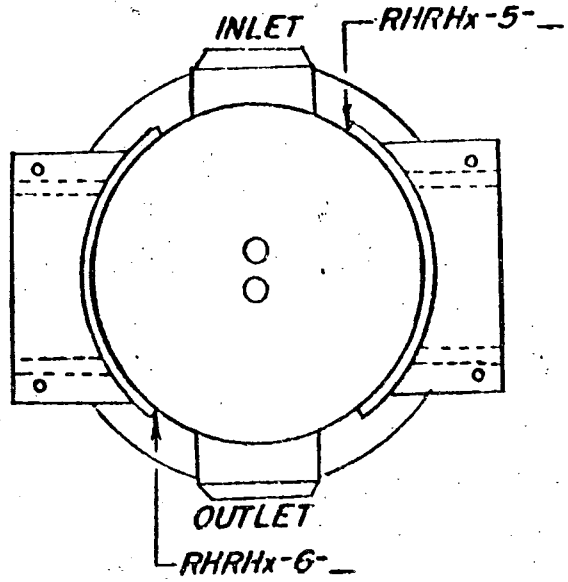


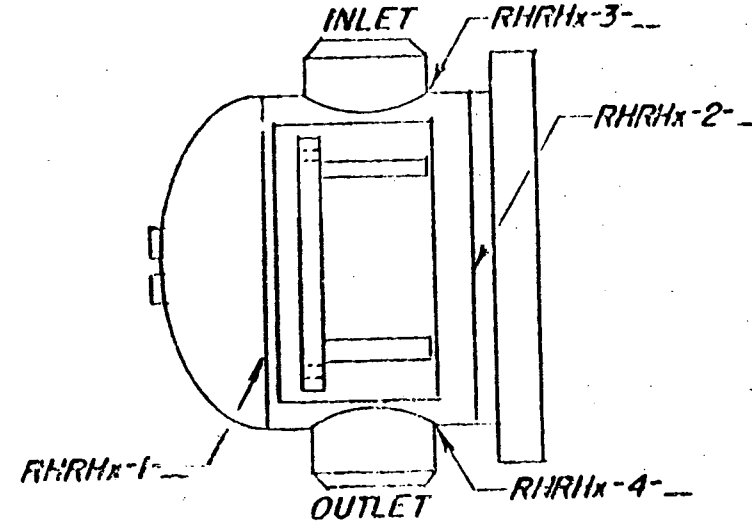


NOTE:
TO DO THE CLAD PATCH INSPECTION, PLACE CLAD PATCH FRAME (SEE DRAWING NO. CH-M-2525-A) ON STUDS #8 AND #9.

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNITS #1 & #2
STEAM GENERATOR
(PRIMARY MANWAY BOLTING)



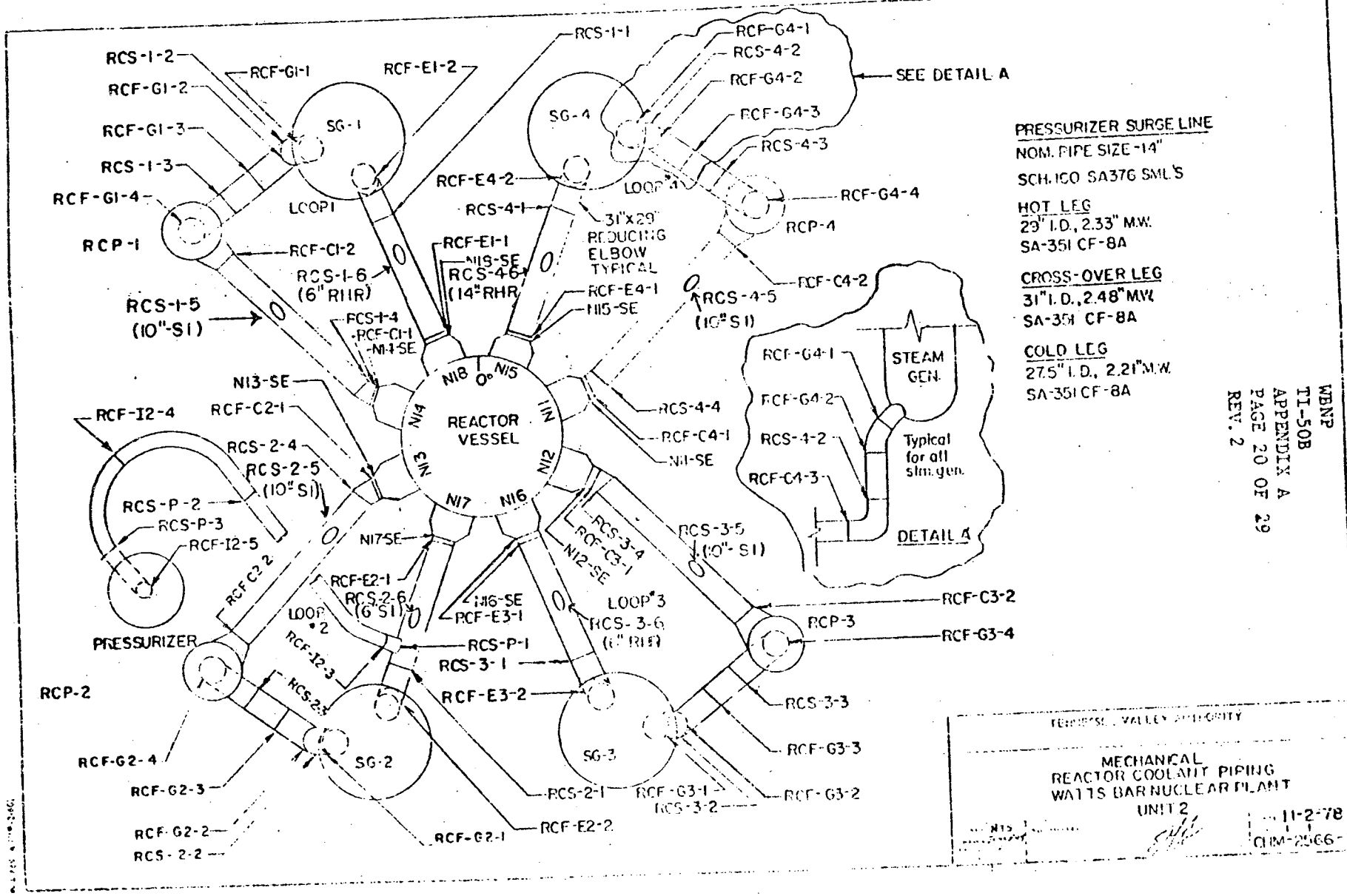


NOTE: PLACE HEAT EXCHANGER NUMBERS AT END OF WELD NUMBER

TENNESSEE VALLEY AUTHORITY
DIVISION OF POWER PRODUCTION

WATTS BAR NUCLEAR PLANT
UNITS #1 & #2
RESIDUAL HEAT REMOVAL
HEAT EXCHANGER
CHANNEL WELDS

NTS KEV			DATE 5/3/79 1 of 1 CH-M-2662-A



PRESSURIZER SURGE LINE
NOM. PIPE SIZE-14"
SCH. 160 SA376 SML'S

HOT LEG
29" I.D., 2.33" M.W.
SA-351 CF-8A

CROSS-OVER LEG
31" I. D., 2.48" M.W.
SA-351 CF-8A

COLD LEG
27.5" I. D., 2.21" M.W.
SA-351 CF-8A

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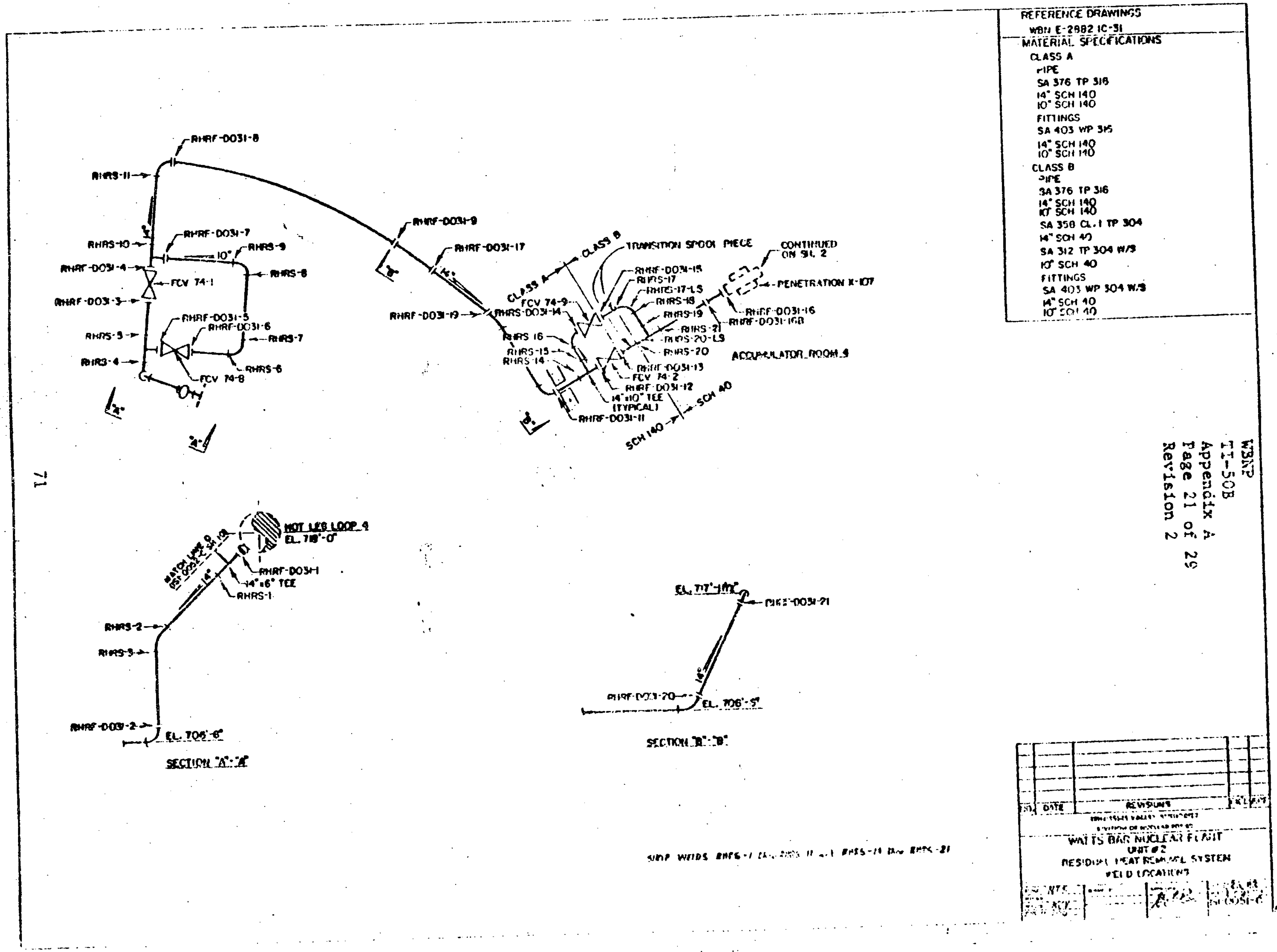
TENNESSEE VALLEY AUTHORITY

MECHANICAL
REACTOR COOLANT PIPING
WATTS BAR NUCLEAR PLANT
UNIT 2

NTS

11-2-78

CIM-2566-B


REFERENCE DRAWINGS
WBN E-2882 IC-31
MATERIAL SPECIFICATIONS
CLASS A
PIPE
SA 376 TP 316
14" SCH 140
10" SCH 140
FITTINGS
SA 403 WP 316
14" SCH 140
10" SCH 140
CLASS B
PIPE
SA 376 TP 316
14" SCH 140
10" SCH 140
SA 358 CL. 1 TP 304
14" SCH 40
SA 312 TP 304 W/S
10" SCH 40
FITTINGS
SA 403 WP 304 W/S
14" SCH 40
10" SCH 40
RHRF-D031-8
RHRS-11
RHRF-D031-7
RHRS-10
10"
RHRS-9
RHRS-8
RHRF-D031-4
FCV 74-1
RHRF-D031-3
RHRF-D031-5
RHRF-D031-6
RHRS-7
RHRS-5
RHRS-4
RHRS-6
FCV 74-8
RHRF-D031-9
RHRF-D031-17
14"
RHRF-D031-19
RHRS-D031-14
CLASS A
CLASS B
TRANSITION SPOOL PIECE
CONTINUED ON SH. 2
FCV 74-9
RHRF-D031-15
RHRS-17
RHRS-17-LS
RHRS-18
RHRS-19
PENETRATION X-107
RHRF-D031-16
RHRF-D031-16B
RHRS 16
RHRS-21
RHRS-20-LS
RHRS-20
RHRS-15
RHRS-14
RHRF-D031-13
FCV 74-2
RHRF-D031-12
14"x10" TEE (TYPICAL)
RHRF-D031-11
ACCUMULATOR ROOM 3
SCH 40
SCH 140
HOT LEG LOOP 4
EL. 718'-0"
MATCH LINE D
RHRF-D031-1
14"x6" TEE
RHRS-1
14"
RHRS-2
RHRS-3
RHRF-D031-2
EL. 706'-6"
SECTION "A"-"A"
EL. 717'-
RHRF-D031-21
14"
RHRF-D031-20
EL. 706'-5"
SECTION "B"-"B"
SHOP WELDS RHRS-1 THRU RHRS-11 and RHRS-14 thru RHRS-21
DATE
REVISIONS
WATTS BAR NUCLEAR PLANT
UNIT #2
RESIDUAL HEAT REMOVAL SYSTEM
WELD LOCATIONS

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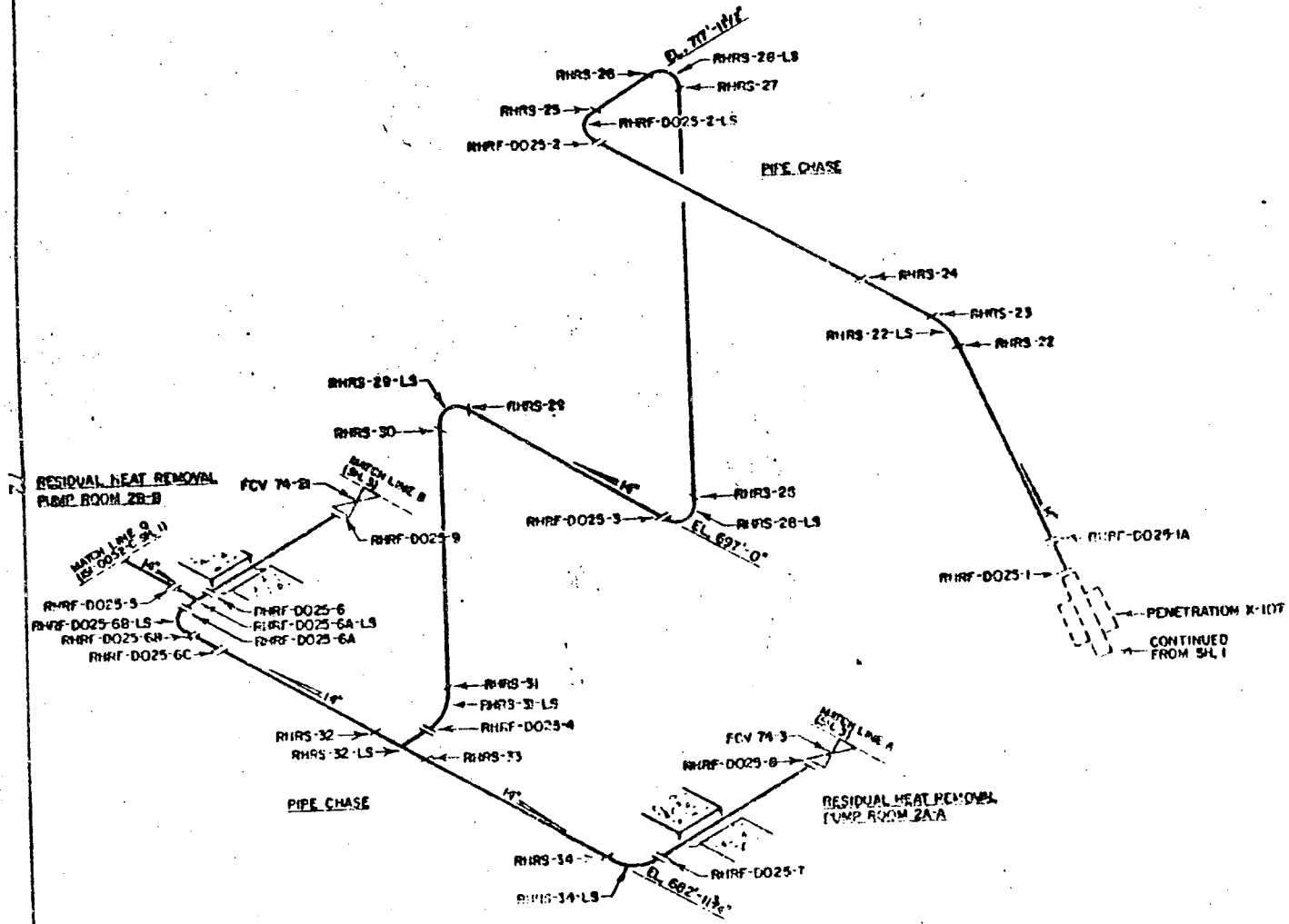
REFERENCE DRAWINGS
WBN E-2882 IC-25
WBN E-2882 IC-123

MATERIAL SPECIFICATIONS
CLASS B
PIPE
SA 358 CL. 1 TP 304
14" SCH 40
FITTINGS
SA 403 WP 304W/S
14" SCH 40
12" SCH 40



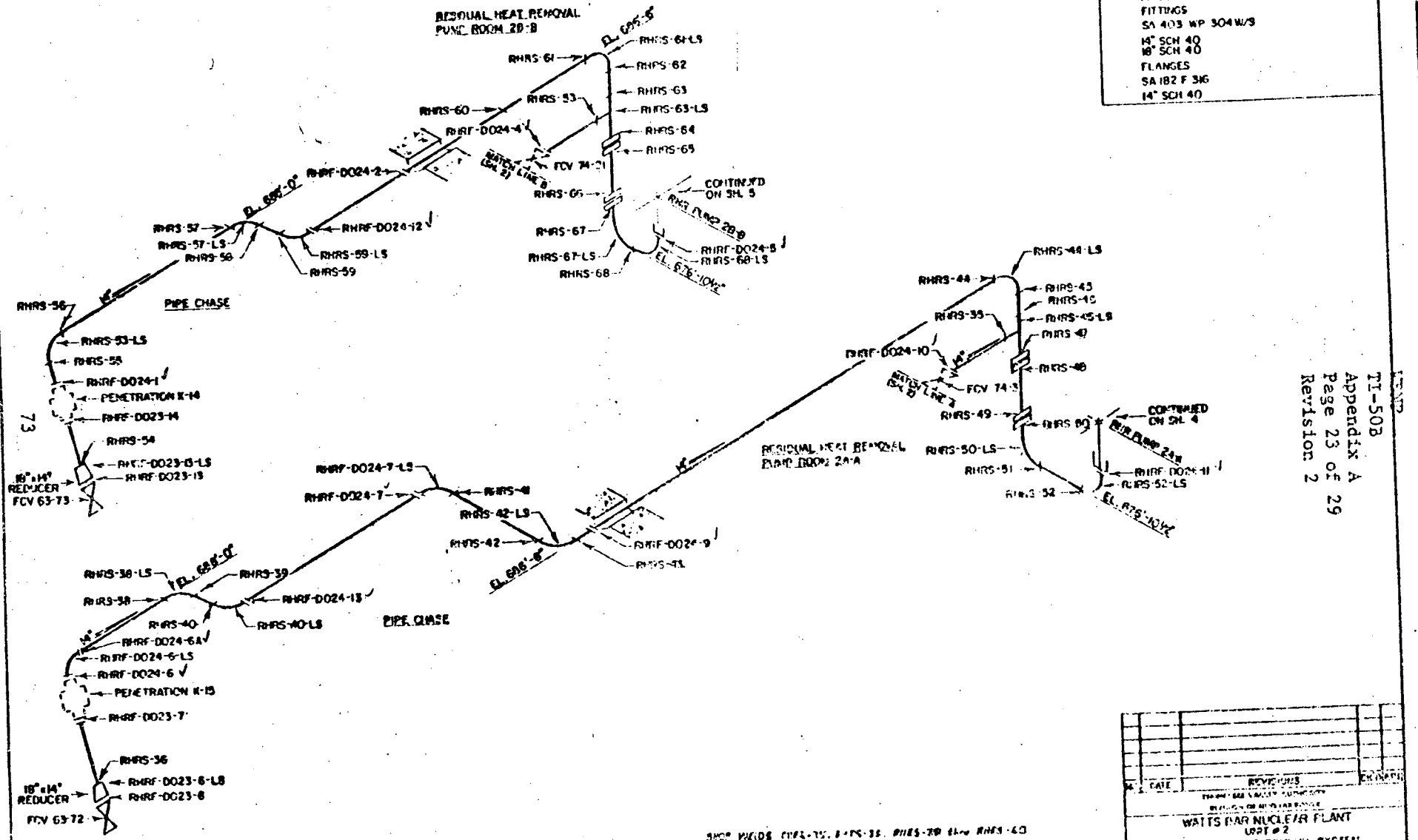
NO.	DATE	REVISIONS	CK'D	APP

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNIT #2
RESIDUAL HEAT REMOVAL SYSTEM
WELD LOCATIONS

REFERENCE DRAWINGS
WBN E-2882 IC-23
WBN E-2882 IC-24

MATERIAL SPECIFICATIONS
CLASS B
PIPE
SA 358 CL. 1 TP 304
14" SCH 40
FITTINGS
SA 403 WP 304 W/S
14" SCH 40
16" SCH 40
FLANGES
SA 182 F 316
14" SCH 40

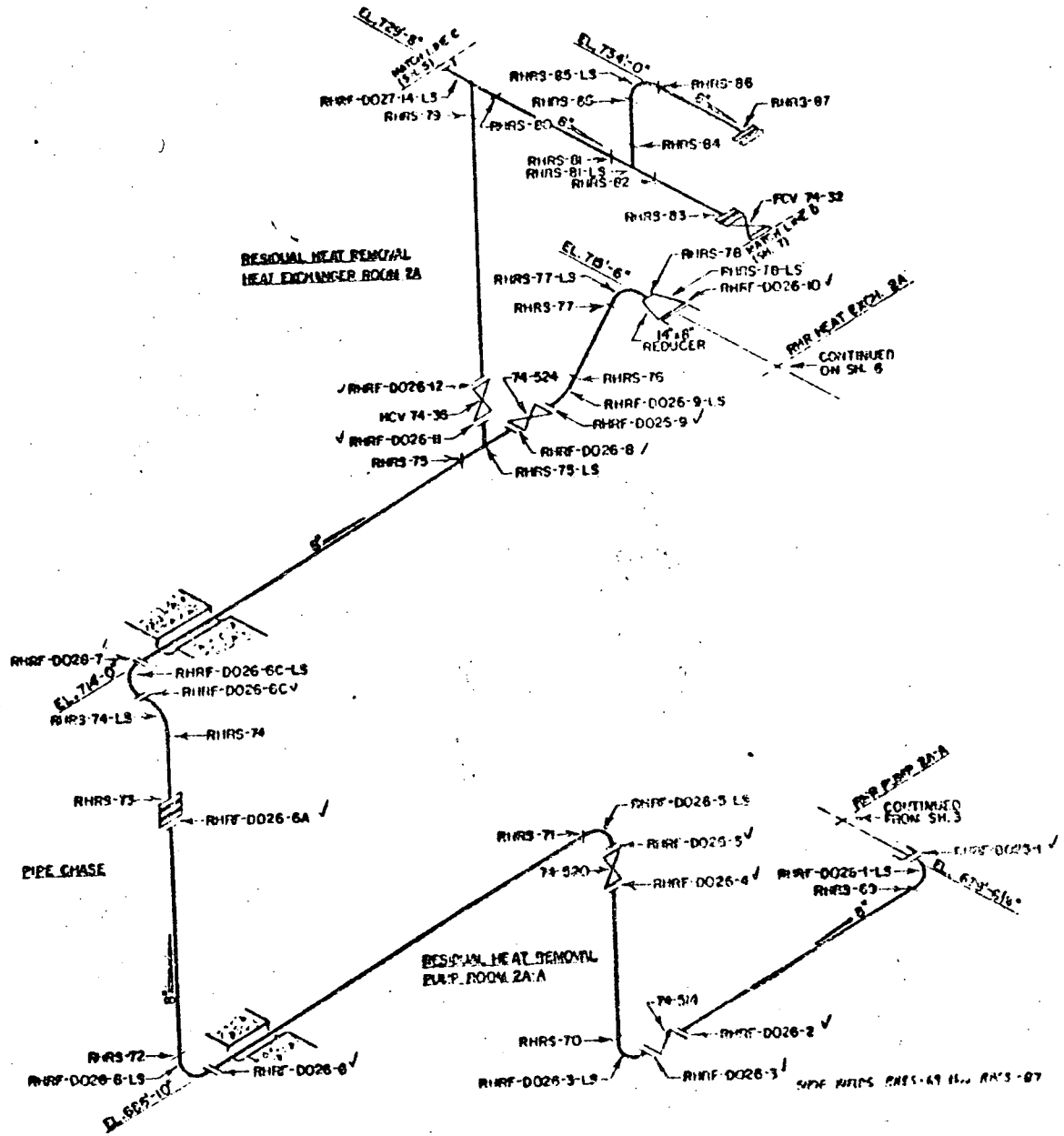


NO.	DATE	REVISIONS	BY

WATTS BAR NUCLEAR PLANT
UNIT # 2
RESIDUAL HEAT REMOVAL SYSTEM
WELD LOCATIONS

REFERENCE DRAWINGS
WBN E-2802 IC-26

MATERIAL SPECIFICATIONS
CLASS B
PIPE
SA 312 TP 304W/S
8" SCH 40S
FITTINGS
SA 403 WP 304 WW0/S
14" SCH 40
8" SCH 40S
FLANGES
SA 182 F 304
8" SCH 40S



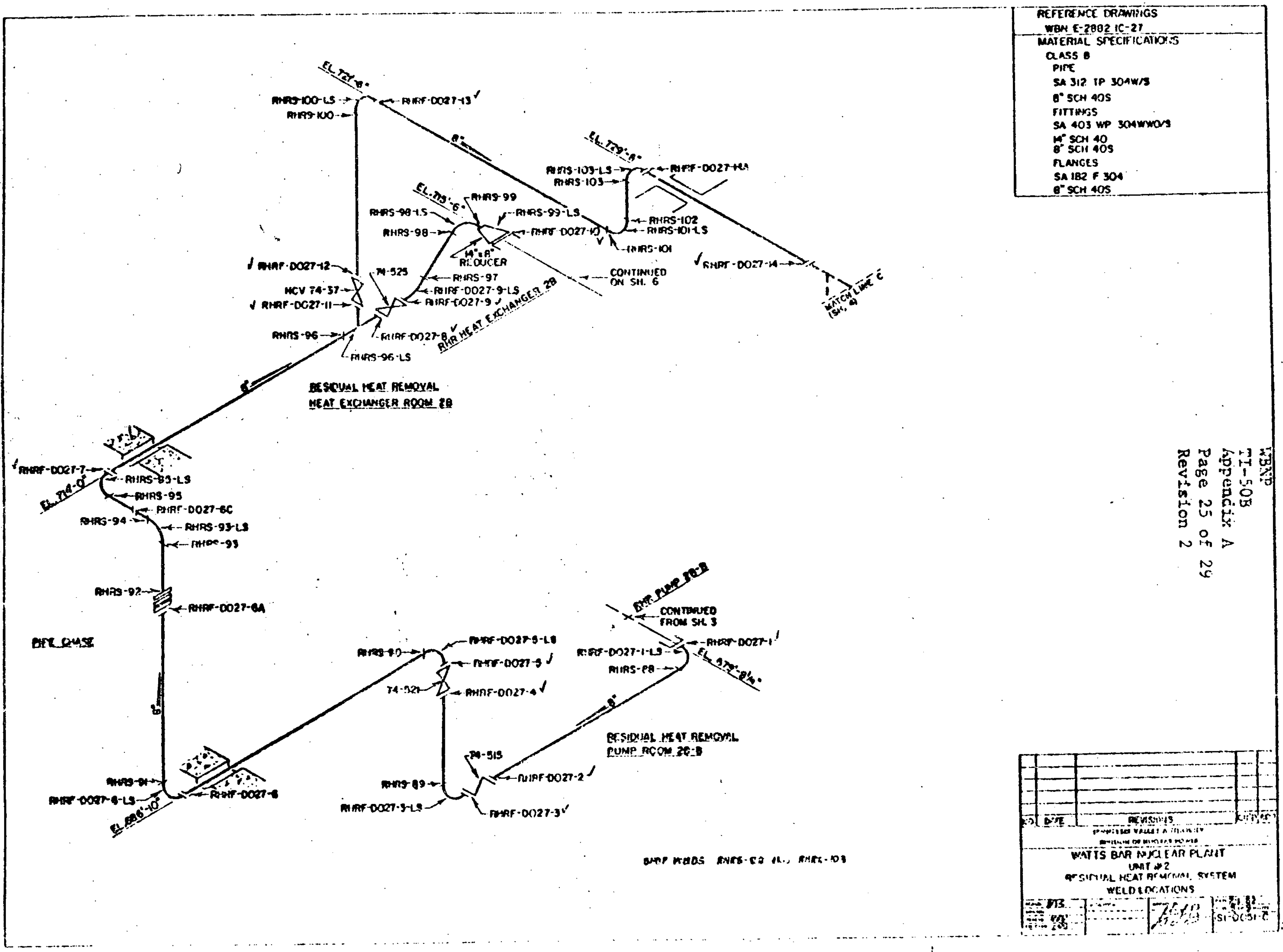
NO.	DATE	REVISION	BY	APPD

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNIT #2
RESIDUAL HEAT REMOVAL SYSTEM
WELD LOCATIONS

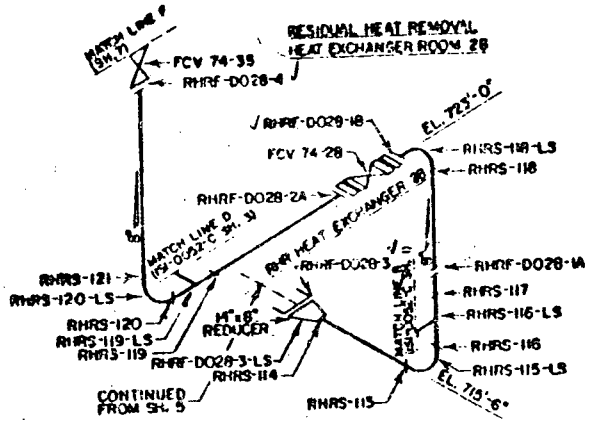
NUCLEAR			
SCALE: NONE	DRAWN	APPD	CODE:

