GPU Nuclear

TMI-1
Steam Generator Recovery Program
Task 7
Primary System Review
Reactor Coolant System Inspections And Requalification

Appendix C
Examination Results

Compiled by

N. C. Kazanas
G. E. Rhedrick

APPENDIX C

Examination Results and Validation

1.	OTSG stainless clad upper and lower head	Dye penetrant and wipe samples of the upper and lower tube sheet and upper and lower head.
	&	
2.	OTSG inconel clad upper and lower tube sheet	
3A. B. C.	Make up nozzle safe end, HPI nozzle safe ends, spray line pressurizer nozzle safe end, surge line pressurizer nozzle safe end.	(3A) Dye Penetrant: Muv-95, Muv-86-A and 86-B, Visual: Muv-94, Muv-95, Muv-86A and Muv-86B, Radiography: Muv-94, Muv-95, Muv-86A, Muv-86B Ultrasounic: Muv-94, Muv-95 Muv-86A and Muv-86B (3B) Radiography: Pressurizer spray nozzle, Ultrasonic - pressurizer spray nozzle (3C) Ultrasonic - pressurizer surge nozzle
4.	Lead screw	Results reported in OTSG failure analysis report Task 1.
5.	Reactor vessel inner o-ring	Laboratory metallographic investigation site and B&W LRC
6.	Motor tube	Ultrasonic examination of motor tube #63,66 and 68.
7.	CRDM end fitting	Laboratory metallography investigation.
8.	Hold down bolts of plenum lift lugs	Ultrasonic examination of (6) plenum lifting lugs.
9.	Top of core and control component.	Visual examination of report.
10A. B. C. D.	Fuel assembly & control component reactor internals baffle plate region	(10A) Visual examination of un-irradiated fuel (10B) Visual examination of irradiated fuel (10C) Visual examination of baffle region & RV internals (10D) Visual examination of control component
11.	RNS retainer	Laboratory metallographic investigation
12.	Core support shield to core barrel bolt.	Ultrasonic examination of bolts.
13. & 14.	Lower bolting rings in RV internals and lower vessel head	Visual examination of RV internals.

Appendix C (cont'd)
Examination Results and Variation

15.	CRDM nozzles to stainless flange	Eddy current examination of motor tube #68.
16.	Plenum assembly	Visual examination of structural components.
17.	Plenum cylinder to plenum cover bolts	Ultrasonic examination of bolts.
18.	Vent valves and core support shield I.D.	Visual and functional examination of valves and structrual components.
19.	Intentionally left blank	Deleted inspection.
20.	Low pressure injection pipe welds	Re-scheduled for supplementary ISI program.
21.	Incore detectors	Functional exam.
22.	Incore detector sheath	Dye penetrant exam and wipe samples B&W analysis.
23.	Vent valve thermocouple nozzle.	Eddy current exam of nozzles.

TEST

1 & 2

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 1

Inspected Item: OTSG Clad Upper and Lower Head

Type of Inspection: Dye Penetrant

Inspection and Test Plan: Dye Penetrant Examination of stainless steel weld deposit cladding. The examination is performed to verify general conditions of the cladding and to obtain a data point for PWHT stainless weld deposits.

	YES	NO
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected _____ Minimum required ______.)	✓	

Note: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	YES	NO
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

Note: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 1132109-00

8. Task #7 Procedure No. MTIS-007 Rev. 3

NES/LPT-1-NP

Reviewer's Signature J Tuitjen, QC

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 2

Inspected Item: OTSG Inconel Clad on Upper and Lower Tube Sheets

Type of Inspection: Dye Penetrant

Inspection and Test Plan: Dye Penetrant Examination of inconel weld deposit cladding. The examination is performed to verify general conditions of the cladding and to obtain a data point for PWHT Inconel 600 weld deposits.

	YES	NO
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected _____ Minimum required ______.)	✓	

Note: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	YES	NO
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

Note: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 1132109-00

8. Task #7 Procedure No. MTIS-007 Rev. 3
NES / LPT-1-NP

Reviewer's Signature J Tietjen, QC

QUALITY ASSURANCE MODIFICATIONS/OPERATIONS
QUALITY CONTROL PLANT INSPECTION REPORT

Unit No. I Inspector: Donald Jackson / W. Kimmick PIR No WE-43111/8

Inspection Description OTSG 'A' and 'B' Top and Bottom Tube Sheet Periphery and Top and Bottom Head P.T. Inspections. Dwg. IE 224-WM-001 Rev 0, IE-224-WM-002 Rev 0

Method: Visual: ☒ Direct Measurement: ☐ Document Review: ☐ Other: ☒ P.T

References:

Title	Rev.	Date	Verified
B&W 51-1132109-00		3-11-82	DJackson
LPT-1-NP	1	3-20-80	DJackson

Vendor/Item Identification (as appropriate)	Item/Characteristic/Activity To Be Inspected	Accept/Reject Criteria	Inspection Results/Readings	Compliance		
				Sat	Unsat	NA
OTSG 'A' & 'B'	Upper and Lower Tubesheet Periphery Upper and Lower Head P.T. Examinations in areas shown on continuation Dwgs.	ASME-Sec III 1977-S-1978 NB-5352	Acceptable Per Code	DJ		

Q. A. RECORD
ORIGINAL COPY

Page 2 of 10

QUALITY CONTROL PLANT INSPECTION REPORT

PIR No. WE-43

Vendor/Item Identification (as appropriate)	Item/Characteristic/ Activity To Be Inspected	Accept/ Reject Criteria	Inspection Results/ Readings	Sat	Unsat	Nc At

Measuring and Test Equipment Used

Identification of Equipment	Serial No.	Calibratio Date Due
Thermometer	47	4-5-8-

MNCR Issued: Yes ☐ No ☒ QDR Issued: Yes ☐ No ☒

MNCR QDR No.	Date	Reason for Issue	Hold/Cond Release Tag Nos. Issued
		N/A	

Comments/Other Information: P.T. inspections made on OTSG A & B Heads - u
and lower alongside manways or inside above The centerline -
The manways - (No Recordable indications)
P.T. inspections of The outer periphery of The lower Tubesheets app
10" long - 2" wide - (No Recordable indications)
P.T. Inspections of upper Tube sheets - Areas shown on dux
Indications photographed

Inspected By: Donald Jackson / Bojanic Date: 4-1-82

Reviewed and Approved By: Rutjan Date: 4-23-

Distribution (X) Manager Admin. and Services Unit 2 (Orig.)
( ) QA Mod/Ops Manager
( ) QC Manager
(X) File

Others: (X) M. Keeble
(X) T. Potter
( )

MO-108-2 (Rev. 0)

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PIR WE. 43111/82

ATTACHEMENT I
NDT REPORT - TECHNIQUE DATA

TECHNICIAN Donald Jackson   ASSISTANT TECNINICIAN William Kimmick

PROCEDURE NO. LPT-1-NP   REV. 1   6-30-80   CODE INTERPRETED BY QJ

BRAND NAME OF TESTING MATERIALS Spot Check

TYPE:
PENETRANT SKL-S   CLEANER SKC-S   DEVELOPER SKD-S   SURFACE CONDITION Smooth

PENETRANT APPLICATION USED:
SPRAYING ( ) BRUSHING ( ) DIPPING ( )

DEVELOPER APPLICATION USED:
SPRAY ( ) POWDER ( ) WET ( )

BATCH NO.
PENETRANT 6A035   CLEANER 81H055   DEVELOPER 80J055

WELD DATA

SYSTEM OTSG 'A' & 'B'   ISO/DWG. NO. 1E 224 WM 001 REV0
1E 224 WM 002 REV0   LOCATION Unit 1

ENG. SPEC. NO. NA   WELD SPEC.NO. NA   CLASS N-1

SPECIMEN BEING TESTED Upper & Lower Heads Tube sheet Periphery

BEFORE PWHT (X)
AFTER PWHT ( )

ACCEPTANCE STANDARD ASME Sec III NB 5352

Weld Number or Identification	Welder	Symb.	Pipe Size	W.T.	Mat. Type	Joint Type	Weld Layer	Within Code	Beyond Code
OTSG A & B	NA	NA	NA	NA	Inconel	NA	NA	✓	

ORIGINAL COPY

A RECORD

FILE COPY

INDICATION DESCRIPTION: See Photographs.

REMARKS:

DATE 4-1-82   EXAMINER Donald Jackson

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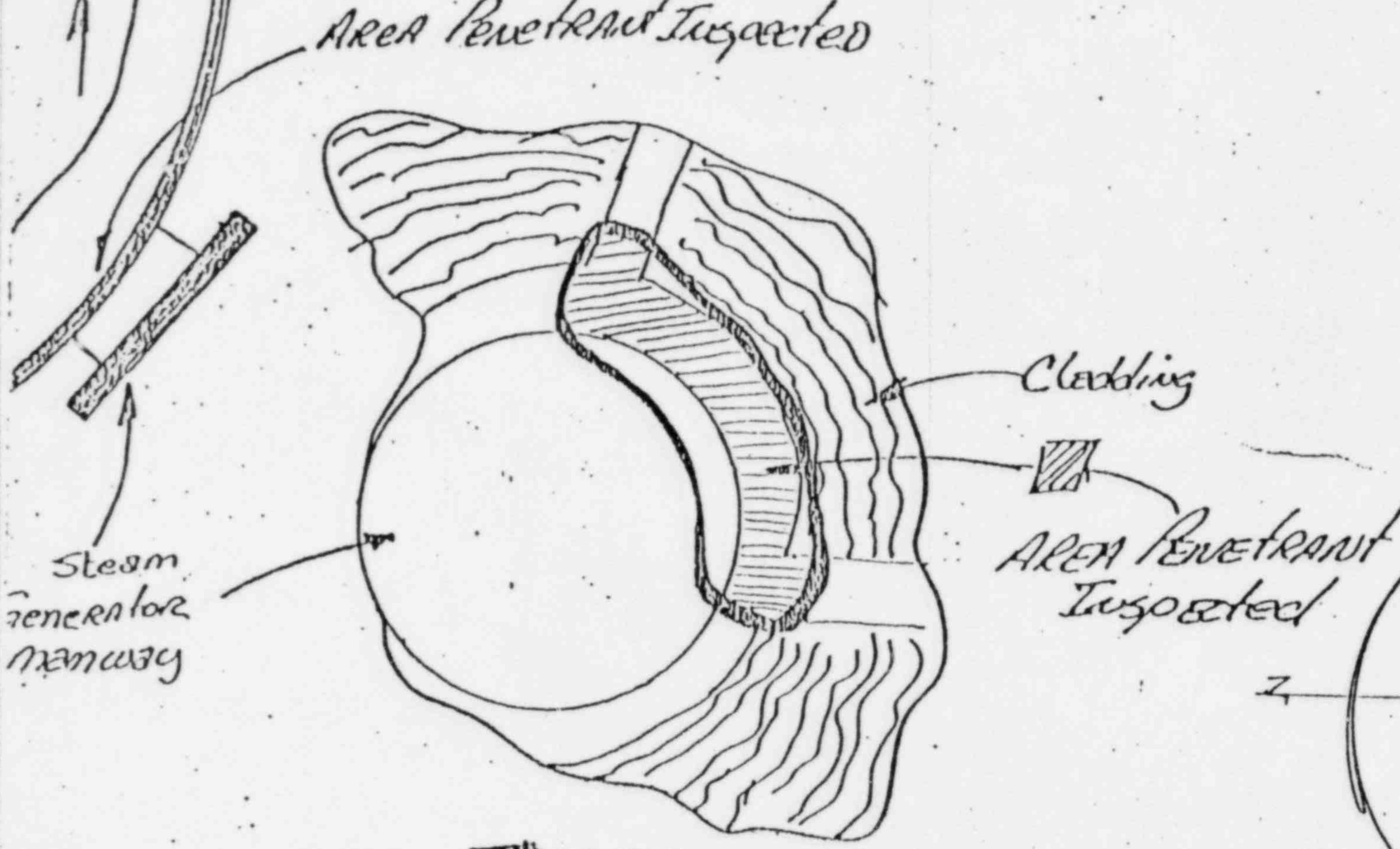
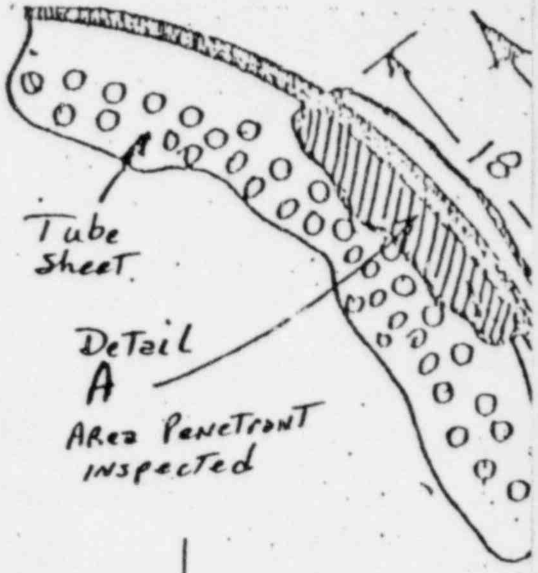
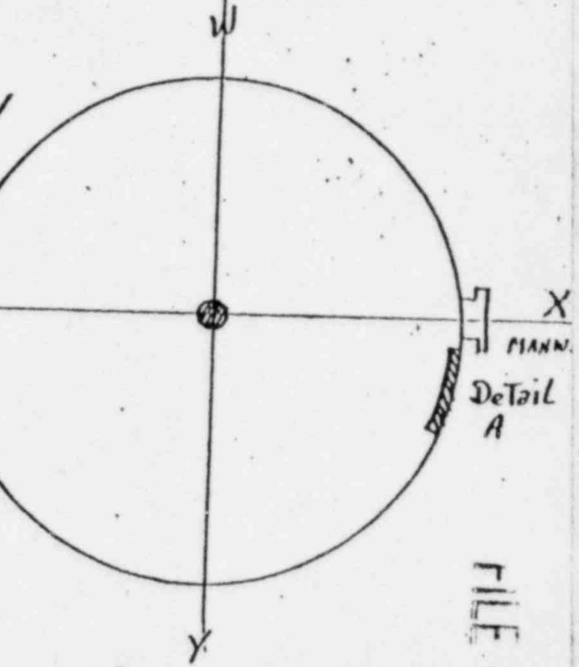
PIR WE-43111/82



Inside "A" Generator Looking Out
Upper





P.T. inspection in center of Tubesheet. Approx. 5" dia. Circle

Detail A - Approx 18" Long, 2" wide

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RECORD

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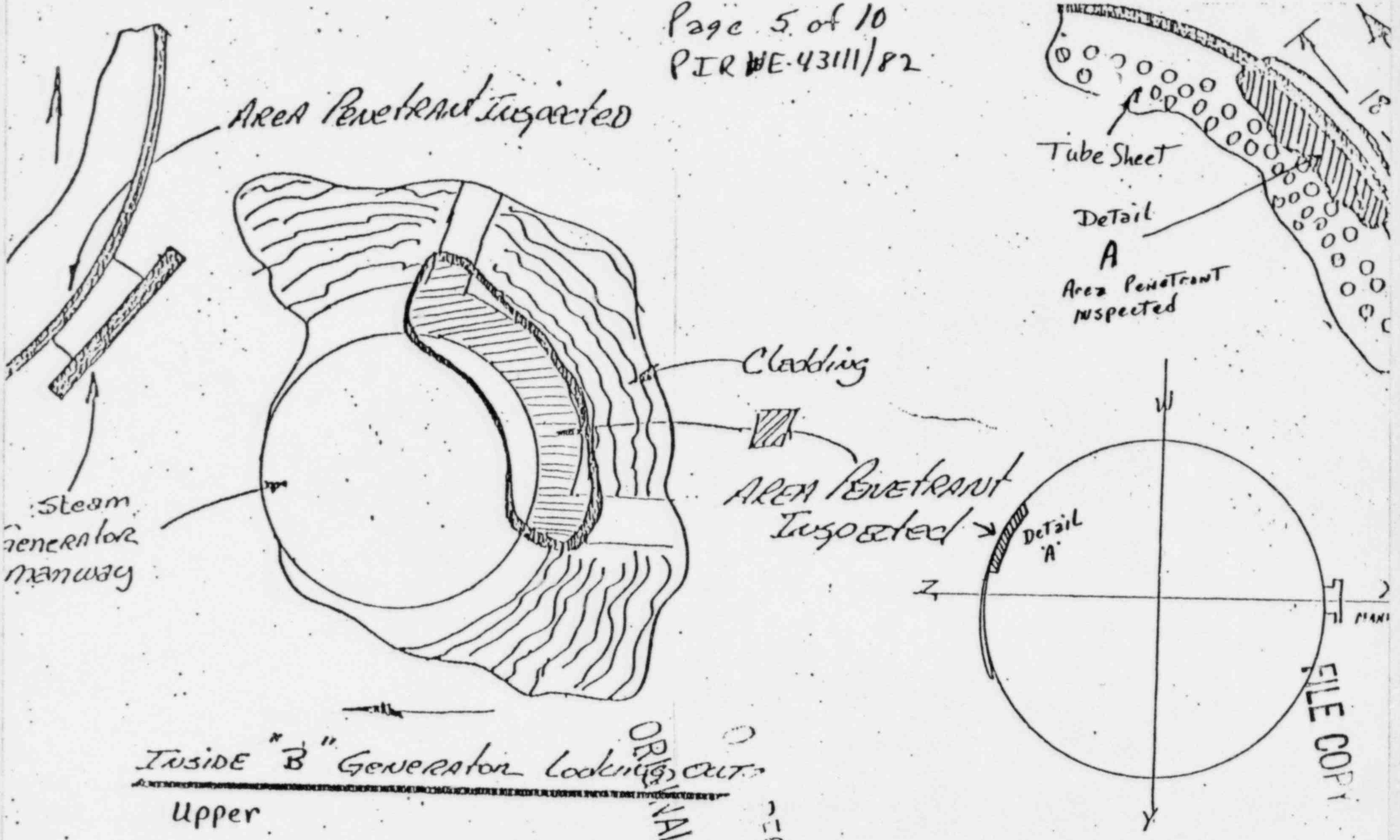
PIR #E-43111/82



Inside "B" Generator Looking Out

Upper

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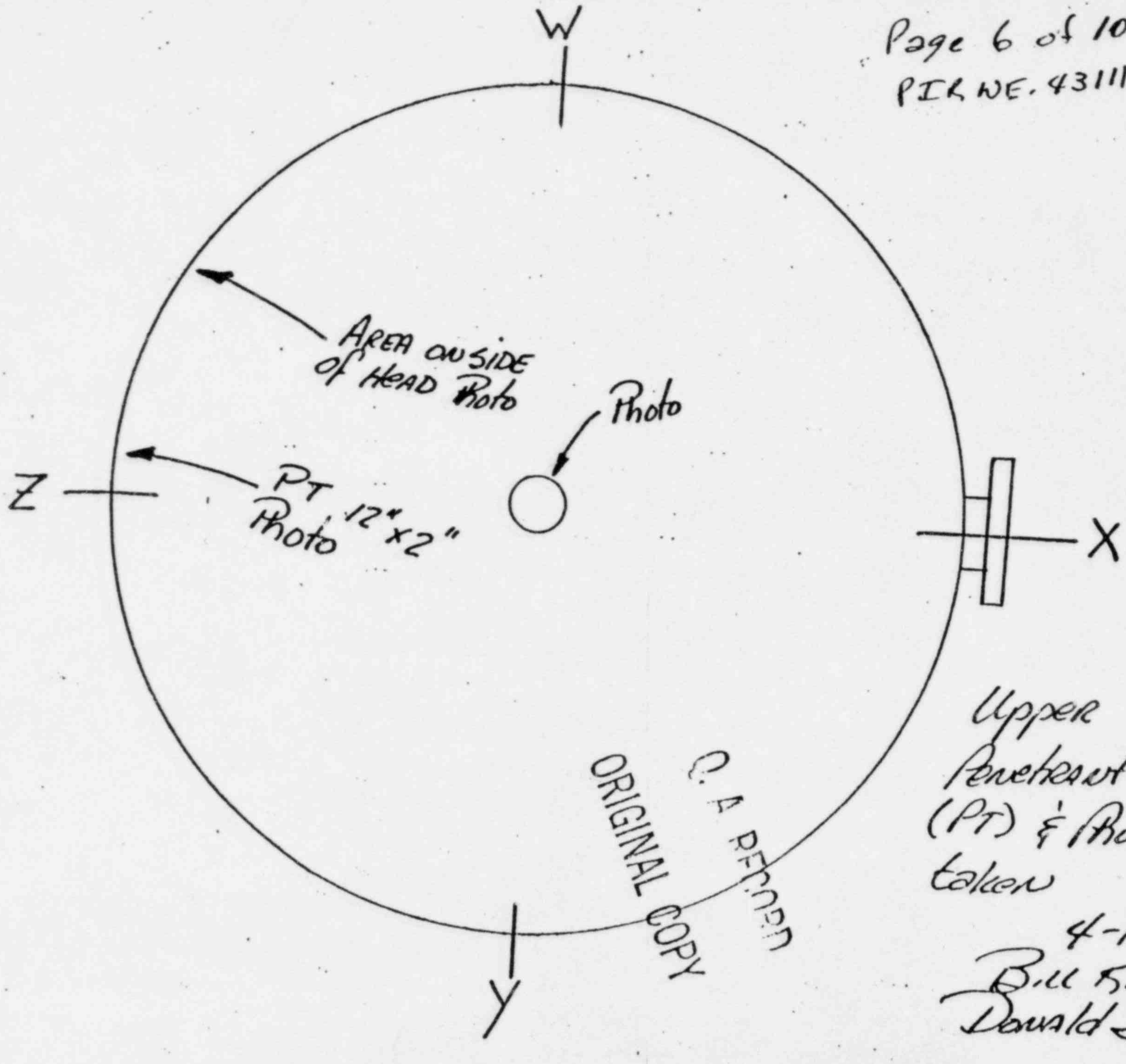
PIR WE. 43111/82



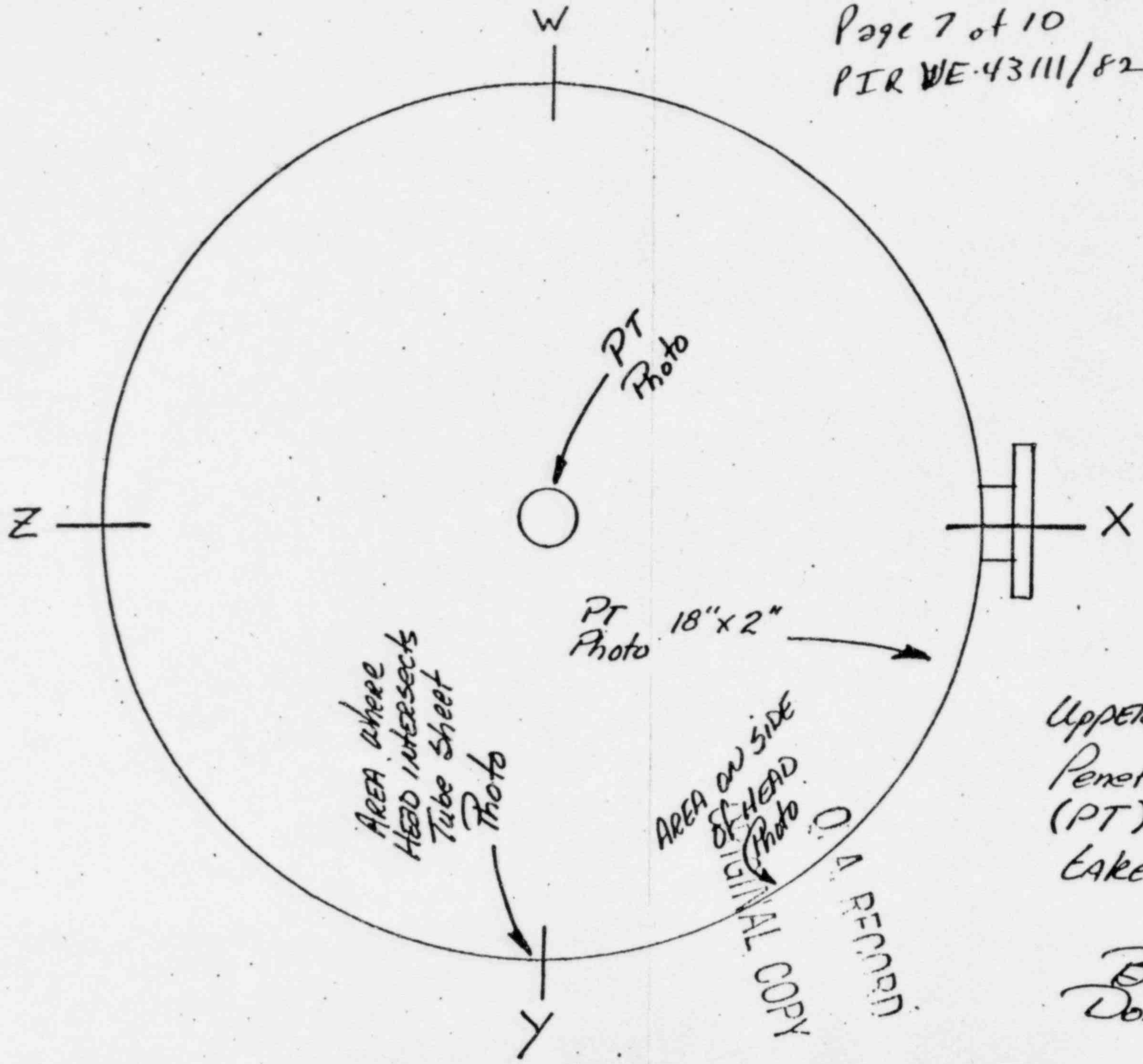
Q. A RECORD
ORIGINAL COPY

Upper "B" Generator
Penetrant Examination
(PT) & Photographs
taken

FILE COPY

4-1-82
Bill Kimmick GPU
Donald Jackson NES

Page 7 of 10
PIR WE·43111/82



Q.A. RECORD

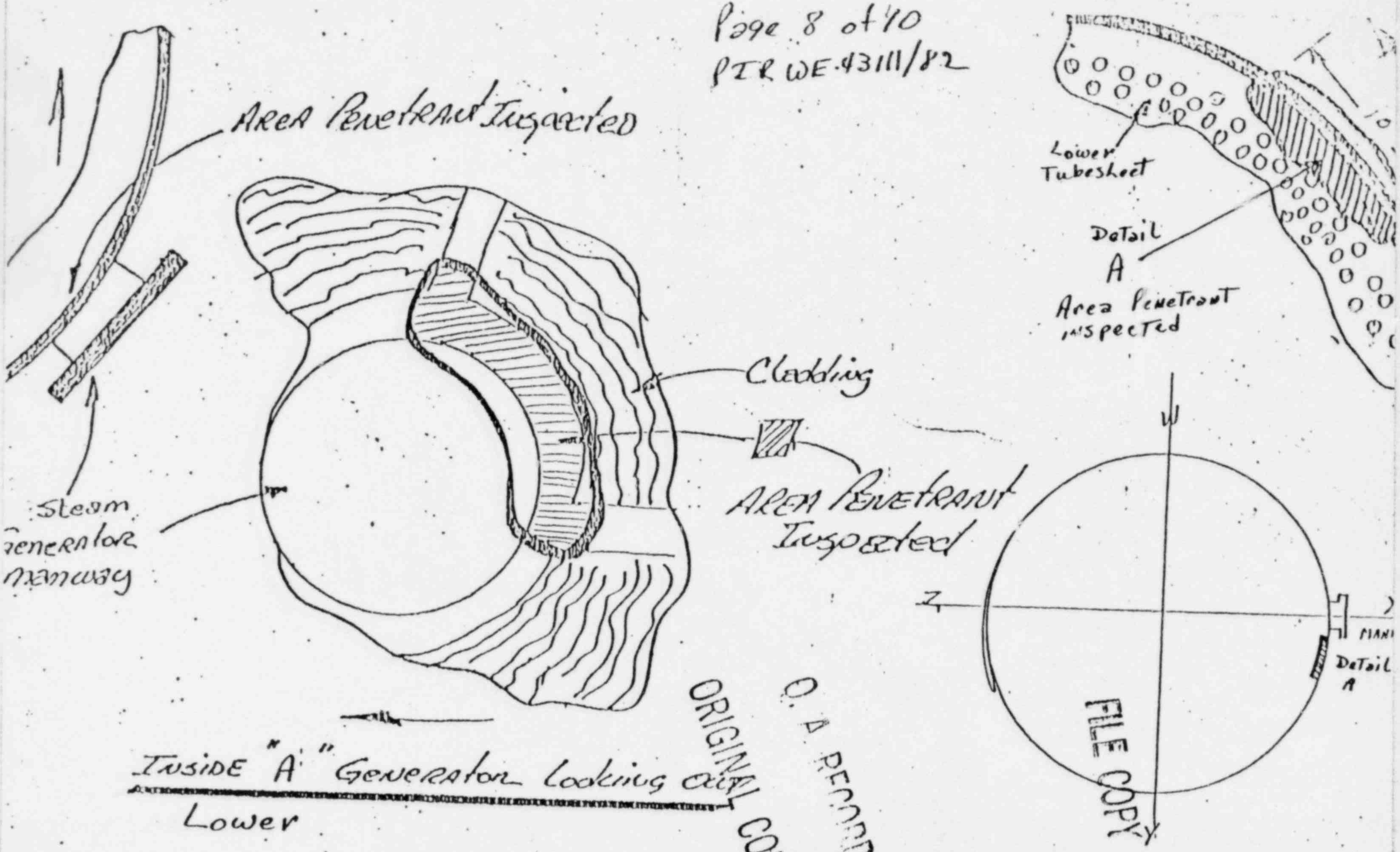
ORIGINAL COPY

Upper "A" Generator
Penetrant Examinatio
(PT) & Photographs
taken

E COPY

4-1-82
Bill Kimmich (GA
Donald Jackson (NE

Page 8 of 40
PIR WE-43111/82



Inside "A" Generator Looking Out
Lower

Q. A. RECORD

ORIGINAL COPY

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GPU Nuclear
NDE

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PIR WE-4: 111/82

000167

Visual/Surface Data Sheet

Site: TMI-1
Inspection ID:
Component: OTSG Head and Tubesheet
Description: Approximately 12 sq. in. each of tubesheet and head (interior)
I.D.: OTSG "B" Lower Head
Procedure: MT/S-007, Rev. 3
Material: INCONEL
Thickness: NA
Test Surface: NA
Test Method: PT
No. Positions: NA
Distance: NA In.
Drawing: NA
Date: March 26, 1982
Examiner: David L. Layser LANGAN
I.D.: NA II
Level: II
Examiner: NA
I.D.: NA
Level: NA

Notes: See attached sheet for sketch showing areas PT'd.

Acceptance Criteria - ASME Sect. III, NB-5350, 1977 ed. thru Summer 1978, per B&W Engineering Information Record #51-1131109-00 Titled OTSG Surface Sample and PT Insp.

Magnetic Particle (Only)

Particle:
Wet ☐ Dry ☐ Color ______
Visible ☐ Fluorescent ☐ Batch ______
Instrument:
Method ______ Current ______
Machine ______ Amperes ______

NA

Dye Penetrant (Only)

Cleaner Batch# 81H055
Penetrant Batch# 6A035
Developer Batch# 80J055
Method:
Visible ☑ Thermometer #A48
Fluorescent ☐ Temp 82°

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		

NA

ORIGINAL COPY

CONTROLLED

FILE COPY

No Reportable Indications ☑ (No Relevant Indications) Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by:
Level:
Date:
Page of
NDE Request No.

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925

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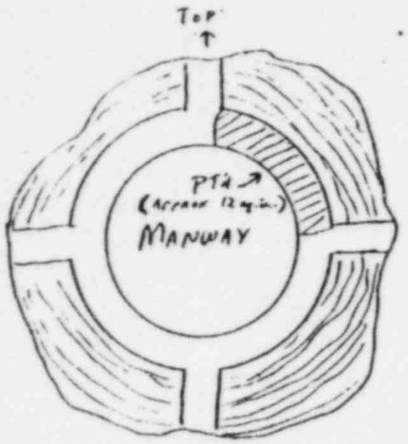
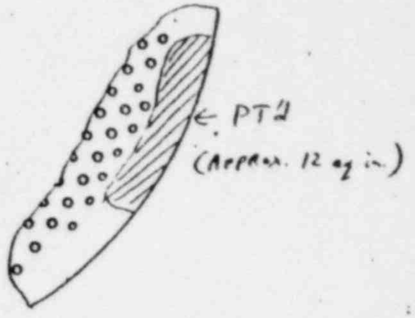
PIR #E-43111/82

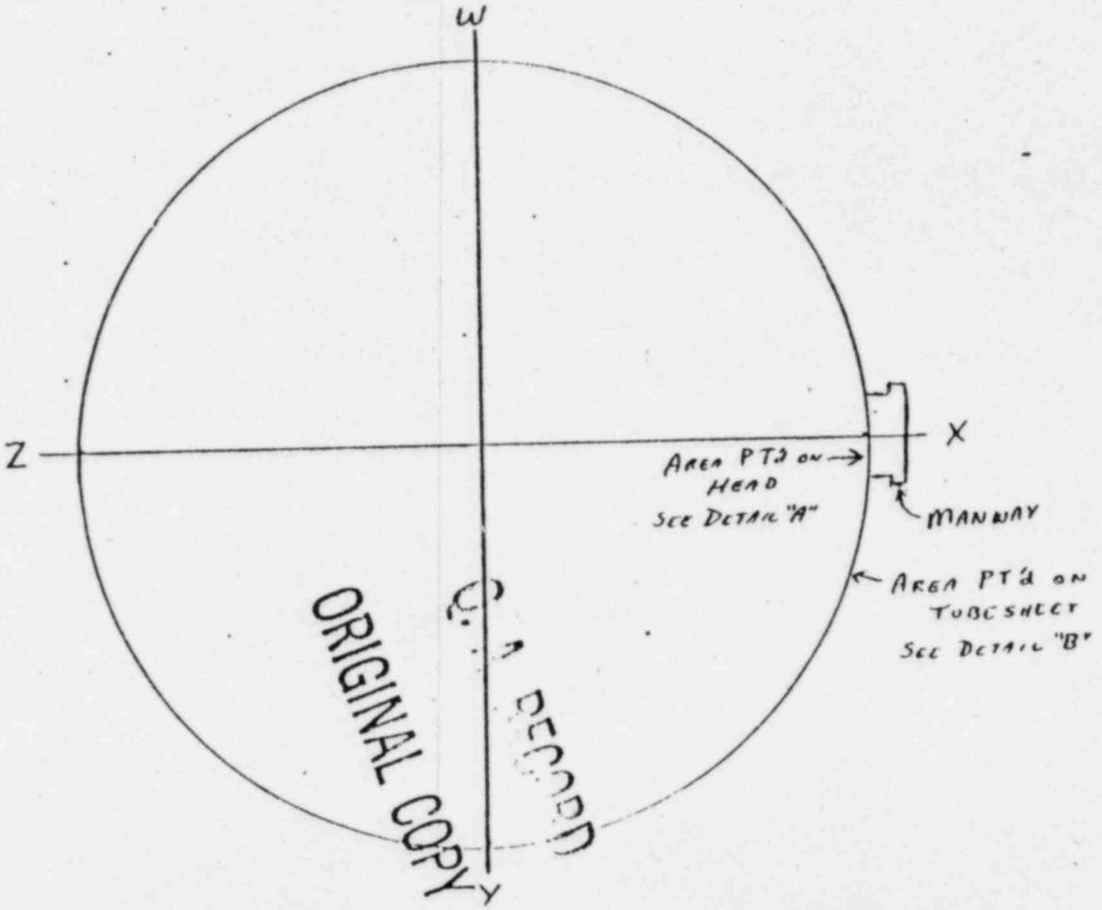
▨ AREA PT'D



DETAIL "A"



DETAIL "B"



AREAS OF PENETRANT INSPECTION

BWNP-20440 (4-80)

BABCOCK & WILCOX - NPGD

ENGINEERING INFORMATION RECORD

Test 1 : 2

DOCUMENT IDENTIFIER 51-1132109-00

TITLE OTSG SURFACE SAMPLE AND PT INSPECTION

PREPARED BY Frederick D Johnson DATE 3-11-82

REVIEWED BY J R Conklin H B Luke DATE 3-11-82

Jim Mickle 3/11/82

REMARKS:

This document defines the engineering requirements for collecting surface film samples and liquid penetrant (PT) examination of the stainless steel cladding in the OTSG upper and lower heads. The surface film samples will provide information on the presence and concentration of contaminants in the OTSG. The PT examination should reveal any defects in the cladding.

I. Introduction

This document defines the engineering requirements for collecting surface film samples and liquid penetrant (PT) examination of the stainless steel cladding in the OTSG upper and lower heads. The surface film samples will provide information on the presence and concentration of contaminants in the OTSG. The PT examination should reveal any defects in the cladding.

II. Surface Film Samples

1. The samples are to be taken using the "wipe" method. The number and locations of these samples shall be:

    a. 2 samples taken above the maximum water level during wet layup, (An elevation equal to mid-span of the upper head manway).

    b. 2 samples taken at the water line, (Preliminary data indicates that this is approximately 13-1/2" above the primary face of the upper tubesheet).

    c. 2 samples taken approximately 4" above the primary face of the UTS.

    d. 2 samples taken in the lower head.

    The highest and lowest samples may be taken from the upper and lower head manway regions provided that they are sufficiently far from the openings to eliminate artificial (i.e., human) contamination. The wipe area should be approximately 2 ft^2.

Info

2. Wipe samples require that the sample cloths be moistened. The sample cloths come pre-moistened but demineralized water can be used to wet the sample cloths if required. Acetone or alcohol of an acceptable purity may also be used to moisten wipe cloths for sampling.

3. Only pre-cleaned wipe cloths should be used. These will be available through the B&W site office.

4. Special care should be taken to minimize inadvertant chemical contamination of the wipes due to handling. For example, rubber gloves should be worn when handling sample cloths and taking samples from cladding surfaces. The gloves should be thoroughly washed and rinsed with demineralized water prior to use.

5. Samples should be taken by rubbing the wipe cloth over the selected area with the gloved hand. Even pressure should be applied to as much of the area covered as possible. Repeat this process one time over the same area to better assure that contaminants are removed by the wipe cloth. An approximate area and location of sample region that is wiped should be noted on the sample label. (i.e., 2 ft^2) Samples taken should then be resealed in individual sample bags. Acetone or alcohol soaked wipe cloths will collect some types of dirt and greases (if

present) which the water wipes may not pick up. If an acetone or alcohol wipe is used, it would be wiped over an area previously wiped with a water wipe. Both acetone and water wipes from the same area should then be placed in the same bag.

6. Sample cloth bags should be clearly marked to indicate:

   - Sample number
   - Sample location (elevation and approximate orientation to axis)
   - Approximate area wiped by sample cloth
   - Date/Time
   - Water or Acetone/water wipe

   Any unusual surface conditions observed or other information which may be useful in determining the condition of the cladding surface should be noted for each sample taken.

III. PT Examination

1. A total of four PT examinations shall be performed. A PT shall be performed in the upper OTSG head region in an area at an elevation equal to or greater than the centerline of the upper head manway on the stainless clad. A PT shall also be performed on the upper and lower tubesheet on the inconel clad. A PT shall also be performed on the lower head stainless clad.

2. The examination shall be performed to the requirements of NB-5110 Section III of the 1977 thru Summer, 1978 Addenda of the ASME Code. The examined areas shall meet the acceptance standard of NB-5350, Section III of the 1977 thru Summer, 1978 Addenda of the ASME Code.

3. The stainless clad PT examination shall have a size of an approximate 6" diameter circle. The specific locations shall be recorded.

4. The inconel clad PT examinations shall be performed on the periphery of the tubesheet where an area of approximately 2" by 6" is available.

5. Clad material removal shall be minimized during preparation of the examination surface.

6. Areas identified as having a defect shall be photographed and material removed to a depth of approximately .005". The area is then to be PT examined again to the requirements of NB-5110 and NB-5350 and if any defects are identified these are to be photographed and reported to B&W.

7. All examination information is to be sent to B&W. Location of the examined areas is to be supplied with the information.

Caution: PT solution shall not be allowed to contaminate tubes.

(c) Relevant indications are those which result from mechanical discontinuities. Linear indications are those indications in which the length is more than three times the width. Rounded indications are indications which are circular or elliptical with the length less than three times the width.

NB-5352 Acceptance Standards

(a) Only indications with major dimensions greater than 1/16 in. (1.6 mm) shall be considered relevant.

(b) Unless otherwise specified in this Subsection, the following relevant indications are unacceptable:

(1) any cracks or linear indications;

(2) rounded indications with dimensions greater than 3/16 in. (4.8 mm);

(3) four or more rounded indications in a line separated by 1/16 in. (1.6 mm) or less edge to edge;

(4) 10 or more rounded indications in any 6 sq in. (3870 mm^2) of surface with the major dimension of this area not to exceed 6 in. (152 mm) with the area taken in the most unfavorable location relative to the indications being evaluated.

NB-5360 VISUAL ACCEPTANCE STANDARDS FOR BRAZED JOINTS

Braze metal shall give evidence of having flowed uniformly through a joint by the appearance of an uninterrupted, narrow visible line of brazing alloy at the end of the joint.

NB-5380 GAS AND BUBBLE FORMATION TESTING

For gas and bubble formation testing, the test procedure shall be in accordance with T-1030 of Article 10 of Section V. When vacuum box testing is used, the soak time shall be a minimum of 10 sec. Any indication of leaking, by the formation of bubbles or by the breaking of the continuous soap film by leaks, shall be evidence of an unacceptable condition.

NB-5400 FINAL EXAMINATION OF VESSELS

NB-5410 EXAMINATION AFTER HYDROSTATIC TEST S79

After the hydrostatic or pneumatic test of a vessel, all weld joints and heat affected zones of Categories A, B, C, and D, used to join ferritic material and repair welds in ferritic material that exceed in depth either 3/8 in. (10 mm) or 10% of the section thickness whichever is less, shall be examined when physically accessible by the magnetic particle or liquid penetrant method.

NB-5500 QUALIFICATIONS AND CERTIFICATION OF NONDESTRUCTIVE EXAMINATION PERSONNEL S78

NB-5510 GENERAL REQUIREMENTS

Organizations performing Code required nondestructive examinations shall use personnel competent and knowledgeable to the degree specified by NB-5520. When these services are subcontracted by the Certificate Holder or Quality System Certificate Holder, he shall verify the qualification of personnel to the requirements of NB-5520. All nondestructive examinations required by this Subsection shall be performed by and the results evaluated by qualified nondestructive examination personnel.

TEST

3

SAFE END NOZZLES

3A

Inter-Office Memorandum

GPU Nuclear

QC-CL-394

Date March 16, 1982

Subject Nondestructive Testing of 2½" Sch. 160 Pressure Injection Nozzle and Heat Effective Zone of MUV-94.

To D. Croneberger

Location TMINS Trailers #256/258

I. General:

The assembly is as shown on B & W drawing #160493-E, Rev. 0 (Modification).

The radiographic examination was conducted using the technique data obtained from the original examination completed on site in 1973. One (1) film (4-5) taken on 3/6/82 was found un-acceptable due to movement of the film and was discussed.

II. Scope:

The nondestructive examinations conducted are as follows:

A. Radiographic examination of the safe-end to valve (MUV-94) weld joint.

B. Presence of four (4) weld beads per note #8 on referenced drawing.

C. Location of thermal sleeve with reference to weld beads. Determine possible movement and/or wear of sleeve and weld beads.

D. Determine presence of possible clearance between O. D. of thermal sleeve and I. D. of safe-end in the expanded area of the thermal sleeve.

E. Liquid penetrant examination of the O. D. surface starting from the heat affected zone of the nozzle to safe-end weld up to and including 1" of the valve surface adjacent to the valve to safe-end weld.

F. Visual examination of surface per "E" above.

G. Ultrasonic examination of safe-end to nozzle weld, safe-end and safe-end to valve weld.

III. Evaluation:

II-A. Radiographs evaluated per acceptance standards of ANSI B31.7 films (0-1) and (1-2) showed minor tungsten inclusions which were accepted. The film did not reveal any unsatisfactory conditions and the weld was accepted. The technique for each exposure was identical however, due to placement of the shims and penetrameters on the film the density was found less than required on several exposures. Based on acceptable densities of exposures (5-6) and (6-0) and exposure techniques being alike for all exposures the film showing low density were considered acceptable.

II-B.
II-C. A comparison was made using the original film taken on site 1973 and those taken on 3/6/82. The four (4) beads appeared unchanged. The location of the thermal sleeve with reference to the weld beads appears unchanged. The radiographs do not show any wearing away of the welds or thermal sleeve.

II-D. One (1) film (0-1) shows a intermetant line starting at the up stream end of the thermal sleeve and extending, down stream approximately ½" in the area of the expanded/rolled portion of the sleeve. Evaluation of the remaining five (5) film was completed with acceptable results.

II-E. Liquid penetrant examination revealed three (3) .020 dia. indications located on the as cast surface of the valve. These indications were documented for information purposes only. No relevant indications appeared on the tested surface.

II-F. The visual examination was completed with no objectional condition to report. The entire surface was found free from defects.

II-G. Ultrasonic examination revealed three (3) indications as follows:

1. Low level indication near I. D. surface. Plot shows indication in nozzle clad surface.
2. Indication appears to be a corner on the I. D. weld prep. surface of the safe-end.
3. Low level indication on safe-end I. D. surface in the weld joint area. Appears as slight under cut - safe end to nozzle weld.

Attachments: 1) Ultrasonic Examination:
   a) Calibrations Sheets (#000173 thru #000175).
   b) Thickness Date Sheet (1-Sheet).
   c) Limited Scan Report (1-Sheet).
   d) Ultrasonic Date Sheets (#000058, page 1 & 2).
   e) Request for Evaluation/Recordable Indications (sheets 1 thru 4).

2) Visual/Surface Date Sheet (1-Sheet #000155).

3) Visual/Surface Date Sheet (1-Sheet #000154) Dye Penetrant Examination.

4) Radiographic Report dated 3/6/82 (NUS).

JET/BEB/ejg
Attachments
cc: N. Kazanas
B. Ballard
R. Fenti
R. Toole
D. Cowfer
J. Colitz
F. Faust (B & W)
QC file (2)

JTietjen
J. E. Tietjen
Mod/Ops Inspection Supervisor

RFH for BEBallard Sr.
B. E. Ballard
Manager-TMI QA Mod/Ops

JJP - monitor

Inter-Office Memorandum

GPU Nuclear

Date March 19, 1982
MT/2001

Subject TMI-1 - Materials Technology Report of
NDE Results - Make up Branch Connection Safe-end/Welds

To D. K. Croneberger
N. C. Kazanas

Location

Materials Technology has completed VT, PT and UT of the subject make-up Piping System/RT Pipe branch connections. Mod/Ops QC has provided RT contractor support to verify the thermal sleeve position on two(2) branch connections to date. The remaining RT is scheduled for completion 3/20/82. No relevant findings to report. The enclosed NDE record sheets (3-UT reports will be forwarded later) include some ID geometric UT reflectors and a low level cladding UT reflector that are documented for information. These are not considered revelant. Data sheet No. 058 documents the access restriction at the reduced "3.5" diameter valve to safe-end weld precluding contact UT of that area. The one(1) inch axial length of the 3.5" diameter region has been reduced to approximately 0.5 inches as-built because of weld reinforcement overlap. The valve to safe-end weld is in the as-welded condition. The scope and extent of the NDE examinations follow:

NDE METHOD	SCOPE AND EXTENT
1. Visual (VT)	- All surfaces including Safe-end/Attachment welds/ Buttered weld and one(1) inch (min) of valve and nozzle or Branch connection base material.
2. Liquid Penetrant (PT)	- Same as VT
3. Ultrasonic (UT)	- All safe-end areas and one(1) inch of Nozzle base material, excluding the 3.5 inch safe-end reduced diameter and the valve to safe-end weld and valve base materials. (Exclusions due to OD geometry access restrictions). UT included scans for both circumferential and axially oriented flaws in the complete thru-thickness volume of the material.
4. Radiographic (RT)	- The valve to safe-end weld and verification of the Thermal Sleeve location.
Conclusions:	- No relevant findings pending completion of the two(2) remaining RT action items.

C. D. Cowfer
Manager Materials Technology

CDC:blf
*Attachment

cc: [redacted] *
R. Barley
B. Elam *
J.J. Colitz
R. Fenti *
J. Tietjen
R. Turner
M. Torborg
ISI File

G Rhedrick

Inter-Office Memorandum

GPU Nuclear

Date April 7, 1982
MT/2016

Subject Task #7 Ultrasonic Examination
Results for Spray and Surge Line

To N. C. Kazanas

Location HQ

Materials Technology has completed the Ultrasonic examination of TMI Unit #1 spray and surge nozzle to safe ends (bi metalic), safe end to elbows and on the spray line only the first weld after the safe end. The area of inspection and extent was established by B&W per document identifier #51-1132391-00 and #51-1132392-0C. Several reflectors were detected and are outlined below. All reflectors are geometric in nature and all welds, base metals inspected on the spray and surge lines are acceptable to ultrasonics. Attached are copies of the data sheets & plots for these welds, also attached are the data sheets & plots for the HPI welds inspected earlier and reported in a letter (MT/2001), dated March 19, 1982 by C. D. Cowfer. Below is a detailed listing of each area inspected.

SPRAY LINE COMPONENT	EXAMINATION RESULTS
Nozzle to safe end (bi metalic)	Resulted in no reflector being detected. (Data sheet 000067)
Safe end to elbow	Resulted in the detection of several geometric reflectors (data sheet 000068). A indication plot was drafted to verify reflectors location. A limited scan report was filled out due to the curvature of the elbow left an area partially inaccessible to U.T. The baseline radiographs were retrieved and found to contain tooling marks and a poor fit up condition, which is cause for a U.T. reflector.
1st weld after safe end elbow to elbow weld.	Contained a reflector which was 360° around the weld. A indication plot was developed from the data on (sheet 000069). This data showed the reflector was due to a change in thickness at the ID surface and is classified as geometric. A limited scan report was completed due to an area that was inaccessible to U.T. at the inside curvature of the elbow.

SURGE LINE COMPONENT	EXAMINATION RESULTS
Nozzle to safe end (bi-metalic)	No reflectors detected (data sheet 000066). A limited scan report was issued due to a large restraint that was attached to the nozzle's C/S area of interest and U.T. coverage of this area was limited.
Safe end to elbow	Detected two(2) 360° reflectors per (data sheet 000065) which were plotted out on the indication plot form. This reaffirmed that these reflectors were from the counter bores change in thickness section and poor fit up. Both indications are classified geometric.

Rodney Turner
Rodney Turner
NDE Specialist

Approval
C. D. Cowfer, Manager Materials Technology

RT:blf

* Attachments

cc:* B. E. Ballard
R. O. Barley
* J. J. Colitz
* D. K. Croneberger
* B. Elam
* R. Fenti
J. J. Potter
J. Tietjen
M. Torborg
M. Zeise
ISI File

TEST

3A

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 3A

Inspected Item: Make-up Nozzle Safe End (HPI)

Type of Inspection: R.T.

Inspection and Test Plan: This RT examination shall include areas as required to comply with;

- a. The thermal sleeve is tight or has separated from the safe end thereby revealing a gap between the thermal sleeve and safe end.
- b. The thermal sleeve is in it's "as design axial position within the safe end or has moved axially.
- c. The outboard end weld retainer buttons are in place and not damaged or have been damaged or are missing.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected ______ Minimum required ______.)	✓	

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	Yes	No
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 1132394-00

8. Task #7 Procedure No. NES/XR-1-NP

Reviewer's Signature J Tietjen, QC

of 1

QUALITY ASSURANCE MODIFICATIONS/OPERATIONS
QUALITY CONTROL PLANT INSPECTION REPORT

Inspector Donald Jackson

PIR No. [illegible]3106/8

Inspection Description Make Up and Purification. R.T. In [illegible] and Thermal Sleeves Dwg. 160493E Rev 0. (Mod/[illegible])

Method: Visual: ☒ Direct Measurement: ☐ Document Review: ☐ Other: ☒ R.T.

References:

Title	Rev.	Date	Verified
B&W (TMI 82-022)		3-4-82	D Jackson

Vendor/Item Identification (as appropriate)	Item/Characteristic/ Activity To Be Inspected	Accept/ Reject Criteria	Inspection Results/ Readings	Compliance		
				Sat	Unsat	Not App
MUV-94 Q	R.T. Inspection using	ANSI B31.7	Acceptable			
MUV 95 Q	Same Technique	69+S-70				
MUV 86A Q	employed to accomplish	B.1.140 and				
MUV 76B Q	The original Radiographs.	Original	* See Comments			
		Radiographs				
		for Comparison				

MO-108-1 (Rev. 0)

TMI-201 6-80

Page [illegible] of [illegible]

QUALITY CONTROL PLANT INSPECTION REPORT

[illegible] T-43106/8

Identification (as appropriate)	Item Characteristic/ Activity To Be Inspected	Accept Reject Criteria	Inspection Results/ Readings	Sat	Unsat	Not Applic

Measuring and Test Equipment Used

Identification of Equipment	Serial No.	Calibration Date Due
NA		

MNCR Issued: Yes ☐ No ☒ QDR Issued: Yes ☐ No ☒

MNCR QDR No.	Date	Reason for Issue	Hold/Condit. Release Tag Nos. Issued
		NA	

Comments/Other Information: XR-1-HP Rev 1 6-30-80

* During The comparison of The original radiographs To The new radiographs for Welds MU86AQ and MU86BQ it was noted That The Thermal Sleeve To Tack (Button) welds appears To be Less Than The 3/32" dimension shown on Drawing (B&W) 160493E. The comparison of The radiographs indicates That no movement of The Thermal sleeves is evident.

Inspected By: Donald Jackson Date: 3-22-82

Reviewed and Approved By: ______ Date: ______

Distribution
(X) Manager Admin. and Services Unit II (Orig.)
( ) QA Mod/Ops Manager
( ) QC Manager
(X) File

Others:
(X) M. Hipple
( ) E.R. Feist (B&W)
( )
( )

MO-108-2 (Rev. 0)

NUCLEAR ENERGY SERVICES
SHELTER ROCK ROAD
DANBURY, CONNECTICUT 06810

[illegible]

FIGURE 4

RADIOGRAPHY REPORT

SERIAL NO. OR PIECE NO.	Weld No.	Film No.	ACC	REJ.	Defect Code	REMARKS
[illegible]		0-1	✓			
		1-2	✓			
		2-3	✓			
		3-4	✓		TI	
		4-5	✓			
		5-6				SlighT Movement (Film)
		6-0	✓		TI	SlighT Concavity ON Root

Radiographs compared with original Film To determine location of Thermal Sleeve, Tack Welds and Possible defects. No Apparent defects, No movement of Thermal Sleeve NoTed by film comparison

RADIOGRAPHY REPORT NO. ____
DATE 3-18-82
Customer GPU
Address ____
Job Location TMI
Customer's P.O. No. ____ Job No. ____
Item Description 2½" Sch 160 S.S.
100% Insp. ✓ Spot Insp. ____
Welder Stamp NA

WORK SUMMARY

Amount Item Description
____ Total Hours IN ____ A.M. OUT ____ A.M. @ ____
IN ____ P.M. OUT ____ P.M. @ ____
____ Travel Hours ____ Lunch ____ Standby ____
____ Ft. Plate Weld ____ in. thk. @ ____
____ Ea. Pipe Weld ____ in. dia. @ ____
17 Films, 4½ x 10 Type [illegible] @ ____
____ Films, ____ x ____ Type ____ @ ____
7 Exposures @ ____
____ @ ____
WPS NA

TECHNIQUE DATA

Inspection Specification MU SysTem
Acceptance Standard ANSI B31.7
RT Procedure No. XR-1-NP
Shooting Sketch (RSSS) ✓
Physical Source Size .1" X .1" Effective Focal Spot .14"
SFD 16" Source to Object 15.5
Material Thickness .375 OD Type Material A351/S316L
Geometric Unsharpness (Ug) .003"
No. of Film per Cassette 2 Penetrameter 10 Shim 1/4"
Viewing: Single ✓ Superimposed ____
Pb Screens Front .010" Center — Back .010"
Masking or Blocking Used —
Exposure Time 12 MIN Dev. Time 5 min
Type Source Ir192 Curies 113

DEFECT CODE

P – Porosity	SI – Slag Inclusions	TI – Tungsten Inclus.
C – Crack	BT – Burn Through	CV – Root Concavity
IF – Incomplete Fusion	DT – Drop Through	CX – Root Convexity
SL – Slag Lines	UC – Undercut	OX – Oxidation

1. Donald Jackson LEVEL III
TECHNICIAN

2. ____ LEVEL ____
TECHNICIAN

3. Donald Carlson LEVEL III
TECHNICIAN INTERPRETER

Page 4 of 6

FIGURE 4

NUCLEAR ENERGY SERVICES
SHELTER ROCK ROAD
DANBURY, CONNECTICUT 06810

RADIOGRAPHY REPORT

SERIAL NO. OR PIECE NO.	Weld No.	Film No.	ACC	REJ.	Defect Code	REMARKS
		1-2	✓		TI	Water in Pipe
		2-3	✓			
		3-4	✓			
		~~4-5~~				Motion on Film
		5-6	✓			
		6-0	✓			

Radiographs Compared With original Film To determine location of Thermal Sleeve, Tack Welds and Possible defects. No Apparent Defects. No movement of Thermal Sleeve noted by Comparison of Films.

The Radiographs were made for Information only Comparison To Film originally made in 1973. 1½" Shim Block was based on Technique Sheet included with The original radiographs. The density of the new film on exposures 5-6, 6-0 meets code requirements. Other exposures have less Than The required densities in The Penetrameters due To placement of Pens and Shims on The Film. All other exposure Techniques were The same. Based on This, I feel The sensitivity of The other films are acceptable for Comparison To The original film.

Donald Jackson III

RADIOGRAPHY REPORT NO. ________
DATE 3-6-82

Customer GPU
Address TMI

Job Location ________
Customer's P.O. No. ________ Job No. ________
Item Description 1½" Sch. 160
100% Insp. ✓ Spot Insp. ________
Welder Stamp NA

WORK SUMMARY

Amount Item Description

____ Total Hours IN ____ A.M. ____ P.M. OUT ____ A.M. ____ P.M. @ ____
____ Travel Hours ____ Lunch ____ Standby ____
____ Ft., Plate Weld ____ in. thk. @ ____
____ Ea. Pipe Weld ____ in. dia. @ ____
14 Films, 4½ x 10 Type Red R @ ____
____ Films, ____ x ____ Type ____ @ ____
7 Exposures @ ____
____ @ ____
WPS — NA

TECHNIQUE DATA

Inspection Specification ________
Acceptance Standard ANSI B31.7
RT Procedure No. XR-1-NP
Shooting Sketch (RSSS) ✓
Physical Source Size .1" X .1" Effective Focal Spot .144
SFD 16" Source to Object 15⅝"
Material Thickness .375 Type Material A351/SB166
Geometric Unsharpness (Ug) .003"
No. of Film per Cassette 2 Penetrameter 10 Shim 1½"
Viewing: Single ✓ Superimposed -
Pb Screens Front .010 Center — Back .010"
Masking or Blocking Used —
Exposure Time 24 min Dev. Time 5 min
Type Source Ir192 Curies 47

DEFECT CODE

P – Porosity	SI – Slag Inclusions	TI – Tungsten Inclus.
C – Crack	BT – Burn Through	CV – Root Concavity
IF – Incomplete Fusion	DT – Drop Through	CX – Root Convexity
SL – Slag Lines	UC – Undercut	OX – Oxidation

1. Donald Jackson LEVEL III
TECHNICIAN

2. ________ LEVEL ____
TECHNICIAN

3. Donald Jackson LEVEL III
TECHNICIAN/INTERPRETER

Page 3 of

NUCLEAR ENERGY SERVICES
SHELTER ROCK ROAD
DANBURY CONNECTICUT 06810

FIGURE 4

RADIOGRAPHY REPORT

Make up [illegible] f.

SERIAL NO. OR PIECE NO	Weld No.	Film No.	ACC	REJ.	Defect Code	REMARKS
[illegible]		0-1	✓			
		1-2	✓		TI	
		2-3	✓			
		3-4	✓		TI	
		4-5	✓		TI	
		5-6	✓			
		6-0	✓		TI	

Radiographs Compared To
original Film To determine
Location of Thermal sleeve,
Tack Welds and Possible defects
No apparent defects, No
Movement of Thermal Sleeve
Noted by film Comparison

RADIOGRAPHY REPORT NO. ______
DATE 3-20-82
Customer GPU
Address ______
Job Location TMI
Customer's P.O. No. ______ Job No. ______
Item Description 2½" Sch 160 [illegible]
100% Insp. ✓ Spot Insp. ______
Welder Stamp JA

WORK SUMMARY

Amount — Item Description
______ Total Hours IN ______ A.M. OUT ______ M.@ ______
IN ______ P.M. OUT ______ P.M.@ ______
______ Travel Hours ______ Lunch ______ Standby ______
______ Ft., Plate Weld ______ in. thk. @ ______
______ Ea. Pipe Weld ______ in. dia. @ ______
14 Films, 4½ x 10 Type [illegible] @ ______
______ Films, ______ x ______ Type ______ @ ______
7 Exposures @ ______
______ @ ______

WPS – NA

TECHNIQUE DATA

Inspection Specification MU System
Acceptance Standard ANSI B31-7
RT Procedure No. XR-1-NP
Shooting Sketch (RSSS) ✓
Physical Source Size .1"X.1" Effective Focal Spot .14
SFD 16" Source to Object 15⅛"
Material Thickness .375" Type Material A351/Sc
Geometric Unsharpness (Ug) .003"
No. of Film per Cassette 2 Penetrameter 10 Shim 1
Viewing: Single ✓ Superimposed ______
Pb Screens Front .010" Center — Back .01
Masking or Blocking Used —
Exposure Time 12 min Dev. Time 5 min
Type Source Ir 192 Curies 110

DEFECT CODE

P – Porosity
C – Crack
IF – Incomplete Fusion
SL – Slag Lines

SI – Slag Inclusions
BT – Burn Through
DT – Drop Through
UC – Undercut

TI – Tungsten
CV – Root Cor
CX – Root Cor
OX – Oxidatio

1. Donald Jackson LEVEL II
TECHNICIAN

2. ______ LEVEL ______
TECHNICIAN

3. Donald Jackson LEVEL II
TECHNICIAN/INTERPRETER

NUCLEAR ENERGY SERVICES
SHELTER ROCK ROAD
DANBURY, CONNECTICUT 06810

RADIOGRAPHY REPORT

MAKE UP & PURIF

SERIAL NO. OR PIECE NO.	Weld No.	Film No.	ACC	REJ.	Defect Code	REMARKS
[illegible]		0-1	✓		TI	
		1-2	✓			
		2-3	✓		TI	
		3-4	✓			
		4-5	✓		TI	
		5-6	✓			
		6-0				Film MOTION

Radiographs Compared WITH Original Film To determine Location of Thermal Sleeve, Tack Welds and possible defects. No apparent defects, No movement of Thermal Sleeve Noted by Film Comparison

RADIOGRAPHY REPORT NO. ______
DATE 3-20-
Customer GPU
Address ______
Job Location TMI
Customer's P.O. No. " Job No. ______
Item Description 2" Sch 160 SS
100% Insp. ✓ Spot Insp. ______
Welder Stamp NA

WORK SUMMARY

Amount Item Description
______ Total Hours IN ______ A.M. OUT ______ A.M.@ ______
______ P.M. ______ P.M.@ ______
______ Travel Hours ______ Lunch ______ Standby ______
______ Ft., Plate Weld ______ in. thk. @ ______
______ Ea. Pipe Weld ______ in. dia. @ ______
14 Films, 4½ x 10 Type [illegible] @ ______
______ Films, ______ x ______ Type ______ @ ______
2 Exposures @ ______
______ @ ______
WPS - NA

TECHNIQUE DATA

Inspection Specification MU System
Acceptance Standard ANSI B31.7
RT Procedure No. XR-1-NP ✓
Shooting Sketch (RSSS) ______
Physical Source Size .1" X .1" Effective Focal Spot .14"
SFD 16" Source to Object 15½
Material Thickness .375" Type Material A351/B166
Geometric Unsharpness (U_g) .003"
No. of Film per Cassette 2 Penetrameter 10 Shim 1½
Viewing: Single ✓ Superimposed ______
Pb Screens Front .010" Center — Back .010"
Masking or Blocking Used —
Exposure Time 12 min Dev. Time 5 min
Type Source Ir 192 Curies 111

DEFECT CODE

P – Porosity	SI – Slag Inclusions	TI – Tungsten Inclus
C – Crack	BT – Burn Through	CV – Root Concavity
IF – Incomplete Fusion	DT – Drop Through	CX – Root Convexity
SL – Slag Lines	UC – Undercut	OX – Oxidation

1. Donald Jackson LEVEL III
TECHNICIAN

2. ______ LEVEL ______
TECHNICIAN

3. Donald Jackson LEVEL III
TECHNICIAN/INTERPRETER

MAY 24 1982

Inter-Office Memorandum

GPU Nuclear

Date May 18, 1982

Subject Reinspection/Radiographic Technique of 2½" Sch. 160 Injection Nozzle.

6111-82-2079

To N. C. Kazanas
Director-Quality Assurance

Location TMINS Trailers #256/258

I. General:

This examination was conducted to provide additional information of the area previously reported (re: QC-CL-394) as an intermittent line 1/2" long as shown on film #0-1.

II. Scope:

Endeavor to reproduce the condition exactly as shown on film #0-1, from that position point make one (1) additional exposure on each side of that point. The distance/separation between exposures should be approximately 1/4" using the I.D. surface of the safe end as a reference.

III. Evaluation:

The re-shot representing the orginial 0-1 position was found to be misaligned approximately 1/16 of an inch. The two (2) additional exposures were found to be approximately 5/16" from either side of the 0-1 re-shot position.

As a result, the area of concern has been exposed to six (6) radiographic evaluations, (i.e., two (2) original exposures taken during construction, one (1) taken on 3/6/82 and three (3) re-exposures taken on 5/12/82.)

With exception to the 1-0 film showing the 1/2" long intermittent line the radiographs were found free from any linear indications and the condition reported is considered non-relevent.

J. E. Tietjen
QC Mods/Constr. Inspection Supervisor

JET/ejg

attachment: Radiographic Report, dated 5/12/82/MUV-94

cc: B. E. Ballard, Sr. w/o attach.
C. D. Cowfer w/o attach.
J. J. Colitz w/o attach.
R. F. Fenti w/o attach.
QC file w/attachment
CARIRS w/attachment

NUCLEAR ENERGY SERVICES
SHELTER ROCK ROAD
DANBURY, CONNECTICUT 06810

FIGURE 4

RADIOGRAPHY REPORT

MakeUP & Purifi

SERIAL NO. OR PIECE NO.	Weld No.	Film No.	ACC	REJ.	Defect Code	REMARKS
MdV	94Q	0-1	✓			
		1-0-1	✓			
		0-1-1	✓			

Ref. Document GPU-GC-CL-394
Dated 3-16-82

Radiographs were made for Additional investigation of Possible Linear indication Between Thermal Sleeve and I.D. of Piping.
No Apparent Indications

D Jackson 5-12-82

RADIOGRAPHY REPORT NO. ______
DATE 5-12-82
Customer GPU
Address TMI
Job Location ______
Customer's P.O. No. ______ Job No. ______
Item Description 2½" Sch 160 S.S./Inc.
100% Insp. ______ Spot Insp. ______
Welder Stamp NA

WORK SUMMARY

Amount Item Description
______ Total Hours IN ______ A.M. OUT ______ A.M.@ ______
______ P.M. ______ P.M.@ ______
______ Travel Hours ______ Lunch ______ Standby ______
______ Ft., Plate Weld ______ in. thk. @ ______
______ Ea. Pipe Weld ______ in. dia. @ ______
6 Films, 4½ x 10 Type Kod M @ ______
______ Films, ______ x ______ Type ______ @ ______
3 Exposures @ ______
______ @ ______
WPS NA

TECHNIQUE DATA

Inspection Specification ______
Acceptance Standard ANSI B31.7
RT Procedure No. XR.1. NP
Shooting Sketch (RSSS) ______
Physical Source Size .1"X.1" Effective Focal Spot .14"
SFD 16" Source to Object 15½"
Material Thickness .375" Type Material A351/SB166
Geometric Unsharpness (Ug) .003"
No. of Film per Cassette 2 Penetrameter 10 Shim 1½"
Viewing: Single ✓ Superimposed ✓
Pb Screens Front .010" Center — Back .010"
Masking or Blocking Used —
Exposure Time 30 MIN Dev. Time 5 MIN
Type Source Ir 192 Curies 68

DEFECT CODE

P – Porosity	SI – Slag Inclusions	TI – Tungsten Inclus.
C – Crack	BT – Burn Through	CV – Root Concavity
IF – Incomplete Fusion	DT – Drop Through	CX – Root Convexity
SL – Slag Lines	UC – Undercut	OX – Oxidation

1. Donald Jackson LEVEL III
TECHNICIAN

2. ______ LEVEL ______
TECHNICIAN

3. Donald Jackson LEVEL III
TECHNICIAN/INTERPRETER

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 3A

Inspected Item: Make-up Nozzle Safe End (HPI)

Type of Inspection: U.T.