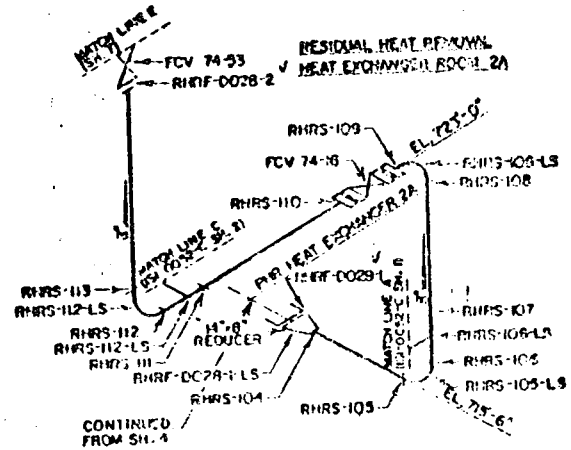
74


REFERENCE DRAWINGS
WBN E-2802 IC-27
MATERIAL SPECIFICATIONS
CLASS B
PIPE
SA 312 TP 304W/S
8" SCH 40S
FITTINGS
SA 403 WP 304WWO/S
14" SCH 40
8" SCH 40S
FLANGES
SA 182 F 304
8" SCH 40S
EL. 727'-8"
RHRS-100-LS
RHRS-100
RHRF-D027-13
8"
EL. 729'-8"
RHRS-103-LS
RHRS-103
RHRF-D027-14A
RHRS-102
RHRS-101-LS
RHRS-101
RHRF-D027-14
MATCH LINE C (SH. 4)
EL. 715'-6"
RHRS-99
RHRS-98-LS
RHRS-99-LS
RHRS-98
RHRF-D027-10
14"x8" REDUCER
CONTINUED ON SH. 6
RHRF-D027-12
74-525
RHRS-97
HCV 74-37
RHRF-D027-9-LS
RHRF-D027-11
RHRF-D027-9
RHRS-96
RHRF-D027-8
RHR HEAT EXCHANGER 2B
RHRS-96-LS
RESIDUAL HEAT REMOVAL HEAT EXCHANGER ROOM 2B
RHRF-D027-7
RHRS-95-LS
EL. 714'-0"
RHRS-95
RHRF-D027-6C
RHRS-94
RHRS-93-LS
RHRS-93
RHRS-92
RHRF-D027-6A
PIPE CHASE
RHR PUMP 2B-B
CONTINUED FROM SH. 3
RHRF-D027-5-LS
RHRF-D027-1
RHRS-90
RHRF-D027-5
RHRF-D027-1-LS
RHRS-88
EL. 675'-8¼"
74-521
RHRF-D027-4
8"
RESIDUAL HEAT REMOVAL PUMP ROOM 2B-B
74-515
RHRS-91
RHRS-89
RHRF-D027-2
RHRF-D027-6-LS
RHRF-D027-6
RHRF-D027-3-LS
RHRF-D027-3
EL. 686'-10"
REVISIONS
WATTS BAR NUCLEAR PLANT
UNIT #2
RESIDUAL HEAT REMOVAL SYSTEM
WELD LOCATIONS

REFERENCE DRAWING
WBN E-2882 IC-28

MATERIAL SPECIFICATIONS
CLASS B
PIPE
SA 312 TP 304W/S
8" SCH 40S
FITTINGS
SA 403 WP 304WW0/S
14" SCH 40
8" SCH 40S
FLANGES
SA 182 F 316
8" SCH. 40S





SHOP WELDS RHRS-104 (W) RHRS-121

NO.	DATE	REVISIONS	BY

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNIT #2
RESIDUAL HEAT REMOVAL SYSTEM
WELD LOCATIONS

DES.			
DRN. SFK		1/13	CI CODE C

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TI-50B
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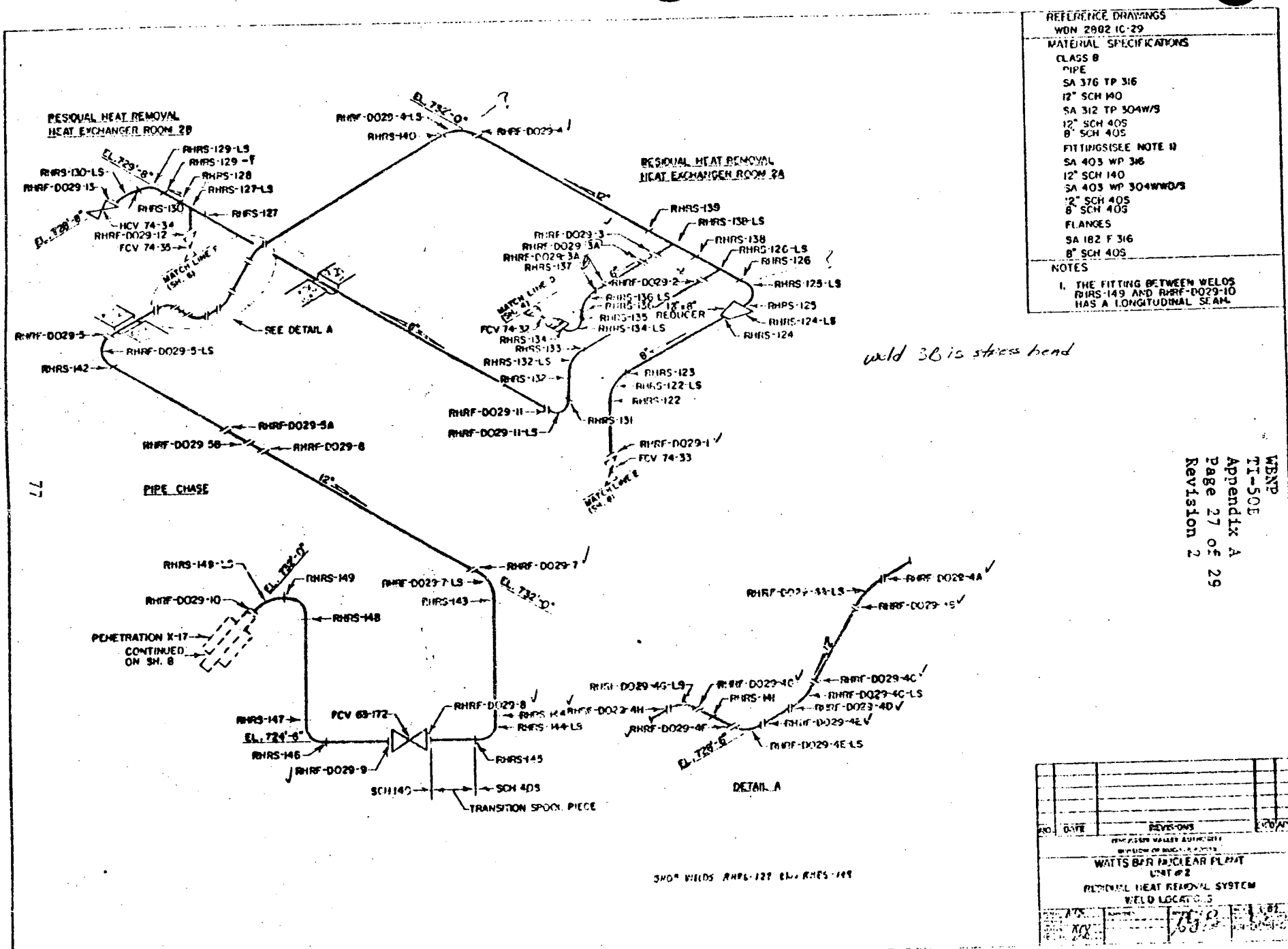
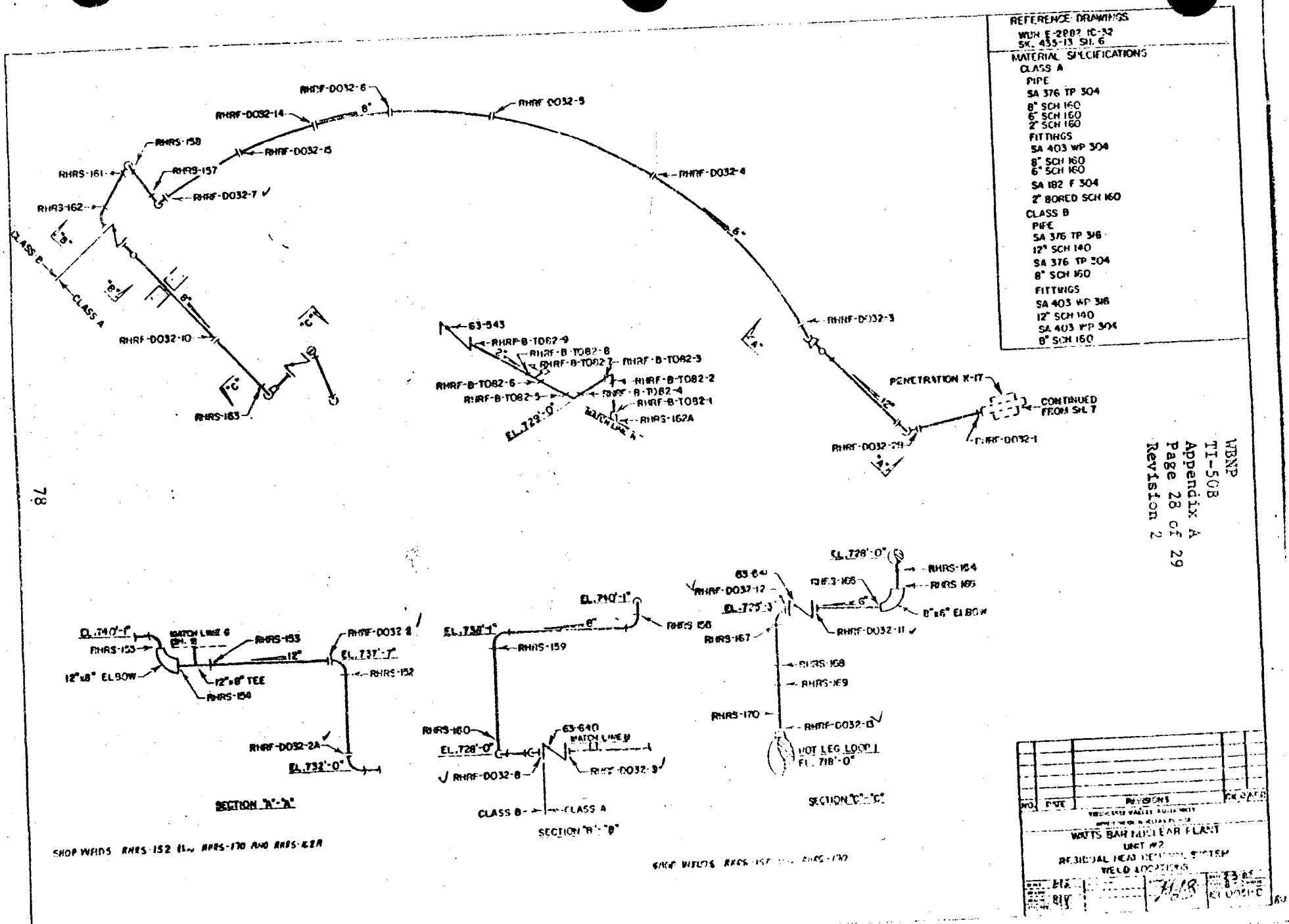
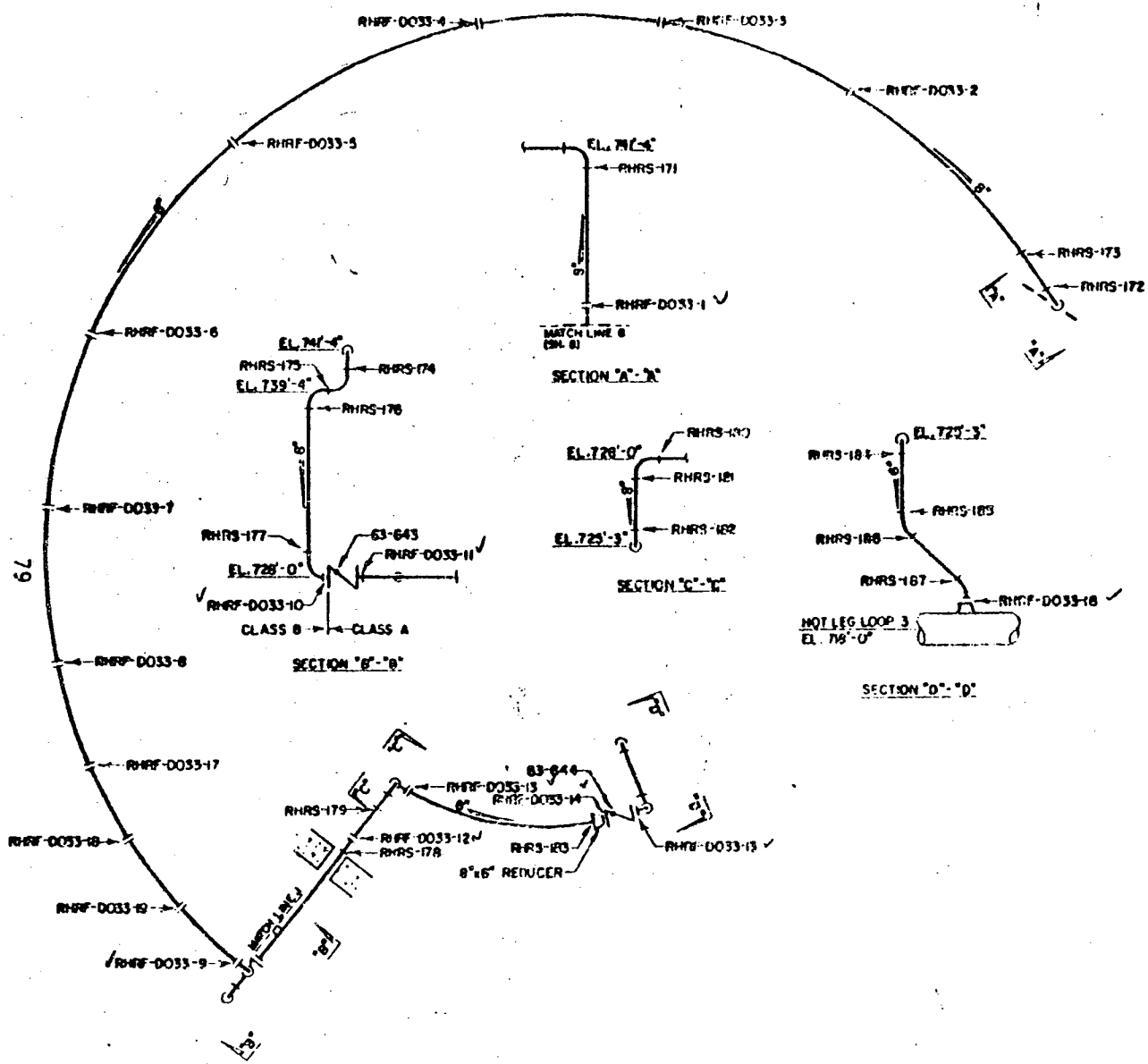


wld 3B is stress head


REFERENCE DRAWINGS
WBN E-2882 IC-32
SK. 435-13 SH. 6
MATERIAL SPECIFICATIONS
CLASS A
PIPE
SA 376 TP 304
8" SCH 160
6" SCH 160
2" SCH 160
FITTINGS
SA 403 WP 304
8" SCH 160
6" SCH 160
SA 182 F 304
2" BORED SCH 160
CLASS B
PIPE
SA 376 TP 316
12" SCH 140
SA 376 TP 304
8" SCH 160
FITTINGS
SA 403 WP 316
12" SCH 140
SA 403 WP 304
8" SCH 160
RHRF-D032-6
RHRF-D032-14
RHRF-D032-5
RHRF-D032-15
RHRS-158
RHRS-161
RHRS-157
RHRF-D032-7
RHRS-162
RHRF-D032-4
CLASS B
CLASS A
RHRF-D032-10
RHRS-163
63-543
RHRF-B-T082-9
RHRF-B-T082-8
RHRF-B-T082-7
RHRF-B-T082-3
RHRF-B-T082-6
RHRF-B-T082-2
RHRF-B-T082-5
RHRF-B-T082-4
RHRF-B-T082-1
RHRS-162A
EL. 729'-0"
MATCH LINE A
RHRF-D032-3
PENETRATION X-17
CONTINUED FROM SH. 7
RHRF-D032-29
RHRF-D032-1
EL. 740'-1"
RHRS-153
MATCH LINE G
RHRS-153
12"x8" ELBOW
12"x8" TEE
RHRS-154
RHRF-D032-2
EL. 737'-7"
RHRS-152
RHRF-D032-2A
EL. 732'-0"
SECTION "A"-"A"
EL. 740'-1"
EL. 738'-1"
RHRS-159
RHRS-156
RHRS-160
EL. 728'-0"
63-640
MATCH LINE B
RHRF-D032-8
RHRF-D032-9
CLASS B
CLASS A
SECTION "B"-"B"
EL. 728'-0"
RHRS-164
RHRS-165
63-641
RHRF-D032-12
EL. 725'-3"
8"x6" ELBOW
RHRS-167
RHRF-D032-11
RHRS-168
RHRS-169
RHRS-170
RHRF-D032-13
HOT LEG LOOP 1
EL. 718'-0"
SECTION "C"-"C"
SHOP WELDS RHRS-152 ... RHRS-170 AND RHRS-162A
SHOP WELDS RHRS-157 ... RHRS-170
NO. DATE REVISIONS
WATTS BAR NUCLEAR PLANT
UNIT #2
RESIDUAL HEAT REMOVAL SYSTEM
WELD LOCATIONS



SHOP WELDS RHRS-170 thru RHRS-187

REFERENCE DRAWINGS
WBN E-2482 IC-33

MATERIAL SPECIFICATIONS
CLASS A
PIPE
SA 376 TP 304
8" SCH 160
6" SCH 160
2" SCH 160
FITTINGS
SA 403 WP 304
8" SCH 160
6" SCH 160
SA 182 F 304
2" BORED SCH 160
CLASS B
PIPE
SA 376 TP 304
8" SCH 160
SA 403 WP 304
8" SCH 160

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER
WATTS BAR NUCLEAR PLANT
UNIT #2
RESIDUAL HEAT REMOVAL SYSTEM
WELD LOCATIONS

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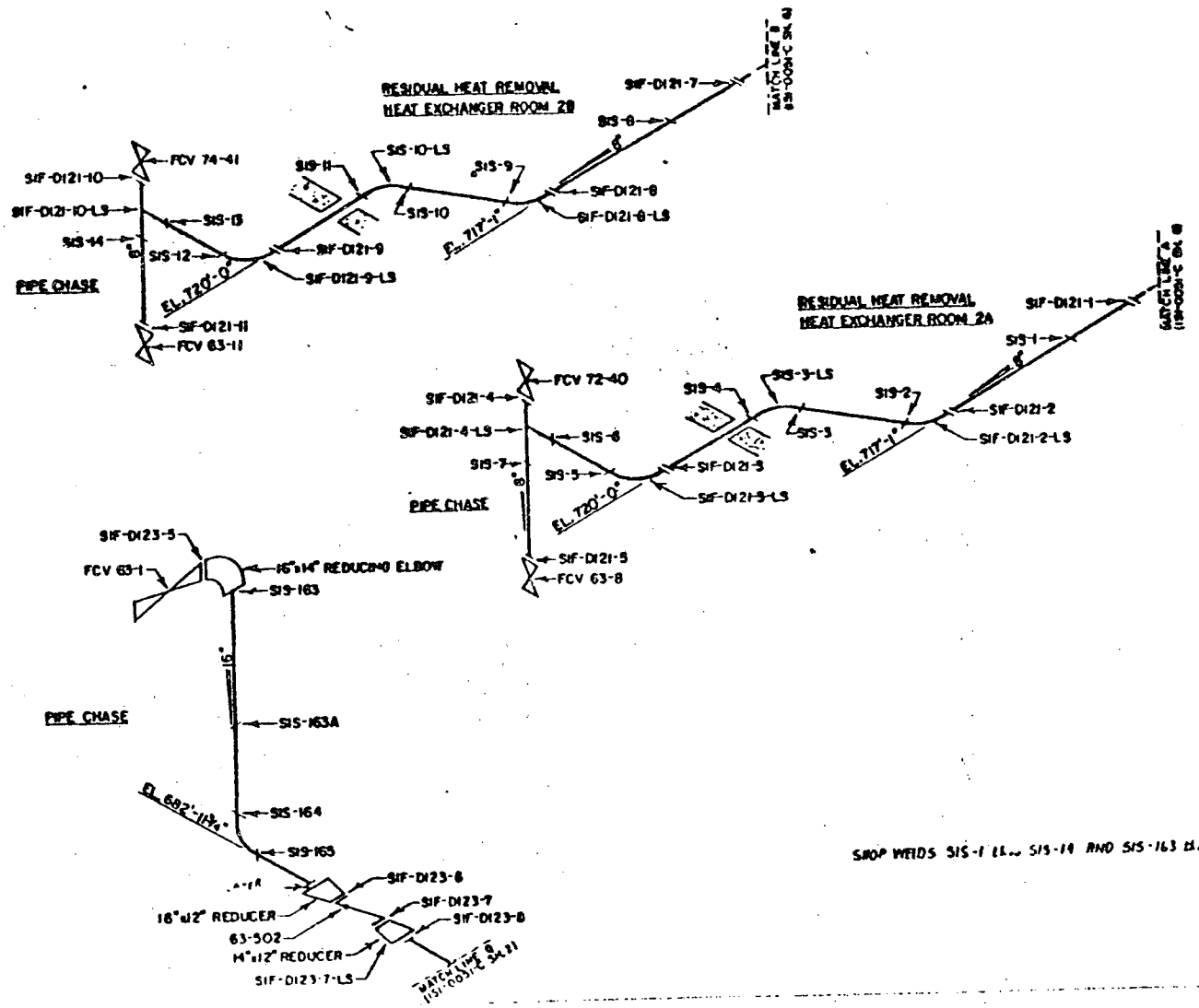
Revision 3

REFERENCE DRAWINGS
WBN E-2882 IC-121
WBN E-2882 IC-123

MATERIAL SPECIFICATIONS
CLASS B
PIPE
SA 358 Cl. 1 TP 304
16" SCH 80S
SA 312 TP 304W/S
8" SCH 40S
FITTINGS
SA 403 WP 304
16" SCH 80S
16"x14" RED. ELL. SCH 40S
16"x12" RED. SCH 40S
SA 403 WP 304WWO/S
8" SCH 40S



NO.	DATE	REVISIONS	CK'D	APP.

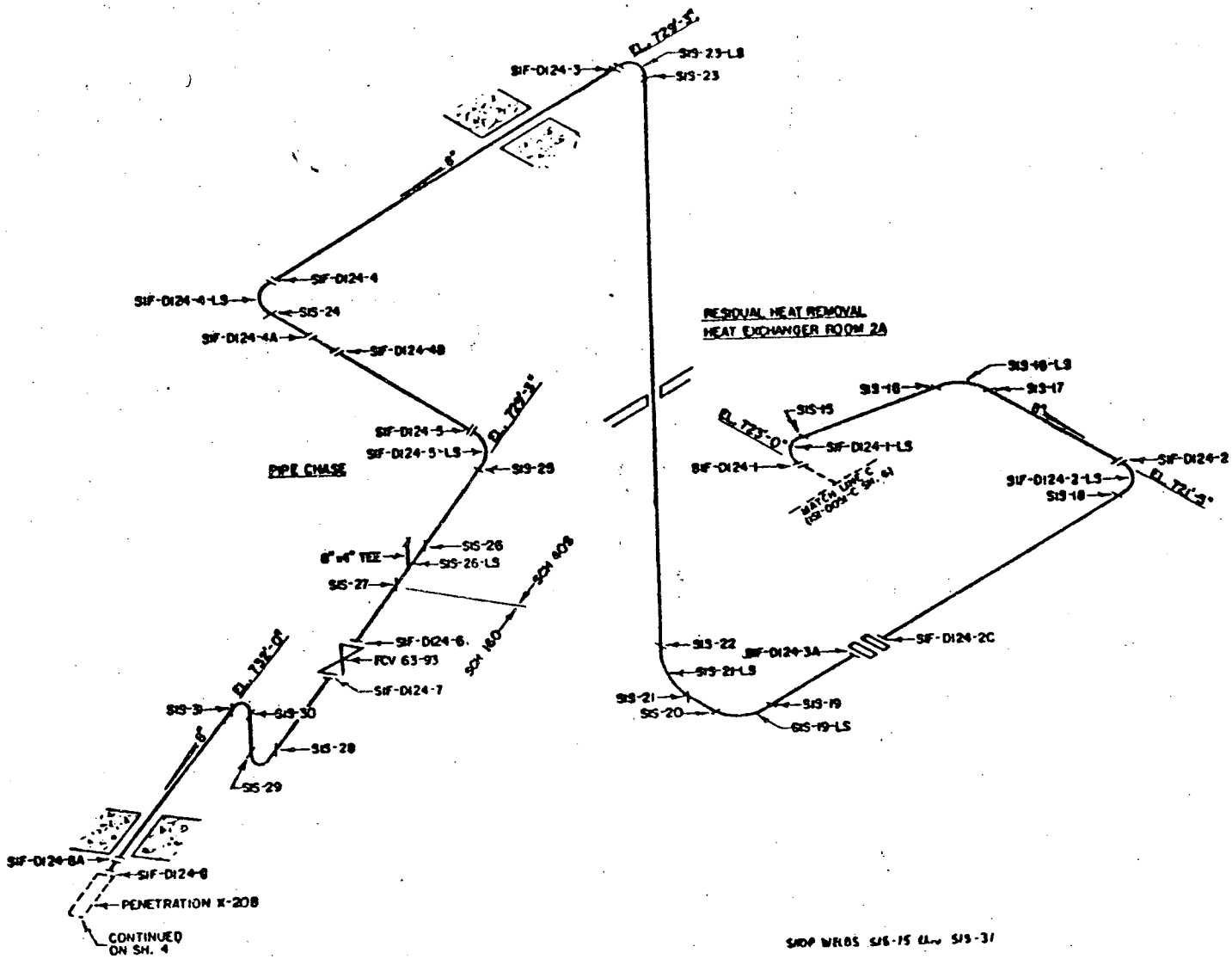
TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNIT #2
SAFETY INJECTION SYSTEM
WELD LOCATIONS

2-6-82
ISI-0052-C

REFERENCE DRAWINGS
WBN E-2892 IC-124

MATERIAL SPECIFICATIONS
CLASS B
PIPE
SA 376 TP 304
8" SCH 160
SA 312 TP 304W/S
8" SCH 40S
FITTINGS
SA 403 WP 304
8" SCH 160
SA 403 WP 304WW0/S
8" SCH 40S
FLANGES
SA 182 F 304
8" SCH 40S



SHOP WELDS SIS-15 thru SIS-31

NO.	DATE	REVISIONS	BY	CHK'D	APP'D

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER
WATTS BAR NUCLEAR PLANT
UNIT #2
SAFETY INJECTION SYSTEM
WELD LOCATIONS

DES.	DRN.	APP.	1 OF 82
NTS	LAO	WJE	ISI-0052-C

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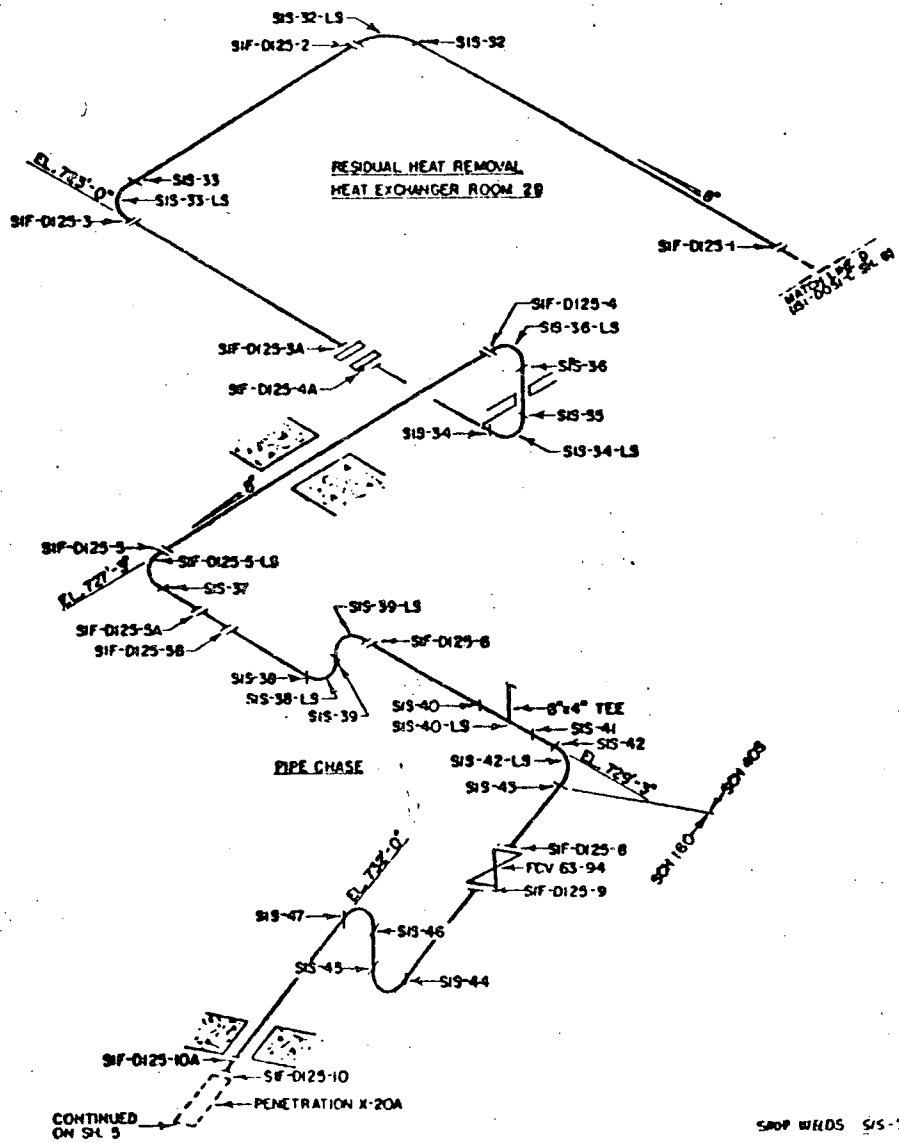
REFERENCE DRAWINGS
WBN E-2882 IC-125

MATERIAL SPECIFICATIONS
CLASS B
PIPE
SA 376 TP 304
8" SCH 160
SA 312 TP 304 W/S
8" SCH 40S
FITTINGS
SA 403 WP 304
8" SCH 160
SA 403 WP 304WWO/S
3" SCH 40S
FLANGES
SA 182 F 304
8" SCH 40S



SHOP WELDS SIS-32 thru SIS-47

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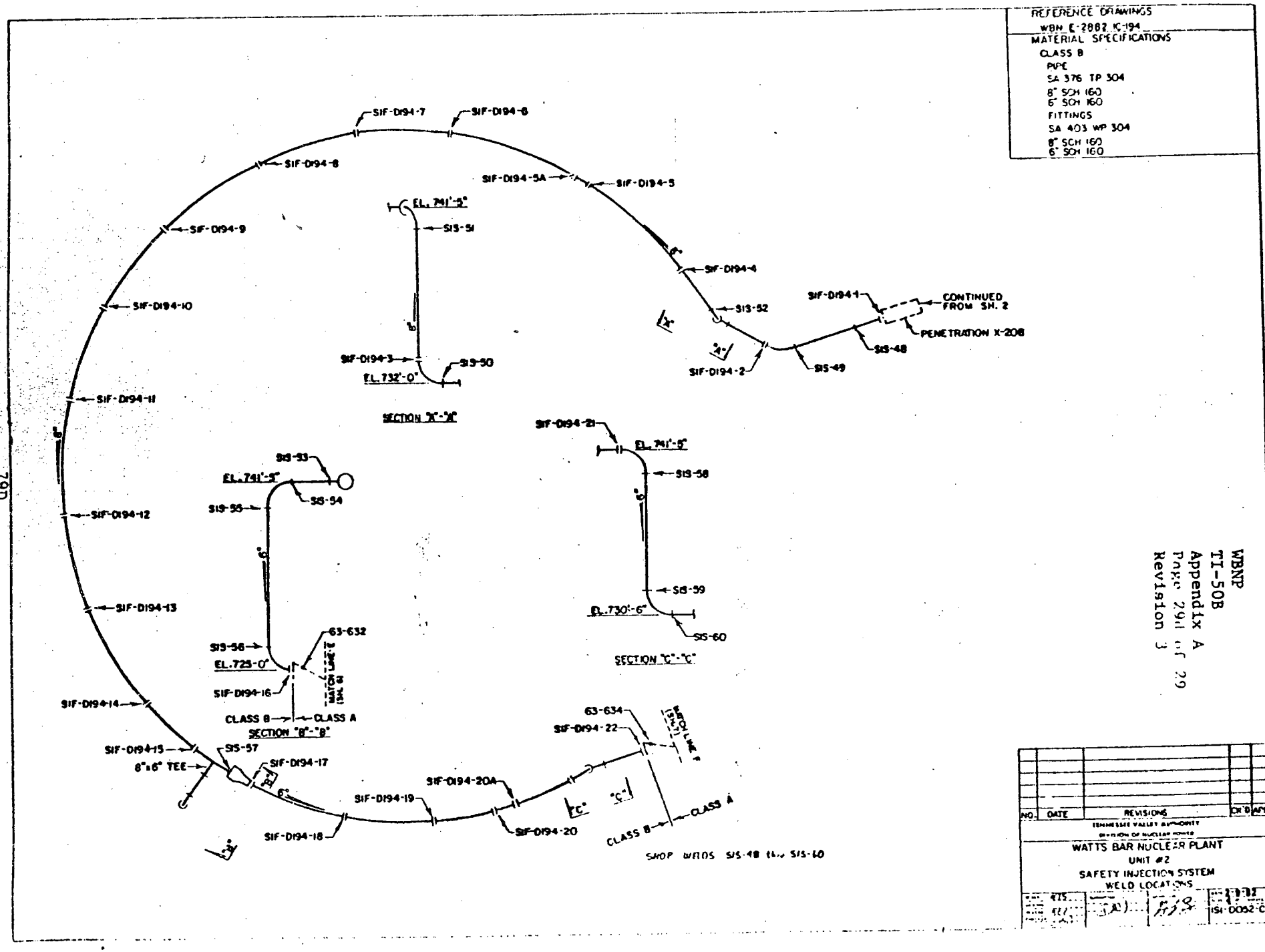
NO.	DATE	REVISIONS	CHK'D

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

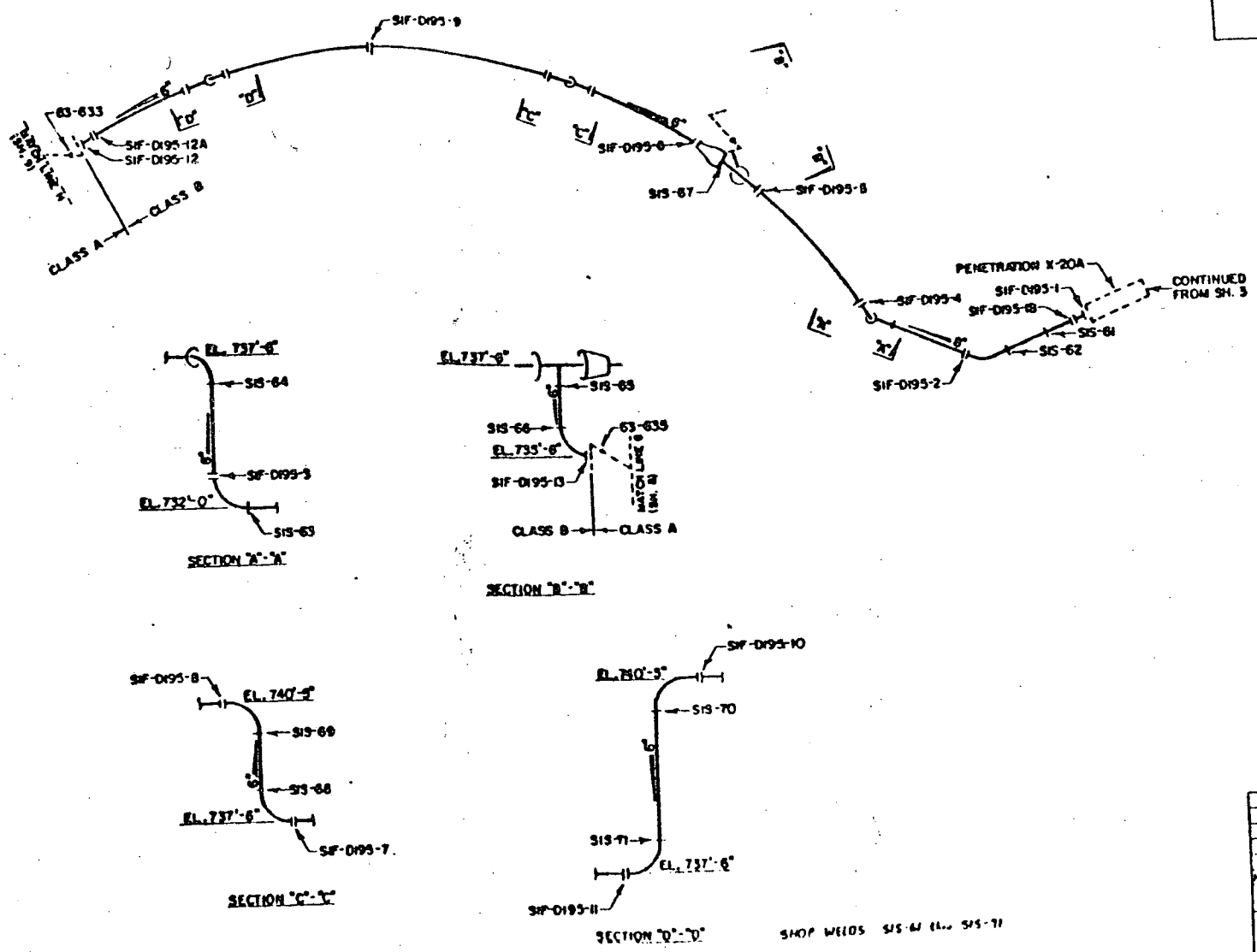
WATTS BAR NUCLEAR PLANT
UNIT #2
SAFETY INJECTION SYSTEM
WELD LOCATIONS

ISI-0052-C


REFERENCE DRAWINGS
WBN E-2882 IC-194
MATERIAL SPECIFICATIONS
CLASS B
PIPE
SA 376 TP 304
8" SCH 160
6" SCH 160
FITTINGS
SA 403 WP 304
8" SCH 160
6" SCH 160
SIF-D194-7
SIF-D194-6
SIF-D194-8
SIF-D194-5A
SIF-D194-5
SIF-D194-9
SIF-D194-4
SIF-D194-10
SIS-52
SIF-D194-1
CONTINUED FROM SH. 2
PENETRATION X-208
SIS-48
SIF-D194-2
SIS-49
SIF-D194-3
SIS-50
EL. 741'-5"
SIS-51
EL. 732'-0"
SECTION "A"-"A"
SIF-D194-11
SIF-D194-21
EL. 741'-5"
SIS-58
SIS-59
EL. 730'-6"
SIS-60
SECTION "C"-"C"
SIS-53
EL. 741'-5"
SIS-54
SIS-55
SIF-D194-12
SIF-D194-13
SIS-56
EL. 725-0"
63-632
SIF-D194-16
CLASS B
CLASS A
SECTION "B"-"B"
SIF-D194-14
63-634
SIF-D194-22
SIF-D194-15
SIS-57
8"x6" TEE
SIF-D194-17
SIF-D194-20A
SIF-D194-19
SIF-D194-20
SIF-D194-18
CLASS B
CLASS A
SHOP WELDS SIS-48 thru SIS-60
NO. DATE REVISIONS CK'D APP
TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER
WATTS BAR NUCLEAR PLANT
UNIT #2
SAFETY INJECTION SYSTEM
WELD LOCATIONS
ISI-0052-C

REFERENCE DRAWINGS
WBN E-2982 IC-195

MATERIAL SPECIFICATIONS
CLASS B
PIPE
SA 376 TP 304
8" SCH 160
6" SCH 160
FITTINGS
SA 403 WP 304
8" SCH 160
6" SCH 160



NO.	DATE	REVISIONS	CK'D	APP

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

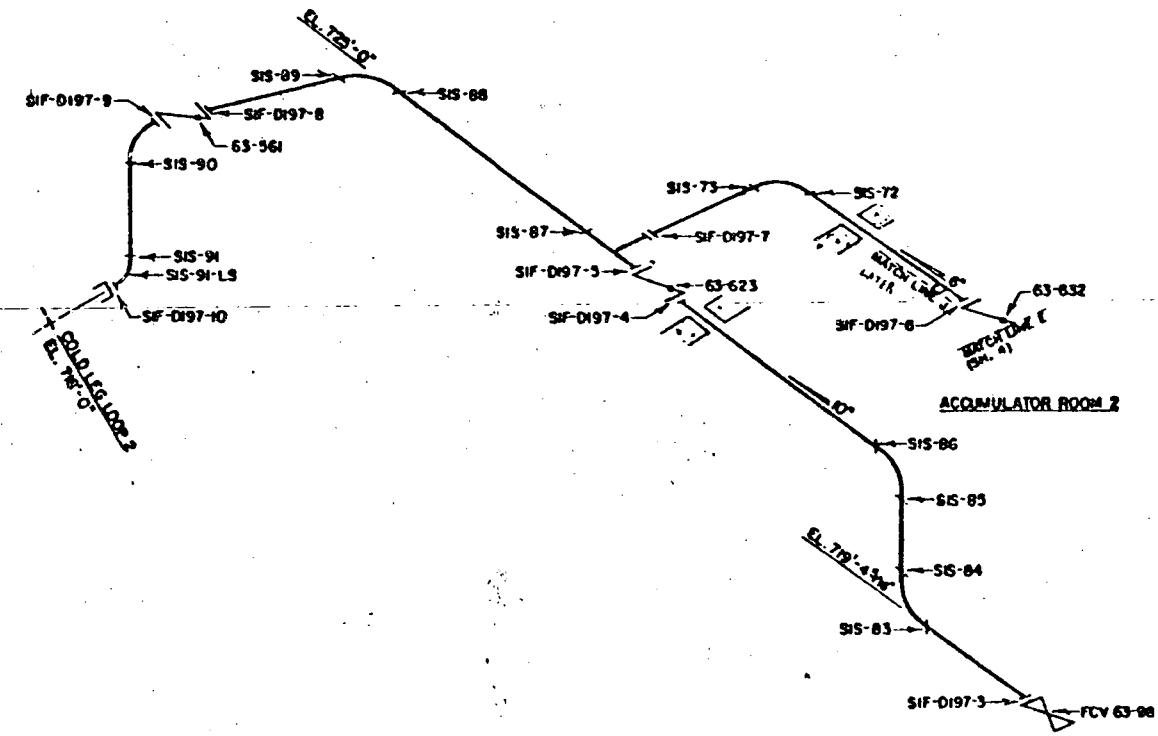
WATTS BAR NUCLEAR PLANT
UNIT #2
SAFETY INJECTION SYSTEM
WELD LOCATIONS

2-10-82
151-0052-C

REFERENCE DRAWINGS
WBN E-2882 IC-197

MATERIAL SPECIFICATIONS
CLASS A
PIPE
SA 376 TP 316
10" SCH 140
6" SCH 160
SA 376 TP 304
2" SCH 160
FITTINGS (SEE NOTE 1)
SA 403 WP 316
10" SCH 140
6" SCH 160
SA 182 F 304
2" BORED SCH 160

NOTES
1. THE FITTING BETWEEN WELDS SIS-91 AND SIF-D197-10 HAS A LONGITUDINAL SEAM.



SHOP WELDS SIS-83 thru SIS-91
SHOP WELDS SIS-72 thru SIS-82 HAVE BEEN OMITTED

NO.	DATE	REVISIONS	CK'D	APP

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

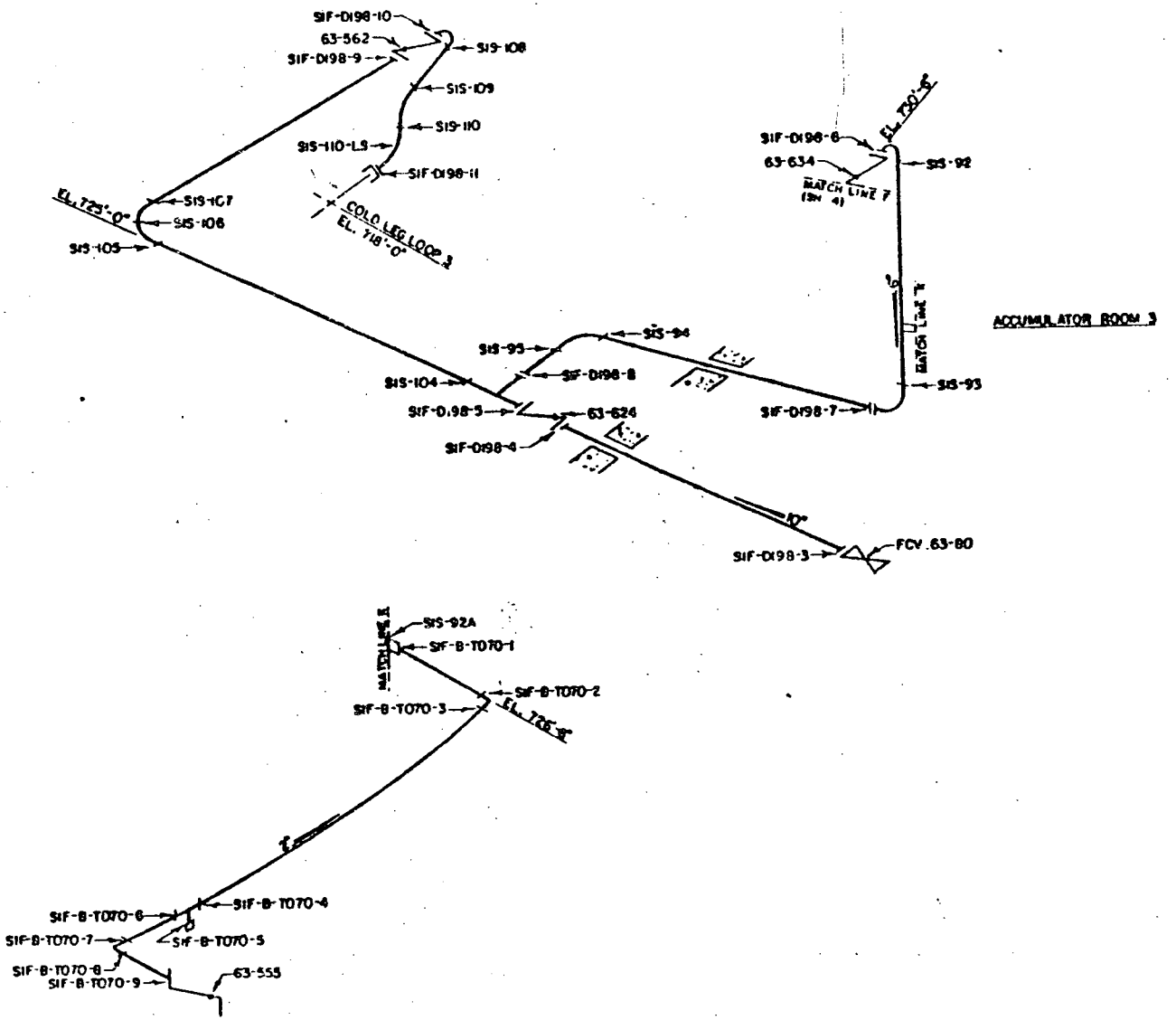
WATTS BAR NUCLEAR PLANT
UNIT #2
SAFETY INJECTION SYSTEM
WELD LOCATIONS

2-10-82
ISI-0062-C

REFERENCE DRAWINGS
WBN E-2882 IC-198
SK. 435-15 SH. 7

MATERIAL SPECIFICATIONS
CLASS A
PIPE
SA 376 TP 316
10" SCH 140
6" SCH 160
SA 376 TP 304
2" SCH 160
FITTINGS (SEE NOTE 1)
SA 403 WP 316
10" SCH 140
6" SCH 160
SA 182 F 304
2" BORED SCH 160

NOTES
1. THE FITTING BETWEEN WELDS SIS-110 AND SIF-D198-11 HAS A LONGITUDINAL SEAM.



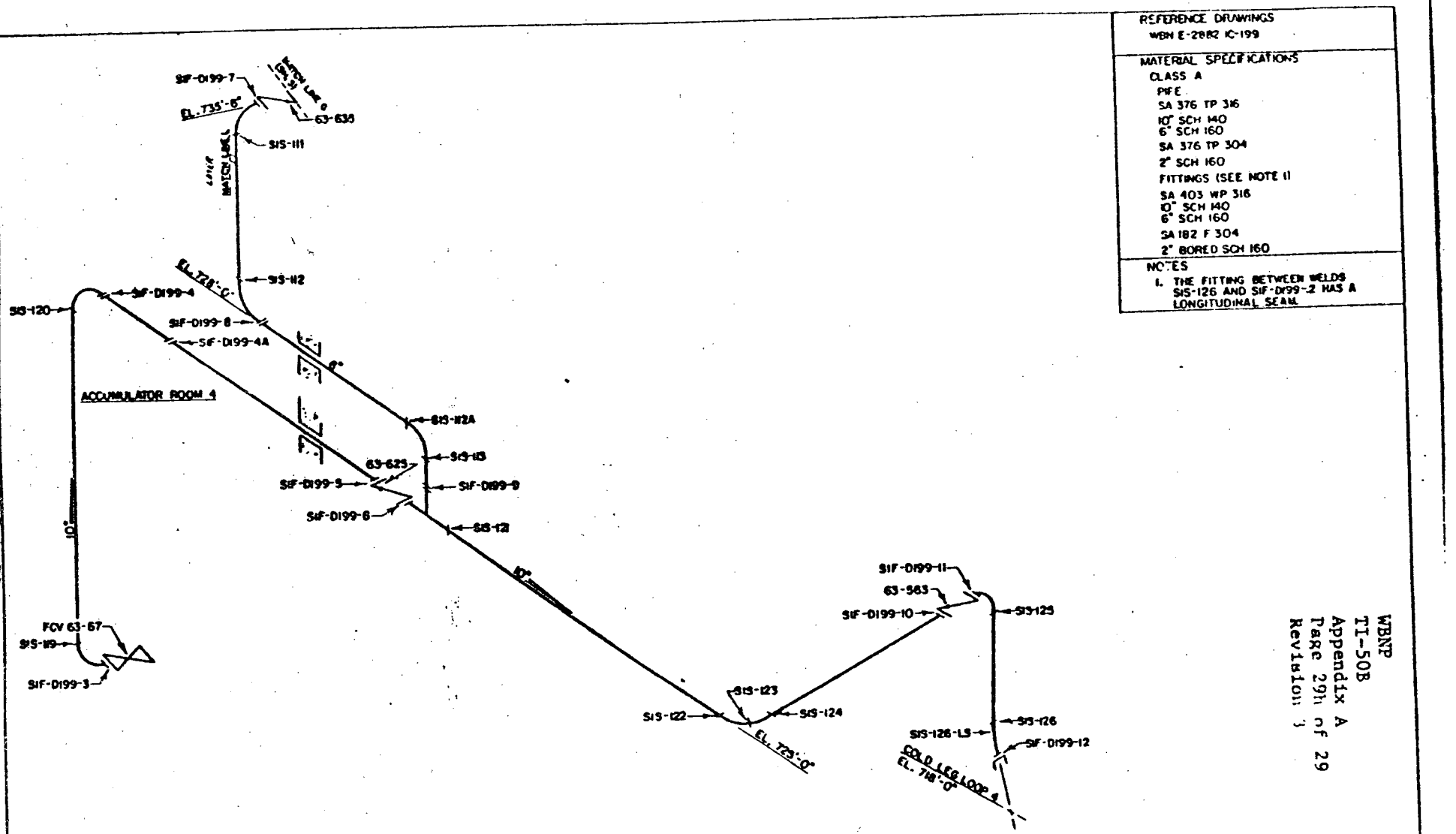
SHOP WELDS SIS-92 thru SIS-110
SHOP WELDS SIS-96 thru SIS-104 HAVE BEEN OMITTED

NO.	DATE	REVISIONS	CK'D	APP

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNIT #2
SAFETY INJECTION SYSTEM
WELD LOCATIONS

ISI 0052-C



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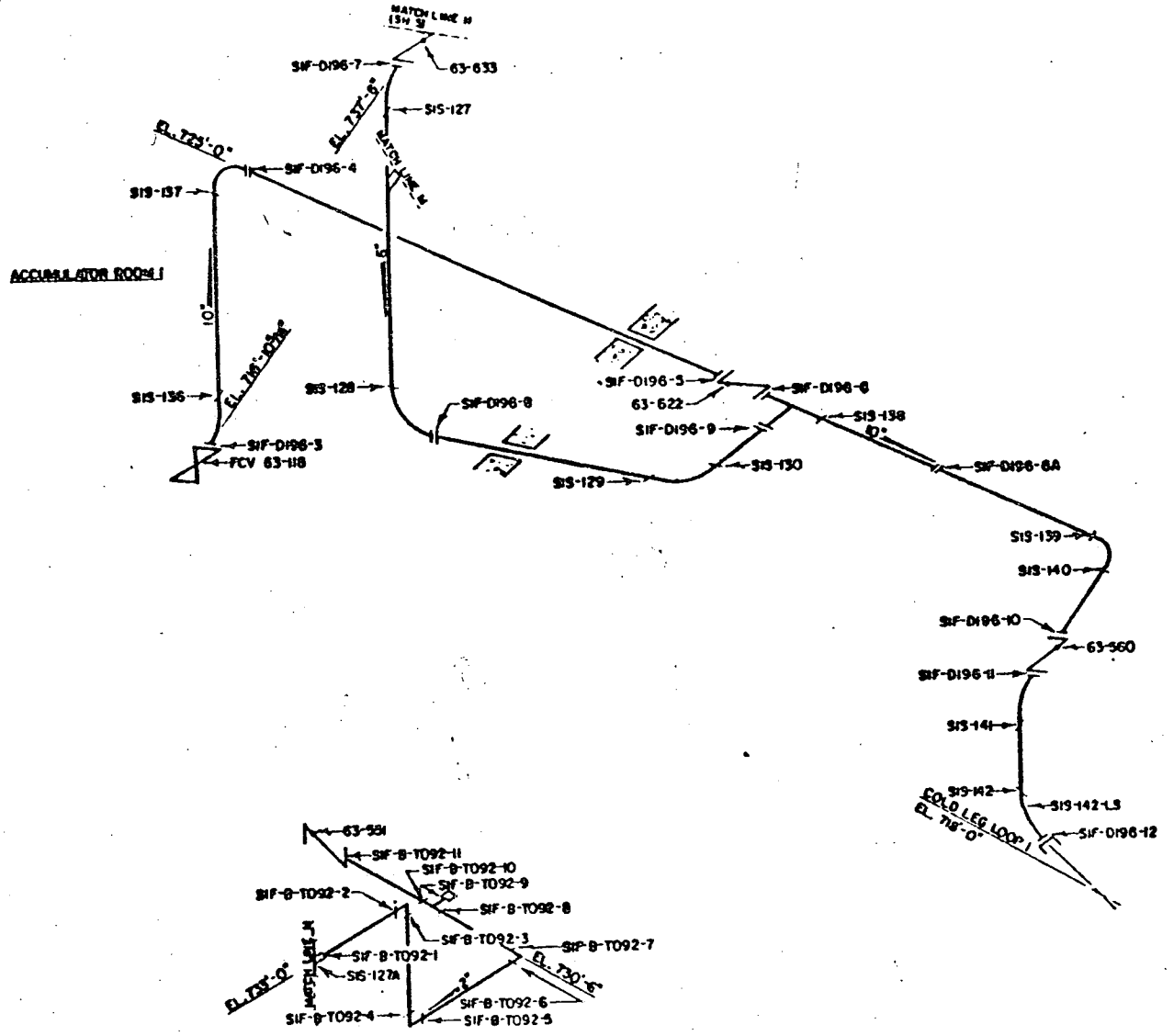

SHOP WELDS SIS-129 thru SIS-130 AND SIS-136 thru SIS-142, SIS-127A
SHOP WELDS SIS-131 thru SIS-135 HAVE BEEN OMITTED

REFERENCE DRAWINGS
WBN E-2882 IC-196
SK. 435-13 SH. 2

MATERIAL SPECIFICATIONS
CLASS A
PIPE
SA 376 TP 316
10" SCH 140
6" SCH 160
SA 376 TP 304
2" SCH 160
FITTINGS (SEE NOTE 1)
SA 403 WP 316
10" SCH 140
6" SCH 160
SA 182 F 304
2" SCH 160

NOTES
1. THE FITTING BETWEEN WELDS SIS-142 AND SIF-D196-12 HAS A LONGITUDINAL SEAM.