Inspection and Test Plan: This examination includes the inconel buttering which has been PWHT, the inconel welds on either end of the B-166 safe end, the B-166 safe end and HAZ, and the 304 SS pipe and HAZ.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?		✓
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 4 Minimum required 4.)		✓

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	Yes	No
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132394-00

8. Task #7 Procedure No. mtis-007 c̄ mtis-008 c̄ mtis-014

Reviewer's Signature Rodney T

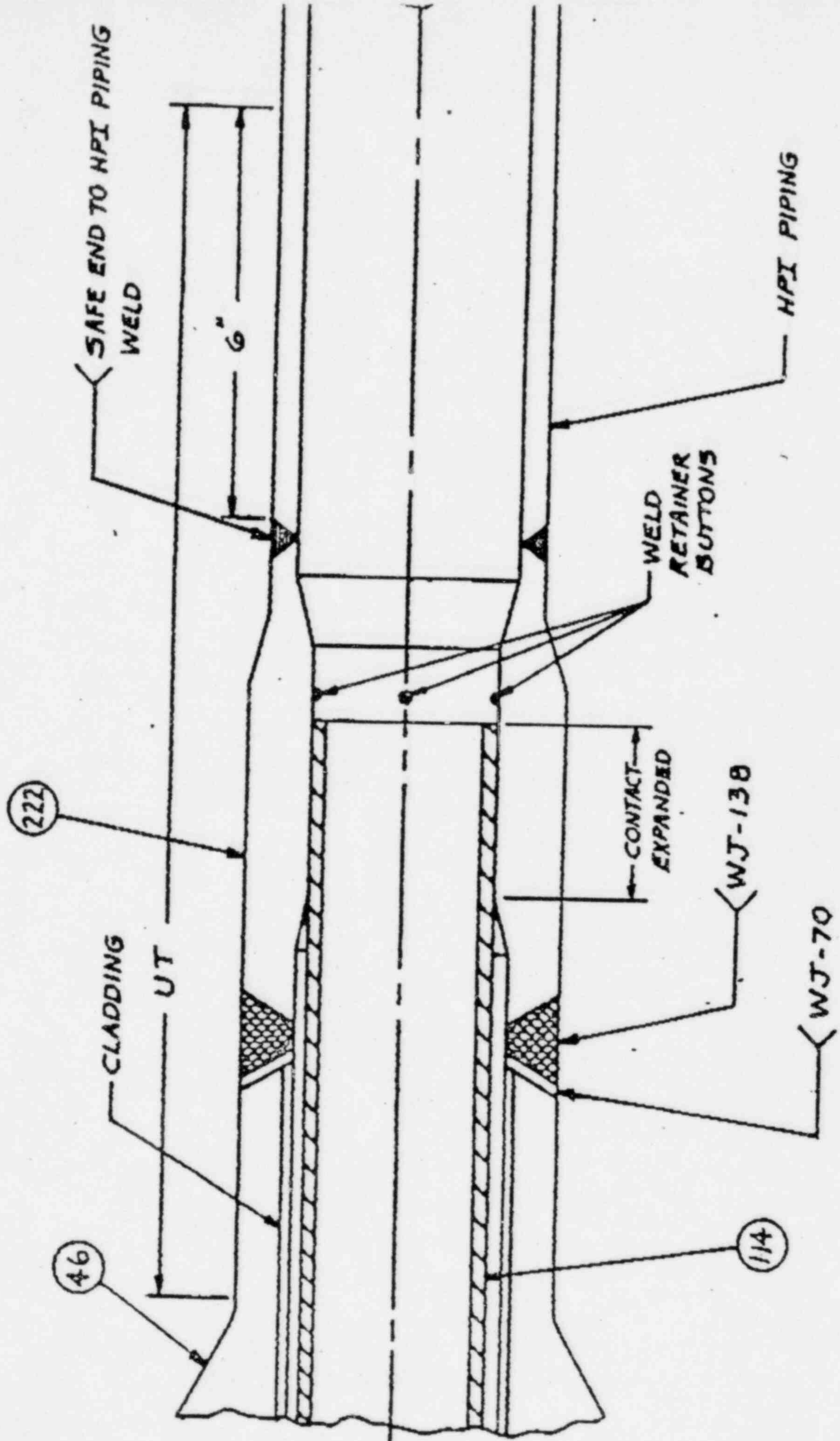
Test Completion Review Sheet Comments Task #7/Test: 3A

Item #1. B&W EIR No. 51-1132394-00 requires an Ultrasonic examination for the entire volume, from 6" outboard of the nozzle safe ends pipe field weld to the tangent point of the transition radius on the nozzle shoulder inboard of the safe end to nozzle shop weld (see Attachment #1). This type of design/configuration is not incorporated at TMI Unit #1 site. TMI Unit #1 has a valve welded directly to the safe end (see Attachment #2)/ U.T. examination was limited to the C/S nozzle, C/S to S/S safe end weld and up to the transition on the safe end. In conjunction with the U.T. exam a liquid penetrant and a visual examination was performed.

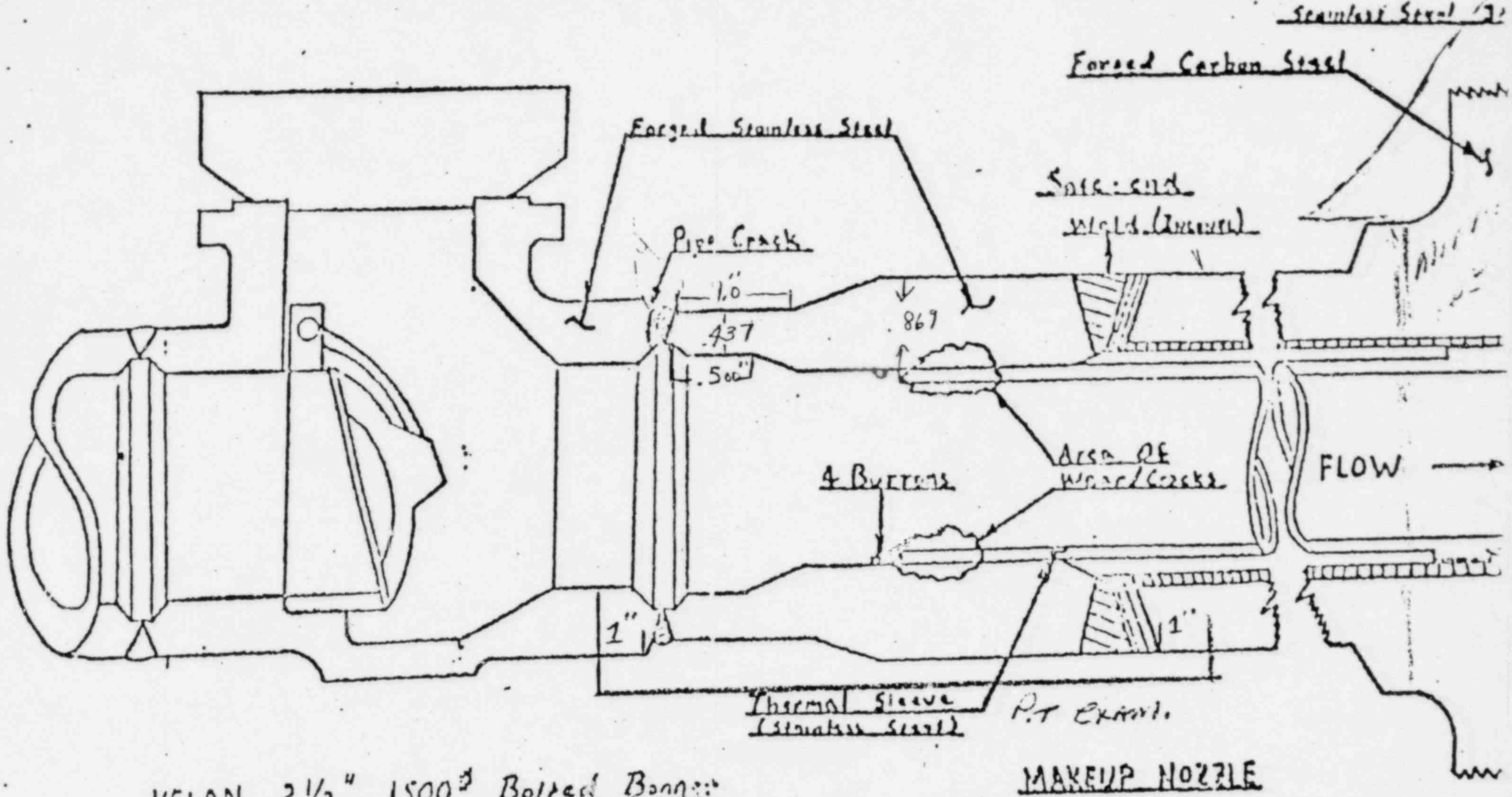
Item #4. Limited accessibility as stated in Item #1 above has affected this item. However, an effort was made to attempt to achieve as much coverage as possible. This typical of all four(4) nozzle safe ends examined.

Rodney Turner

Rodney Turner
NDE Specialist



Attachment #1



VELAN 2 1/2" 1500# Bolted Bonnet
Swing Check, F316 SS
B9-3114B-13MS

Attachment #2

GPU Nuclear
NDE

Ultrasonic Data Sheet

000061

Site: TMI-1
Inspection ID: N/A
Component: SAFE END HPI
Description: SAFE END, SAFE END WELDS TO VALVE & TO NOZZLE
Cal. Block: 033
I.D.: MUV-86A SAFE END
Procedure: MHIS-008
Material: C/S & S/S
Thickness: .865 In.
Test Surface: O.D.
No. Positions: 1
Distance: N/A In.
Drawing: B&W 160493E
Cal. Sheet 000178
Cal. Sheet: 000177
Cal. Sheet: 000176
Beam Direction 1 Long 2 Shear
Limited Exam ☒ No ☒ Yes
Angle: 0°
Angle: 45°
Angle: 45°
Examiner: Rodney Turner Rodney TURNER
ID#: 1863
Level: III
Time Start: 12:14 Hr.
Time Start: 13:24 Hr.
Time Start: 14:58 Hr.
Examiner: N/A
ID#: N/A
Level: N/A
Time Stop: 12:18 Hr.
Time Stop: 13:39 Hr.
Time Stop: 15:13 Hr.
Notes:
Part Temp: 103 0°F
Part Temp: 103 0°F
Part Temp: 103 0°F
Date: MARCH 18, 1982
Date: MARCH 18, 1982
Date: MARCH 18, 1982

0° Information Only
Weld Height Flush Weld Width 1.600"

→

Surface One to Surface Two

BM	Haz	℄ Weld	Haz	BM
.865	.825	.760	.700	.700

Ind. No.	Angle (Deg)	Surface	Beam Direction	LAM		LNGTH	WIDTH			Through Wall Dimension						Remarks
										Minimum			Maximum			
				Max Amp % DAC	Depth	Crystal Distance From				Depth	Position In.		Depth	Position In.		
											1	2		1	2	
						CW	CCW	1	2		CW	CCW		CW	CCW	
200	45	1	2	200	.800				1.450	.862	–	1.250	.887	–	1.600	INTERMITTENT 360°

No Reportable Indications ☐ Reportable Indications ☐ Non Relevant Indications ☑

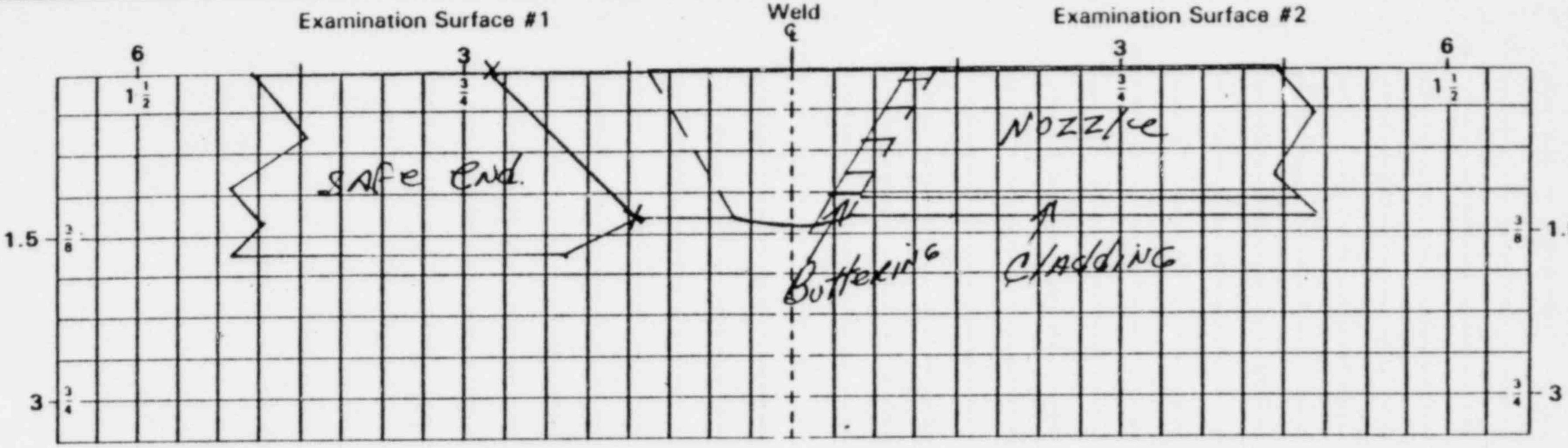
Reviewed by:
Level: III
Date: 4 82
Page 1 of 3
NDE Request No. N/A

GPU Nuclear

NDE

Request for Evaluation/Indication Plot

Request # 1-82-003



1SQ = .200

Examiners Comments INDICATION APPEARS 360° AT different AMPLITUDES, PLOT OUT AS 'C' dimension thickness CHANGE.

Examiner Rodney Tiernan Level III Date 3/18/82

Materials Technology Evaluation and Disposition DATA Sh #00061 Reflector IS Geometric AND NO Disposition IS Required

☑ Geometric ☐ Recordable ☐ Reportable Analyst Rodney Tiernan Title NDE Specialist Date 3/18/82

Site/Inspection I.D. N/A

Component I.D. SAFE END TO NOZZLE C/S TO S/S ON VALVE MU-V-86A

Component/Weld No. N/A

Acceptance Standard IWB 3000 Section XI 1977 Through Summer of 1978 Page 2 of 3

GPU Nuclear

NDE

Date: MARCH 18, 1992

Limited Scan Report

Data Sheet No.: 000061

Component: SAFE END MUV-86A

No ☒ Limited Scan ☐

Surface 1 ☒ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☒

CW ☐ CCW ☐

________ Inches from Reference Point to ________ inches From Reference Point. ________ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☒ 60° ☐ Other ________

Due to: CONFIGURATION of SAFE END (ANGLE) VALVE WELD

Examiner: Rodney [illegible] | I.D. #: 1863 | Level: III | Date: MARCH 18, 1992

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

________ Inches from Reference Point to ________ inches From Reference Point. ________ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ________

Due to: ________

Examiner: | I.D. #: | Level: | Date:

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

________ Degrees, ________ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ________

Due to: ________

Examiner: | I.D. #: | Level: | Date:

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

________ Degrees, ________ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ________

Due to: ________

Examiner: | I.D. #: | Level: | Date:

Reviewed by: | Level: | Date: | Page __ of __

GPU Nuclear
NDE

000060

Ultrasonic Data Sheet

Site: TMI-1
Inspection ID: N/A
Component: Safe end
Description: Safe end, Safe end welds to Valve & to Nozzle
Cal. Block: 033
I.D.: MU-V-86B Safe. end
Procedure: MTS-008
Material: C/S S/S
Thickness: .875 In.
Test Surface: O.D.
No. Positions: 1
Distance: N/A In.
Drawing: B&W 160493E
Beam Direction 1 Long 2 Shear
Limited Exam ☐ No ☑ Yes
Examiner: Rodington ® Turner
ID#: 1863
Level: III
Examiner: N/A
ID#: N/A
Level: N/A
Notes:

Cal. Sheet 000178	Cal. Sheet: 000177	Cal. Sheet: 000176
Angle: 0	Angle: 45°	Angle: 45°
Time Start: 12:05 Hr.	Time Start: 12:37 Hr.	Time Start: 14:17 Hr.
Time Stop: 12:11 Hr.	Time Stop: 13:16 Hr.	Time Stop: 14:53 Hr.
Part Temp: 104 0°F	Part Temp: 104 0°F	Part Temp: 104 0°F
Date: March 18, 1982	Date: March 18, 1982	Date: March 18, 1982

0° Information Only
Weld Height Flush Weld Width 1.500"

→

Surface One to Surface Two

BM	Haz	℄ Weld	Haz	BM
.875	.850	.790	.700	.700

Ind. No.	Angle (Deg)	Surface	Beam Direction	LAM Max Amp % DAC	LAM Depth	Crystal Distance From CW (LNGTH)	Crystal Distance From CCW (WIDTH)	Crystal Distance From 1	Crystal Distance From 2	Through Wall Dimension Minimum Depth	Minimum Position In. 1 CW	Minimum Position In. 2 CCW	Maximum Depth	Maximum Position In. 1 CW	Maximum Position In. 2 CCW	Remarks
200	45	1	2	200	.800				1.450		.780	1.300		.840	1.600	intermittent 360°
200	45	1	2	100	.800	} 360°										
200	45	1	2	100	.800	}										

No Reportable Indications ☐
Reportable Indications ☐
Non Relevant Indications ☑

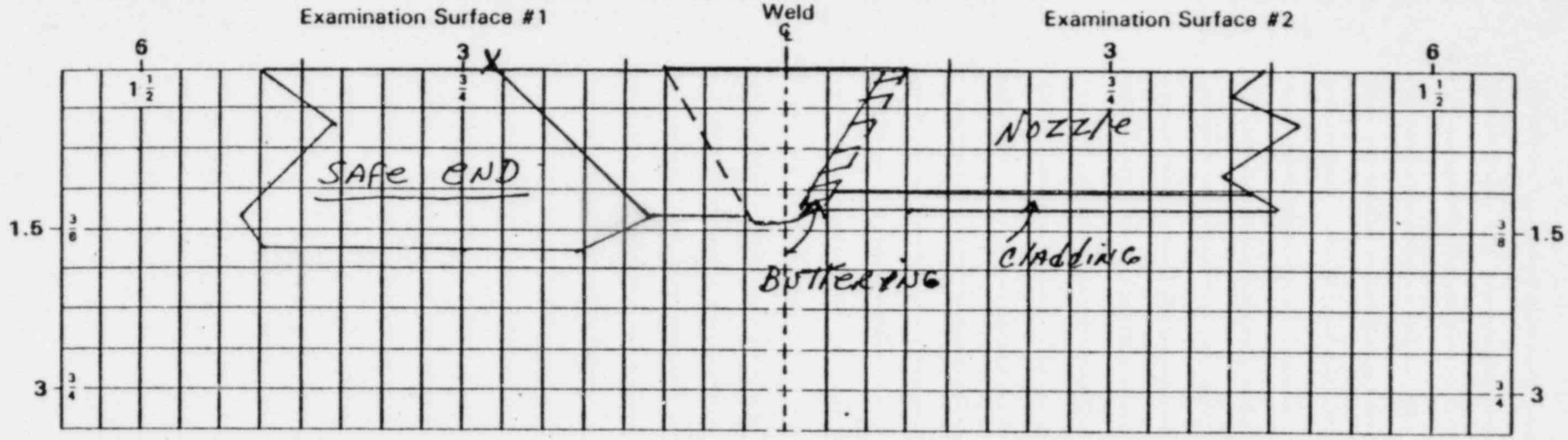
Reviewed by:
Level: III
Date: 4 82
Page 1 of 3
NDE Request No. N/A

GPU Nuclear

NDE

Request for Evaluation/Indication Plot

Request # 1-82-003



1 sq = .200

Examiners Comments INDICATION APPEARS 360° AT DIFFERENT AMPLITUDES, SHOWS ON OTHER SAFE ENDS, PLOT AS GEOMETRIC, CHANGE IN THICKNESS AT 'C' DIMENSION.

Examiner Rodney Turner Level III Date 3/18/82

Materials Technology Evaluation and Disposition DATA SHT 000060 INDICATIONS ARE GEOMETRIC NO DISPOSITION REQUIRED

☑ Geometric ☐ Recordable ☐ Reportable Analyst Rodney Turner Title NDE Specialist Date 3/18/82

Site/Inspection I.D. N/A

Component I.D. SAFE END TO NOZZLE C/S TO S/S ON VALVE MU-V-86B

Component/Weld No. N/A

Acceptance Standard IWB 3000 SECTION XI 1977 EDITION THROUGH SUMMER 1978 Page 2 of 3

GPU Nuclear

NDE

Date: MARCh 18, 1982

Limited Scan Report

Data Sheet No.: 000060

Component: SAfe end MUV86B

No ☑ Surface 1 ☒ Beam Direction 1 ☐ CW ☐
Limited Scan ☐ Surface 2 ☐ Beam Direction 2 ☒ CCW ☐

________ Inches from Reference Point to ________ inches
From Reference Point. ________ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☑ 60° ☐ Other ________

Due to: CONFIGURATION OF SAFe end (ANGle). VAlve weld.

Examiner: Rodney Turner I.D. #: 1863 Level: III Date: march 18, 1982

No ☐ Surface 1 ☐ Beam Direction 1 ☐ CW ☐
Limited Scan ☐ Surface 2 ☐ Beam Direction 2 ☐ CCW ☐

________ Inches from Reference Point to ________ inches
From Reference Point. ________ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ________

Due to: ________

Examiner: I.D. #: Level: Date:

No ☐ Surface 1 ☐ Beam Direction 1 ☐ CW ☐
Limited Scan ☐ Surface 2 ☐ Beam Direction 2 ☐ CCW ☐

________ Degrees, ________ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ________

Due to: ________

Examiner: I.D. #: Level: Date:

No ☐ Surface 1 ☐ Beam Direction 1 ☐ CW ☐
Limited Scan ☐ Surface 2 ☐ Beam Direction 2 ☐ CCW ☐

________ Degrees, ________ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ________

Due to: ________

Examiner: I.D. #: Level: Date:

Reviewed by: Level: Date: Page 3 of 3

GPU Nuclear

NDE

Request for Evaluation/Recordable Indications

Request # 1-82-003

Component Identification SAFe end MUV-86A and MUV 86B Procedure No. MTIS-008 Rev. 4

Data Sheets Attached No. 000059 & 000061

Attached Additional Information: Indication plot forms

Acceptance Standard 1977 edition Section XI through summer 1978 IWB-3000

ISI/NDE Staff Comments:

Originator Rodney Turner Date 3/18/82

☐ Authorized Inspector

☐ Site ISI Coordinator

☐ QA Modifications/Operations Manager

☐ Manager-Plant Engineering

☐

☐

Page 1 of 1

A0000931

GPU Nuclear
NDE

000058

Ultrasonic Data Sheet

Site: TMI-1
Inspection ID: N/A
Component: MU-V94 to Safe end
Description: Safe end, Safe end to Nozzle weld (bm)
Cal. Block: 033
I.D.: Safe-end MU-V-94 to Nozzle
Procedure: NHS-001 Rev 4
Material: ~~SS~~ Inconel
Thickness: .750 In.
Test Surface: O.D.
No. Positions: 1
Distance: N/A In.
Drawing: B&W 160443E
Beam Direction ____ Long ✓ Shear
Limited Exam ☐ No ☑ Yes
Examiner: Rodney Turner TURNER
ID#: 1863
Level: III
Examiner: N/A
ID#: N/A
Level: N/A
Notes:
FCA-*TMI-1-004-Applies

Cal. Sheet 000174	Cal. Sheet: 000173	Cal. Sheet: N/A
Angle: 45°	Angle: 45°	Angle:
Time Start: 14:23 Hr.	Time Start: 14:50 Hr.	Time Start: Hr.
Time Stop: 14:37 Hr.	Time Stop: 15:40 Hr.	Time Stop: Hr.
Part Temp: 94 0 °F	Part Temp: 94 0 °F	Part Temp: 0 °F
Date: march 11, 1982	Date: march 11, 1982	Date:

0° Information Only
Weld Height 0" Weld Width 1.5

Surface One to Surface Two

BM	Haz	℄ Weld	Haz	BM
.725	.725	.755	.900	.900

Ind. No.	Angle (Deg)	Surface	Beam Direction	LAM		LNGTH	WIDTH			Through Wall Dimension						Remarks
						Crystal Distance From				Minimum			Maximum			
				Max Amp % DAC	Depth	CW	CCW	1	2	Depth	Position In. 1 CW	Position In. 2 CCW	Depth	Position In. 1 CW	Position In. 2 CCW	
200	45	2	1	40%	.750	—	.100	1.0"	—	.715	.950	—	.805	1.125	—	
"	45	2	1	30%	.750	—	.300	1.0"	—							
"	45	2	1	20%	.750	—	.050	1.0"	—							
201	45	2	1	80%	.620	—	1.400	.225	—	.550	.125	—	.620	.275	—	
"	45	2	1	40%	.620	—	1.350	.225	—							
"	45	2	1	40%	.620	-	1.650	.225	—							
[illegible]																

No Reportable Indications ☐ Reportable Indications ☐ Non Relevant Indications ☑

Reviewed by:
Level: [illegible]
Date: 7/2/82
Page 1 of 2
NDE Request No. N/A

Angle/Inc 0 Deg/0-199 45 Deg/200-399 60 Deg/400-599 Other [illegible]-799

Nuclear
NDE

Ultrasonic Data Continuation Page

Data Sheet No. 000058

Site: TMI- 1			Date: MARCH 11, 1981	Drawing: B&W AS BUILT 160493E
Examiner: Rodney Turner Ed Turner	ID#: 1863	Level: III	ID: SAFE END MV-J-9594 TO NOZZLE
Examiner: N/A	ID#: N/A	Level: N/A	Component: SAFE END, SAFE-END WELD of NOZZLE

Ind No.	Angle (Deg)	Surface	Beam Direction	LAM Max Amp % DAC	LAM Depth	LNGTH Crystal Distance From CW	WIDTH Crystal Distance From CCW	Crystal Distance From 1	Crystal Distance From 2	Through Wall Dimension Minimum Depth	Minimum Position In. 1 CW	Minimum Position In. 2 CCW	Maximum Depth	Maximum Position In. 1 CW	Maximum Position In. 2 CCW	Remarks
202	45	2	1	45	.750	3.500	—	1.150	—	.730	1.125	—	.865	1.250	—	
"	45	2	1	45	.750	3.100	—	1.150	—							
"	45	2	1	45	.750	3.900	—	1.150	—							

Reviewed by: Level: Mgr MT Date: 7/17/82

Page 2 of 2

A0000929

GPU Nuclear

NDE

Date: March 11, 1982

Limited Scan Report

Data Sheet No.: 0000 58

Component: HPI Safe-end MU-V-94

No ☒ Surface 1 ☒ Beam Direction 1 ☐ CW ☐
Limited Scan ☐ Surface 2 ☐ Beam Direction 2 ☒ CCW ☐

________ Inches from Reference Point to ________ inches
From Reference Point. ________ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☒ 60° ☐ Other ________

Due to: Safe-end taper on weld of safe-end-to valve weld MU-V-94

Examiner: Rodney Tumer | I.D. #: 1813 | Level: III | Date 3-11-82

No ☐ Surface 1 ☐ Beam Direction 1 ☐ CW ☐
Limited Scan ☐ Surface 2 ☐ Beam Direction 2 ☐ CCW ☐

________ Inches from Reference Point to ________ inches
From Reference Point. ________ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ________

Due to: ________

Examiner: | I.D. #: | Level: | Date

No ☐ Surface 1 ☐ Beam Direction 1 ☐ CW ☐
Limited Scan ☐ Surface 2 ☐ Beam Direction 2 ☐ CCW ☐

________ Degrees, ________ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ________

Due to: ________

Examiner: | I.D. #: | Level: | Date:

No ☐ Surface 1 ☐ Beam Direction 1 ☐ CW ☐
Limited Scan ☐ Surface 2 ☐ Beam Direction 2 ☐ CCW ☐

________ Degrees, ________ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ________

Due to: ________

Examiner | ID # | Level | Date

Reviewed by | Level: Mov MT | Date 3/17/82 | Page __ of __

GPU Nuclear

NDE

Request for Evaluation/Recordable Indications

Request # 1-82-002

Component Identification MU-V-94 Safe-end on HPI Nozzle Procedure No. MTS-008 Rev. 4
FCA# TMI-1-004

Data Sheets Attached No. 000058

Attached Additional Information: Indication Plot Form

Acceptance Standard Section XI IWB-3000 1974 Edition through Summer 1975

ISI/NDE Staff Comments:

Originator Rodney Turner Date 3/12/82

☐ Authorized Inspector

☐ Site ISI Coordinator

☐ QA Modifications/Operations Manager

☐ Manager-Plant Engineering

☐ ____________

☐ ____________

Page 1 of 4

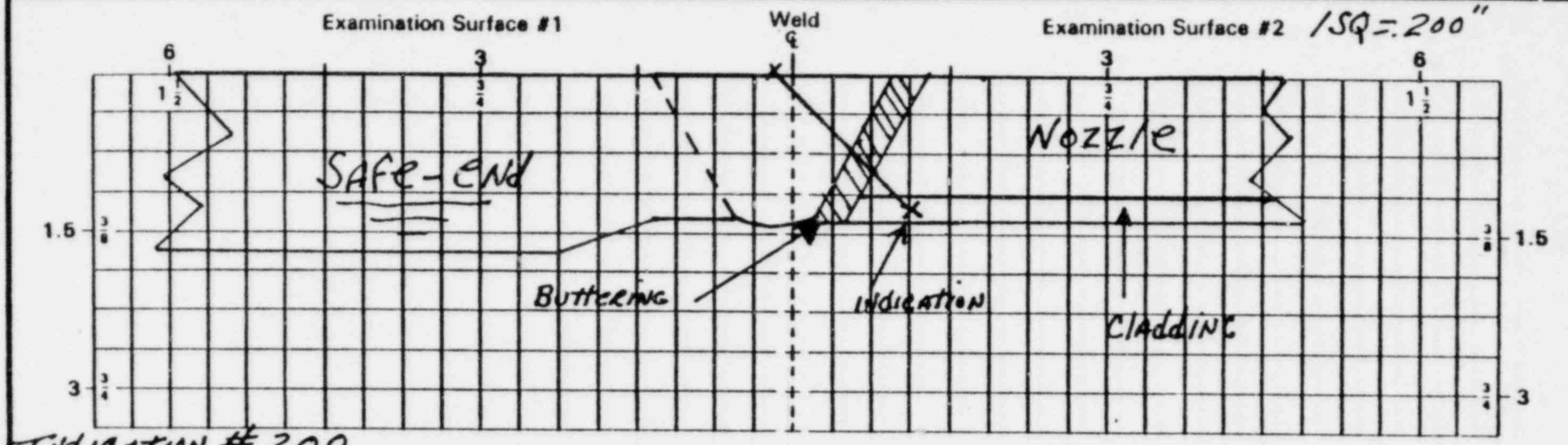
GPU Nuclear

NDE

Request for Evaluation/Indication Plot

Request # 1-82-002

ISQ=.200"



INDICATION # 200

Examiners Comments low level INDICATION NEAR I.D. SURFACE Plot Shows it IN CLADDING, POSSIBLE LACK OF BOND.

LENGTH=.250" THROUGH-WALL= ~~.175~~ .090" Examiner Rodney Teeman Level III Date 3/12/82

Materials Technology Evaluation and Disposition The indication is noted for the record (40% of DAC) not normally recordable, it is contained totally within the clad, it does not penetrate the base material. ASME Code Section XI permits cladding flaws provided they do not penetrate the base material.

Reflectors detected IN baseline EXAMINATION.

☐ Geometric ☐ Recordable ☐ Reportable Analyst Title Mgr [illegible] Date [illegible]

Site/Inspection I.D.

Component I.D.

Component/Weld No.

Acceptance Standard

Page 2 of 4

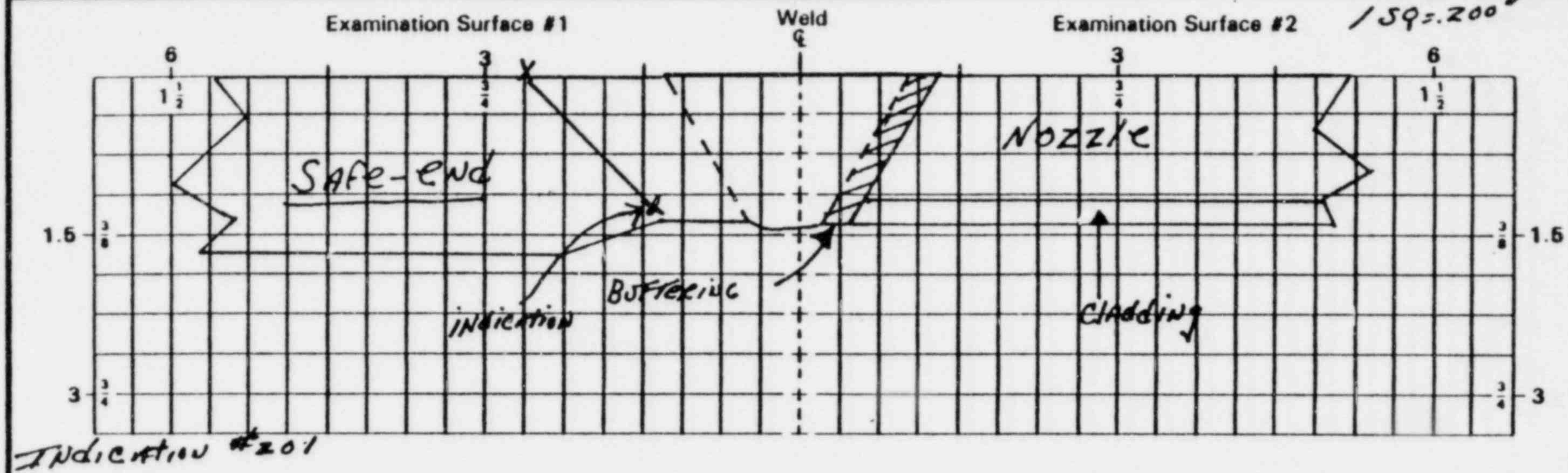
GPU Nuclear

NDE

Request for Evaluation/Indication Plot

Request # 1-82-002

1 SQ = .200"



Indication #201

Examiners Comments INDICATION APPEARS TO BE A SHARP CORNER IN SAFE-END WELD PREP.

LENGTH = .300" THROUGH-WALL .070" Examiner Rodney Turner Level III Date 3/12/82

Materials Technology Evaluation and Disposition Indication is recorded for information, it is considered a geometric ID "C" dimension reflection. (80% DAC)

Reflector detected in base line examination. Rd.

☒ Geometric ☐ Recordable ☐ Reportable Analyst Title Mgr MT Date 3/12/82

Site/Inspection I.D.

Component I.D.

Component/Weld No.

Acceptance Standard

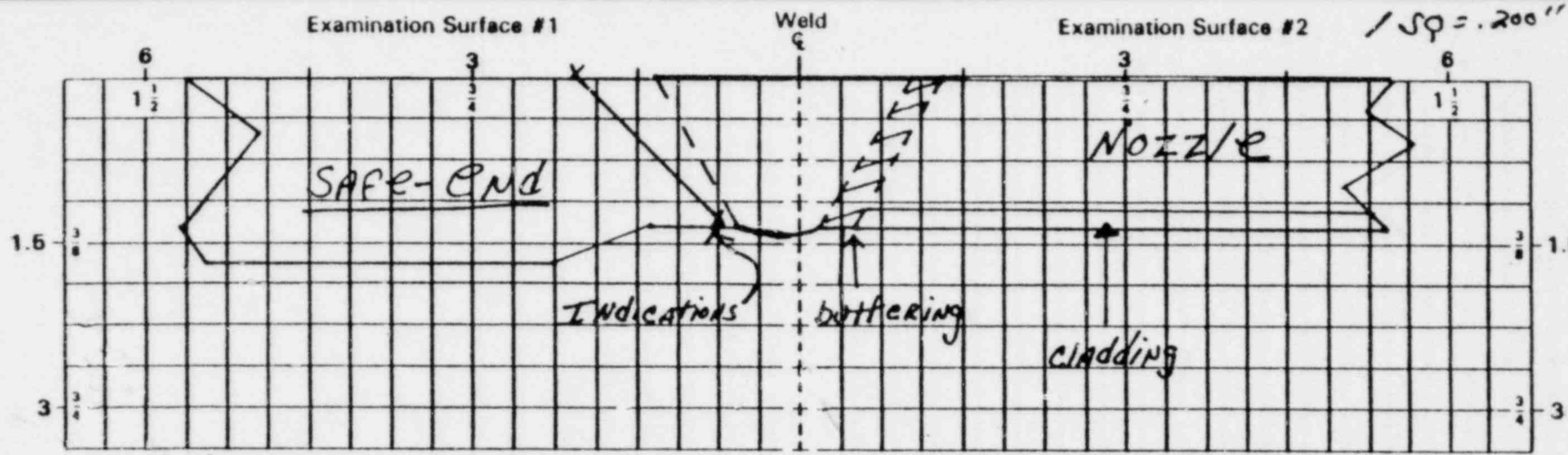
Page 3 of 4

GPU Nuclear

NDE

Request for Evaluation/Indication Plot

Request # 1-82-002



INDICATION #202

Examiners Comments low level indication at weld prep appears as slight under cut at joint

length = .800" Throughwall = ~~.125~~ .075" Examiner Rodney [illegible] Level III Date 3/17/82

Materials Technology Evaluation and Disposition Indication was confirmed at root location (40% DAC), it did not exceed the recording level & recorded for information.

Reflector detected in baseline examination.

☒ Geometric ☐ Recordable ☐ Reportable Analyst Title Mgr MT Date 3/17/82

Site/Inspection I.D.

Component I.D.

Component/Weld No.

Acceptance Standard Page 4 of 4

A0000937

GPU Nuclear
NDE

000173

Calibration Sheet

Site: TMI-1
Inspection ID: N/A
Component: Safe end MJ-1 94
Procedure: MIS-008 Rev. 4

Examiner: Rodney Turner RD TURNER
ID#: 1863
Level: III
Couplant: SONOTRACE 30

Examiner: N/A
ID#: N/A
Level: N/A
Couplant ID#: E 179110

Drawing# B&W AS built 160493E

Date: March, 11 1982 Time: ~~2:10~~ 14:45

Calibration Block
ID# 33
Length 5 in.
OD 4. Dia In.
Thickness .750 In.
Temp 91 °F

Crystal
ID# L 25119
Type S
Freq. 2.25 MHZ
Size 1/4 R In.
Actual 45 °

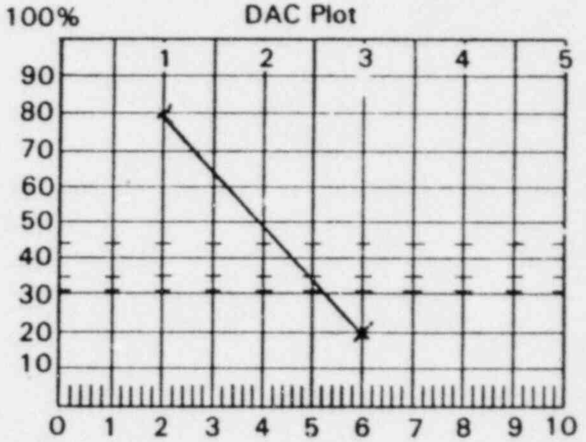
Search Unit Cable 3/11/82
Type MicroDot ID TC-002 Length 6'

Thermometer TMI-012
(Required Summer '73 for Vessels
Required Winter '75 for piping)

Instrument
ID#: 01542 E
Linearity Check ☐ Yes ☑ No
Reject: off
Mat'l. Cal.: 2.70
Delay: 0.44
Pulse Energy: N/A
Coarse Gain in DB: 50
Fine Gain in DB: 1/2
Fine Gain: 7
Screen Range: 5"
Screen Depth: 1.875" in.
☐ T&R
☑ Normal
Operation
Frequency: 2.0 MHZ
Pulse Rep. Rate 3K
Damping MIN
Filter off

System Calibration
Angle 43 °
Cal. Dir.
Axial ☑ Circ. ☐

Reflector	Amplitude % of Full Screen	Screen Reading In Inches
2/8 Node	80 %	.375 In.
6/8 Node	20 %	1.025 In.
/8 Node	N/A %	N/A In.
/8 Node	%	In.
/8 Node	%	In.
Top Notch	%	In.
Opposite Notch	%	In.
Notch	%	In.
Bkr CB	%	In.
Bkr P	%	In.



Calibration Confirmation

Time	15:45 Hrs			Hrs		Hrs		Hrs		Hrs
Back Refl.	N/A %	N/A In.	%	In.	%	In.	%	In.	%	In.
2/8 Node	80 %	.375 In.	%	In.	%	In.	%	In.	%	In.
6/8 Node	20 %	1.025 In.	%	In.	%	In.	%	In.	%	In.
/8 Node	N/A %	N/A In.	%	In.	%	In.	%	In.	%	In.
Top Notch	%	In.	%	In.	%	In.	%	In.	%	In.
Opposite Notch	%	In.	%	In.	%	In.	%	In.	%	In.
Notch	%	In.	%	In.	%	In.	%	In.	%	In.
Initials	RL									

Remarks

FBA # TMI-1-004 Applies

Reviewed By:
Level Mgr MI
Date 3/17/82

Bkr CB (Back Reflection From Cal. Block) Bkr P (Back Reflection from Part)

40000927

GPU Nuclear

NDE

000174

Calibration Sheet

Site: TMI-1	Inspection ID: N/A	Component Safe-end MU-V-94	Procedure mts-008 Rev. 4
Examiner: Rodney Turnne Re Torrce	ID#: 1863	Level: III	Couplant: SONOTRACE 30
Examiner: N/A	ID#: N/A	Level: N/A	Couplant ID#: E 179 110

Drawing# B&W AS built 160493E

Instrument

ID#: 015725

Linearity Check ☐ Yes ☒ No

Reject: off

Mat'l. Cal.: 1.79

Delay: 1.34

Pulse Energy: N/A

Coarse Gain in DB: 50

Fine Gain in DB: ½

Fine Gain: 6

Screen Range: 5

Screen Depth: 1.375 In.

Operation

☐ T&R

☑ Normal

Frequency: 2.0 MHZ

Pulse Rep. Rate 3K

Damping MiN

Filter off

Calibration Block

ID# 33

Length 5 In.

OD 4 DIA In.

Thickness .750 In.

Temp 91 °F

Crystal

ID# L 23119

Type S

Freq. 2.25 MHZ

Size ¼R In.

Actual 45 °

Date: MARch 11, 1982 Time: 14:20

Search Unit Cable

Type Micro Dot ID TC-002 Length 6'

Thermometer TMI-012

(Required Summer '73 for Vessels

Required Winter '75 for piping)

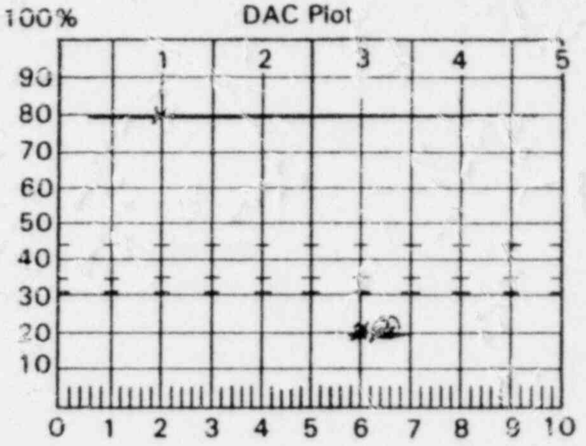
System Calibration

Angle 43 °

Cal. Dir.

Axial ☐ Circ. ☒

Reflector	Amplitude % of Full Screen	Screen Reading In Inches
2/8 Node	80 %	.375 In.
/8 Node	N/A %	N/A In.
/8 Node	%	In.
/8 Node	%	In.
/8 Node	%	In.
Top Notch	%	In.
Opposite Notch	%	In.
Notch	%	In.
Bkr CB	— %	.750 In.
Bkr P	N/A %	N/A In.



Calibration Confirmation

Time	14:40 Hrs		Hrs		Hrs		Hrs		Hrs	
Back Refl.	N/A%	N/A In.	%	In.	%	In.	%	In.	%	In.
2/8 Node	80%	.375 In.	%	In.	%	In.	%	In.	%	In.
/8 Node	N/A%	N/A In.	%	In.	%	In.	%	In.	%	In.
/8 Node	%	In.	%	In.	%	In.	%	In.	%	In.
Top Notch	%	In.	%	In.	%	In.	%	In.	%	In.
Opposite Notch	%	In.	%	In.	%	In.	%	In.	%	In.
BkrCB ~~Notch~~	— %	.750 In.	%	In.	%	In.	%	In.	%	In.
Initials	RL									

Remarks

Atten: Add 2 db to Primary Refer level

SCAN db = 62db.

FCA # TMI-1-004 Applies

Reviewed By:

Level III Date 3-7-82

Bkr CB (Back Reflection From Cal. Block) Bkr P (Back Reflection from Part)

A0000927

GPU Nuclear
NDE

000175

Calibration Sheet

Site: TMI-1 | Inspection ID: N/A | Component: Safe-end # MU-V 94 | Procedure: NDE-008 Rev. 4

Examiner: Rodney Turner Rod TURNER | ID#: 1863 | Level: III | Couplant: SONOTRACE 30

Examiner: N/A | ID#: N/A | Level: N/A | Couplant ID#: E179110

Drawing# B&W As built 160493E

Calibration Block
ID# 33
Length 5 In.
OD 4 Dia In.
Thickness .750 In.
Temp 91 °F

Crystal
ID# L12110
Type L
Freq. 5.0 MHZ
Size 1/4R In.
Actual 0 °

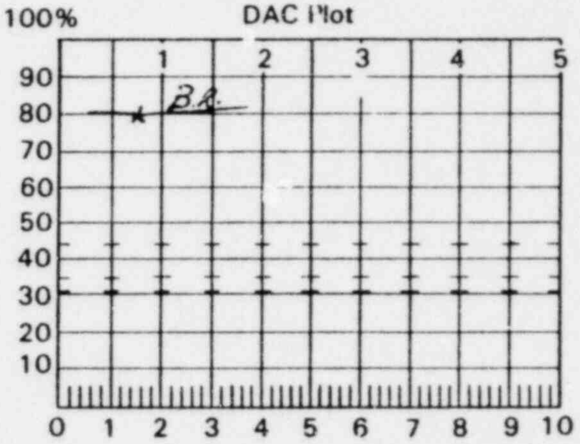
Date: March 11, 1982 Time: 14:00

Search Unit Cable
Type Microdot ID TC-002 Length 6'
Thermometer TMI-012
(Required Summer '73 for Vessels
Required Winter '75 for piping)

Instrument
ID#: C1542E
Linearity Check ☐ Yes ☒ No
Reject: off
Mat'l. Cal.: 10.0
Delay: 0.92
Pulse Energy: N/A
Coarse Gain in DB: 30
Fine Gain in DB: 1/2
Fine Gain: 6
Screen Range: 1"
Screen Depth: 5 In.
☐ T&R
☒ Normal
Operation
Frequency: 5.0 MHZ
Pulse Rep. Rate 3K
Damping min
Filter off

System Calibration
Angle 0 °
Cal. Dir.
Axial N/A Circ. N/A

Reflector	Amplitude % of Full Screen	Screen Reading In Inches
/8 Node	N/A %	N/A In.
/8 Node	%	In.
/8 Node	%	In.
/8 Node	%	In.
/8 Node	%	In.
Top Notch	%	In.
Opposite Notch	%	In.
Notch	%	In.
Bkr CB	80 %	.750" In.
Bkr P	80 %	.900" In.



Calibration Confirmation

Time	14:15 Hrs		Hrs		Hrs		Hrs		Hrs	
Back Refl. P	80 %	.900 In.	%	In.	%	In.	%	In.	%	In.
/8 Node	N/A %	N/A In.	%	In.	%	In.	%	In.	%	In.
/8 Node	%	In.	%	In.	%	In.	%	In.	%	In.
/8 Node	%	In.	%	In.	%	In.	%	In.	%	In.
Top Notch	%	In.	%	In.	%	In.	%	In.	%	In.
Opposite Notch	%	In.	%	In.	%	In.	%	In.	%	In.
Notch	%	In.	%	In.	%	In.	%	In.	%	In.
Initials	RT									

Remarks
Attenuation check
Cal block = 34 db to 80%
Part = 36 db to 80%
Also increase in thickness on part.

Reviewed By:
Level N/A NA Date 5/7/82

Bkr CB (Back Reflection From Cal. Block) Bkr P (Back Reflection from Part)

A0000927

GPU Nuclear

NDE

Thickness Data Sheet

Site: TMI-1

Inspection I.D. N/A

Component: MU-V-94 - Safe end

Description: Safe end, Safe end Weld to Nozzle (BM).

Cal. Block: Met-ed-033

I.D.: MU-V-94 safe end

Drawing: BW 1604935

Procedure: NDTS-008 Rev. 4

Material: Inconel

Thickness: .750

Examiner: Rodney Turner Rd TURNER

ID # 1863

Level: III

Examiner: N/A

ID # N/A

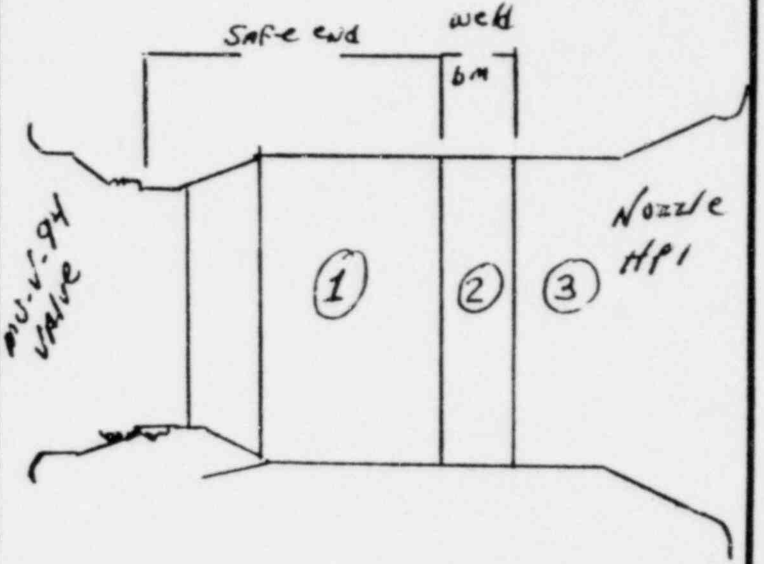
Level: N/A

Position #

Reading in Inches

1	.900	21		41		61		81		101		121		141	
2	.725	22		42		62		82		102		122		142	
3	.725	23		43		63		83		103		123		143	
4	N/A	24		44		64		84		104		124		144	
5		25		45		65		85		105		125		145	
6		26		46		66		86		106		126		146	
7		27		47		67		87		107		127		147	
8		28		48		68		88		108		128		148	
9		29		49		69		89		109		129		149	
10		30		50		70		90		110		130		150	
11		31		51		71		91		111		131		151	
12		32		52		72		92		112		132		152	
13		33		53		73		93		113		133		153	
14		34		54		74		94		114		134		154	
15		35		55		75		95		115		135		155	
16		36		56		76		96		116		136		156	
17		37		57		77		97		117		137		157	
18		38		58		78		98		118		138		158	
19		39		59		79		99		119		139		159	
20		40		60		80		100		120		140		160	

Drawing



Reviewed By:

Date: 3/17/82

Page 1 of 1

GPU Nuclear
NDE

000059

Ultrasonic Data Sheet

Site: TMI-1
Inspection ID: N/A
Component: SAFE END
Description: SAFE end, SAFE end welds to valve & to Nozzle
Cal. Block: 033
I.D.: MU-V-95 & SAFE end
Procedure: MHS-008
Material: C/S & S/S
Thickness: .875 In.
Test Surface: O.D.
No. Positions: 1
Distance: N/A In.
Drawing: B&W 160493E
Beam Direction 1 Long 2 Shear
Limited Exam ☐ No ☑ Yes
Examiner: Rodney Turner R-Turner
ID#: 1863
Level: III
Examiner: N/A
ID#: N/A
Level: N/A
Notes:

Cal. Sheet 000178	Cal. Sheet: 000177	Cal. Sheet: 000176
Angle: 0°	Angle: 45°	Angle: 45°
Time Start: 11:45 Hr.	Time Start: 12:39 Hr.	Time Start: 13:59 Hr.
Time Stop: 11:58 Hr.	Time Stop: 12:53 Hr.	Time Stop: 14:12 Hr.
Part Temp: 102 0 °F	Part Temp: 102 0 °F	Part Temp: 102 0 °F
Date: march 18, 1982	Date: march 18, 1982	Date: march 18, 1982

0° Information Only
Weld Height Flush Weld Width 1.500"

Surface One to Surface Two

BM	Haz	℄ Weld	Haz	BM
.875	.860	.750	.700	.700

Ind. No.	Angle (Deg)	Surface	Beam Direction	LAM		LNGTH		WIDTH		Through Wall Dimension						Remarks
				Max Amp % DAC	Depth	Crystal Distance From				Minimum			Maximum			
						CW	CCW	1	2	Depth	Position In. 1	Position In. 2	Depth	Position In. 1	Position In. 2	
											CW	CCW		CW	CCW	

No Reportable Indications ☑ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by:
Level: MP
Date: 4/13/82
Page of
NDE Request No. N/A

GPU Nuclear

NDE

Date: MARCH 18, 1982

Limited Scan Report

Data Sheet No.: 000059

Component: SAFE END MUV-95

No ☒ Limited Scan ☐

Surface 1 ☒ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☒

CW ☐ CCW ☐

______ Inches from Reference Point to ______ inches From Reference Point. ______ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☒ 60° ☐ Other ______

Due to: CONFIGURATION OF SAFE END (ANGLE) VALVE WELD

Examiner: Rodney Turner	I.D. #: 1863	Level: III	Date: MARCH 18, 1982

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

______ Inches from Reference Point to ______ inches From Reference Point. ______ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ______

Due to: ______

Examiner:	I.D. #:	Level:	Date:

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

______ Degrees, ______ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ______

Due to: ______

Examiner:	I.D. #:	Level:	Date:

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

______ Degrees, ______ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ______

Due to: ______

Examiner:	I.D. #:	Level:	Date:
Reviewed by:	Level:	Date:	Page __ of __

8-81 A0000930

SUPPLEMENTAL EXAMINATIONS

GPU Nuclear
NDE

000162

Visual/Surface Data Sheet

Site: TMI-1
Inspection ID: N/A
Component: MUV-95 & SAFe-end
Description: SAFe end, SAFe end welds to Valve And Nozzle
I.D.: MUV-95 SAFe end
Procedure: MTIS-007
Material: C/S & S/S
Thickness: .750"
Test Surface: O.D.
Test Method: P.T.
No. Positions: 1
Distance: N/A In.
Drawing: B&W 160430
Date: MARCH 17, 1982
Examiner: Rodney Turner RD Turner
I.D.: 1863
Level: III
Examiner: N/A
I.D.: N/A
Level: N/A
Notes:

Magnetic Particle (Only) N/A

Particle:
Wet ☐ Dry ☐ Color
Visible ☐ Fluorescent ☐ Batch
Instrument:
Method Current
Machine Amperes

Dye Penetrant (Only)

Cleaner Batch# 81C114
Penetrant Batch# 6A035
Developer Batch# 81C082
Method:
Visible ☑ Thermometer TMI-012
Fluorescent ☐ Temp 101°

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
								NON Relevant indications on Steel of
								Nozzle from SCAle.

No Reportable Indications ☐ Reportable Indications ☐ Non Relevant Indications ☑

Reviewed by:
Level: Mgmt
Date: 3/18/82
Page 1 of 1
NDE Request No. N/A

Method Ind. No. [illegible]al 0-199 P.T./200-399 M.T./400-599 Other/600-799

A[illegible]0925

GPU Nuclear
NDE

000164

Visual/Surface Data Sheet

Site: TMI-1
Inspection ID: N/A
Component: MU-V-86-A & Safe end
Description: Safe end, safe end welds of Valve and to Nozzle
I.D.: MUV-86A Safe end
Procedure: NTIS-007
Material: C/S & S/S
Thickness: .750"
Test Surface: O.D.
Test Method: P.T.
No. Positions: 1
Distance: N/A In.
Drawing: B&W 160400
Date: March 17, 1982
Examiner: Rodney Turner RD Turner
I.D.: 1863
Level: III
Examiner: N/A
I.D.: N/A
Level: N/A
Notes:

Magnetic Particle (Only) N/A

Particle:
Wet ☐ Dry ☐ Color
Visible ☐ Fluorescent ☐ Batch
Instrument:
Method
Current
Machine
Amperes

Dye Penetrant (Only)

Cleaner Batch# 81C 114
Penetrant Batch# 6A 035
Developer Batch# 81C 082
Method:
Visible ☑ Thermometer TMI-012
Fluorescent ☐ Temp 104°

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		

No Reportable Indications ☑ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by: C Skarf
Level: NA MT
Date: 3/18/82
Page 1 of 1
NDE Request No. N/A

Method Ind No ial 0-199 P.T./200-399 M.T./400-599 Other/600-799

GPU Nuclear
NDE

000165

Visual/Surface Data Sheet

Site: TMI-1 | Inspection ID: N/A | Component: MU-V-86-B & Safe-end

Description: Safe-end, Safe-end welds to Valve and Nozzle

I.D.: MU-V-86-B Safeend | Procedure: MTS-007 | Material: C/S & S/S | Thickness: .750" | Test Surface: O.D.

Test Method: P.T. | No. Positions: 1 | Distance: N/A In. | Drawing: B&W 160493E | Date: March 17, 1982

Examiner: Rodney Turner RC Turner | I.D.: 1863 | Level: III

Examiner: N/A | I.D.: N/A | Level: N/A

Notes:

Magnetic Particle (Only) N/A

Particle:
Wet ☐ Dry ☐ Color
Visible ☐ Fluorescent ☐ Batch
Instrument:
Method
Machine
Current
Amperes

Dye Penetrant (Only)

Cleaner Batch# 81C 114
Penetrant Batch# 6A 035
Developer Batch# 81C 082
Method:
Visible ☑ Thermometer TMI-012
Fluorescent ☐ Temp 105°

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		

No Reportable Indications ☑ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by: | Level: [illegible] | Date: 3/18/82 | Page 1 of 1 | NDE Request No. N/A

Method Ind. No. ual 0-199 P.T./200-399 M.T./400-599 Other/600-799

GPU Nuclear
NDE

000161

Visual/Surface Data Sheet

Site: TMI-1
Inspection ID: N/A
Component: MUV-86-A & Safe end
Description: Safe end, Safe end welds to Valve and Nozzle
I.D.: MU-V-86-B Safe end
Procedure: ntiso-014
Material: C/S & S/S
Thickness: .750
Test Surface: O. D.
Test Method: Visual
No. Positions: 1
Distance: N/A In.
Drawing: B&W 160480
Date: March 17, 1982
Examiner: Rodney Turner RD TURNER
I.D.: 1863
Level: II
Examiner: N/A
I.D.: N/A
Level: N/A
Notes:

Magnetic Particle (Only) N/A

Particle:
Wet ☐ Dry ☐ Color
Visible ☐ Fluorescent ☐ Batch
Instrument:
Method
Current
Machine
Amperes

Dye Penetrant (Only) N/A

Cleaner Batch#
Penetrant Batch#
Developer Batch#
Method:
Visible ☐ Thermometer
Fluorescent ☐ Temp

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
								Identification on Safe end
								620-0005-04
								S/N 222-205-50-2
								Ht NX-3483
								MU-V-86-A-Q 6-7-73 5K

No Reportable Indications ☑ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by:
Level: [illegible]
Date: 3/18/82
Page 1 of 1
NDE Request No.

Method Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925

GPU Nuclear
NDE

Visual/Surface Data Sheet

000160

Site: TMI-1
Inspection ID: N/A
Component: MUV-86-B & SAFE-END
Description: SAFE END, SAFE END WELDS TO VALVE AND TO NOZZLE
I.D.: MU-V86B SAFE END
Procedure: MTS-014
Material: C/S & S/S
Thickness: .750
Test Surface: O.D.
Test Method: VISUAL
No. Positions: 1
Distance: N/A In.
Drawing: B&W 1604BE
Date: MARCH 17, 1982
Examiner: Rodney Turner R TURNER
I.D.: 1863
Level: II
Examiner: N/A
I.D.: N/A
Level: N/A
Notes:

Magnetic Particle (Only) N/A

Particle:
Wet ☐ Dry ☐ Color
Visible ☐ Fluorescent ☐ Batch
Instrument:
Method
Current
Machine
Amperes

Dye Penetrant (Only) N/A

Cleaner Batch#
Penetrant Batch#
Developer Batch#
Method:
Visible ☐ Thermometer
Fluorescent ☐ Temp

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
								IDENTIFICATION ON SAFE-END
								620-0005-04
								S/N 222-205-50-1
								HT NX-3483
								B-166 ×
								MUV-86-B Q 6-7-73 SR

No Reportable Indications ☑ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by:
Level:
Date: 3/18/82
Page 1 of 1
NDE Request No. N/A

Method ind No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

00925

GPU Nuclear
NDE

000159

Visual/Surface Data Sheet

Site: TMI-1
Inspection ID: N/A
Component: Safe end & MUV-95
Description: safe-end, weld of safe-end to valve & safe end to Nozzle
I.D.: MU-V 95
Procedure: MTIS-014
Material: S/S & C/S
Thickness: .750
Test Surface: O.D.
Test Method: Visual
No. Positions: 1
Distance: N/A In.
Drawing: B&W 1604936
Date: MARCH 18, 1982
Examiner: Rodney Turner RD TURNER
I.D.: 1863
Level: II
Examiner: N/A
I.D.: N/A
Level: N/A
Notes:

Magnetic Particle (Only) N/A
Particle:
Wet ☐ Dry ☐ Color
Visible ☐ Fluorescent ☐ Batch
Instrument:
Method
Current
Machine
Amperes

Dye Penetrant (Only) N/A
Cleaner Batch #
Penetrant Batch #
Developer Batch #
Method:
Visible ☐ Thermometer
Fluorescent ☐ Temp

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
								Identification on safe-end
								620-0006-50
								S/N 222-205-50-4
								Ht NX 3483
								B-166 x
								Identification MUV-95 Q 6-12-73 SR
								Nozzle I.d.
								620-0005-50
								S/N 46-205-50-1
								Ht A172 VW

No Reportable Indications ☑ Reportable Indications ☐ Non Relevant Indications ☑ RD

Reviewed by: Level: Date: 7/18/82 Page 1 of 1 NDE Request No. N/A

Method Ind. No. Visual 0-199 P.T./200-399 M.T./400-599 Other/600-799

A000925

GPU Nuclear
NDE

000154

Visual/Surface Data Sheet

Site: TMI-1
Inspection ID: N/A
Component: MUV-94 & SAfe end
Description: SAfe end weld (BM) to Nozzle, SAfe And safe end to Valve
I.D.: MUV-94 & SAfe end
Procedure: NDIS-007 Rev 3
Material: C/S to S/S
Thickness: N/A
Test Surface: O D
Test Method: Dye Penet
No. Positions: 1
Distance: N/A In.
Drawing: 160493
Date: 3/5/82
Examiner: Rodney Turner RD Turner
I.D.: 1863
Level: III
Examiner: Mark Torborg MTT Torborg
I.D.: 2000
Level: II

Notes:
O Located on surface
1 4.5" from ℄ of weld

Magnetic Particle (Only) N/A
Particle:
Wet ☒ Dry ☐ Color ______
Visible ☐ Fluorescent ☐ Batch ______
Instrument:
Method ______ Current ______
Machine ______ Amperes ______

Dye Penetrant (Only)
Cleaner Batch# 81C114
Penetrant Batch# 5K018
Developer Batch# 81C082
Method:
Visible ☒ Thermometer S/N 9
Fluorescent ☐ Temp 72°F

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
1	Round	.020"	2.43"	~~.32~~	.325"		2	Paint on safe end near nozzle.
2	Round	.020"	2.46"		.325"		2	
3	Round	.020"	2.82"		.325"		2	
								# Ind No's 1, 2 & 3 Are NonRecordable, Recorded for info only.
								FCA # TMI-1-003

No Reportable Indications ☑ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by: Level: Date: Page of NDE Request No.

Method/Ir . Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925

GPU Nuclear
NDE

000155

Visual/Surface Data Sheet

Site: TMI-1
Inspection ID: N/A
Component: SAfe end & MUV-94 Valve
Description: SAfe end to Nozzle (BM) weld - SAfe end and Valve to SAfe end weld
I.D.: MUV-94 & SAfe end
Procedure: MTIS-014
Material: C/S & S/S
Thickness: N/A
Test Surface: O.D.
Test Method: Visual-VT-1
No. Positions: 1
Distance: N/A In.
Drawing: 160493
Date: 3/5/82
Examiner: Rodney Turner R. TURNER
I.D.: 1863
Level: II
Examiner: Mark Embrey Mark Torborg
I.D.: 2000
Level: II
Notes:

Magnetic Particle (Only) N/A
Particle:
Wet ☐ Dry ☐ Color
Visible ☐ Fluorescent ☐ Batch
Instrument:
Method
Machine
Current
Amperes

Dye Penetrant (Only) N/A
Cleaner Batch#
Penetrant Batch#
Developer Batch#
Method:
Visible ☐ Thermometer
Fluorescent ☐ Temp

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		

No Reportable Indications ☑
Reportable Indications ☐
Non Relevant Indications ☐

Reviewed by:
Level:
Date:
Page of
NDE Request No.

Method Ind. No. Visual 0-199 P.T./200-399 M.T. 400-599 Other/600-799

A0000925

TEST

3B

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 3B

Inspected Item: Spray Line Nozzle Safe End

Type of Inspection: U.T.

Inspection and Test Plan: This area includes Inconel 600 weld buttering, B-166 safe end forging and A 376 TP 316 piping. Two circumferential welds are included in the inspection which will involve HAZ of the two different base metals.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?		✓
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 1 Minimum required 1.)		✓
NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.		
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓
NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.		