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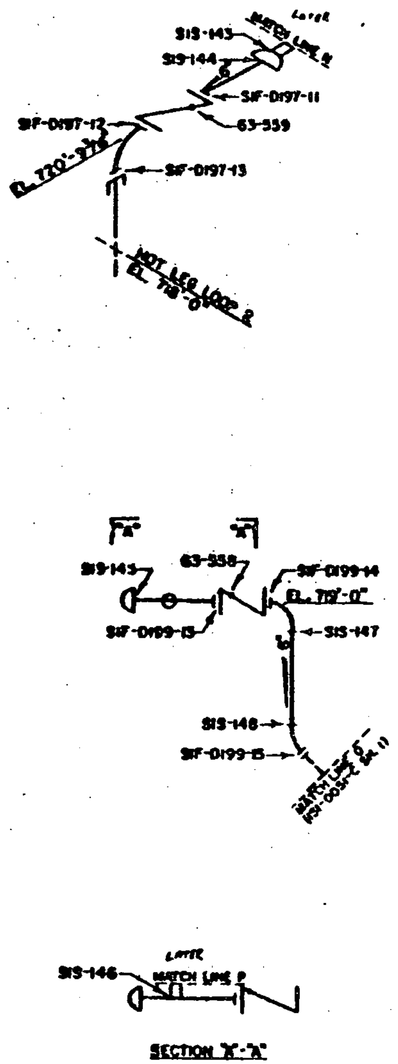
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNIT #2
SAFETY INJECTION SYSTEM
WELD LOCATIONS

2-12-82
ISI-0052-C

REFERENCE DRAWINGS

WBN E-2882 IC-197
WBN E-2882 IC-199



SHOP WELDS SIS-143 thru SIS-148

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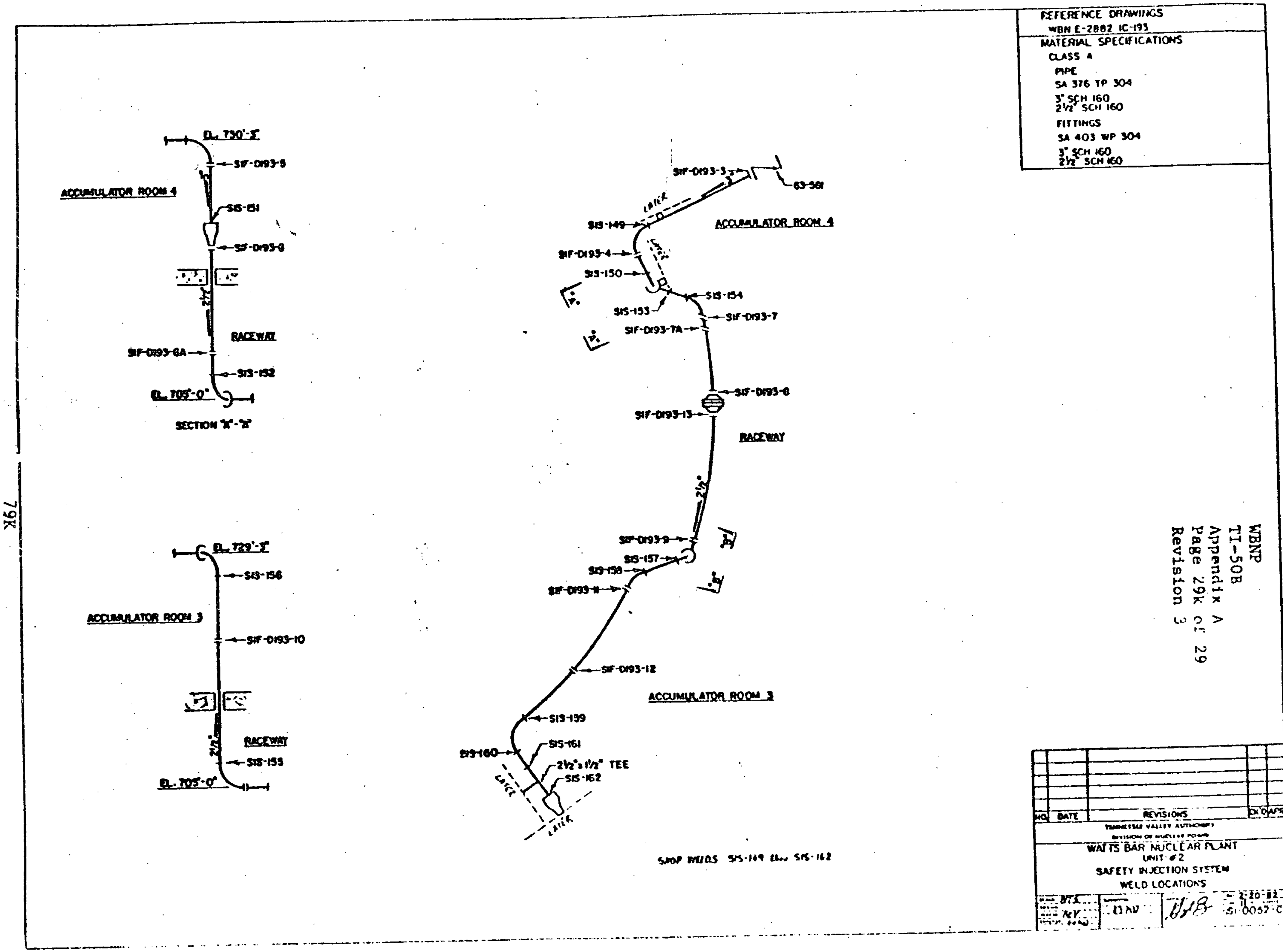
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLE.. PLANT
UNIT #2
SAFETY INJECTION SYSTEM
WELD LOCATIONS

ISI-0052 C


REFERENCE DRAWINGS
WBN E-2882 IC-193
MATERIAL SPECIFICATIONS
CLASS A
PIPE
SA 376 TP 304
3" SCH 160
2½" SCH 160
FITTINGS
SA 403 WP 304
3" SCH 160
2½" SCH 160
EL. 730'-3"
SIF-D193-5
ACCUMULATOR ROOM 4
SIS-151
SIF-D193-6
RACEWAY
SIF-D193-6A
SIS-152
EL. 705'-0"
SECTION "A"-"A"
EL. 729'-3"
SIS-156
ACCUMULATOR ROOM 3
SIF-D193-10
RACEWAY
SIS-155
EL. 705'-0"
SIF-D193-3
63-561
SIS-149
ACCUMULATOR ROOM 4
SIF-D193-4
SIS-150
SIS-154
SIS-153
SIF-D193-7
SIF-D193-7A
SIF-D193-8
SIF-D193-13
RACEWAY
2½"
SIF-D193-9
SIS-157
SIS-158
SIF-D193-11
SIF-D193-12
ACCUMULATOR ROOM 3
SIS-159
SIS-160
SIS-161
2½" x 1½" TEE
SIS-162
SHOP WELDS SIS-149 thru SIS-162
NO. DATE REVISIONS
TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER
WATTS BAR NUCLEAR PLANT
UNIT #2
SAFETY INJECTION SYSTEM
WELD LOCATIONS
2-20-82
SI-0052-C

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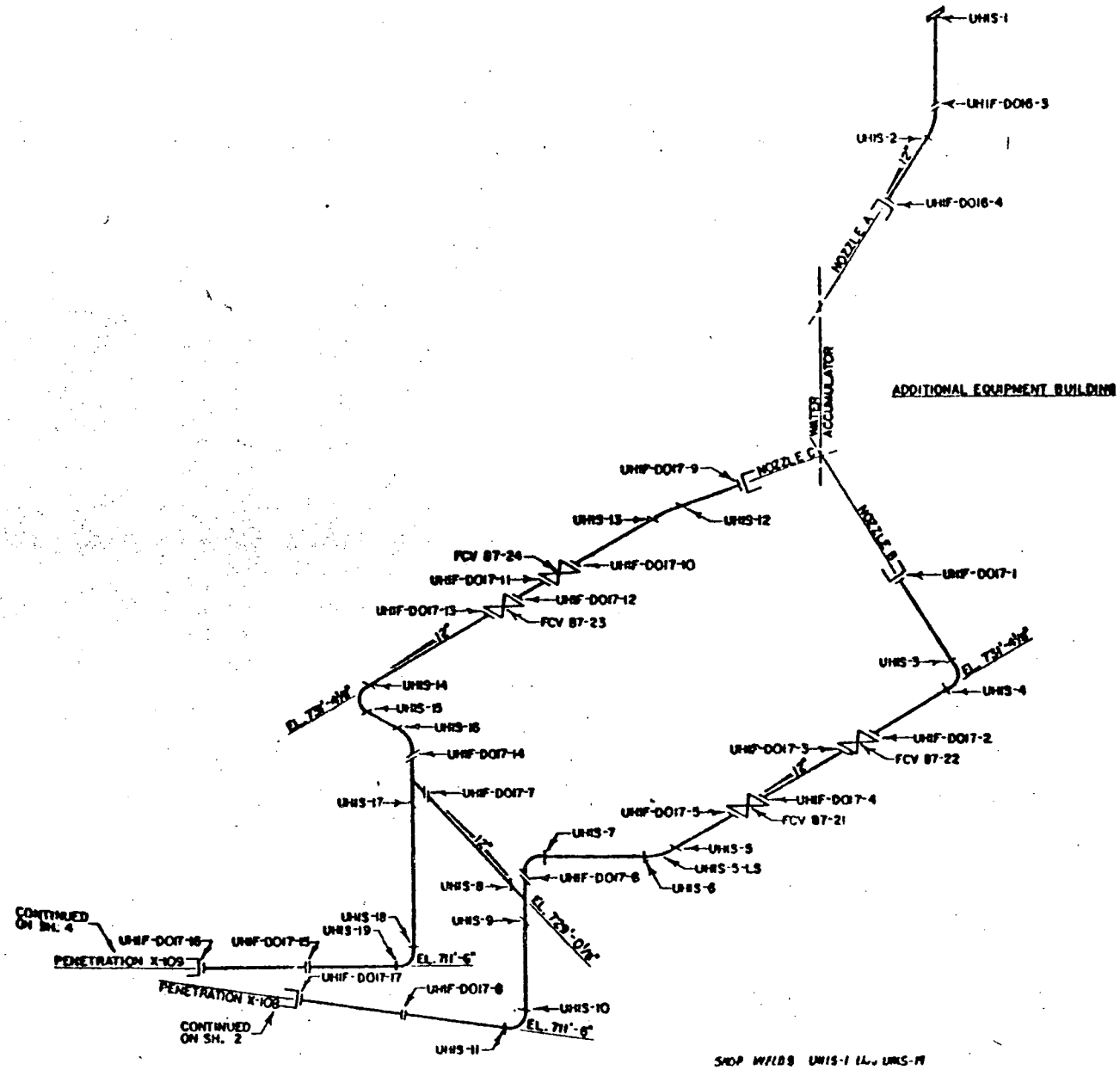

SHOP WELDS UHIS-1 EL. UHIS-11

REFERENCE DRAWINGS
E-2882 IC-16
E-2882 IC-17

MATERIAL SPECIFICATIONS
CLASS B
PIPE
SA 376 TP 316
12" SCH 140
FITTINGS (SEE NOTE 1)
SA 403 WP 316
12" SCH 140
FLANGES
SA 182 F 316
12" SCH 140

NOTES
1. THE FITTING BETWEEN WELDS UHIS-9 AND UHIS-8 HAS A LONGITUDINAL SEAM.

NO.	DATE	REVISIONS	BY	CK	APP'D

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNIT #2
UPPER HEAD INJECTION SYSTEM
WELD LOCATIONS

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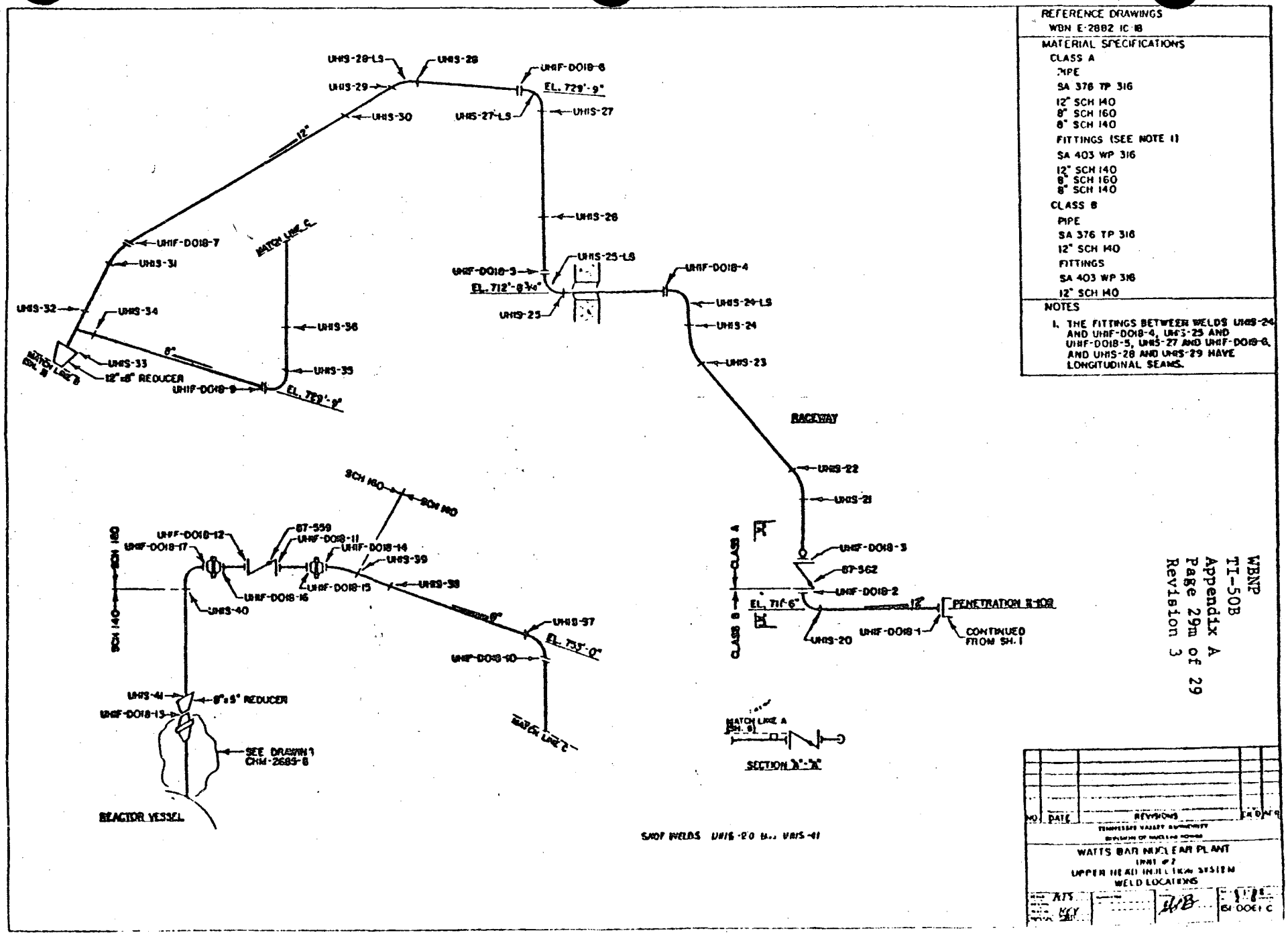

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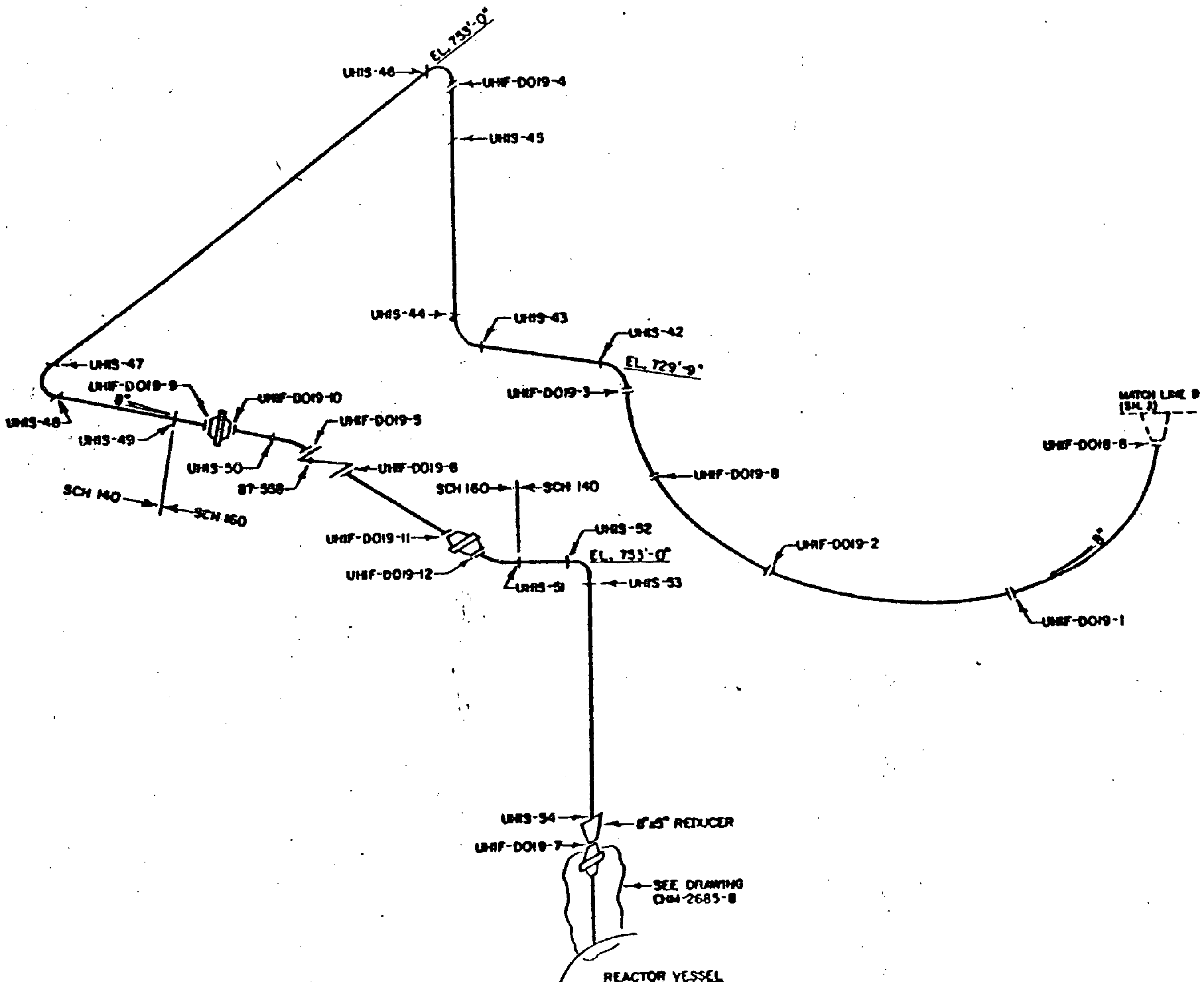
REFERENCE DRAWINGS
WBN E-2982 [illegible]-19

MATERIAL SPECIFICATIONS
CLASS A
PIPE
SA 376 TP 316
8" SCH 160
8" SCH 140
FITTINGS
SA 403 WP 316
8" SCH 160
8" SCH 140



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SHOP WELDS UHIS-42 [illegible] UHIS-64

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TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER
WATTS BAR NUCLEAR PLANT
UNIT #2
UPPER HEAD INJECTION SYSTEM
WELD LOCATIONS

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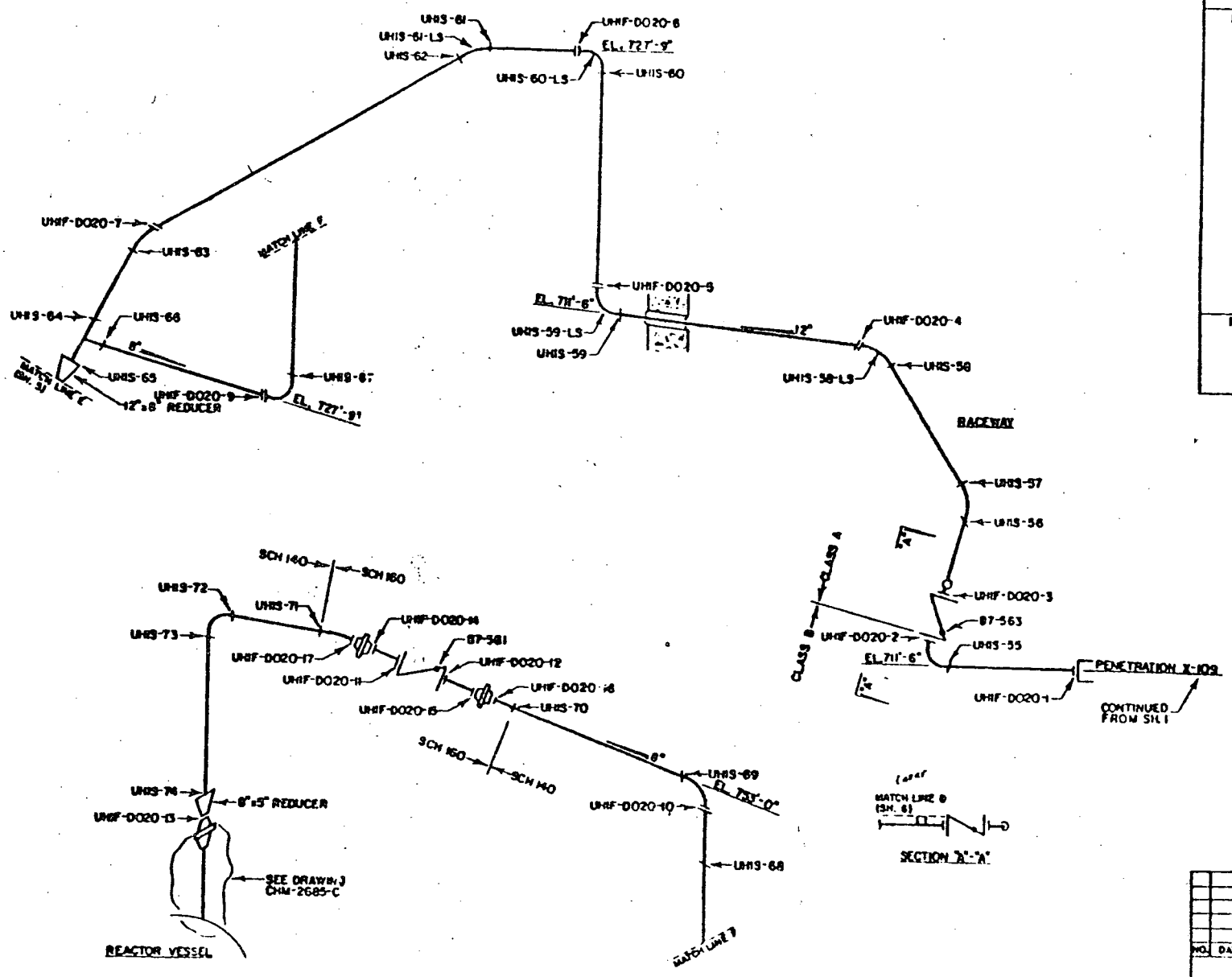


REFERENCE DRAWINGS

WBN E-2892 & 20

MATERIAL SPECIFICATIONS

CLASS A

PIPE

SA 376 TP 316

12" SCH 140
8" SCH 160
8" SCH 140

FITTINGS (SEE NOTE 1)

SA 403 WP 316

12" SCH 140
8" SCH 160
8" SCH 140

CLASS B

PIPE

SA 376 TP 316

12" SCH 140

FITTINGS

SA 403 WP 316

12" SCH 140

NOTES

1. THE FITTINGS BETWEEN WELDS UHIS-58 AND UHIF-0020-4, UHIS-59 AND UHIF-0020-5, UHIS-60 AND UHIS-0020-6, AND UHIS-61 AND UHIS-62 HAVE LONGITUDINAL SEAMS

NO.	DATE	REVISIONS	CK'D/APP'D

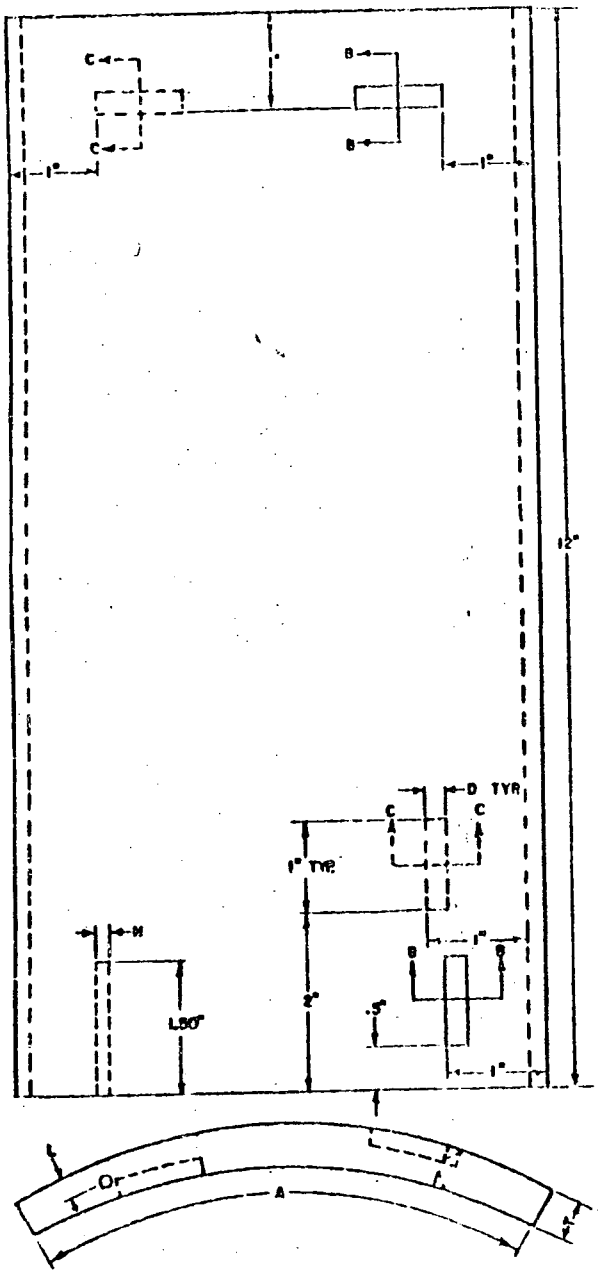
TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

WATTS BAR NUCLEAR PLANT
UNIT #2
UPPER HEAD INJECTION SYSTEM
WELD LOCATIONS

SCALE: NTS

TABLE A
LIST OF CALIBRATION BLOCK DRAWINGS

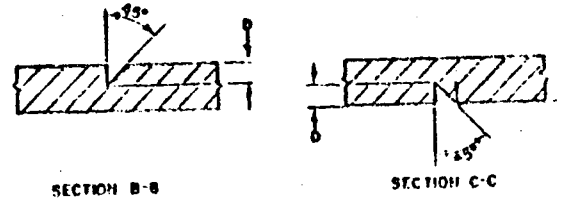
BLOCK NO.	DRAWING NO.	APPENDIX B PAGE NO.
WB-1	CH-M-2445-C	1
WB-2	CH-M-2445-C	1
WB-3	CH-M-2445-C	1
WB-4	CH-M-2445-C	1
WB-5	CH-M-2445-C	1
WB-6	CH-M-2460-B	3
WB-7	CH-M-2507-C	4
WB-8	CH-M-2507-C	4
WB-9	CH-M-2507-C	4
WB-10	CH-M-2553-C	7
WB-11	CH-M-2593-C	11
WB-12	CH-M-2553-C	7
WB-13	CH-M-2571-C	8
WB-14	CH-M-2550-C	5
WB-15	CH-M-2552-C	6
WB-16	CH-M-2591-B	10
WB-17	CH-M-2571-C	8
WB-18	CH-M-2571-C	8
WB-19	CH-M-2571-C	8
WB-20	CH-M-2589-B	9
WB-21	CH-M-2571-C	8
WB-23	CH-M-2597-C	12
WB-24	CH-M-2597-C	12
WB-25	CH-M-2597-C	12
WB-26	CH-M-2597-C	12
WB-27	CH-M-2597-C	12
WB-29	CH-M-2591-B	10
WB-30	CH-M-2591-B	10
WB-31	CH-M-2597-C	12
WB-32	CH-M-2597-C	12
WB-33	CH-M-2638-C	
WB-34	CH-M-2638-C	
WB-35	CH-M-2597-C	12
WB-36	CH-M-2597-C	12
WB-37	CH-M-2678-B	13
WB-38	CH-M-2742-C	14
WB-39	CH-M-2771-C	15
WB-ET-1	CH-M-2447-B	2
7-1-8-CS-3-WAB	D-5420 032 (SWRI)	22
10.5-7-8-CS-4-WAB	D-5420 033 (SWRI)	23
16-59-2	D-5420 037 (SWRI)	25
IR-CSCL-2-WAB	D-5420 031 (SWRI)	21
NS-CSCL-1-WAB	D-5420 030 (SWRI)	20
Q-7053 1 of 2		
Q-7053 2 of 2	D-5420 035 (SWRI)	24
TO 4529		
TO 7216		
WAT-UT-01	D-5420 022 (SWRI)	17
WAT-UT-02	D-5420 026 (SWRI)	19
WAT-UT-03	D-5420 025 (SWRI)	18
WAT-UT-05	D-5420 021 (SWRI)	16
WAT-UT-06	2414 SH-7 (RDM)	26
C&L Special #1	E4-144	28
		29



BLOCK NO.	DIA.	T	D	A	H	L
XX-1*	6	0.681	0.034	120°	3/32	1/2 T
XX-2	8	0.878	0.044	120°	3/32	1/2 T
XX-3	12	1.128	0.056	120°	1/8	1/4 T
XX-4	16	0.827	0.041	120°	3/32	1/2 T
XX-5	32	1.434	0.072	60°	1/8	1/4 T

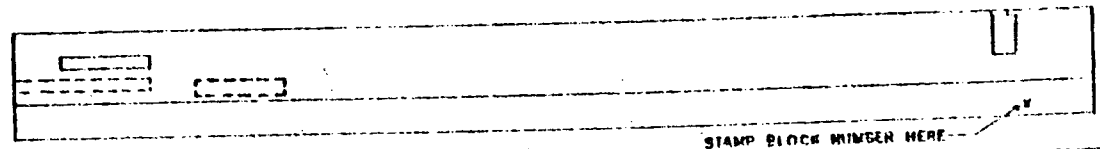
* NOTE:
SUBSTITUTE SQ FOR SEQUOYAH NUCLEAR PLANT OR WB FOR WATTS BAR NUCLEAR PLANT IN PLACE OF THE XX IN THE BLOCK NUMBER.

ENGINEERING CHANGE [illegible] CERTIFIED CORRECT AS BUILT WITH ALL APPLICABLE TOLERANCES
BY: [illegible]
DATE: [illegible]



SECTION B-B

SECTION C-C



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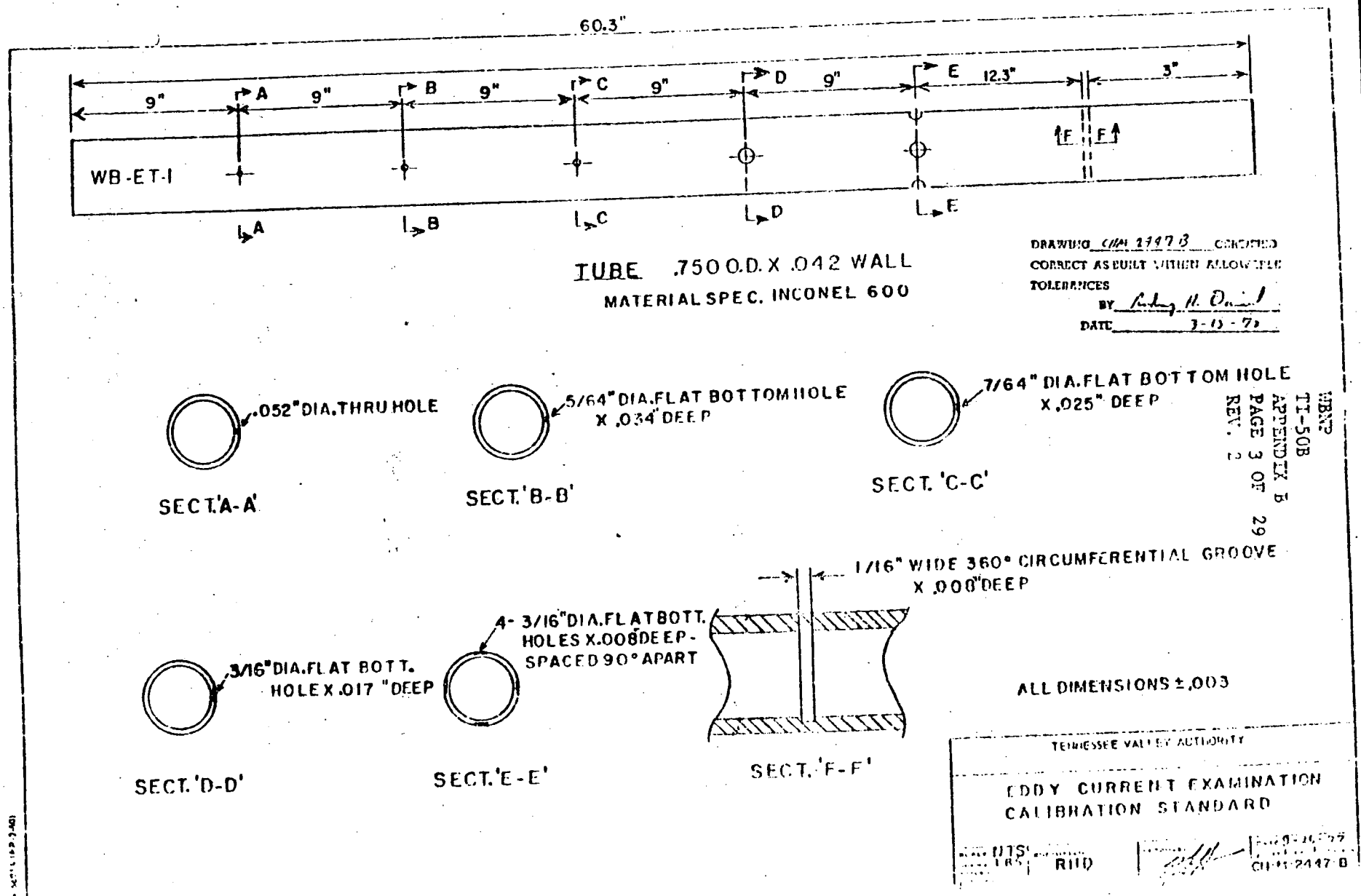
TENNESSEE VALLEY AUTHORITY
DIVISION OF POWER [illegible]

ULTRASONIC CALIBRATION BLOCKS

[illegible]



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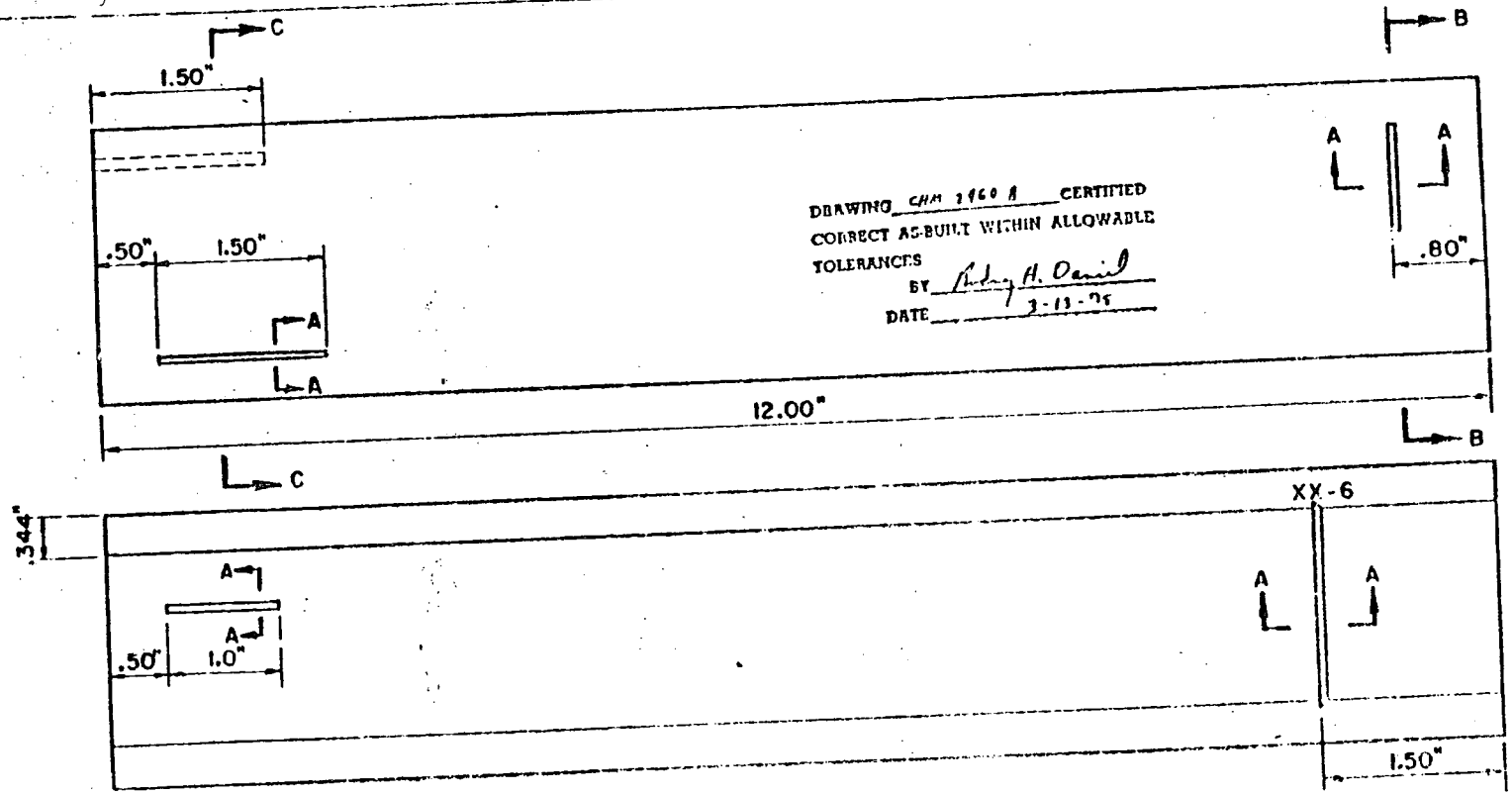
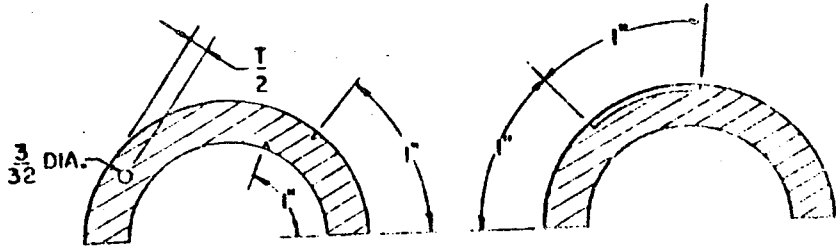
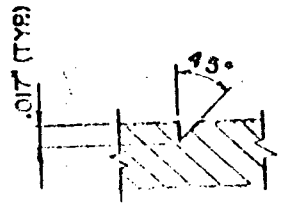




SECT 'C-C'

SECT 'B-B'

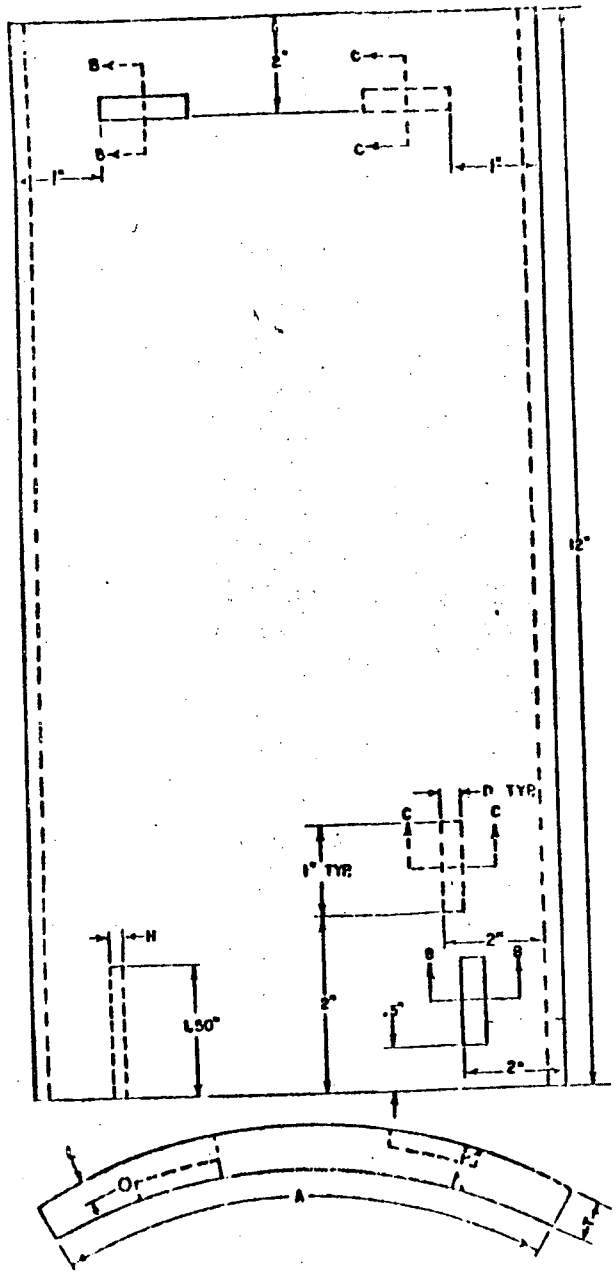


SECT 'A-A'

SUBSTITUTE SQ FOR SEQUOYAH NUCLEAR PLANT OR WB FOR WATTS BAR NUCLEAR PLANT IN PLACE OF THE XX IN THE BLOCK NUMBER.

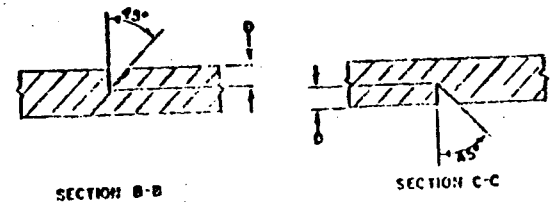
ULTRASONIC CALIBRATION BLOCK

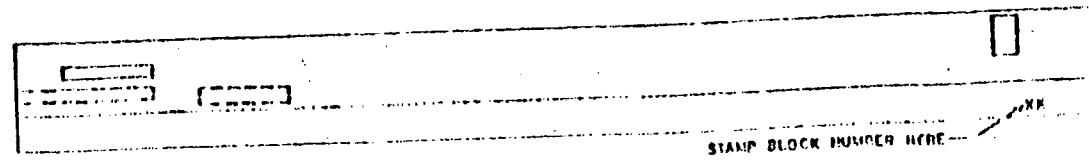
3-15-78



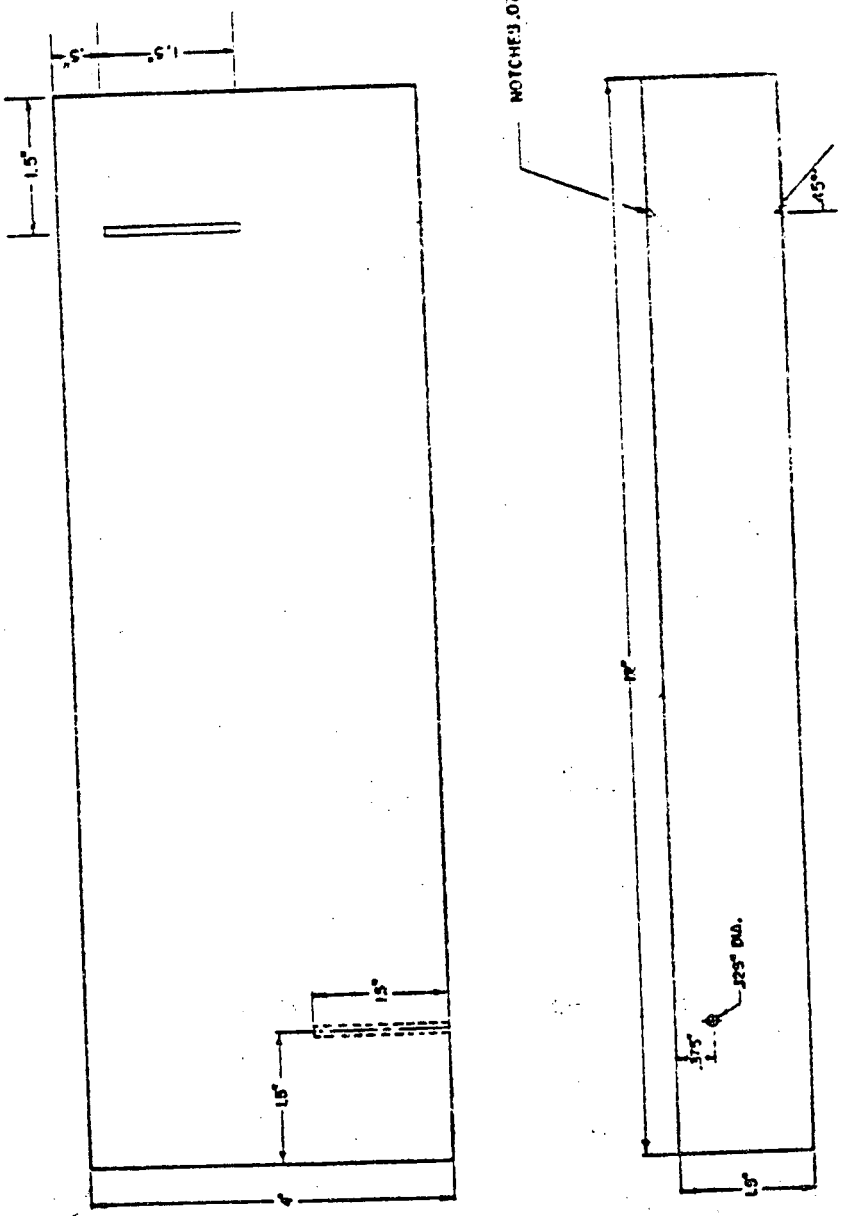
BLOCK NO	DIA	T	D	A	H	L
XX-7	8"	0.75	0.038	120°	3/32	1/2 T
XX-8	12"	0.75	0.038	120°	3/32	1/2 T
XX-9	8"	0.309	0.015	120°	3/32	1/2T

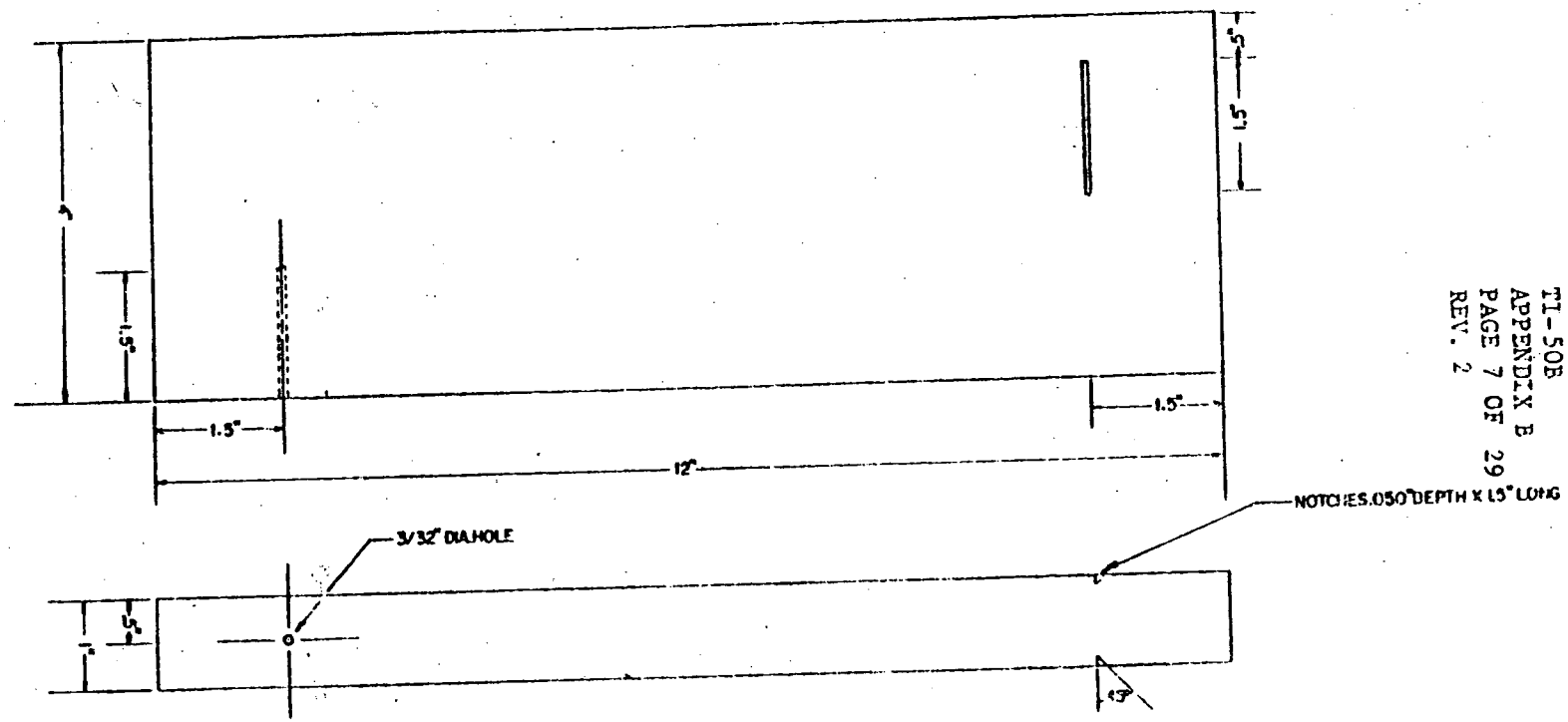
* NOTE:
SUBSTITUTE SQ FOR SEQUOYAH NUCLEAR PLANT OR WB FOR WATTS BAR NUCLEAR PLANT IN PLACE OF THE XX IN THE BLOCK NUMBER.





ULTRASONIC CALIBRATION BLOCKS

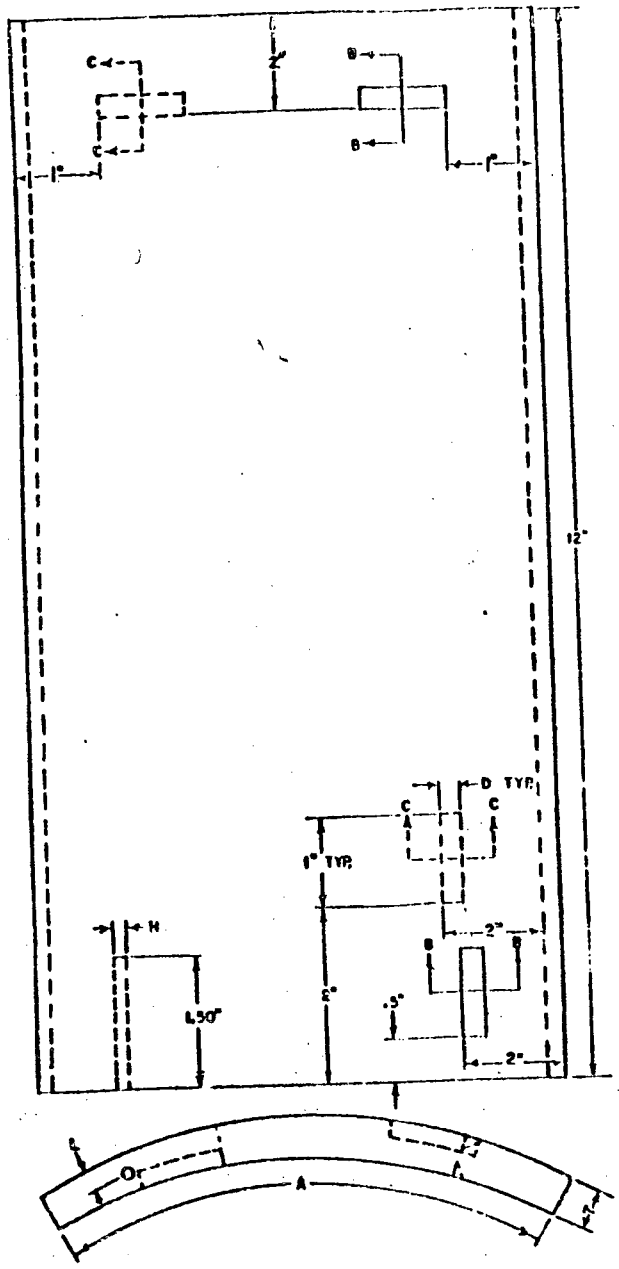

NOTCHES .075 DEPTH X 1.5" LONG
1.5"
1.5"
1.5"
1.5"
4"
45°
11"
.375"
.225" DIA.
1.5"



SS 304 WD-15 22-15

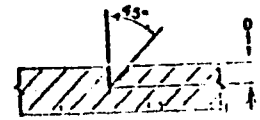
TENNESSEE VALLEY AUTHORITY
DIVISION OF POWER PRODUCTION

ULTRASONIC CALIBRATION BLOCK
WATTS BAR NUCLEAR PLANT &
SEQUOYAH NUCLEAR PLANT
CVCS SYSTEM

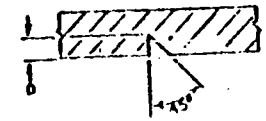


BLOCK NO	DIA	T	D	A	H	L
XX 10	14"	1.362	0.068	120°	1/8	1/4T
XX 12	21/2"	0.415	0.021	180°	3/32	1/2T

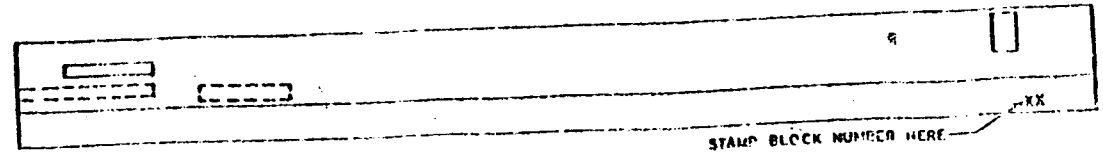
* NOTE:
SUBSTITUTE SQ FOR SEQUOYAH NUCLEAR PLANT OR WB FOR WATTS BAR NUCLEAR PLANT IN PLACE OF THE XX IN THE BLOCK NUMBER.