7. B&W EIR No. 51-1132391-00

8. Task #7 Procedure No. mts-008

Reviewer's Signature Rodney [illegible]

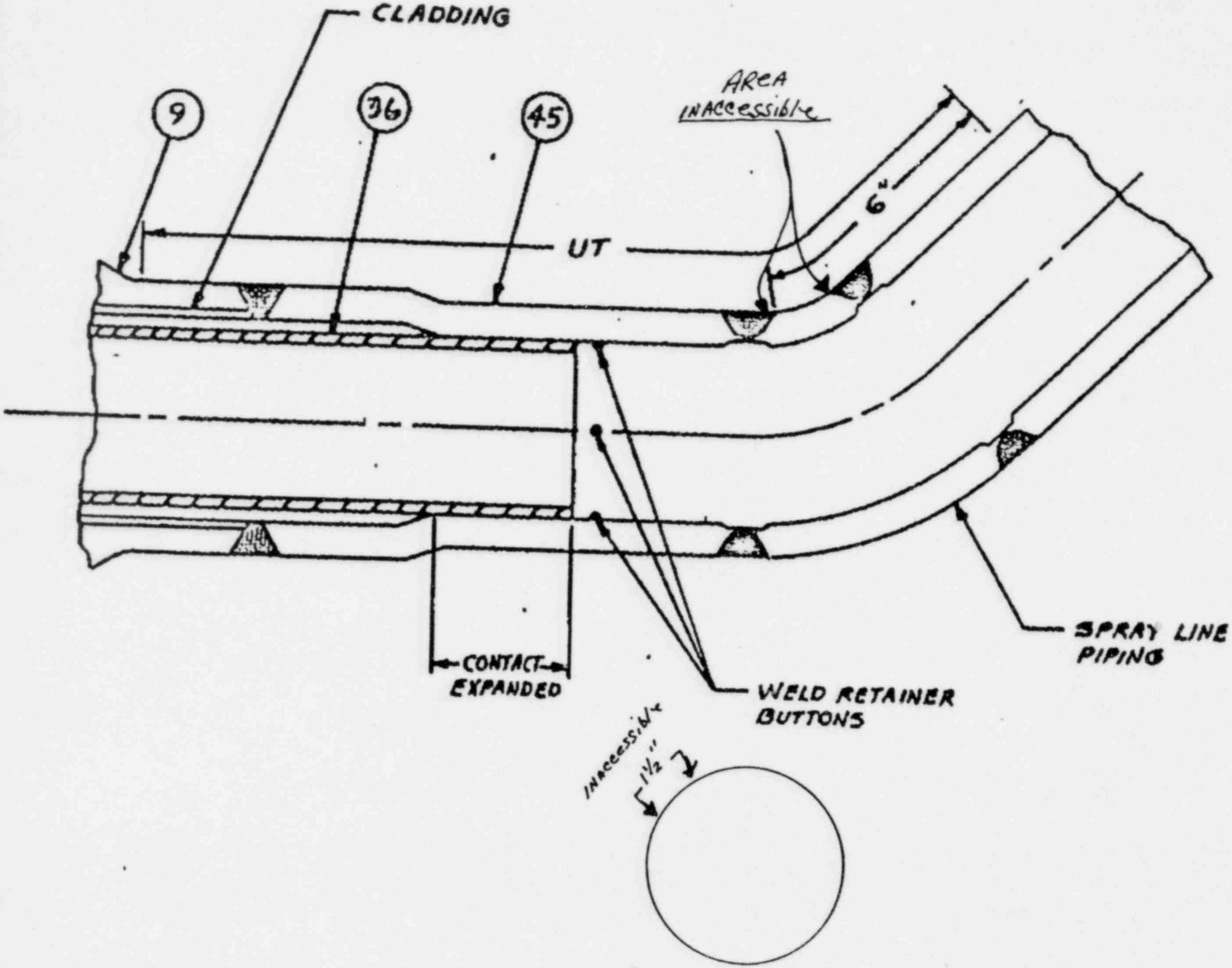
Test Completion Review Sheet Comments, Task #7/Test:3B, Spray Line Nozzle Safe

Item #1 The volume of the work scope required on B&W EIR No. 51-1132391-00 was not capable of entirely being ultrasonically inspected. The inside radius between the safe end to elbow weld and first elbow to pipe weld after the safe end for a radial distance of 1 1/2" was encapable of being U.T. examined, due to the curvature of the elbow. A limited scan report was issued.

Item #4 The quantity of this Item was limited as reflected above. A best effort was attempted to achieve as much of the required coverage as possible.

Rodney Turner

Rodney Turner
NDE Specialist



Attachment #1

GPU Nuclear
NDE

Ultrasonic Data Sheet

000067

Site: TMI-1
Inspection ID: N/A
Component: SPRAY line

Description: SPRAY Nozzle to SAfe end
Cal. Block: met-ed 022A
met-ed 032

I.D.: C/S Nozzle to Inconel safe-end
Procedure: ntis-008 Rev 4
No. Positions: 1
Distance: N/A In.
Drawing: 129286E Rev 5
Beam Direction ✓ Long ✓ Shear
Limited Exam ☒ ~~No~~ ☐ Yes
Examiner: Rodney Turner RD Turner ID#: 1863 Level: III
Examiner: Michael Zeise MAZ Zeise ID#: A374 Level: II

Material: C/S - S/S	Thickness: .514 In.	Test Surface: o.d.
Cal. Sheet 000182	Cal. Sheet: 000183	Cal. Sheet: 000184
Angle: 45°	Angle: 45	Angle: 45
Time Start: 11:50 Hr.	Time Start: 12:25 Hr.	Time Start: 12:58 Hr.
Time Stop: 12:00 Hr.	Time Stop: 12:34 Hr.	Time Stop: 13:05 Hr.
Part Temp: 87 0 °F	Part Temp: 87 0 °F	Part Temp: 87 0 °F
Date: MARCH 31, 1982	Date: March 31, 1982	Date: March 31, 1982

Notes:
CAl SHT 000185
Angle 45°
Start 1402
Stop 1408

0° Information Only
Weld Height Flush Weld Width 1.0"

Surface One to Surface Two

BM	Haz	℄ Weld	Haz	BM
.725	.725	.725	.725	.725

Ind. No.	Angle (Deg)	Surface	Beam Direction	LAM		LNGTH	WIDTH			Through Wall Dimension						Remarks
				Max Amp % DAC	Depth	Crystal Distance From				Minimum			Maximum			
										Depth	Position In.		Depth	Position In.		
						CW	CCW	1	2		1 CW	2 CCW		1 CW	2 CCW	

No Reportable Indications ☑ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by: C Elouf Level: Mgr MT Date: 4/5/82 Page of NDE Request No. N/A

Angle Ind. No. 0 Deg/0-199 45 Deg/200-399 60 Deg/400-599 Other/600-799

A0000926

GPU Nuclear
NDE

Ultrasonic Data Sheet

000068

Site: TMI-1
Inspection ID: N/A
Component: SPRAY line
Description: SAfe end to 45° elbow ON PRessurizer SPRAY line
Cal. Block: met.ed 022A
I.D.: SPRAY Nozzle SAfe end to elbow
Procedure: MTIS-008 Rev 7
No. Positions: 1
Distance: N/A In.
Drawing: 129286E Rev 3
Beam Direction ____ Long 2 Shear
Limited Exam ☐ No ☑ Yes
Examiner: Rodney Turner RT Turner ID#: 1863 Level: III
Examiner: Michael Zeise MHZ Zeise ID#: A374 Level: II

Notes:
BAseline RAdiogRAphs weld I.D. Re-54 AQ.

Material: S/S	Thickness: .514 In.	Test Surface: O.D.
Cal. Sheet 000182	Cal. Sheet: 000184	Cal. Sheet:
Angle: 45°	Angle: 45°	Angle:
Time Start: 12:00 Hr.	Time Start: 13:05 Hr.	Time Start: Hr.
Time Stop: 12:07 Hr.	Time Stop: 13:35 Hr.	Time Stop: Hr.
Part Temp: 87 °F	Part Temp: 87 °F	Part Temp: °F
Date: march 31, 1982	Date: march 31, 1982	Date:

N/A

0° Information Only
Weld Height Flush Weld Width .650

Surface One to Surface Two

BM	Haz	℄ Weld	Haz	BM
.575	.550	.510	.500	.510

Ind. No.	Angle (Deg)	Surface	Beam Direction	LAM		LNGTH		WIDTH		Through Wall Dimension						Remarks
						Crystal Distance From				Minimum			Maximum			
				Max Amp % DAC	Depth	CW	CCW	1	2	Depth	Position In. 1 CW	Position In. 2 CCW	Depth	Position In. 1 CW	Position In. 2 CCW	
200	45	1	2	150	.510	2.300	—	—	.650	.450		.450	.575		.750	
200	45	1	2	75	.515	1.500	—	—	.700	~~.650~~						
200	45	1	2	75	.515	2.900	—	—	.700	~~.550~~						
201	45	2	1	150	.550	*			.350							* intermittent 360°
																Numerous low level indications
																< 40% amplitude - Geometric

No Reportable Indications ☐ Reportable Indications ☐ Non Relevant Indications ☑

Reviewed by: CLew Level: III Date: 4/5/- Page 1 of 3 NDE Request No. N/A

Angle Ind. No. 0 Deg/0-199 45 Deg/200-399 60 Deg/400-599 Other/600-799

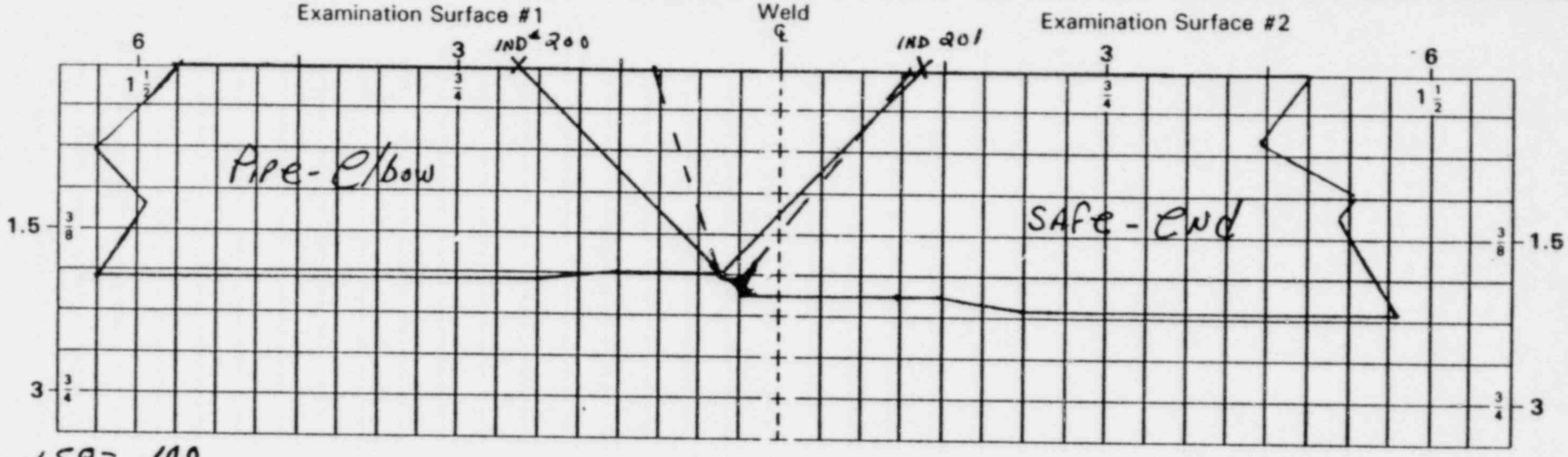
A0000926

GPU Nuclear

NDE

Request for Evaluation/Indication Plot

Request # N/A



ISQ = .100

Examiners Comments Both signals are due to Geometric Reflectors at the Root Area. Base line Radiographs show a poor fit up condition as well as a tool mark.

Examiner Rodney Teum Level III Date 3/31/82

Materials Technology Evaluation and Disposition Indications are Geometric and Require no evaluation/Disposition.

☑ Geometric ☐ Recordable ☐ Reportable

Analyst Rodney Teum Title NDE Specialist Date 3/31/82

Site/Inspection I.D. N/A

Component I.D. Spray Nozzle safe end to 45° elbow weld

Component/Weld No. N/A

Acceptance Standard IWB 3000 Section XI 1977 Edition Through summer of 1978 Page 2 of 3

GPU Nuclear

NDE

Date: MARCH 3/1982

Limited Scan Report

Data Sheet No.: 00068

Component: SPRAY line SAFE-END to elbow 45°

No ☐ Limited Scan ☑

Surface 1 ☑ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☑

CW ☐ CCW ☐

RD ~~3~~0" Inches from Reference Point to 1.5" inches, 0" to 1.5 CCW.
From Reference Point. ______ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☑ 60° ☐ Other ______

Due to: CURVATURE IN elbow of Nozzle

Examiner: Rodney | I.D. #: 1863 | Level: III | Date 3/31/82

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

______ Inches from Reference Point to ______ inches
From Reference Point. ______ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ______

Due to: ______

Examiner: | I.D. #: | Level: | Date:

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

______ Degrees, ______ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ______

Due to: ______

Examiner: | I.D. #: | Level: | Date:

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

______ Degrees, ______ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ______

Due to: ______

Examiner: | I.D. #: | Level: | Date:

Reviewed by: | Level: | Date: | Page 3 of 3

GPU Nuclear
NDE

Ultrasonic Data Sheet

000069

Site: TMI-1
Inspection ID: N/A
Component: SPRAY line
Description: elbow 45° to 90° elbow
Cal. Block: metEd022A
I.D.: 1st weld after safe-end
Procedure: MT15-008 rev 4
No. Positions: 1
Distance: N/A In.
Drawing: N/A
Beam Direction ______ Long 2 Shear
Limited Exam ☐ No ☑ Yes
Examiner: Rodney Turner
ID#: 1863 Level: III
Examiner: Michael Zeise
ID#: A374 Level: II
Notes:

Material: S/S	Thickness: .514 In.	Test Surface: O.D.
Cal. Sheet 000182	Cal. Sheet: 000184	Cal. Sheet: N/A
Angle: 45°	Angle: 45°	Angle:
Time Start: 12:07 Hr.	Time Start: 13:35 Hr.	Time Start: Hr.
Time Stop: 12:13 Hr.	Time Stop: 13:46 Hr.	Time Stop: Hr.
Part Temp: 87 0 °F	Part Temp: 87 0 °F	Part Temp: 0 °F
Date: march 31, 1982	Date: MARCH 31, 1982	Date:

0° Information Only
Weld Height Flush Weld Width .500

Surface One to Surface Two

BM	Haz	℄ Weld	Haz	BM
.525	.490	.500	.490	.490

Ind. No.	Angle (Deg)	Surface	Beam Direction	LAM Max Amp % DAC	LAM Depth	LNGTH Crystal CW	LNGTH Crystal CCW	WIDTH Distance From 1	WIDTH Distance From 2	Through Wall Dimension Minimum Depth	Minimum Position In. 1 CW	Minimum Position In. 2 CCW	Through Wall Dimension Maximum Depth	Maximum Position In. 1 CW	Maximum Position In. 2 CCW	Remarks
200	2	1	2	150	.500	*			.800							INTERMITTENT 360°

No Reportable Indications ☐ Reportable Indications ☐ Non Relevant Indications ☑

Reviewed by: Level: III MT Date: 4/5/82 Page 1 of 3 NDE Request No. N/A

Angle Ind. No. 0 Deg/0-199 45 Deg/200-399 60 Deg/400-599 Other/600-799

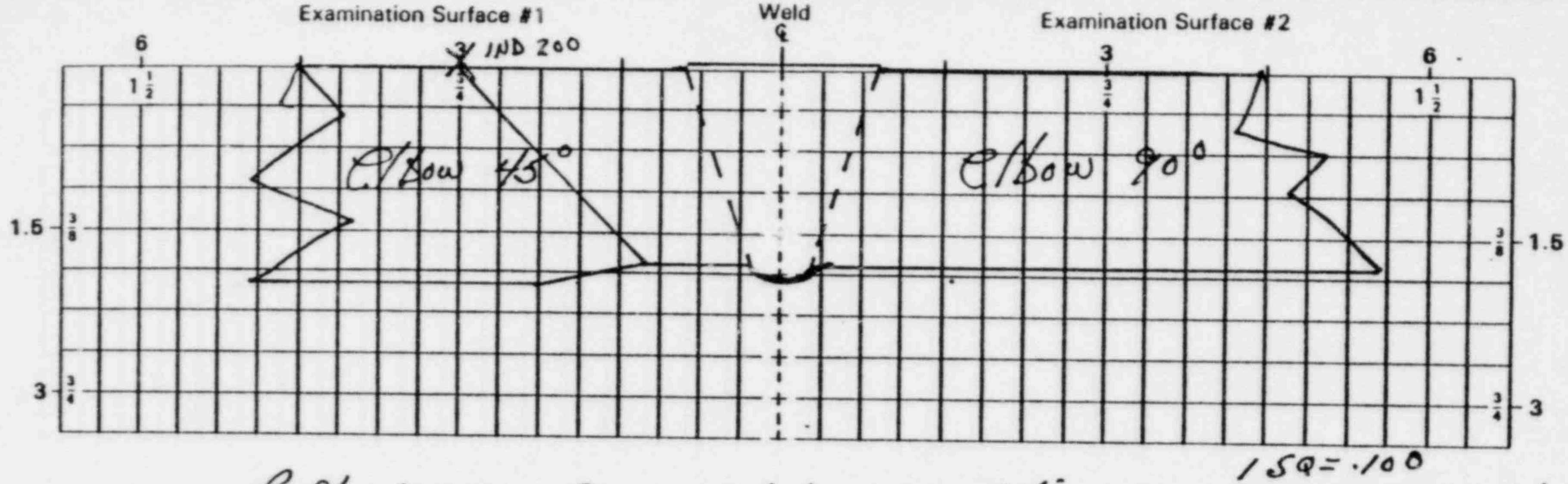
A0000926

GPU Nuclear

NDE

Request for Evaluation/Indication Plot

Request # N/A



Examiners Comments Reflector is from change in thickness transition and is Geometric.

Examiner Rodney Level III Date 3/31/82

Materials Technology Evaluation and Disposition Reflector is Geometric and no evaluation or disposition is Required.

☑ Geometric ☐ Recordable ☐ Reportable Analyst Rodney Title NDE Specialist Date 3/31/82

Site/Inspection I.D. N/A

Component I.D. elbow 45° to elbow 91°

Component/Weld No. 1st weld after safe-end to elbow on spray nozzle on Pressurizer

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GPU Nuclear

NDE

Date: March 31, 1982

Limited Scan Report

Data Sheet No.: 000069

Component: SPRAYline 45° elbow to 90° elbow

No ☐ Limited Scan ☑

Surface 1 ☑ Surface 2 ☑

Beam Direction 1 ☑ Beam Direction 2 ☑

CW ☐ CCW ☐

0 0 Inches from Reference Point to 1.5 CW 1.5 CCW inches From Reference Point. ________ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☑ 60° ☐ Other ________

Due to: 45° elbow to 90° elbow

Examiner: Rodney	I.D. #: 1863	Level: III	Date: 3/31/82

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

________ Inches from Reference Point to ________ inches From Reference Point. ________ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ________

Due to: ________

Examiner:	I.D. #:	Level:	Date:

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

________ Degrees, ________ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ________

Due to: ________

Examiner:	I.D. #:	Level:	Date:

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

________ Degrees, ________ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ________

Due to: ________

Examiner:	I.D. #:	Level:	Date:
Reviewed by	Level:	Date:	Page 3 of 3

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 3B

Inspected Item: Spray Line Nozzle Safe End

Type of Inspection: R.T.

Inspection and Test Plan: This area includes Inconel 600 weld buttering, B-166 safe end forging and A 376 TP 316 piping. Two circumferential welds are included in the inspection which will involve HAZ of the two different base metals.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected ______ Minimum required ______.)	✓	

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	Yes	No
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 1132391-00

8. Task #7 Procedure No. NES/XR-1-NP

Reviewer's Signature J Tietjen, QC

MAY 24 1982

Inter-Office Memorandum

GPU Nuclear

Date May 18, 1982

Subject Nondestructive Examination of the Pressurizer: 4" Nozzle (Spray) and 10" Nozzle (Surge) Lines.

6111-82-2078 Page 1 of 2.

Location TMINS Trailers #256/258

To N. C. Kazanas
Director-Quality Assurance

I. General:

This report covers radiographic examination of the 4" Spray Nozzle. The 10" Surge Nozzle was not shot for the following reasons: 1) Configuration/excessive wall thickness, 2) No tack welds to use as reference and 3) original radiographs did not show the thermal sleeve. No reference available for comparison.

II. Scope: (4" Spray Nozzle)

Radiographic examination to determine:

a. Location of thermal sleeve as compaired with original film taken during construction.

b. Presence of four (4) tack weld beads.

c. Location and condition of the tacks.

d. Evidence of possible clearance between O.D. of thermal sleeve and I.D. of safe end.

III. Reference Data:

B & W Drawing #129286 Rev. 5.

ANSI B31.7

RT Procedure XR-1-NP

PIR #WE/43128/82

NES Radiographic Report, dated 3/31/82, Weld Number (I.D.) RC-54

IV. Evaluation:

II-a. A comparison was made between the original film and the film taken on 3/31/82. There appears to be no change of position and/or physical condition of the thermal sleeve.

II-b-c. The four (4) tack welds were apparent and there does not appear to be evidence of wear and/or change of position between the weld(s) and thermal sleeve end.

II-d. Evaluation of the radiographs did not reveal any gaps/ clearance between the O.D. of the thermal sleeve and I.D. of the safe end.

Radiographic examination has not provided any evidence of movement of the thermal sleeve and shows no wearing away of the welds or sleeve. Evaluation of all five (5) radiographs was completed with acceptable results.

J Tietjen

J. E. Tietjen
QC Mod/Construction Inspection
Supervisor

JET/ejg

attachments (2)
PIR #WE/43128/82
Radiographic Report, dated
3/31/82 for item #RC-54

cc:	B. E. Ballard, Sr.	w/o attach.
	C. D. Cowfer	w/o attach.
	J. J. Colitz	w/o attach.
	R. F. Fenti	w/o attach.
	F. Faust (B&W)	w/o attach.
	QC file	w/attachment
	CARIRS	w/attachment

Page 3 of 3
PIR WE-43128/82

NES

NUCLEAR ENERGY SERVICES
SHELTER ROCK ROAD
DANBURY, CONNECTICUT 06810

FIGURE 4

RADIOGRAPHY REPORT

R.C. Piping

SERIAL NO. OR PIECE NO.	Weld No.	Film No.	ACC	REJ.	Defect Code	REMARKS
RC 54	AG	0-1	✓			
		1-2	✓			
		2-3	✓			
		3-4	✓			
		4-0	✓			

These Radiographs were Compared with The original Film To determine The location of The thermal Sleeve, Tack Welds, and possible defects. No Apparent defects. No movement of Thermal Sleeve, as Noted by comparisons.

RADIOGRAPHY REPORT NO. ______
DATE 3-31-82
Customer GPU
Address ______
Job Location TMI
Customer's P.O. No. ______ Job No. ______
Item Description 4" Sch 120 S.S.
100% Insp. ✓ Spot Insp. ______
Welder Stamp NA

WORK SUMMARY

Amount	Item Description
	Total Hours IN ______ A.M. OUT ______ A.M. @ ______
	N ______ P.M. T ______ P.M. @ ______
	Travel Hours ______ Lunch ______ Standby ______
	Ft., Plate Weld ______ in. thk. @ ______
	Ea. Pipe Weld ______ in. dia. @ ______
10	Films, 4½ x 10 Type Kod M. @ ______
	Films ______ x ______ Type ______ @ ______
5	Exposures @ ______
	@ ______

WPS N.A.

TECHNIQUE DATA

Inspection Specification ______
Acceptance Standard ANSI B31.7
RT Procedure No. XR-1-N.P.
Shooting Sketch (RSSS) ✓
Physical Source Size .1"x.1" Effective Focal Spot .14"
SFD 5" .138 Source to Object 4½" 1403/501.
Material Thickness .013 Type Material ______
Geometric Unsharpness (Ug) 2 10 15
No. of Film per Cassette ______ Penetrameter ______ Shim ✓
Viewing: Single .010 Superimposed ______
Pb Screens Front ______ Center ______ Back ______
Masking or Blocking Used 50 sec 8 min
Exposure Time Ir192 Dev. Time 103
Type Source ______ Curies ______

DEFECT CODE

P – Porosity	SI – Slag Inclusions	TI – Tungsten Incl
C – Crack	BT – Burn Through	CV – Root Concavit
IF – Incomplete Fusion	DT – Drop Through	CX – Root Convexi
SL – Slag Lines	UC – Undercut	OX – Oxidation

1. Donald Jackson LEVEL II
TECHNICIAN

2. ______ LEVEL ______
TECHNICIAN

3. Donald Jackson LEVEL II
TECHNICIAN/INTERPRETER

Page 1 of 3

QUALITY ASSURANCE MODIFICATIONS/OPERATIONS
QUALITY CONTROL PLANT INSPECTION REPORT

Unit No. I Inspector Donald Jackson

PIR No WE-43128/82

Inspection Description Radiography of R.C. System 4" S.S. Pipe at Top of Pressurizer

Method: Visual: ☒ Direct Measurement: ☐ Document Review: ☐ Other: ☒ R.T.

References:

Title	Rev.	Date	Verified
XR-1-NP	1	6-30-80	DJackson

Vendor/Item Identification (as appropriate)	Item/Characteristic/ Activity To Be Inspected	Accept/ Reject Criteria	Inspection Results/ Readings	Complience		
				Sat	Unsat	Not Applic.
Weld RC 54 A Q	R.T. Weld	ANSI B31.7	Acc	DOJ		
	See Comments	B 1.140	See Comments			

MO-108-1 (Rev. 0)

TMI-201 6-80

Page 2 of 3

QUALITY CONTROL PLANT INSPECTION REPORT

PIR No NE 47128/82

Vendor/Item Identification (as appropriate)	Item/Characteristic/ Activity To Be Inspected	Accept/ Reject Criteria	Inspection Results/ Readings	Sat	Unsat	Not Applic.

Measuring and Test Equipment Used

Identification of Equipment	Serial No.	Calibration Date Due
NA		

MNCR Issued: Yes ☐ No ☒ QDR Issued: Yes ☐ No ☒

MNCR QDR No.	Date	Reason for Issue	Hold/Condit. Release Tag Nos. Issued
		NA	

Comments/Other Information: Radiographs compared with original radiographs To determine Location of Thermal Sleeve and Tack Welds and possible defects. No apparent defects and no movement of Thermal sleeve as determined by radiograph comparison.

Inspected By: Donald Jackson Date: 4-21-82

Reviewed and Approved By: J Fritzen Date: 5-18-82

Distribution (X) Manager Admin. and Services Unit 1 (Orig.)
( ) QA Mod/Ops Manager
( ) QC Manager
(X) File

Others: (X) M. Hipple
( )
( )
( )

MO-108-2 (Rev. 0)

TEST

3C

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 3C

Inspected Item: Pressurizer Surge Line Nozzle Safe End

Type of Inspection: R.T.

Inspection and Test Plan: This inspection includes the safe end made of AS 336 CL F8M material and the connecting welds to the SA 182 TP 316 surge pipe and Inconel 600 buttering.

Inspection not conducted. Due to configuration and Thickness involved RT examination would not result in an acceptable film.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?	___	___
2. Was there an approved inspection/test procedure used for this examination?	___	___
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	___	___
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected ______ Minimum required ______.)	___	___

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	Yes	No
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?	___	___
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?	___	___

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 1132392-00

8. Task #7 Procedure No. ______________________

Reviewer's Signature Hietjen - QC

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 3C

Inspected Item: Pressurizer Surge Line Nozzle Safe End

Type of Inspection: U.T.

Inspection and Test Plan: This inspection includes the safe end made of AS 336 CL F8M material and the connecting welds to the SA 182 TP 316 surge pipe and Inconel 600 buttering.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?		✓
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 1 Minimum required 1.)		✓

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	Yes	No
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132392-00

8. Task #7 Procedure No. mtis-008

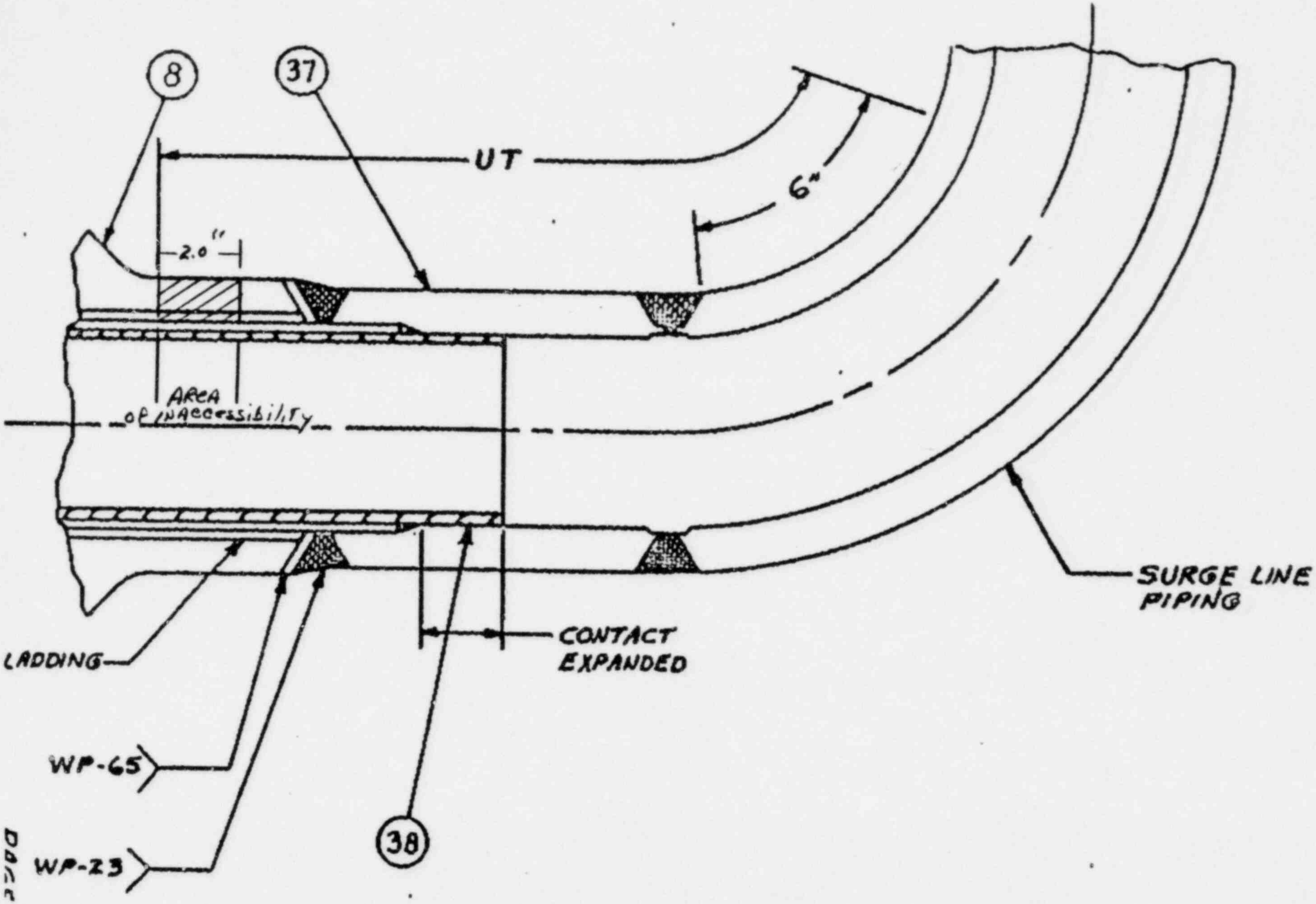
Reviewer's Signature Rodney Turner

Test Completion Review Sheet Comments, Task #7, Test: 3C
Surge Line Nozzle Safe End.

Item #1. B&W's required work scope (area of examination) as stated on B&W EIR 51-1132392-00 was not capable of completely being examined. The area limited to examination was the C/S portion of the nozzle. This area for 360° was inaccessible because a main restraint was attached directly in this area, and removal would have caused numerous hardships. A limited scan report was issued.

Item #2. The quantity of this item was reduced due to the attached restraint as mentioned above. All other areas were examined. A best effort scan was performed on the nozzle's C/S portion. Refer to Attachment #1.

Rodney Turner
Rodney Turner
NDE Specialist



ATTACHMENT #1

Nuclear
NDE

Ultrasonic Data Sheet

000065

Site: TMI-1
Inspection ID: N/A
Component: SURGE line
Description: SAFE-END to elbow weld
Cal. Block: Met ed-021A
I.D.: Surge Nozzle SAfe-end ~~on Pressurizer~~ To elbow.
Procedure: MTS-008 Rev 4
No. Positions: 1
Distance: N/A In.
Drawing: 129285E Rev 6
Beam Direction ______ Long 2 Shear
Limited Exam ☒ No ☐ Yes
Examiner: Rodney Turner RJ Turner ID#: 1863 Level: III
Examiner: Michael Zeise MZ Zeise ID#: A374 Level: II

Material: S/S	Thickness: 1.100 In.	Test Surface: O.D.
Cal. Sheet 000180	Cal. Sheet: 000181	Cal. Sheet: N/A
Angle: 45°	Angle: 45°	Angle:
Time Start: 14:22 Hr.	Time Start: 15:16 Hr.	Time Start: Hr.
Time Stop: 14:32 Hr.	Time Stop: 16:05 Hr.	Time Stop: Hr.
Part Temp: 87 0 °F	Part Temp: 87 0 °F	Part Temp: 0 °F
Date: MARCH 30, 1982	Date: MARCH 30, 1982	Date:

Notes:
BASeline RADIOGRAPH weld I.D. RC-55A Q

0° Information Only
Weld Height Flush Weld Width 1.500"

Surface One to Surface Two

BM	Haz	℄ Weld	Haz	BM
1.250	1.200	1.100	1.200	1.300

Ind. No.	Angle (Deg)	Surface	Beam Direction	LAM		LNGTH	WIDTH			Through Wall Dimension						Remarks
										Minimum			Maximum			
						Crystal Distance From					Position In.			Position In.		
											1	2		1	2	
				Max Amp % DAC	Depth	CW	CCW	1	2	Depth	CW	CCW	Depth	CW	CCW	
200	45°	1	2	200	1.200	-	-		1.700	-	-	-	-	-	-	intermittent 360°
201	45°	2	1	200	1.350	-	-	2.500	-	-	-	-	-	-	-	intermittent 360°

No Reportable Indications ☐ Reportable Indications ☐ Non Relevant Indications ☑

Reviewed by: Level: MGMT Date: 4/[illegible]2 Page 1 of 2 NDE Request No. N/A

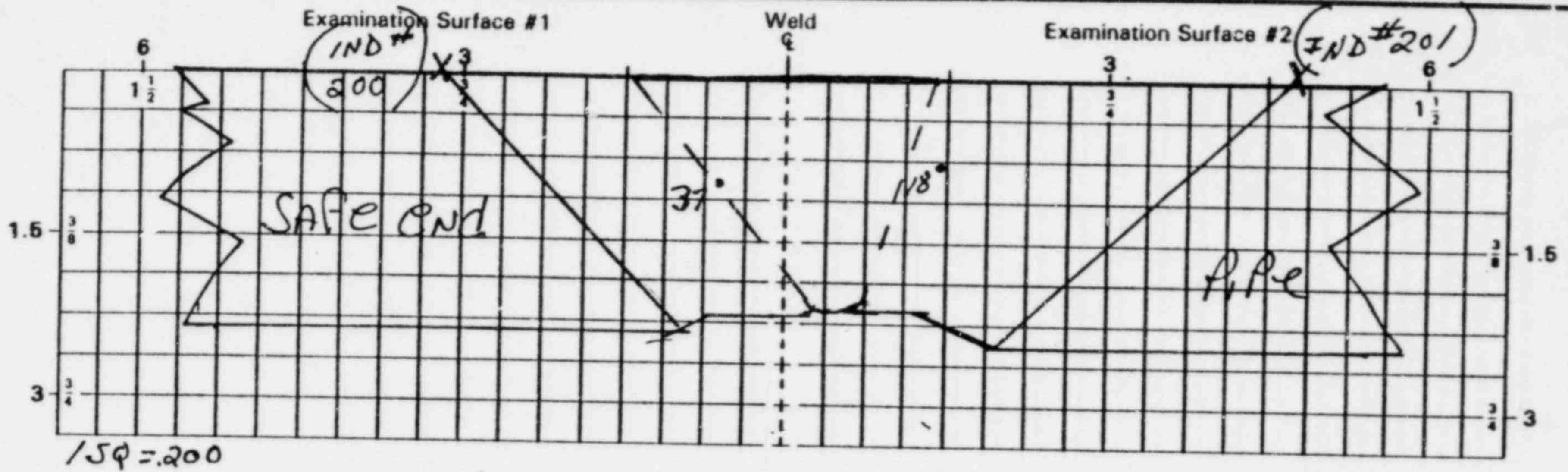
Angle/Ind. No. 0 Deg/0-199 ✓45 Deg/200-399 60 Deg/400-599 Other/600-799

GPU Nuclear

NDE

Request for Evaluation/Indication Plot

Request # N/A



15Q = .200

Examiners Comments Both indications are reflections from counterbore & poor fit up of safe end to elbow. Verification of counterbore per baseline Radiograph.

Examiner Rodney Turner Level III Date 3/31/82

Materials Technology Evaluation and Disposition No disposition required due to indications are Geometric.

☒ Geometric ☐ Recordable ☐ Reportable Analyst Rodney Turner Title Level III Date 3/31/82

Site/Inspection I.D. N/A

Component I.D. Safe end to elbow on surge line of Pressurizer

Component/Weld No. N/A

Acceptance Standard IWB-3000 1977 edition section XI

Page 2 of 2

GPU Nuclear
NDE

Ultrasonic Data Sheet

000066

Site: TMI-1
Inspection ID: N/A
Component: SURGE line
Description: Surge Nozzle to Safe end weld
Cal. Block: met-ed-020A
I.D.: SURGE Nozzle weld ON safe end
Procedure: mtis-008 Rev 4
Material: C/S & S/S
Thickness: 1.100 In.
Test Surface: O.D.
No. Positions: 1
Distance: N/A In.
Drawing: 129285E
Beam Direction ____ Long 2 Shear
Limited Exam ☐ No ☑ Yes
Examiner: Rodney Turner RT Turner ID#: 1863 Level: III
Examiner: Michael Zeise MRZ Zeise ID#: A374 Level: II

Cal. Sheet 000180	Cal. Sheet: 000181	Cal. Sheet: N/A
Angle: 45°	Angle: 45°	Angle:
Time Start: 1357 Hr.	Time Start: 14:52 Hr.	Time Start: Hr.
Time Stop: 14:20 Hr.	Time Stop: 15:15 Hr.	Time Stop: Hr.
Part Temp: 87 0 °F	Part Temp: ____ 0 °F	Part Temp: 0 °F
Date: MARCH 30, 1982	Date: MARCH 30, 1982	Date:

Notes:
BASE line Radiograph weld I.D. RC-55AQ is the weld attaching the safe-end to elbow up stream.

0° Information Only
Weld Height Flush Weld Width 2.0"

Surface One to Surface Two

BM	Haz	℄ Weld	Haz	BM
1.300	1.100	1.250	1.400	1.600

Ind. No.	Angle (Deg)	Surface	Beam Direction	LAM Max Amp % DAC	LAM Depth	LNGTH Crystal CW	WIDTH Crystal CCW	Distance From 1	Distance From 2	Through Wall Dimension Minimum Depth	Minimum Position In. 1 CW	Minimum Position In. 2 CCW	Maximum Depth	Maximum Position In. 1 CW	Maximum Position In. 2 CCW	Remarks

No Reportable Indications ☑ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by: Level: [illegible] Date: 4/5/82 Page 1 of 1 NDE Request No. N/A

Angle/Ind. No. 0 Deg/0-199 45 Deg/200-399 60 Deg/400-599 Other/600-799

A0000926

GPU Nuclear

NDE

Date: MARCH 30, 1982

Limited Scan Report

Data Sheet No.: 000066

Component: SURGE Nozzle to SAfe-end

No ☑ Limited Scan ☐

Surface 1 ☑ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☑

CW ☐ CCW ☐

0" Inches from Reference Point to 360° ~~inches~~ From Reference Point. ______ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☑ 60° ☐ Other ______

Due to: Restraint on steel Area of Nozzle

Examiner: Rodney | I.D. #: 1863 | Level: III | Date 3/30/82

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

______ Inches from Reference Point to ______ inches From Reference Point. ______ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ______

Due to: ______

Examiner: | I.D. #: | Level: | Date

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

______ Degrees, ______ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ______

Due to: ______

Examiner: | I.D. #: | Level: | Date:

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

______ Degrees, ______ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ______

Due to: ______

Examiner: | I.D. #: | Level: | Date:

Reviewed by: | Level: | Date: | Page ___ of ___

TEST

4

RESULTS REPORTED BY FAILURE ANALYSIS GROUP TASK 1

TEST

5, 7, & 11

DESTRUCTIVE EXAMINATIONS
WIPE SAMPLE ANALYSIS

[illegible]
MAY 21 1982
G.P.U. SYSTEM LAB.

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 5

Inspected Item: Reactor Vessel Inner O-Ring

Type of Inspection: Destructive Examination

Inspection and Test Plan: The RV O-Ring is made of Inconel 718. It has been highly stressed due to the pre-load induced by the closure head. This examination offers a confirmatory check on the cracking or lack of cracking in a highly stressed area plus a check for contaminant concentration.

	YES	NO
1. Is the work scope in agreement with the B&W Engineering Information Record?	X	
2. Was there an approved inspection/test procedure used for this examination? B&W EIR and GPU Memo No MTI-1077	X	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	X	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected ____ Minimum required _____.)	X	
Note: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.		
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		X
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		X
Note: If any of the answers to (5) and (6) are yes, a written description must be attached.		

7. B&W EIR No. 51-1132536-01

8. Task #7 Procedure No. MTI-1077. "Examination of TMI #1 RV Head O-Ring"; F.S. Giacobbe to J. Potter

Reviewer's Signature R. L. Miller

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 7

Inspected Item: CRDM Closure Insert

Type of Inspection: Destructive Examination

Inspection and Test Plan: This insert is made of SA 182 GR F 304. It is in the "as-ordered" condition. The purpose of this examination was to obtain a data point for general attack to annealed F 304.

	YES	NO
1. Is the work scope in agreement with the B&W Engineering Information Record?	X	
2. Was there an approved inspection/test procedure used for this examination? B&W EIR.	X	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	X	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected _____ Minimum required ______.)	X	
Note: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.		
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		X
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		X
Note: If any of the answers to (5) and (6) are yes, a written description must be attached.		

7. B&W EIR No. 51-1132535-01

8. Task #7 Procedure No. ________________

Reviewer's Signature R. L. Miller

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 11

Inspected Item: RNS Retainer

Type of Inspection: Destructive Examination

Inspection and Test Plan: Was examined in detail for evidence of sulfur assisted intergranular corrosion cracking. The retainer assembly includes a spring made of Inconel X-750 and high stress areas of SS-304 load arm.

	YES	NO
1. **Is the work scope in agreement with the B&W Engineering Information Record?**	X	
2. **Was there an approved inspection/test procedure used for this examination?** B&W EIR	X	
3. **Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?**	X	
4. **Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected ____ Minimum required ______.)**	X	

Note: **If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.**

	YES	NO
5. **Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?**		X
6. **Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?**		X

Note: **If any of the answers to (5) and (6) are yes, a written description must be attached.**

7. B&W EIR No. 51-1132403-00

8. Task #7 Procedure No. ________________

Reviewer's Signature R. L. Miller

G Rhedrick

Inter-Office Memorandum

GPU Nuclear

Date April 13, 1982
ISI/NDE M82017

Subject Removal, Ultrasonically Locating Weld and Sectioning of Inner O-Ring (Task #7 Test 5)

To N. C. Kazanas

Location Parsippany

A maintenance crew of four (4) men entered the head stand on April 13, 1982 and before cutting was started each sector was marked to its proper coordinates. The inner O-Ring was cut at clips 1, 4, 7, and 10. At this time water from the inside of the Ring was attempted to be collected. The O-Ring contained no water therefore, this was unable to be performed. The four (4) Sections were laid out and prepped for UT inspection. UT inspection was performed and revealed two welds. These welds were cut at a distance of 6" on both sides of the weld and labled #1 and #2. They were bagged in a lay flat, tagged for B & W L.R.C., and placed in the B & W shipping box.

Sample #1 came from Quad 'X' to 'Y' axis, sample #2 came from 'Y' to 'Z' axis. Both samples were visually examined on the I.D. to verify the samples contained a weld. Two (2) other 12" samples were labled #3 and #4, bagged for B & W, and placed in their shipping box. Sample #3 was taken from Quad 'Z' to 'W' axis and sample #4 was taken from Quad 'W' to 'X' axis. Two additional samples were cut, these were for GPUN's use and were bagged in a lay flat.

GPUN samples were removed in accordance with procedure 1504-9 and were delivered to the Decon Room (R. Campbell). One (1) sample was from "W' to 'Y' axis and the other from 'Y' to 'Z' axis (as depicted in procedure). The only exception to the procedure is two weld samples (#1 and #2) which were included instead of only one weld sample. This completes the involvement required on my part.

Rodney Turner

Rodney Turner
NDE Specialist
Materials Technology

RT:ef

cc: C. Cowfer
J. Potter
G. Rhedrick
R. Toole
M. Zeise

Greg R —

Inter-Office Memorandum

GPU Nuclear

MAY 6 1982

Date April 30, 1982
(MTI.1086)

Subject Bend Testing Strips from TMI-1 R.V.
Head O-ring

To J. J. POTTER Location Reading

Introduction

On April 23, 1982, the writer visited TMI-1 Nuclear Station for the following purposes:

(1) Oversee the sectioning of two reactor vessel head O-ring pieces into longitudinal strips and the bend testing of these strips in accordance with the attached memo (MTI.1077).

(2) Examine the tensioned surface of the bend specimens for transverse cracks.

Testing

Two O-ring pieces, marked W-X axis and Y-Z axis, were each split longitudinally into four sections. Subsequently, bend testing was performed on these strips. Specifically, three of the four strips from each O-ring piece, numbered 1, 2 and 3, were bent around a 1" diameter rod so as to place the I.D. surface in tension. The remaining strip from each O-ring piece, numbered 4, was bent putting the O.D. surface in tension.

Post test examination consisted of inspecting the entire tensioned surface of each strip under the stereo microscope at magnifications up to 70X.

Observations

1. The O.D. surface of each O-ring strip was shiny while the I.D. surface was discolored and had a black appearance.
2. No cracking was observed on the tensioned surface of any strip.

R. L. Miller

R. L. MILLER

RLM:brk

cc: C. D. Cowfer
F. S. Giacobbe
R. R. Harper
N. C. Kazanas
H. L. Wilson

Inter-Office Memorandum

GPU Nuclear

Date March 29, 1982
(MTI.1077)

Subject Examination of TMI #1 R.V. Head O-Ring

To J. POTTER

Location Reading

The examination of the Inconel 718 O-ring from the reactor vessel head to shell flange shall be conducted in the following manner.

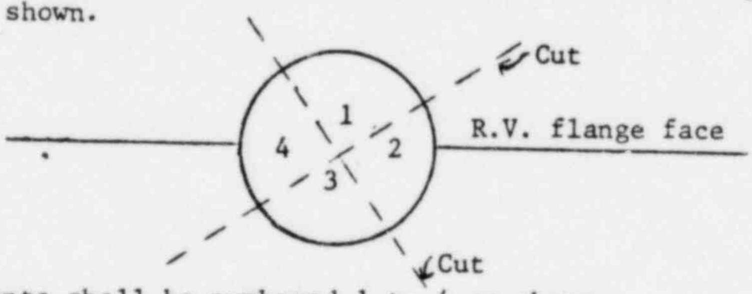
1. If fluid is contained within the central annulus of the O-ring plans need to be formulated to collect this fluid for future analysis. Mr. Jim Tangen should be contacted regarding sample containers, sample size and analytical laboratory.

2. The analysis of the fluid should include the following:
   PH
   Conductivity
   S
   Cl
   F
   B
   Na
   Li

3. Once the water sample is collected, a three (3) inch section of O-ring shall be removed from two (2) locations 180 degrees from each other.

   Note: Record the locations from which the samples were removed with reference to the R.V.

4. These two sections shall each be split into four (4) longitudinal strips as shown.



The quadrants shall be numbered 1 to 4 as shown.

5. All longitudinal strips except one (1) shall be completely bent around a 1.00" diameter rod putting the I.D. surface in tension. The remaining section shall be bent putting the O.D. surface in tension (a number 2 or 4 section shall be used for this).

   Note: When bending the sample, the longitudinal axis of the sample shall be transverse to the longitudinal axis of the rod.

6. After the sections are bent, they shall be examined on-site using a stereo microscope. This examination to be performed by GPUN Materials Technology. A clean area shall be prepared in the hot machine shop or hot instrument shop for this examination. A 2' X 3' area is sufficient.
7. A report shall be prepared describing the visual examination.
8. If defects are discovered which require further investigation, preparation shall be made to ship the samples to B&W Lynchburg Research Center.

Please give me a call if you have any questions. As we discussed, you are writing the site procedure to accomplish this work.

F. Scott Giacobbe
Failure Analysis Task Force

FSG/ds

cc: J. J. Colitz
R. L. Long
N. C. Kazanas
D. G. Slear
J. Tangen
J. Sipp

MAY 24 1982

Inter-Office Memorandum

GPU Nuclear

Date May 17, 1982

Subject Visit to B&W Lynchburg Research Center (LRC) on May 6, 1982 (GP.0128)

To [redacted]

Location Reading

On the subject date, the writer visited B&W LRC and met with Messrs. Baker, McInteer, Garner, Piascik, Behnke, Mathens, Baty and Clevenger. The purpose of this meeting was to review the status of each of the following metallurgical examinations:

(1) Regenerative Neutron Source (RNS) Retainer
(2) CRDM Closure Insert
(3) Reactor Vessel O-ring
(4) Waste Gas System Header Pipe

These examinations, except for item #4, are being conducted in support of the TMI-1 Reactor Coolant System (RCS) Review Tests (Task 7) which were established to identify any corrosion damage to the RCS internals as a result of sulfur contamination of the reactor coolant.

Summary

The on-going metallurgical analyses of selected TMI-1 RCS parts have revealed no evidence of corrosion damage. These parts are representative of RCS materials of construction. During service they were highly stressed and were exposed to one of the following environmental conditions: continuous immersion or liquid-vapor interface.

From the current metallurgical results, it can be deduced that the stress assisted intergranular corrosion mechanism which was responsible for the OTSG tube failures has not occurred elsewhere in the TMI-1 RCS. Also, it is evident that the entire RCS is contaminated with sulfur compounds.

Analysis of RNS Retainer

TEST 11

This part is composed of two Type 304ss arms, a Type 304ss can with a Type 308ss closure weld on each end and an Inconel X750 internal spring.

Findings of this metallurgical examination were:

(1) Low magnification microscopy revealed several patches of yellow deposits on the arms. Also, both black and white crystalline deposits, normally present on RCS parts, were observed on all surfaces of the retainer. Constituents of the yellow deposits were sulfur, silicon, chlorine, magnesium and potassium. The black deposits were composed of iron, chromium, nickel and silicon and the white deposits were identified as boron.

(2) Both bend testing and metallography revealed no degradation of retainer material.

(3) Chemical analysis of wipe samples measured the following chloride and sulfur levels: 8 ppm Cl^- maximum and 33 ppm S maximum.

(4) Load deflection tests on the Inconel X750 spring and subsequent comparison of this test data to design base data indicated no noticeable change in the spring constant.

In summary, this metallurgical examination has shown that there was neither apparent degradation of the mechanical properties of the spring nor corrosion damage to any retainer material. Also, it identified that sulfur compounds were present on the interior and exterior of this part although reduced sulfur species were confined to the exterior only.

The last item that needs to be completed to finish this examination is chemical analysis of wipe samples which were taken from the retainer surfaces at Three Mile Island Station.

Analysis of CRDM Insert TEST 7

A sketch of this Type 304ss part is shown in Figure 1.

Findings of this metallurgical examination were:

(1) Eddy current examination from the exterior of this part revealed no indications.

(2) Low magnification light microscopy revealed possible intergranular corrosion on some inner surfaces of the CRDM insert as shown in Figure 1.

(3) Metallographic examination of the suspect defect at the interior of the CRDM insert revealed no intergranular attack, suggesting that the microscopic observation identified in item (2) was probably oxide cracking.

In short, this metallurgical analysis has revealed no metal deterioration via intergranular corrosion.

Items that need to be completed to finish this examination are: (1) metallography to further substantiate that there was no corrosion damage to the CRDM insert material (2) Kevex energy dispersive X-ray analysis of deposition and ASTMA-262 Practice A for sensitization.

RV O-ring TEST 5

Four sections of the RV O-ring were submitted for metallurgical analysis. A circumferential weld was present at the midpoint of two of the four sections. The O-ring was made of Inconel 718 and was coated on its exterior with ~2.5 mils of silver.

Findings of this metallurgical analysis were:

(1) Radiography has revealed a few rounded indications in one sample. These indications were confined to one side of the closure weld but at some distance from the weld. On the same sample there appeared to be a band of circumferential linear indications on the other side of the weld but once again at some distance from the weld.

(2) Eddy current testing from the exterior of each sample revealed no indications.

(3) Scanning Electron Microscopy identified the rounded indications as small cracks on the exterior of the ring. One of these cracks was broken open and its fracture surface examined in the SEM. This SEM examination revealed a dimpled structure which is characteristic of ductile rupture; however, it was unable to determine if the crack extended through the silver plating. This microscopic observation indicates that these cracks were not produced by the stress assisted intergranular corrosion mechanism which was responsible for the OTSG tube failure since it is recognized by intergranular fracture.

To date this metallurgical examination has revealed no evidence of intergranular corrosion or cracking.

Remaining metallurgical tests include: (1) bend tests and weld bend tests and (2) metallography and fractography (if necessary) of tested bend specimens.

Analysis of WGS Cracked Pipe

This failed pipe was a four inch long, 2" sch 40 Type 304ss pipe with a socket weld on each end. It contained a thru wall circumferential crack adjacent to one socket weld.

This metallurgical examination is in its preliminary stages with receipt inspection and radiography completed. Radiography has revealed that the thru wall crack was ~3/16" from the toe of the socket weld. Also, it revealed another small branched circumferential indication about 1/4 inch from the toe of the other socket weld.

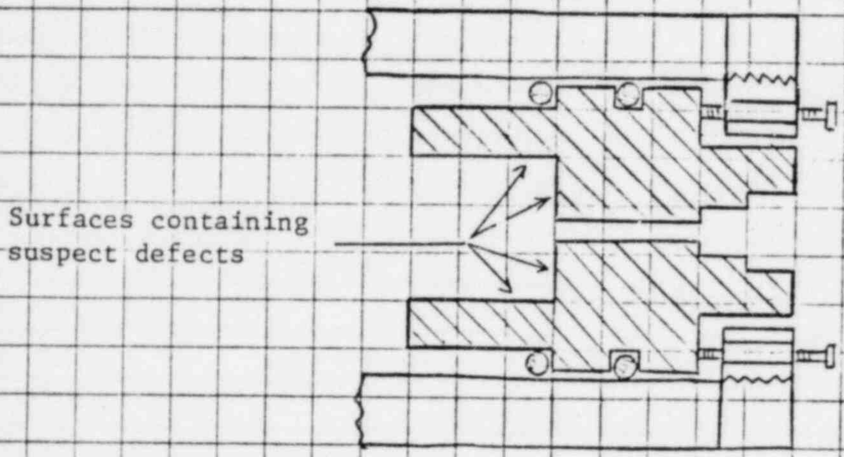
R. L. Miller

R. L. Miller

RLM/ds

cc: J. J. Colitz
C. D. Cowfer
D. K. Croneberger
F. S. Giacobbe
H. D. Hukill
R. L. Long
D. G. Slear

Figure 1. Sketch of CRDM Insert.



Form LRC-139

Babcock & Wilcox

Research and Development Division
LYNCHBURG RESEARCH CENTER
LYNCHBURG, VIRGINIA

To R. S. PIASCIK, FUEL ENGINEERING NPGD

From D. L. BATY, NUCLEAR MATERIALS TECHNOLOGY, LRC DLBaty

Cust. GPU

File No. or Ref. RDD:83:5490/5491:01

Subj. EXAMINATION OF TMI-1 REACTOR VESSEL O-RING AND CRDM CLOSURE INSERT

Date MAY 25, 1982

This letter to cover one customer and one subject only.

SUMMARY

This report outlines the results of the metallurgical examinations performed on TMI-1 reactor vessel O-ring sections (silver plated alloy 718) and a CRDM closure insert (type 304 stainless steel). These sections were potentially exposed to sulphur contaminated primary coolant. This examination was to determine whether any intergranular attack had occurred in these components as a result of this potential exposure.

The examination of both components consisted of visual examination, nondestructive evaluation, surface examination by stereo light microscopy, scanning electron microscopy (SEM), Kevex energy dispersive x-ray spectroscopy, metallography, and bend testing and examination with SEM.

The results have shown that neither component suffered any intergranular attack although the presence of sulphur was detected. The O-ring contained some shallow cracks prior to bending and some sections fractured as a result of bending. However, fracture surface examination revealed all cracking to be transgranular ductile rupture. The CRDM closure insert did not contain any cracks prior to or as a result of bend testing.

A subsequent report is in preparation which will contain appropriate figures and tables to document the microstructural examination.

1. INTRODUCTION

This report contains a summary of the results obtained from the metallurgical examination of the Three Mile Island Unit-1 (TMI-1) reactor vessel O-ring and a control rod drive mechanism (CRDM) closure insert. These components were examined to determine if the metal had undergone any intergranular attack as a result of sulphur contamination in the primary coolant. The entire examination was performed at the Lynchburg Research Center (LRC) of the Babcock & Wilcox Company.

1.1 Component Description

1.1.1 O-Ring

The reactor vessel O-ring examined was the inner of two O-rings. Four (4) approximately 12-inch long sections were shipped to the LRC. These sections were identified as follows:

Sample #1: contained circumferential weld; from X to Y quadrant.
Sample #2: contained a circumferential weld.
Sample #3: taken from Z to W quadrant.
Sample #4: taken from end of W to X quadrant.

As seen from above two specimens contained a circumferential weld.

The inner O-ring is fabricated from alloy 718 tubing which is typically solution annealed at 1950 ± 25°F for 30 minutes maximum and precipitation hardened at 1350 ± 25°F for 3-6 hours, air cooled. The outer surface of this ring has been plated with silver. The tube outer diameter prior to plating is 0.500" $^{+0.006"}_{-0.000"}$ with a nominal wall thickness of 0.050". The silver plate has a thickness of 0.004" to 0.006". The mean diameter of the inner O-ring is 169.750" REF.

1.1.2 CRDM Closure Insert

A single closure insert was sent for examination. This component forms a high elevation primary boundary in the upper part of the control rod drive mechanism.

As such, the lower portion of this component comes into contact with the primary coolant. The component is machined and assembled from type 304 stainless steel in the annealed condition.

2. EXAMINATION PLAN

Based upon the request for examination by GPU and discussions with NPGD, a work scope was proposed in Reference 1. This workscope was agreed upon with some modifications as identified in Reference 2. The tasks performed on each component and a brief description of the procedures used is given below.

2.1 O-Ring

The examination of the O-ring consisted of the following tasks.

2.1.1 Receipt Inspection

The four O-ring specimens were visually examined and photographed at low magnification to document any unusual appearance. O-ring outer diameter measurements were taken at 0° and 90° with dial calipers to document the ellipticity of the O-ring tube's cross section.

2.1.2 Nondestructive Examination

The O-ring specimens were examined using two eddy current techniques. An annular differential encircling coil was used with a 400 kHz and 900 kHz mix to suppress the effects of wobble. The other technique used a radial absolute pencil probe with the same frequency mix to suppress the effects of lift-off. This examination was used to identify surface defects both on the OD and ID of the O-ring tube.

2.1.3 Radiography

Radiographs at three orientations were performed on the four O-ring sections using a Norelco 150 KV industrial x-ray unit. The following operating parameters were used: 140 KV, 12 MA, 48" source to film distance, 3/4" to 3-3/8" collimator at source. Type M film was used with 45 second exposure time.

2.1.4 Surface Examination

Stereo light microscopy and scanning electron microscopy (SEM) were used to examine the ID and OD surfaces for evidence of any surface cracking and unusual deposits. Kevex energy dispersive x-ray spectroscopy was utilized to examine these surfaces for the qualitative composition of deposits. Samples 1, 2, and 4 received complete ID and OD examinations. Sample 3 was held in reserve and was not sectioned for ID examination; however, the OD was examined by light microscopy.

2.1.5 Metallography

Based upon the examinations above, locations for metallographic examination were selected from samples 1, 2, and 4. Sample #3 was not destructively examined. Sectioning was performed with either a diamond saw, band saw, or hack saw. No water or cutting lubricant was used during sectioning. Samples were mounted in "Epimet" for excellent edge retention and processed with normal metallographic specimen preparation procedures. All specimens were examined initially in the unetched condition on an Olympus metallurgical microscope. Photographs were taken to document both typical and unusual conditions. Examination of all specimens was performed at magnifications from 50X to 1000X in bright field illumination. A total of ten (10) metallographic sections were prepared and examined; four (4) were axial sections, six (6) were transverse sections. Two (2) transverse sections and one (1) axial section were examined after bending.

2.1.6 Bend Testing

Based upon the nondestructive examinations, both axial and circumferential bend test specimens were selected. The axial bend specimens were approximately 2-1/2" long × 1/4" wide (circumference). These specimens were bent over a 1/2" diameter steel rod using a bench vise. Tests were performed which put either the ID or OD in tension.

The circumferential bends were performed on ∿3/8" long half cross section or "C" specimens. Again tests were performed to put either the ID or OD in tension. The OD tension tests were performed by flattening the "C" section with a pair of vise grips. The ID tension specimens were pressed into a flat strip with a bench vise. A total of six (6) axial bends were performed, three (3) in

ID tension. Nine (9) transverse bend specimens were performed; five (5) in OD tension, four (4) in ID tension.

2.2 CRDM Closure Insert

2.2.1 Receipt Inspection

The CRDM closure insert was visually examined and photographed at low magnification to document unusual or suspicious features.

2.2.2 Nondestructive Examination

Eddy current examination was performed on the outer surface exposed to the primary coolant. A radial absolute pencil probe was used to scan the entire surface. A frequency mix of 200 kHz and 900 kHz was used to reduce the response to lift-off.

2.2.3 Surface Examination

Low magnification stereo light microscopy and low to high magnification scanning electron microscopy was performed on surfaces suspected of containing defects based on the previous examinations Kevex energy dispersive x-ray spectroscopy was performed to obtain qualitative analysis of deposits on surfaces in contact with primary coolant.

2.2.4 Metallography

Two (2) metallographic sections were prepared. These sections were taken from two different surfaces in contact with primary coolant. Both were mounted in "Epimet" to preserve the specimen edges. The samples were prepared using standard metallographic techniques and examined in the unetched condition. The examination was performed on an Olympus metallurgical microscope at magnifications ranging from 50X to 1000X in bright field. Subsequently, one specimen was prepared and examined in accordance with Practice A of ASTM-A262, Detecting Susceptibility to Intergranular Attack in Stainless Steels.

2.2.5 Bend Testing

A total of eight bend specimens were prepared from two different surfaces exposed to primary coolant. The specimens were machined strips removed from the insert so that the tensile surface had been exposed to the primary coolant. Specimen dimensions were either 7/8" or 1-1/8" long × 1/4" wide × 1/16" thick. The specimens were bent over a 1/4" diameter steel bar using a bench vise. Due to the curvature of the surfaces being tested the specimens did not have a flat surface in the tensile bend side. The surfaces were either slightly convex in the width direction with a radius of 1-1/4" or concave in the width direction with a radius of 7/8".

During all handling and sectioning the specimens from both components were kept from any liquid contamination and handled with latex gloves and polyethylene bags. The O-ring specimens had already been marked on the OD surface with a black ink marker.

3. RESULTS

3.1 O-Ring Examination

3.1.1 Receipt Inspection

All four (4) O-ring sections had a light silver appearance except for bronze colored stains associated with the seating flats on the top, bottom, and outer diameter of the O-ring. The inside diameter of the O-ring was free of these stains. Associated with the bronze stain were grayish-black stains covering a much smaller area and located at the interface of the smeared flat seat and undisturbed surface. These bronze and grayish-black stains were usually elongated in the tube axis direction. At high magnification these stains could be seen to be cracked and flaking off in certain areas.

Visual examination of these stained areas with the Nikon stereo light microscope indicated that some axially aligned cracks may be present in these stained areas particularly near the interface between the flat seating and the smooth surface.

Dimensions taken at the major and minor axis of the now approximately elliptical cross section showed dimensions ranging from 0.501" to 0.504" at the major axis to 0.424" to 0.431" on the minor axis.

3.1.2 Eddy Current Examination

No defect indications were found on the ID or OD of any of the four samples.

3.1.3 Radiographic Examination

No indication of cracking was found in any of the four (4) samples. Some broad circumferential bands were observed on all four samples; however, the location of these bands varied between orientations on the same sample and the band was missing altogether in some orientations. This is believed to be an artifact and had no bearing on tube integrity. Subsequent examinations in these areas revealed nothing which would correlate with these marks. A porosity-like structure was seen on all four sections at specific locations and orientations. No pattern appeared to be present and this pattern was not related to the welds. Roughness in the silver plate layer may account for this effect or it is an artifact.

3.1.4 Surface Examination Results

Samples 1, 2, and 4 were each sectioned axially yielding two 12" half sections. Each half section was cut into three (3) approximately 3-inch sections yielding six (6) specimens per sample or 18 specimens in all. The results of visual, low magnification light microscopy, SEM, and Kevex indicated that some shallow cracking was present on both the ID and OD of some specimens, but not all specimens, and that sulphur was present on the OD of the O-ring and possibly on the ID in some locations. The ID cracking was contained in regions under the top and bottom seating flat of the O-ring. This is an area which is put in tension by bending during loading. Similarly, the OD cracking was found adjacent to the outer diameter seating flat, also an area put in tension from bending during loading.

Other than S and the major elements in alloy 718, Ti, Zr, Al, Si and Cl were occasionally observed in random ID deposits. The Ti and Zr seemed particularly noticeable in deposits near the weld in sample 2. Typically the OD contained only Ag with a minor amount of Si. The bronze and grayish-black areas observed frequently are areas rich in Fe, Cr, and Ni. In the grayish-black deposits, Fe is the major component with some Cr and even smaller amounts of Ni; in the bronze areas Fe, Cr, and Ni are found in approximately equal amounts but much lower quantity. S was occasionally found associated with these deposits. Other elements occasionally found on the OD in adherent deposits were minor amounts of Ti and Cl.

3.1.5 Metallographic Examination

A total of ten (10) metallographic specimens were examined. These sections came from samples 1, 2, and 4. Six (6) of these were transverse sections, two (2) of which were examined after bending. One axial specimen which had broken into two pieces was examined after bending. The examination results indicated that any cracking which had been observed in the surface exams was extremely shallow and, in some cases, could not be detected in the metallographic sections. The deepest OD cracking observed was found after bending and it was 0.001" deep, entirely within the silver plate. One transverse specimen contained a region of observable ID cracking with the largest being 0.0016" deep. Etching in this structure revealed the crack to probably be transgranular. Three (3) of the axial sections examined contained welds and other than one which broke during bending, no evidence of cracking was observed in the weld zones. The specimen which broke had been examined on the SEM for fracture mode and is discussed in the next section.

3.1.6 Bend Testing

Of the 16 bend specimens tested and examined, ten (10) contained evidence of cracking on either the ID or OD. Cracking ranged from shallow surface cracking to through-wall fracture. In all cases, however, the fracture features contained cusps and voids, or shear parabolas, all indicative of a ductile rupture mechanism. There were no indications of any intergranular cracking. This was true near the surface in tension, where such cracks might act as initiation sites for further propagation by ductile means, as well as deeper into the fracture where active crack propagation was occurring.

3.2 CRDM Closure Insert Examination

3.2.1 Receipt Inspection

Visual examination indicated the presence of a grayish-black film on the inside surface which had been in contact with primary coolant. The outer surfaces which were also in contact with primary coolant did not contain this film. In general, the part appeared in very good condition except for the film. Small amounts of a white crystal were observed in the vent hole and these are believed to be boric acid crystals.

3.2.2 Nondestructive Examination

Results from the eddy current pencil probe examination of the outer surfaces in contact with the primary coolant showed no indication of cracking. Eddy current examination on the inside surfaces was delayed and eventually not performed due to the need to confirm whether intergranular attack was occurring by examination on the SEM and subsequent metallography.