SECTION B-B

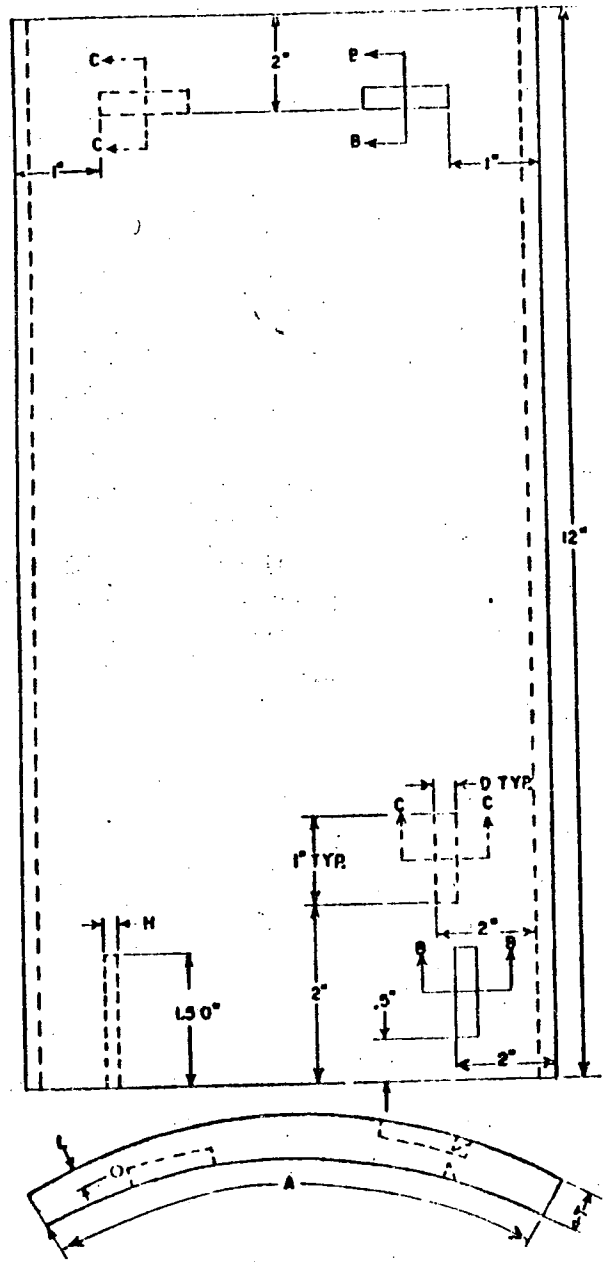


SECTION C-C



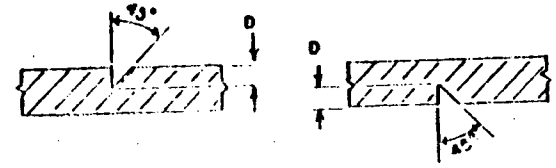
STAMP BLOCK NUMBER HERE

TENNESSEE VALLEY AUTHORITY
ULTRASONIC CALIBRATION BLOCKS
DATE 7-13-70

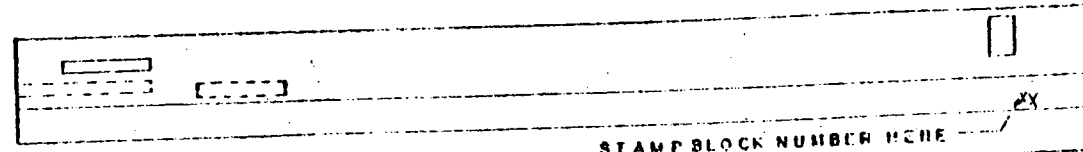


BLOCK NO	DIA	T	D	A	H	L
XX-13	4"	0.438	0.022	180°	3/32	1/2 T
XX-17	5"	0.625	0.031	180°	3/32	1/2 T
XX-18	10"	0.938	0.047	120°	3/32	1/2 T
XX-19	6"	0.864	0.043	180°	3/32	1/2 T
XX-21	10"	1.500	0.075	180°	1/8	1/4T

NOTE: SUBSTITUTE SQ FOR SEQUOYAH NUCLEAR PLANT OR WB FOR WATTS BAR NUCLEAR PLANT IN PLACE OF THE XX IN THE BLOCK NUMBER.



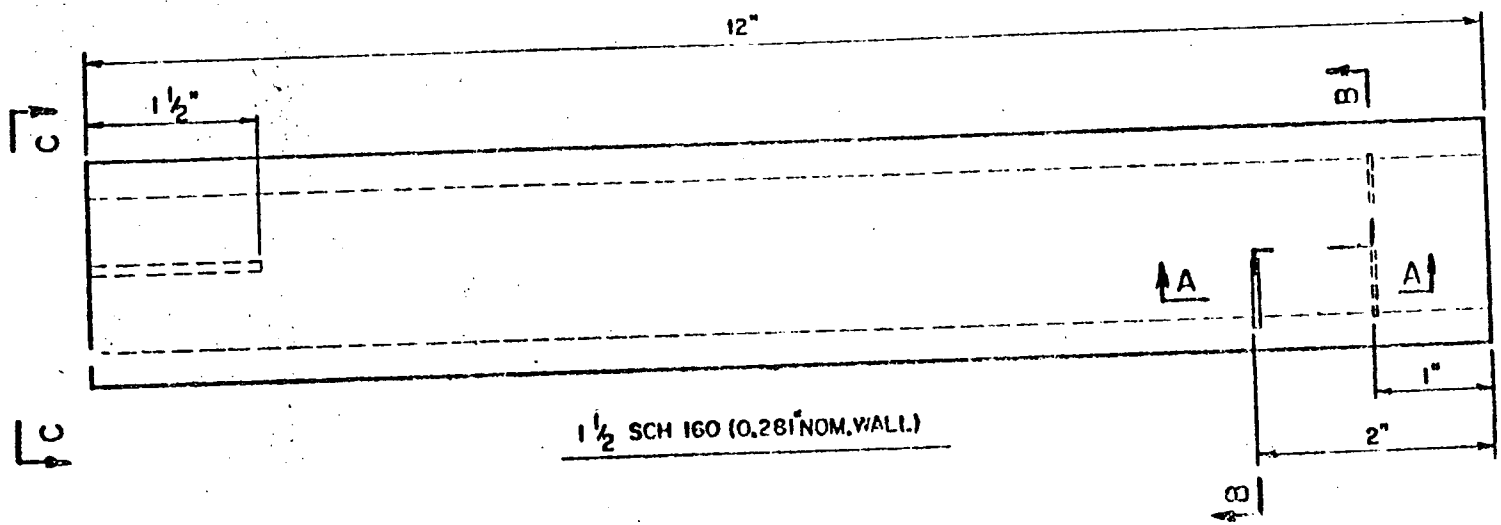
SECTION B-B SECTION C-C



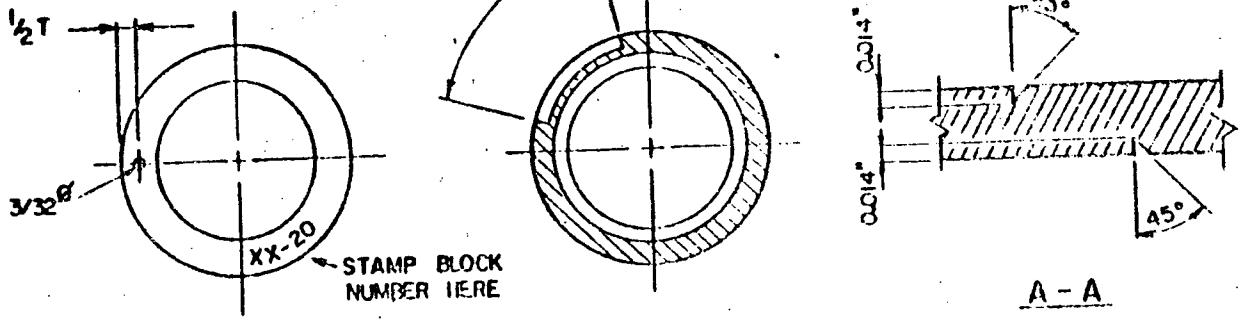
STAMP BLOCK NUMBER HERE

TENNESSEE VALLEY AUTHORITY

ULTRASONIC CALIBRATION BLOCKS



1½ SCH 160 (0.281" NOM. WALL)



C - C

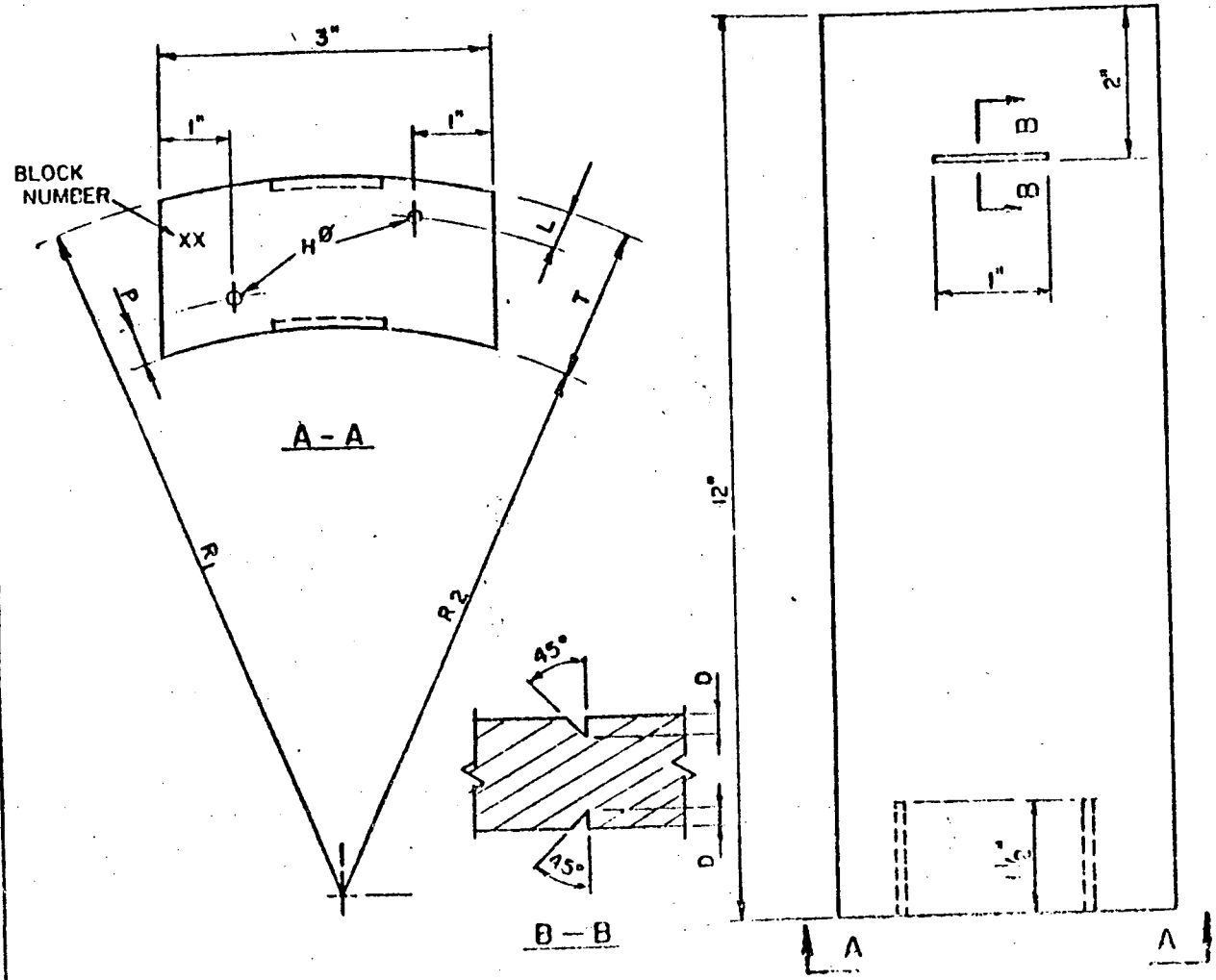
B - B

A - A

SUBSTITUTE SQ FOR SEQUOYAH NUCLEAR PLANT OR WB FOR WATTS BAR NUCLEAR PLANT IN PLACE OF THE XX IN THE BLOCK NUMBER.

TENNESSEE VALLEY AUTHORITY

ULTRASONIC CALIBRATION BLOCK



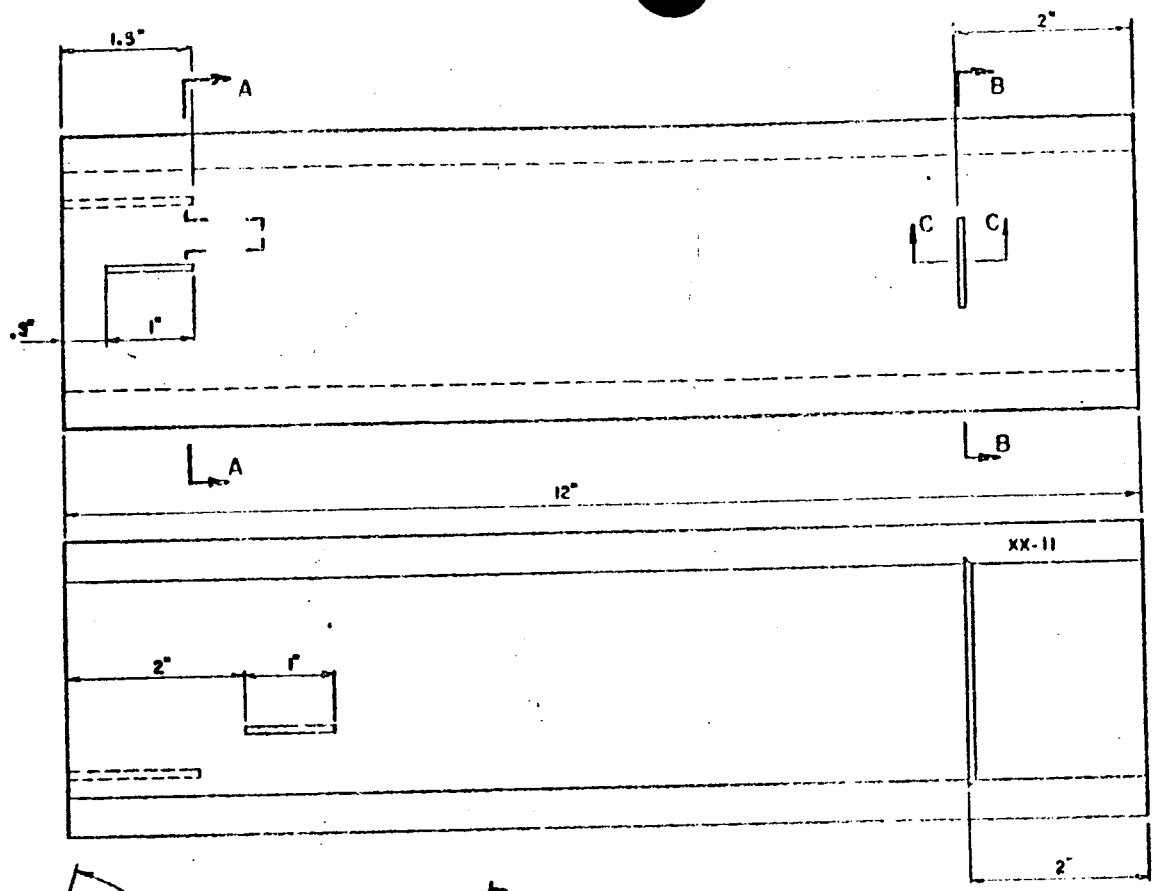
BLOCK NUMBER	R_1	R_2	D	T	L	H	P
XX-16	6.375	5.063	0.066	1.312	1/4 T	1/8	1/4T
XX-29	4.200	3.000	0.060	1.200	1/4 T	1/8	1/4T
XX-30	2.900	2.000	0.045	0.900	1/2 T	3/32	NA

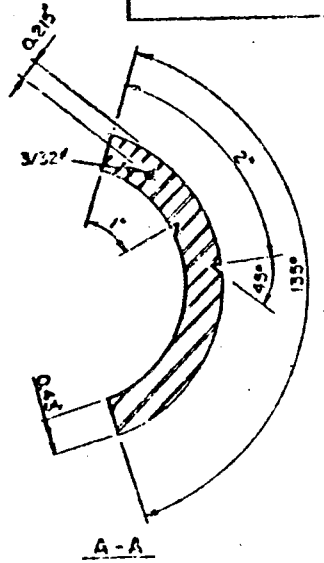
SUBSTITUTE SQ FOR SEQUOYAH NUCLEAR PLANT OR WB FOR WATTS BAR NUCLEAR PLANT IN PLACE OF THE XX IN THE BLOCK NUMBER.

FABRICATE FROM S.S. PLATE.

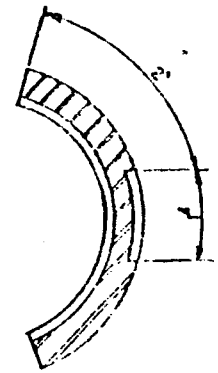
TENNESSEE VALLEY AUTHORITY

ULTRASONIC CALIBRATION BLOCKS

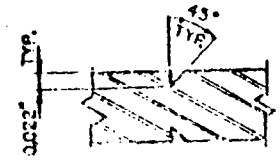




A-A



B-B

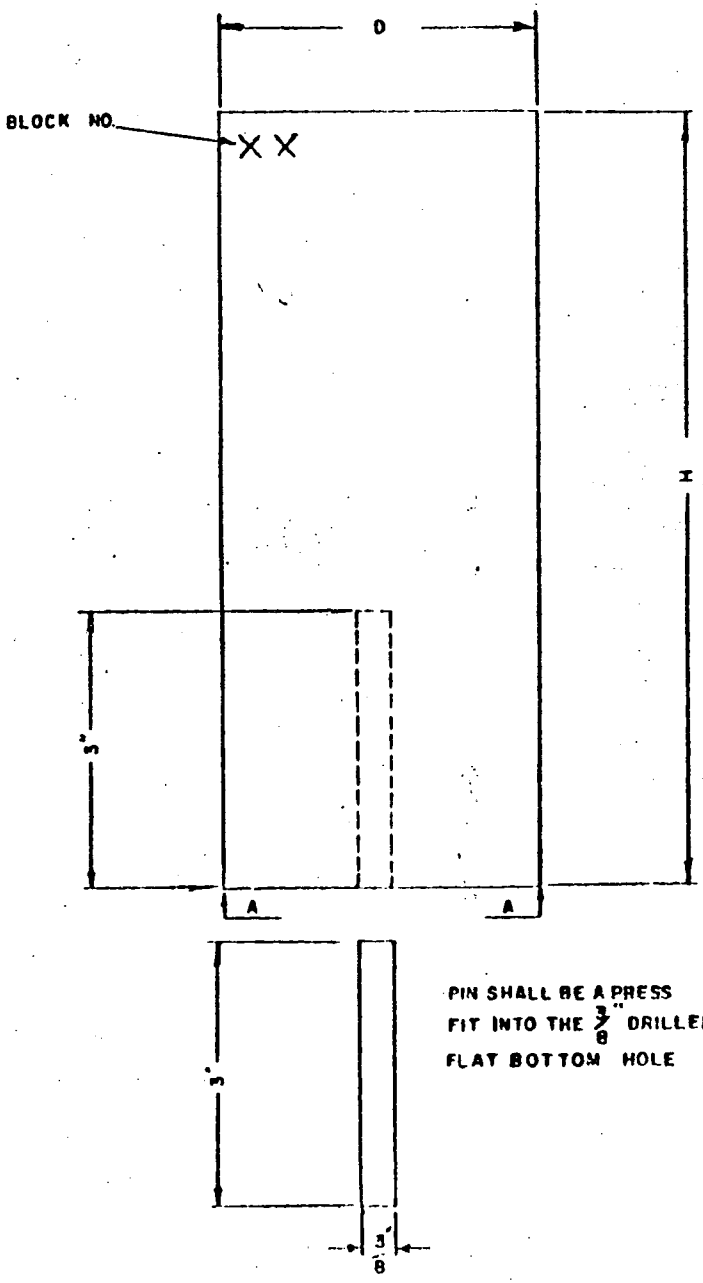


C-C

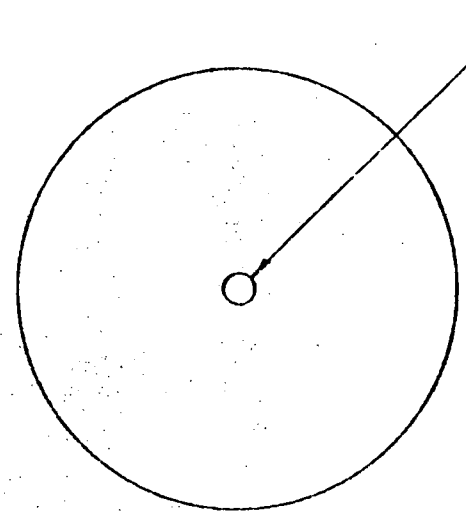
NOTES:
1. MATL: 3" SCH 160 PIPE S.S.
2. SUBSTITUTE SQ FOR SEQUOYAH NUCLEAR PLANT OR WB FOR WATTS BAR NUCLEAR PLANT IN PLACE OF THE XX IN THE BLOCK NUMBER.

TENNESSEE VALLEY AUTHORITY

ULTRASONIC CALIBRATION BLOCK XX-II



PIN SHALL BE A PRESS FIT INTO THE 3/8" DRILLED FLAT BOTTOM HOLE



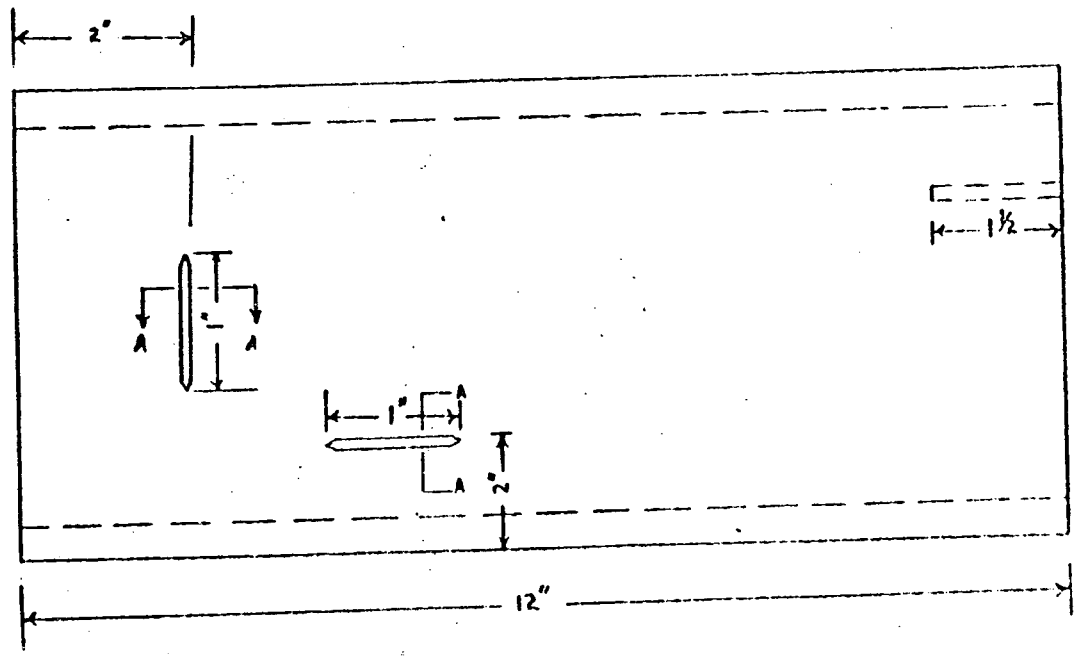
A-A

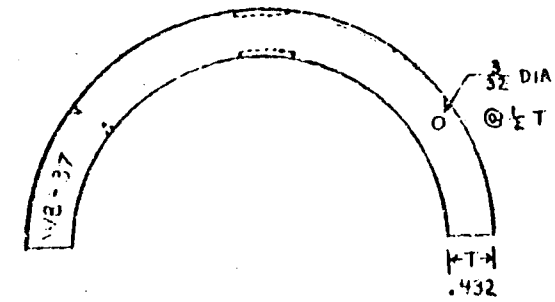
BLOCK	D	H	MATERIAL
XX 23	1 3/8"	17"	SA-A3 GRB7
XX 24	1 1/4"	5"	SA-A36RB7
XX 25	1 1/8"	10 1/2"	SA A3GRB7
XX 26	4 1/2"	30 1/2"	SA A3GRB7
XX 27	2"	8"	SA-A3GRB7
XX 31	1 1/8"	7 1/2"	AISI-4140
XX 32	1 1/8"	10"	AISI-4140
XX33	1 3/8"	8"	AISI-4140
XX36	1 1/8"	10 3/4"	AISI-4140

NOTE:
1. PIN SHALL BE SAME MATERIAL AS ROLLED STOCK
2. SUBSTITUTE SQ FOR SEQUOYAH NUCLEAR PLANT OR WB FOR WATTS BAR NUCLEAR PLANT IN PLACE OF THE XX IN THE BLOCK NUMBER

TENNESSEE VALLEY AUTHORITY
DIVISION OF [illegible]

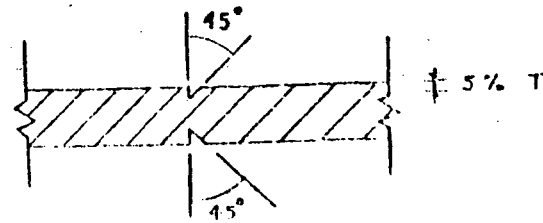
STUD AND BOLT CALIBRATION BLOCK





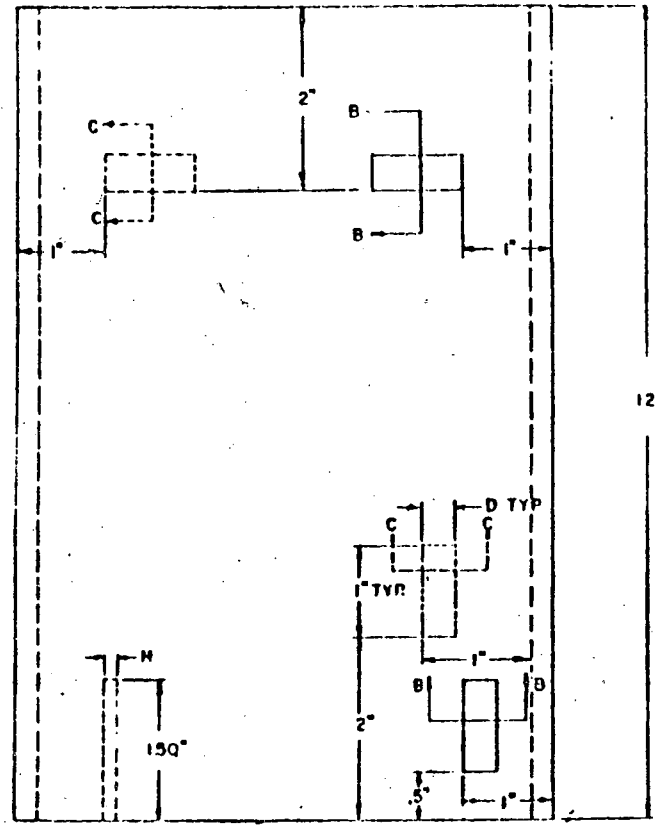
SA-53 GR B

SECTION A-A

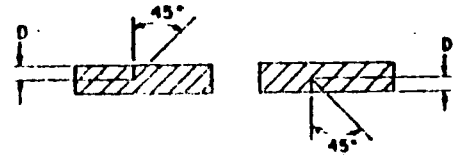


TENNESSEE VALLEY AUTHORITY
DIVISION OF POWER PRODUCTION

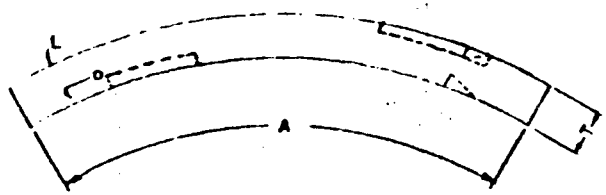
6" SCH 80
UT PIPE CALIBRATION BLOCK WELD