3.2.3 Surface Examination

Examination of the inside surface film with stereo light microscopy revealed a pattern which resembled intergranular attack. The closure insert was sectioned dry using a band saw and milling machine to gain access to this surface for examination on the SEM. SEM examination revealed that the suspected intergranular attack was basically a film which had formed on the surface in a pattern resembling a grain boundary network. This network was clearly raised and could be readily smeared. Kevex energy dispersive x-ray spectroscopy revealed a large amount of Si to be present in the film with some S present also.

3.2.4 Metallographic Examination

Two (2) metallographic sections were prepared to examine the inside and outside surfaces. No evidence of intergranular attack or cracking of any kind was found in and away from areas containing the surface film. One section was further examined for susceptibility to intergranular attack and was found to have an acceptable microstructure.

3.2.5 Bend Testing

Eight (8) bend specimens were prepared from both inside and outside surfaces at 90° intervals around the insert. All bends were made without any obvious cracking. Further examination of the maximum tensile strain areas on the SEM showed no signs of cracking.

4. CONCLUSIONS

Although the presence of S was detected on both the reactor vessel O-ring and CRDM closure insert, no intergranular attack was found. Cracking which was found on the O-ring surfaces before and after bending was ductile rupture and not intergranular. The closure insert contained no evidence of cracking before or after bend testing.

5. REFERENCES

[1] D. L. Baty to L. J. Stanek, "Proposed Work Scopes for Reactor Vessel O-Ring and CRDM Closure Insert Examinations," March 31, 1982.

[2] D. L. Baty to L. J. Stanek, "Additions to Work Scope of TMI-1 Reactor Vessel O-Ring and CRDM Closure Insert Examinations," April 20, 1982.

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 11

Inspected Item: RNS Retainer

Type of Inspection: Destructive Examination

Inspection and Test Plan: The retainer assembly includes a spring made of X-750 material which is under load in the cold condition. It also includes 304 SS material which is welded and is under load.

	YES	NO
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 1 Minimum required 1.)	✓	

Note: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	YES	NO
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

Note: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132403-00

8. Task #7 Procedure No. STP-1-82-0022

Reviewer's Signature E. David [illegible]

OTSG Task 7 Inspection Area #11

Title: RNS Retainer Exam

Type of Inspection: Remote Visual/Local Visual/Met Lab

Equipment Used: Westinghouse 1250 w/St. Lens

Procedure:

Final Report Prep: G. R. Bond/E. D. Shoua - Visual Exam
B&W LRC - Met Lab Exam

This inspection was performed in accordance with B&W EIR 51-1132403-00 and GPU Nuclear Fuels Memo NF-2620. The following individuals were directly involved with the examination on-site.

E. D. Shoua - GPU Nuclear Fuels
J. R. Stair - Nuclear Engineer, TMI-1

Both retainers were examined using remote video and were found to be free of any discernable defects. The retainer in core location "P-4" (RNS Retainer L106) was selected due to its slightly darker shading. A hands on examination was done and revealed no material degradation. Wipe samples were taken as requested and the entire retainer sent to LRC for Met Lab exam.

##

NF 2628

Inter-Office Memorandum

File: 701.2/4003.2

GPU Nuclear

Date April 27, 1982

Subject TASK 7 PRIMARY SYSTEM REVIEW:
SUBTASK 11 RNS RETAINER INSPECTION

To N. C. KAZANAS
DIRECTOR, QUALITY ASSURANCE

Location Three Mile Island

Reference: 1. J. D. McCarthy to N. C. Kazanas, "TMI-1 Task 7 Fuel Inspection Plan" dated April 16, 1982 Memo No. NF 2620

2. B&W Engineering Information Record #51-1132401-00 "TMI-1 RNS Retainer Examination", dated March 25, 1982

In accordance with the above two references, the two retainers in the core were examined by means of a video camera. The first retainer had a shiny appearance while the second retainer exhibited a uniform light brown discoloration over its entire surface. The video closeup of both retainers revealed no visible degradation i.e. no visible corrosion cracks at welds, load arms or inconnel X-750 springs. In addition no visible signs of crud buildup was evident in either retainers and neither load arms were displaced from their normal unloaded position.

It was therefore decided to pullout the discolored retainer from core location P-4 (Retainer No. R00006) for hands-on examination. As soon as it was removed from the water, the H.P. took a wipe sample from the outer surface of the can housing of the retainer, and a wet soak wipe sample of the coolant water.

The RNS retainer exhibited about 25 mR/hr activity and consequently was brought up for hands on examination.

The hands on examination which consisted of a visual of the welds and spring showed no visible sign of material degradation; in addition, the load arm was depressed one/two inches four consecutive times with no sign of damage or permanent set to the spring.

Poloroid photographs were taken of the inspected retainer to document the condition of the welds, the spring and the load arms.

Subsequently, the inspected RNS retainer and the wipes were packaged for shipment to B&W LRC as per Reference 2. A new retainer was installed on the RNS in location P-4.

E. David Shoua

E. David Shoua
Nuclear Analysis & Fuels

EDS/dss

cc: G. R. Bond, Nuclear Analysis & Fuels Director
J. J. Colitz, Plant Engineering Director, TMI-1
R. W. Keaten, Director, Systems Engineering
J. D. Luoma, Manager, TMI Fuels Projects
J. D. McCarthy, Fuels Project Engineer
[redacted] QA Engineer III Mechanical
J. R. Stair, Engineer II Nuclear, TMI-1
D. G. Slear, TMI-1 Project Engineering Manager
W. S. Wilkerson, Lead Nuclear Engineer, TMI-1

orm LRC-139

abcock & Wilcox

Research and Development Division
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J. E. MATHESON, FUEL ENGINEERING, NPGD

From W. A. MCINTEER
G. M. BAIN GMB - IRRADIATED MATERIALS TECHNOLOGY, LRC

st. GPUN

File No. or Ref. RDD:83:5489:01

bj. TMI-1 RECOVERY — RNS RETAINER EXAMINATION

Date MAY 20, 1982

This letter to cover one customer and one subject only.

SUMMARY

As part of the TMI-1 recovery effort, a RNS retainer was examined at the LRC Hot Cell Facility. Although it was unirradiated, the retainer had been installed in-core since the EOC-4 outage in late 1978. Detailed testing of the retainer and its component parts included:

- visual examinations
- spring load-deflection and full-compression tests
- sodium azide spot tests
- liquid penetrant checks
- bend tests
- metallography and SEM examinations
- chemical analysis of surface wipe samples

While sulfur compounds were found on the external retainer surfaces, there was no evidence of mechanical property degradation or sulfur assisted intergranular attack.

1. INTRODUCTION

Analysis of cracked tubes from both A and B steam generators at TMI-1 indicated the failure mode was intergranular stress corrosion cracking with a reduced form of sulfur most likely acting as the corrosive agent.[1] Since the tube cracks were initiated from the ID surface, the presence of sulfur contaminents in the primary system implies the potential for material degradation of other RCS components.

A detailed examination of a regenerative neutron source (RNS) retainer from the TMI-1 core was conducted at B&W's Lynchburg Research Center as part of an effort to assess potential damage to various core components.[2] Although the retainer was unirradiated, it had been installed during the end-of-cycle four outage, and the retainer spring and load legs had been in a stressed condition while exposed to the RCS environment. A RNS retainer was selected for examination, since it contained materials representative of a wide range of core components (304 SS, 308 SS weld metal, and Inconel X750).

After receipt at the LRC, the retainer (#L106) was visually examined and load-deflection tests of the spring were performed. The retainer was then disassembled and the following tests were conducted on the components:

- detailed visual examination
- spring compression test
- sodium azide spot tests
- liquid penetrant checks
- bend tests
- metallography
- SEM examinations

Chemical analyses were also performed on cloth wipe samples from the retainer components and on samples obtained at the reactor site. Wipe samples taken at TMI-1 were from the north face of a new fuel assembly (NJ0132) and from the retainer, prior to shipment.

This letter report presents results from the examination of the retainer at the LRC and the chemical analysis of the cloth wipe samples.

2. EXAMINATIONS AND RESULTS[3,4]

2.1 Visual Examinations

2.1.1 Method

Visual examination of the retainer and its component parts was conducted at magnifications up to 60X with a stereo microscope. Photographic records of visual observations were taken with a 4X5 camera attached to the microscope. Macrophotographs of the retainer were taken with a MP-3 copy camera.

2.1.2 Results

A visual inspection of the retainer, prior to disassembly, showed no cracks in the weld, knee, or foot regions of the retainer legs. A schematic view of a retainer identifying its various components is shown in Figure 1. Typical macrophotos of the leg weld, knee, and foot regions are shown in Figure 2. Virtually no crud was observed on the outside surface. Overall views of the retainer are shown in Figures 3 and 4.

After disassembly all retainer components were examined in detail. Disassembly consisted of cutting the top fitting off the can and cutting the numbered leg from the hub through the weld area. Examination of the retainer legs showed no cracks or evidence of sulfur assisted attack of the surfaces. Several areas of black and white deposits and two small areas of yellow deposits were noted. The black areas are most likely crud and the white areas appear to be boron crystals from the coolant. The previously reported SEM/EDX analysis of the yellow deposits[4] was incorrectly based on a contaminated sample. Other EDX analyses on similar deposits found on the reactor vessel o-ring indicate the composition is mostly Fe with some Cr.[5] The spring surface was a uniform dark gray with localized areas of black and white deposits (see Figure 5). Two small areas also had yellow deposits similar to those found on the retainer leg. Examination of the retainer can showed no signs of surface degradation. The outside of the can had a thin, black oxide layer with a blue tint. The inside of the can had a dark, powdery crud layer with several areas of localized crud deposits.

2.2 Spring Load-Deflection Tests

2.2.1 Method

Prior to disassembly the X750 spring was tested for preload and spring rate using a load-deflection test rig previously used for irradiated retainers from Oconee 3.[6] The retainer spring was compressed using known weights of up to 100 pounds, while spring deflection was measured with two dial indicators accurate to 0.001 inch.

2.2.2 Results

Three load-deflection curves were recorded and are shown in Figure 6. Measured spring preloads ranged from 40 to 41 pounds and spring rates from 48-50 pounds per inch. These values are considered normal and agree with other retainer data.

2.3 Spring Compression Test

2.3.1 Method

After the retainer was disassembled, the spring was compressed to its solid spring height using five lead bricks. Eack brick weighed a nominal 26 pounds. Relaxed spring height was measured before and after full compression with dial calipers accurate to 0.001 inch.

2.3.2 Results

Relaxed spring height before and after full compression was 4.00 inch, indicating no plastic deformation occurred during testing. After testing, the outer surface of the spring was visually examined at 10X magnification with a stereo microscope. No cracks or other forms of damage were observed.

2.4 Sodium Azide Spot Tests

2.4.1 Method[7]

Sodium azide spot tests for the presence of reduced forms of sulfur were conducted by placing drops of test solution on surfaces of interest (spring, leg, weld area, inner and outer can surfaces). The areas where the drops were placed were then observed through the stereo microscope. Bubbles from the solution indicate the presence of reduced forms of sulfur (sulfide, thiosulfate, etc.). The basis for the test is the catalytic acceleration of the iodine-azide reaction by reduced forms of sulfur. This reaction evolves free nitrogen gas to produce bubbles and will detect reduced forms of sulfur at concentrations less than one ppm.

2.4.2 Results

Outside surfaces of the retainer components showed positive reactions to the sodium azide spot test. The inner surface of the can and the retainer spring showed negative reactions. Results of the tests are summarized below:

	Retainer Component				
Run	Spring	Leg	Leg-Weld	Can (outside)	Can (inside)
1	neg.	pos.	neg.	pos.	neg.
2	neg.	pos.	pos.	pos.	neg.

Tests indicated the presence of reduced sulfur on outer surfaces of the retainer. The inside of the can and the Inconel X750 spring showed no evidence of reduced sulfur, but results may have been affected by crud deposits.

2.5 Liquid Penetrant Tests

2.5.1 Method

Liquid penetrant tests were conducted on the retainer leg and hub and on the spring using the procedure specified in Reference 6. The pieces were ultrasonically degreased with tichloroethylene, cleaned with Spotcheck Cleaner/Remover, and dried with clean cloths. The parts were sprayed with Spotcheck Penetrant and kept thoroughly wetted for 20 minutes. The spring was tested while under compression to open any cracks that may have been present. After removing excess penetrant, the parts were uniformly covered with Spotcheck developer and visually inspected.

2.5.2 Results

No indications of cracks were observed in either the leg, weld area, or spring. The only positive indications observed were from elongated surface inclusions on the sides of the leg.

2.6 Bend Tests

2.6.1 Method

Bend tests were performed on the leg/hub weld region and a 1-1/2 inch piece from the middle coil of the spring. The parts were clamped in a vise and bent to open any cracks which may have been present.

2.6.2 Results

The leg weld was bent through approximately 45 degrees with no visible crack initiation, indicating a sound weld. The spring sample was bent and fractured. The fracture surface was examined with an SEM to characterize the mode of failure. The SEM examination showed the fracture surface was new and failure was 100 percent ductile. Examples of the appearance of the fracture surface are shown in Figure 7. No evidence of intergranular cracking was observed.

2.7 Metallography

2.7.1 Method

Samples from the leg, knee, weld area, and the active coil and contact region of the spring were mounted in Buehler Epomet. The samples were ground flat on silicon carbide through 600 grit and polished with alumina. Final polishing was done with 0.05 micron alumina. The samples were then metallographically examined at 400X magnification for evidence of intergranular attack. The samples were examined in both polished and etched conditions. The Inconel X750 spring material was etched with copper regia and the 304 and 308 stainless steel samples with glycerol regia.

2.7.2 Results

The microstructure of all the samples appeared normal and no evidence of intergranular attack was observed. Figure 8 shows typical etched microstructures of the 304 SS base metal, 308 SS weld metal, and X750 spring. The weld area and heat-affected zone are shown at 50X in Figure 9.

2.8 Chemical Analysis of Surface Wipe Samples

2.8.1 Method

Cloth wipe samples were taken from the RNS retainer and a new fuel assembly, NJ0132, at TMI-1 prior to shipment of the retainer to the LRC. The retainer wipe covered 15.5 square-inches of the leg area. The fuel assembly wipes covered one face of a grid and across 15 rods just below a grid. Wipe samples were taken from the retainer after disassembly at the LRC. Samples were obtained from one retainer leg, two coils of the spring, and the inner and outer surfaces of the can.

Wipe samples from the disassembled retainer were analyzed for chlorine content by a LRC procedure similar to ASTM D512, "Tests for Chloride Ion in Water and Waste Water," and for sulfur content by a procedure similar to ASTM D516, "Tests for Sulfate Ion in Water and Waste Water." Since the chloride ion results were low (8 μg total or less) and used half the wipe sample, wipe samples from TMI-1 were only tested for sulfate content.

2.8.2 Results

Chloride and sulfate ion contents of wipe samples from the retainer parts were low, < 5 to 8 μg total Cl^- and < 20 to 50 μg total SO_2^{-2}. When the background from the cloth samples was subtracted, only the sample from the spring showed any removable sulfur. Results of the sulfate analysis of wipe samples are given below:

LRC Wipe Sample Results

(cloth batch 67)

RNS Component	Total SO$_4$, µg	Less Blank	Total* Sample S, µg	Wipe Area, in^2	Removable Sulfur, µg/in^2
blank	18				
blank	15				
Avg	<20				
Leg	<20	--	--	20	--
Spring	50	>30	>20	9	∿2
Can (outside)	25	>5	>3	28	--
Can (inside)	<20	--	--	--	--

* on a whole cloth basis

Cloth wipe samples taken from the retainer after it was removed from the core and from the fuel assembly grid and rods showed slightly higher levels of removable sulfur, in the range of three to five µg/in^2. Results of the sulfate analysis are given below:

TMI-1 Wipe Sample Results

Cloth Batch	Sample	Total SO$_4$, µg	Less Blank	Total Sulfur, µg	Wipe Area, in^2	Removable Sulfur, µg/in^2
75	blank	30				
	blank	< 10				
	Avg	< 20				
	Zr Fuel Rods	50	> 30	> 10	2.7	∿4
	Inconel Grid	90	> 70	> 23	8.1	∿3
71	blank	<10				
	blank	20				
	Avg	<15				
	Cloth Dipped in core	20	>5	>1.7		
	Retainer	243	228	76	15.5	∿5

3. CONCLUSIONS

While reduced forms of sulfur were detected on the retainer components, there was no evidence of mechanical property degradation or intergranular attack.

4. REFERENCES

1. M. A. Rigdon and E. B. S. Pardue, "Evaluation of Tube Samples from TMI-1 — Final Report," RDD:83:5390-03:01, Babcock & Wilcox, Lynchburg, Virginia, April 1982.

2. C. G. Dideon to D. G. Culberson, Memorandum, "TMI-1 Recovery — Core Examination Task," FPO-82-41, March 24, 1982.

3. W. A. McInteer and G. M. Bain to Distribution, Memorandum, TMI Core Recovery — Initial Retainer Exam," April 30, 1982.

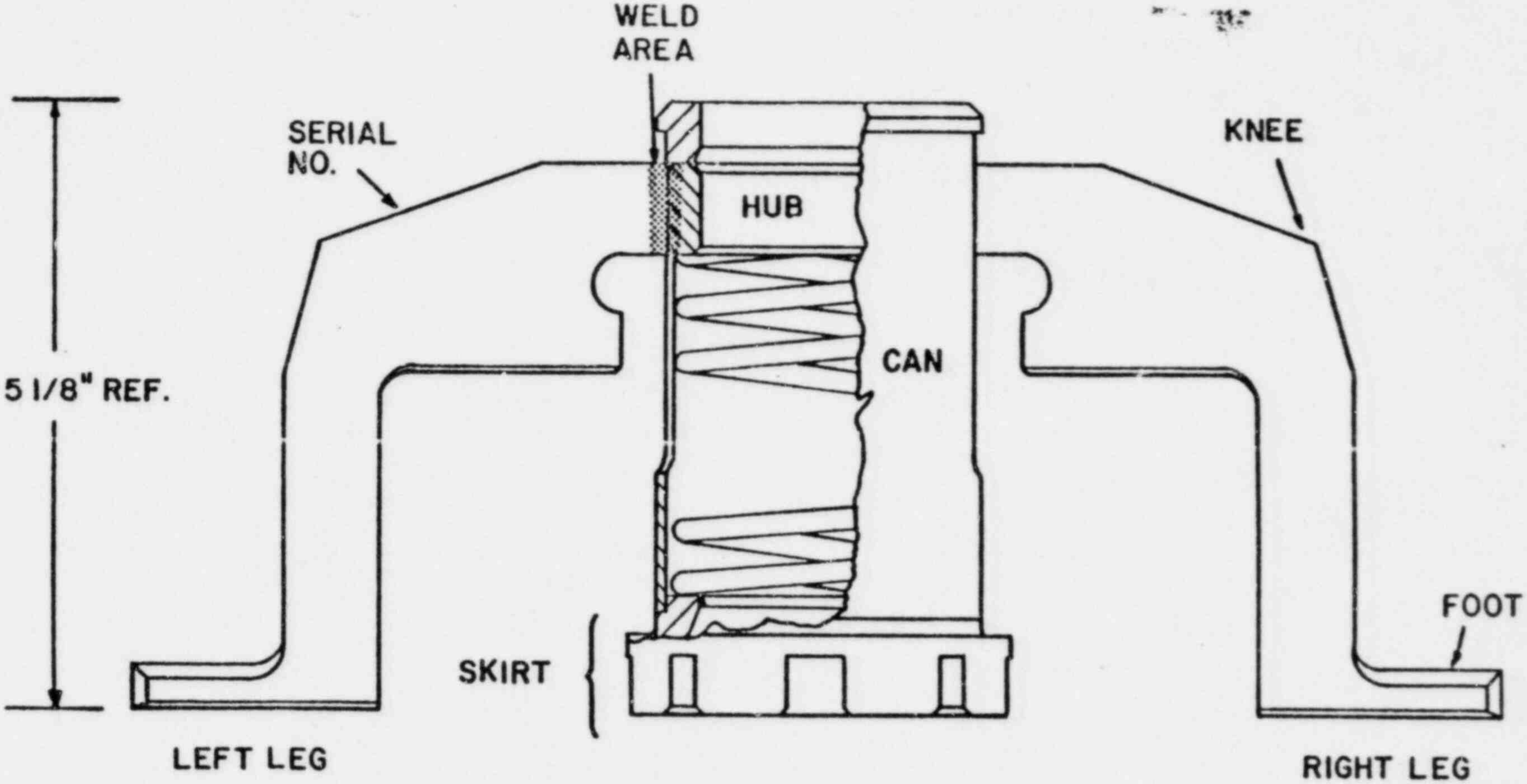
4. W. A. McInteer to C. G. Dideon, Memorandum, "TMI Core Recovery — RNS Retainer Detailed Exam," May 6, 1982.

5. D. L. Baty, "Examination of TMI-2 Reactor Vessel O-Ring and CRDM Closure Insert," RDD:83:5490/5491:01, Babcock & Wilcox, Lynchburg, Virginia, May 25, 1982.

6. E. B. S. Pardue, "Examination of Oconee 3 RNS Retainers," LRC 9085, Babcock & Wilcox, Lynchburg, Virginia, February 1982.

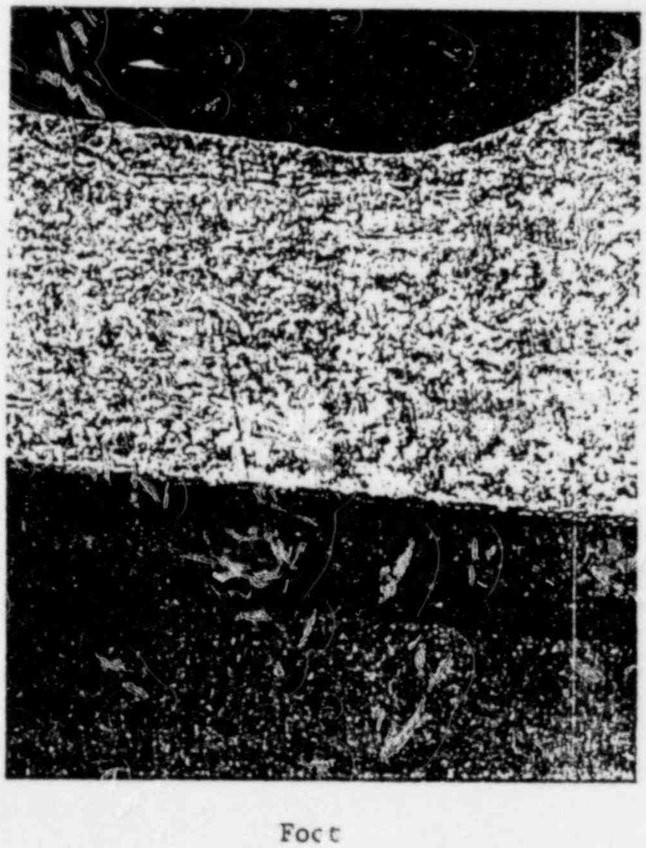
7. F. Feigl, Laboratory Manual of Spot Tests, p. 163-166, Academic Press, New York, 1943.

Figure 1. Front View of RNS Retainer



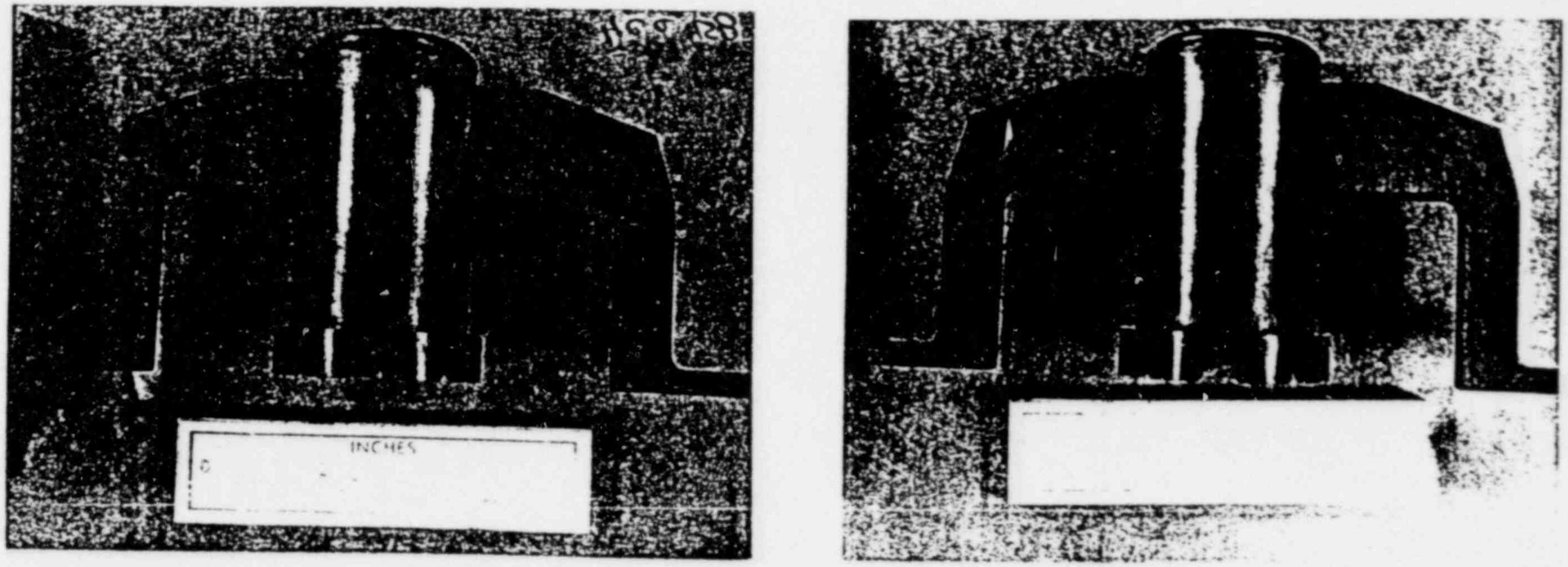
Weld Area

Inside Knee



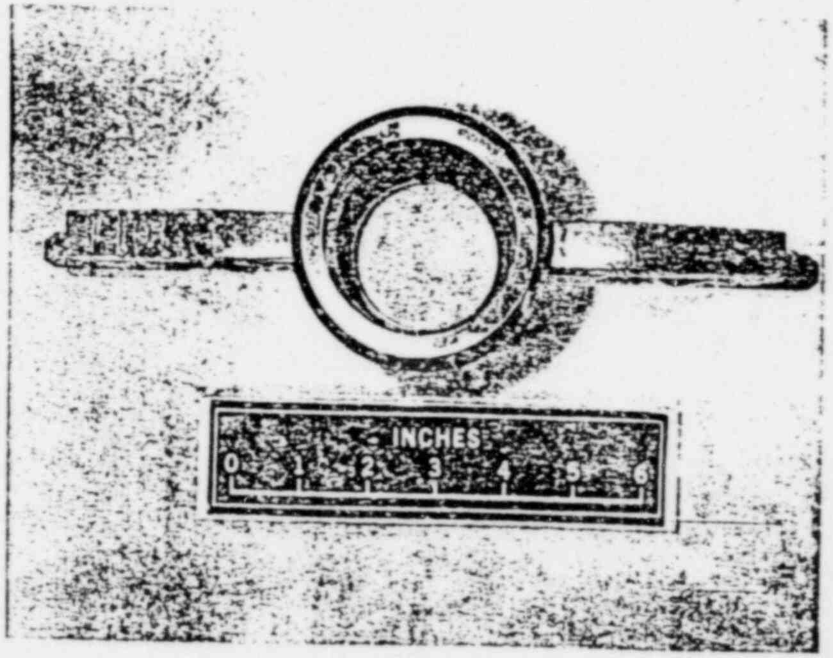
Foot

Figure 2. Typical Macro Appearance of Retainer Leg



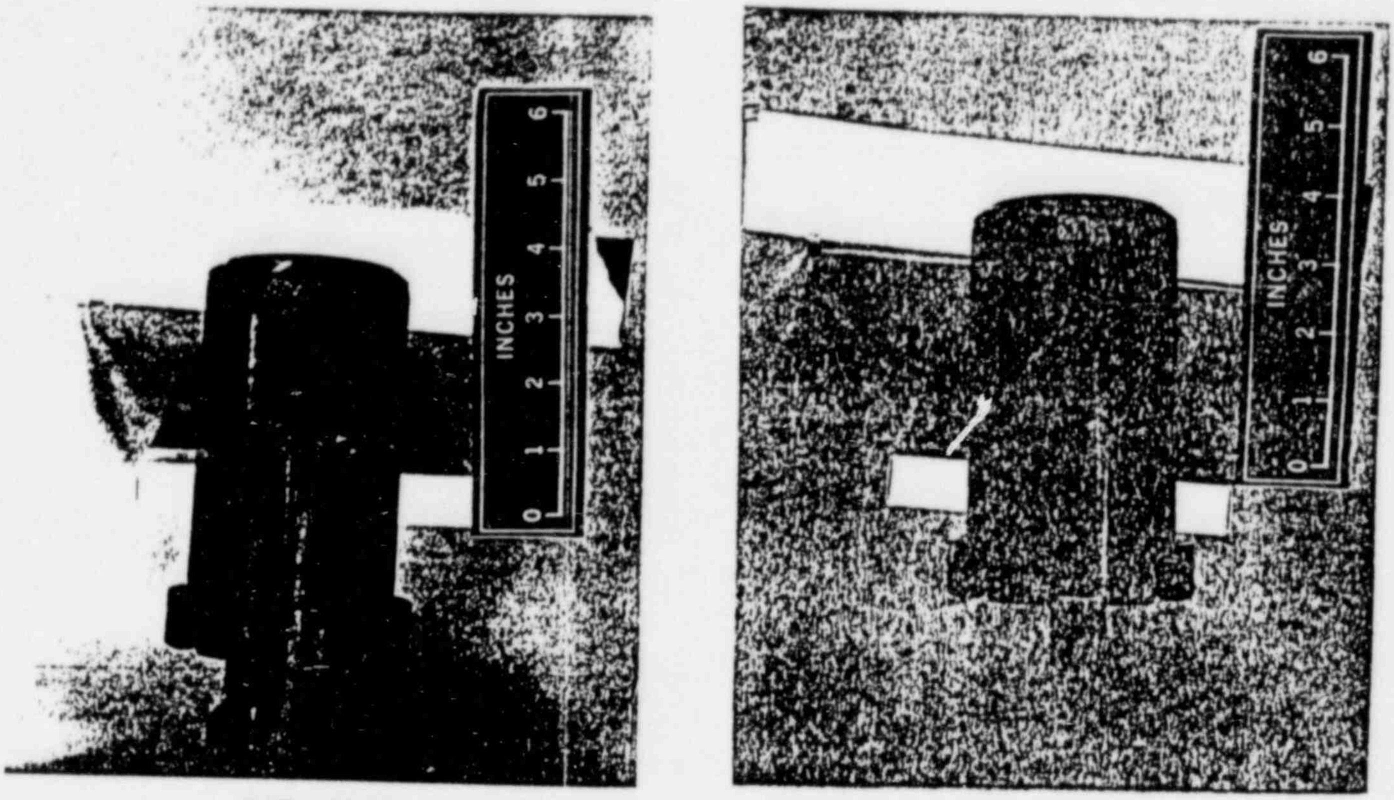
Front

Back



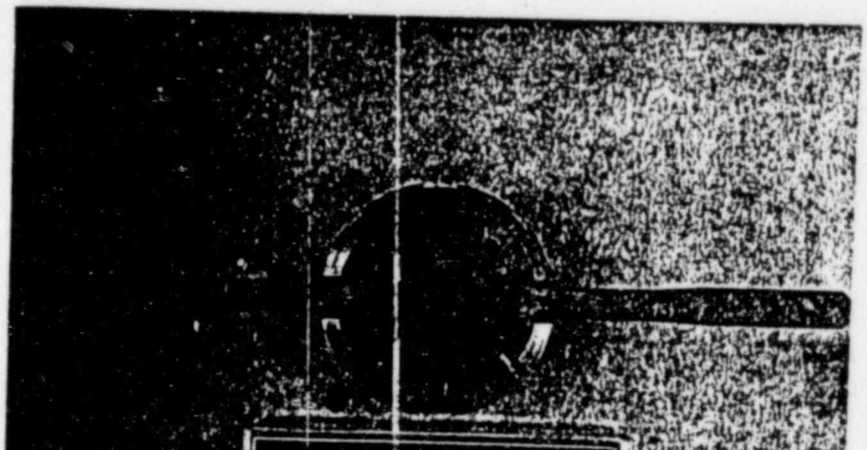
Top

Figure 3. Overall Appearance of Front, Back, and Top of Retainer L106



Left Side

Right Side



Bottom

Figure 4. Overall Appearance of Sides and Bottom of Retainer L106

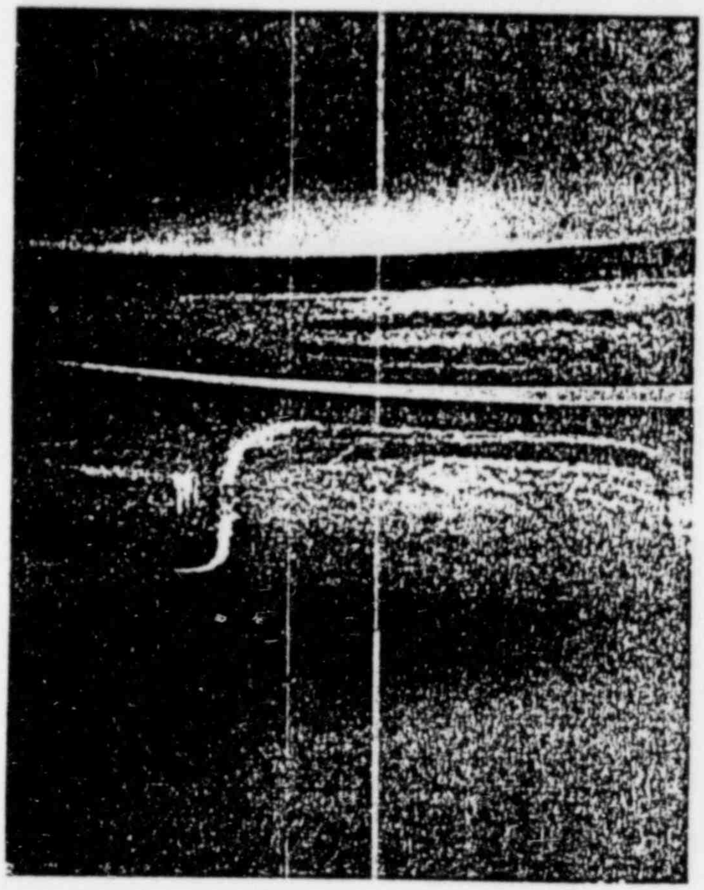


Figure 5. Crud and Boron Crystal Deposits on Spring From Retainer L106

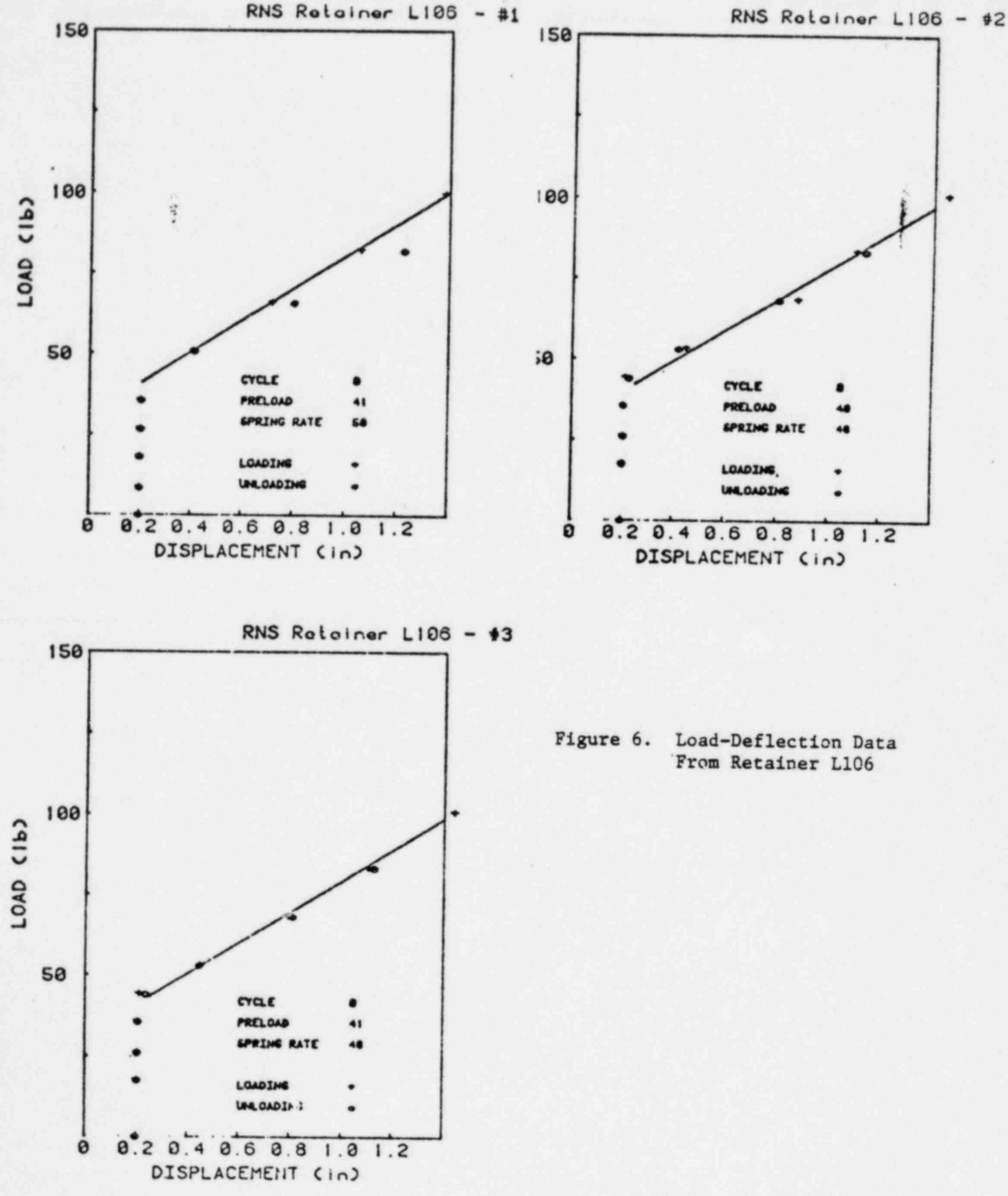


Figure 6. Load-Deflection Data From Retainer L106

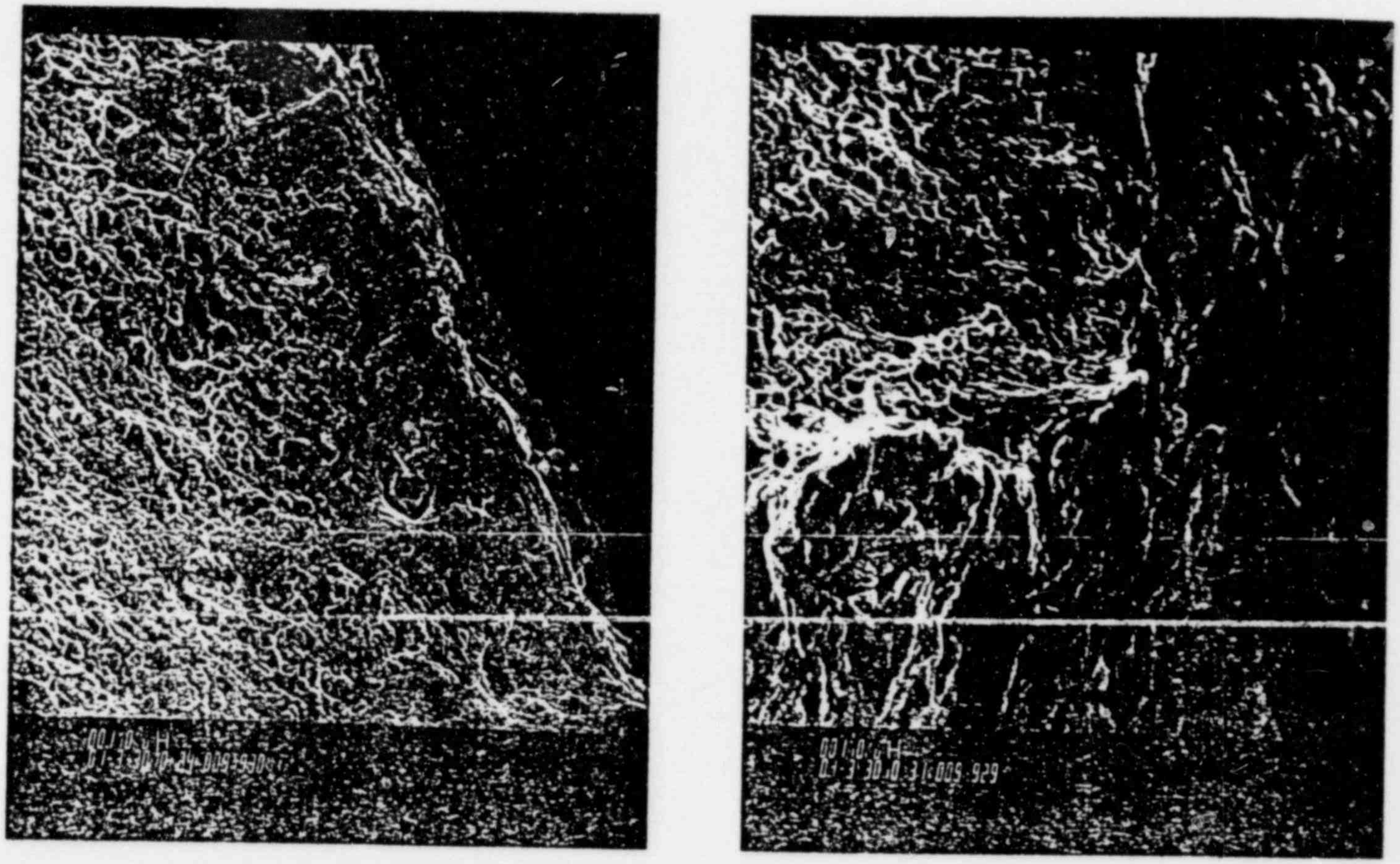
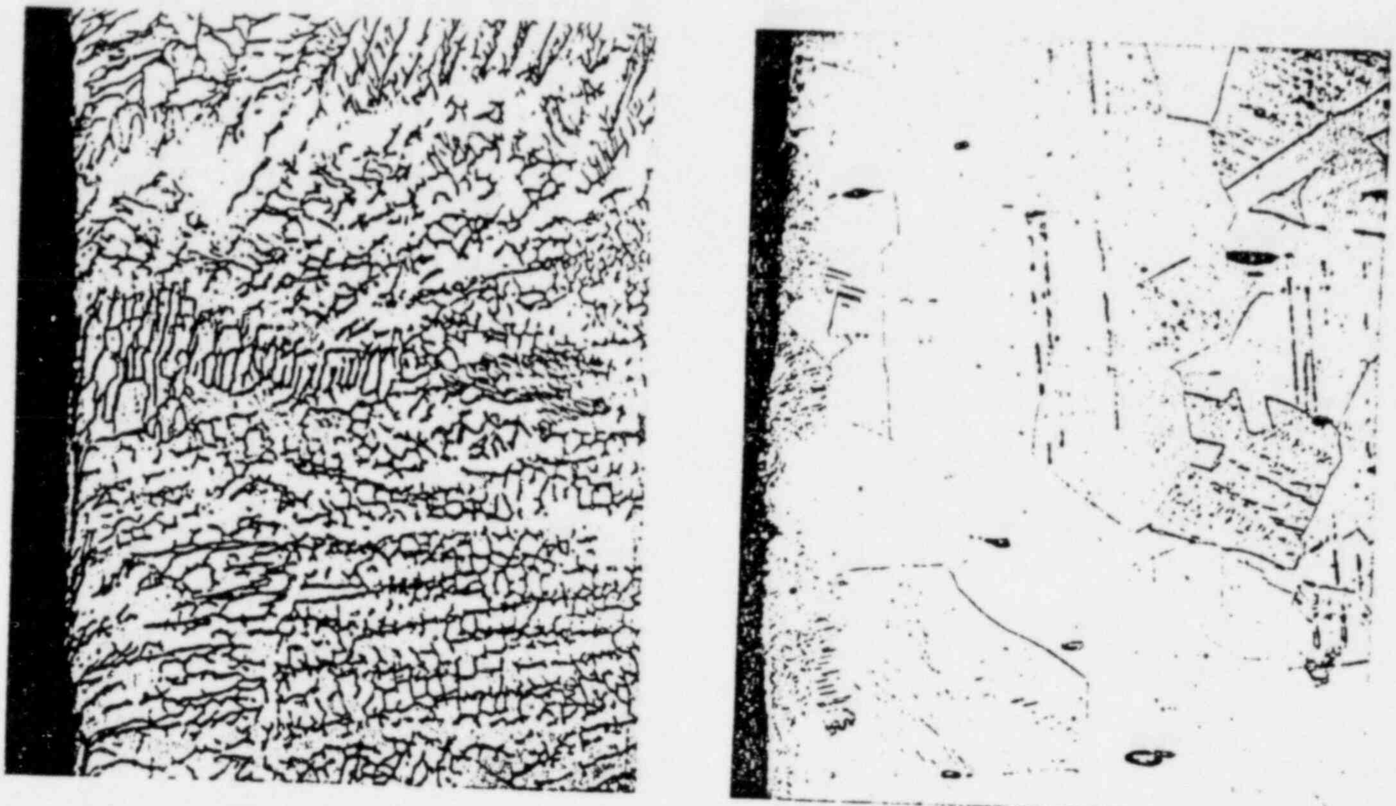
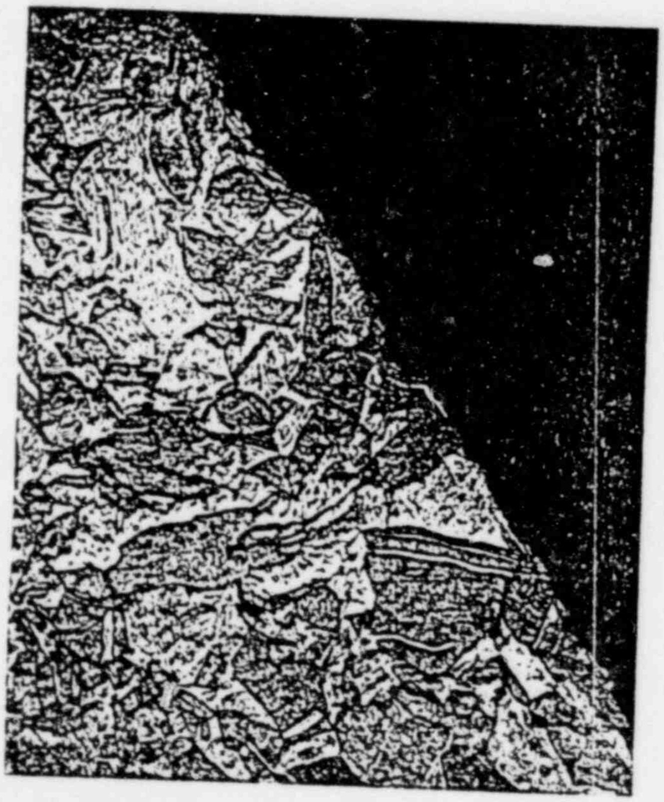


Figure 7. Typical Appearance of Inconel X750 Spring Fracture Surface (1000X)



308 SS Weld

304 SS Knee



X750 Spring

Figure 8. Typical Etched Appearance of Retainer Component Microstructures (400X)

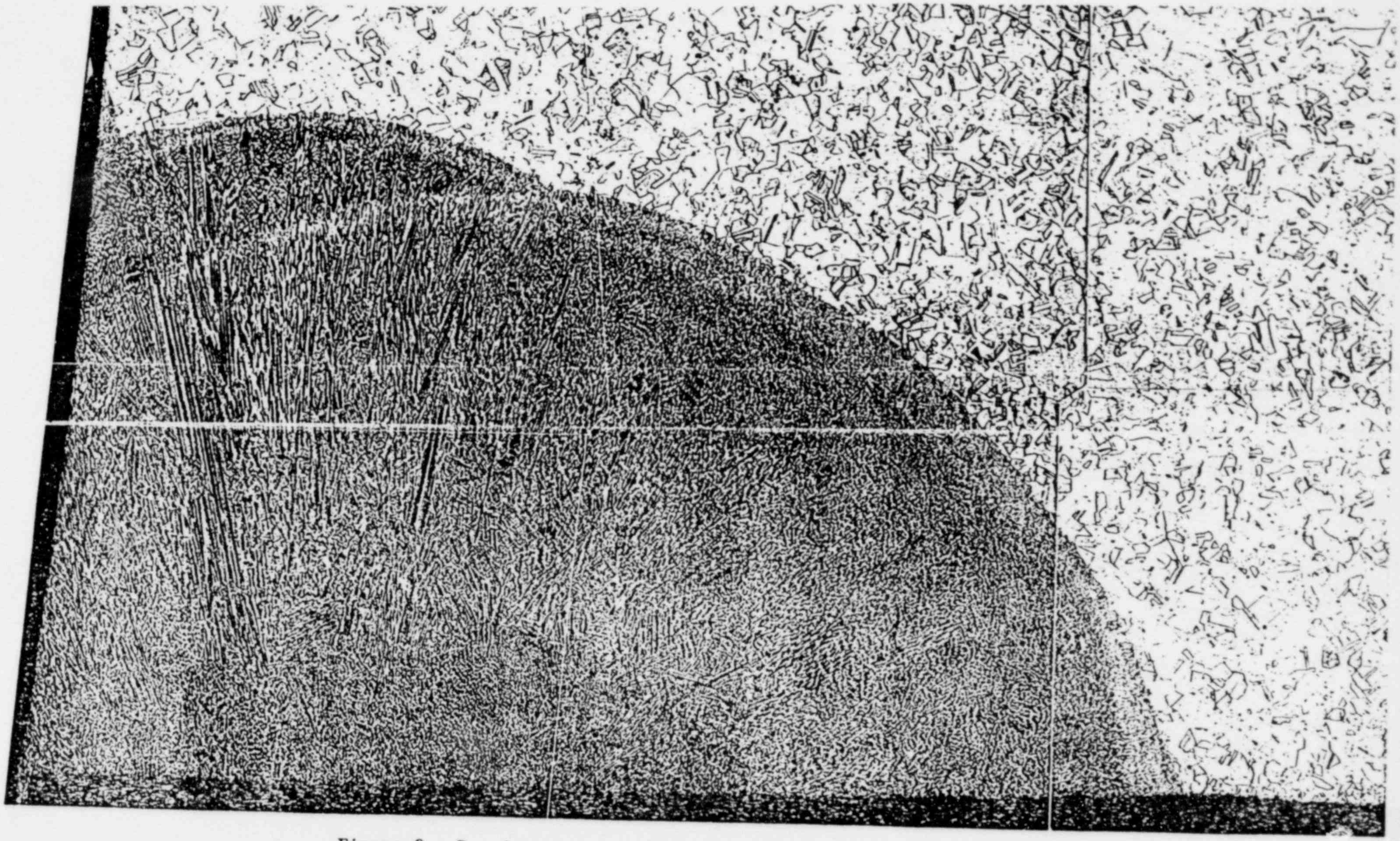


Figure 9. Retainer Leg Weld and Heat Affected Zone (50X)

TEST

6

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 6

Inspected Item: Motor Tube Extension (3)

Type of Inspection: Ultrasonic

Inspection and Test Plan: These motor tubes are made of SA312 GR TP 304. Included in the examination is one weld seam on each motor tube which is in the "as welded" condition. This examination will include heat affected zone and stainless filler metal. Two of these tubes were reworked prior to installation to remove flaws induced by the hot drawing process. Therefore, they may have had small initial flaws which would make them more susceptible to corrosion attack.

	YES	NO
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	~~✓~~ void Ref. memo MT/2049 R. Turner 6/2/82
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 3 Minimum required 3.)	✓	

Note: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	YES	NO
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

Note: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132496-01

8. Task #7 Procedure No. STP-1-82-0015

Reviewer's Signature Rodney Turner

Test Completion Review Sheet Comments, Task #7 Test #6, Motor Tube Extension (3)

Item #3 The ultrasonic examinations for APSR #63 and 66 were examined inplace atop of the reactor head. This exam did not reveal any indication which exceeded the acceptance criteria. The ultrasonic examination of APSR #68 was performed after it was removed from the reactor head. An ultrasonic reflector was detected, this reflector exceeded both amplitude and length of that stated in the acceptance criteria. At this time, this reflector is only being classified as a suspected indication, further investigation is on-going to determine the nature of this reflector and until that is established APSR #68, connection weld remains an open item.

Rodney Turner
Rodney Turner
NDE Specialist

G. Rhedrick

Inter-Office Memorandum

GPU Nuclear

ate April 26, 1982
ISI/M82020

Subject Ultrasonic Examination of the CRDM Motor Tubes APSR #63 and #66 (Task #7 Test #6 Partial)

To N. C. Kazanas

Location Parsippany

An ultrasonic examination was performed on the motor tubes APSR #63 and #66 on April 15, 1982 by Materials Technology personnel. Both APSR's were found to be acceptable.

These two (2) APSR's were still bolted in place on the Reactor Vessel Head during this examination causing access problems which were overcome with some difficulty. The connecting weld, 1" above and 18" below this weld was the area subject to this inspection. An ultrasonic reflector was detected and reported in the connecting weld area on both APSR's. These reflectors were recorded on data sheets 000070 and 000071 (attached) APSR #63 and #66 respectively. These reflectors were plotted on the indication plot form (attached) and found to be attributed from a change in thickness on the I.D. A longitudinal beam test was performed prior to plotting which verified that this condition exists in both APSR's.

APSR #63 revealed this reflector 360° intermittently while APSR #66 showed this reflector continuously for 360°. This falls into the guidelines that APSR #63 change in thickness is not as severe as APSR #66. This change in thickness is cuased by a honing process which was employed on the I.D. surface to remove hot tears, which developed during fabrication of the motor tube.

Limited scan reports were issued to denote that 100% scanning was not obtainable due to the stator and thermocouple connections which caused interference. The exam was performed in accordance with procedure MTIS-008, Rev. 4, FCA TMI-1-005 and STP-1-82-0015. The acceptance criteria employed was taken from B&W E.I.R. document 51-113-2496-01. This test is only partially completed. The examination of APSR #68 is still open, and can not be performed at this time. The Plant is still attempting to remove this APSR from the Head due to the fact that this APSR requires a greater extent of ultrasonic inspection which is inaccessible when attached to the Head. A follow up report will be issued upon completion of the ultrasonic examination of APSR #68.

Rodney Turner

Rodney Turner
NDE Specialist

RT:ef

cc: C. Cowfer
J. Potter
G. Rhedrick
M. Zeise

GPU Nuclear
NDE

000070

Ultrasonic Data Sheet

Site: TMI-1
Inspection ID: N/A
Component: CRDM motor tube
Description: motor tube connecting weld & 18" down tube & 1" above connecting weld.
Cal. Block: met. drill
I.D.: motor tube APSR #63
Procedure: mtis-008 Rev 4
Material: S/S
Thickness: .360 In.
Test Surface: O.D
No. Positions: 1
Distance: N/A In.
Drawing: N/A
Beam Direction ______ Long 2 Shear
Limited Exam ☐ No ☑ Yes
Examiner: Rodney Turner RD Turner ID#: 1863 Level: III
Examiner: Michael Zeise MHZ Zeise ID#: A374 Level: II
Notes:

Cal. Sheet	000186	000187	
Angle	45°	45°	
Time Start	14:40 Hr.	17:11 Hr.	Hr.
Time Stop	15:44 Hr.	17:23 Hr.	Hr.
Part Temp	72 0°F	74° 0°F	0°F
Date	April 15, 1982	April 15, 1982	

0° Information Only
Weld Height Flush Weld Width .250"

Surface One to Surface Two

BM	Haz	℄ Weld	Haz	BM
.350	.385	.415	.340	.305

Ind. No.	Angle (Deg)	Surface	Beam Direction	LAM		LNGTH / WIDTH				Through Wall Dimension						Remarks
										Minimum			Maximum			
				Max Amp % DAC	Depth	Crystal Distance From				Depth	Position In. 1	Position In. 2	Depth	Position In. 1	Position In. 2	
						CW	CCW	1	2		CW	CCW		CW	CCW	
200	45°	1	2	95	.350	*	—	—	.150	.345	—	—	.355	—	—	Through wall .010"
																* intermittent 360°
																At various amplitudes

No Reportable Indications ☐ Reportable Indications ☐ Non Relevant Indications ☑

Reviewed by:
Level:
Date: 4/[illegible]/82
Page 1 of ~~2~~ 3
NDE Request No. N/A

Angle/Ind. No. 0 Deg/0-199 45 Deg/200-399 60 Deg/400-599 Other/600-799

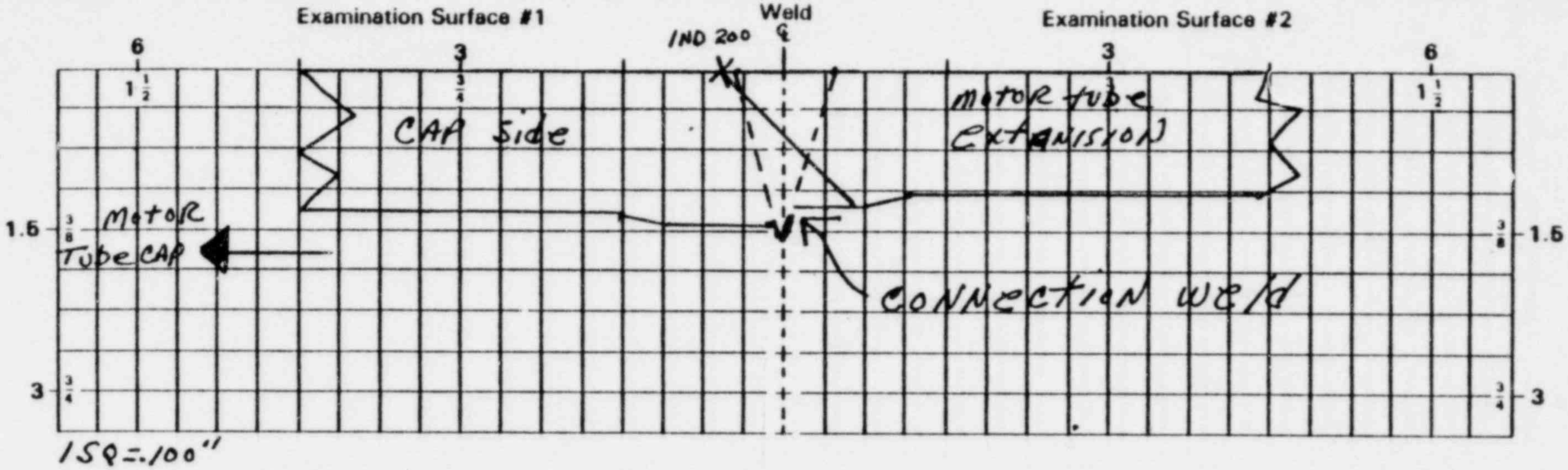
A0000926

GPU Nuclear

NDE

Request for Evaluation/Indication Plot

Request # N/A



Examiners Comments DATA SHT. 000070 INdications Appear intermitten 360°. Reflectors are from Change in thickness section, Verified by 0° probe, Reflectors Are Geometric Signals

Examiner Rodney Lumm Level III Date 4-15-82

Materials Technology Evaluation and Disposition evaluation/disposition Not Required due to Reflector are Geometric.

☑ Geometric ☐ Recordable ☐ Reportable Analyst Rodney Lumm Title NDE Specialist Date 4-15-82

Site/Inspection I.D. TMI-1

Component I.D. CRDM motor tube

Component/Weld No. APSR #63

Acceptance Standard Section XI 1977 Edition through summer of 1978 IWB 3000 Page 2 of ~~2~~ 3

RD 4-15-82

A0000937

GPU Nuclear

NDE

Date: APRil 15, 1982

Limited Scan Report

Data Sheet No.: 000070

Component: CRDM motor tube APSR #63

No ☐ Limited Scan ☑

Surface 1 ☐ Surface 2 ☑

Beam Direction 1 ☑ Beam Direction 2 ☑

CW ☑ CCW ☑

4½" Inches from Reference Point to 9½" inches

From Reference Point. 17½" to 28" inches from ~~Weld Centerline.~~ RD 4-15/82 TOP OF CRDM (CAP)

For Angles: 0° ☐ 45° ☑ 60° ☐ Other ______

Due to: STATOR, thermocouple CONNECTIONS

Examiner: Rodney Turner	I.D. #: 1863	Level: III	Date: 4-15-82

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

______ Inches from Reference Point to ______ inches

From Reference Point. ______ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ______

Due to: ______

Examiner:	I.D. #:	Level:	Date:

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

______ Degrees, ______ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ______

Due to: ______

Examiner:	I.D. #:	Level:	Date:

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

______ Degrees, ______ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ______

Due to: ______

Examiner:	I.D. #:	Level:	Date:
Reviewed by:	Level:	Date:	Page 3 of 3

GPU Nuclear
NDE

000071

Ultrasonic Data Sheet

Site: TMI-1
Inspection ID: N/A
Component: CRDM motor tube
Description: motor tube connection weld to cap. 1" above and 18" below this weld
Cal. Block: met-ed-011
I.D.: motor tube APSR #66
Procedure: mtis-008 Rev 4
Material: C/S
Thickness: .350 In.
Test Surface: O.D.
No. Positions: 1
Distance: N/A In.
Drawing: N/A
Beam Direction ______ Long 2 Shear
Limited Exam ☐ No ☑ Yes
Examiner: Rodney Turner RD Turner
ID#: 1813
Level: III
Examiner: Michael Zeise MHZ Zeise
ID#: A374
Level: II
Notes:

Cal. Sheet 000186	Cal. Sheet: 000187	Cal. Sheet:	
Angle: 45	Angle: 45	Angle:	
Time Start: 15:49 Hr.	Time Start: 16:49 Hr.	Time Start: Hr.	
Time Stop: 16:24 Hr.	Time Stop: 17:05 Hr.	Time Stop: Hr.	
Part Temp: 72° 0 °F	Part Temp: 73° 0 °F	Part Temp: 0 °F	
Date: April 15, 1982	Date: April 15, 1982	Date:	N/A

0° Information Only
Weld Height Flush Weld Width .250

Surface One to Surface Two

BM	Haz	℄ Weld	Haz	BM
.330	.340	.445	.350	.295

				LAM		LNGTH	WIDTH			Through Wall Dimension						
										Minimum			Maximum			
						Crystal Distance From					Position In.			Position In.		
											1	2		1	2	
Ind. No.	Angle (Deg)	Surface	Beam Direction	Max Amp % DAC	Depth	CW	CCW	1	2	Depth	CW	CCW	Depth	CW	CCW	Remarks
200	45	1	2	150	.300	*	–	–	.050	.275	–	–	.340	–	–	Through wall .340-275=.065"
																* 360° in length.

No Reportable Indications ☐ Reportable Indications ☐ Non Relevant Indications ☑

Reviewed by:
Level:
Date: 4/[illegible]2
Page 1 of 3
NDE Request No. N/A

Angle/Ind. No. 0 Deg/0-199 45 Deg/200-399 60 Deg/400-599 Other/600-799

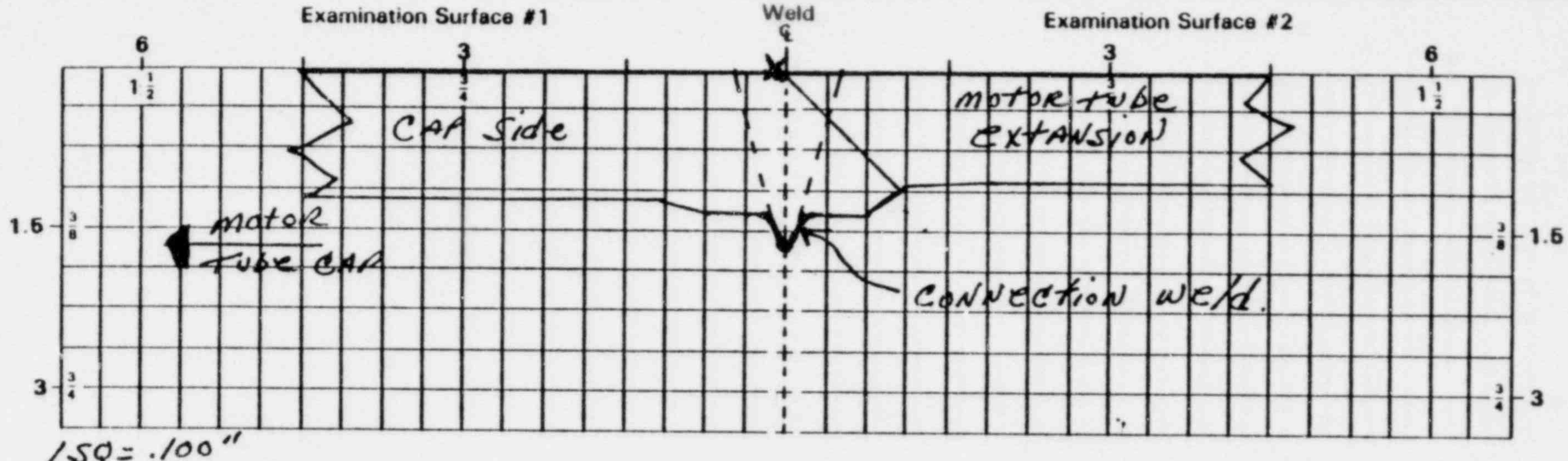
A0000926

GPU Nuclear

NDE

Request for Evaluation/Indication Plot

Request # N/A



1SQ= .100"

Examiners Comments DATA SHT. 000071 INDICATIONS ARE 360° AND ARE Attributed to A sever change in Thickness Section. Indications are Geometric.

Examiner Rodney Turner Level III Date 4-15-82

Materials Technology Evaluation and Disposition evaulation is not Required due to indications are found to be Geometric

☑ Geometric ☐ Recordable ☐ Reportable Analyst Rodney Turner Title NDE Specialist Date 4-15-82

Site/Inspection I.D. TMI-1

Component I.D. CRDM motor tube

Component/Weld No. motor tube APSR #66

Acceptance Standard IWB-3000 Section XI 1977 edition through summer 1978 Page 2 of 3

GPU Nuclear

NDE

Date: APRil 15, 1982

Limited Scan Report

Data Sheet No.: 000071

Component: CRDM motor tube APSR #66

No ☐ Limited Scan ☑

Surface 1 ☐ Surface 2 ☑

Beam Direction 1 ☑ Beam Direction 2 ☑

CW ☑ CCW ☑

1 1/2" Inches from Reference Point to 9 1/2 inches From Reference Point. 17½" to 28" inches from ~~Weld Centerline~~. @ Heater Top of CRDM

For Angles: 0° ☐ 45° ☑ 60° ☐ Other ____

Due to: Stator, thermocouple connections

Examiner: Rodney Turner	I.D. #: 1863	Level: III	Date: 4-15-82

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

____ Inches from Reference Point to ____ inches From Reference Point. ____ inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ____

Due to: ____

Examiner:	I.D. #:	Level:	Date:

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

____ Degrees, ____ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ____

Due to: ____

Examiner:	I.D. #:	Level:	Date:

No ☐ Limited Scan ☐

Surface 1 ☐ Surface 2 ☐

Beam Direction 1 ☐ Beam Direction 2 ☐

CW ☐ CCW ☐

____ Degrees, ____ Inches from Weld Centerline.

For Angles: 0° ☐ 45° ☐ 60° ☐ Other ____

Due to: ____

Examiner:	I.D. #:	Level:	Date:
Reviewed by:	Level:	Date:	Page 3 of 3

GPU Nuclear
NDE

000186

Calibration Sheet

Site: TMI-1
Inspection ID: N/A
Component: CRDM - motor tube
Procedure Mt 15-008 Rev. 1

Examiner: Rodney Turner RT TURNER ID#: 1863 Level: III
Examiner: Michael Zeise MAZ Zeise ID#: A374 Level: II
Couplant: SONOTRACE #30
Couplant ID#: E179110
Drawing# N/A

Date: April 15, 1982 Time: 14:36

Instrument

ID#: 211050
Linearity Check ☐ Yes ☒ No
Reject: OFF
Mat'l. Cal.: 6.28
Delay: 6.78
Pulse Energy: N/A
Coarse Gain in DB: 20
Fine Gain in DB: 22
Fine Gain: N/A
Screen Range: 2.5"
Screen Depth: 1.750 In.
Operation ☐ T&R ☒ Normal
Frequency: 2.5 MHZ
Pulse Rep. Rate N/A
Damping 75%
Filter N/A

Calibration Block

ID# MET-Cd-011
Length 7 7/8" In.
OD 4" In.
Thickness .350 In.
Temp 70 °F

Crystal

ID# L25119
Type LS
Freq. 2.25 MHZ
Size .25 R In.
Actual 45 °

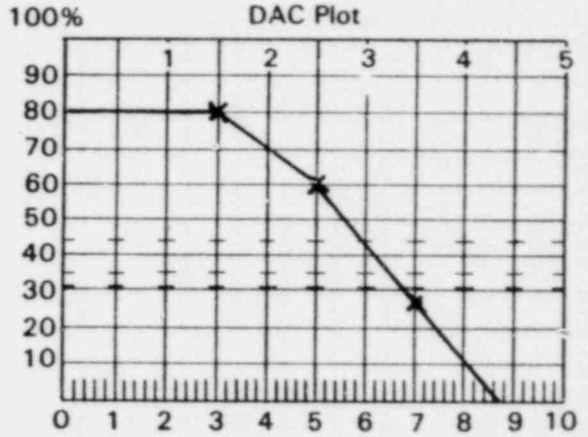
Search Unit Cable

Type micro Dot ID TC-009 Length 6'
Thermometer S/N 9
(Required Summer '73 for Vessels
Required Winter '75 for piping)

System Calibration

Angle 43 °
Cal. Dir. Axial ☑ Circ. ☐

Reflector	Amplitude % of Full Screen	Screen Reading In Inches
6/8 Node	80 %	.525 In.
10/8 Node	60 %	.875 In.
14/8 Node	27 %	1.225 In.
/8 Node	N/A %	N/A In.
/8 Node	%	In.
Top Notch	%	In.
Opposite Notch	%	In.
Notch	%	In.
Bkr CB	%	In.
Bkr P	%	In.



Calibration Confirmation

Time	16:30 Hrs		Hrs		Hrs		Hrs		Hrs	
Back Refl.	N/A %	N/A In.	%	In.	%	In.	%	In.	%	In.
/8 Node	78 %	.525 In.	%	In.	%	In.	%	In.	%	In.
/8 Node	58 %	.875 In.	%	In.	%	In.	%	In.	%	In.
/8 Node	26 %	1.225 In.	%	In.	%	In.	%	In.	%	In.
Top Notch	N/A %	N/A In.	%	In.	%	In.	%	In.	%	In.
Opposite Notch	%	In.	%	In.	%	In.	%	In.	%	In.
Notch	%	In.	%	In.	%	In.	%	In.	%	In.
Initia	RT									

Remarks

SCAN db 48
FCA TMI-1-005
STP 1-82-0015

Reviewed By:
Level Date 4/15/82

Bkr CB (Back Reflection From Cal. Block) Bkr P (Back Reflection from Part)

A0000927

GPU Nuclear
NDE

000187

Calibration Sheet

Site: TMI-1
Inspection ID: N/A
Component: CRDM motor tube
Procedure: mtis 008 Rev. 4

Examiner: Rodney Turner RD TURNER
ID#: 1863
Level: III
Couplant: SoNotRAce #30

Examiner: Michael Zeise MHZ Zeise
ID#: A374
Level: II
Couplant ID#: E179110

Drawing# N/A

Instrument

ID#: 211050
Linearity Check ☐ Yes ☒ No
Reject: OFF
Mat'l. Cal.: 6.25
Delay: 6.72
Pulse Energy: N/A
Coarse Gain in DB: 20
Fine Gain in DB: 24
Fine Gain: N/A
Screen Range: 2.5"
Screen Depth: 1.750 In.
☐ T&R
☒ Normal
Operation
Frequency: 2.5 MHZ
Pulse Rep. Rate N/A
Damping 70%
Filter OFF

Calibration Block

ID# met-ed-011
Length 7½" In.
OD 4" In.
Thickness .350 In.
Temp 72 °F

Crystal

ID# L25119
Type LS
Freq. 2.25 MHZ
Size .25 R In.
Actual 45 °

Date: April 15, 1982 Time: 16:41

Search Unit Cable

Type micro Dot ID TC-009 Length 6'

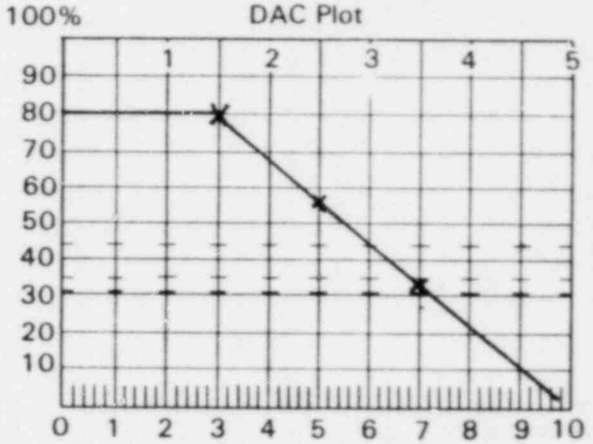
Thermometer S/N 9
(Required Summer '73 for Vessels
Required Winter '75 for piping)

System Calibration

Angle 43 °
Cal. Dir.
Axial ☐ Circ. ☒

Reflector	Amplitude % of Full Screen	Screen Reading In Inches
6/8 Node	80 %	.525 In.
10/8 Node	55 %	.875 In.
14/8 Node	34 %	1.225 In.
/8 Node	N/A %	N/A In.
/8 Node	%	In.
Top Notch	%	In.
Opposite Notch	%	In.
Notch	%	In.
Bkr CB	80 %	.350 In.
Bkr P	80 %	.350 In.

} ATTENUATION Check.



Calibration Confirmation

Time	17:26 Hrs		Hrs		Hrs		Hrs	
Back Refl.	N/A %	N/A In.	%	In.	%	In.	%	In.
6/8 Node	80 %	.515 In.	%	In.	%	In.	%	In.
10/8 Node	55 %	.870 In.	%	In.	%	In.	%	In.
14/8 Node	34 %	1.225 In.	%	In.	%	In.	%	In.
Top Notch	N/A %	N/A In.	%	In.	%	In.	%	In.
Opposite Notch	%	In.	%	In.	%	In.	%	In.
Notch	%	In.	%	In.	%	In.	%	In.
Initia	RD							

Remarks

Reviewed By:
Level Date 4/16/82

Bkr CB (Back Reflection From Cal. Block) Bkr P (Back Reflection from Part)

A0000927

Inter-Office Memorandum

GPU Nuclear

Date June 2, 1982
MT/2049

Subject Evaluation of APSR #68 Ultrasonic Indication. Task #7 Test 6 (Completion)

To N. C. Kazanas

Location HQ

On April 26, 1982 an Ultrasonic Reflector was detected and plotted out. This signal was believed to be originating from an indication that was developed during original construction and not caused during service such as IGSCC.

The signal was plotted out on the plot form (attached) and found to be located at approximately .075" from the outside surface. The indication had a length of 8.550" which equates to 230 degrees and produced a general amplitude of 100% of DAC.

A review of the original (Base line) Radiographs was conducted. This review revealed that a grain boundary existed in the base metal adjacent to the weld in the motor tube extension. This condition was noted on the film in one (1) area, however, the report made no mention of this condition what so ever.

A review of the Ultrasonic indication plot against the Radiographs disclosed that the Reflector found Ultrasonically was possibly the same condition found Radiographically (Grain Boundary). A Radiographic examination was conducted on the APSR in the area of the Ultrasonic Reflector to verify that a defect did not exist and that the Reflector was from the Grain Boundary of the weld to HAZ of the base metal.

Two (2) areas were exposed and in both cases no indications were detected, the Grain Boundary could not be observed due to the use of a higher source (IR^{192}) of power employed, this fell into our thinking prior to exposure.

The APSR #68 was re-evaluated and found to be acceptable as is. The Ultrasonic Reflector was caused by Grain Boundary in the HAZ of the cap connection weld. No other further work or testing is required.

Rodney Turner
Rodney Turner
NDE Specialist

RT:blf

Attachment

cc: C. D. Cowfer
J. Potter
G. Rhedrick
M. Zeise

GPU Nuclear

NDE

Request for Evaluation/Recordable Indications

Request # 1-82-003

Component Identification CRDM APSR #68 Motor tube #P/N 120E221-9 Rev 5 SNR72-003 Procedure No. MTS-008 Rev. 4

Data Sheets Attached No. 000072

Attached Additional Information: Calibration sheet 000188 & 000189. B&W Document 51-1132496-01 & Indication plot form

Acceptance Standard B&W Document 51-1132496-01

ISI/NDE Staff Comments: Indication is not located on the I.D. surface and may be acceptable to ~~section~~ B&W Document 51-1132496-01 but this indication may be required to be evaluated to section XI.

Originator Rodney Turner Date April 27, 1982

☐ Authorized Inspector

☐ Site ISI Coordinator

☐ QA Modifications/Operations Manager

☐ Manager-Plant Engineering

☐ ____________

☐ ____________

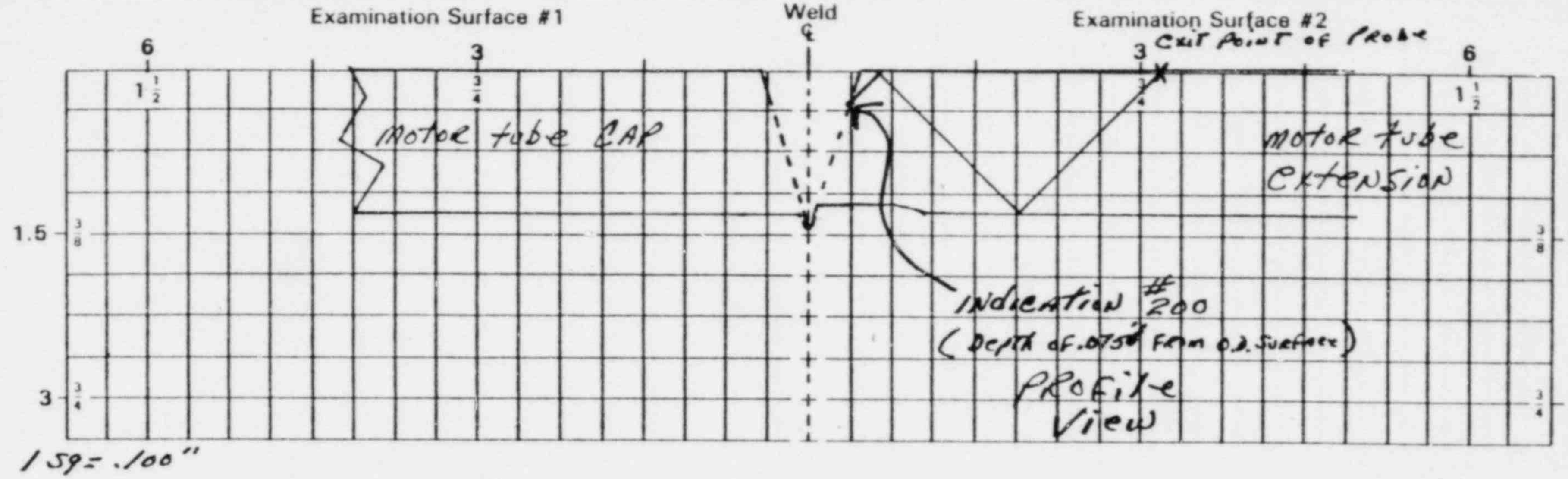
Page 1 of ~~3~~4

GPU Nuclear

NDE

Request for Evaluation/Indication Plot

Request # 1-82-003



159 = .100"

Examiners Comments Indication has a general amplitude of 100% of DAC, indication dips to 50% of DAC in some areas and rises to 150% of DAC in other areas, also contains two separate signals in areas. Examiner Rodney [illegible] Level III Date 1/27/82

Depth of .075" from O.D. surface.

Materials Technology Evaluation and Disposition The indication is identified as a grain boundary affection verified by HAZ location shown above, the respective radiography — repair and construction — and the characteristic response observed. This data is for records purposes only, no Code evaluations for acceptance are required.

☐ Geometric ☐ Recordable ☐ Reportable Analyst [illegible] Title Mgr MT Date 6/2/82

X Metallurgical

Site/Inspection I.D. N/A

Component I.D. CRDM #68

Component/Weld No. P/N 120E221 Rev J S/N R 72-003

Acceptance Standard As per B&W Document EIR 51-1132496-01 Page 2 of 4

GPU Nuclear
NDE

Ultrasonic Data Sheet

000072

Site: TMI-1
Inspection ID: N/A
Component: CRDM motor tube
Description: motor tube CAP weld (Connecting weld) to motor tube extension
Cal. Block: meted-011
I.D.: motor tube APSR #68 P/N 1206221-9 S/N R72-003 Rev J
Procedure: mtis-008 Rev 4
No. Positions: 1
Distance: N/A In.
Drawing: N/A
Beam Direction N/A Long 2 Shear
Limited Exam ☑ No ☐ Yes
Examiner: Rodney Turner @ Turner
ID#: 1863
Level: III
Examiner: N/A
ID#: N/A
Level:

Notes:
Reference line started at spring locking bolt on lifting fixture.

Material: S/S	Thickness: .350 In.	Test Surface: O.D.
Cal. Sheet 000188	Cal. Sheet: 000189	Cal. Sheet: N/A
Angle: 45°	Angle: 45°	Angle:
Time Start: 14:24 Hr.	Time Start: 16:17 Hr.	Time Start: Hr.
Time Stop: 15:58 Hr.	Time Stop: 16:52 Hr.	Time Stop: Hr.
Part Temp: 63 0 °F	Part Temp: 63 0 °F	Part Temp: 0 °F
Date: April 26, 1982	Date: April 26, 1982	Date:

0° Information Only
Weld Height Flush Weld Width .250"

Surface One to Surface Two

BM	Haz	℄ Weld	Haz	BM
.350	.350	.390	.335	.340

Ind. No.	Angle (Deg)	Surface	Beam Direction	LAM Max Amp % DAC	LAM Depth	LNGTH Crystal CW	WIDTH CCW	Distance From 1	2	Through Wall Dimension Minimum Depth	Position In. 1 CW	2 CCW	Maximum Depth	Position In. 1 CW	2 CCW	Remarks
200	45	2	1	125%	.755"	9.395"	–	.850	–	.720	.750	–	.830	1.00	–	Through wall
200	45	2	1	50%	.765"	4.200	–	.850								.720"-.830 = .110" Through wall
200	45	2	1	50%	.755"	12.750	–	.850								
																Length
																4.200"-12.750" = 8.550" length
																Depth: .075" from O.D Surface.

No Reportable Indications ☐ Reportable Indications ☐ Non Relevant Indications ☑

Reviewed by: Level Date: 6/2/82 Page 3 of ~~3~~ 4 NDE Request No. N/A

Angle/Ind. No. 0 Deg/0-199 45 Deg/200-399 60 Deg/400-599 Other/600 99

A0000926

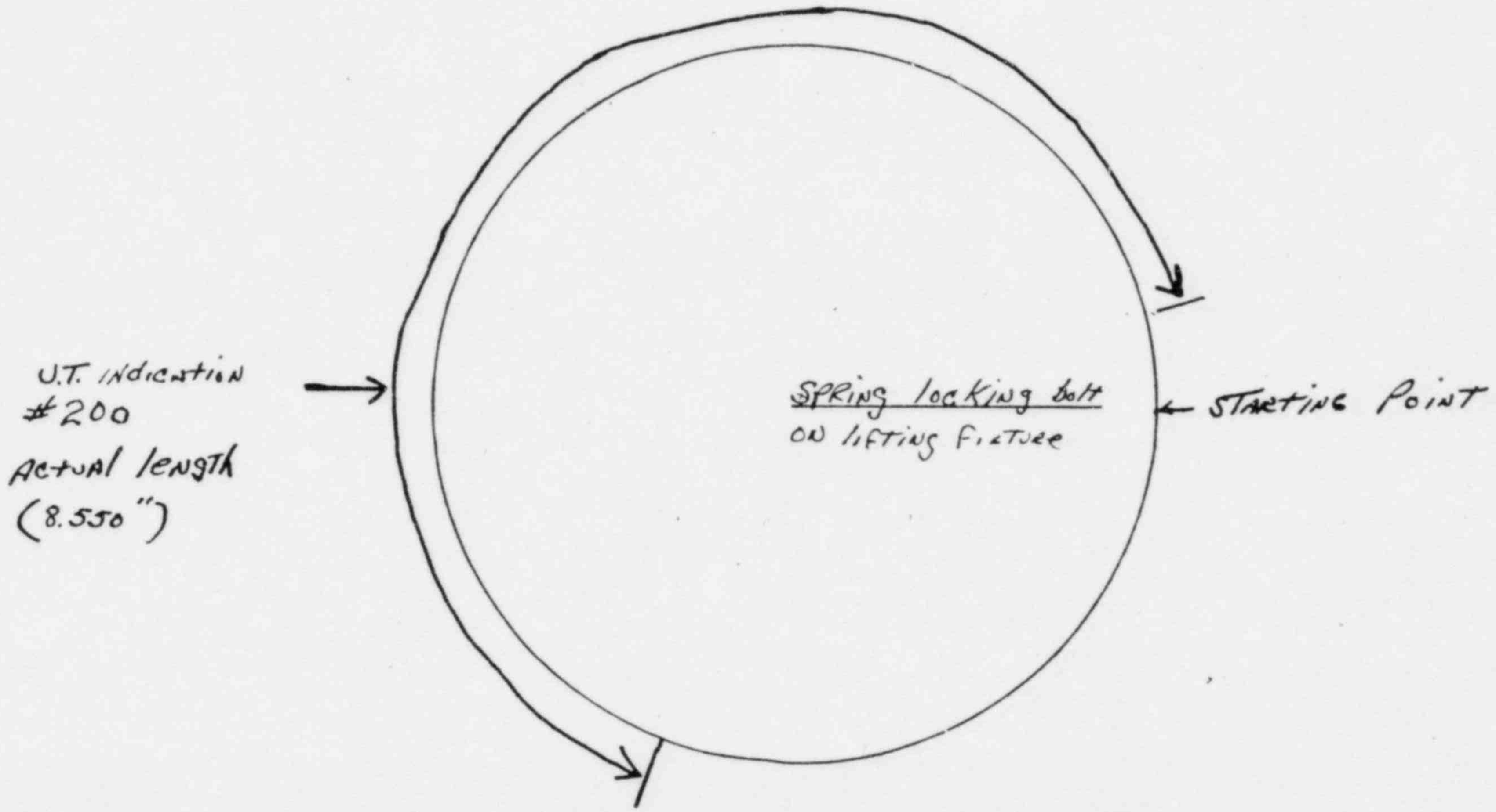
GPU Nuclear

Sketch Form

Component: CRDM APSR #68 Motor tube extension P/N 120E 221 Rev I P/R 72-003	Data Sheet No. 000072
Location: Unit #1 Reactor Head CRDM.	Drawing No. N/A / Rev. N/A

DRAWING

Request #1-82-003



Radial View

Prepared by: Rodney Pellman RD - Turner		Title: Level III	Date: 1/27/82
Reviewed by:	Level	Date: 6/2/82	Page 1 of 1 / NDE Request No. N/A

7-81 A0001025

GPU Nuclear
NDE

Calibration Sheet

Site: TMI-1
Inspection ID: N/A
Component: CRDM motor tube
Procedure: mtis-008 Rev. 4
Examiner: Rodney Turner RD TURNER
ID#: 1863
Level: III
Couplant: SONOTRACE #30
Examiner: N/A
ID#: N/A
Level: N/A
Couplant ID#: E179110
Drawing#: N/A
Date: April 26, 1982 Time: 14:17

Instrument
ID#: 211050
Linearity Check ☐ Yes ☑ No
Reject: OFF
Mat'l. Cal.: 6.98
Delay: 6.71
Pulse Energy: N/A
Coarse Gain in DB: 20
Fine Gain in DB: 22
Fine Gain: —
Screen Range: 2.5
Screen Depth: 1.750 In.
☐ T&R
Operation
☑ Normal
Frequency: 2.5 MHZ
Pulse Rep. Rate: N/A
Damping: 50%
Filter: N/A

Calibration Block
ID# Met-Ed 011
Length 7 7/8" In.
OD 4" In.
Thickness .350 In.
Temp 62 °F

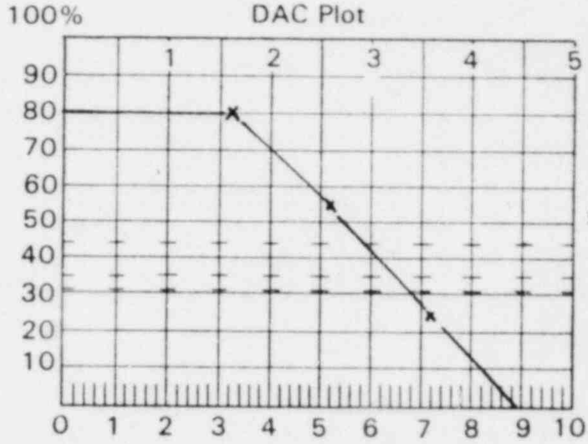
Crystal
ID# L25119
Type LS
Freq. 2.25 MHZ
Size .250 R In.
Actual 45 °

Search Unit Cable
Type Microdot ID TC-009 Length 6'
Thermometer S/N 9
(Required Summer '73 for Vessels
Required Winter '75 for piping)

System Calibration
Angle 43 °
Cal. Dir.
Axial ☑ Circ. ☐

Reflector	Amplitude % of Full Screen	Screen Reading In Inches
6/8 Node	80 %	.525 In.
10/8 Node	55 %	.875 In.
14/8 Node	25 %	1.225 In.
/8 Node	N/A %	N/A In.
/8 Node	%	In.
Top Notch	%	In.
Opposite Notch	%	In.
Notch	%	In.
Bkr CB	80 %	.350 In.
Bkr P	80 %	.350 In.

} Attenuation check same db level



Calibration Confirmation

Time	16:02 Hrs		Hrs		Hrs		Hrs		Hrs	
Back Refl.	— %	— In.	%	In.	%	In.	%	In.	%	In.
6/8 Node	80 %	.515 In.	%	In.	%	In.	%	In.	%	In.
10/8 Node	55 %	.875 In.	%	In.	%	In.	%	In.	%	In.
14/8 Node	25 %	1.225 In.	%	In.	%	In.	%	In.	%	In.
Top Notch	N/A %	N/A In.	%	In.	%	In.	%	In.	%	In.
Opposite Notch	%	In.	%	In.	%	In.	%	In.	%	In.
Notch	%	In.	%	In.	%	In.	%	In.	%	In.
Initials	RD									

Remarks
FCA-1-005 } Applies
STP-1-82-0015 }

Reviewed By:
Level Mgr MT Date 6/2/82

Bkr CB (Back Reflection From Cal. Block) Bkr P (Back Reflection from Part)

GPU Nuclear
NDE

000189

Calibration Sheet

Site: TMI 1 | Inspection ID: N/A | Component CRDM motor tube | Procedure NTIS-0 Rev.

Examiner: Rodney Turner RD TURNER | ID#: 1863 | Level: III | Couplant: SONOTRACE #30

Examiner: N/A | ID#: N/A | Level: N/A | Couplant ID#: E 179110

Drawing# N/A

Date: April 26, 1982 Time: 16:11

Instrument

ID#: 211050
Linearity Check ☐ Yes ☒ No
Reject: OFF
Mat'l. Cal.: 6.16
Delay: 6.70
Pulse Energy: N/A
Coarse Gain in DB: 20
Fine Gain in DB: 24
Fine Gain: N/A
Screen Range: 2.5
Screen Depth: 1.750 In.
Operation ☐ T&R ☒ Normal
Frequency: 2.5 MHZ
Pulse Rep. Rate N/A
Damping 50%
Filter N/A

Calibration Block

ID# MET-ED-011
Length 7 7/8 In.
OD 4 In.
Thickness .350 In.
Temp 62 °F

Crystal

ID# L25119
Type LS
Freq. 2.25 MHZ
Size .250 R In.
Actual 45 °

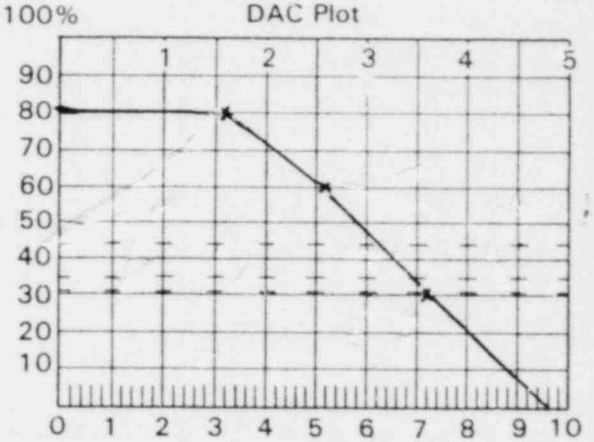
Search Unit Cable

Type MICRO DOT ID TC-009 Length 6'
Thermometer S/N 9
(Required Summer '73 for Vessels
Required Winter '75 for piping)

System Calibration

Angle 43 °
Cal. Dir. Axial ☐ Circ. ☒

Reflector	Amplitude % of Full Screen	Screen Reading In Inches
~~20~~ 6 /8 Node	80 %	.525 In.
10 /8 Node	60 %	.875 In.
14 /8 Node	30 %	1.225 In.
/8 Node	N/A %	N/A In.
/8 Node	%	In.
Top Notch	%	In.
Opposite Notch	%	In.
Notch	%	In.
Bkr CB	%	In.
Bkr P	%	In.



Calibration Confirmation

Time	16:54 Hrs		Hrs		Hrs		Hrs		Hrs	
Back Refl.	N/A %	N/A In.	%	In.	%	In.	%	In.	%	In.
6 /8 Node	80 %	.525 In.	%	In.	%	In.	%	In.	%	In.
10 /8 Node	60 %	.875 In.	%	In.	%	In.	%	In.	%	In.
14 /8 Node	30 %	1.225 In.	%	In.	%	In.	%	In.	%	In.
Top Notch	N/A %	N/A In.	%	In.	%	In.	%	In.	%	In.
Opposite Notch	%	In.	%	In.	%	In.	%	In.	%	In.
Notch	%	In.	%	In.	%	In.	%	In.	%	In.
Initials	RD									

Remarks

Reviewed By:
Level III Date 6/2/82

Bkr CB (Back Reflection From Cal. Block) Bkr P (Back Reflection from Part)

A0000927

Inter-Office Memorandum

GPU Nuclear

Date May 25, 1982

Subject RT Examination of CRDM #APSR-68 Grid Location D-10, Mfg. Ser. #R72-003 Weld

6111-82-2083

Location TMINS Trailers #256/258

To N. C. Kazanas
Director-Quality Assurance

The above referenced CRDM has been radiographic examined per RT Procedure #XR-1-NP (N.E.S.) and results evaluated per ANSI N31.7. Per the attached radiographic report, the two (2) exposures were found acceptable with no apparent defects.

J Tietjen
J. E. Tietjen
QC Mods/Const. Inspection Supervisor

JET/ejg

attachments (2):
1) GPU PIR #WE/43171/82
2) Radiographic Report, dated 5/21/82

cc: R. F. Fenti
B. E. Ballard, Sr.
CARIRS
QC file

Page 1 of 3

QUALITY ASSURANCE MODIFICATIONS/OPERATIONS
QUALITY CONTROL PLANT INSPECTION REPORT

Unit No. I Inspector Donald Jackson PIR No. WE-43171/82

Inspection Description Failure Analysis CRDM Motor Tube to support I.S.I U.T. Examination

Method: Visual: ☒ Direct Measurement: ☐ Document Review: ☐ Other: ☒ R.T.

References:

Title	Rev.	Date	Verified
XR-1-NP	1	6-30-80	D Jackson

Vendor/Item Identification (as appropriate)	Item/Characteristic/ Activity To Be Inspected	Accept/ Reject Criteria	Inspection Results/ Readings	Compliance		
				Sat	Unsat	Not Applic.
B72-003	R.T. Weld	ANSI B31.7	Acc - No Apparent	DJ		
CRDM APSR-68		69 S 70 B.1.140	Defects			

Page 2 of 3

QUALITY CONTROL PLANT INSPECTION REPORT

PIR No U1 3171/82

Vendor/Item Identification (as appropriate)	Item/Characteristic/ Activity To Be Inspected	Accept/ Reject Criteria	Inspection Results/ Readings	Sat	Unsat	Not Applic.

Measuring and Test Equipment Used

Identification of Equipment	Serial No.	Calibration Date Due
N/A		

MNCR Issued: Yes ☐ No ☒ QDR Issued: Yes ☐ No ☒

MNCR QDR No.	Date	Reason for Issue	Hold/Condit. Release Tag Nos. Issued
		NA	

Comments/Other Information:

Inspected By: Donald Jackson Date: 5-24-82

Reviewed and Approved By: J. Kuetjen Date: 5-25-82

Distribution (✓) Manager Admin. and Services Unit I (Orig.)
( ) QA Mod/Ops Manager
( ) QC Manager
(X) File

Others: (X) M. Hipple
( )
( )
( )

MO-108-2 (Rev. 0)

Page 3c-3
PIR 10E-9317/82

NUCLEAR ENERGY SERVICES
SHELTER ROCK ROAD
DANBURY, CONNECTICUT 06810

FIGURE 4

RADIOGRAPHY REPORT

Failure Analysis

SERIAL NO. OR PIECE NO.	Weld No.	Film No.	ACC	REJ.	Defect Code	REMARKS
CRDM	RT2-	0				
HPSE-68	003	3-0	✓			No Apparent Defects
		1.2	✓			No Apparent Defects

R.T. Examination of 4" Weld To Support I.S.I U.T. Examination.

Two (2) Exposures were Taken due To obstructions outside the CRDM Tube and Eight (8) holes in The Sleeve on The I.D. of The Tube

D. Jackson 5-24-82

RADIOGRAPHY REPORT NO. ______
DATE 5.21-82
Customer GPU
Address ______
Job Location TMI
Customer's P.O. No. ______ Job No. ______
Item Description 4" S.S. CRDM Tube
100% Insp. ______ Spot Insp. ✓
Welder Stamp NA

WORK SUMMARY

Amount — Item Description

______ Total Hours IN ______ A.M. OUT ______ A.M.@ ______
N ______ P.M. T ______ P.M.@ ______
______ Travel Hours ______ Lunch ______ Standby ______
______ Ft., Plate Weld ______ in. thk. @ ______
______ Ea. Pipe Weld ______ in. dia. @ ______
4 Films, 4½ x 10 Type Kodak M @ ______
______ Films, ______ x ______ Type ______ @ ______
2 Exposures @ ______
______ @ ______
WPS-NA

TECHNIQUE DATA

Inspection Specification ______
Acceptance Standard ANSI B31.7
RT Procedure No. XR-1-NP
Shooting Sketch (RSSS) ✓
Physical Source Size .1" x .1 Effective Focal Spot .14"
SFD 12" Source to Object 1½"
Material Thickness .330" Type Material S.S. Inconel
Geometric Unsharpness (Ug) .004"
No. of Film per Cassette 2 Penetrameter 10 Shim 1/32"
Viewing: Single ✓ Superimposed ______
Pb Screens Front .010" Center — Back .010"
Masking or Blocking Used —
Exposure Time 6 min Dev. Time 5 min
Type Source Ir 192 Curies 63

DEFECT CODE

P – Porosity	SI – Slag Inclusions	TI – Tungsten Inclus.
C – Crack	BT – Burn Through	CV – Root Concavity
IF – Incomplete Fusion	DT – Drop Through	CX – Root Convexity
SL – Slag Lines	UC – Undercut	OX – Oxidation

1. Donald Jackson LEVEL III
TECHNICIAN

2. ______ LEVEL ______
TECHNICIAN

3. Donald Jackson LEVEL III
TECHNICIAN-INTERPRETER

TEST

8

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 8

Inspected Item: Hold-down Bolts of Plenum Lift Lug

Type of Inspection: Ultrasonic

Inspection and Test Plan: These bolts are made of A-193 B8 and have a nominal stress of 23 KSI. This material and pre-load is typical of the stainless steel bolts used in the RV internals.

	YES	NO
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 6 Minimum required 6.)	✓	
Note: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.		
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓
Note: If any of the answers to (5) and (6) are yes, a written description must be attached.		

7. B&W EIR No. 51-1132418-00

8. Task #7 Procedure No. STP-1-82-0012

Reviewer's Signature Rodney Turner

G Rhedrick

Inter-Office Memorandum

GPU Nuclear

Date April 13, 1982
ISI/NDE M82016

Subject Ultrasonic Examination of the Plenum Lifting Lug Bolts (Task #7 Test 8)

To N. C. Kazanas

Location Parsippany

An ultrasonic examination on the six (6) plenum lifting bolts was performed on April 13, 1982 by two (2) B & W personnel and Material Technology representative, Mike Zeise.

The examination was performed in accordance with Procedure B & W ISI 166, Rev. 0, STP 1-82-0012. No recordable indications were detected, all six (6) lifting bolts are acceptable and meet the criteria set forth in B & W Document 51-1132418-00. During this examination a visual inspection of the plenum cylinder cover bolting was performed which revealed an inadequate surface for UT examination due to normal sludge build-up on the bolting end surfaces. Maintenance personnel, at this time, cleaned the bolts involved.

Attached are the B & W Data Sheets which I have reviewed and with which I am in concurrence. This completed test 8 of Task #7.

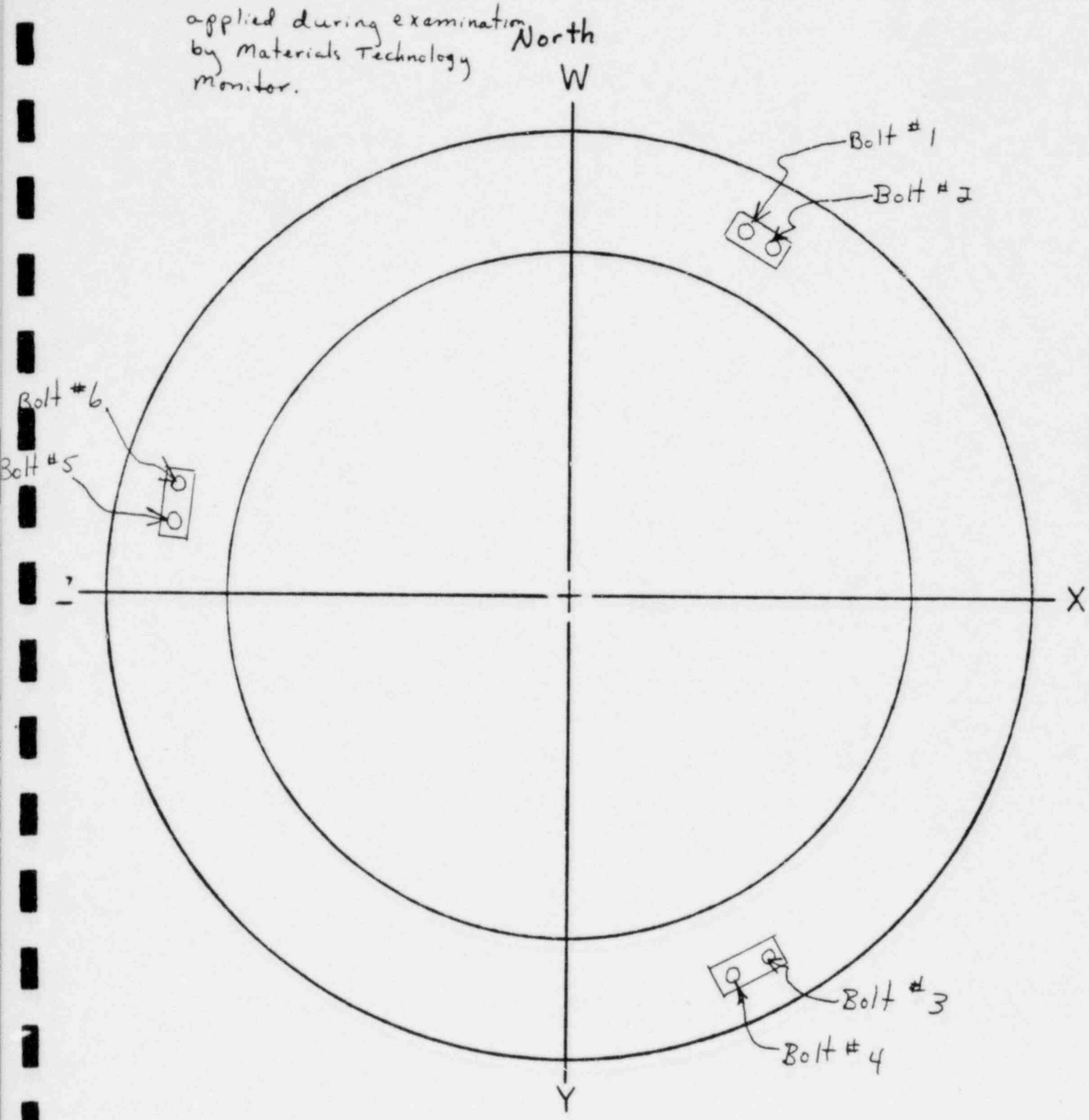
Rodney Turner
Rodney Turner
NDE Specialist
Materials Technology

APPROVAL
C. D. Cowfer

RT:ef

cc: J. Potter
G. Rhedrick
M. Zeise
ISI File

Note: Bolt locations will be applied during examination by Materials Technology Monitor.



Test N° 8

Plenum Cover to lifting lug bolts

Figure 3

BABCOCK & WILCOX COMPANY
NUCLEAR POWER GENERATION DIVISION

VOLUMETRIC TEST DATA

BWNP-20502-3 (12-81)

CUSTOMER: GENERAL PUBLIC UTILITIES
CONTRACT NO: 579-7239-07-02
COMPONENT: Plenum Assembly
DESCRIPTION: 6 Plenum Lift Lug BoITS
ID#: ~~N/A~~ DB MK-115
PROCEDURE: ISI 166 Rev. 0
NO. POSITIONS: 1
DISTANCE: N/A
#1 REFERENCE: "W" Axis
BEAM DIRECTION ⊥ LONG ~~N/A~~ SHEAR
LIMITED EXAM ☒ NO ☐ YES (IF SO WHY)
EXAMINER: Robert Laughlin ID#: L9644 LEVEL: II
EXAMINER: DNByr ID#: B2224 LEVEL: I

NOTES:
TEST Surface
Opposite end from NUT surface. RL

	Column 1	Column 2	Column 3
MATERIAL: SS	THICKNESS: 7.5 IN.	TEST SURFACE: ~~2~~ ① See note
CAL. SHEET: 001	CAL. SHEET:	CAL. SHEET:
ANGLE: 0°	ANGLE:	ANGLE:
TIME START: 1832 HR.	TIME START: HR.	TIME START: HR.
TIME STOP: 1842 HR.	TIME STOP: HR.	TIME STOP: HR.
PART TEMP: 105 °F	PART TEMP: °F	PART TEMP: °F
DATE: 13 Apr. 82	DATE:	DATE:

(columns 2 and 3 lined through: N/A)

CAL. BLOCK: Plenum Lug
DWG. # N/A
FCA(S) 1 ~~001~~DB

THERMOMETER ID# 15083
60° REQUIRED: ~~N/A~~
60° NOT REQUIRED: N

1ST SCAN: ~~N/A~~
2ND SCAN: ~~N/A~~

WELD INFORMATION & 0° THICKNESS (lined through: N/A)

SURFACE-#2		SURFACE-#1
	HTH-	
	WD-	
	℄-	
BM-	MIN- N	BM-
HAZ-	MAX-	HAZ-

IND. NO.	POSITION OR PART ITEM A	POSITION OR PART ITEM B	ANGLE (DEG.)	SURFACE	BEAM DIRECTION	STATUS	LAM. MAX AMP % DAC	LAM. DEPTH (IN.)	LENGTH LGTH 20%	LENGTH WDTH 50% OR HMA	LENGTH 100%	(INCHES) CRYSTAL A	(INCHES) DISTANCE B	(INCHES) FROM 1	(INCHES) 2	THROUGH WALL DIMENSION MINIMUM DEPTH	MINIMUM POSITION IN. 1 A	MINIMUM POSITION IN. 2 B	MAXIMUM DEPTH	MAXIMUM POSITION IN. 1 A	MAXIMUM POSITION IN. 2 B	DAMPS	REMARKS
	6 BoITS		0°			No	Recordable Indications																

REVIEWED BY: Robert Laughlin LEVEL: II DATE REVIEWED: 4-14-82 FIGURE NO: N/A

ANGLE-	0 DEG.	45 DEG.	60 DEG.	OTHER
IND.	1 TO 199	200 TO 399	400 TO 599	600 TO 799

PAGE 1 OF 1

BABCOCK & WILCOX
NUCLEAR POWER GENERATION DIVISION

BWNP-20503-3 (2-82)

CALIBRATION SHEET

DATE: 13 Apr. 82
TIME: 1830 HR.

CUSTOMER: General Public Utilites
CONTRACT NO.: 599-7239-07-02
COMPONENT: Plenum Assembly
PROCEDURE: 151 166 Rev. 0

EXAMINER: Robert Laughlin — ID# L9644 — LEVEL: II
EXAMINER: D.D. Byrd — ID# B2224 — LEVEL: I
COUPLANT: Demin Water — ID# N/A

INSTRUMENT ID#: 12071
CAL/DUE DATE: 10-8-82
LINEARITY CHECK ☒ YES ☐ NO
REJECT: OFF
MAT'L. CAL.: 109
DELAY: 776
PULSE ENERGY: 1
COARSE GAIN IN DB: 20
FINE GAIN IN DB: 30
FINE GAIN: 10 %
SCREEN RANGE: 10.0"
SCREEN DEPTH: 10.0"

OPERATION: ☐ T&R ☒ NORMAL
FREQUENCY: 2.25 MHZ
DISPLAY: ☐ NORMAL ☐ RF
REP. RATE:
ZERO CONTROL:
RESOLUTION:
DGC: A ______ B ______ C ______
GATE: A ______ B ______ C ______
ECHO START: ☐ NORMAL ☐ FIRST ECHO

N/A

CALIBRATION BLOCK

ID# Left Lug Bolt
LENGTH N/A IN.
OD 1.75 IN.
THICKNESS 7.5 IN.
TEMP 83 °F

CRYSTAL

ID# 33014
IR ☐, LS ☐, LW ☒
FREQ. 2.25 MHZ
SIZE .5 IN.
ACTUAL ∠ 0 DEG

CALIBRATION BLOCK SIMULATOR

SERIAL NO.:
SCREEN RANGE:
SIGNAL AMP:
SIGNAL DEPTH:
COARSE GAIN:
FINE GAIN:
TEMP.: °F
THERMO DB:
CAL/DUE DATE:

N/A

SEARCH UNIT CABLE
TYPE: Microdot
LENGTH: 6.0'

NOTES:

SYSTEM CALIBRATION

ANGLE 0°
CAL. DIR. AXIAL ☐ CIRC ☐

REFLECTOR	AMPLITUDE % OF FULL SCREEN	SCREEN READING IN INCHES
3.0" Notch ~~1/8 NODE~~ DB	80%	3.0 IN.
5.5" Notch ~~1/8 NODE~~ DB	28%	5.5 IN.
1/8 NODE	%	IN.
1/8 NODE	%	IN.
1/8 NODE	%	IN.
1/8 NODE	%	IN.
OTHER	%	IN.
OPPOSITE NOTCH	%	IN.
BKR CB	%	IN.
BKR P	%	IN.

N/A

FIGURE NO(S) EXAMINED

N/A

CALIBRATION CONFIRMATION

TIME	1845 HRS		HRS		HRS		HRS		HRS		HRS
BLOCK SIM.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
BACK REFL.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
3.0" Notch ~~1/8 NODE~~ DB	80%	3.0 IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
5.5" Notch ~~1/8 NODE~~ DB	28%	5.5 IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
1/8 NODE	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
OTHER	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
OPPOSITE NOTCH	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
INITIALS	RL										

FINAL

N/A

REVIEWED BY: Robert Laughlin LEVEL II DATE 13 April 82

CAL. SHEET NO. 001

TEST

9

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 9

Inspected Item: Top of Core

Type of Inspection: Video Examination

Inspection and Test Plan: This examination is intended to confirm the "normal" appearance and condition of the core componets prior to conducting other inspections. Emphasis is placed on confirming no failed or defective parts are present and no sulfur assisted corrosion is observed.

	YES	NO
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Do~~es~~ the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 106 Minimum required ① .)	✓	

Note: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	YES	NO
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Do~~es~~ there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓ ②

Note: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132401-01

8. Task #7 Procedure No. STP 1-82-0023

① ~~Discrepancy~~ Discretion of inspecting engineers

Reviewer's Signature

② - Zoom not used
- Reel to reel recording
- no color

Inter-Office Memorandum

GPU Nuclear

JUN 4 '82

Date May 25, 1982

Subject OTSG Task 7 Area #9
"Top of Core Video"

To ~~N. C. Kazanas~~
Director - Quality Assurance

Location Three Mile Island

Ref: (1) GPUN Memo NF-2620, J. D. McCarthy to
N. C. Kazanas, April 16, 1982

A remote video inspection of the top of the TMI-1 Cycle 5 core was completed on April 23, 1982. The scope of the actual inspection exceeded the minimum requirements of the program specified by the GPUN TMI Fuel Projects group (Ref. 1).

All conditions observed were determined to be normal with no indication of IGSCC.

GPUN TMI Fuel Projects, TMI-1 Nuclear Engineering, TMI-1 QC Piping/NDE Inspection, and to a small extent B&W Fuels Engineering, were all involved in the Area #9 inspections. Individual reports for each GPU group have been written and are attached. As responsible Task Leader for this inspection I have reviewed these reports, and concur that all Task 7 Area 9 requirements have been met.

The B&W involvement was limited to technical input to TMI Fuel Projects to assist in the program development, and a brief review of the inspection video tapes.

In view of the fact that there has been some inconsistency in the material list for the fuel assembly components provided by B&W, a thorough review was performed by TMI Fuel Projects. The resultant material list is attached and should be used in the Task 7 material evaluation.

Scott Wilkerson
W. S. Wilkerson
Lead Nuclear Engineer, TMI-1

Attachments
WSW/sf
cc: J. J. Colitz, Plant Engineering Director, TMI-1
W. L. Kimmick, NDE/Piping Insp. Lead QA
J. D. McCarthy, Engineer, TMI Fuels Project
G. R. Bond, Nuclear Analysis & Fuels Director
J. R. Stair, Nuclear Engineer, TMI-1
J. D. Luoma, Manager TMI Fuels Projects

May 18, 1982

OTSG Task 7 Inspection Area #9

Title: Top of Core

Type of Inspection: Remote Video

Equipment Used: Diamond ST-5

Procedure: STP 1-82-0023

Report Prep: W. S. Wilkerson

This inspection was performed on April 22 and April 23, 1982 and was done in accordance with the inspection plan outlined by the GPU Nuclear Fuels Memo NF-2620 (Summary attached). The following people were directly involved in the actual exam:

J. D. McCarthy - GPU Nuclear Fuels
C. B. Mehta - GPU Nuclear Fuels
R. M. Rama - GPU Nuclear Fuels
E. D. Shoua - GPU Nuclear Fuels
J. R. Stair - Nuclear Engineer, TMI-1
W. S. Wilkerson - Lead Nuclear Engineer, TMI-1

The video tapes were reviewed by W. L. Kimmick, Lead QC Piping/NDE Inspection, after completion of the examination. A summary of this review was provided.

Using the Table nomenclature from NF-2620 the results are listed below.

Item A.1 "General Conditions/loose parts"

A complete video scan of the entire top of the core was done. There was no obvious deterioration of any type noted and in general the conditions were found to be excellent. No loose parts were identified although there were loose flakes of material typical of those broken loose by the head removal evolution and CRDM uncoupling which were generally small (less than 1/16 inch in diameter).

Item A.3 "Fuel Assembly Holddown Springs"

A video exam was made of all 177 fuel assembly holddown springs without lifting any control components. On the 106 assemblies without control components 85 to 100% of the spring was viewed. The remaining 71 springs received less coverage with approximately 15 to 25% of each spring being accessible for the exam. A 100% inspection does not indicate that 100% of the entire spring surface was examined. A crack in this highly stressed material would propagate thru the spring material and be present as a 360° indication. Therefore, an inspection of the entire inner diameter or outer diameter would reveal this condition. A 100% inspection indicates that the entire inner or outer diameter, or an equivalent combination of both was examined.

In all cases there was no excessive relocation or cracking observed.

Item A.4.a "Holddown Spring Retaining Spider"

As in Item A.3 above the coverage varied due to the presence of control components with almost 100% coverage on the 106 without CCA's to 15 to 25% on those with CCA's. No visible cracks, relocation, or tilt was seen in any case.

Item A.4.b "Guide Tube Nuts"

During the holddown spring inspection, approximately 12-16 guide tube nuts were visible in the assemblies without CCA's The number of nuts examined well exceeded that required by the program outline. Again there were no unusual conditions (cracks, crud, missing nuts) identified.

Item A.4.c "Latchup Weld"

Although a specific exam of this weld was not performed a large number (106) of latchups were seen during the holddown spring inspection with no sign of cracks or other irregularities.

##

[redacted] TMI-[redacted]EL [redacted] CO[redacted]L [redacted]NTS[redacted]RIF[redacted]TION [redacted] EXC[redacted] FR[redacted]F-2[redacted]

OTSG TASK 7 AREA # 9 " TOP OF CORE "

ITEM	INSPECTION	NUMBER / LOCATION	ACCEPTANCE CRITERIA	JUSTIFICATION/REMARKS
Top of Core				
1. General condition/ loose parts	- video scan	whole top of core	- No obvious deterioration; - No loose parts.	- Early indication of degradation - Assure no loose parts - Documentation
2. Intentionally Left Blank				
3. Fuel assembly holddown springs	- video closeup	All 177 springs (without lifting CCAs)	No visible cracks or excessive relocation (Ref. B&W recommendations)	- Highest vulnerable material: Inconel X-750 - Former NRC concern over spring breaks at other plants. - Number of springs inspected in detail to be determined by inspecting engineers.

ITEM	INSPECTION	NUMBER / LOCATION	ACCEPTANCE CRITERIA	JUSTIFICATION/REMARKS
4. F.A. Upper End Fittings				
a) Holddown spring retaining spider	- video closeup	Fresh F.A. in C-4 Batch 5 F.A. in C-3	- No visible cracks at load arms - No relocation or tilt	- Stressed CF-3M material - Indication of spring integrity.
(NOTE: Inspections b and c are not first priority. They should be performed if visibility allows.)				
b) Guide tube nuts (and welds)	- video closeup	Same two F.A.s in (a) above. 2 to 4 nuts in each F.A.	- nuts in place - No visible cracks in welds	- weld between SS304 and CF-3M.
c) Latchcup weld	- video closeup	Same two F.A.s in (a) above. Visible portion of circumference	- No visible cracks or irregularities	- Fillet weld - Latchcup subject to CRA impact. Locates CRs in core.

Attachment
W. S. Wilkerson to
N. C. Kazanas
May 25, 1982

Area #9 Top of Core Inspection
Material List

*Item	Description	Material	Condition	**Stress
A.1	Upper End Fitting	316L S.S. Casting & Plate	As ordered/ welded	Low
A.3	Holddown Spring	Inconel X-750	drawn wire	High
A.4a	Holddown Spring Retaining Spider	316L S.S. CF3M Casting	As ordered	Moderate
A.4b	Guide Tube Nuts	304 S.S.	As ordered/ welded	Low
A.4c	Latchcup	304 S.S. Casting	As ordered/ welded	Low

* Item number as outlined by GPUN memo NF-2620, 4/16/82
** Stress in the cold condition

Inter-Office Memorandum

File: 701.2/4003.2

GPU Nuclear

NF-2635

Date May 3, 1982

Subject Task 7: Item 9, Top of the Core Inspection

To [redacted]

Location Headquarters

Refs.: (1) IOM NF-2620, J.D. McCarthy to N.C. Kazanas, "TMI-1 Task 7 Fuel Inspection Plan", April 16, 1982.

(2) B&W EIR 51-1132401-01, "TMI-1 Top of Core Video Examination", April 16, 1982.

(3) IOM NF-2628, E.D. Shoua to N.C. Kazanas, "Task 7: Subtask 11, RNS Retainer Inspection", April 27, 1982.

(4) Task 7 Procedure No. STP 1-82-0023.

On April 22nd and 23rd TMI Fuel Projects and Plant Engineering personnel inspected the top of the TMI-1 core in accordance with the Task 7 requirements specified in References 1, 2, and 4. The inspections consisted of video scans and closeups of representative top of the core components. No anomalous materials or mechanical conditions were observed for the upper fuel and control components examined. The examinations also served to verify that no loose parts or general materials deterioration were present.

Camera and lighting equipment were suspended from the auxiliary fuel handling bridge and maneuvered manually. The video image was monitored both on the bridge by the equipment handlers and remotely by the inspecting engineers with voice-over comments from the latter. All inspections were video-taped for documentation and any necessary further evaluations. Every core location was examined at least to a detail consistent with the inspection requirements. Actually, due to the excellent picture clarity and visibility of most components, many more specific closeup exams were obtained than originally required.

In addition to observing for general conditions, inspections included F.A. holddown springs, spring retaining spiders (and load arms), guide tube nuts (and welds), and latchcups. At control element (CCA) locations the CCA spiders, rod nuts and rod nut welds were examined. Viewing conditions allowed clear closeup inspection of all visibly accessible components.

Special attention was paid to the Inconel X-750 F.A. holddown springs in the 106 core locations without a CCA inserted. These included three springs from the B&W heat 64G5XS that recently had several breaks at other plants. Also, partial views of spring coils beneath almost every CCA were obtained. No corrosion, cracking, coil relocation, or excessive crud were seen for any spring. A further indication of the integrity of all holddown springs was that no spring retainers exhibited tilt.

The CF-3M spring retaining spiders also showed no excessive crud buildup, corrosion, or indications of cracking at the load arms. All of the SS304 guide tube nuts inspected were in place with no visible degradation to their welds. The circumferential latchcup welds were not visible at the camera angle used (angle was chosen for best holddown spring views); however, the tops of all latchcups in the 106 non-CCA locations were in good condition and show no relocations. No significant debris was evident on the upper end fitting grill plates.

Overall conditions were typical for all components; i.e., the older F.A.s and CCAs with more exposure were darkened with varying amounts of crud buildup, while fresh components were brighter and clean.

Inspection of the RNS/ORA mechanical retainer was reported earlier in Reference 3.

Therefore, based on these inspection results, the top of the core fuel and control components examined showed no indications of anomalous materials or mechanical conditions.

Test Completion Review Sheet is attached.

Joe McCart

J. D. McCarthy
TMI Fuel Projects

JDMc:rmc
Attach.

cc: G.R. Bond
J.J. Colitz (TMI)
R.W. Keaten
J.D. Luoma
C.B. Mehta
R.M. Rama
G.E. Rhedrick (w/attach.)
E.D. Shoua
D.G. Slear
J.R. Stair (TMI)
W.S. Wilkerson (TMI)

Inter-Office Memorandum

GPU Nuclear

6111-82-2073

Date May 11, 1982

Subject Remote Visual Examination (Task 7, Inspection #9) Top of Fuel and Core Components.

Location TMINS Trailers #256/258

To W. S. Wilkerson
Lead Nuclear Engineer-Unit I

Ref: GPU Nuclear Fuels Memo #NF-2620

Reviewed five (5) reels of reel to reel video tape of the top portion of the fuel and core components. The review was in accordance with Inspection #9, Task 7. The review took place after the actual inspection had been performed. The area appeared to be in good shape and the film sensitivity was such that the identification number of each assembly was easily discernible. There was white shiny particles apparent throughout the entire area. These particles were most of the assemblies.

Inspection #9 outlined the areas of interest and the following was noted:

1) A.1. of inspection outline: No metal degradation and no loose parts were noted.

2) A.3. of inspection outline: Springs don't appear to have any excessive relocation and none appear to be cracked.
Note: A.P.S.R. and C.R. 25% of spring visible, on all others 70% to 80% of spring is visible.

3) A.4.a. of inspection outline: Retainer Load Arms not broken (four (4) places). Note: A.P.S.R. and C.R. only two (2) Load Arms were visible.

4) A.4.a. of inspection outline: All hold-down Spring Retaining Spiders were in place and not askew.

5) A.4.b. of inspection outline: Guide tube nuts were in place.
    a) A.P.S.R. and C.R.; only four (4) to six (6) nuts out of sixteen (16) were visible.

    b) All other assemblies; eight (8) to twelve(12) nuts out of sixteen (16) were visible.

The above items are the only items on the inspection list which were visually accessible and discernible. It should be noted that nine (9) of the fuel assemblies are not covered on the video tapes.

W. L. Kimmick
Lead QC Piping/NDE Inspection

WLK/ejg
attachment
cc: J. Potter
R. Fenti
J. Tietjen
[redacted]
QC File (1)
CARIRS (1)

GPU Nuclear
NDE

000188

Visual/Surface Data Sheet

Site: TMI 1
Inspection ID: Task 7 Inspec. 9
Component: Reactor Internals
Description: Top of Fuel and Core Components
I.D.: Top of Fuel Assembly
Procedure: STP-1-82-0025
Material: S/S
Thickness: N/A
Test Surface: Smooth
Test Method: Visual/Video
No. Positions: N/A
Distance: N/A In.
Drawing: N/A
Date: 5-4-82
Examiner: B. Kimmich Kimmick RK
I.D.: A-411
Level: II
Examiner:
I.D.:
Level:

Notes: This examination was a remote visual using video recording equipment. The original examination was performed 4-27-82

Magnetic Particle (Only) N/A

Particle:
Wet ☐ Dry ☐ Color
Visible ☐ Fluorescent ☐ Batch
Instrument:
Method
Current
Machine
Amperes

Dye Penetrant (Only) N/A

Cleaner Batch#
Penetrant Batch#
Developer Batch#
Method:
Visible ☐ Thermometer
Fluorescent ☐ Temp

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
	Below is list of 9 assemblys							This examination was a review of
	which do not appear on the							Video tapes after the examination
	Video Tapes.*							was performed.
	14F	OMJ	* NOTE: This Appears					
	0AD	0M3	to have occured					
	13H	OWK	As A Result of					
	0LJ	0BQ	problems during					
	0L8		the Taping process.					

No Reportable Indications ☑ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by:
Level:
Date:
Page 1 of 3
NDE Request No.

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925

Tast II 7 Inspection #9

Attachment "1"

FIGURE 1

Page 2 of 3

Figure 4-1. 177-Fuel Assembly Core Assembly Designations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A						1BY 5	14E 5	1C5 5	1BX 5	1BZ 5					
B				1BL 1	14A 1	14N C29	OAM 1	13T C54	OBC 1	1BN 1 45	1BU 1	1BW R605			
C			OLT 2	132 2	13A C55	OAQ 2	OMV C09	OL6 2	13E C17	OAJ 2	13U C16	O13P 2	OLH 2		
D		18J 2	13L 2	OB1 B30	OLG 2	147 A04	OLN 2	OMH B02	OLK 2	144 A05	OLV 2	OAE B33	1C6 2	1C3 2	
E		1C4 2	13F C10	OLY 2	OMA C12	OLA 2	143 C44	OAH 2	13D C16	OWH 2	OM2 C18	OLU 2	OMS B57	1BP 2	
F	14H 3	1BB B41	OAT 3	14P B03	OM9 3	13M B28	OMF 3	13G B43	OME 3	136 B31	OLF 3	OLE A06	OBD 3	1BC B32	1CB 3
G	1CZ 3	OBZ 3	OLZ C11	OLP 3	141 C42	OMR 3	139 C13	OM7 3	138 C19	OMH 3	145 C48	OMU 3	140 C15	OAS 3	1BG 3
H	14B 3	OMQ C60	OM5 3	14Q C20	OBE 3	13J C39	OMO 3	OAV C61	OL9 3	13Y C47	OB5 3	135 B08	OM4 3	OMG B56	1BM 3
K	14F *	OAD *	13H C03	OLJ *	OL8 C40	OMJ *	13X B07	OL7 4	137 B01	OMP 4	OMX B50	OMC 4	135 C23	OAG 4	14G 4
L	1BK 4	14L C26	OB4 4	OLB A02	OMB 4	13V C25	OML 4	13W B51	OMK 4	13Z C34	OLD 4	146 A07	OBH 4	14D C49	1BH 4
M		14C 4	OLL C53	OLX 4	OM1 C06	OMY 4	134 C38	OBF 4	142 C52	OWJ 4	OM8 C24	OM6 4	138 C22	1C1 4	
N		14J 4	1C7 4	OBG C27	OLW 4	OMW A01	OLQ 4	13R C14	OMD 4	OLC A08	OLS 4	OBL C36	13Q 4	149 4	
O			OLM 4	13N 4	13C C04	OAC 4	13K C05	OM3 5	OWK C21	OBQ *	OLR B59	14M 5	OMT 5		
P				M2B ~~M2B~~ C00	1BV 5V	1BQ C51	OBK 5	OMH B58	OAL 5	133 C35	1BD 5	1BS 5			
R						148 5	14K 5	1BT 5	1BR 5	1BF 5					

* Assembly not R006 Covered on any Video Cassett (Reel)

Video Reels: Red Number in Square Represents Number of Reel.

TMI-1 CYCLE 5 FUEL VERIFICATION

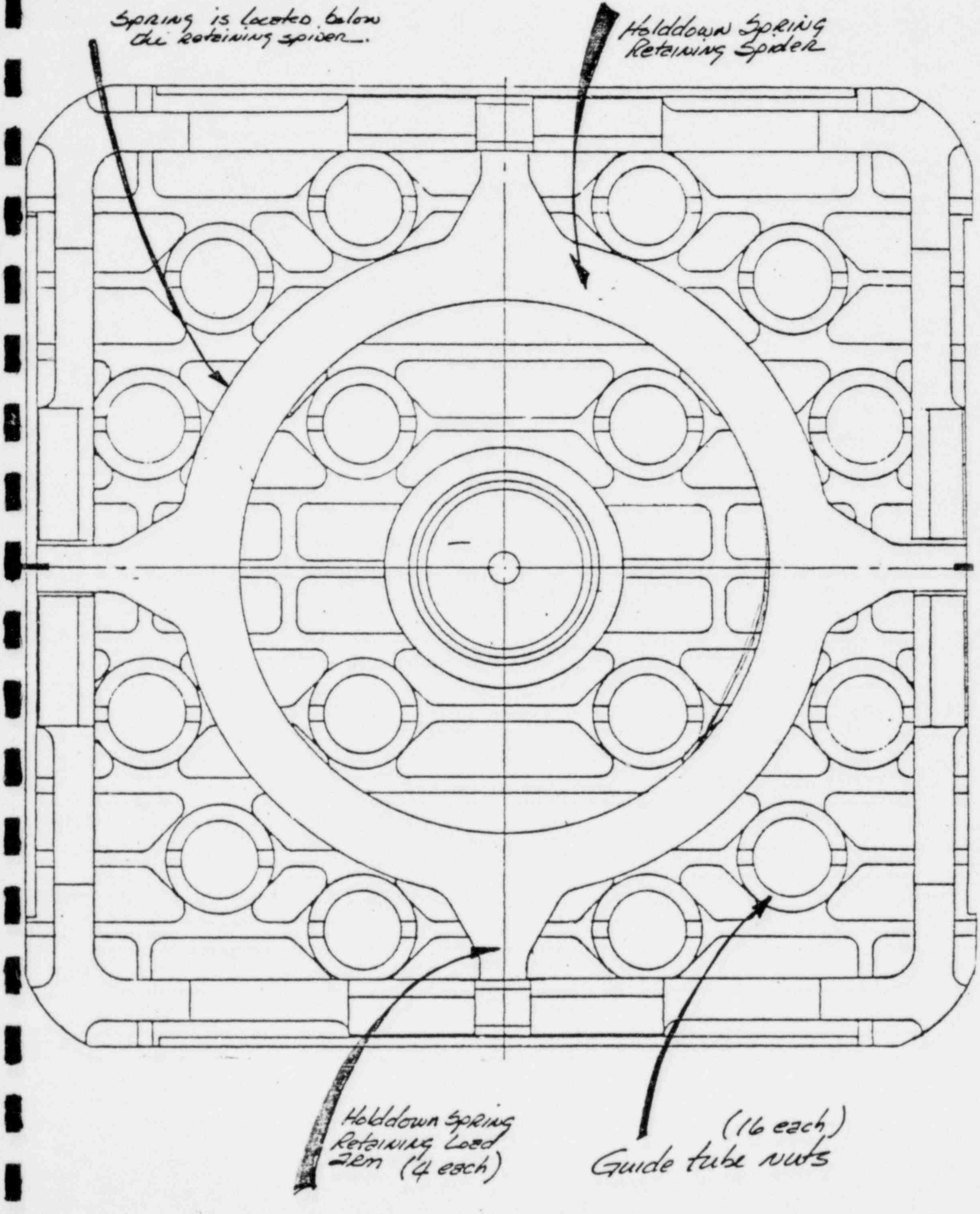
W L Benson 3/12/79

Earl [illegible] 3/12/79

Task #7 Inspection #9

Page 3 of 3

Top of Fuel Assembly



TEST

10

FUEL INSPECTION

Inter-Office Memorandum

File: 701.2/4003.2

GPU Nuclear

NF-2646

Date May 10, 1982

Subject Task 7, Fuel and Control Assembly Inspection Results: Items 10A,10B,10D

To [redacted]

Location Headquarters

Refs.:

1. IOM NF-2620, J.D. McCarthy to N.C. Kazanas, "TMI-1 Task 7 Fuel Inspection Plan", April 16, 1982.
2. B&W EIR 51-1132404-01, "TMI-1 Recovery: Fuel Assembly Inspection", April 16, 1982.
3. B&W EIR 51-1132412-01, "TMI-1 Recovery: Control Component Inspection", April 16, 1982
4. Task 7 Procedure No. TCN 1-82-0051.
5. Task 7 Procedure No. STP 1-82-0027.

As part of Task 7 of the OTSG Recovery Program, inspections were completed on TMI-1 fuel assemblies and control component assemblies in accordance with the requirements specified in References 1 to 5. The inspections were performed by TMI Fuel Projects and Plant Engineering personnel; B&W fuels engineers also participated. Inspections consisted of video scans and close-ups of two fresh fuel assemblies pulled from the core, four irradiated FAs and one fresh FA in the core, two control components (one CRA and one APSRA) , and a portion of the core baffle. Several faces of the pulled fresh FAs were also inspected by direct visual examination. Special attention was paid to materials potentially vulnerable to sulfur-induced corrosion, to potential weld-sensitized areas, and to areas of higher stress. Results showed no anomalous materials conditions on any of the fuel or control components examined.

Results of the baffle inspection will be reported independently by Plant QA (W. Kimmick).

Item 10A - Unirradiated Fuel

Fresh fuel assemblies NJ0132 and NJ01BM were pulled from core locations C-4 and H-15, respectively, using the main fuel handling bridge and moved over the deep end of the fuel canal. A Diamond ST-5 video camera with zoom lens on pan and tilt was situated on the canal floor about 3 feet from the assembly. Appropriate stationary lighting was provided. Viewing was in air and the video system provided extremely clear black and white remote monitor pictures. Left-right field ranged from the full width of the FA face at about 1X to a 4-5X magnification of any detailed area on the face. Video tapes were recorded on Betamax cassettes with voice-annotation by the inspecting engineer. Video inspection included the N, S, E and W faces of FA 132 and the N and S faces of FA 1 BM. In addition, the B&W fuels engineers performed direct visual examinations of the S face of 132 and the N, W and E faces of 1 BM.