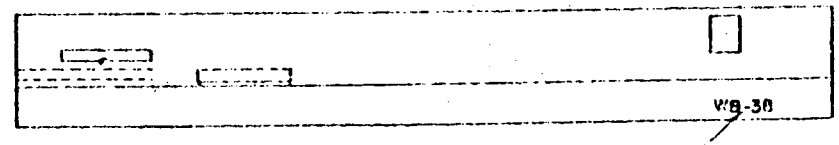


BLOCK NO.	DIA.	T	D	A	H	L
WB 38	8"	0.500	0.025	120°	3/32	1/2 T



SECTION B-B SECTION C-C

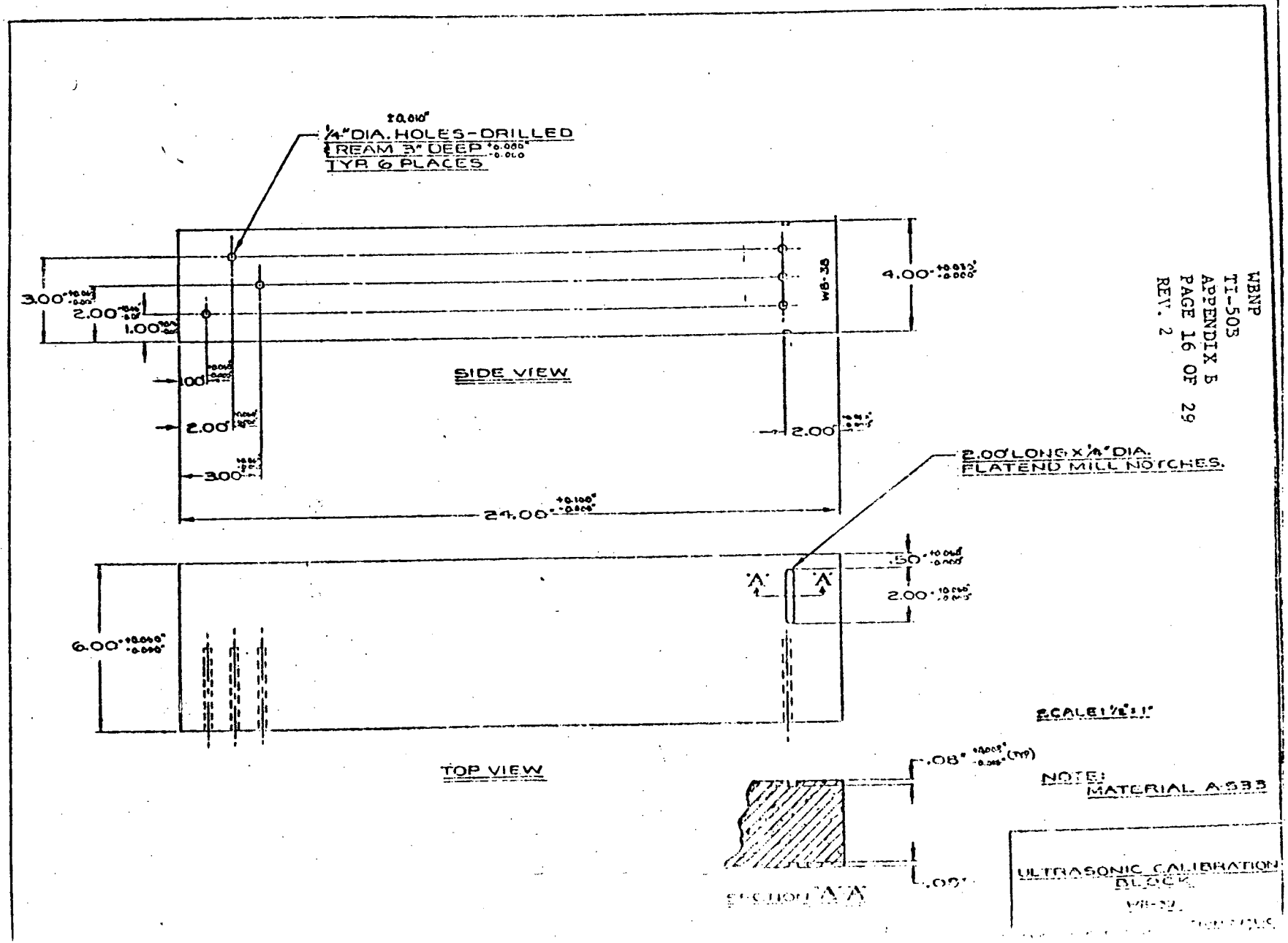


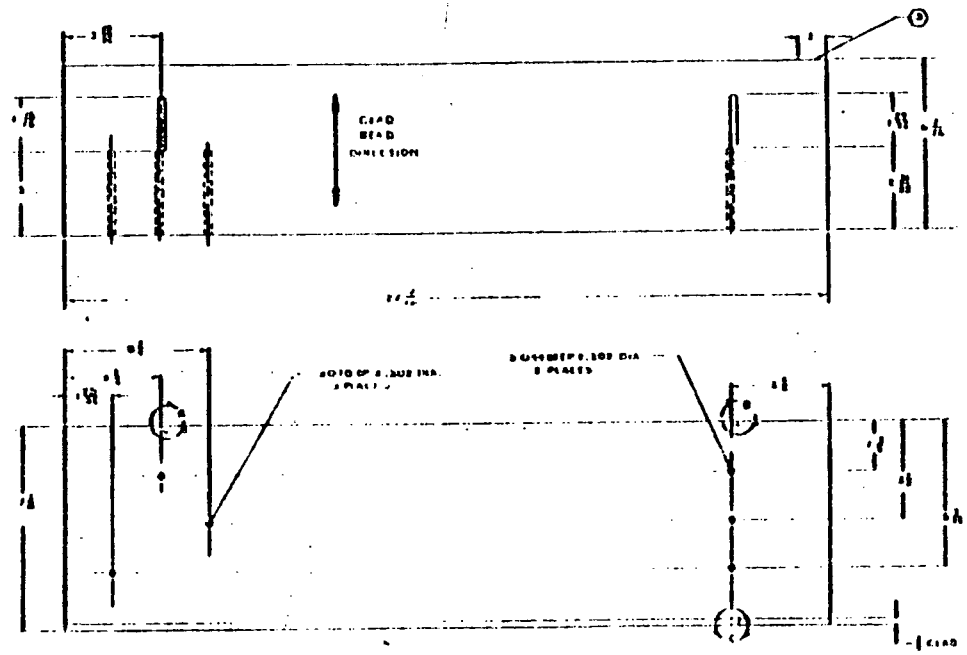


STAMP BLOCK NO. HERE

TENNESSEE VALLEY AUTHORITY
DIVISION OF POWER SYSTEMS

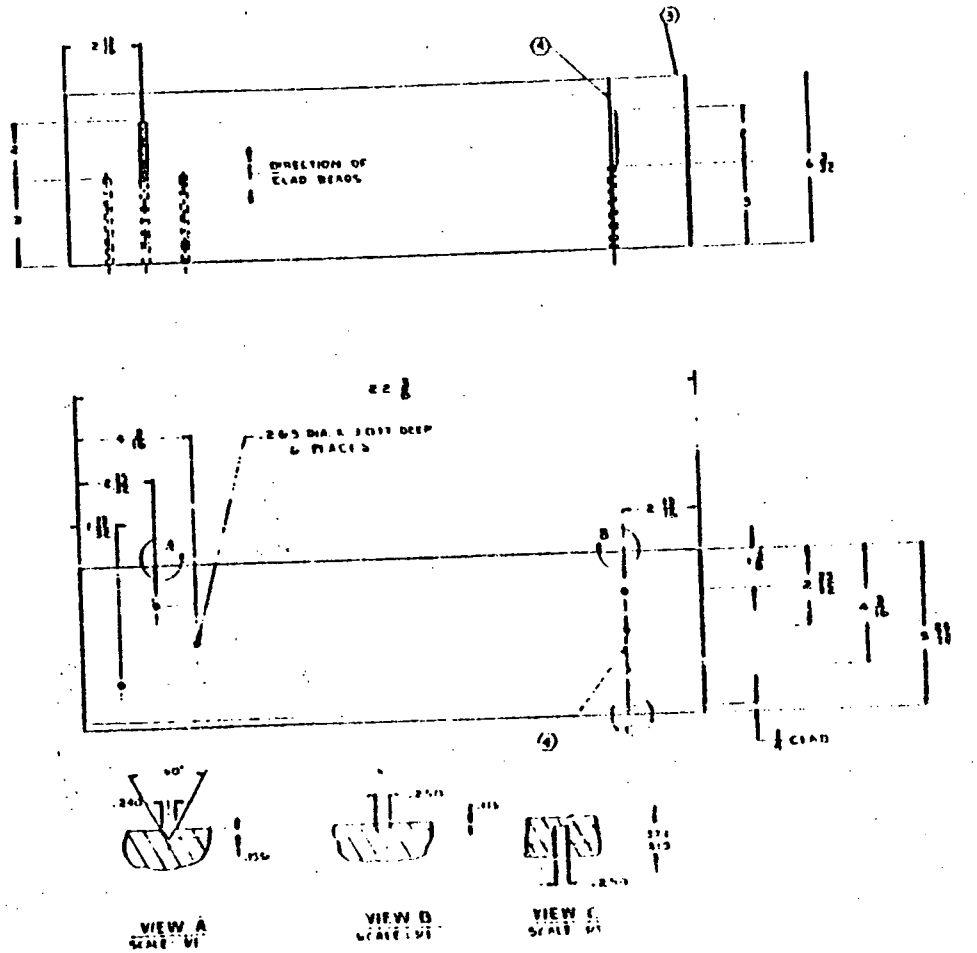
ULTRASONIC CALIBRATION BLOCK


±0.010"
¼"DIA. HOLES-DRILLED
& REAM 3" DEEP +0.000" -0.010"
TYP 6 PLACES
3.00
2.00
1.00
.100
2.00
.300
SIDE VIEW
4.00
2.00
2.00" LONG x ¼" DIA.
FLAT END MILL NOTCHES.
24.00
.50
2.00
A
A
6.00
TOP VIEW
.08" (TYP)
.00"
SECTION "A-A"
SCALE 1½":1"
NOTE:
MATERIAL A-533
ULTRASONIC CALIBRATION
BLOCK



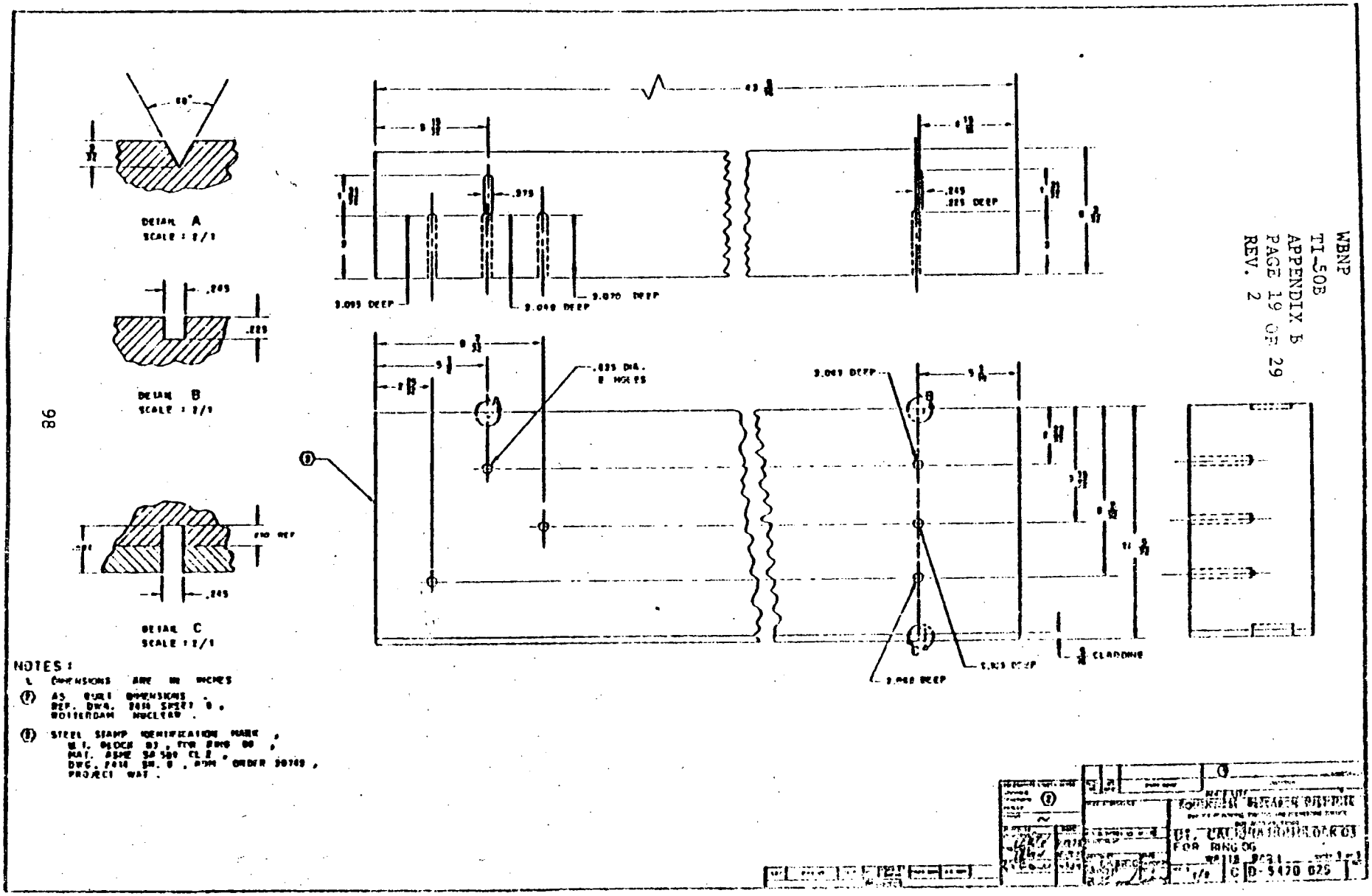
DETAIL A DETAIL B DETAIL C

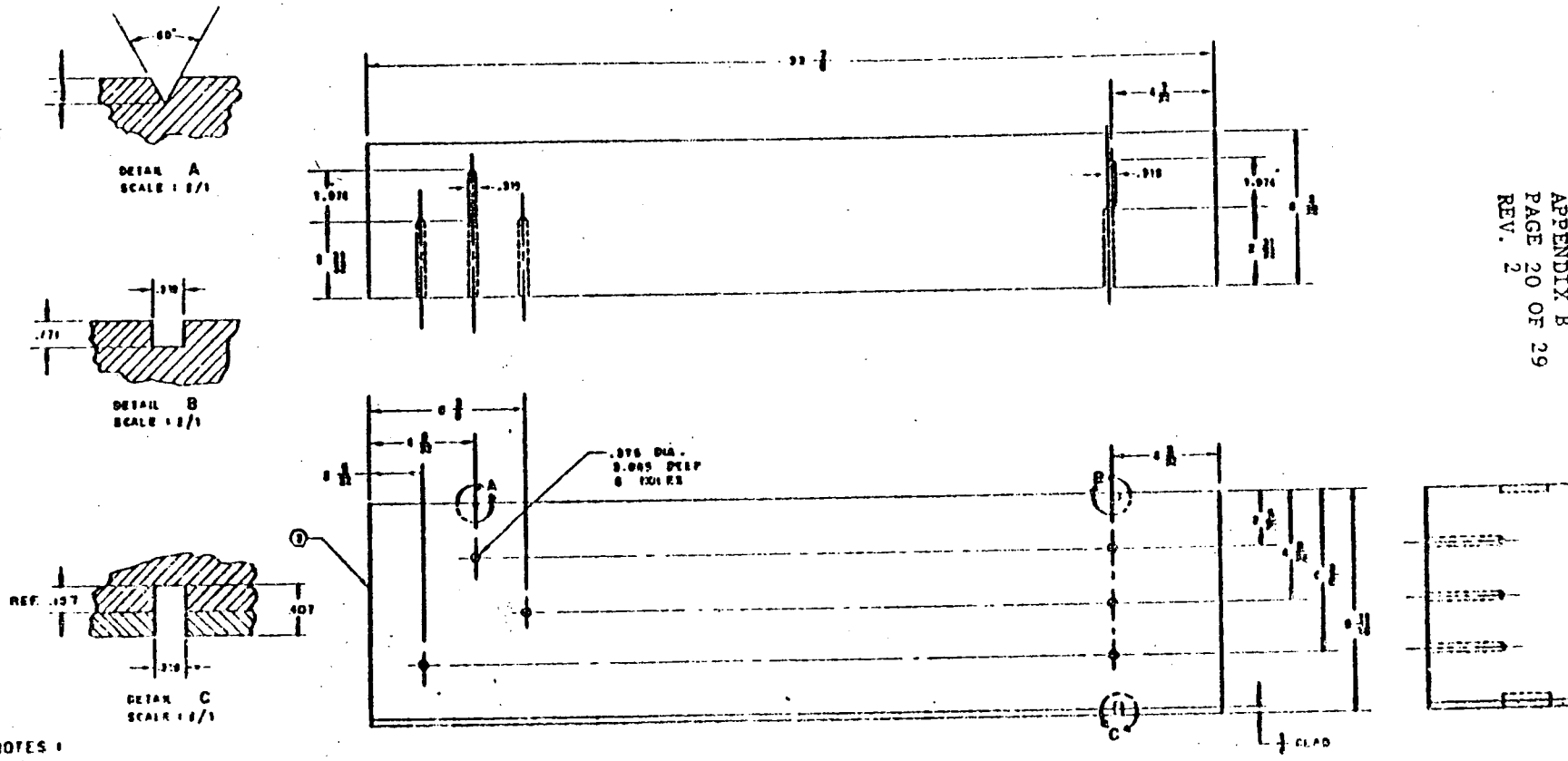
DETAIL SCALE 8:1



NOTES:
1. DIMENSION ARE IN INCHES
(3) AS BUILT DIMENSIONS REF DWG. 2414 SHEET 2 ROTTERDAM NUCLEAR
(5) STEEL STAMP IDENTIFICATION MARK.
U.T. BLOCK 01 FOR BOTTOM HEAD CAP
MAT. ASME SA 508 CL 2 DWG. 2414 SHEET 2
ROB ORDER 30795
PROJECT WAT-1
(4) SCRIBE LINE, (0.25 mm DEEP) ON TOP AND BOTTOM OF BLOCK TO BE THE EXTENSION OF SCRIBE LINE ON SIDE AND TO PASS ALONG EDGE OF SQUARE NOTCH.

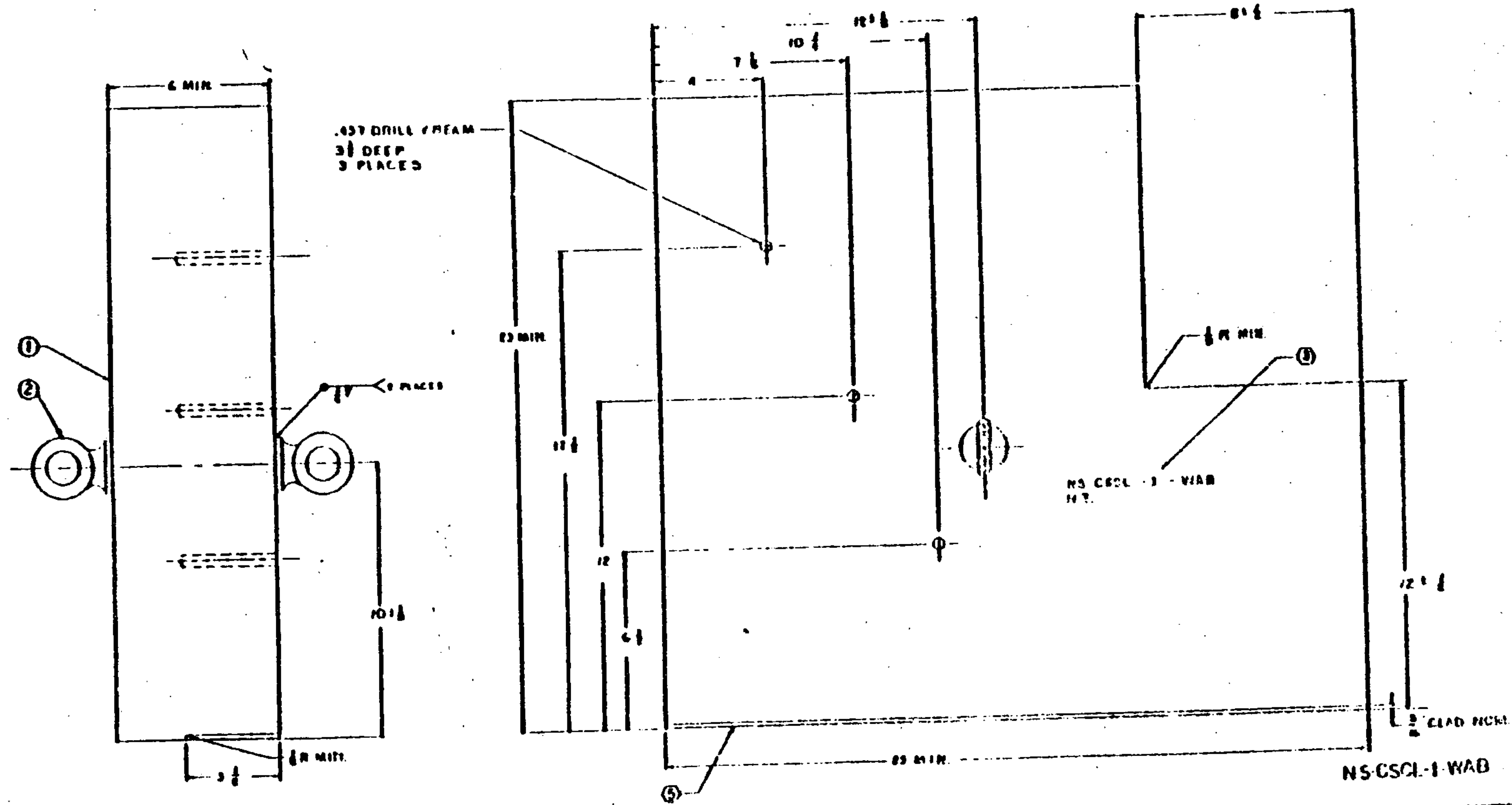
UT CALIBRATION BLOCK 01 FOR BOTTOM HEAD CAP
C D 5420022


DETAIL A
SCALE : 2/1
DETAIL B
SCALE : 2/1
DETAIL C
SCALE : 2/1
.245
.225
.375
.225 DEEP
3.095 DEEP
3.070 DEEP
.625 DIA.
2 HOLES
3.063 DEEP
CLADDING
NOTES :
1. DIMENSIONS ARE IN INCHES
(2) AS BUILT DIMENSIONS .
REF. DWG. 2414 SHEET 8 ,
ROTTERDAM NUCLEAR .
(3) STEEL STAMP IDENTIFICATION MARK ,
MAT. ASME SA 509 CL 2 ,
DWG. 2414 SH. 8 , ADM ORDER 30749 ,
PROJECT WAT .
FOR RING 06
C D-5470 025



NOTES :

1. DIMENSIONS ARE IN INCHES .
2. AS BUILT DIMENSIONS .
   REF. DWG. 3310 SHEET 8 ,
   ROTTERDAM RUTLEAP .
3. STEEL STAMP IDENTIFICATION MARK ,
   U.T. BLOCK 01 , FOR Rad 03 , 04 , 05 ,
   MAT. ASME SA-508 CL 2 ,
   DWG. 3310 SH. 3 ,
   FOR ORDER 20750 ,
   PROJECT WAT .

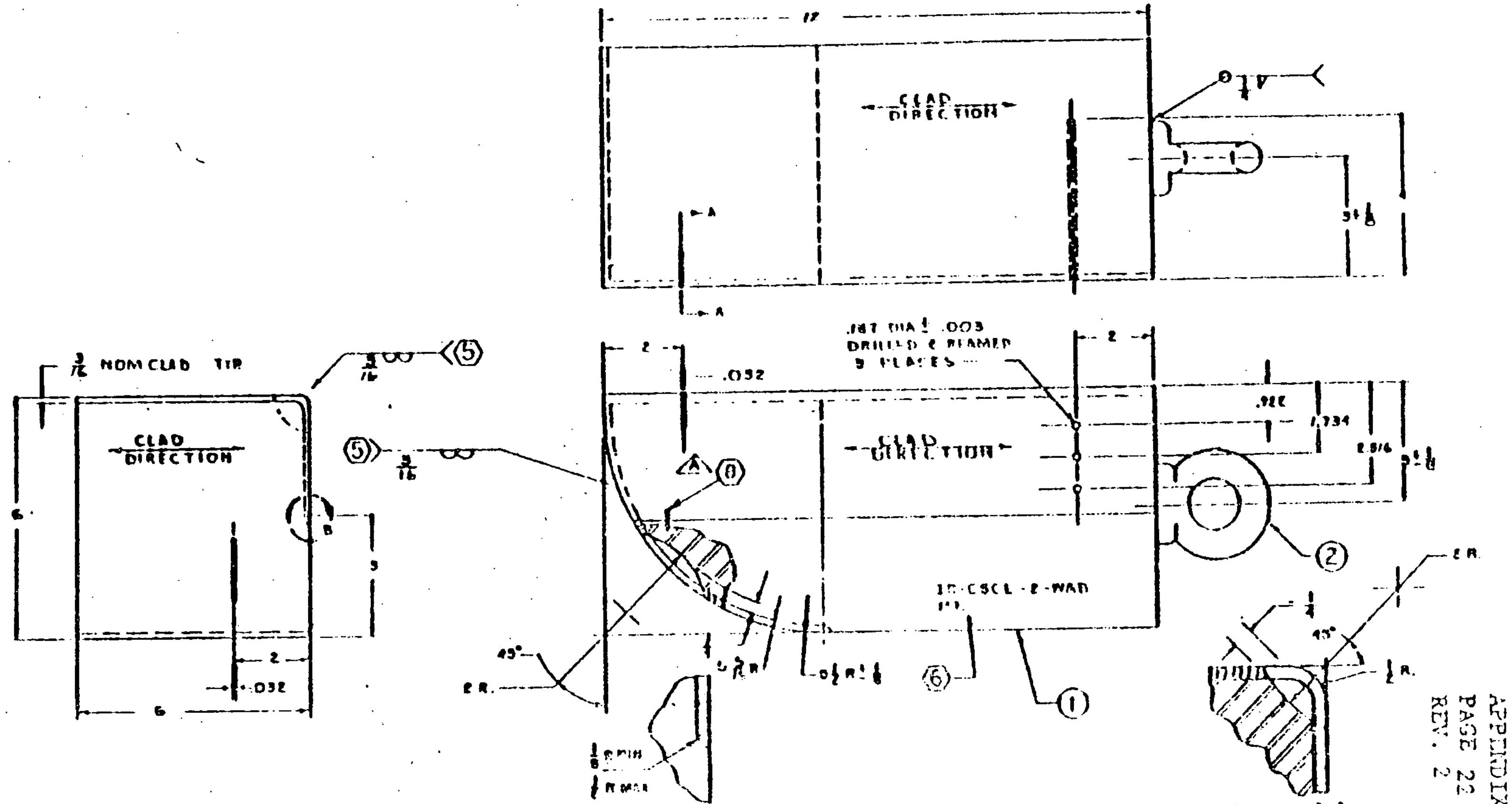


NOTES:

1. OVERLAY CLADDING IN ACCORDANCE WITH SWES WPS 100-1 REV 0.
2. MADE FROM SA 508 CL 2 HEAT NO [illegible] SWES LOG NO 0108
3. STEEL STAMP STANDARD ID NO. AND HEAT NO. AS SHOWN ON SURFACE INDICATED IN CHARACTERS [illegible] MIN. HEIGHT.
4. MATERIAL FOR STANDARD TO BE FREE OF INDICATION OF REPAIR WELDS AND LAMINAR INDICATIONS WHICH MAY AFFECT ANGLE BEAM OR STRAIGHT BEAM CALIBRATIONS.
5. REMOVE BURRS AND BREAK SHARP EDGES.

NOZZLE TO SHELL UT CALIBRATION BLOCK WATTS BAR [illegible]

[illegible]-5420 030



VIEW B
SCALE 1:1

SECTION A-A
SCALE 1:1

⑧ SAW CUT ON SURFACE SHOWN, NOT TO BE USED FOR CALIBRATION.