Inspections consisted of a full vertical scan of each FA face as the assembly was raised or lowered past the camera (or the direct-visual inspector). Specific examinations included: the holddown spring retaining spider plugs, the horizontal structural welds connecting the end fitting grill and plenum, the welds connecting the end fitting grill to the skirted end spacer grids, the outer ribs of all spacer grids, and the outer fuel rods. Due to the excellent picture clarity and smoothness of operations, many more detailed examinations were performed than specified in the requirements.

Each FA has two holddown spring retaining spider plugs (304SS) at 180° welded between two upper end fitting locating fingers (CF3M-SS) to contain the spider. Although it was necessary to view the plugs through cutouts in the FA grappling tool lifting arms, all four plugs were clearly visible, in place, and the tack welds to the fingers were in good condition. The retaining spider load arms beneath the plug were properly oriented (no tilt) and flush against the plug.

The outer surfaces of the CF3M-SS upper and lower end fittings were smooth and clean in all cases.

All of the horizontal structural welds joining the CF3M grill and the CF3M plenum to form the upper and lower end fitting assemblies were inspected on both FAs. For the six FA faces examined using the video zoom this included individual inspections of the 48 welds at about 3-4X. No indications of any cracking or weld deterioration were observed. Nor were any anomalies seen on the remaining 16 welds inspected by direct-visual.

Axially adjacent to each plenum-to-grill weld there is a large (5/8-inch diameter) button weld joining the end fitting grill to the Inconel-718 skirted end spacer grids. These welds were also examined at 3-4X and all showed no indications of defects or corrosive attack.

The outer ribs of all Inconel-718 spacer grids on both FAs were closely inspected. Welds and other detail areas (e.g., hard-stop indentations) were viewed at 3-5X on the 6 videoed faces. All spot welds on the end spacer grid skirt weldments were in good condition. Rib surfaces were smooth and clean. Occasional darker patches or light scratches showing on the video image of the ribs were interpreted as post-welding grind marks or rub marks due to fuel handling. No corrosive damage was detected. This was verified by the direct-visual inspections.

Special attention was given to the stamped hard-stop depression areas on the ribs and to the rib intersection welds. No cracks or evidence of corrosive damage were seen. Although viewing conditions did not permit a fully-lighted image within the peripheral fuel rod cells, the adjacent rib springs were seen to be in place and against the rods. Corners of the grids were examined, and in several cases turned directly into the camera, with no signs of deterioration.

According to the B&W inspectors who performed the direct-visuals, several grid strap surfaces exhibited a light yellow discoloration. A wipe sample was taken across one such rib and the colored material was easily removed. No corrosion or other anomalous material conditions were associated with the discoloration. The wipe sample will be chemically analyzed at B&W LRC.

The full view of each intermediate spacer grid showed that all were properly oriented relative to the fuel rods.

The Zircaloy-4 fuel rods were scanned vertically in each span between grids. Views were full-width of an FA at about 1X and, in several instances, 3 or 4 adjacent rods at 4-5X. All rods were free of adhering crud and in excellent condition.

At several spacer locations the rods exhibited small elliptical swirl marks of a whitish-gray color immediately below (and sometimes also above) the grid. The pattern of the marks seemed to be symmetrical about the middle fuel rod in the outer row. A wipe sample was taken across the rods at one location and sent to B&W LRC for chemical analysis. No indications of corrosion were associated with these markings.

During the inspections several irregularly-shaped bright marks were seen on the rods or grid straps. These were determined by direct-visual examination to be debris from the deep end water and did not adhere to the FA components.

As part of the in-core inspections described below under Item 10B, an additional face of a fresh fuel assembly was inspected (FA NJ01BL, Location B-4, West face). Although camera and lighting equipment were different, good pictures were obtained. Results were the same as for the removed fresh assemblies, i.e., a uniformly clean assembly with no indications of any corrosion or other material degradation.

Several 35mm color slides were taken of FA 132 during the inspections. The pictures verify the good condition of all components on the assembly. A close-up shot of one spacer grid area shows both the swirl marks on the fuel rods and a light yellowish-orange discoloration on portions of the outer strap. Again, no materials degradation is associated with these markings.

Inspections of the bottom of the lower end fittings were not performed (Items 8 and 9 of Reference 1). These exams were optional in the inspection plan and were omitted because camera angles did not permit viewing. Direct visual examination would have created an unjustified risk. The GPUN and B&W inspecting engineers agreed that the good condition of the other FA components made it unlikely that the LEF contained any excessive crud deposits, or that the guide tube nuts or guide bars were damaged.

Item 10B - Irradiated Fuel

Irradiated fuel assemblies were inspected in place in the core. The following were examined:

Fuel Assembly	Core Location	Insertion Batch	Face Inspected
NJO OMG	H-14	6	S
NJO 13A	C-5	6	N
NJO OLT	C-3	5	S
NJO OB1	D-4	4B	E

A Westinghouse-1250 video camera with a right-angle lens was suspended from the auxiliary fuel handling bridge into the empty core locations (C-4, H-15) created by removal of the two fresh assemblies. A supplementary light source was also provided. Both camera and light were manually maneuvered from the bridge. Viewing was in water and the video system provided clear black and white remote monitor pictures. Left-to-right field ranged from about one-third the width of an assembly (4-5 rods) at about 1-2X to a magnification of 6-8X of any detailed area on the FA face. Betamax cassette video tapes were taken for all inspections with voice-over by the inspecting engineer.

In addition to the irradiated assemblies, the West face of fresh FA NJO1BL was also examined by the above method. Results are described above under Item 10A.

Inspections consisted of a full vertical scan of each FA face by raising or lowering the camera. Specific examinations included: holddown spring retaining spider plugs, structural welds between the end fitting grill and plenum, welds between the end fittings and spacer grid skirts, outer grid straps, and outer fuel rods. Special attention was given to end fitting and spacer grid components and welds which were examined completely on each FA face. Coverage of fuel rods was detailed but representative, with full horizontal scans across all rods at elevations with distinctive crud patterns.

Because of assembly orientations the holddown spring retaining spider plug (304SS) was visible only on the Batch 4B FA. The plug was in place and the tack welds to the UEF locating fingers (CF3M) showed no degradation. The plug and welds exhibited a typical amount of crud deposition for an assembly with three cycles of exposure. The retaining spider load arms in the 4B, and all three other irradiated FAs, were properly oriented.

The outer surfaces of the CF3M end fittings on each FA were all in good condition with crud deposits typical for their respective exposures. (The Batch 6 assemblies were particularly clean after one cycle.)

Each structural weld joining the end fitting CF3M grill and plenum was inspected on each FA face (total of 32 welds). Magnification was about 5X. No cracks or weld degradation were observed.

Each adjacent button weld joining the CF3M grill to the Inconel-718 end spacer grids was similarly inspected (total of 32 welds). No deterioration was seen on any weld.

The outer ribs of all Inconel-718 spacer grids on the face of each irradiated FA were closely examined. The spacers showed varying amounts of crud deposits typical for their different operating times. Welds and other detail areas were viewed at 6-7X across each grid strap. Spot welds on the end spacer skirt weldments appeared in good condition. Various minor markings and shadings were identified as due to fabrication grinding, fuel handling, or irregular crud patterns. No indications of corrosive material damage was observed.

Special attention was paid to all rib intersection welds and the hard-stop depression locations. No cracks or other material deterioration were seen. Lighting conditions afforded many good views into the outer fuel rod cells. Adjacent rib springs were in place and against the rods. Visible portions of the grid corners were also intact.

Although a full view of a grid could not be obtained, the partial views indicated that all were properly oriented relative to the fuel rods. The top few spacers on the older Batch 4B FA showed some axial misalignments (¼" to ½") relative to grids on adjacent lower burnup assemblies. This is expected due to irradiation-induced assembly growth.

Minor grid damage, unrelated to Task 7 concerns, was observed on the upper end spacer of the Batch 5 assembly. The bottom edge of the outer rib is bent upward (or torn off) to a height of about one quarter inch across two adjacent fuel rod cells near the SE corner of the grid. However, all the rib intersection welds appeared intact and the grid structurally sound. Also, there was no difficulty removing the adjacent fresh assembly from location C-4. The B&W fuel engineers concurred that such damage was of minor concern.

The Zircaloy-4 fuel rods were vertically scanned in each inter-grid span. Views were of 4 or 5 rods at 1-2X. At elevations of particular interest (e.g., distinctive crud patterns) full horizontal pans were made across the assembly at 6-7X. The two Batch 6 assemblies appeared very clean with a uniform lustre. The Batch 5 FA had some moderately heavy crud patterns at the upper spans, becoming uniform at mid-assembly to the bottom. The Batch 4B FA exhibited heavier crud deposits in the top spans with a very mottled light and dark pattern. This also became more unifrom toward the bottom of the assembly. None of these crud patterns were considered atypical or excessive for the relative burnups of the FAs; this was concurred with by the B&W LRC engineer. No indications of defects or chemical degradation were observed.

Item 10D - Control Components

Two control component assemblies (CCA) were selected for inspection: Control Rod Assembly (CRA) #C10 from core location E-3; and Axial Power Shaping Rod Assembly (APSRA) #A03 from location F-4. The CCAs were partially lifted out of the fuel assemblies from the main fuel bridge using the manual CCA handling tool suspended from the bridge hoist. Removal was limited to a height of about 2½ feet based on minimization of both personnel exposure and mechanical damage risks.

Viewing equipment was the same as for the irradiated fuel inspections (Item 10B above): Westinghouse 1250 video camera with right-angle lens and a separate supplementary light source. Both were suspended from the bridge and maneuvered manually. Monitoring was also the same as described for irradiated fuel, with a magnification capability of 6-8X of detailed areas. Betamax video tapes with voice-over were recorded.

Inspections consisted of scans and/or close-ups, as appropriate, of spider assemblies, rod nut welds, retainer pin welds, upper end plug to cladding welds, and CR cladding. As for the other fuel-related examinations, good picture quality and relative ease of operations allowed more inspections to be performed than called for in the requirements.

Both CF-3M spider assemblies were in good condition with no excessive crud buildup or observable corrosion. This confirmed the results of the top of the core inspection which showed these and other CCA spiders to be free of materials damage.

Six to eight SS304 rod nuts and welds on each CCA were examined at about 7X with no missing nuts and no signs of weld cracks or other deterioration. At least two retainer pin and the stop pin area welds were inspected on the SS304 female coupling hub of each CCA and were also in good condition. Again, these confirmed the top of the core results.

Special attention was paid to the circumferential welds joining the upper end plugs (SS 304/308) to the SS304 CR cladding. About 10 welds were examined on each CCA at about 6X. For the CRA, all of the welds were in excellent condition: smooth with no indications of cracking or corrosion. For the APSRA, several of the welds had a rougher appearance indicating some circumferential ridging. One weld contained a grooved indication between the bottom of the fusion area and the cladding that warranted further evaluation. This concern was alleviated by closer examination of the video tape using freeze-frames of the weld which indicated that no separation existed at the groove. The concern was fully resolved by inspection of the same weld on several rods of an inventory APSRA. The as-fabricated welds, examined at about 2-3X, showed similar circumferential grooves in the fusion area, but no indications of separation or cracking. These evaluations provided sufficient evidence to judge the weld acceptable. A more detailed report on this concern will be prepared by Plant QA (W. Kimmick).

The SS304 cladding was inspected at about 3-4X for a length of 15 to 20 inches below the end plug weld. Eight to ten rods were examined on each CCA. All had light, mostly uniform crud deposits judged to be typical for rods in their exposure range. This was concurred with by the B&W LRC engineer. No defects, irregularities, or corrosion were observed.

Summary

The purpose of Task 7 inspection Items 10A, 10B, and 10D was to assess the general appearance and overall structural integrity of the Cycle 5 fuel assemblies and control components for abnormal crud deposits, anomalous surface textures, and indications of sulfur-induced corrosion. As described in the above sections, detailed examinations of representative unirradiated and irradiated fuel assemblies and control assemblies has been completed. Particular interest was focused on potentially vulnerable materials, possibly sensitized weld areas, and areas of higher stress. Results show that the core components examined exhibit no atypical conditions and no visually-observable materials or mechanical degradation.

Test Completion Review Sheets for inspection Items 10A, 10B, and 10D are attached.

Joe McCart
J. D. McCarthy

E. D. Shoua
E. D. Shoua
Nuclear Analysis & Fuels Group

JDMc/EDS:rmc

Att.

cc: G.R. Bond
J.J. Colitz (TMI)
R.W. Keaten
W.L. Kimmick (TMI)
J.D. Luoma
C.B. Mehta
R.M. Rama
G.E. Rhedrick (w/att.)
D.C. Slear
J.R. Stair (TMI)
W.S. Wilkerson (TMI)

MAY 1 4 1982 Greg R - replacements

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a McDermott company

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May 10, 1982
GPU-82-122

Mr. D. G. Slear
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GPU Nuclear
100 Interpace Parkway
Parsippany, NJ 07054

Subject: GPUN (TMI-1)
Master Services Contract, Effective Date June 1, 1977
Reference Nos: B&W 582-7105, GPUN M77120
Task 182-Task 7 RCS Inspection

Reference: Gregory E. Rhedrick to J. F. Pearson, "Validation of TMI-1 Fuel Assembly Inspection," dated April 29, 1982, QA/82-005.

Attachment: Trip Report J. E. Matheson to Distribution, dated May 3, 1982.
Trip Report J. T. Mayer to Distribution, dated May 4, 1982

Attention: [redacted]

Dear Mr. Slear:

The attached information was provided directly to Mr. Kazanas. It is being formally transmitted for record purposes.

The attached information provides results of inspections of fuel in the TMI-1 core, both new fuel and irradiated fuel in the vicinity of the new fuel. The inspection results for control components and axial power shaping rod assemblies are also reported.

The general conclusion from the visual inspections was that no significant degradation of these assemblies or components has occurred. The only anomaly noted was the presence of a light yellow substance on and near the fuel assembly grids. The nature of this material is presently being investigated at the Lynchburg Research Center.

Should you have any questions or comments regarding this information please contact me at 804-385-2611 in Lynchburg.

Very truly yours,

L. J. Stanek
Engineering Product Manager

/dmr
Attachment
cc: R. L. Long
H. D. Hukill
U. S. Bhachu
J. J. Colitz
R. A. Knief
L. R. Allen
M. J. Graham
J. A. Mann
F. R. Faist
D. W. Demers
R. J. Toole
R. E. Kosiba

Babcock & Wilcox Nuclear Power Generation Division

INFORMATION

BWNP-20553(7-81)

To

DISTRIBUTION

From

J. E. MATHESON, FUEL MECHANICAL ENGINEERING, 3433

Customer or File FSA-82-30

Subject

TRIP REPORT - TMI-1 FUEL INSPECTION, APRIL 26-30, 1982

Date MAY 3, 1982

DISTRIBUTION

KO STEIN
RV DEMARS
CG DIDEON
JT MAYER (LRC)
GL GARNER
JB ANDREWS
MH FISH
DG CULBERSON
RJ BAKER
RS PIASCIK

The purpose of this trip was to inspect two new fuel assemblies and the top of two components at the TMI-1 site. This inspection was intended to determine whether the sulphur-contaminated primary coolant had any deleterious effects on fuel assemblies and components. The two assemblies to be inspected were NJ01BM and NJ0132. The control components were ASPRA S/N A02 and Control Component S/N C10.

A thorough visual examination was conducted on the fuel using remote video equipment. The camera was set up on the drained canal floor and was capable of panning the fuel assembly while it was raised and lowered into the water in the deep end. While inspecting assembly NJ01BM, an anomaly was observed on one of the fuel rods. The nature of this could not be determined from the video picture, so I went down on the canal floor for a visual examination. The problem was determined to be a wetted flake of boron which had floated on to the fuel from the plenum which was stored in the deep end.

While down there, I observed a light yellow deposit on the grids which was concentrated about the soft stops and above and below the grids on the fuel rods. Wipes of this substance were taken by J. T. Mayer (LRC) when the second fuel assembly was inspected. For that inspection, I remained on the canal floor during the entire procedure. A report form was filled out for each face of each fuel assembly which was visually inspected. These forms were submitted to Joe McCarthy (GPU). Copies are attached to this report. In general, no significant degradation of the fuel assemblies was noted.

The CRA and APSRA were pulled up far enough to view the end plug/tube weld area, using underwater video equipment suspended from the fuel handling bridge. During this inspection, an incomplete weld zone was noted on one of the rods. Further investigation proved this to be acceptable, since zones of this type occur in the welding process. No other anomalies were noted. This inspection completed the inspection of the RCS components at TMI-1.

JE Matheson

JEM/jss
Attachments

TMI-1 FUEL VISUAL INSPECTION RECORD

FUEL ASSEMBLY ID 1 BM FACE EAST

CORE LOCATION: [redacted] ______ [redacted] ______

[redacted] ______

DATE 4-27-82 TIME 1800

OPERATOR(S) J.E. MATHESON & J.T. MAYER - B&W

CONFIGURATION OF VIEWING EQUIPMENT VISUAL EXAMINATION FROM CANAL FLOOR WITH FUEL BEING LOWERED IN THE DEEP END. - NAKED EYE ONLY

INSPECTION FOR EVIDENCE OF:

CORROSION SOME DEPOSITS OF LIGHT YELLOW MATERIAL ON GRIDS AND ON FUEL RODS NEAR GRIDS - NOT NECESSARILY CORROSION

BROKEN WELDS NONE - APPARENT

FAILED FUEL RODS NONE APPARENT

FUEL ROD BOW APPEARED STRAIGHT

FUEL ASSEMBLY BOW APPEARED STRAIGHT

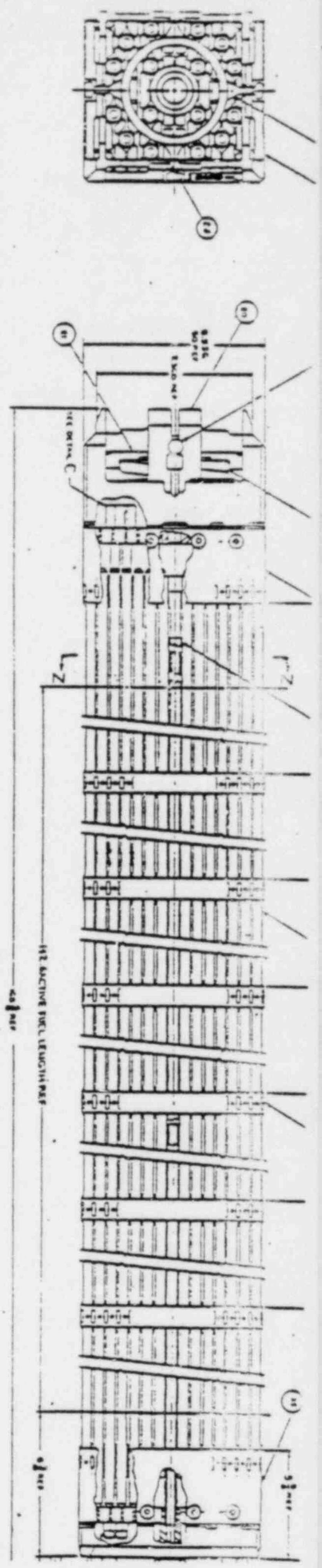
FUEL ROD FRETTING NONE APPARENT

WEAR ON END FITTINGS NORMAL

COMMENTS THE ASSEMBLY APPEARED TO THE NAKED EYE TO BE IN A NORMAL CONDITION FOR NEW FUEL WITH THE EXCEPTION OF THE LIGHT YELLOW DEPOSITS ON AND NEAR GRIDS AS NOTED ABOVE

JEM 4-28-82

JTM 4/28/82



TMI-1 FUEL VISUAL INSPECTION RECORD

FUEL ASSEMBLY ID 1BM FACE NORTH

CORE LOCATION: [redacted] ____ [redacted] ____

[redacted] ____

DATE 4-27 TIME 1800

OPERATOR(S) J.E. MATHESON / J.T. MAYER - B&W

CONFIGURATION OF VIEWING EQUIPMENT VISUAL - FROM CANAL FLOOR AT DEEP END - CCTV PLUS NAKED EYE.

INSPECTION FOR EVIDENCE OF:

CORROSION SOME DEPOSITS OF LIGHT YELLOW MATERIAL ON GRIDS AND ON FUEL RODS NEAR GRIDS - SEE NOTE ①

BROKEN WELDS NONE APPARENT

FAILED FUEL RODS NONE APPARENT

FUEL ROD BOW APPEARED STRAIGHT

FUEL ASSEMBLY BOW APPEARED STRAIGHT

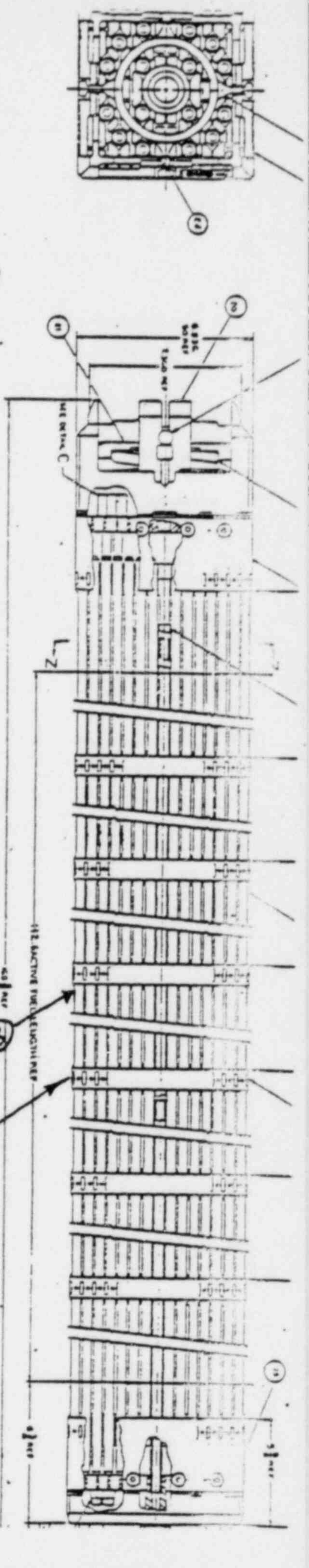
FUEL ROD FRETTING NONE APPARENT

WEAR ON END FITTINGS NORMAL

COMMENTS NOTE ① - WET WIPE SAMPLES WERE TAKEN AT TWO LOCATIONS: Ⓐ ACROSS ENTIRE AREA OF OUTSIDE GRID STRAP, AND Ⓑ ACROSS THE FUEL RODS (ALL 15) JUST BELOW THE GRID. YELLOWISH MATERIAL WAS EASILY REMOVED. WIPES APPEARED SOOTY AFTER WIPING.

JEM 4-28-82

JT Mayer 4/28/82



TMI-1 FUEL VISUAL INSPECTION RECORD

FUEL ASSEMBLY ID 1BM FACE WEST

CORE LOCATION: [redacted] ______ [redacted] ______

[redacted] ______

DATE 4-27-82 TIME 1800

OPERATOR(S) J.E. MATHESON - B&W

CONFIGURATION OF VIEWING EQUIPMENT VISUAL EXAMINATION FROM CANAL FLOOR WITH FUEL BEING LOWERED INTO DEEP END - NAKED EYE ONLY

INSPECTION FOR EVIDENCE OF:

CORROSION SOME DEPOSITS OF LIGHT YELLOW MATERIAL ON GRIDS AND AROUND GRIDS ON FUEL RODS

BROKEN WELDS NONE APPARENT

FAILED FUEL RODS NONE APPARENT

FUEL ROD BOW NONE APPARENT

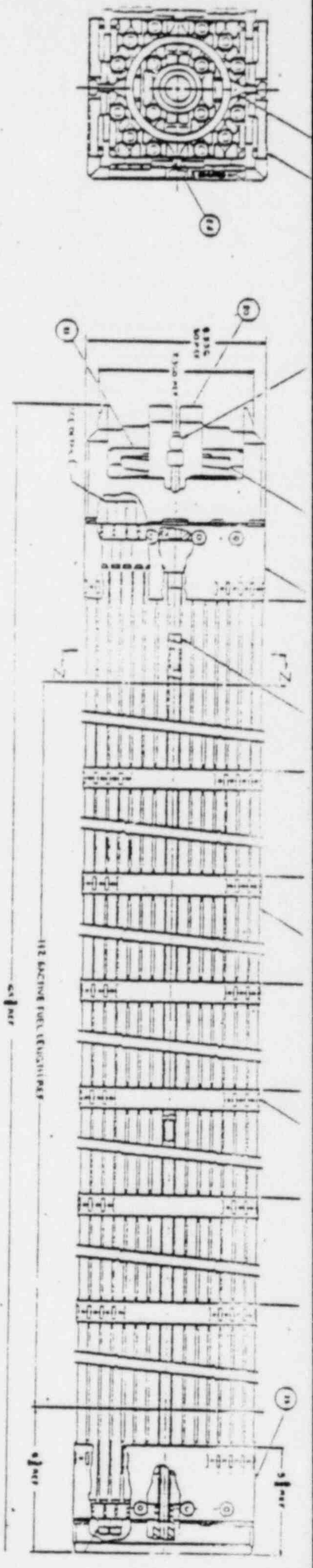
FUEL ASSEMBLY BOW APPEARED STRAIGHT

FUEL ROD FRETTING NONE APPARENT

WEAR ON END FITTINGS NORMAL

COMMENTS THE ASSEMBLY APPEARED TO THE NAKED EYE TO BE IN A NORMAL CONDITION FOR NEW FUEL WITH EXCEPTION OF THE LIGHT YELLOW DEPOSITS ON AND NEAR GRIDS AS NOTED ABOVE

JEM 4-28-82



TMI-1 FUEL VISUAL INSPECTION RECORD

FUEL ASSEMBLY ID 132 FACE

CORE LOCATION: [redacted] [redacted]

[redacted]

DATE 4-27-82 TIME 1400

OPERATOR(S) J.E. MATHESON - B&W

CONFIGURATION OF VIEWING EQUIPMENT VISUAL EXAMINATION FROM CANAL FLOOR WITH FUEL BEING LOWERED INTO DEEP END - NAKED EYE & CCTV

INSPECTION FOR EVIDENCE OF:

CORROSION SOME AREAS WHICH WERE SUSPECT WERE NOTED DURING CCTV INSPECTION. UPON GOING TO THE CANAL FLOOR FOR A VISUAL EXAMINATION (CONT ①)

BROKEN WELDS NONE APPARENT

FAILED FUEL RODS NONE APPARENT

FUEL ROD BOW APPEARED STRAIGHT

FUEL ASSEMBLY BOW APPEARED STRAIGHT

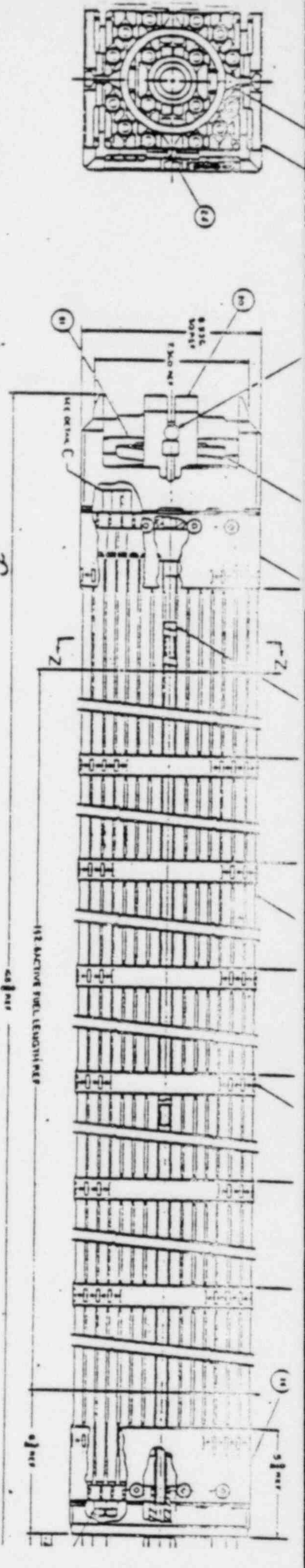
FUEL ROD FRETTING NONE APPARENT

WEAR ON END FITTINGS NORMAL

COMMENTS ① THESE WERE DETERMINED TO BE BORON (WHITE) FLAKES BEING PICKED UP FROM THE WATER IN THE DEEP END - THEY HAD NOT ORIGINALLY BEEN ON THE FUEL. HOWEVER, SOME DEPOSIT OF YELLOW MATERIAL WERE NOTED ON AND NEAR THE GRIDS BY NAKED EYE

IN GENERAL THE CONDITION OF THE ASSEMBLY APPEARED NORMAL FOR NEW FUEL EXCEPT FOR YELLOW DEPOSITS AS NOTED.

JEM
4-28-82



LRC Form 138

Babcock & Wilcox

Research and Development Division
LYNCHBURG RESEARCH CENTER
LYNCHBURG, VIRGINIA

To DISTRIBUTION

From J. T. MAYER, IRRADIATED MATERIALS TECHNOLOGY, LRC

Cust.

File No. or Ref.

Subj. TRIP REPORT, TMI SITE, APRIL 26-30, 1982

Date MAY 4, 1982

This letter to cover one customer and one subject only.

Distribution

G. M. Bain
[redacted]
D. L. Baty
P. C. Childress, NPGD
G. S. Clevinger
D. G. Culberson, NPGD
H. H. Davis
R. V. DeMars
C. G. Dideon
F. R. Faist, TMI Site
S. C. Inman
J. E. Matheson, NPGD
W. A. McInteer
L. J. Stanek, NPGD
K. O. Stein, NPGD

Summary

John Matheson and I participated in the visual examination of fuel and control components conducted by GPU as part of the TMI-1 recovery effort. The examination included two unirradiated fuel assemblies, one face each from four irradiated assemblies, and the upper portion of two control components (see attached core map). I personally concentrated on the irradiated components, and saw nothing out of the ordinary (except for an anomoly on the APSRA, described in more detail below). At GPU's request, I drafted a brief statement summarizing my observations (see attachment). I took two wipe samples from one of the unirradiated fuel assemblies; John Matheson covered the visual examination of these.

Examination Procedure

Two independent video systems were set up in the Unit 1 reactor building for viewing in-core and out-of-core. The new fuel assemblies were pulled from the core and examined while the bridge lowered and raised the assembly at the edge of the deep end of the canal. An ST-5 camera with zoom and pan/tilt had been set up at the canal edge for this purpose, along with two fluorescent lights. The monitoring and recording equipment were up at the walkway level near the southwest corner of the canal. Communication to the bridge was done using headphones.

While the new fuel assembly was being examined, a Westinghouse 1250 camera was lowered into the cavity (from the auxiliary bridge) for examination of the irradiated fuel. An additional set of monitoring equipment and headphones were set up at the southwest corner for this exam. The two examinations were done concurrently. The CRA exam was done with the Westinghouse camera after withdrawing the component with a manual tool.

Joe McCarthy (GPU General Offices) directed the examination of the new fuel assemblies NJ0132 and 1BM. The site people were reluctant at first to allow anyone down on the canal floor during this exam, but were finally persuaded to give permission. John Matheson was down for the last part of the visual on 132, and the entire visual on 1BM. I was down for the first part of the 132 exam and took two wipe samples (batch #75) from the north (A) face. The first covered the entire outer strap on grid 4, and the second was taken on the first inch or so of all fuel rods just below grid 3. These wipes were taken to characterize a yellowish-looking coating on the assemblies. The coating appeared to be removed by the wiping, and the wipes were noticeably blackened.

Dave Shoua (also General Office) directed the irradiated fuel exam. The Westinghouse camera was operated by either Scott Wilkerson (the site coordinator for the entire exam) or Jim Stair, one of Wilkerson's engineers. Bill Kimik, a site Q/C representative, was the responsible GPU man for the control rod exams, especially the weld areas. In general, all exams were thorough and the image quality good; however, the advantages of close-proximity direct inspection of the unirradiated fuel were obvious once this was allowed.

Results

The general appearance of the irradiated components is adequately described in the attached write-up. The one item not mentioned is the "anomaly" on one of the rods from APSRA A03. The lower edge of the end cap/cladding weld region had a thin dark circumferential line that had all the appearances of a crack. Subsequent discussions and review of the videotape were not sufficient to determine just what the anomaly was. After examining several weld areas on some new components being stored onsite, Kimik was satisfied that the mark was merely discoloration, and the issue was dropped. Kimik indicated that several new welds actually looked worse than the one on A03.

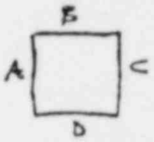
lkw

Attachments

TMI-1 CYCLE 6
Core Loading Map
Rev. 1

FUEL TRANSFER
CANAL

SOUTH →



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
								[illegible]	13X	1BZ					
B							[illegible]	[illegible] C54	[illegible]	[illegible] C45	1BU	[illegible] L105 R00005			
C			[illegible]	[illegible]	[illegible]	[illegible]	[illegible] [illegible]	OLG	13E C17	OAJ	13U C16	13P	OLH		
D		13J	13L	[illegible] [illegible]	[illegible]	[illegible]	[illegible]	[illegible] C02	OLK	144 A05	OLV	OAE C33	1C6	1C3	
E		1C4	13F C10	OLY	[illegible] C12	OLA	143 C44	OAH	13D C46	OWH	OM2 C18	OLU	OMS C57	1BP	
F	[illegible]	1BD	[illegible]	[illegible]		[illegible]	[illegible]	13G C43	OME	136 C31	OLF	OLE A06	OBD	18C C32	1CB
			[illegible]		[illegible]		[illegible]	[illegible]	13B C19	OMH	145 C48	OMU	140 C15	OAS	1BG
H	140	[illegible] C60	[illegible]	[illegible] C20	[illegible]	[illegible] [illegible]	[illegible]	OAV C61	OL3	13Y C47	OB5	13S C08	OM4	OMG C56	1BH
K	14F	OAJ	13H C03	OLU	[illegible] C40	[illegible]	[illegible] C07	OL7	137 C41	OMP	OMX C50	OMC	135 C23	OAG	14G
L	1BK	14L C25	OB4	OLB A02	[illegible]	13? [illegible]	OML	13V C51	OMK	13Z C34	OLD	146 A07	OBH	140 C49	1BH
M		14C	OLL C53	OLX	OM1 C06	OMY	134 C38	OBF	142 C52	OWJ	OM8 C24	OM6	138 C22	1C1	
N		14J	1C7	OBG C27	OLW	OMW A01	OLQ	13R C14	OMD	OLC A08	OLS	OBL C36	13Q	149	
O			OLM	13N	[illegible] [illegible]	[illegible]	[illegible] C05	OM3	OWK C21	OBQ	OLR C59	14M	OMT		
P				[illegible] [illegible]	[illegible]	18Q C37	OBK	[illegible] C58	OAL	133 C35	1BD	18S			
R						148	14K	1BT	1BR	1BF					

Z

FUEL I.D. (OAX & OBX-Batch 4; OLX, OMX & OWX-Batch 5; Batch 6-Underlined; 13X, 14X, 1BX & 1CX Batch 7)

Control Rod I.D. (CXX-CRA; AXX-APSRA) or Retainer I.D. (LXXX)
Source I.D. (ROOOX-Secondary)

NOTE: NJO Prefixes All F.A. I.D. Numbers.

RESULTS OF TMI-1 FUEL EXAM

The writer was present during a visual examination (using CCTV) of irradiated fuel in the TMI-1 core on 4-27-82. The following areas were observed:

Fuel Assembly ID	Batch	Face Examined
NJ00LT	5	South
OB1	4	East
13A	6	North
OMG	6	South

Inspections were generally done at close range; left-to-right field of view was 3 inches or less. Although full 100% coverage of each face was not accomplished, representative areas of all components were covered in detail. During the viewing, particular attention was given to weld areas (skirt-to-end-fitting and intermediate spacer grid welds), stress areas on the grids, and fuel rod crud patterns. No cracks or corroded areas were seen at any of the weld or stress regions. Fuel rod crud patterns were quite variable, ranging from very mottled light and dark regions in the upper portion of higher-burned fuel, to uniform lustrous areas covering entire spans between grids. All of the patterns seen have been previously observed on irradiated fuel from other B&W reactors. Nothing could be seen that would be called atypical, and none of the examinations revealed any evidence of significant chemical degradation to materials.

On 4-29-82, the writer also observed the CCTV visual examination of two partially withdrawn (~ 1½ feet) control components, A03 and C10. The cladding crud deposits were light, reflective and uniform for the most part, and typical of other CRAs from B&W plants.

John T. Mayer
B&W R&D Division
Lynchburg Research Center

JTM/dss

TEST

10A

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 10A

Inspected Item: Un-irradiated Fuel Assembly

Type of Inspection: Video

Inspection and Test Plan: To assess the general appearance and overall structural integrity of the un-irradiated fuel assemblies in the core for idications of abnormal surface deposits (crud), abnormal surface texture, and sulfur-induced corrosion. A general check of the zircaloy. Inconel 718.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 4 faces each F.A. ①② Minimum required 4 faces. each F.A.)	✓	

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	Yes	No
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓ ③

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132404-01

8. Task #7 Procedure No. TCN 1-82-0051

Reviewer's Signature Joseph D. McCarty

① 6 Faces video
2 Faces visual
(East + west F.A. IBM)
② 1 additional face in-core

③ Underside of Lower End Fittings and guide tube nuts were not accessible to viewing.

OTSG Task 7 Inspection Area #10A

Title: Un-irradiated Fuel Assemblies

Type of Inspection: Remoge Video/Local Visual

Equipment Used: Diamond ST-5 with Zoom on Pan & Tilt

Procedure: RP 1507-12, TCN 1-82-0051

Final Report Prep: G. R. Bond/J. D. McCarthy

These inspections were performed on April 20, 1982 and were done in accordance with the inspection plan outlined by the GPU Nuclear Fuels Memo NF-2620. The following people were involved in the actual exam:

T. Mayer - B&W R&D Division
E. Matheson - B&W Fuel Engineering
J. D. McCarthy - GPU Nuclear Fuels
W. S. Wilkerson - Lead Nuclear Engineer, TMI-1

Using the Table nomenclature from NF-2620 the results are listed below.

Item C.1 "F.A. Wipe Samples"

Two wipe samples were taken on F.A. #NJ 01BM removed from core location "H-15".

Item C.2 "Holddown Spring Retainer Plug"

The two plugs in each assembly examined, NJ 0132 and NJ01BM, were viewed. All four plugs were found in place with no sign of cracking or degradation.

Item C.3 "Upper End Fitting Plenum to Grill Weld"

All faces on both assemblies were viewed either thru remote monitoring equipment or a local visual examination. No degradation or cracking was observed.

Item C.4 "Upper End Spacer Grid to UEF Grill Weld"

The same exam and results as noted for Item C.3 above.

Item C.5 "Overall F.A. Grids and Rods"

All faces on both assemblies were viewed by remote monitoring or local visual. All rods and grids appeared normal for a new assembly. Local visual exam revealed that debris noted during video exam was being picked up off the water surface in the deep end and were not representative of the core conditions. The yellow deposits noted by the B&W representatives on NJ0132 were not seen by the GPU individual nor are they apparent on the color slides taken at the time.

Item C.6 "Lower End Spacer Grid to LEF Grill Weld"

Inspection performed with same results as noted in Item C.3 above.

Item C.7 "Lower End Fitting Plenum to Grill Weld"

Inspection performed with same results as noted in Item C.3 above.

Items C.8 and C.9 "LEF Grill and LEF Nuts"

Inspections not performed.

##

TEST

10B

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 10B

Inspected Item: Irradiated Fuel Assembly

Type of Inspection: Video

Inspection and Test Plan: To assess the general appearance and overall structural integrity of the irradiated fuel assemblies in the core for indications of abnormal surface deposits (crud), abnormal surface texture, and sulfur-induced corrosion. A general check of the zircaloy. Inconel 718.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 5 Faces + Baffle ① Minimum required 5 Faces + Baffle.)	✓	

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132404-01

8. Task #7 Procedure No. TCN # 1-82-0051

Reviewer's Signature

① includes one face of fresh assembly 1BL
JDM

TSG Task 7 Inspection Area #10B

Title: Irradiated Fuel Examination

Type of Inspection: Remote Video

Equipment Used: Westinghouse 1250 TV Camera w/Rt Angle Lens.

Procedure: RP 1507-12, TCN 1-82-0051

Final Report Prep: G. R. Bond/E. D. Shoua

These inspections were performed in accordance with the GPU Nuclear Fuels inspection plan outlined in Memo NF-2620 on April 20, 1982. The following people were directly involved with the examination:

J. T. Mayer - B&W R&D Division
C. B. Mehta - GPU Nuclear Fuels
R. M. Rama - GPU Nuclear Fuels
E. D. Shoua - GPU Nuclear Fuels
J. R. Stair - Nuclear Engineer, TMI-1
W. S. Wilkerson - Lead Nuclear Engineer, TMI-1

Using the Table nomenclature of GPU Memo NF-2620 the results are listed below.

Item D "Irradiated Fuel Assemblies"

The south face of F.A. NJ 00LT (Batch 5), the east face of F.A. NJ00B1 (Batch 4B), the north face of F.A. NJ013A (Batch 6), and the south face of F.A. NJ 00MG (Batch 6) were examined.

The areas of particular interest for Task 7 were weld areas on the upper and lower end fittings, the intermediate spacer grids, the holddown retainer plugs, and the upper and lower spacer grids. All of these areas as well as a general view of the individual fuel rods were seen during the inspection with no weld cracking or metal degradation identified.

Apart from the Task 7 concerns was the identification of some minor spacer grid damage due to fuel handling on one assembly, and some variable rod crud patterns on F.A. NJ 00B1. Neither of these items is unusual in nature from that which has been observed previously at TMI or other B&W units.

TEST

10C

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 10C

Inspected Item: Baffle Plate and Lower Grid

Type of Inspection: Video

Inspection and Test Plan: This examination will check for damage to the submerged 304 stainless steel shells and plates. Particular attention will be paid to locking welds and HAZ's of welds. Bolts made of A193-B8 and X-750 material will also be included in this inspection.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?		✓
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected ______ Minimum required ______.)		✓

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	Yes	No
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132410-00

8. Task #7 Procedure No. RP 1507-12 TCN 1-82-0051

Reviewer's Signature W. S. Wilkerson

Attachment A
Test Completion Review Sheet
Area #10C

Item 1 & Item 4

The following exceptions were taken to the B&W EIR:

a) Insp. 2.1.1, the entire vertical length of baffle plate was not inspected. The visual conditions of the baffle toward the lower portion of the baffle were insufficient for examination.

b) Insp. 2.1.3, none accessible.

c) Insp. 2.1.4, the two attachment welds on each bolt's locking pin were not visible in all cases, therefore they were not inspected.

d) Insp. 2.1.6, none accessible.

e) Insp. 3.1.1, 3.1.2, 3.1.3 and 3.1.4. These areas were not inspected due to the visual conditions in this area (which prevented meaningful examination) and camera constraints.

BABCOCK & WILCOX - NPGD

ENGINEERING INFORMATION RECORD

DOCUMENT IDENTIFIER 51-1132410-00

TITLE VIDEO INSPECTION PROCEDURE-BAFFLE PLATES AND LOWER GRID

PREPARED BY Earl F. Taylor DATE March 25, 1982

REVIEWED BY DATE 3-26-82

CW Chagnon for JW Mitchem 3-26-82

REMARKS:

1.0 Purpose

As part of the inspections to evaluate the reactor coolant system, two different peripheral fuel assemblies located adjacent to baffle plate assemblies will be removed from the core. A video inspection will then be performed on the accessible, visible baffle plates and the lower grid assembly. Inspections shall be video taped.

2.0 Baffle Plate Inspection

1. Inspect the accessible vertical baffle plates in each location for weld cracks and any other corrosion damage. Areas of special consideration are: 27037F

    1. Inspect the entire vertical length of each baffle plate.

    2. Inspect the flow holes and flow slots (if visible).

    3. Inspect the vertical gap (only if visible) between the baffle plates.

    4. Inspect all baffle plate to former bolts, each bolt's locking pin and each pin's two attachment welds. This excludes the fifth horizontal row down from the top of each baffle plate. 27037F Detail F

    5. Inspect the baffle plate to former bolts located on the fifth horizontal row down from the top of each baffle plate. Inspect the single locking weld which secures the 1/8 inch locking dowel. 27037F Detail J

    6. If visible, inspect the corner baffle to baffle bolts, each bolt's crimp wire and the crimp wire locking weld. 27037 F Detail H

3.0 Lower Grid Inspection

1. Inspect the accessible sections of the lower grid for weld cracks and any other corrosion damage. Areas of special consideration are:

    1. Inspect the accessible lower grid pads and the 1/8 inch fillet weld at each grid pad's ends. 27042 F Section V - V 143533 E
    2. Inspect on each grid pad the two 3/8 inch diameter dowels and 1/16" fillet dowel locking welds 27042 F Section V - V
    3. Inspect on each grid pad the 1/2 inch diameter socket head cap screw and its two locking welds. 27042 F Section V - V
    4. Inspect any visible section of the lower grid top rib section. 27042 F 143527 E

Inter-Office Memorandum

MAY 26 1982

GPU Nuclear

Date May 21, 1982

Subject OTSG Task 7 Area #10C
"Core Baffle Inspection"

To N. C, Kazanas
Director - Quality Assurance

Location Three Mile Island

A remote visual inspection of the core baffle plate area adjacent to core location "H-15" was completed on April 27, 1982.

The examination was performed in accordance with TMI-1 Procedure RP 1507-12 (TCN 1-82-0051). All of the inspected areas were found to be acceptable with no indication of weld cracking or corrosion damage.

The completed report on Area #10C including the evaluations by W. L. Kimmick, R. Ostrowski, and F. S. Giacobbe, the Test Completion Review Sheet, and B&W EIR 51-1132410-00 is attached.

Scott Wilkerson
W. S. Wilkerson
Lead Nuclear Engineer, TMI-1

Enclosures
WSW/sf
cc: J. J. Colitz, Plant Engineering Director, TMI-1
W. L. Kimmick, NDE/Piping Insp. Lead QA
F. S. Giacobbe, Welding & Materials Manager
G. E. Rhedrick, QA Engineer III Mechanical
R. Ostrowski, Supervisor Inservice Inspection, OC

OTSG Task 7 Inspection Area #10C

Title: Baffle Plate and Lower Grid

Type of Inspection: Remote Video

Equipment Used: Westinghouse 1250 w/Rt. Angle Lens

Procedure: RP 1507-12, TCN 1-82-0051

Report Preparation: W. S. Wilkerson

These inspections were performed in accordance with B&W EIR-51-1132410-00 on April 27, 1982. The following people were directly involved with the actual examination:

W. Kimmick - GPUN QA, TMI-1
W. S. Wilkerson - Lead Nuclear Engineer, TMI-1

The video tape made during this exam was subsequently viewed by other GPU individuals to help resolve one indication (discussed in Item 2.1.4 below). This included but is not limited to:

J. Potter - GPUN QA, TMI-1
R. Ostrowski - GPUN QA, Oyster Creek
F. S. Giacobbe - GPUN System Labs, Materials & Welding Manager

Using the nomenclature of the B&W EIR the results are listed below.

Item 2.1.1 "Entire Length of Baffle Plate"

A closeup view of the baffle adjacent to core location "H-15" was obtained for approximately 50-60% of the baffle. Camera handling and the tight confines of the F.A. hole made performing a verifiable 100% baffle inspection extremely difficult. Additionally, the surface texture and visual conditions toward the bottom of the baffle made continued visual inspection less meaningful. No sign of material cracking or degradation was noted in the general baffle plate.

Item 2.1.2 "Flow Holes & Flow Slots"

Only Flow holes were visible and these were examined. No weld cracks or corrosion damage was found.

Item 2.1.4 "Baffle Plate to Former Bolts"

Twenty-one of these bolts were visible, however both locking pin attachment welds were not visible in all twenty-one cases. All visible bolts and welds were found to be free of weld cracking or other corrosion damage.

Underneath the center bolt of the first row down from the top was a dark line in the baffle plate which could not be resolved at the time of inspection. The tape of this indication was sent out for processing. Viewing of the enhanced video tape lead to the conclusion that the indication was not related to the OTSG Stress-Corrosion cracking problem. (See attached F. S. Giacobbe memo for more details).

Item 2.1.5 "Baffle to Former Bolts, Fifth Row"

Three of these were visible. Again, no weld cracking or other corrosion damage was noted.

Item 2.1.6 "Corner Baffle Crimp"

None visible.

Item 3.0 "Lower Grid Inspection"

The shading, crud buildup, and surface texture toward the bottom of the baffle plate made the satisfactory performance of these inspections improbable. Due to this fact, TV camera constraints, and concerns over getting the camera stuck and/or damaging adjacent fuel assemblies during camera positioning these inspections were not performed.

Inter-Office Memorandum

GPU Nuclear

6111-82-2072

Date May 19, 1982

Subject Remote Visual Examination Task 7 Inspection 10C Core Baffle Plate "B" (Area of Fuel Assembly H-15)

Location TMINS Trailers #256/258

To W. S. Wilkerson
Lead Nuclear Engineer-TMI 1

A visual examination using video recording equipment was performed on Core Baffle Plate "B" with twenty-one (21) bolts and welded keepers and three (3) slotted screws with one (1) tack weld as a retainer.

The examination performed was a visual inspection of the Baffle Plate, the bolts with keepers and tack welds.

Approximately 40% of the entire length of the Baffle Plate was examined along with the bolts, keepers and tack welds in the accessible area behind fuel assembly H-15.

During the inspection process of the plate, it was noted that an indication, linear in nature, extended downward from the center bolt hole of the upper first row of bolts. This linear indication extended from the bolt hole down curving away from the center. The appearance of the line was irregular and darker than the adjacent surface.

The video film was reviewed extensively. Final determination of whether the indication was relevant or non-relevant was unattainable.

The video film was then sent out for image inhancement. When the results of this process are received, a final determination on the relevancy of the indication will be made by GPU metallurgist.

B. Kimmick

W. L. Kimmick
Lead QC Piping/NDE Inspection

WLK/ejg

attachment

cc: J. Potter
R. Fenti
J. Tietjen
N. Kazanas
QC file w/attachment
CARIRS w/attachment

GPU Nuclear
NDE

000187

Visual/Surface Data Sheet

Site: TMI 1
Inspection ID: TASK 7 Insp 10C
Component: Reactor Internals
Description: Core Baffle Plate examination (Plate "B") In Area of Fuel Assembly H-15
I.D.: Core Baffle Plate "B"
Procedure: TCN 18251 + 1507-12
Material: S/S
Thickness: 3/4"
Test Surface: Smooth
Test Method: Visual/Video
No. Positions: N/A
Distance: N/A In.
Drawing: 27037-F
Date: 4-27-82
Examiner: B Kimmick Kimmick
I.D.: A411
Level: II
Examiner: N/A
I.D.: N/A
Level: N/A

Notes: This examination was a remote visual using video recording equipment.

Magnetic Particle (Only)
Particle:
Wet ☐ Dry ☐ Color
Visible ☐ Fluorescent ☐ Batch
Instrument: N/A
Method
Current
Machine
Amperes

Dye Penetrant (Only)
Cleaner Batch#
Penetrant Batch#
Developer Batch# N/A
Method:
Visible ☐ Thermometer
Fluorescent ☐ Temp

Ind. No.	Status	Size (Inches)	Distance From (Inches) CW	CCW	1	2	Surface	Remarks
								The examination performed was on Core Baffle Plate "B", 21 Bolts with welded keepers and 3 Slotted screws with tack welds. There was a noted indication:* adjacent to Bolt hole.
*	The bolt hole of concern is the center hole, first row from the top, Baffle Plate "B" behind Fuel Assembly H-15.							

No Reportable Indications ☐ Reportable Indications ☑ Non Relevant Indications ☐

Reviewed by: Rodney Teeme
Level: II
Date: MAY 20, 1982
Page 1 of 1
NDE Request No. N/A

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925

Inter-Office Memorandum

GPU Nuclear

Date May 14, 1982
(MTI 1094) (Rev. 1)

Subject Visual Observation of the TMI Unit 1
Reactor Vessel Baffle Plate

To N. C. KAZANAS

Location Reading

Ref.: Black and White Video tape of north baffle plate center bolt, top row.
Core location H15
B&W E1R-51-1132410-00
Inspection area 10C

On May 6, 1982, the writers reviewed the above video tape including the Aptech computer enhanced tape. This tape revealed a linear indication located near the baffle plate bolt hole.

The indication was approximately 1.0"-2.0" in length with a slight curvature. The major observations which were made are as follows:

1. The indication came up to the bolt hole but did not penetrate the hole I.D. surface.
2. The indication appears to make an abrupt acute angle change at the bolt hole.
3. In the vicinity of this indication there are numerous grinding marks which pass over the indication.
4. Other faint linear indications exist in the vicinity of the main indications, however, resolution is not sufficient to assess their characteristics.
5. The indication has a ragged edge appearance.
6. A depth assessment could not be made.
7. There were no other indications of this type on any other bolt hole examined.
8. There were no deposits or scale observed associated with the indication.
9. In this area the metal appeared bright with a metallic lustre while the indication was dark obviously indicating either depth due to shadowing or staining.

Conclusions

1. The fact that the indication is so near the bolt hole yet does not penetrate it suggests that the indication is not due to applied or residual stresses. Stress would be maximum on the bolt hole I.D. surface and thus initiate cracks from that region.

2. In the absence of a stress related phenomenon, environmentally induced cracking can be ruled out as a possible cause for the linear indication.

3. This indication is believed to be a surface anomaly associated with the plate and/or baffle manufacturing history. The fact that grinding was done in this area would suggest an attempt to remove such an indication during manufacturing.

Recommendation:

1. During the next refueling outage, it is recommended that this area be re-examined to determine if any changes have occurred to the indication shape.

F. S. Giacobbe
Materials & Welding Manager

R. Ostrowski

FSG/ds

cc: B. E. Ballard
J. J. Colitz
C. D. Cowfer
J. J. Potter
D. G. Slear
S. Wilkenson

Inter-Office Memorandum

GPU Nuclear

MTCI-82-371

Date May 28, 1982
(MTI 1105)

Subject Visual Observation of the TMI Unit 1 Reactor Vessel Baffle Plate

To N. C. KAZANAS

Location Reading

Ref.: MTI 1094 dated May 14, 1982.

Please note that in conclusion 1 the word "crack" has been changed to "indication". The use of the word crack was incorrect and was an oversight on the part of the writers.

F. Scott Giacobbe
Manager Materials Engineering
& Failure Analysis

FSG/ds

JUN 1982
RECEIVED

TEST

10D

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 10D

Inspected Item: Control Component

Type of Inspection: Video

Inspection and Test Plan: One control rod assembly (CRA) and one axial power shaping rod assembly (APSRA) will be partially withdrawn in their core position and visually inspected to verify their normal condition.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Do~~es~~ the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 4 to 8 each CCA of rodnut and endplug welds and rods Minimum required 4 to 8 of each.) ①	✓	

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	Yes	No
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132412-01

8. Task #7 Procedure No. STP 1-82-0027

Reviewer's Signature Josep D. McCart

① Two CCAs inspected:
1 CRA
1 APSRA

OTSG Task 7 Inspection Area #10D

Title: Control Component Examination

Type of Inspection: Remote Video

Equipment Used: Westinghouse 1250 w/Rt. Angle Lens

Procedure: STP 1-82-0027

Final Report Prep: G. R. Bond/J. D. McCarthy - General Conditions
W. Kimmick - Detail on End Plug to Tube Weld

The inspections were performed in accordance with the GPU Nuclear Fuels Memo NF-2620 on April 22, 1982. The following people were directly involved in the actual examinations:

W. Kimmick - GPUN QA, TMI-1
J. E. Matheson - B&W Fuel Engineering
J. T. Mayer - B&W R&D Division
J. D. McCarthy - GPU Nuclear Fuels
E. D. Shoua - GPU Nuclear Fuels
J. R. Stair - Nuclear Engineering, TMI-1
W. S. Wilkerson - Lead Nuclear Engineer, TMI-1

As in inspection #10C additional GPU individuals reviewed the video tape. Using the nomenclature from NF-2620 the results are listed below.

Item B.1 "CCA Spider"

Various spider assemblies were examined during the holddown spring inspection and this inspection. No unusual conditions were found.

Item B.2 "Rod Nut Weld"

Rod nut welds on the APSR A03 and C10, additionally some of these welds were examined during the top of core inspection. All nuts were present and no material cracking or corrosion noted.

Item B.3 "Retainer Pin Welds"

A video closeup on some of these welds was performed on A03 and C10, additionally some of these welds were examined during the top of core inspection. No weld cracking or corrosion was found.

Item B.4 "Upper End Plug to Cladding Weld"

Approximately 8 to 10 of these welds were examined close up on each CCA. There were some initial concerns with one weld which were subsequently found to be typical of the as-manufactured condition. Overall, no material cracking or corrosion was found.

Item B.5 "Cladding"

A video closeup of 4 to 8 rods on each CCA was performed over approximately 15-20 inches. No clad irregularities were identified.

In addition to Items B.1 thru B.4 a general overview was obtained of each CCA. Both looked typical for their age and service.

##

Inter-Office Memorandum

GPU Nuclear

Date May 11, 1982

Subject Remote Visual Examination Task 7, Inspection 10D Control Rod Inspection (Axial Power Shaping Rod A.P.S.R.)

6111-82-2075

To W. S. Wilkerson
Lead Nuclear Engineer-TMI-1

Location TMINS Trailers #256/258

A visual examination using video recording equipment was performed on Axial Power Shaping Rod (A.S.P.R.) #A03 located in the Core at F-4.

The examination performed was visual weld inspection of the upper end plugs to the tube welds. There are sixteen (16) rods in the assembly with one (1) weld per rod. Rods examined were only those rods which were accessible with the camera.

During the inspection process of the welds it was noted that one (1) *weld had a dark linier indication running along the toe of the weld on the tube side. The area was looked at for a considerable period of time with adjusted lighting and with a view taken as physically close as possible, which is estimated to be about two (2) or three (3) inches with a good focus for a short period of time.

When the film was reviewed, the area of concern was frozen on the screen which allowed a close and extended examination. It was noted that this dark linier indication ran at the toe of the weld. The indication was noticeably darker than areas adjacent and ran the same contour of the weld bead.

One view of the weld was a profile of the joint. At this point there was an abrupt chnage at the edge of the weld metal with a minute depressed area between it and the base metal of the tube which had a slight transition form the weld.

It was determined from B & W Engineering, Lynchburg, Virginia, that these welds were welded using an automatic TIG process, with no filler metal added, which is buffed after completion. This process is performed to acquire the proper O.D.

It was felt that to get a true propective of what was being seen, a first hand look at one of these assemblies and welds was necessary. It was determined that new assemblies were available on site.

After looking at the new assembly on site and talking to the B & W Engineering people, I have determined that the indication is of a non-relevant nature. This appearance is a result of the as welded condition of the weld and is enhanced by the conditions resulting from four (4) cycles of operation.

*The exact location of the rod in the assembly was not determined. The reason for this was the inability of the camera operator to see exactly where the camera was positioned.

W. L. Kimmick
Lead QC Piping/NDE Inspection

WLK/ejg

attachment

cc: J. Potter
R. Fenti
J. Tietjen
[redacted]
QC file (1)
CARIRS (1)

GPU Nuclear

NDE

Visual/Surface Data Sheet

000191

Site: TMI 1

Inspection ID: Task 7 Insp 10D

Component: Control Rod Insp.

Description: Control Rod Inspection (Axial Power Shapping Rod - A.P.S.R. -)

I.D.: A.P.S.R. A-03

Procedure: STP-1-82-0027

Material: S/S

Thickness: ,021"

Test Surface: Smooth

Test Method: Visual/Video

No. Positions: N/A

Distance: N/A In.

Drawing: 115-8610 R2

Date: 4-24-82

Examiner: Kimmick

I.D.: A-411

Level: II

Examiner:

I.D.:

Level:

Notes: This examination was a remote visual using video recording equipment.

Magnetic Particle (Only) N/A

Particle:

Wet ☐ Dry ☐ Color

Visible ☐ Fluorescent ☐ Batch

Instrument:

Method

Current

Machine

Amperes

Dye Penetrant (Only) N/A

Cleaner Batch #

Penetrant Batch #

Developer Batch #

Method:

Visible ☐ Thermometer

Fluorescent ☐ Temp

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
								A.P.S.R. A-03 Core location F-4

No Reportable Indications ☑

Reportable Indications ☐

Non Relevant Indications ☐

Reviewed by:

Level:

Date:

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NDE Request No.

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925

Task 7
Insp 10D

CYCLE 5

PHYSICAL INVENTORY

1025
Revision 5
07/07/77

FORM 1025-7A
-Unit 1-

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A						1BY	14E	1C5	1BX	1BZ					
B				1BL	14A	14N C29	0AH	13T C54	0BC	1BN C45	1BU	1BW R005.			
C			0LT	132	13A C55	0AQ	0MV C09	0L6	13E C17	0AJ	13U C16	13P	0LH		
D		1BJ	13L	0B1 C30	0LC	147 A04	0LN	0MN C02	0LK	144 A05	0LV	0AE C33	1C6	1C3	
E		1C4	13F C10	0LY	0MA C12	0LA	143 C44	0AH	13D C46	0WH	0M2 C18	0LU	0MS C57	1BP	
F	14H	1BB C41	0AT	14P A03	0M9	13M C28	0MF	13G C43	0ME	136 C31	0LF	0LE A06	0BP	1BC C32	1C
G	1C2	0B2	0LZ C11	0LF	141 C42	0MR	139 C13	0M7	138 C19	0MH	145 C48	0MU	140 C15	0AS	1B
H	14B	0MG C60	0M5	14Q C20	0BE	13J C39	0MC	0AV C61	0L9	13Y C47	0BS	135 C08	0M4	0MG C56	1B
K	14F	0AD	13H C03	0LJ	0L8 C40	0MJ	13K C07	0L7	137 C01	0MP	0MX C50	0MC	135 C23	0AG	14
L	1BK	14L C26	0B4	0LB A02	0MB	13V C25	0ML	13W C51	0MK	13Z C34	0LD	146 A07	0BH	14D C49	1B
M		14C	0LL C53	0LX	0M1 C06	0MY	134 C38	0BF	142 C52	0WJ	0M8 C24	0M6	13B C22	1C1	
		14J	1C7	0BG C27	0LW	0MW A01	0LQ	13R C14	0MD	0LC A08	0LS	0BL C36	13Q	149	
			0LM	13N	13C C04	0AC	13K C05	0M3	0WK C21	0BQ	0LR C59	14M	0MT		
				1C0 R006	1BV	1BQ C37	0BK	0MM C58	0PL	133 C35	1BD	1BS			
						148	14K	1BT	1BR	1BF					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1

← North

Transfer Tubes →

ICA 1 RV

REACTOR VESSEL

Date 6/4/7

Signature

TASK #7
Insp 18D

Page 3 of 3

Table 3-23
Control Rod Assembly Data

Item	Data
Number of CRA	61
Number of Control Rods per Assembly	16
Outside Diameter of Control Rod, in.	0.440
Cladding Thickness, in.	0.021
Cladding Material	Type 304 SS, Cold-Worked
End Plug Material	Type 304 SS, Annealed
Spider Material	SS Grade CF3M
Poison Material	80% Ag, 15% In, 5% Cd
Female Coupling Material	Type 304 SS, Annealed
Length of Poison Section, in.	134
Stroke of Control Rod, in.	139

Table 3-24
Axial Power Shaping Rod Assembly Data

Item	Data
Number of Axial Power Shaping Rod Assemblies	8
Number of Axial Power Shaping Rods per Assembly	16
Outside Diameter of Axial Power Shaping Rod, in.	0.440
Cladding Thickness, in.	0.021
Cladding Material	Type 304 SS, Cold-Worked
Plug Material	Type 304 SS, Annealed
Poison Material	80% Ag, 15% In, 5% Cd
Spider Material	SS, Grade CF3M
Female Coupling Material	Type 304 SS, Annealed
Length of Poison Section, in.	36
Stroke of Control Rod, in.	139

Inter-Office Memorandum

GPU Nuclear

Date May 11, 1982

Subject Remote Visual Examination
Control Rod Inspection (C.R.A.) 6111-82-2074
Task 7, Inspection 10D

Location TMINS Trailers #256/258

To W. S. Wilkerson
Lead Nuclear Engineer-TMI-1

A visual examination using video recording equipment was performed on Control Rod Assembly (C.R.A.) Number C-10, located in the Core at E-3.

The examination performed was a visual weld inspection of the upper end plug to tube welds. There are sixteen (16) rods in the assembly with one (1) weld per rod. Rods examined were only those rods which were accessible with the camera.

The assembly was found to be acceptable.

W. L. Kimmick
Lead QC Piping/NDE Inspection

WLK/ejg

attachment

cc: J. Potter
R. Fenti
J. Tietjen
[redacted]
QC file (1)
CARIRS (1)

GPU Nuclear
NDE

000189

Visual/Surface Data Sheet

Site: TMI I
Inspection ID: Task 7 Insp 100
Component: Control Rod Insp.
Description: Control Rod Inspection (Control Rod Assembly - C.R.A-)
I.D.: CRA C-10
Procedure: STP-1-82-0027
Material: S/S
Thickness: .021"
Test Surface: Smooth
Test Method: Visual/Video
No. Positions: N/A
Distance: N/A In.
Drawing: 115-5630 R1
Date: 4-29-82
Examiner: B Kimmich Kimmich
I.D.: A411
Level: II
Examiner:
I.D.:
Level:

Notes: This examination was a remote visual using video recording equipment.

Magnetic Particle (Only)
Particle:
Wet ☐ Dry ☐ Color
Visible ☐ Fluorescent ☐ Batch
Instrument:
Method Current
Machine Amperes
N/A

Dye Penetrant (Only)
Cleaner Batch#
Penetrant Batch#
Developer Batch#
Method:
Visible ☐ Thermometer
Fluorescent ☐ Temp
N/A

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
								C.R.A C-10 Core Location - E3

No Reportable Indications ☑ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by:
Level:
Date:
Page 1 of 3
NDE Request No.

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925

PHYSICAL INVENTORY

1025
Revision 5
07/07/77

FORM 1025-7A
-Unit 1-

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A						1BY	14E	YC5	1BX	1BZ					
B				1BL	14A	14N C29	0AM	13T C54	0BC	1BN C45	1BU	1BW R005			
C			0LT	132	13A C55	0AQ	0AV C09	0L6	13E C17	0AJ	134 C16	13P	0LH		
D		1EJ	13L	0B1 C30	0LG	147 A04	0LN	0MN C02	0LK	144 A05	0LV	0AE C33	1C6	1C3	
E		1C4	13F C10	0LY	0MA C12	0LA	143 C44	0AH	13D C46	0WH	0M2 C18	0LU	0MS C57	1BP	
	14H	1BB C41	0AI	14P A03	0M9	13M C28	0MF	13G C43	0ME	136 C31	0LF	0LE A06	0BD	1BC C32	1
	1C2	0B2	0LZ C11	0LF	141 C42	0MR	139 C13	0M7	138 C19	0MH	145 C48	0MU	140 C15	0AS	1
	14B	0MG C60	0M5	140 C20	0BE	13J C39	0MC	0AV C61	0L9	13Y C47	0BS	135 C08	0M4	0MG C56	1B
	14F	0AD	13H C03	0LJ	0L8 C40	0MJ	13K C07	0L7	137 C01	0MP	0MX C50	0MC	135 C23	0AG	14
	1BK	14L C26	0B4	0LB A02	0MB	13V C25	0ML	13W C51	0MK	13Z C34	0LD	146 A07	0BH	14D C49	1B
		14C	0LL C53	0LX	0M1 C06	0MY	134 C38	0BF	142 C52	0WJ	0M8 C24	0M6	13B C22	1C1	
		14J	1C7	0BG C27	0LW	0MW A01	0LQ	13R C14	0MD	0LC A08	0LS	0BL C36	13Q	149	
			0LM	13N	13C C04	0AC	13K C05	0M3	0WK C21	0BQ	0LR C59	14M	0MT		
				1C0 L006	1BV	1BQ C37	0EK	0NM C58	0PL	133 C35	1BD	1BS			
						148	14K	1BT	1BR	1BF					

<- North

Transfer Tubes ->

ICA 1 RV

REACTOR VESSEL

Date 6/4/78
Signature

Page 3 of 3

Table 3-23
Control Rod Assembly Data

Item	Data
Number of CRA	61
Number of Control Rods per Assembly	16
Outside Diameter of Control Rod, in.	0.440
Cladding Thickness, in.	0.021
Cladding Material	Type 304 SS, Cold-Worked
End Plug Material	Type 304 SS, Annealed
Spider Material	SS Grade CF3M
Poison Material	80% Ag, 15% In, 5% Cd
Female Coupling Material	Type 304 SS, Annealed
Length of Poison Section, in.	134
Stroke of Control Rod, in.	139

Table 3-24
Axial Power Shaping Rod Assembly Data

Item	Data
Number of Axial Power Shaping Rod Assemblies	8
Number of Axial Power Shaping Rods per Assembly	16
Outside Diameter of Axial Power Shaping Rod, in.	0.440
Cladding Thickness, in.	0.021
Cladding Material	Type 304 SS, Cold-Worked
Plug Material	Type 304 SS, Annealed
Poison Material	80% Ag, 15% In, 5% Cd
Spider Material	SS, Grade CF3M
Female Coupling Material	Type 304 SS, Annealed
Length of Poison Section, in.	36
Stroke of Control Rod, in.	139

TEST

12

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 12

Inspected Item: Core Barrel Bolt

Type of Inspection: Ultrasonic

Inspection and Test Plan: Determine if cracking has occurred on the bolts or screws of the reactor internals.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 96 Minimum required 88.)	✓	

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132420-00

8. Task #7 Procedure No. STP-1-82-0012

Reviewer's Signature Rodney [illegible]

Inter-Office Memorandum

GPU Nuclear

Date April 30, 1982
MT/2032

Subject Remote Ultrasonic Examination of Core Barrel Bolting. Task #7 Test # 12

To N. C. Kazanas

Location HQ

An Ultrasonic examination of the Core barrel bolting on Unit 1's reactor was completed. This examination could only be performed on 96 of the 120 bolts securing the Core barrel. Interferences such as loca bumpers, vent valves and jack screws limited this inspection from doing 100% of the bolts. This meets and exceeds B&W's requirements which only required 88 Core barrel bolts as a minimum to be examined. In performance of the 96 bolts, no reflectors were detected and it is considered that all the bolting which was inspected is acceptable.

On April 26, 1982 two(2) B&W personnel commenced the Ultrasonic examination with one(1) T.V. camera operator (B&W), while under Materials Technology surveillance. During the lotted time, 60 bolts were attemped to be examined. Only 49 of the Core barrel bolts could be examined, the remaining 11 bolts had interferences which created an inadequate exam on these 11 bolts (refer to Attachments). This examination was performed entirely from the fuel handling bridge using along (approx 40') reach rod with the aide of video. At approximately 22:00 hours the exam was terminated due to the plant had to prepare for fuel handling for the next day. Bolts #1 thru 60 (Y to W axis) were completed for the exact identification of the bolting which was examined, refer to B&W Volumetric data sheet attached.

Re-entry was made on April 28, 1982 to complete the examination of the remaining 60 Core barrel bolts. During this exam it was also revealed that out of the remaining 60 bolts to be examined, only 47 were accessible to U.T. and 13 were inaccessible. This is depicted on Volumetric data sheets attached. The test was completed and found acceptable.

This exam exceeded the requirements set forth by B&W on Document 51-1132420-00, which requires that a minimum of 88 out of the 120 bolts be inspected. This exam accomplished 96 out of 120 Core barrel bolts requiring U.T. and was performed in accordance with B&W ISI 166 R/0 and STP-1-82-0012.

Rodney Turner
Rodney Turner
NDE Specialist

RT:blf

cc: C. D. Cowfer
J. Potter
[redacted]
M. Zeise
ISI File

BABCOCK & WILCOX
NUCLEAR POWER GENERATION DIVISION

BWNP-20503-3 (2-82)

CALIBRATION SHEET DATE: 26April 82 TIME: 1230 HR.

CUSTOMER: General Public Utilities
CONTRACT NO. 599-7239-07-20
COMPONENT: Core Barrel Assy
PROCEDURE: 151166R0
EXAMINER: Robert Laughlin ID# L-9644 LEVEL: II
COUPLANT: Demin Water ID# N/A
EXAMINER: D.N. Byrt ID B-2224 LEVEL: I

INSTRUMENT ID#: 12071
CAL/DUE DATE: 10-8-82
LINEARITY CHECK ☒ YES ☐ NO
REJECT: OFF
MAT'L. CAL.: 406
DELAY: 580
PULSE ENERGY: 1
COARSE GAIN IN DB: 20
FINE GAIN IN DB: 16
FINE GAIN: 30 %
SCREEN RANGE: 10"
SCREEN DEPTH: 20"

OPERATION: ☐ T&R ☒ NORMAL
FREQUENCY: 2.25 MHZ
DISPLAY: ☒ NORMAL ☐ RF
REP. RATE:
ZERO CONTROL: °
RESOLUTION:
DAC: A B C
GATE: A B C
ECHO START: ☐ NORMAL ☐ FIRST ECHO

N A

CALIBRATION BLOCK
ID# Core Barrel Bolt
LENGTH N/A IN.
OD 1.8 IN.
THICKNESS 10.6 IN.
TEMP 28 °F

CRYSTAL
ID# 33006
IR ☐, LS ☐, LW ☒
FREQ. 2.25 MHZ
SIZE .50 IN.
ACTUAL ∠ 0 DEG

SYSTEM CALIBRATION
ANGLE 0°
CAL. DIR. AXIAL ☐ CIRC ☐

REFLECTOR	AMPLITUDE % OF FULL SCREEN	SCREEN READING IN INCHES
NOTCH 6.0" ~~18 NODE~~ RL	80 %	6.0 IN.
NOTCH 9.0" ~~18 NODE~~ RL	28 %	9.0 IN.
18 NODE	%	IN.
18 NODE	%	IN.
18 NODE	%	IN.
18 NODE	%	IN.
OTHER	%	IN.
OPPOSITE NOTCH	%	IN.
BKR CB	%	IN.
BKR P	%	IN.

N A

CALIBRATION BLOCK SIMULATOR
SERIAL NO.:
SCREEN RANGE:
SIGNAL AMP:
SIGNAL DEPTH:
COARSE GAIN:
FINE GAIN:
TEMP.: °F
THERMO DB: 15083
CAL/DUE DATE: 9-5-82

N A

SEARCH UNIT CABLE
TYPE: MicroDot
LENGTH: 100.0'

NOTES:

FIGURE NO(S) EXAMINED

N A

CALIBRATION CONFIRMATION

TIME	1630	HRS	2000 ~~1900~~ for DVF	HRS		HRS		HRS		HRS		HRS
BLOCK SIM.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
BACK REFL.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
NOTCH 6.0" ~~18 NODE~~ RL	80 %	6.0 IN.	80 %	6.0 IN.	%	IN.	%	IN.	%	IN.	%	IN.
NOTCH 9.0" ~~18 NODE~~ RL	28 %	9.0 IN.	28 %	9.0 IN.	%	IN.	%	IN.	%	IN.	%	IN.
18 NODE	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
OTHER	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
OPPOSITE NOTCH	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
INITIALS	RL		RL									

N A

REVIEWED BY: Robert Laughlin LEVEL II DATE 4-27-82

CAL. SHEET NO. 004

VOLUMETRIC TEST DATA

BABCOCK & WILCOX COMPANY
NUCLEAR POWER GENERATION DIVISION

BWNP-20502-3 (12-81)

CUSTOMER: G.P.U. / T.M.I. Unit #1
CONTRACT NO: 599-7239-07-20
COMPONENT: REACTOR VESSEL
DESCRIPTION: UPPER CORE BARREL Bolts
ID#: MK 319
PROCEDURE: ISI 166 REV. 0
NO. POSITIONS: 1
DISTANCE: N/A
#1 REFERENCE: "Y" Axis
BEAM DIRECTION L LONG 0 SHEAR
LIMITED EXAM ☐ NO ☒ YES (IF SO WHY)
EXAMINER: Robert Laughlin ID#: L-9644 LEVEL: II
EXAMINER: ID#: B2224 LEVEL: I
NOTES: EXAM PERFORMED FROM HEAD of Bolts

MATERIAL: SS	THICKNESS: 10.6 IN.	TEST SURFACE: See Notes	
CAL. SHEET: 004	CAL. SHEET: N/A	CAL. SHEET:	
ANGLE: 0°	ANGLE:	ANGLE:	
TIME START: 1250 HR.	TIME START: HR.	TIME START: HR.	
TIME STOP: 1950 HR.	TIME STOP: HR.	TIME STOP: HR.	
PART TEMP: 102 °F	PART TEMP: °F	PART TEMP: °F	
DATE: 26 APR. 82	DATE:	DATE:	

CAL. BLOCK: CORE BARREL BOLT
DWG.# N/A
FCA(S) #1

THERMOMETER ID# 15083
60° REQUIRED
60° NOT REQUIRED
N/A

WELD INFORMATION & 0° THICKNESS: N/A

SURFACE-#2		SURFACE-#1
	WTH-	
	WD-	
	¢-	
BM-	MIN-	BM-
HAZ-	MAX-	HAZ-

1ST SCAN: N/A
2ND SCAN

IND. NO.	POSITION OR PART ITEM A	B	ANGLE (DEG.)	SURFACE	BEAM DIRECTION	STATUS	LAM. MAX AMP % DAC	LAM. DEPTH (IN.)	LGTH 20%	WDTH 50% OR HMA	100%	(INCHES) CRYSTAL A	DISTANCE B	FROM 1	2	THROUGH WALL DIMENSION MINIMUM DEPTH	POSITION IN. 1 A	2 B	MAXIMUM DEPTH	POSITION IN. 1 A	2 B	DAMPS	REMARKS
	1-21					NO RECORDABLE INDICATIONS																	
	22					INACCESSABLE																	
	23-26					NO RECORDABLE INDICATIONS																	
	27					INACESSABLE																	
	28,29					NO RECORDABLE INDICATIONS																	
	30					INACCESSABLE																	
	31,32					NO RECORDABLE INDICATIONS																	
	33					INACESSABLE																	

REVIEWED BY: Robert Laughlin LEVEL: II DATE REVIEWED: 4-28-82 FIGURE NO: N/A

ANGLE-	0 DEG.	45 DEG.	60 DEG.	OTHER
IND. NOS	1 TO 199	200 TO 399	400 TO 599	600 TO 799

BABCOCK & WILCOX
NUCLEAR POWER GENERATION DIVISION

VOLUMETRIC TEST DATA FORM 101

BWNP-20631-2(12-81)

CUSTOMER: G.P.U. T.M.I Unit #1

CONTRACT NO: 599-7239-07-20

COMPONENT: REACTOR VESSEL

EXAMINER: Robert Laughlin ID# L-9644 LEVEL II

DATE(S): 26 Apr. 82

EXAMINER: DWBx ID# B2224 LEVEL I

IND. NO.	POSITION OR PART ITEM	ANGLE (DEG)	SURFACE	BEAM DIRECTION	STATUS	LAM. MAX AMP % DAC	LAM. DEPTH (IN.)	LNGTH 20%	WDTH 50% OR MMA	100%	(INCHES) CRYSTAL DISTANCE FROM A	B	1	2	THROUGH WALL DIMENSION MINIMUM DEPTH	POSITION IN. 1 A	2 B	MAXIMUM DEPTH	POSITION IN. 1 A	2 B	DAMPS	REMARKS
								LENGTH														
	34-37				No RECORDABLE INDICATIONS																	
	38,39				INACCESSABLE																	
	40,41				No RECORDABLE INDICATIONS																	
	42				INACCESSABLE																	
	43-47				No RECORDABLE INDICATIONS																	
	48				INACCESSABLE																	
	49,50				No RECORDABLE INDICATIONS																	
	51				INACCESSABLE																	
	52-54				No RECORDABLE INDICATIONS																	
	55,56				INACCESSABLE																	
	57-60				No RECORDABLE INDICATIONS																	
					~~No Other Recor~~ DB																	

REVIEWED BY: Robert Laughlin LEVEL: II DATE REVIEWED: 4-28-82 FIGURE NO.: N/A

PAGE 1 OF ___

BABCOCK & WILCOX
NUCLEAR POWER GENERATION DIVISION

BWNP-20503-3 (2-82)

CALIBRATION SHEET DATE: 28 April 82 TIME: 1000 HR.

CUSTOMER: General Public Utilities	CONTRACT NO.: 599-7239-07-20	COMPONENT: Core Barrel Assy	PROCEDURE: 151166 R0
EXAMINER: Robert Laughlin	ID: L-9644	LEVEL: II	COUPLANT: Demin Water ID: N/A
EXAMINER: D. D. Beyd	ID: B2224	LEVEL: I	

INSTRUMENT ID: 12071
CAL/DUE DATE: 10-8-82
LINEARITY CHECK ☒ YES ☐ NO
REJECT: OFF
MAT'L. CAL.: 406
DELAY: 580
PULSE ENERGY: 1
COARSE GAIN IN DB: 20
FINE GAIN IN DB: 16
FINE GAIN: 30 %
SCREEN RANGE: 10"
SCREEN DEPTH: 20"

OPERATION: ☐ T&R ☒ NORMAL

FREQUENCY: 2.25 MHZ

DISPLAY: ☐ NORMAL ☐ RF
REP. RATE:
ZERO CONTROL: °
RESOLUTION:
A
B
C
DGC
A
B
C
GATE
ECHO START: ☐ NORMAL ☐ FIRST ECHO

N/A

CALIBRATION BLOCK
ID: Core Barrel Bolt
LENGTH N/A IN.
OD 1.8 IN.
THICKNESS 10.6 IN.
TEMP 78 °F

CRYSTAL
ID: 33006
IR ☐, LS ☐, LW ☒
FREQ. 2.25 MHZ
SIZE .50 IN.
ACTUAL ∢ 0 DEG

CALIBRATION BLOCK SIMULATOR
SERIAL NO.:
SCREEN RANGE:
SIGNAL AMP:
SIGNAL DEPTH:
COARSE GAIN:
FINE GAIN:
TEMP: °F
N/A
THERMO DB: 15083
CAL/DUE DATE: 9-5-82

SEARCH UNIT CABLE
TYPE: MICRODOT LENGTH: 100'

NOTES:

SYSTEM CALIBRATION
ANGLE 0° CAL. DIR. AXIAL ☐ CIRC ☐

REFLECTOR	AMPLITUDE % OF FULL SCREEN	SCREEN READING IN INCHES
NOTCH 6.0 ~~/8 NODE~~ RL	80 %	6.0 IN.
NOTCH 9.0 ~~/8 NODE~~ RL	28 %	9.0 IN.
/8 NODE	%	IN.
/8 NODE	%	IN.
/8 NODE	%	IN.
/8 NODE	%	IN.
OTHER	%	IN.
OPPOSITE NOTCH	%	IN.
BKR CB	%	IN.
BKR P	%	IN.

N/A

FIGURE NO(S) EXAMINED

N/A

CALIBRATION CONFIRMATION

TIME	1230 HRS		HRS		HRS		HRS		HRS		HRS	
BLOCK SIM.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
BACK REFL.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
NOTCH 6.0 ~~/8 NODE~~ RL	80 %	6.0 IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
NOTCH 9.0 ~~/8 NODE~~ RL	28 %	9.0 IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
/8 NODE	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
OTHER	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
OPPOSITE NOTCH	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
INITIALS	RL											

Final

N/A

REVIEWED BY: Robert Laughlin LEVEL II DATE 4-28-82

CAL. SHEET NO. 005

VOLUMETRIC TEST DATA

BABCOCK & WILCOX COM...NY
NUCLEAR POWER GENERATION DIVISION

BWNP-20502-3 (12-81)

CUSTOMER: General Publ Utilities
CONTRACT NO: 592 7239-07-20
COMPONENT: Core Barrel Assy
DESCRIPTION: Upper Core Barrel Bolts

ID#: MK-319
PROCEDURE: 151166R0
MATERIAL: SS
THICKNESS: 10.6 IN.
TEST SURFACE: [illegible]

NO. POSITIONS: 1
DISTANCE: N/A
#1 REFERENCE: "Y" Axis
BEAM DIRECTION 1 LONG 0 SHEAR
LIMITED EXAM ☐ NO ☒ YES (IF SO WHY)

EXAMINER: Robert Laughlin ID#: L-9644 LEVEL: II
EXAMINER: D. N. Boyd ID#: B2224 LEVEL: I

NOTES: Exam Performed from Head of Bolts.

CAL. SHEET: 005	CAL. SHEET: N/A	CAL. SHEET:
ANGLE: 0°	ANGLE:	ANGLE:
TIME START: 1015 HR.	TIME START: HR.	TIME START: HR.
TIME STOP: 1215 HR.	TIME STOP: HR.	TIME STOP: HR.
PART TEMP: 100 °F	PART TEMP: °F	PART TEMP: °F
DATE: 4-28-82	DATE:	DATE:

CAL. BLOCK: Core Barrel Bolt
DWG.# N/A
FCA(S) #1

WELD INFORMATION & 0° THICKNESS: N/A

SURFACE-#2		SURFACE-#1
	WTH-	
	WD-	
	℄-	
BM-	MIN-	BM-
HAZ-	MAX-	HAZ-

THERMOMETER ID# 15083
60° REQUIRED
60° NOT REQUIRED
N/A

1ST SCAN N/A
2ND SCAN

IND. NO.	POSITION OR PART ITEM A	B	ANGLE (DEG.)	SURFACE	BEAM DIRECTION	STATUS	LAM. MAX AMP % DAC	LAM. DEPTH (IN.)	LGTH 20%	WDTH 50% OR HMA	100%	(INCHES) CRYSTAL A	DISTANCE B	FROM 1	2	THROUGH WALL DIMENSION MINIMUM DEPTH	POSITION IN. 1 A	2 B	MAXIMUM DEPTH	POSITION IN. 1 A	2 B	DAMPS	REMARKS
	61-68		No Recordable Indications																				
	69		Inaccessable																				
	70-81		No Recordable Indications																				
	82		Inaccessable																				
	83-86		No Recordable Indications																				
	87		Inaccessable																				
	88-89		No Recordable Indications																				
	90		Inaccessable																				

REVIEWED BY: Robert Laughlin LEVEL: II DATE REVIEWED: 4-28-82 FIGURE NO: N/A

ANGLE-	0 DEG.	45 DEG.	60 DEG.	OTHER
IND. NOS.	1 TO 199	200 TO 399	400 TO 599	600 TO 799

PAGE 1 OF 2

BABCOCK & WILCOX
NUCLEAR POWER GENERATION DIVISION

VOLUMETRIC TEST DATA FORM 101

BWNP-20631-2(12-81)

CUSTOMER: General Public Utilities
CONTRACT NO: 599-7293-02-20
COMPONENT: Core Barrel Assy
EXAMINER: Robert Laughlin ID# 6-9644 LEVEL II
DATE(S): 4-28-82
EXAMINER: D.D. Rye ID# B2224 LEVEL I

IND. NO.	POSITION OR PART ITEM	ANGLE (DEG)	SURFACE	BEAM DIRECTION	STATUS	LAM.		LNGTH	WDTH		(INCHES)				THROUGH WALL DIMENSION						DAMPS	REMARKS
						MAX AMP % DAC	DEPTH (IN.)	20%	50% OR DMA	100%	CRYSTAL	DISTANCE	FROM		MINIMUM			MAXIMUM				
								LENGTH			A	B	1	2	DEPTH	POSITION IN. 1 A	2 B	DEPTH	POSITION IN. 1 A	2 B		
	91-92	NO Recordable Indications																				
	93	Inaccessable																				
	94-98	No Recordable Indications																				
	99-102	Inaccessable																				
	103-112	No Recordable Indications																				
	113-116	Inaccessable																				
	117-120	No Recordable Indications																				
		NO ~~Other~~ RL RECORDABLE INDICATIONS																				

REVIEWED BY: Robert Laughlin LEVEL: II DATE REVIEWED: 4-28-82 FIGURE NO.1

BWP-20604-2(12-81)

BABCOCK & WILCOX
NUCLEAR POWER GENERATION DIVISION

☐ NO SCAN SURFACE ☐ 1 BEAM DIRECTION ☐ 1 ☐ A
☐ LIMITED SCAN. ☐ 2. ☐ 2 ☐ B.
BETWEEN POINTS ______ AND ______, ______ INCHES FROM POINT ______
TO ______ INCHES FROM POINT ______. ______ INCHES FROM WELD ℄.
FOR ANGLES: ☐ 0° ☐ 45° ☐ 60° OTHER ______
DUE TO: ______

☐ NO SCAN SURFACE ☐ 1 BEAM DIRECTION ☐ 1 ☐ A
☐ LIMITED SCAN. ☐ 2. ☐ 2 ☐ B.
BETWEEN POINTS ______ AND ______, ______ INCHES FROM POINT ______
TO ______ INCHES FROM POINT ______. ______ INCHES FROM WELD ℄.
FOR ANGLES: ☐ 0° ☐ 45° ☐ 60° OTHER ______
DUE TO: ______

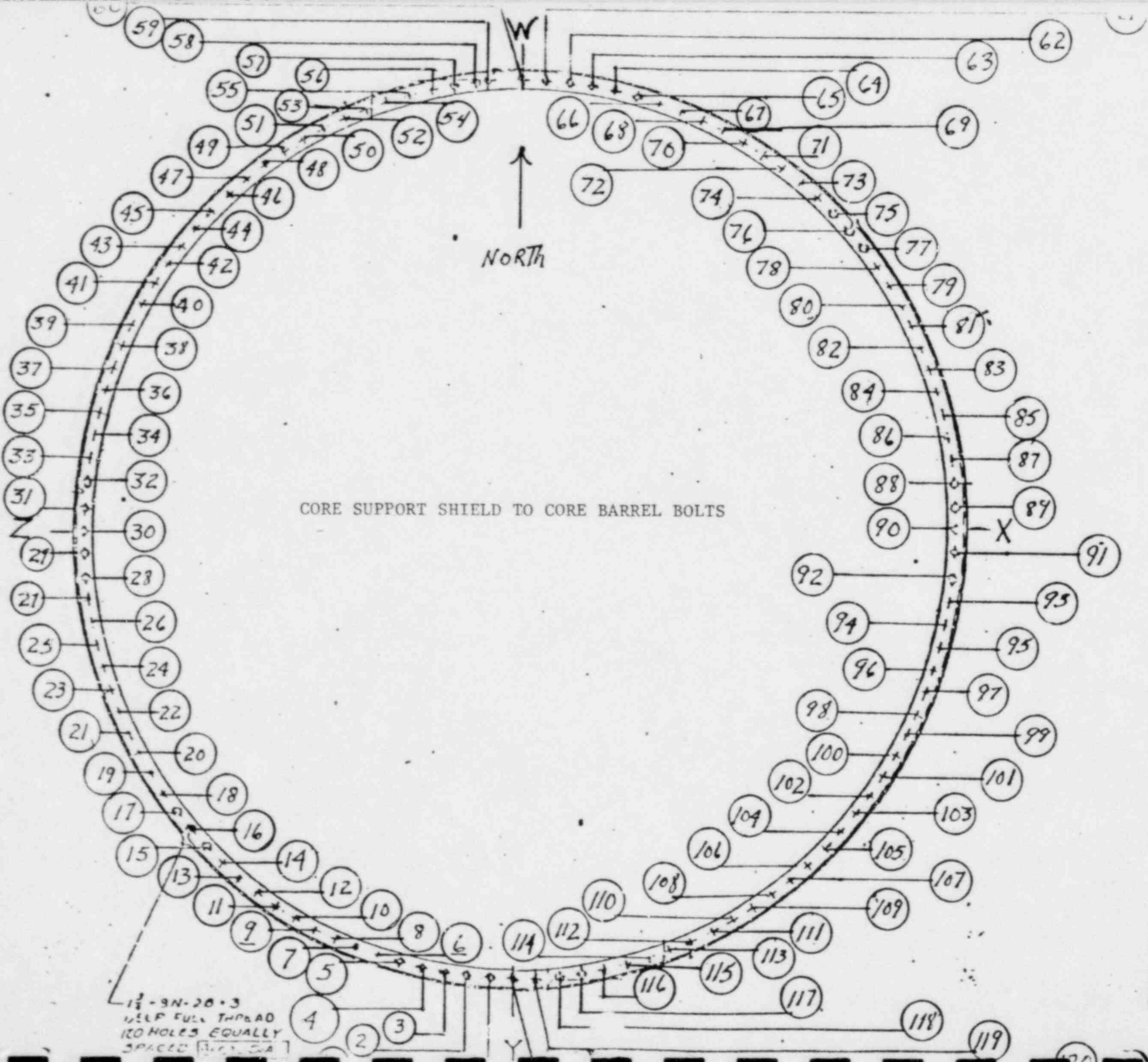
☐ NO SCAN SURFACE ☐ 1 BEAM DIRECTION ☐ 1 ☐ A
☐ LIMITED SCAN. ☐ 2. ☐ 2 ☐ B.
______ DEGREES, ______ INCHES FROM WELD CENTERLINE.
FOR ANGLES: ☐ 0° ☐ 45° ☐ 60° OTHER ______
DUE TO: ______

☐ NO SCAN SURFACE ☐ 1 BEAM DIRECTION ☐ 1 ☐ A
☐ LIMITED SCAN. ☐ 2. ☐ 2 ☐ B.
______ DEGREES, ______ INCHES FROM WELD CENTERLINE.
FOR ANGLES: ☐ 0° ☐ 45° ☐ 60° OTHER ______
DUE TO: ______

NOTES: All Bolts Listed As INACCESSABLE WERE Due To Bumper PADS, AND Jack Screws

CONTRACT NO- 599-7239-07-20
FIGURE NO. N/A
PAGE 1

REVIEWED BY: Robert Laughlin LEVEL II DATE 4-28-82



TEST #12
Core Barrel Bolting
Ultrasonic Examination

Figure 5

Task #7

TEST

13, & 14

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 13 and 14

Inspected Item: Annulus Between CSA and RV

Type of Inspection: Video

Inspection and Test Plan: This examination shall check the annulus between the reactor vessel inside diameter and the core support shield (CSS) and thermal shield, the outside of the flow distributor and the region below it.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?	X	
2. Was there an approved inspection/test procedure used for this examination?	X	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	X	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected X Minimum required ______.)	X	

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	Yes	No
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		X
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		X

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132399-00

8. Task #7 Procedure No. 1-82-0014

Reviewer's Signature ______________________

CONFIRMATION COPY

Inter-Office Memorandum

GPU Nuclear

Date May 17, 1982
MTCO-82-72

Subject Task #7 Inspections 13, 14 (Annulus Area Between Core Support Assembly and Reactor Vessel), 16 (Plenum Assembly)

To N. C. Kazanas

Location Parsippany

Remote visual inspections using video tape equipment were performed on the subject areas in accordance with GPUN Procedure STP 1-82-0014. There were no recordable indications as a result of these examinations.

The following data sheets were generated to document the examinations.

Inspection 13 & 14	000176 000177
Inspection 16	000170 000174 000175 000179 000180 000181 000193 000194

R. Ostrowski
Supervisor, Inservice Inspection

RO/dg
cc: G. Rhedrick w/attachment

[redacted]

ANNULUS BETWEEN CSA and RV

Core Support Shield Annulus

A	360° Weld OD Upper Flange & Shield Cylinder	(15%) Accessible & completed
B	360° Weld OD Lower Flange & Shield Cylinder	(15%) Accessible & completed
C	OD Surface Shield Cylinder, Upper & Lower Flange	(15%) Accessible & completed
D	360° Weld OD Between (2) Outlet Nozzles and Shield Cylinder	Non-accessible (0%)
E	(4) Flow Deflectors & Attachment Welds	Non-accessible (0%)
F	Surveillance Tube Assemblies	Non-accessible (0%)

Thermal Shield Annulus

A	360° Weld OD Between Upper & Lower Cylinder Section of Thermal Shield	(10%)
B	OD Surface of Thermal Shield	Performed - % undetermined
C	(20) Block Ass'y [(3) Bolts & Welds]	(2/20) Accessible & completed
D	(120) Lower Grid Sheet to Thermal Shield Bolts [Locking Clips & Welds]	(74/120) Accessible & completed
E	(108) Lower Grid Shell to Core Barrel Bolts [Locking Clips & Welds]	(72/108) Accessible & completed

TASK I.D.: 13 & 14

ENGINEERING INFO RECORD: 51-1132399-00

INSPECTION CHECK LIST

SHEET 1 of 8

TITLE: Annulus Between CSA and SV/Video Inspection

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
2.1 Core Support Shield assembly outside diameter region See Note 1 under Remarks.	----	----	Inspect for evidence of weld cracks and corrosion damage - See specific item for additional requirements.	Note 1: Access to perform the inspection of the annulus region between the reactor vessel inside diameter wall and the core support shield is through the eight (3) 3 1/8" diameter vent valve exercise holes in the core support shield flange.
360° circumferential weld (weld has been blended) between the core support shield upper flange and the shield cylinder.	2.1.1	27039F 146605E 27040F Detail-D	Inspect accessible outside surfaces of detectable parts for weld cracks and corrosion damage.	
360° circumferential weld (weld has been blended) between the core support shield lower flange and the shield cylinder.	2.1.2	27039F 146605E 27040F Detail-E	Inspect accessible outside surfaces of detectable parts for weld cracks and corrosion damage.	

Rev. 0

TASK I.D.: 13 & 14

ENGINEERING INFO RECORD: 51-132399-00

INSPECTION CHECK LIST

SHEET 2 of 8

TITLE: Annulus between CSA and RV/Video Inspection

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
1. Core support shield cylinder 2. Upper flange 3. Lower flange	2.1.3	27039F	Inspect accessible outside surfaces for weld cracks/corrosion damage.	
360° weld between each of the two (2) outlet nozzles and the core support shield cylinder.	2.1.4	27040F Detail F	Inspect accessible outside surfaces for weld cracks and corrosion damage	
Four (4) flow deflectors and attachment welds to core support shield cylinder.	2.1.5	27039F view J-J 27040F View C-C	Inspect accessible areas for weld cracks and corrosion damage.	
Surveillance tube assemblies on core support shield.	2.1.6	----	Inspect accessible areas for cracks/corrosion damage.	

Rev. 0

TASK I.D.: 13 & 14

ENGINEERING INFO RECORD: 51-1132399-00

INSPECTION CHECK LIST

SHEET 3 of 8

TITLE: Annulus Between CSA and RV/Video Inspection

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
3.1 Thermal shield assembly outside diameter area.	----	27038F	Inspect for weld cracks and other corrosion damage. See specific item for additional requirements.	
360° circumferential weld (weld has been blended) between upper and lower cylinder sections of the thermal shield	3.1.1	143538E	Inspect accessible outside surfaces of the detectable parts for weld cracks and other corrosion damage.	
Thermal Shield	3.1.2	----	Inspect accessible outside diameter surface for cracks/corrosion damage.	
Accessible thermal shield restraint block assemblies (20)	3.1.3	125655D	Inspect noting in each restraint. 1. The three (3) bolts and their locking clips per assembly. 2. Two (2) locking clip welds per clip (cracks). 3. Restraints A, B, and shim	

Rev. 0

TASK I.D.: 13814

ENGINEERING

INFO RECORD: 51-1132399-00

INSPECTION CHECK LIST

SHEET 4 of 8

TITLE: Annulus Between CSA and RV/Video Inspection

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
Accessible (96) lower grid shell forging to thermal shield bolts their locking clips and the two locking clip welds per clip.	3.1.4	27038F & Detail-R	Inspect for weld cracks and corrosion damage.	
Accessible (103) lower grid shell forging to core barrel bolts, their locking clips and the two locking clip welds per clip.	3.1.5	27038F & Detail-R	Inspect for weld cracks and corrosion damage.	

Rev. 0

TASK I.D.: 13 & 14

INSPECTION CHECK LIST

SHEET 5 of 8

ENGINEERING
INFO RECORD: 51-132399-00

TITLE: Annulus Between CSA and RV/Video Inspection

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
4.1 Lower grid shell forging, flow distributor assembly and guide tubes inspecton.	----	----	Inspect outside diameter area for cracked welds and corrosion damage. See specific item for additional requirements.	
Accessible (12) shock pad assemblies composed of: 1. Shock pad. 2. Two (2) bolts. 3. Two (2) bolt locking clips. 4. Two (2) locking clip welds.	4.1.1	27038F View D-D	Inspect for weld cracks and corrosion damage.	

Rev. 0

TASK I.D.: 13 6 14

INSPECTION CHECK LIST

SHEET 6 of 8

ENGINEERING INFO RECORD: 51-1132399-00

TITLE: Annulus Between CSA and RV/Video Inspection

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
Accessible (24) guide block assemblies (located in pairs below each shock pad) composed of: 1. Guide block. 2. 1½" diameter dowel. 3. 1" hex head bolt & washer. 4. Bolt to washer weld (3) per bolt. 5. Washer to guide block weld (2) per washer.	4.1.2	27038F	Inpsect for weld cracks and corrosion damage	
Lower grid shell forging.	4.1.3	----	Inspect accessible outside diameter surface for cracks/corrosion damage	

Rev. 0

TASK I.D.: 13 & 14

INSPECTION CHECK LIST

SHEET 7 of 8

ENGINEERING INFO RECORD: 51-1132399-00

TITLE: Annulus Between CSA and RV/Video Inspection

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
Accessible (96) flow distributor to lower grid shell forging bolts, their locking clips, (2) locking clip welds per clip.	4.1.4	143529E	Inspect for weld cracks and corrosion damage.	
Accessible areas of the lower flow distributor head including the (156) 6" diameter flow holes.	4.1.5	143529E 143540E	Inspect for cracks and corrosion damage.	
Accessible incore guide tubes (52) their gussets and accessible gusset welds.	4.1.6	----	Inspect for cracks and corrosion damage.	

Rev. 0

TASK I.D.: 13 & 14

INSPECTION CHECK LIST

SHEET 8 of 8

ENGINEERING INFO RECORD: 51-1132399-00

TITLE: Annulus Between CSA and RV/Video Inspection

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
Accessible areas of the bottom of the reactor vessel.	4.1.7	----	Inspect for cracks/corrosion damage	

Rev. 0

GPU Nuclear
NDE

Visual/Surface Data Sheet

000177

Site: TMI-1
Inspection ID: TASK 7 INSP. 13 14
Component: ANNULUS BETWEEN CSA AND REACTOR VESSEL
Description: SEE REMARKS FOR SPECIFIC LOCATIONS AND ITEMS EXAMINED
I.D.: ITEMS 2.1, 3.1, 4.1
Procedure: MTIS-014 R2
Material: S/S
Thickness: N/A
Test Surface: N/A
Test Method: VISUAL
No. Positions: N/A
Distance: N/A In.
Drawing: SEE CHECKLIST
Date: APRIL 25, 1982
Examiner: Richard Ostrowski R.C. OSTROWSKI
I.D.: 1691
Level: II
Examiner: N/A
I.D.: N/A
Level: N/A

Magnetic Particle (Only)
Particle:
Wet ☐ Dry ☐ Color ______
Visible ☐ Fluorescent ☐ Batch ______
Instrument:
Method ______ Current ______
Machine ______ Amperes ______
N/A

Dye Penetrant (Only)
Cleaner Batch# ______
Penetrant Batch# ______
Developer Batch# ______
N/A
Method:
Visible ☐ Thermometer ______
Fluorescent ☐ Temp ______

Notes:
SEE INSPECTION CHECK LIST FOR ACCEPTANCE REQUIREMENTS
REMOTE VISUAL USING VIDEO EQUIPMENT
TAPES # 3, 4

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
								TABE #3
								HOLE "E" SUBITEMS- 4.1.5, 4.1.6, 41.4, 4.1.2,
								3.1.4, 3.1.5, 3.1.2, 3.1.3, 2.1.1, 2.1.3
								HOLE "J" SUBITEMS- 4.1.5, 4.1.6, 4.1.4,
								4.1.2, 3.1.4, 3.1.5, 4.1.1, 3.1.2, 2.1.1, 2.1.3,
								3.1.3
								TAPE #4 SUBITEMS 4.1.5, 4.1.6, 4.1.2,
								4.1.1, 3.1.4, 3.1.5, 3.1.3, 3.1.2, 2.1.1,
								2.1.3

No Reportable Indications ☒ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by: T Michael [illegible]
Level: II
Date: May 13, 1982
Page 1 of 1
NDE Request No. N/A

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925

GPU Nuclear
NDE

Visual/Surface Data Sheet

000176

Site: TMI-1
Inspection ID: TASK 7 INSP 13 14
Component: ANNULUS BETWEEN CSA AND REACTOR VESSEL
Description: SEE REMARKS FOR SPECIFIC LOCATIONS AND ITEMS EXAMINED
I.D.: ITEMS 2.1, 3.1, 4.1
Procedure: MTIS-014 R2
Material: S/S
Thickness: N/A
Test Surface: N/A
Test Method: VISUAL
No. Positions: N/A
Distance: N/A In.
Drawing: SEE CHECKLIST
Date: APRIL 24, 1982
Examiner: Richard Ostrowski R.C. OSTROWSKI
I.D.: 1691
Level: II
Examiner: N/A
I.D.: N/A
Level: N/A

Magnetic Particle (Only)
Particle:
Wet ☐ Dry ☐ Color ______
Visible ☐ Fluorescent ☐ Batch ______
Instrument:
Method ______ Current ______
Machine ______ Amperes ______
N/A

Dye Penetrant (Only)
Cleaner Batch# ______
Penetrant Batch# ______
Developer Batch# ______
Method:
Visible ☐ Thermometer ______
Fluorescent ☐ Temp ______
N/A

Notes:
SEE INSPECTION CHECK LIST FOR ACCEPTANCE REQUIREMENTS
REMOTE VISUAL USING VIDEO EQUIPMENT
TAPES # 1,2

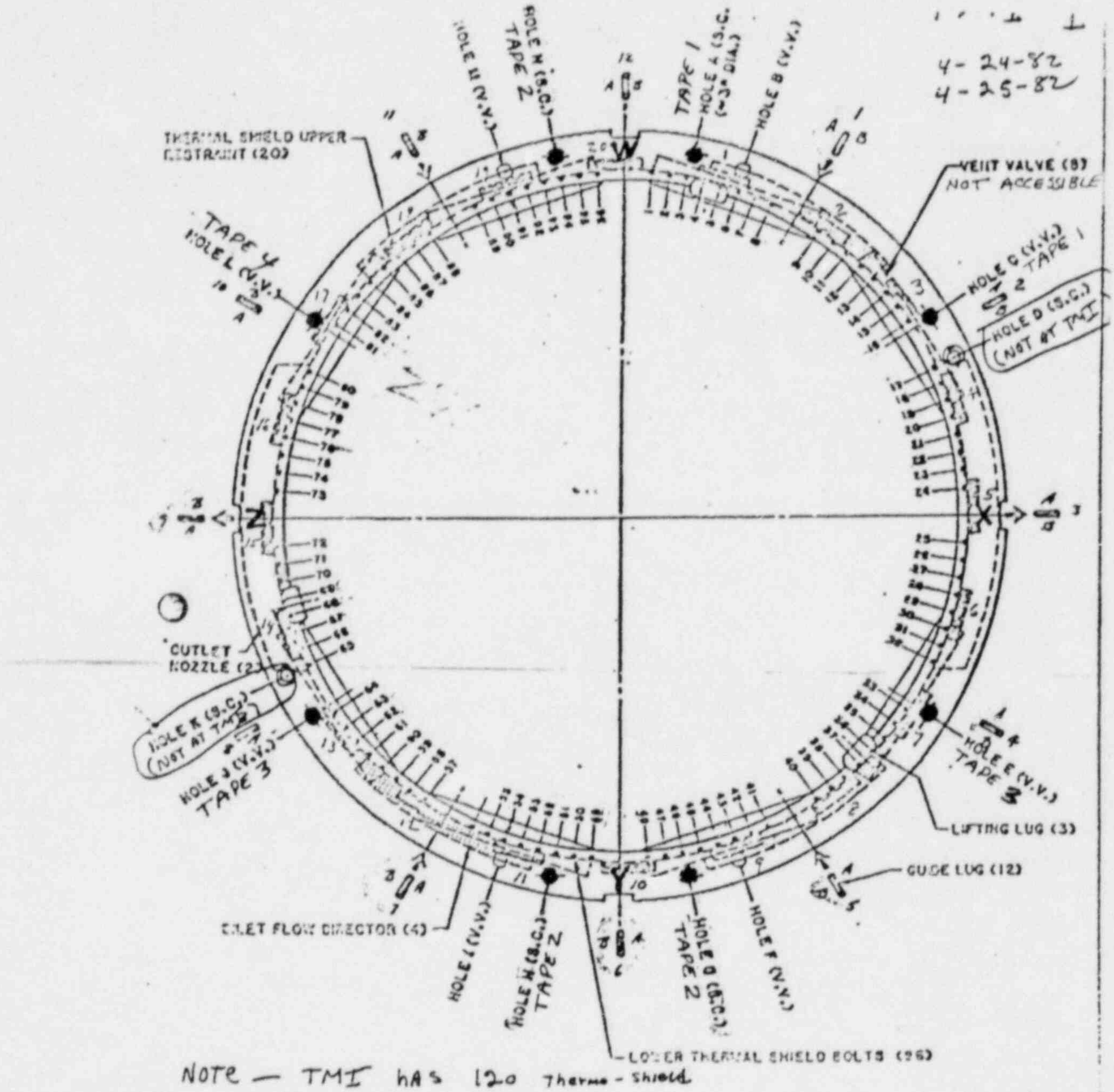
Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		TAPE #1
								HOLE "A" SUBITEMS- 4.1.5, 4.1.6, 4.1.4, 4.1.2,
								3.1.4, 3.1.5, 4.1.1, 3.1.1, 3.1.2, 3.1.3
								HOLE "C" SUBITEMS- 3.1.3, 4.1.5, 4.1.6,
								4.1.4, 3.1.4, 3.1.5, 4.1.2, 2.1.1, 2.1.5
								TAPE #2
								HOLE "G" SUBITEMS. 4.1.5, 4.1.4 4.1.2, 3.1.4,
								3.1.5, 4.1.1, 3.1.2, 2.1.1, 4.1.6
								HOLE "H" SUBITEMS. 3.1.3, 4.1.5, 4.1.4, 4.1.2,
								3.1.4 4.1.1, 3.1.5, 3.1.2, 4.1.6
								HOLE "M" SUBITEMS- 4.1.5, 4.1.6, 4.1.4,
								4.1.2, 3.1.4, 4.1.1, 3.1.5

No Reportable Indications ☒ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by: Michael Zeise
Level: II
Date: May 3, 1982
Page 1 of 1
NDE Request No. N/A

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925



4-24-82
4-25-82

NOTE — TMI has 120 Thermo-shield bolts instead of 96.

LOWER THERMAL SHIELD BOLT
INSPECTION MAP

FIGURE 1

[illegible]
[illegible]

[illegible]

TEST

15

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 15

Inspected Item: CRDM Nozzle to Stainless Flange

Type of Inspection: Eddy Current

Inspection and Test Plan: This examination is to ensure that significant defects are not present on the inside surface of the nozzle.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 1 Minimum required 1.)	✓	

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	Yes	No
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132497-00

8. Task #7 Procedure No. STP-1-82-0017

Reviewer's Signature Rodney Turner

Inter-Office Memorandum

GPU Nuclear

Date May 3, 1982
MT/2033

Subject Eddy Current Examination of CRDM
Nozzle #68 Task #7 Test 15

To N. C. Kazanas

Location HQ

Eddy Current examination was performed on CRDM #68 nozzle on April 27, 1982. Two(2) B&W personnel and one(1) person from Materials Technology completed this test which revealed no signals and was deemed acceptable.

A long guide tube was assembled and lowered on top of the CRDM Nozzle Flange. The probe was lowered down inside this tube, however, the probe would not pass into the nozzle. The tube was removed and disassembled. By reaching through and into the fan hole on the Heads CRDM shield, the probe could be inserted. One(1) man atop of the CRDM's would pull the probe during testing and the other man on the bottom reaching into the fan hole could push the probe back down for another scan. This action was required to over come the failure of the Guide Tube.

This examination meets the requirements of B&W Document 51-1132497-00 and was performed in accordance to B&W Procedure ISI 412 R/O and STP1-82-0017. B&W calibration sheet and data sheet was reviewed and found to be acceptable.

Rodney Turner
Rodney Turner
NDE Specialist

RT:blf

cc: C. D. Cowfer
J. Potter
[redacted]
M. Zeise
ISI File

BWNP-20516 (3-81)

BABCOCK & WILCOX
NUCLEAR POWER GENERATION DIVISION
INSERVICE INSPECTION PROCEDURE

EDDY CURRENT MULTIFREQUENCY
CALIBRATION SHEET

SHEET NO. 002

C.R.D.M. Nozzle #68

CUSTOMER General Public Utilities

CONTRACT NO. 599-7239-07-20

PROCEDURE : ISI- 412 R0

STEAM GENERATOR N/A

STATION/UNIT NO. : 1

MF DB/N 24139 FILL IN VALUES

CH-1 MIZ-12
FREQUENCY 1 0
PHASE 0 9 5
GAIN 5 0
BAL ☐ DIFF/ABS ☐ 990 350 KHZ ☐ 350 100 KHZ ☒ 99 35 KHZ ☐ 35 10 KHZ ☐
D/B# 24141

CH-2 MIZ-12
FREQUENCY 3 0
PHASE 2 1 1
GAIN 6 5
BAL ☐ DIFF/ABS ☐ 990 350 KHZ ☐ 350 100 KHZ ☒ 99 35 KHZ ☐ 35 10 KHZ ☐
D/B# 24140

UPPER MIXER MIZ-12 MIXER
3 0 0
Y-PHASE 3 0 0
Y GAIN 10
H GAIN 0
OUT PHASE 2 3 0
D/B# 24145

CH-3 MIZ-12
FREQUENCY 1 0
PHASE 0 9 8
GAIN 5 0
BAL ☐ DIFF/ABS ☐ 990 350 KHZ ☐ 350 100 KHZ ☒ 99 35 KHZ ☐ 35 10 KHZ ☐
D/B# 24142

CH-4 MIZ-12
FREQUENCY
PHASE
GAIN
N/A
BAL DIFF/ABS 990 350 KHZ 350 100 KHZ 99 35 KHZ 35 10 KHZ N/A
D/B# N/A

LOWER MIXER MIZ-12 MIXER
Y-PHASE
Y GAIN N
H GAIN A
OUT PHASE
D/B# 24144

PROBE

P/N 15210
S/N AZ-715
TYPE : DIFF
SIZE : 2.7'
LENGTH : 40'
MANUFACTURER Zetec

HP STRIP CHART RECORDER

IDENTIFICATION
MF : DB# 24049
VERT : DB# 24065
HORIZ : DB# 24066

GAIN
VERT : 100 MV/D
HORIZ : 200 MV/D
SPEED 5 MM/SEC

EXTENSION CABLES

CABLE NO. : 1
LENGTH : 100'
CABLE NO:
LENGTH :

H.P. TAPE RECORDER

DB# : 24135
SPEED: 3.75 IN/SEC.

CALIBRATION STANDARD

ID# : CRDM Nozzle
AS BUILT
DWG. NO. : N/A
SYSTEM RESPONSE
FIGURE NO. : N/A

EXAMINATION SPEED - PROBE SPEED VERIFIED TO BE LESS THAN 14 INCHES PER SECOND DURING RETRACTION

MIZ-12 DISPLAY
PLACE "X" IN DEPRESSED BUTTONS.

Y/DIV		LOWER MIX		UPPER MIX		
4 ☐	V-SET	☐	V-SET	☐	CH-1	☐
2 ☐	H-SET	☐	H-SET	☐	CH-2	☐
1 ☒	SP-IN	☐	SP-IN	☐	CH-3	☒
.5 ☐	OUT	☐	OUT	☒	CH-4	☐
OFF ☐						

MF: 24091

D/B : ~~24077~~ 24103 DB

CALIBRATION TIME/DATE	DATA SHEET PAGE NO.	LEVEL II	REMARKS
1845/10-22-92	1	RWK.	Initial
1945/10-21-92	1	RWK.	Final

EDDY CURRENT DATA FORM 600

BABCOCK & WILCOX
NUCLEAR POWER GENERATION DIVISION

BWNP-20496-1(11-81)

CUSTOMER/SITE: General Public Utilities
CONTRACT NO.: 599-7239-07-20
COMPONENT: Reactor Vessel Head Assy
DESCRIPTION: CRDM Nozzle # 68
CAL. STD.: CRDM
CAL. SHEET: 002
THICKNESS: .649"
DATE: 27 April 82
EXAMINER: Robert Laughlin
ID#: L-9644
LEVEL: II
PROCEDURE: ISI412 R0
F.C.A.(S): N/A
EXAMINER:
ID#: B2224
LEVEL: I

ROW NO.	TUBE COLUMN	TAPE FT. METER	TAPE/CHART NO.	CAL. CHECK	REMARKS	INDICATION			INDICATION			INDICATION			INDICATION		
						LOC	TYPE	%TWD	LOC	TYPE	%TWD	LOC	TYPE	%TWD	LOC	TYPE	%TWD
					CRDM Nozzle #68 OK												

INDICATION DESIGNATIONS

(1) O.D. LONG. CRACK
(2) DING
(3) CHATTER
(4) LOOPS
(5) LTS-1
(6) LTS-2
(7) LTS-B
(8) MISC.
(9) SPECIAL TUBES
(10) I.D. INDICATION
(11) O.D. WEAR-THINNING
(12) PLUGGED
(13) REMOVED
(14) STABILIZED
(15) UTS-C1
(16) UTS C2
(17) UTS C3
(18) O.D. INDIC.
(19) I.D. LONG CK
(20) PERMEABILITY

NOTES:

1. TBR-INDICATES TUBE TO BE RERUN: PRELIMINARY DATA FOR INFORMATION ONLY; SEE FINAL DATA ON RERUN
2. CONFIRMATION-INDICATES DEFECT/TUBE NUMBER IS CONFIRMED.
3. PV-INDICATES MANIPULATOR POSITION VERIFICATION.

EVALUATED BY: Robert W. Laughlin
LEVEL: II
DATE EVALUATED: 4-28-82
INSPECTED FROM ☐ INLET ☐ OUTLET
PAGE 1 OF 1

REVIEWED BY:
LEVEL: —
DATE REVIEWED:
FIGURE NO.:
REV.

[redacted]

TEST

18

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 16

Inspected Item: Plenum Assembly

Type of Inspection: Video

Inspection and Test Plan: Inspection for general condition of 304 stainless steel welded shells and bolting rings.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?	X	
2. Was there an approved inspection/test procedure used for this examination?	X	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	X	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected X Minimum required ______.)		X

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	Yes	No
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		X
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		X

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132398-00

8. Task #7 Procedure No. 1-82-0014

Reviewer's Signature ______________________

Inter-Office Memorandum

GPU Nuclear

Date May 17. 1982
MTCO-82-72

Subject Task #7 Inspections 13, 14 (Annulus Area Between Core Support Assembly and Reactor Vessel), 16 (Plenum Assembly)

To N. C. Kazanas

Location Parsippany

Remote visual inspections using video tape equipment were performed on the subject areas in accordance with GPUN Procedure STP 1-82-0014. There were no recordable indications as a result of these examinations.

The following data sheets were generated to document the examinations.

Inspection 13 & 14	000176 000177
Inspection 16	000170 000174 000175 000179 000180 000181 000193 000194

R. Ostrowski
Supervisor, Inservice Inspection

RO/dg
cc: G. Rhedrick w/attachment

Attachment

Percentage Areas (Items) Examined - Inspection 16

Item	Percentage	Remarks
2.1.1	0 %	Ultrasonic examination performed on bolts
2.1.2	1. 25% 2. 0 % 3. 68%	
2.1.3	0 %	
2.1.4	0 %	
2.1.5	100%	
2.1.6	0%	
2.2.1	100%	Where accessible
2.2.3	100%	All bumpers examined. Entire weld not accessible (only 60% accessible)
2.2.4	0 %	Inaccessible
2.2.5	100%	Where accessible
2.2.6	100%	Where accessible
2.3.1	100%	Where accessible
2.3.2	100%	Where accessible
2.3.3	100%	Where accessible

Inspection 13 & 14

See data sheets for subitems examined as accessible.

[redacted]

PLENUM VIDEO

A	(3) Plenum Assembly Lift Lug	Not Performed (UT Test #8)
B	Cover Plate of Plenum Cover Accessible Cover Plate to Grid Ribs Welds (69) Fillet Welds Cover Plate to Rod Guide	25% Completed 20% Completed (47/69) Completed
C	Grid Ribs, Rib to Rib Weld, Rib to Flange Weld	Not performed - inaccessible
D	(32) Upper Top Clamping Pads	Not performed - inaccessible
E	(4) Key Ways W, X. Y, &Z Axes	(4/4) Completed
F	Inside EACL Brazement	Not performed
G	360° Weld Upper Flange to Plenum Cylinder	Completed
H	360° Weld Lower Flange to Plenum Cylinder	Completed
I	(13) LOCA Bumpers (Porcupines)	(13/13) Completed
J	(2) Reinforcing Plates & Welds	Not performed - inaccessible
K	(64) Plenum Upper Flange to Cover Bolts	(39/64) Completed (UT 56/64 #17)
L	(36) Lower Flange to Upper Grid Ass'y Bolts	(22/36) Accessible & completed
M	Accessible CRGT	(23/69) Accessible & completed
N	1/2" Diameter Screws (4/CRGT)	(46/92) Accessible & completed
O	Pipe Weldment to Spacer Casting 3/8" Screw	(184/184) Accessible & completed

GPU Nuclear
NDE

JUN 8 1982

1 of 6

Visual/Surface Data Sheet

Page 1 of 2

000170

Site: TMI I

Inspection ID: TASK 7 Insp 16

Component: Plenum Assembly

Description: Plenum Cover Plate

I.D.: Item 2.1.2

Procedure: MTIS-014 R2

Material: S/S

Thickness: N/A

Test Surface: N/A

Test Method: Visual/Video

No. Positions: N/A

Distance: N/A In.

Drawing: 143421E

Date: 4-25-82

Examiner: Kirmmick

I.D.: A-411

Level: II

Examiner: N/A

I.D.: N/A

Level: N/A

Notes: This examination was a remote visual using Video and Recording equipment.

Magnetic Particle (Only)

Particle:

Wet ☐ Dry ☐ Color ______

Visible ☐ Fluorescent ☐ Batch ______

N/A

Instrument:

Method ______ Current ______

Machine ______ Amperes ______

Dye Penetrant (Only)

Cleaner Batch# ______

Penetrant Batch# ______

Developer Batch# ______

N/A

Method:

Visible ☐ Thermometer ______

Fluorescent ☐ Temp ______

~~Ind. No.~~	~~Status~~	~~Size (Inches)~~	Distance From (Inches) CW	CCW	1	2	Surface	Remarks

The Cover Plate and Fillets weld's Around the Following Control Rod Guide Tubes to include adjacent Grid Rib welds.

Tube # 13-5, 13-7 13-9, 12-4, 12-6, 12-8, 12-10, 11-3, 11-5, 11-7, 11-9, 11-11, 10-2, 10-4, 10-6, 10-8

Remarks: This examination was performed on the Cover plate on top of the Plenum Assembly Concentrating primarily on the fillet welds for the Control Rod drive tubes to the Cover plate. In addition to the above the cover plate was examined as well as the fillet welds of the Grid Ribs to Cover Plate.

It must be noted that the surface is covered with a dark Stain linier in nature and white & Shiny Crystals.

No Reportable Indications ☒ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by: R Hostetler

Level: II

Date: 5-13-82

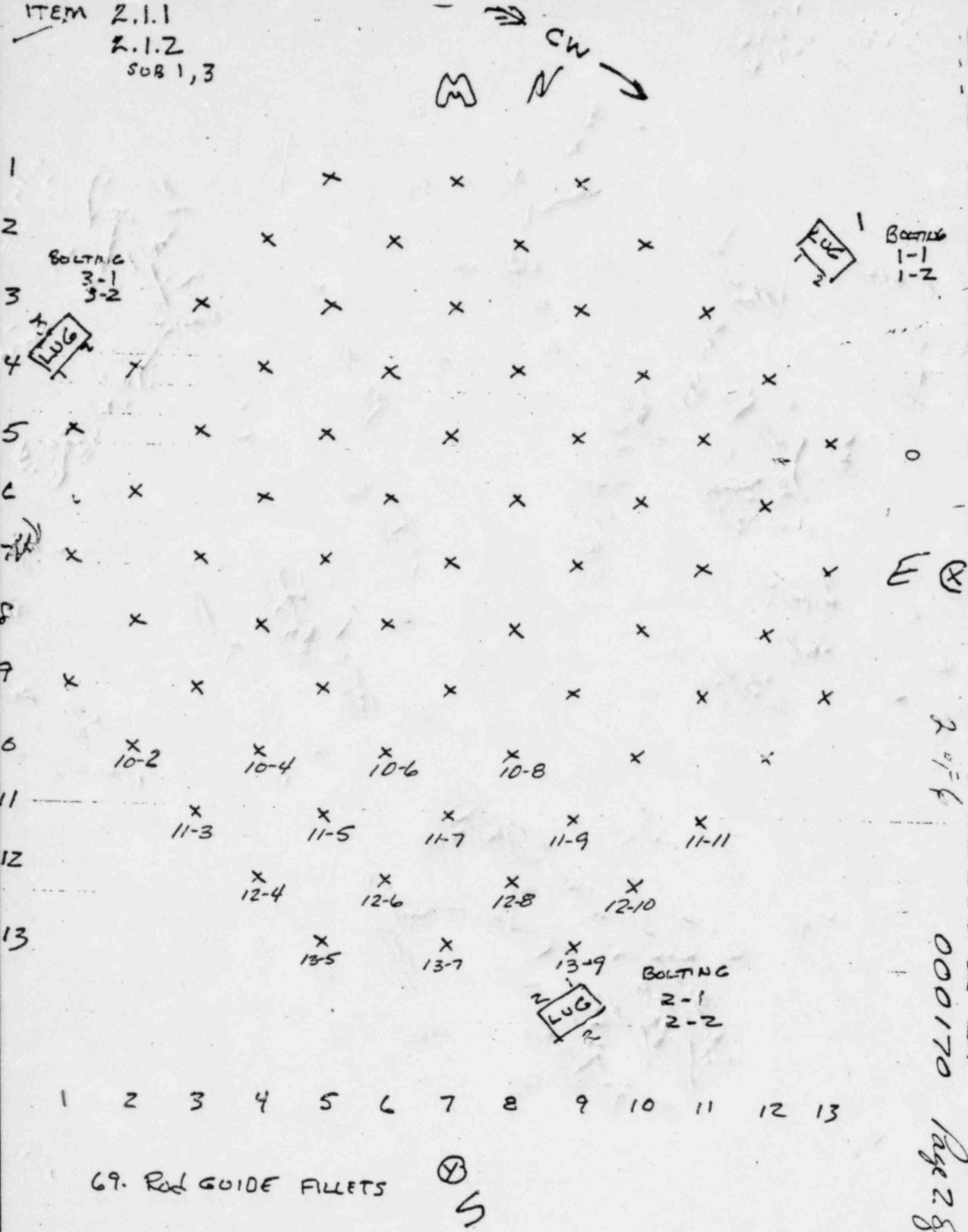
Page 1 of 2

NDE Request No.

Method/Ind. No. Visual/0-199 / P.T./200-399 M.T./400-599 Other/600-799

A0000925

ITEM 2.1.1
2.1.2
SUB 1,3



69. Rod GUIDE FILLETS

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GPU Nuclear
NDE

Visual/Surface Data Sheet 'JUN 8 1982, Page 1 of 2 000170

Site: TMI I
Inspection ID: TASK 7 Insp. 16
Component: Plenum Assembly
Description: Peripheral Control Rod Guide tube Assemblies
I.D.: Item 2.3
Procedure: MTIS-014R2
Material: S/S
Thickness: N/A
Test Surface: N/A
Test Method: Visual/Video
No. Positions: N/A
Distance: N/A In.
Drawing: 146601E
Date: 4-24-82
Examiner: B Kimmick Kimmick Br
I.D.: A 411
Level: II
Examiner: N/A
I.D.: N/A
Level: N/A

Notes: This Examination was a Remote Visual using Video & Recording equipment.

Magnetic Particle (Only) N/A
Particle:
Wet ☐ Dry ☐ Color
Visible ☐ Fluorescent ☐ Batch
Instrument:
Method ______ Current ______
Machine ______ Amperes ______

Dye Penetrant (Only) N/A
Cleaner Batch # ______
Penetrant Batch # ______
Developer Batch # ______
Method:
Visible ☐ Thermometer ______
Fluorescent ☐ Temp ______

Br ~~Ind. No.~~	Br ~~Status~~	Br ~~Size (Inches)~~	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		

Tubes which were looked at are as follows:

"W" axis towards "X" axis
#1-9 2-10, 3-11, 4-12, 5-13
"X" axis towards "Y" axis
#9-13, 10-12, 11-11, 12-10 13-9
"Y" axis towards "Z" axis
#13-5, 12-4, 11-3, 10-2, 9-1
"Z" axis towards "W" axis
#5-1, 4-2, 3-3, 2-4, 1-5

Remarks: This inspection was performed on the Outer periphery Guides tubes of the Plenum assembly. The areas inspected were only those which were accessible. This inspection included the Guide Tube, the 3/8" Screws washers and Tack welds, and the 1/2" bolts on the flange.

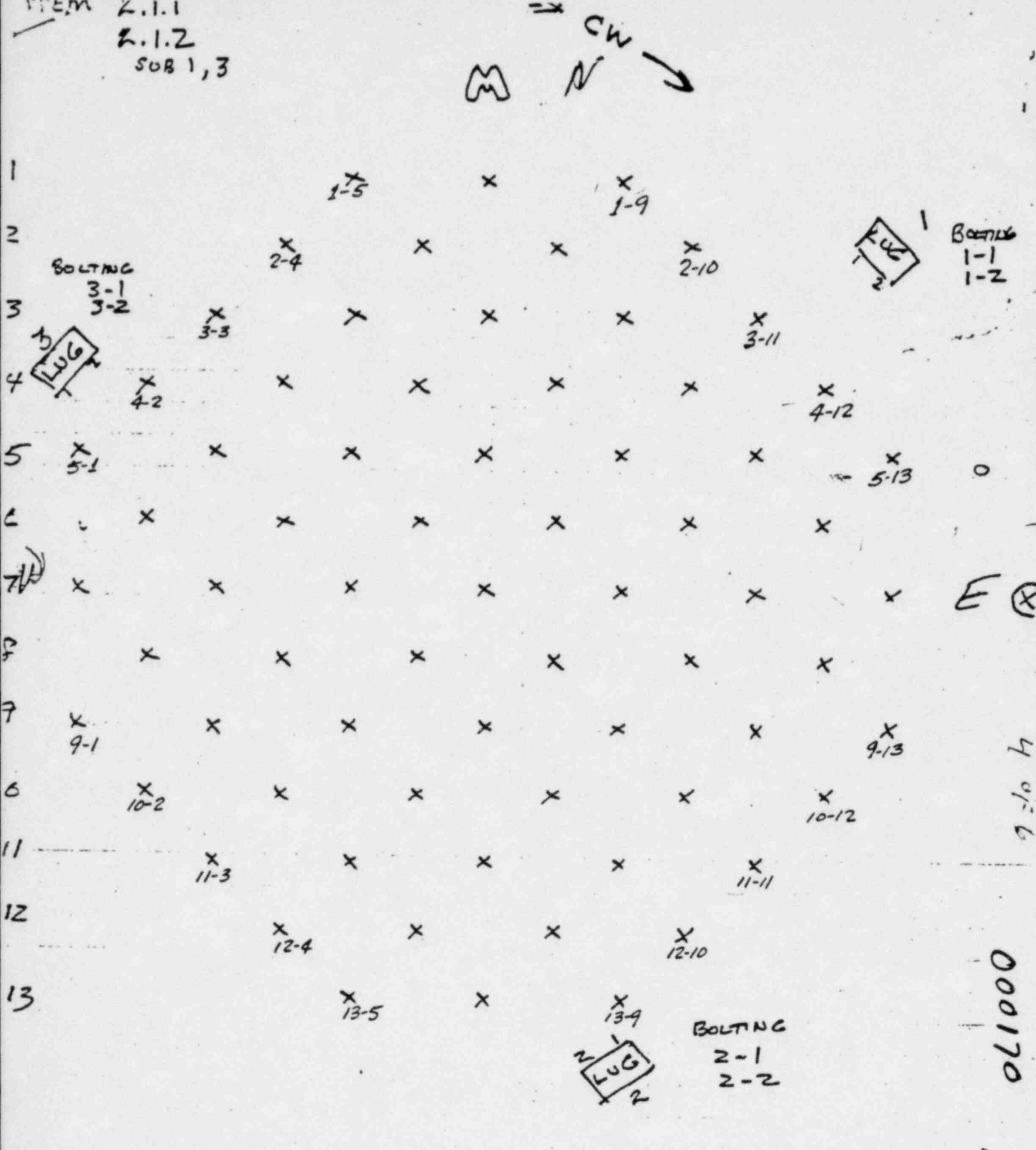
No Reportable Indications ☒ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by: R J Stoll Level: II Date: 5-13-82 Page 1 of 2 NDE Request No. N/A

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925

ITEM 2.1.1
2.1.2
SUB 1,3



69. Rod GUIDE FILLETS

Y S

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000170

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GPU Nuclear
NDE

000170

Visual/Surface Data Sheet

Site: TMI I
Inspection ID: TASK 7 Insp 16
Component: Plenum Assembly
Description: Lower Flange to Plenum Cylender + Nuts & Keepers
I.D.: Item 2.2.2, 2.2.6
Procedure: NTIS-014 R2
Material: S/S
Thickness: N/A
Test Surface: N/A
Test Method: Visual / Video
No. Positions: N/A
Distance: N/A In.
Drawing: 27035F
Date: 4-20-82
Examiner: Kimmick Bk
I.D.: A411
Level: II
Examiner: N/A
I.D.: N/A
Level: N/A

Notes: This examination was a remote Visual performed with Video & Recording equipment. The area of interest was the Lower Flange w/ nuts & Keepers, and the Flange weld to plenum cylinder of the Plenum Assembly.

Magnetic Particle (Only) N/A

Particle:
Wet ☐ Dry ☐ Color ______
Visible ☐ Fluorescent ☐ Batch ______
Instrument:
Method ______ Current ______
Machine ______ Amperes ______

Dye Penetrant (Only) N/A

Cleaner Batch# ______
Penetrant Batch# ______
Developer Batch# ______
Method:
Visible ☐ Thermometer ______
Fluorescent ☐ Temp ______

~~Ind. No.~~ Bk	~~[illegible]~~ Bk	~~Size (Inches)~~ Bk	Distance From (Inches) CW	CCW	1	2	Surface	Remarks
*	In the area of the 5th, 6th & 7th grid opening after the "Y" axis and at the "Z" axis There are areas which have a manufacturing condition which was not totally removed during machining.							The following areas were examined: "Y" axis along with the 1st, 2nd, 3rd, 4th, 5th, 6th, 7th grid openings after the "Y" axis. "Z" axis along with the 1st, 2nd, 3rd grid opening after the "Z" axis. The above examination was performed on 4-20-82 The following examination was performed on 4-24-82 4th, 5th, 6th grid opening after the "Z" axis. This completes 180° of lower flange to plenum cylinder, "Y" axis through "Z" axis to "W" axis.