⑦ MAKE FROM SA508 CL II HT NO. 216817 SWRI LOG NO. 0766

⑥ STEEL STAMP ID NO. AS SHOWN ON SURFACE INDICATED IN CHARACTERS 3/16 MIN HEIGHT

⑤ HAND GRIND OR MACHINE FLUSH TO CONTOUR SHOWN AND MACHINE FLAT SURFACES FLUSH

4. CLAD OVERLAY IN ACCORDANCE WITH SWRI WPS 900 2 REV. 1

3. MATERIAL TO BE FREE OF FABRICATION OR REPAIR WELDS AND LAMINAR INDICATIONS WHICH MAY AFFECT CALIBRATION.

2. DEBURR/BREAK SHARP EDGES 1/32.

1. DIMENSIONS ARE IN INCHES.

1R-CSCL-2-WAB

2	1	LIFTING EYE	McMASTER-CARR 3084T26
1	1	BLOCK	⑦
ITEM NO	QTY REQ	PART NAME	MATERIAL

PARTS LIST

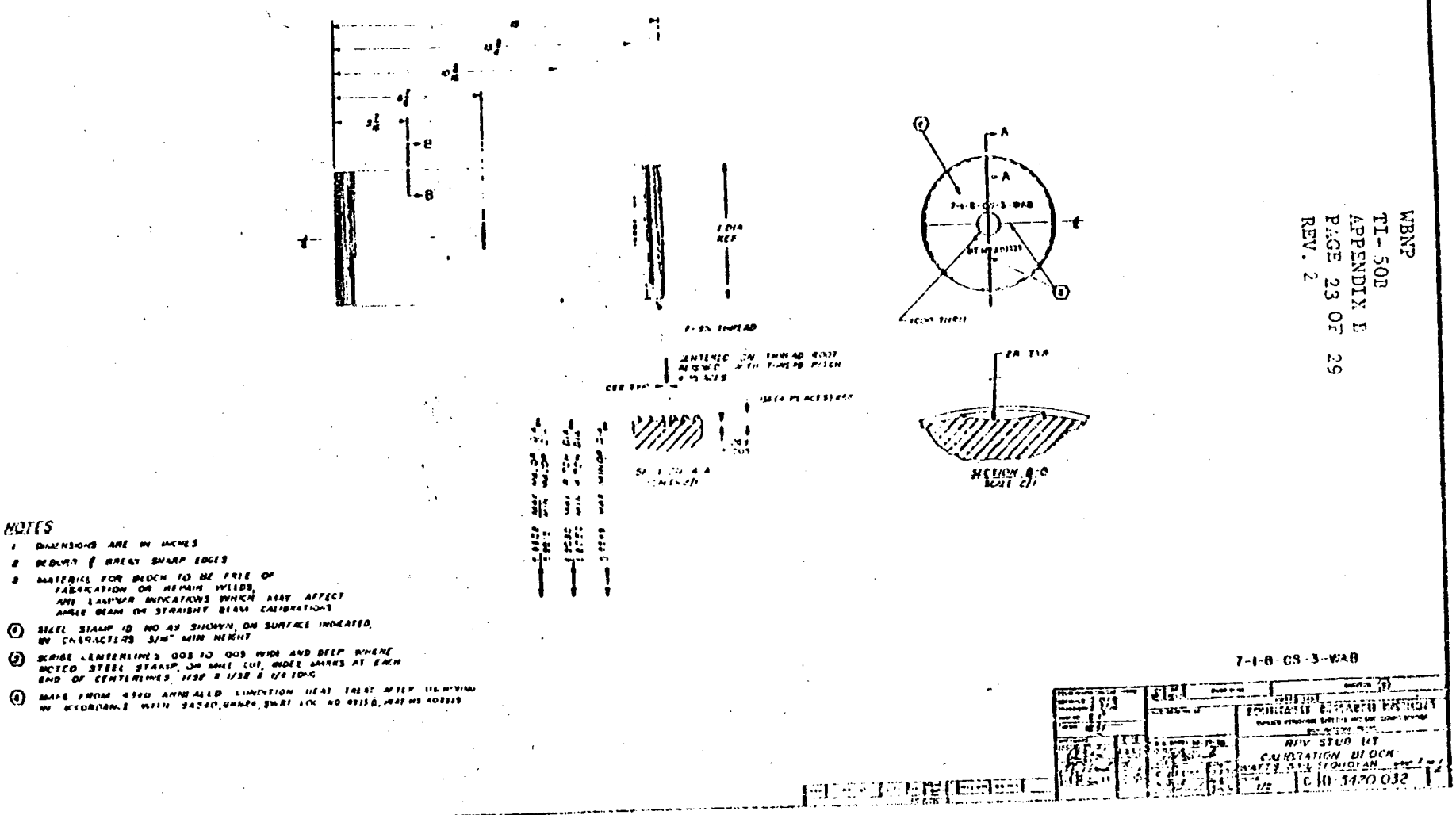
TOLERANCES: .010, 1/16, 1/2°, 125

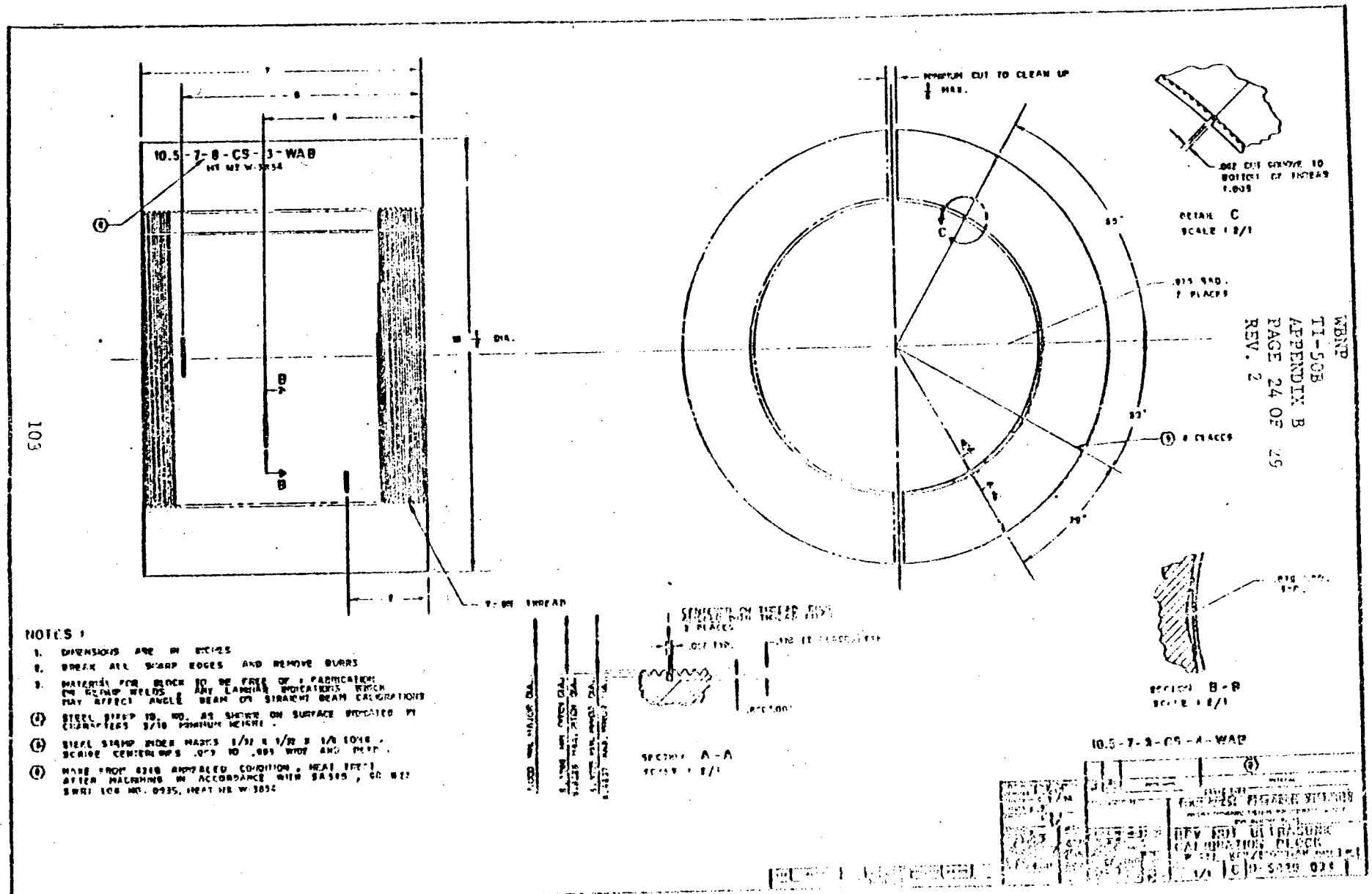
SOUTHWEST RESEARCH INSTITUTE
SAN ANTONIO, TEXAS

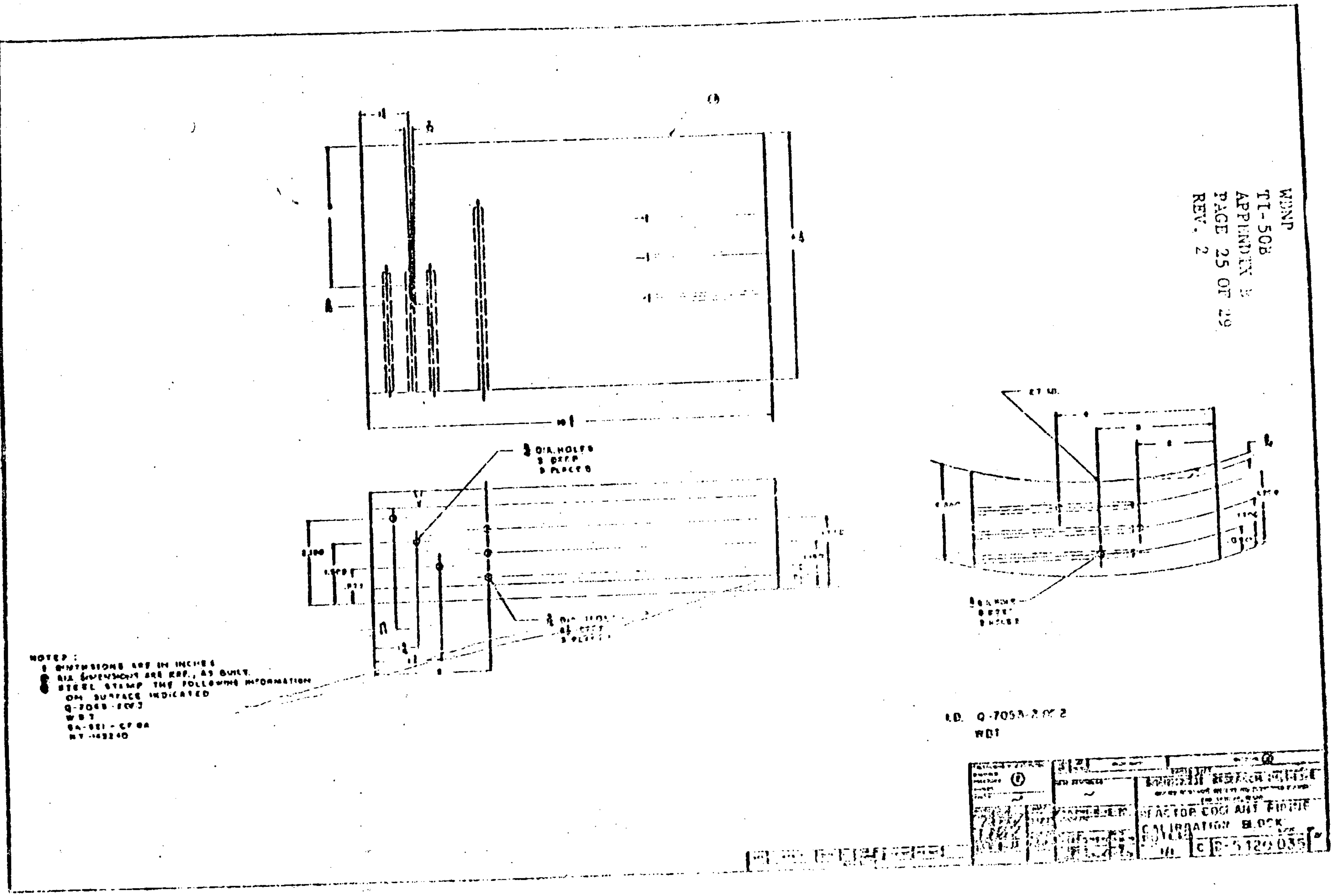
INLET/OUTLET NOZZLE INNER RADIUS UT CALIBRATION BLOCK

WATTS BAR NUCLEAR PLANT

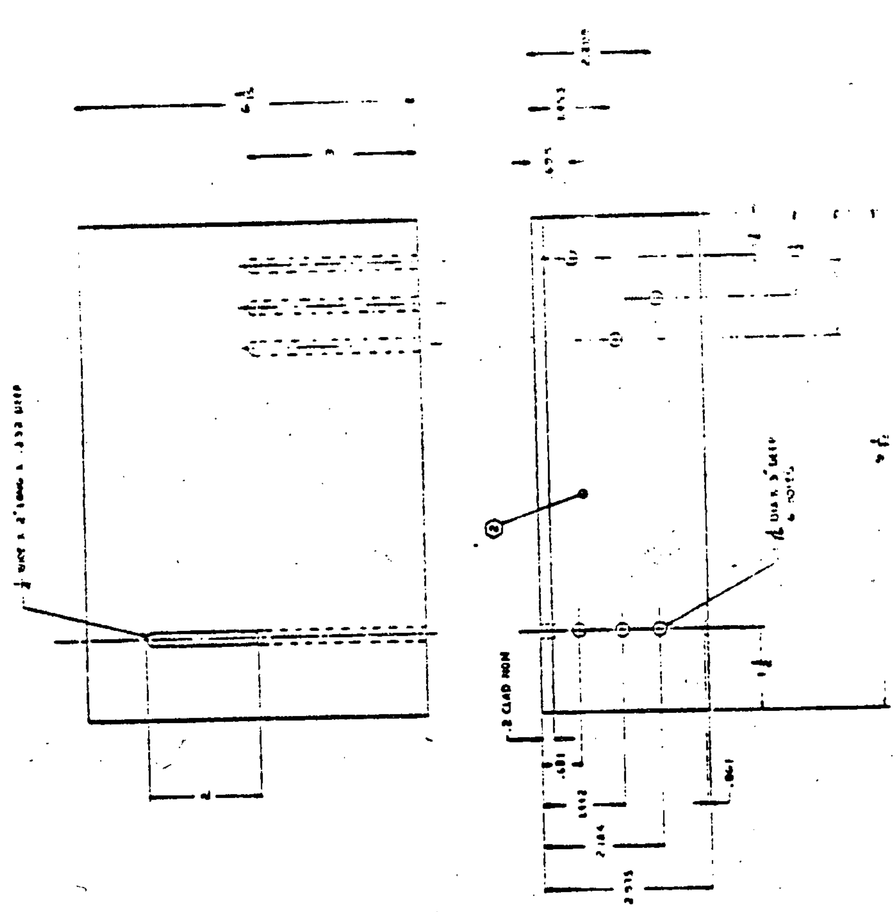
C 5420041 A

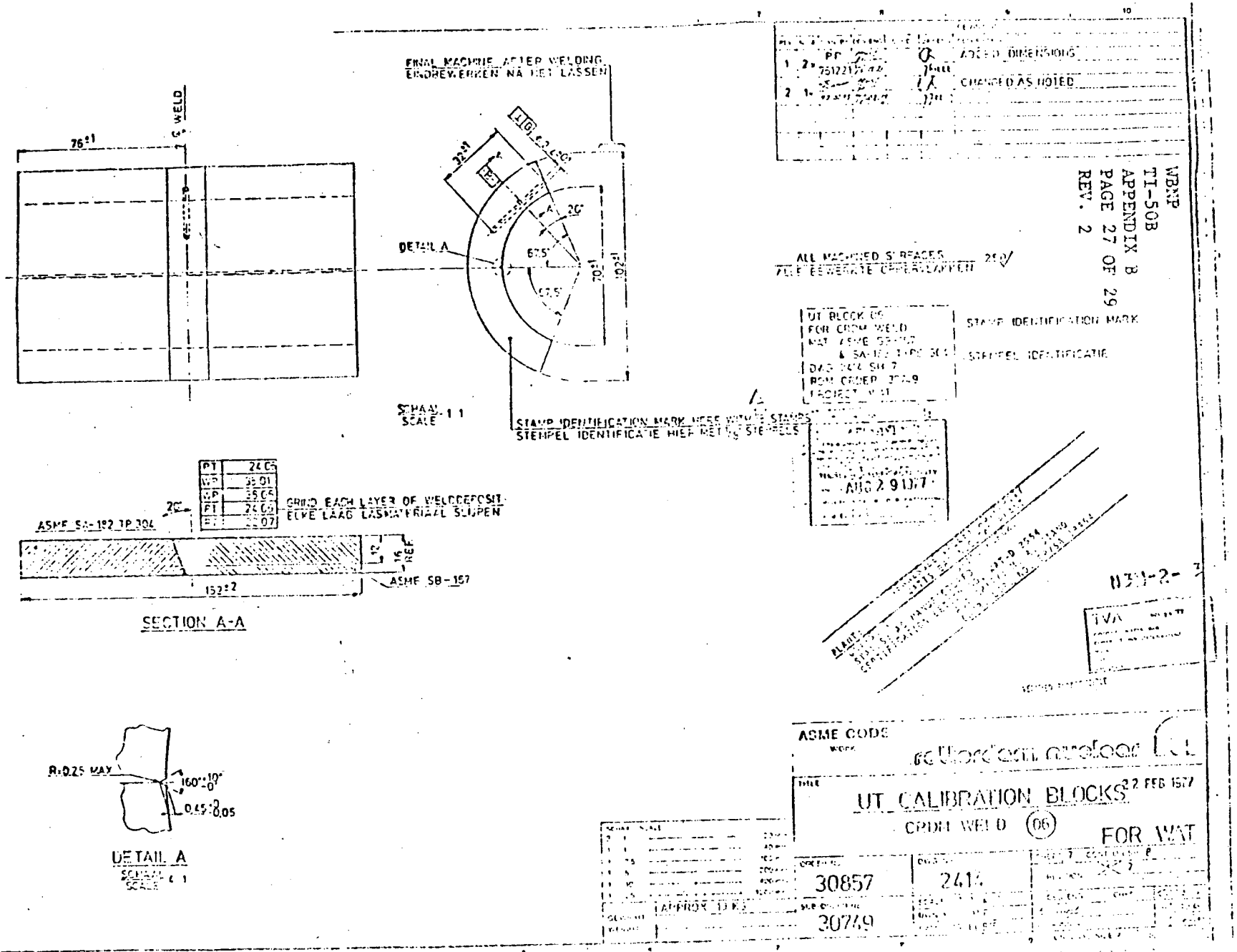

NOTES
1 DIMENSIONS ARE IN INCHES
2 DEBURR & BREAK SHARP EDGES
3 MATERIAL FOR BLOCK TO BE FREE OF FABRICATION OR REPAIR WELDS, AND LAMINAR INDICATIONS WHICH MAY AFFECT ANGLE BEAM OR STRAIGHT BEAM CALIBRATIONS
4 STEEL STAMP ID NO AS SHOWN, ON SURFACE INDICATED, IN CHARACTERS 3/16" MIN HEIGHT
5 SCRIBE CENTERLINES .003 TO .005 WIDE AND DEEP WHERE NOTED STEEL STAMP, OR MILL CUT, INDEX MARKS AT EACH END OF CENTERLINES 1/32 X 1/32 X 1/4 LONG
6 MADE FROM 4340 ANNEALED CONDITION HEAT TREAT AFTER MACHINING IN ACCORDANCE WITH SA540, GRADE, SWRI LOC NO 9315B, HEAT NO 403339
7-1-8-CS-3-WAB
RPV STUD UT
CALIBRATION BLOCK
C 10 5420 032


10.5-7-8-CS-3-WAB
MINIMUM CUT TO CLEAN UP
DETAIL C
SCALE 1 2/1
SECTION A-A
SCALE 1 2/1
SECTION B-B
SCALE 1 2/1
10.5-7-8-CS-4-WAB
NOTES:
1. DIMENSIONS ARE IN INCHES
2. BREAK ALL SHARP EDGES AND REMOVE BURRS
3. MATERIAL FOR BLOCK TO BE FREE OF: FABRICATION OR REPAIR WELDS. ANY LAMINAR INDICATIONS WHICH MAY AFFECT ANGLE BEAM OR STRAIGHT BEAM CALIBRATIONS
(4) STEEL STAMP ID. NO. AS SHOWN ON SURFACE INDICATED IN CHARACTERS 3/16 MINIMUM HEIGHT.
(5) STEEL STAMP INDEX MARKS 1/32 X 1/32 X 1/8 LONG. SCRIBE CENTERLINES .003 TO .005 WIDE AND DEEP.
(6) MAKE FROM 4340 ANNEALED CONDITION, HEAT TREAT AFTER MACHINING IN ACCORDANCE WITH SA505, GR B22 SWRI LOG NO. 0935, HEAT NO. W-3854
REV NOT ULTRASONIC CALIBRATION BLOCK

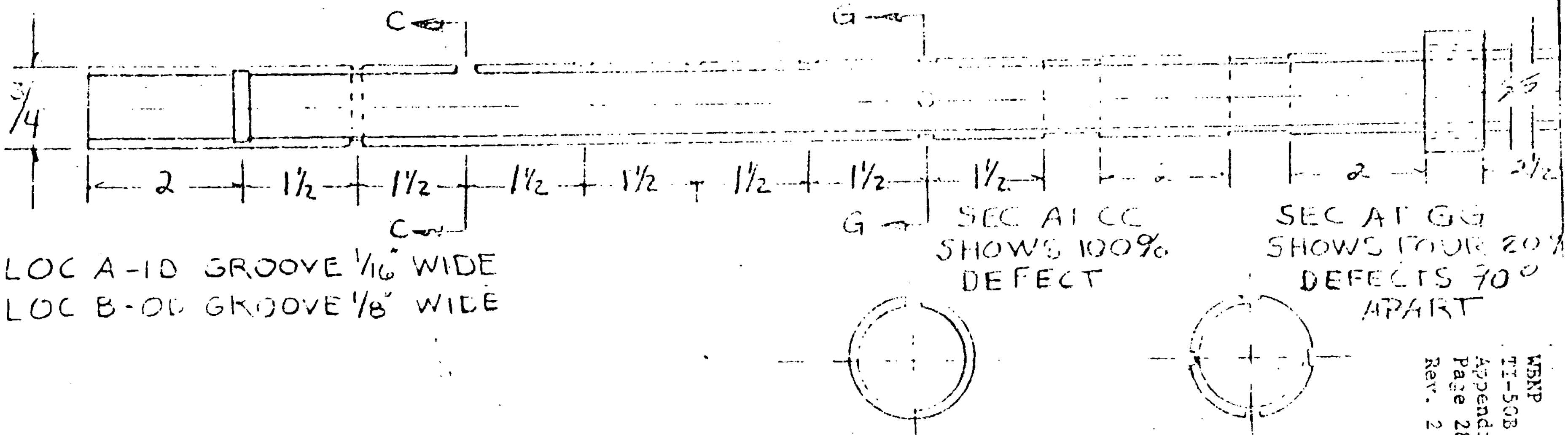

NOTES:
DIMENSIONS ARE IN INCHES
ALL DIMENSIONS ARE REF., AS BUILT.
STEEL STAMP THE FOLLOWING INFORMATION
ON SURFACE INDICATED
WBT
I.D. Q-7053-2 OF 2
WBT
REACTOR COOLANT PIPING
CALIBRATION BLOCK
C
5120035

SERIAL No 6-2-2016-55-1




FINAL MACHINE AFTER WELDING
EINDBEWERKEN NA HET LASSEN
76±1
℄ WELD
DETAIL A
32±1
20°
67.5°
70±1
102±1
SCHAAL
SCALE 1:1
STAMP IDENTIFICATION MARK HERE WITH 1/8 STAMPS
STEMPEL IDENTIFICATIE HIER MET 1/8 STEMPELS
ALL MACHINED SURFACES
ALLE BEWERKTE OPPERVLAKKEN
UT BLOCK 06
FOR CRDM WELD
STAMP IDENTIFICATION MARK
STEMPEL IDENTIFICATIE
AUG 2 9 1977
PT 24.05
WP 35.01
WP 35.05
PT 24.05
PT 22.07
GRIND EACH LAYER OF WELDDEPOSIT
ELKE LAAG LASMATERIAAL SLIJPEN
ASME SA-182 TP 304
ASME SB-167
152±2
SECTION A-A
R=0.25 MAX
160°
0.45
DETAIL A
SCHAAL
SCALE 4:1
ASME CODE
WORK
rotterdam nuclear
TITLE
UT CALIBRATION BLOCKS
22 FEB 1977
CRDM WELD (06)
FOR WAT
30857
2414
30749
APPROX 10 KG
TVA

LOCATION (LOC. A THRU G)	A	B	C	D	E	F	G	H	I	J
PHYSICAL MEASURED DEPTH (IN %)	.0085"	.0045"	thru	.0345"	.027"	.017"	.008"	DEPTH .0025" RADIAL 3/4"	DEPTH .0006" DENTS WIDE	SIMULATED TUBE SHEET RING 3/4" WIDE 1/8" THICK
E.T. PHASE MEASUREMENT	—	—	—	DNA	—	—	—			
DIA OF DEFECT			.052	5/64	7/64	3/16	3/16			



LOC A-ID GROOVE 1/16" WIDE
LOC B-OD GROOVE 1/8" WIDE

107

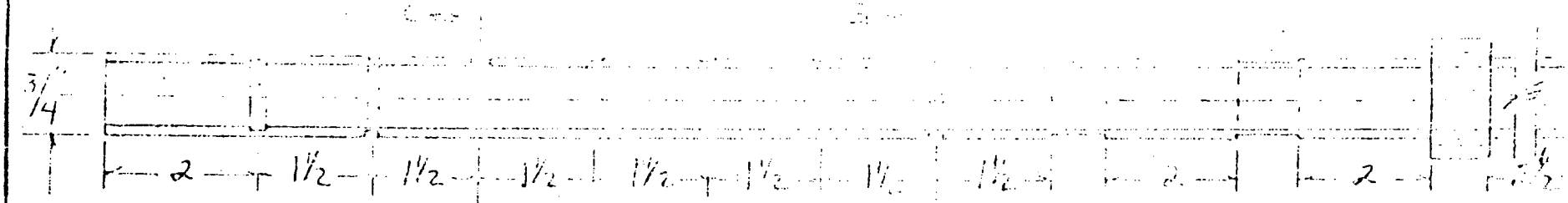
WBNP
TI-50B
Appendix A
Page 28 of 29
Rev. 2

MATERIAL INCONEL 600
AVE. WALL THKNS .0435"
HEAT TREAT # NX 2586
TEST FREQ USED 550 KHZ
SERIAL # CEL Special #1 (Rev 2 3-18-82)
NOTE: ALL OD DEFECTS ARE FLAT BOTTOM HOLES

RECORDED ON REEL # None

ET CALIBRATION STND.		
SCALE:	APPROVED BY: [signature]	DRAWN BY
DATE: 10-2-81		REVISED
ZETEC INC		
TOLERANCE		DRAWING NUMBER FA-144

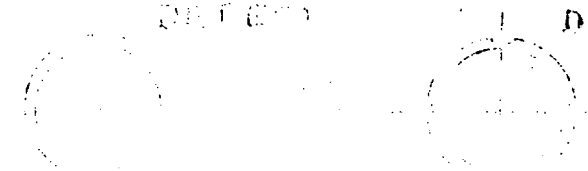
LOCATION (LOC. A THRU G)	A	B	C	D	E	F	G	H	I	J
PHYSICAL MEASURED DEPTH (IN.)	.009"	.004"	THRU	.03	.026"	.0175	.0085"	DEPTH .0025"	DEPTH .0005"	
ET PHASE MEASUREMENT				.004				RADIAL DENTS 3/4" WIDE		SIMULATED TUBE SHEET [illegible]
DIA OF DEFECT			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible] WIDE [illegible] THICK



LOC A-ID GROOVE 1/16" WIDE
LOC B-OD GROOVE 1/8" WIDE

SEC AT CC SHOWS 100% DEFECT

SEC AT GG SHOWS FOUL 20% DEFECTS 90° APART



MATERIAL INCONEL [illegible]
AVE. WALL THKNS .0[illegible]
HEAT TREAT # 5875
TEST FREQ USED [illegible]
SERIAL # CEL. Special [illegible]
NOTE: ALL OD DEFECTS ARE FLAT BOTTOM HOLES

[illegible]

DRAWN BY
REVISED
DRAWING NUMBER