* No Reportable Indications ☒ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by: R J Steil
Level: II
Date: 5-13-82
Page 1 of 1
NDE Request No. N/A

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A000C925

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GPU Nuclear
NDE

000170

Visual/Surface Data Sheet

Site: TMI Unit I
Inspection ID: Task 7 Insp. 16
Component: Plenum Assembly
Description: L.O.C.A. Bumpers & their attachment welds
I.D.: Item 2.2.3 sub. 1 & 2
Procedure: MTI5-014 R2
Material: S/S
Thickness: NA
Test Surface: AS welded
Test Method: Visual/video
No. Positions: NA
Distance: VARIOUS In.
Drawing: 27035-SEC V-V
Date: 4-29-82
Examiner: Michael Hipple / Michael J Hipple / MJH
I.D.: employee # 2057
Level: II
Examiner: NA
I.D.: NA
Level: NA

Notes: Inspection performed using remote video equipment and recording equipment
Inspection encompassed the LOCA bumpers and their attachment welds for cracks/corrosion damage
-Quality of recording tape is not indicative of that shown on the monitor at time of inspection

Magnetic Particle (Only)
Particle:
Wet ☐ Dry NA ☐ Color
Visible ☐ Fluorescent ☐ Batch
Instrument:
Method
Current
Machine
Amperes

Dye Penetrant (Only)
Cleaner Batch#
Penetrant Batch#
Developer Batch# NA
Method:
Visible ☐ Thermometer
Fluorescent ☐ Temp

Ind. No.	Status	Size (Inches)	Distance From (Inches) NA				Surface	Remarks
			CW	CCW	1	2		
LOCA bumpers on the X AXIS: the three (3) horizontal bumpers, vertical bumpers 2-1 & 2-2 and vertical bumpers 3-1 & 3-2								On the "Z" AXIS 50-60% coverage of the items noted were examined with no reportable indications noted
LOCA bumpers on the Z AXIS: the three (3) horizontal bumpers, vertical bumpers 3-1 & 3-2 and vertical bumpers 2-1, 2-2, 2-3 & 2-4								On the "X" AXIS 80-90% of the horizontal row and 50-60% of the vertical bumpers noted were examined with no reportable indications noted
								-On the "X" AXIS vertical LOCA bumper #2-2 has an apparent ding on the bottom right corner, looking at the bumper straight on. (refer video tape at aprox. 805' on the tape)

* No Reportable Indications ☒ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by: Level: II Date: 5-13-82 Page 1 of 1 NDE Request No. NA

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

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* SEE Remarks

GPU Nuclear
NDE

Visual/Surface Data Sheet

000174

Site: TMI-1
Inspection ID: TASK 7 INSP. 16
Component: PLENUM ASSEMBLY
Description: KEY WAYS (4) W, X, Y, Z AXIS
I.D.: ITEM 2.1.5
Procedure: MTIS-014 RZ
Material: S/S
Thickness: N/A
Test Surface: N/A
Test Method: VISUAL
No. Positions: N/A
Distance: N/A In.
Drawing: 143523E RZ
Date: APRIL 18, 1982
Examiner: Richard Ostrowski R.J. OSTROWSKI
I.D.: 1691
Level: II
Examiner: N/A
I.D.: N/A
Level: N/A

Notes: SEE INSPECTION CHECK LIST FOR ACCEPTANCE REQUIREMENTS

REMOTE VISUAL USING VIDEO EQUIPMENT

Magnetic Particle (Only) N/A
Particle:
Wet ☐ Dry ☐ Color ______
Visible ☐ Fluorescent ☐ Batch ______
Instrument:
Method ______ Current ______
Machine ______ Amperes ______

Dye Penetrant (Only) N/A
Cleaner Batch# ______
Penetrant Batch# ______
Developer Batch# ______
Method:
Visible ☐ Thermometer ______
Fluorescent ☐ Temp ______

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		

No Reportable Indications ☒ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by: Michael [illegible]
Level: II
Date: 5-13-82
Page 1 of 1
NDE Request No. N/A

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

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NDE

000175

Visual/Surface Data Sheet

Site: TMI-1
Inspection ID: TASK 7 INSP. 16
Component: PLENUM ASSEMBLY
Description: COVER PLATE TO ROD GUIDE ASSEMBLIES, FILLET WELDS
I.D.: ITEM 2.1.2 (3)
Procedure: MTIS-014 R2
Material: S/S
Thickness: N/A
Test Surface: N/A
Test Method: VISUAL
No. Positions: N/A
Distance: N/A In.
Drawing: 143421E
5 RD 4-27-82
Date: APRIL 17, 1982
Examiner:
I.D.: 1691
Level: II
Examiner: N/A
I.D.: N/A
Level: N/A

Notes: SEE INSPECTION CHECK LIST FOR ACCEPTANCE REQUIREMENTS

REMOTE VISUAL USING VIDEO EQUIPMENT

Magnetic Particle (Only)
Particle:
Wet ☐ Dry ☐ Color ______
Visible ☐ Fluorescent ☐ Batch ______
Instrument:
Method ______ Current ______
Machine ______ Amperes ______
N/A

Dye Penetrant (Only)
Cleaner Batch# ______
Penetrant Batch# ______
Developer Batch# ______
Method:
Visible ☐ Thermometer ______
Fluorescent ☐ Temp ______
N/A

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks	
			CW	CCW	1	2			
								LOCATIONS EXAMINED	
								1-5	3-11
								1-7	3-9
								1-9	3-7
								2-4	3-5
								2-6	3-3
								2-8	4-2
								2-10	4-4

No Reportable Indications ☒ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by:
Level: II
Date: 5-13-82
Page 1 of 1
NDE Request No. N/A

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925

GPU Nuclear
NDE

000179

Visual/Surface Data Sheet

Site: TMI - I
Inspection ID: TASK 7 INSP. 16
Component: PLENUM ASSEMBLY
Description: COVER PLATE TO ROD GUIDE ASSEMBLIES , FILLET WELDS
I.D.: ITEM 2.1.2 (3)
Procedure: MTIS-014 R2
Material: SS
Thickness: N/A
Test Surface: N/A
Test Method: VISUAL
No. Positions: N/A
Distance: N/A In.
Drawing: 143521E
Date: 4-17-82
Examiner:
I.D.: A.163
Level: II
Examiner: N/A
I.D.: N/A
Level: N/A

Notes: SEE INSP. CHECK LIST FOR ACCEPTANCE REQ'TS
~
EXAMINATION USING REMOTE VISUAL VIA VIDEOTAPE EQUIPMENT

Magnetic Particle (Only)
Particle:
Wet ☐ Dry ☐ Color
Visible ☐ Fluorescent ☐ Batch
Instrument:
Method Current
Machine Amperes
N/A

Dye Penetrant (Only)
Cleaner Batch#
Penetrant Batch#
Developer Batch#
Method:
Visible ☐ Thermometer
Fluorescent ☐ Temp
N/A

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
								THE FOLLOWING LOCATIONS WERE EXAMINED: 4-6, 4-8, 4-10, 4-12, 5-13, 5-11, 5-9, 5-7, 5-5, 5-3, 5-1, 6-2, 6-4, 6-6, 6-8, 6-10, & 6-12.

No Reportable Indications ☒
Reportable Indications ☐
Non Relevant Indications ☐

Reviewed by:
Level: II
Date: 5-13-82
Page 1 of 1
NDE Request No. N/A

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925

GPU Nuclear

NDE

Visual/Surface Data Sheet

000180

Site: TMI -I

Inspection ID: TASK 7 INSP. 16

Component: PLENUM ASSEMBLY

Description: 360° CIRCUM. WELD BETWEEN PLENUM ASSY. UPPER FLANGE & PLENUM CYL.

I.D.: ITEM 2.2.1

Procedure: MT15-014 R2

Material: SS

Thickness: N/A

Test Surface: N/A

Test Method: VISUAL

No. Positions: N/A

Distance: N/A In.

Drawing: 27035F(B)

Date: 4-19-82

Examiner:

I.D.: A-163

Level: II

Examiner: N/A

I.D.: N/A

Level: N/A

Notes: SEE INSP. CHECK LIST FOR ACCEPTANCE REQTS

EXAMINATION USING REMOTE VIDEO VIA VIDEO TAPE EQUIPMENT

Magnetic Particle (Only) N/A

Particle:

Wet ☐ Dry ☐ Color ______

Visible ☐ Fluorescent ☐ Batch ______

Instrument:

Method ______ Current ______

Machine ______ Amperes ______

Dye Penetrant (Only) N/A

Cleaner Batch# ______

Penetrant Batch# ______

Developer Batch# ______

Method:

Visible ☐ Thermometer ______

Fluorescent ☐ Temp ______

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
								ENTIRE 360° WELD EXAMINED

No Reportable Indications ☒ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by:

Level: II

Date: 5-13-82

Page 1 of 1

NDE Request No. N/A

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925

GPU Nuclear
NDE

000181

Visual/Surface Data Sheet

Site: TMI - I
Inspection ID: TASK 7, INSP. 16
Component: PLENUM ASSEMBLY
Description: LOWER FLANGE TO PLENUM CYL NUTS & KEEPERS / CIRCUMF. WELD
I.D.: ITEMS 2.2.2 & 2.2.6
Procedure: MTIS-014 R2
Material: S/S
Thickness: N/A
Test Surface: N/A
Test Method: VISUAL
No. Positions: N/A
Distance: N/A In.
Drawing: 27035 F(c) 143521 E
Date: 4-19-82
Examiner:
I.D.: A-163
Level: II
Examiner: N/A
I.D.: N/A
Level: N/A

Notes: SEE INSP. CHECK LIST FOR ACCEPTANCE REQ'TS

EXAMINATION USING REMOTE VIDEO VIA VIDEO TAPE EQUIPMENT

Magnetic Particle (Only) N/A
Particle:
Wet ☐ Dry ☐ Color ______
Visible ☐ Fluorescent ☐ Batch ______
Instrument:
Method ______ Current ______
Machine ______ Amperes ______

Dye Penetrant (Only) N/A
Cleaner Batch# ______
Penetrant Batch# ______
Developer Batch# ______
Method:
Visible ☐ Thermometer ______
Fluorescent ☐ Temp ______

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
								THE FOLLOWING AREAS WERE
								EXAMINED: 180° FROM THE
								W-AXIS TO THE Y-AXIS -
								EXAMINATIONS MADE AT THE
								AVAILABLE GRID OPENINGS.
								NOTE: DUE TO ACCESS AVAILABLE
								& VISUAL (VIDEO) CONSIDERATIONS,
								100% OF THE CIRCUMFERENTIAL
								WELD COULD NOT BE SEEN ACCURATELY
								BETWEEN GRID OPENINGS.

No Reportable Indications ☒ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by:
Level: II
Date: 5-13-82
Page 1 of 1
NDE Request No. N/A

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

GPU Nuclear
NDE

000193

Visual/Surface Data Sheet

Site: TMI -I
Inspection ID: TASK 7 INSP. 16
Component: PLENUM ASSEMBLY
Description: PLENUM CYL UPPER FLANGE TO COVER BOLTS / LOCKING CUPS
I.D.: ITEM 2.2.5
Procedure: MTIS-014 R2
Material: SS
Thickness: N/A
Test Surface: N/A
Test Method: VISUAL
No. Positions: N/A
Distance: N/A In.
Drawing: 1435 21E
Date: 4-19-82
Examiner:
I.D.: A163
Level: II
Examiner: N/A
I.D.: N/A
Level: N/A

Notes:
SEE INSP. CHECK LIST FOR ACCEPTANCE REQTS

EXAMINATION USING REMOTE VIDEO VIA VIDEO TAPE EQUIPMENT

Magnetic Particle (Only)
Particle:
Wet ☐ Dry ☐ Color ______
Visible ☐ Fluorescent ☐ Batch ______
Instrument:
Method ______ Current ______
Machine ______ Amperes ______
N/A

Dye Penetrant (Only)
Cleaner Batch # ______
Penetrant Batch # ______
Developer Batch # ______
Method:
Visible ☐ Thermometer ______
Fluorescent ☐ Temp ______
N/A

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
								LOCATIONS EXAMINED:
								1) W AXIS. BY LIFTING LUG
								2) W AXIS LOOKING TOWARD X
								3) X AXIS LOOKING TOWARD Y
								4) Y AXIS LOOKING TOWARD Z
								5) Z AXIS LOOKING TOWARD W
								NOTE: DUE TO AVAILABLE OPENINGS FOR
								CAMERA EXACT LOCATIONS NOT POSSIBLE.
								APPROX 25% OF WELDS COULD BE ACCURATELY
								EXAMINED. LOCKING CUPS VERIFIED IN PLACE.

No Reportable Indications ☒ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by:
Level: II
Date: 5-13-82
Page 1 of 1
NDE Request No. N/A

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925

GPU Nuclear
NDE

Visual/Surface Data Sheet

000194

Site: TMI - I
Inspection ID: TASK 7 INSP. 16
Component: PLENUM ASSEMBLY
Description: LOCA BUMPERS /WELDS
I.D.: ITEM 2.2.3
Procedure: MTIS-014 R2
Material: SS
Thickness: N/A
Test Surface: N/A
Test Method: VISUAL
No. Positions: N/A
Distance: N/A In.
Drawing: 27035 F SECT V-V
Date: 4-19-82
Examiner:
I.D.: A163
Level: II
Examiner: N/A
I.D.: N/A
Level: N/A

Notes: SEE INSP. CHECK LIST FOR ACCEPTANCE REQTS
~
EXAMINATION USING REMOTE VIDEO VIA VIDEO TAPE EQUIPMENT

Magnetic Particle (Only)
Particle:
Wet ☐ Dry ☐ Color ____
Visible ☐ Fluorescent ☐ Batch ____
Instrument:
Method ____ Current ____
Machine ____ Amperes ____
N/A

Dye Penetrant (Only)
Cleaner Batch# ____
Penetrant Batch# ____
Developer Batch# ____
Method:
Visible ☐ Thermometer ____
Fluorescent ☐ Temp ____
N/A

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
								LOCATIONS EXAMINED:
								1) X-AXIS 2-3, 2-4, 2-5
								3-3, 3-4, 3-5
								2) Z-AXIS 2-5
								3-3, 3-4, 3-5
								NOTE: DUE TO VIDEO CONSIDERATIONS
								50% TO 75% COVERAGE WAS AVAILABLE
								FOR ACCURATE VISUAL EXAMINATION

No Reportable Indications ☒ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by:
Level: II
Date: 5-13-82
Page 1 of 1
NDE Request No. N/A

Method/Ind. No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

A0000925

TASK I.D.: 16

INSPECTION CHECK LIST

SHEET 1 of 5

ENGINEERING INFO RECORD: 51-1132398-00

TITLE: Plenum Assembly/Video Inspection

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
2.1 Plenum Assembly cover See Note 1 under Remarks	---	143523E	Evidence of weld cracks and other corrosion damage - See specific item no. for additional requirements.	Note #1: This inspection is performed with plenum assembly located on a stand in deep end of canal
Plenum assembly lifting lugs and associated bolting 3-lugs 6-bolts 1 3/4"	2.1.1	143526E	1. Inspect each bolt, 2. Its locking cup and 3. lock cup attachment welds	
Plenum cover cover plate	2.1.2	143521E	1. Inspect cover plate (located on top of the grid ribs) 2. Accessible cover plate to grid rib welds 3. Accessible cover plate to rod guide assemblies (69) fillet welds.	
1. Accessible grid ribs. 2. Accessible rib to rib welds. 3. Ribs to outer flange welds	2.1.3	143523E 143524E Detail A Section C-C	1. 2. 3. Corrosion damage/weld cracks	

REV 0

TASK I.D.: 16

INSPECTION CHECK LIST

SHEET 2 of 5

ENGINEERING INFO RECORD: 51-1132398-00

TITLE: Plenum Assembly/Video Inspection

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
(32) Upper top clamping pads and their attachment welds	2.1.4	143523E 143524E Detail A Section C-C	Corrosion damage/weld cracks	
Key ways (4)	2.1.5		Inspect the four (4) key ways on the W, X, Y and Z axes sides of the plenum cover flange for scoring galling and any other abnormal conditions.	
Brazements	2.1.6		With camera in vertical position inspect accessible inside of each brazement.	

REV 0

TASK I.D.: 16

INSPECTION CHECK LIST

SHEET 3 of 5

ENGINEERING INFO RECORD: 51-1132398-00

TITLE: Plenum Assembly/Video Inspection

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
2.2 Plenum Assembly	----	----	Evidence of weld cracks and other corrosion damage - See specific item No. for additional requirements	
360° circumferential weld between plenum assembly upper flange and plenum cylinder	2.2.1	27035F Detail B	Inspect outside diameter side of deterable parts of weld for cracks/ corrosion damage	
360° circumferential weld between plenum assembly lower flange and plenum cylinder	2.2.2	27035F Detail C	Inspect outisde diameter side of detectable parts of weld for cracks/ corrosion damage	
Outside surface plenum cylinder	2.2.3	27035F Section V-V	In two (2) locations 1. The thirteen (13) LOCA bumpers (Porcupines). 2. Their attachment welds for cracks/corrosion damage.	

REV 0

TASK I.D.: 16

INSPECTION CHECK LIST

SHEET 4 of 5

ENGINEERING INFO RECORD: 51-1132398-00

TITLE: Plenum Assembly/Video Inspection

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
Reinforcing plates located on inside surface of plenum assembly	2.2.4	27034F Section U-U	1. Inspect two (2) plates 2. Their attachment welds for cracks/corrosion damage.	
64 plenum cylinder upper flange to plenum cover bolts 1 1/8" diameter their locking cups, and two (2) locking cup attachment welds per cup	2.2.5	143521E	Corrosion damage/weld cracks	
36 plenum cylinder lower flange to upper grid assembly bolts, their locking cups and two (2) locking cup attachment welds per cup	2.2.6	143521E	Corrosion damage/weld cracks	

REV 0

TASK I.D.: 16

INSPECTION CHECK LIST

SHEET 5 of 5

ENGINEERING INFO RECORD: 51-1132398-00

TITLE: Plenum Assembly/Video Inspection

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
2.3 Peripheral control rod guide tube (CRGT) assemblies.	----	146601E	Evidence of weld cracks/corrosion damage.	
Accessible Crgt's	2.3.1	143521E	Inspect total length for cracking/ corrosion damage	
Accessible attachment screws (4 per crgt) 1/2" dia. from flange to upper grid assembly and accessible locking welds of each screw (3 per screw)	2.3.2	143521E	Evidence of weld cracks/corrosion damage	
Accessible pipe weldment to spacer casting 3/8" screw, special washer, and the locking welds 1. Screw to washer 2. Washer to pipe weldment welds	2.3.3	146602E 146601E View B-B	Evidence of weld cracks/corrosion damage	

REV 0

TEST

17

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 17

Inspected Item: Plenum Cylinder to Plenum Cover Bolts

Type of Inspection: Ultrasonic

Inspection and Test Plan: These bolts are also made of A-193 B8 and have a nominal stress of 22 KSI. These bolts represent a second sampling of the stainless steel bolts used in the RV internals.

	YES	NO
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 56 Minimum required 56.)	✓	

Note: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	YES	NO
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

Note: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132419-00

8. Task #7 Procedure No. STP-1-82-0012

Reviewer's Signature Rodney Turner

G Rhedrick

Inter-Office Memorandum

GPU Nuclear

Date April 14, 1982
ISI/NDE M82015

Subject Ultrasonic Inspection of Plenum Cylinder to Plenum Cover Bolting (Task #7, Test 17)

To N. C. Kazanas

Location Parsippany

On April 14, 1982, two (2) B & W personnel and myself ultrasonically examined the bolting on the above subject. The test was performed in the canal using direct contact by hand of the UT probe. The original plan was to use handling tools from the bridge with the water in the canal. The direct contact method allowed a superior UT examination with greater access to more bolts. Attached is figure 4 from the UT procedure ISI 166, Rev. 0, STP 1-82-0012 which was used in the performance of this examination. Figure 4 numbers each bolt that is capable of being visually seen from this position and the numbering of these bolts are only applicable for this test. Four (4) bolts that were capable of being seen were inaccessible to UT due to the fact that they penetrated the beam of the plenum. These bolts are numbered 2, 29, 32, and 59. The remaining bolts from 1 through 60 (as depicted on figure 4) were UT examined and found acceptable to the criteria set forth in B & W EIR Document 51-1132419-00.

This examination is considered complete and meets all the requirements. Also, attached are the B & W Ultrasonic Data Sheets which I have reviewed and which I am in concurrence.

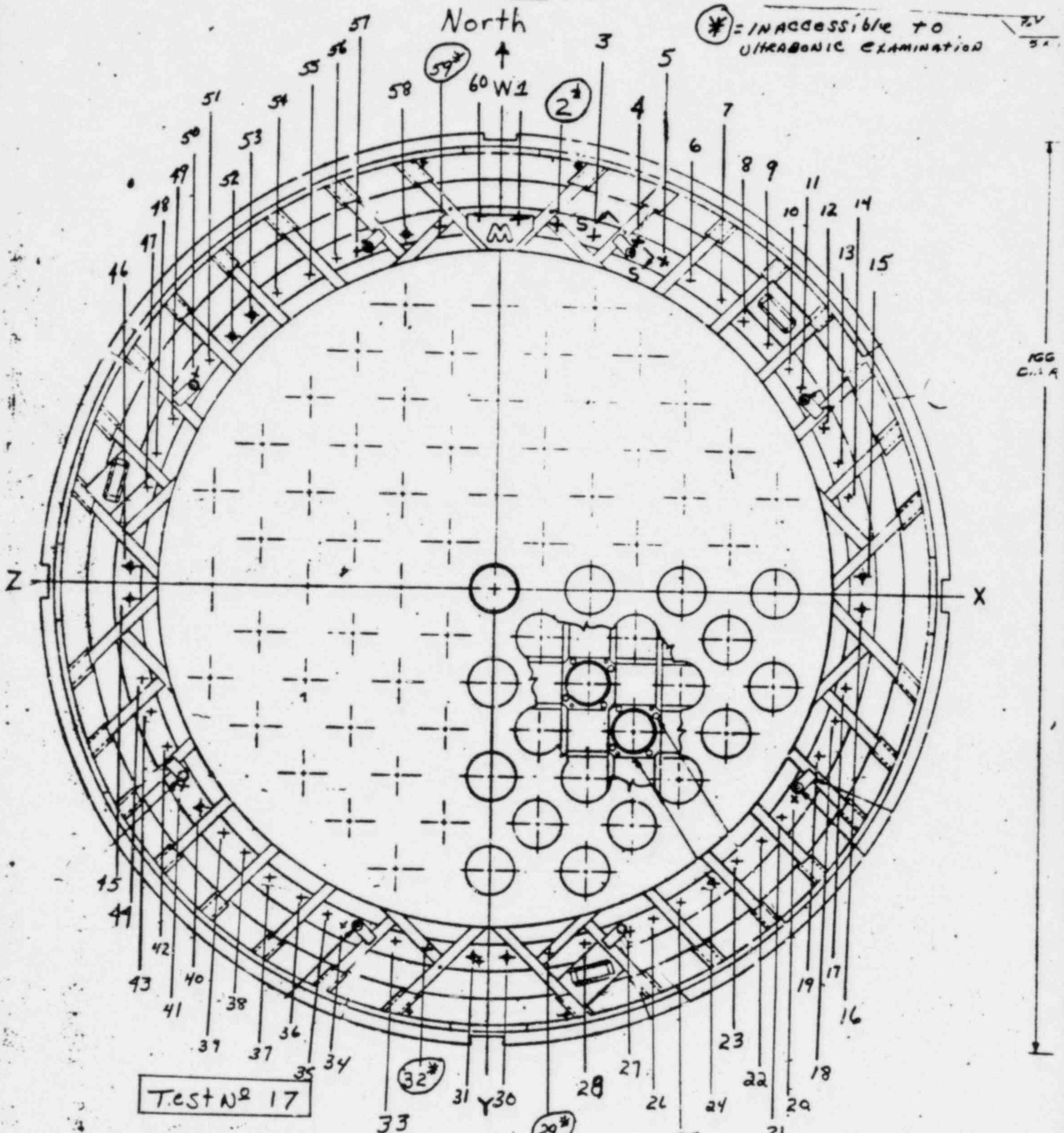
Rodney Turner
Rodney Turner
NDE Specialist
Materials Technology

APPROVAL C D Cowfer
C. D. Cowfer
Manager Materials Technology

RT:ef

cc: J. Potter
G. Rhedrick
M. Zeise
ISI File

Note: Bolt accessability will be tracked through out examination by Materials Technology Monitor. Bolt locations will be applied during examination.



Plenum cylinder to Plenum cover bolts
Figure 4

VOLUMETRIC TEST DATA

BABCOCK & WILCOX COMPANY
NUCLEAR POWER GENERATION DIVISION

BWNP-20502-3 (12-81)

CUSTOMER: General Public Utilities
CONTRACT NO: 592-7239-07-02
COMPONENT: Plenum Assy
DESCRIPTION: Plenum Cover to Plenum Cylinder Bolts
ID#: MK 219
PROCEDURE: 151166 R0
NO. POSITIONS: 1
DISTANCE: N/A
#1 REFERENCE: "W" AXIS
BEAM DIRECTION ⊥ LONG N/A SHEAR
LIMITED EXAM ☒ NO ☐ YES (IF SO WHY)
EXAMINER: Robert Laughlin
ID#: L-9644
LEVEL: II
EXAMINER: O.D. [illegible]
ID#: B2224
LEVEL: I

NOTES: 1) Bolts # 2, 29, 32, and 59 unable To Inspect due to cross Beam.
2) Bolts # 1, + 3-19 were Inspected on Cal. Sheet # 002.
3) Bolts # 20-28, 30, and 31, and 33-58 and #60 were inspected on calsheet # 003

THERMOMETER ID# 15083

1ST SCAN N/A
2ND SCAN

60° REQUIRED N/A
60° NOT REQUIRED

MATERIAL: SS	THICKNESS: 5.2 IN.	TEST SURFACE: See Remarks Page #2 OD R[illegible]	
CAL. SHEET: 002	CAL. SHEET: 003	CAL. SHEET:	
ANGLE: 0°	ANGLE: 0°	ANGLE:	
TIME START: 1155 HR.	TIME START: 12:17 HR.	TIME START: HR.	
TIME STOP: 12:07 HR.	TIME STOP: 12:34 HR.	TIME STOP: HR.	
PART TEMP: 96 °F	PART TEMP: 96 °F	PART TEMP: °F	
DATE: 4-14-82	DATE: 4-14-82	DATE:	

CAL. BLOCK: Plenum cover Bolt
DWG. # N/A
FCA(S) 1 ~~001~~ R1

WELD INFORMATION & 0° THICKNESS

SURFACE-#2		SURFACE-#1
	HTH-	
	WD-	
	℄-	
BM-	MIN-	BM-
HAZ-	MAX-	HAZ-

N/A

IND. NO.	POSITION OR PART ITEM A	POSITION OR PART ITEM B	ANGLE (DEG.)	SURFACE	BEAM DIRECTION	STATUS	LAM. MAX AMP % DAC	LAM. DEPTH (IN.)	LGTH 20% LENGTH	WDTH 50% OR HMA LENGTH	100% LENGTH	(INCHES) CRYSTAL A	DISTANCE B	FROM 1	2	THROUGH WALL DIMENSION MINIMUM DEPTH	MINIMUM POSITION IN. 1 A	MINIMUM POSITION IN. 2 B	MAXIMUM DEPTH	MAXIMUM POSITION IN. 1 A	MAXIMUM POSITION IN. 2 B	DAMPS	REMARKS
	#1-Bolt		0°	No Recordable Indications																			
	#2-Bolt		0°	Unable to Inspect																			
	#3-28		0°	No Recordable Indications																			
	#29		0°	Unable To Inspect																			
	#30-31		0°	No Recordable Indications																			
	#32		0°	Unable to Inspect																			
	#33-58		0°	No Recordable Indications																			
	#59		0°	Unable To Inspect																			

REVIEWED BY: Robert Laughlin
LEVEL: II
DATE REVIEWED: 14 April 82
FIGURE NO: N/A

ANGLE-	0 DEG.	45 DEG.	60 DEG.	OTHER
IND.	1 TO 199	200 TO 399	400 TO 599	600 TO 799

PAGE 1 OF 2

VOLUMETRIC TEST DATA

BABCOCK & WILCOX COMPANY
NUCLEAR POWER GENERATION DIVISION

BWNP-20502-3 (12-81)

CUSTOMER: GENERAL Public UTilities
CONTRACT NO: 599-7239-07-02
COMPONENT: Plenum Assembly
DESCRIPTION: Plenum Cover To Plenum Cylinder BolTS
ID#: MK 219
PROCEDURE: ISI 166 Rev 0
NO. POSITIONS: 1
DISTANCE: N/A
#1 REFERENCE: "W" Axis
BEAM DIRECTION: L LONG ___ SHEAR
LIMITED EXAM ☒ NO ☐ YES (IF SO WHY)
EXAMINER: Robert Laughlin ID#: L-9644 LEVEL: II
EXAMINER: D.N. ID#: B2224 LEVEL: I

MATERIAL: SS	THICKNESS: 5.2 IN.	TEST SURFACE: See note OD
CAL. SHEET: 003	CAL. SHEET:	CAL. SHEET:
ANGLE: 0°	ANGLE:	ANGLE:
TIME START: 1217 HR.	TIME START: HR.	TIME START: HR.
TIME STOP: 1234 HR.	TIME STOP: N HR.	TIME STOP: HR.
PART TEMP: 96 °F	PART TEMP: °F	PART TEMP: °F
DATE: 4-14-82	DATE:	DATE:

CAL. BLOCK: Plenum Cover Bolt

DWG.# N/A

FCA(S): 1

NOTES: SEE Page 1 of 2
test surface: opposite end of Nut surface.

THERMOMETER ID# 15083
60° REQUIRED
60° NOT REQUIRED N/A

1ST SCAN N
2ND SCAN A

WELD INFORMATION & 0° THICKNESS

SURFACE-#2		SURFACE-#1
	HTH-	
	WD-	
	℄-	
BM-	MIN- N/A	BM-
HAZ-	MAX-	HAZ-

IND. NO.	POSITION OR PART ITEM A	B	ANGLE (DEG.)	SURFACE	BEAM DIRECTION	STATUS	LAM. MAX AMP % DAC	LAM. DEPTH (IN.)	LENGTH LGTH 20%	LENGTH WDTH 50% OR HMA	LENGTH 100%	(INCHES) CRYSTAL A	DISTANCE B	FROM 1	2	THROUGH WALL DIMENSION MINIMUM DEPTH	MINIMUM POSITION IN. 1 A	2 B	MAXIMUM DEPTH	MAXIMUM POSITION IN. 1 A	2 B	DAMPS	REMARKS
	#60		0°	No Recordable Indications																			

REVIEWED BY: Robert Laughlin LEVEL: II DATE REVIEWED: 4-14-82 FIGURE NO: N/A

ANGLE-	0 DEG.	45 DEG.	60 DEG.	OTHER
IND.	1 TO 199	200 TO 399	400 TO 599	600 TO 799

PAGE 2 OF 2

BABCOCK & WILCOX
NUCLEAR POWER GENERATION DIVISION

BWNP-20503-3 (2-82)

CALIBRATION SHEET DATE: 4-14-82 TIME: 12:15 HR.

CUSTOMER: General Public Utilities
CONTRACT NO.: 599-7239-07-02
COMPONENT: Plenum Assy
PROCEDURE: ISI 166 R0

EXAMINER: Robert Laughlin ID# L-9644 LEVEL: II
EXAMINER: D.N. Boyd ID# B 2224 LEVEL: I

COUPLANT: Demin Water ID# N/A

INSTRUMENT ID#: 12071
CAL/DUE DATE: 10-8-82
LINEARITY CHECK ☒ YES ☐ NO
REJECT: OFF
MAT'L. CAL.: 138
DELAY: 774
PULSE ENERGY: 1
COARSE GAIN IN DB: 0
FINE GAIN IN DB: 26
FINE GAIN: 50 %
SCREEN RANGE: 10"
SCREEN DEPTH: 10"

OPERATION: ☐ T&R ☒ NORMAL

FREQUENCY: 2.5 MHZ

DISPLAY: ☐ NORMAL ☐ RF

REP. RATE:
ZERO CONTROL: °
RESOLUTION:

DGC: A B C N A

GATE: A B C

ECHO START: ☐ NORMAL ☐ FIRST ECHO

CALIBRATION BLOCK
ID# Plenum Cover Bolt
LENGTH N/A IN.
OD 1.125 IN.
THICKNESS 5.2 IN.
TEMP 80 °F

CRYSTAL
ID# 33014
TR ☐, LS ☐, LW ☒
FREQ. 2.25 MHZ
SIZE .5 0 IN.
ACTUAL ∡ 0 DEG

CALIBRATION BLOCK SIMULATOR
SERIAL NO.:
SCREEN RANGE:
SIGNAL AMP: NA
SIGNAL DEPTH:
COARSE GAIN:
FINE GAIN: A
TEMP.: °F
THERMO DB:
CAL/DUE DATE:

SEARCH UNIT CABLE
TYPE: MICRODOT
LENGTH: 6'

NOTES:

SYSTEM CALIBRATION

ANGLE 0°

CAL. DIR. AXIAL ☐ CIRC ☐

REFLECTOR	AMPLITUDE % OF FULL SCREEN	SCREEN READING IN INCHES
10 NOTCH ~~/8 NODE~~ RL	80 %	1.0 IN.
30 NOTCH ~~/8 NODE~~ RL	28 %	3.0 IN.
/8 NODE	%	IN.
/8 NODE	%	IN.
/8 NODE	%	IN.
/8 NODE	%	IN.
OTHER	%	IN.
OPPOSITE NOTCH	%	IN.
BKR CB	%	IN.
BKR P	%	IN.

N A

FIGURE NO(S) EXAMINED

N A

CALIBRATION CONFIRMATION

TIME	1236 HRS		HRS		HRS		HRS		HRS		HRS	
BLOCK SIM.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
BACK REFL.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
10 NOTCH ~~/8 NODE~~ RL	80 %	1.0 IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
30 NOTCH ~~/8 NODE~~ RL	28 %	3.0 IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
/8 NODE	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
OTHER	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
OPPOSITE NOTCH	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
INITIALS	RL											

Final

N A

REVIEWED BY: Robert Laughlin LEVEL II DATE 14 Apr '82

CAL. SHEET NO. 003

BABCOCK & WILCOX
NUCLEAR POWER GENERATION DIVISION

BWNP-20503-3 (2-82)

CALIBRATION SHEET

DATE: 14 Apr 82
TIME: 1148 HR.

CUSTOMER: General Public Utilities
CONTRACT NO.: 599-7239-07-02
COMPONENT: Plenum Assembly
PROCEDURE: 151 166 Rev. 0

EXAMINER: Robert Laughlin
ID# L9644
LEVEL: II

EXAMINER: D.D. [illegible]
ID# B2224
LEVEL: I

COUPLANT: Demin. Water
ID# N/A

INSTRUMENT ID#: 12071
CAL/DUE DATE: 10-8-82
LINEARITY CHECK ☒ YES ☐ NO
REJECT: OFF
MAT'L. CAL.: 138
DELAY: 774
PULSE ENERGY: 1
COARSE GAIN IN DB: 0
FINE GAIN IN DB: 26
FINE GAIN: 50 %
SCREEN RANGE: 10.0"
SCREEN DEPTH: 10.0"

☐ T&R
☒ NORMAL
OPERATION

FREQUENCY: 2.5 MHZ

☐ NORMAL
☐ RF
DISPLAY

REP. RATE:
ZERO CONTROL:
RESOLUTION:

A
B
C
DGC

A
B
C
GATE

☐ NORMAL
☐ FIRST ECHO
ECHO START

N/A

CALIBRATION BLOCK
ID# Plenum Cover Bolt
LENGTH N/A IN.
OD 1.175 IN.
THICKNESS 5.2 IN.
TEMP 80 °F

CRYSTAL
ID# 33014
IR ☐ . LS ☐ . LW ☒
FREQ. 2.25 MHZ
SIZE .5 IN.
ACTUAL ∡ 0 DEG

CALIBRATION BLOCK SIMULATOR
SERIAL NO.:
SCREEN RANGE:
SIGNAL AMP: %
SIGNAL DEPTH:
COARSE GAIN:
FINE GAIN:
TEMP.: °F
THERMO DB:
CAL/DUE DATE:
N/A

SEARCH UNIT CABLE
TYPE: Microdot
LENGTH: 6.0'

SYSTEM CALIBRATION

ANGLE 0°
CAL. DIR. AXIAL ☐ CIRC ☐

REFLECTOR	AMPLITUDE % OF FULL SCREEN	SCREEN READING IN INCHES
1.0" Notch ~~/8 NODE~~ AB	80 %	1.0 IN.
3.0" Notch ~~/8 NODE~~ AB	28 %	3.0 IN.
/8 NODE	%	IN.
/8 NODE	%	IN.
/8 NODE	%	IN.
/8 NODE	%	IN.
OTHER	%	IN.
OPPOSITE NOTCH	%	IN.
BKR CB	%	IN.
BKR P	%	IN.

N/A

NOTES:

FIGURE NO(S) EXAMINED

N/A

CALIBRATION CONFIRMATION

TIME	1210	HRS		HRS		HRS		HRS		HRS		HRS
BLOCK SIM.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
BACK REFL.		IN.		IN.	%	IN.	%	IN.	%	IN.	%	IN.
1.0" Notch ~~/8 NODE~~ AB	80	1.0 IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
3.0" Notch ~~/8 NODE~~ AB	28 %	3.0 IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
/8 NODE	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
OTHER	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
OPPOSITE NOTCH	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.	%	IN.
INITIALS	RL											

FINAL

N/A

REVIEWED BY: Robert Laughlin
LEVEL II
DATE 14 April 82

CAL. SHEET NO. 002

TEST

18

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 18

Inspected Item: Vent Valves and Core Support Shield I.D.

Type of Inspection: Video Examination

Inspection and Test Plan: The vent valve assembly contains 304 SS forging materials plus a variety of unique materials in the system. The jack screw which is under compressive load is made of A286. Materials include Stellite, 17-4Ph, 15-5Ph, and 400 series stainless steel. The inspection includes exercising the valve while under observation.

	YES	NO
1. Is the work scope in agreement with the B&W Engineering Information Record?		✓
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected _____ Minimum required ______.)		✓

Note: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	YES	NO
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

Note: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132407-00

8. Task #7 Procedure No. STP-1-82-0021

Reviewer's Signature W. S. Wilkerson

Inter-Office Memorandum

GPU Nuclear

MAY 25 1982

Date May 21, 1982

Subject OTSG TASK 7 AREA #18 "VENT VALVES AND CORE SUPPORT SHIELD"

To N. C. KAZANAS
DIRECTOR - QUALITY ASSURANCE

Location Three Mile Island

An inspection of the TMI-1 Reactor Internals Vent Valves and Core Support Shield has been completed. A combination of remote visual and local visual techniques were used for these inspections.

The examinations were performed in accordance with TMI Station Procedure STP #1-82-0021. No reportable conditions were found during these inspections. All areas examined have no visually detectable signs of weld cracking or corrosion damage.

The completed Area #18 Report including the Visual Inspection Checklists of STP #1-82-0021, the Test Completion Review Sheet, and B&W EIR 51-1132407-00 is attached.

Scott Wilkerson
W. S. Wilkerson
Lead Nuclear Engineer, TMI-1

WSW/dss

Attachment
cc: J. J. Colitz, Plant Engineering Director, TMI-1
G. E. Rhedrick, QA Engineer III Mechanical

May 21, 1982

OTSG Task 7 Investion Area #18

Title: Vent Valve and Core Support Shield

Type of Inspection: Remote Video and Local Visual (Binoculars)

Equipment Used: Westinghouse 1250 w/Rt. Angle Lens, 10x50 Binoculars

Procedure: STP #1-82-0021

Report Preparation: W. S. Wilkerson

The inspections were performed in accordance with TMI Station Procedure STP #1-82-0021 on April 21, 1982. The following people were directly involved with the actual examination:

H. Behnke - B&W Mech. Components
J. Woodward - B&W Video Assistance
W. S. Wilkerson - Lead Nuclear Engineer, TMI-1

Using the nomenclature of the B&W EIR, a general summary of the results is listed below. The inspection checklists of STP #1-82-0021 provide an item by item summary.

Item 2.1.1 "Vent Value Nozzle O.D. Welds"

These were attempted during the lower internals examination, however camera problems, notably stuck camera concerns, dictated the deletion of this item. See Test #13/14.

Item 2.1.2 "Inside Dia. Vent Valve Nozzle Welds"

These nozzle welds were examined using remote video along the lower portions of each nozzle and the upper sections. About a 70% coverage of these welds was obtained. There was difficulty in identifying the areas of each weld where blended into core support shield. In addition, a local visual inspection was made of all eight upper nozzle welds with excellent coverage. Each was examined from two sides with a pair of 10x50 binoculars from a distance of approximately six feet. No signs of weld cracking or corrosion damage were found.

Item 2.1.3 "Inside & Outside of Vent Valve"

Outer diameter inspections were not performed for reason noted above in Item 2.1.1. Each jackscrew, bushing, and locking devices were examined. The top and bottom retaining rings were examined on each valve, and each valve was viewed during its Tech. Spec. exercise. Also, a tack weld on each jackscrew housing was examined. No signs of weld cracking or material degradation was noted. On some retainer plates there were light shaded "water marks" as well as some darker general stains. These types of indications have been seen during previous vent valve examinations at TMI.

In addition to the video a local visual using 10x50 binoculars was performed on each vent valve. The coverage was very good and in many cases better than that obtained during the video exam. No signs of corrosion damage or cracking was seen.

All eight vent valves were viewed during the T.S. 4.16.1 exercise. All valves moved satisfactorily with no indication of abnormal wear.

Item 3.1.1 "Core Support Shield Upper Flange Weld"

This weld was not detectable using video or binoculars.

Item 3.1.2 "CSS Lower Flange Weld"

As above in Item 3.1.1.

Item 3.1.3 "Outlet Nozzle to Core Support Shield Weld"

These welds were also not detectable.

Item 3.1.4 "LOCA Bumpers"

All 26 LOCA Bumpers were inspected with approximately 80-100% coverage on each Bumper. No signs of weld cracking or corrosion damage was noted. In addition to video inspection a local visual was performed on 10 of the 26 Bumpers. No cracking or corrosion was seen.

Item 3.1.5 "Core Support Shield Barrel Bolts"

Inspection done concurrently with UT of Core Barrel Bolts video support. See Test #12.

Item 3.1.6 "CSA Lifting Lugs"

A local visual inspection using 10x50 binoculars from approxiamtely three feet as well as a local visual done unaided from about 6-8" was done. No signs of weld cracking or corrosion damage were noted.

Item 3.1.7 "Inside Diameter CSS"

Approximately 10-15% of this structure was examined using remote video during the individual inspections noted above. In addition a local visual using 10x50 binoculars was performed over an area of about 65-70% of the CSS. No irregularities, cracking, or corrosion damage was noted.

Attachment A
Test Completion Review Sheet
Area #18

Item #1 -

The following exceptions to the B&W EIR:

a) Insp. 2.1.1 not performed due to equipment constraints and safety concerns.

b) Insp. 2.1.2 was modified to include allowance for the weld detectability (Portions are blended into Core Support Shield) and visual conditions due to crud buildup on weld surface.

c) Outside diameter inspections of Insp. 2.1.3 not performed. See (a) above.

d) Insp. 3.1.5 not performed under Area #18. Bolts were UT examined under Area #12 (UT exam included visual positioning which provided viewing of locking clips).

e) Insp. 3.1.7 not specifically performed over 100% of accessible area.

Item #4 -

The following exceptions were taken to the B&W EIR:

a) Insp. 2.1.1 not performed. 0/8 minimum inspections.

b) Insp. 2.1.3 outside dia. inspections not performed. 0/8 minimum inspected.

c) Insp. 3.1.5, only 96 of the specified 120 Core Barrel Bolts were inspected. See Test #12.

d) Insp. 3.1.7, at most only 70% of all accessible inside diameter areas were inspected.

:NG[redacted]E[redacted]N[redacted]19

:NFO RECORD: Insp. Area #18

51-1132407-00

TITLE: Rx. Internals Vent Valves & Core Support Shiel

:EA TO BE AMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
. Vent Valve #1 (XY)				All areas acceptable. Two tack welds also inspected.
1.1. Jackscrew #1, bushing, locking cup, screw	1.A.1		Inspect for weld cracking or signs of corrosion damage.	(TV Video and Binocular 10x50) inspections.
.2. #2 Jackscrew, bushing & locking cup	1.A.2		as in A.1 above	All areas acceptable. Two tack welds also inspected. (TV Video & 10x50 Binocular)
A3. Top & bottom retaining rings	1.A.3		as in A.1 above	All areas acceptable. (TV Video)
A4. Vent nozzle to CSS attachment welds	1.A.4	27040F Detail G	as in A.1 above	All areas inspected acceptable Blended into Core Support Shield in some areas making weld inspection areas unacceptable (not detectable) for visual inspections. Approx. 50% to 65% of 360° inspected. (TV Video & 10x50 Binocular)

Rev

TASK I.D. : OTSG Task #7 INSPECTION CHECK LIST

ENGINEERING

INFO RECORD: Insp Area #18 TITLE: Rx. Internals Vent Values & Core Support Shiel

51-1132407-00

REA TO BE XAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
9. Core Support Shield Upper Flange to Shield weld between #1 & #2 Vent Values	B&W 3.1.1	27040 F Detail D	Inspect for weld cracking or signs of corrosion damage.	Not Detectable
0. Core Support Shield Lower Flange to Shield Weld between #1 & #2 Vent Values	B&W 3.1.2	27040F Detail E	As Above	Not Detectable or Accessible

Rev

NG EE NO

NFO RECORD: Insp. Area #18
51-1132407-00

TITLE: Rx. Internals Vent Values & Core Support Shiel

EA TO BE AMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
Vent Valve #2 (YX)				All areas acceptable. Two Tack welds also insp.
1. Jackscrew #1, bushing, locking cup, screw	2.A.1		Inspect for weld cracking or signs of corrosion damage.	(TV Video & 10x50 Binocular)
2. #2 Jackscrew, bushing & locking cup	2.A.2		as in A.1 above	All areas acceptable. Two tack welds also insp. (TV Video & 10x50 Binocular)
3. Top & bottom retaining rings	2.A.3		as in A.1 above	All areas acceptable (TV Video)
4. Vent nozzle to CSS attachment welds	2.A.4	27040F Detail G	as in A.1 above	See remarks for Item #1.A.4

TASK I.D.: OTSG Task #7 INSPECTION CHECK LIST

ENGINEERING

INFO RECORD: Insp. Area #18
51-1132407-00

TITLE: Rx. Internals, Vent Valves & Core Support Shie

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
Core Support Shield Upper Flange to Shield weld between #2 & #3 ent Valves	B&W 3.1.1	27040 F Detail D	Inspect for weld cracking or signs of corrosion damage.	Not Detectable
Core Support Shield Lower Flange to Shield Weld between #2 & #3 ent Values	B&W 3.1.2	27040F Detail E	As above	Not Detectable/Accessible

ASK I.D.: OTSG Task #7

NGINEE NO

NFO RECORD: Insp. Area #18 TITLE: Rx. Internals Vent Valves & Core Support Shiel

51-1132407-00

EA TO BE AMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
. Vent Valve #3 (YZ)				See remarks for 1.A.1
.1. Jackscrew #1, bushing, locking cup, screw	3.A.1		Inspect for weld cracking or signs of corrosion damage.	
2. #2 Jackscrew, bushing & locking cup	3.A.2		as in A.1 above	See remarks for 1.A.2
3. Top & bottom retaining rings	3.A.3		as in A.1 above	See remarks for 1.A.3
4. Vent nozzle to CSS attachment welds	3.A.4	27040F Detail G	as in A.1 above	See remarks for 1.A.4

Rev

INFO RECORD: Insp. Area #18 TITLE: Rx. Internals, Vent Values & Core Support Shiel

51-1132407-00

EM TO BE AMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
Core Support Shield Upper Flange to Shield weld between #3 & #4 ent Values	B&W 3.1.1	27040 F Detail D	Inspect for weld cracking or signs of corrosion damage.	Not Detectable
ore Support hield Lower lange to Shield Weld etween #3 & #4 ent Values	B&W 3.1.2	27040F Detail E	As Above	Not Detectable/Accessible

:N E N 19

:NFO RECORD: Insp. Area #18 TITLE: Rx. Internals Vent Values & Core Support Shiel

51-1132407-00

:EA TO BE AMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
/. Vent Valve #4(ZY)				See remarks for 1.A.1
.1. Jackscrew #1, bushing, locking cup, screw	4.A.1		Inspect for weld cracking or signs of corrosion damage.	
.2. #2 Jackscrew bushing & locking cup	4.A.2		as in A.1 above	See remarks for 1.A.2
3. Top & bottom retaining rings	4.A-3		as in A.1 above	See remarks for 1.A.3
4. Vent nozzle to CSS attachment welds	4.A.4	27040F Detail G	as in A.1 above	See remarks for 1.A.4 Better visual conditions on weld areas allowed insp. of 60% to 80% of nozzle weld.

NFO RECORD: Insp. Area #18
51-1132407-00

TITLE: Rx. Internals, Vent Valves & Core Support Shie

EM TO BE AMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
Core Support Shield Upper Flange to Shield weld between #4 & #5 ent Valves	B&W 3.1.1	27040 F Detail D	Inspect for weld cracking or signs of corrosion damage.	Not Detectable
Core Support Shield Lower Flange to Shield Weld between #4 & #5 ent Valves	B&W 3.1.2	27040F Detail E	As above	Not Detectable/Accessible

ENGINEER NO [redacted]

INFO RECORD: Insp. Area #18 TITLE: Rx. Internals Vent Valves & Core Support Shie

51-1132407-00

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
5. Vent Valve #5 (ZW)				See remarks for 1.A.1
A.1. Jackscrew #1, bushing, locking cup, screw	5.A.1		Inspect for weld cracking or signs of corrosion damage.	
A.2. #2 Jackscrew, bushing & locking cup	5.A.2		as in A.1 above	See remarks for 1.A.2
A3. Top & bottom retaining rings	5.A.3		as in A.1 above	See remarks for 1.A.3
A4. Vent nozzle to CSS attachment welds	5.A.4	27040F Detail G	as in A.1 above	See remarks for 4.A.4

Rev

EN IN

ENFO RECORD: Insp. Area #18 51-1132407-00 TITLE: Rx. Internals Vent Values & Core Support Shie

EM TO BE AMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
Core Support Shield Upper Flange to Shield weld between #5 & #6 ent Values	B&W 3.1.1	27040 F Detail D	Inspect for weld cracking or signs of corrosion damage.	Not Detectable
Core Support Shield Lower Flange to Shield Weld between #5 & #6 Vent Values	B&W 3.1.2	27040F Detail E	As above	Not Detectable/Accessible

ENGINEE NG

INFO RECORD: Insp. Area #18

51-1132407-00

TITLE: Rx. Internals Vent Values & Core Support S.

REA TO BE XAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
6. Vent Valve #6 (WZ)				See remarks for 1.A.1
A.1. Jackscrew #1, bushing, locking cup, screw	6.A.1		Inspect for weld cracking or signs of corrosion damage.	
A.2. #2 Jackscrew, bushing & locking cup	6.A.2		as in A.1 above	See remarks for 1.A.2
A3. Top & bottom retaining rings	6.A.3		as in A.1 above	See remarks for 1.A.3
A4. Vent nozzle to CSS attachment welds	6.A.4	27040F Detail G	as in A.1 above	See remarks for 1.A.4

ENGINEERING 2

INFO RECORD: Insp. Area #18 51-1132407-00 TITLE: Rx. Internals Vent Values & Core Support Shie

REA TO BE XAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
9. Core Support Shield Upper Flange to Shield weld between #6 & #7 Vent Values	B&W 3.1.1	27040 F Detail D	Inspect for weld cracking or signs of corrosion damage.	Not Detectable
0. Core Support Shield Lower Flange to Shield Weld between #6 & #7 Vent Values	B&W 3.1.2	27040F Detail E	As above	Not Detectable/Accessible.

NGINEE NG 19

NFO RECORD: Insp. Area #18 51-1132407-00

TITLE: Rx. Internals Vent Values & Core Support Shiel

EA TO BE AMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
Vent Valve #7 (WX)				See remarks for 1.A.1
1.1. Jackscrew #1, bushing, locking cup, screw	7.A-1		Inspect for weld cracking or signs of corrosion damage.	
.2. #2 Jackscrew, bushing & locking cup	7.A.2		as in A.1 above	See remarks for 1.A.2
13. Top & bottom retaining rings	7.A.3		as in A.1 above	See remarks for 1.A.3
14. Vent nozzle to CSS attachment welds	7.A.4	27040F Detail G	as in A.1 above	See remarks for 4.A.4

ENGINE IN

NFO RECORD: Insp. Area #18
51-1132407-00

TITLE: Rx. Internals, Vent Values & Core Support Shie

EA TO BE AMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
Core Support Shield Upper Flange to Shield weld between #7 & #8 ent Values	B&W 3.1.1	27040 F Detail D	Inspect for weld cracking or signs of corrosion damage.	Not Detectable
Core Support Shield Lower Flange to Shield Weld between #7 & #8 ent Values	B&W 3.1.2	27040F Detail E	As above	Not Detectable/Accessible

:NGINEE NO 15 19

:NFO RECORD: Insp. Area #18 TITLE: Rx. Internals Vent Valves & Core Support Shir

51-1132407-00

EM TO BE AMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
. Vent Valve #8(XW)				See remarks for 1.A.1
1.1. Jackscrew #1, bushing, locking cup, screw	8.A.1		Inspect for weld cracking or signs of corrosion damage.	
.2. #2 Jackscrew bushing & locking cup	8.A.2		as in A.1 above	see remarks for 1.A.2
A3. Top & bottom retaining rings	8.A.3		as in A.1 above	see remarks for 1.A.3
14. Vent nozzle to CSS attachment welds	8.A.4	27040F Detail G	as in A.1 above	See remarks for 4.A.4

EN INE ING
INFO RECORD: Insp. Area #18
51-1132407-00

TITLE: Rx. Internals Vent Valves & Core Support Shie

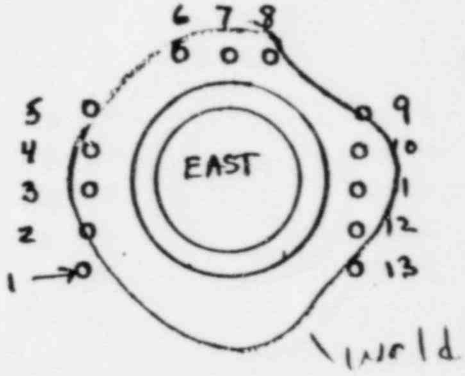
REA TO BE (AMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
1. Core Support Shield Upper Flange to Shield weld between #8 & #1 Vent Valves	B&W 3.1.1	27040 F Detail D	Inspect for weld cracking or signs of corrosion damage.	Not Detectable
1. Core Support Shield Lower Flange to Shield Weld between #8 & #1 Vent Values	B&W 3.1.2	27040F Detail E	As above	Not Detectable/Accessible

TASK I.D.: OTSG Task #7 INSPECTION CHECK LIST SHEET __ of __

ENGINEERING 19

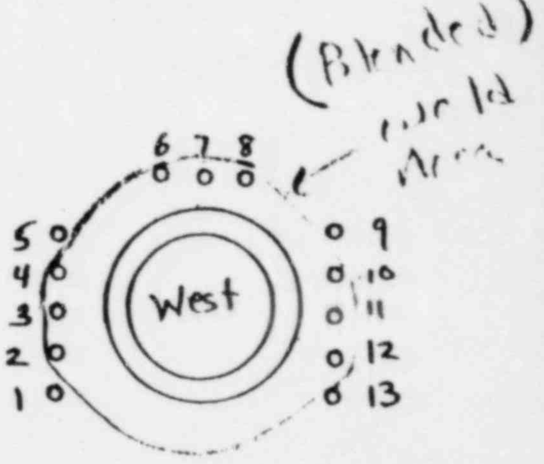
INFO RECORD: Insp. Area #18 TITLE: Rx. Internals Vent Valves & Core Support Shiel

51-1132407-00

REA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
5. East RCS Outlet Nozzle weld joint	B&W 3.1.3	27040F Detail F	Inspect for weld cracking or signs of corrosion damage.	Not detectable to sufficient detail for visual inspections.
6. 13 LOCA Bumpers around East Outlet Nozzle	B&W 3.1.4	27040 F	as above	Inspected all 13 welds with coverage from 80% to 100% on Most attachment welds. 

Re

ENGINEERING
INFO RECORD: Insp. Area #18 TITLE: Rx. Internals Vent Valves & Core Support Shie
51-1132407-00

AREA TO BE EXAMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
7. West RCS Outlet nozzle weld joint	B&W 3.1.3	27040 F Detail F	Inspect for weld cracking or signs of corrosion damage	See remarks for East RCS nozzle.
8. 13 LOCA Bumpers around west outlet nozzle	B&W 3.1.4	27040 F	Same as above	See remarks for East LOCA Bumpers. 

Rev

TASK I.D. : OTSG Task #7 INSPECTION CHECK LIST SHEET # of 17

ENGINEERING

INFO RECORD: Insp. Area #18 51-1132407-00

TITLE: Rx. Internals Vent Valves & Core Support Shell

REA TO BE AMINED	ITEM No.	DRAWING NUMBER	REQUIREMENT	REMARKS
9. CORE SUPPORT ssembly lifting ugs and their ttachment welds				
ug WX	B&W 3.1.6	27040F	Inspect for weld cracking or signs of corrosion damage	All areas acceptable. (10x50 Binocular + unaided eye from 6-8")
ug XY	B&W 3.1.6	27040F	as above	As above
ug YZ	B&W 3.1.6	27040F	as above	As above

TEST

20

TO BE COMPLETED
ON SUPPLEMENTAL ISI PROGRAM

TEST

21

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 21

Inspected Item: Incore Detector

Type of Inspection: Functional Check

Inspection and Test Plan: This examination is an effective check for cracking in the detector sheath and also determine the signal functioning ability of the incore detector assemblies as neutron flux sensing devices.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓*	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 364+52 Minimum required 364+52.)	✓	

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached. *See Attachment A

	Yes	No
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132613-00

8. Task #7 Procedure No. RP 1508-1

Reviewer's Signature W. S. Wilkerson

Attachment A
Test Review Completion Sheet
Area #21

Item 3

The acceptance criteria set forth by B&W EIR 51-1132613-00 as indicative of thru-wall penetration of the Inconel 600 sheath by primary coolant is a detector electrical insulation resistance between 1000 and 3000 ohms. All detectors had resistances greater than 3000 ohms.

BABCOCK & WILCOX - NPGD

ENGINEERING INFORMATION RECORD

DOCUMENT IDENTIFIER 51 - 1132613-00

TITLE INCORE DETECTOR FUNCTIONAL CHECK

PREPARED BY Wood DATE April 13, 1982

REVIEWED BY R. D. DATE 4/13/82

REMARKS:

This document defines the testing requirements necessary to determine the signal functioning ability of the incore detector assemblies as neutron flux sensing devices. If certain measurements are found during testing a positive indication of primary coolant penetration through both the assembly oversheath and individual detector sheath is almost assured.

The reference document, "OP 1105 13" can be found at the TMI-1 station in that form or identified as "OP 1105 13".

Water indicating resistance values are based on private communications with H.D. Warren, LRC.

I . INTRODUCTION

This document defines the testing requirements necessary to determine the signal functioning ability of the incore detector assemblies as neutron sensing devices. If certain measurements are found during testing a positive indication of primary coolant penetration through both the assembly oversheath and individual detector sheath is almost assured.

II TESTING

The functional testing consists of detector electrical insulation resistance measurements made from either in or out of the reactor containment building. Each individual rhodium and background detector should be tested. Resistance checks of aluminum oxide insulated detectors showing greater than 10^8 ohms indicate a functioning device. Resistance checks indicating DGW 1000 to 3000 ohms indicate water (versus moisture) is present in the insulation and so sheath penetrations by primary coolant.

Testing voltages should be about 10 volts but in no case more than 50 volts D.C. Since each detector is probably a small current source differential current versus differential voltage measurements should be made. (The inverse of the I/E measurements will indicate detector resistance.)

Draft procedure "DP 1105 13", "Periodic Calibration of Incore Detectors" is a station-available procedure to guide the step-by-step accomplishment of the measurements.

MAY 26 1982

Inter-Office Memorandum

GPU Nuclear

Date May 24, 1982

Subject OTSG Task 7 Area #21
"Incore Detector Functional Check"

To N. C. Kazanas
Director - Quality Assurance

Location Three Mile Island

An electrical insulation resistance measurement of the 364 rhodium and 52 background incore detectors has been completed.

These measurements were performed in accordance with TMI-1 Procedure RP 1508-1 and were primarily intended to determine if a detector's Inconel-600 sheath has been degraded by IGSCC. No detector was found to have insulation resistance indicative of sheath failure.

The completed report on Area #21 including the Test Completion Review Sheet, and B&W EIR 51-1132613-00 is attached. The individual detector resistance measurement values are available on-site.

Scott Wilkerson
W. S. Wilkerson
Lead Nuclear Engineer, TMI-1

Attachment
WSW/sf
cc: J. J. Colitz, Plant Engineering Director, TMI-1
V. P. Orlandi, Lead I&C Engineer, TMI-1
G. E. Rhedrick, QA Engineer III Mechanical

OTSG Task 7 Inspection Area #21
Title: Incore Detector Functional Check
Type of Inspection: Electrical
Equipment Used: Megohm Bridge
Procedure: RP 1508-1
Report Prep. by: V. P. Orlandi

The electrical insulation resistance of all incore detectors (8 levels in 52 strings) was measured using a megohm bridge. 10 individual detectors (1 each in 7 strings and 3 in one string) indicated less than the expected value of 10^8 ohms. The lowest indicated 3.5×10^5 ohms. All detectors exceeded the one-to-three thousand ohm value which B&W states is indicative of sheath penetration by primary coolant. For the detectors indicating low resistance, the resulting leakage current is negligible in terms of effect upon detector accuracy.

All detectors therefore appear to be functional with no indication of sheath penetration by primary coolant.

V. P. Orlandi

V. P. Orlandi

TEST

22

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 22

Inspected Item: Incore Detector Assembly

Type of Inspection: Liquid Penetrant

Inspection and Test Plan: This assembly contains the closure which is made of 304L SS and the sheath which is made of Inconel 600.

	Yes	No
1. Is the work scope in agreement with the B&W Engineering Information Record?		✓
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 2 Minimum required 2 .)	✓	

NOTE: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	Yes	No
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

NOTE: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132680-01

8. Task #7 Procedure No. STP-1-82-0024

Reviewer's Signature Rodney [illegible]

Test Completion Review Sheet Comments, Task #7/Test:22, Incore Detector Assembly

Item #1 The B&W requirements per EIR 51-1132680-01 requires the taking of wipes and a liquid penetrant examination of two(2) incore detectors. The areas of inspection are stated on this EIR. GPUN exceeded these requirements of areas of inspection by wiping and P.T. of the entire length for a distance of 35 feet on one(1) detector and adhering to the B&W requirements on the other incore detector. The reasoning for exceeding B&W requirements was to assure that a wetted portion of the incore detector was inspected. This was done per verbal agreement between B&W and GPUN.

Rodney Turner
Rodney Turner
NDE Specialist

Inter-Office Memorandum

GPU Nuclear

Date April 30, 1982
MT/2031

Subject Liquid Penetrant Examination and Wipe Sampling of the Incore Detectors on Task 7 Test #22

To N. C. Kazanas

Location HQ

A liquid penetrant examination was preformed on two(2) Incore detectors and twelve(12) wipe samples were taken prior to the P.T. examination on these detectors. As of the present time these wipes are in our possession and stored in the H.P. lab at TMI Unit 1. The P.T. examination did not disclose any revelant indications and was found to be acceptable for both incore detectors.

On April 28, 1982 Materials Technology personnel and Plant Maintenance personnel raised incore detector identified as #30 to a height of 36'. While this was being raised ten(10) wipes were taken, two(2) wipes in the closure area, two(2) for a distance of ten(10) feet starting at the closure area and going down to a distance of ten(10) feet. Two(2) wipes from the ten foot mark to a distance of 20 feet, two other wipes from the 20 foot mark to a distance of 30 feet and finally two more wipes from the 30 foot mark down to the 35 foot mark. All wipes were taken in accordance with Procedure STP -82-0024, bagged and labled.

Prior to installing detector #30 a liquid penetrant exam was performed. The first area was the 30 to 35 foot mark, this revealed no indications. The second area P.T. examined was between the 20 foot and 30 foot mark, this also revealed no indications. The third area was between the 10 foot and 20 foot mark, this revealed only an area of P.T. entrapment and not an indication. This area was deemed acceptable. The fourth and final area being P.T. inspected was the closure area its weld and down to the 10 foot mark. This entire area contained no indications. This concluded the P.T. and wipes for the entire length of 35 feet for incore detector #30 and it was lowered back into position and secured.

The next step of raising incore detector #31 to a height of 38 feet was accomplished. Two(2) wipes were taken between the 33 foot and the 37 foot marks as being measured from the closure area down. These wipes were also taken in accordance with STP-82-0024, bagged and labled.

A liquid penetrant examination was performed in this area (33' thru 37') and revealed no indications. The sheath was lowered and a P.T. exam was done on the closure area it's weld, the oversheath and its weld and extending two(2) feet down from the closure assembly. The weld on the oversheath contained one(1) area of P.T. entrapment and not and indication. This was visually verified, all other areas were acceptable. The incore detector was lowered, however, due to lack of time Plant Maintenance personnel were unable to secure fully and were scheduled to return on April 29, 1982 and complete this Task. (QC inspector aware of situation).

This examination exceeds B&W's written requirements on Document 51-1132680-01, which only calls out limited areas of inspection as stated in Section II & III. All other requirements on this Document were met.

Rodney Turner

Rodney Turner
NDE Specialist

RT:blf

cc: C. D. Cowfer
J. Potter
[redacted]
M. Zeise
ISI File

GPU Nuclear

NDE

000171

Visual/Surface Data Sheet

Site: TMI-1

Inspection ID: N/A

Component: INCORE detector

Description: INCORE detector sheath for atotal distance of 35' from closure end and Closure Area, c weld.

I.D.: INCORE detector #30

Procedure: NIS-007 Rev 3

Material: S/S

Thickness: N/A

Test Surface: O.D

Test Method: P.T

No. Positions: 1

Distance: N/A In.

Drawing: N/A

Date: APRIL 28, 1982

Examiner: Rodney [illegible] Rd TURNER

I.D.: 1863

Level: III

Examiner: N/A

I.D.: N/A

Level: N/A

Notes: (Procedure) STP-1-82-0024 Applies

Magnetic Particle (Only) N/A

Particle:
Wet ☐ Dry ☐ Color ____
Visible ☐ Fluorescent ☐ Batch ____

Instrument:
Method ____ Current ____
Machine ____ Amperes ____

Dye Penetrant (Only)

Cleaner Batch# 817111

Penetrant Batch# 5K018

Developer Batch# 81C082

Method:
Visible ☑ Thermometer S/S TMI-011
Fluorescent ☐ Temp 71°

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		
								ADDITIONAL INFORMATION: DAZA 76-7R-1B-1T-1C
								BCIFAB-5-753

No Reportable Indications ☑ Reportable Indications ☐ Non Relevant Indications ☐

Reviewed by:

Level:

Date:

Page of

NDE Request No. N/A

Method No. Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

GPU Nuclear

NDE

Visual/Surface Data Sheet

000172

Site: TMI-1

Inspection ID: N/A

Component: INCore detector

Description: INcore detector Closure Area; weld; a distance of 2' Down AND 2' on both sides of the 35' mark (33' thru 37')

I.D.: INCore detector #31

Procedure: MTIS.007 Rev 3

Material: S/S

Thickness: N/A

Test Surface: O.D

Test Method: P.T

No. Positions: 1

Distance: N/A In.

Drawing: N/A

Date: APRil 28, 1982

Examiner: Rodney Turner RD-TURNER

I.D.: 1863

Level: III

Examiner: N/A

I.D.: N/A

Level: N/A

Notes: (Procedure) STP-1-82-0024 Applies

Magnetic Particle (Only)

Particle:
Wet ☐ Dry ☐ Color
Visible ☐ Fluorescent ☐ Batch
Instrument:
Method
Machine
Current
Amperes

Dye Penetrant (Only)

Cleaner Batch# 817114

Penetrant Batch# 5K 018

Developer Batch# 81C082

Method:

Visible ☑ Thermometer TMI-011

Fluorescent ☐ Temp 75°

Ind. No.	Status	Size (Inches)	Distance From (Inches)				Surface	Remarks
			CW	CCW	1	2		

No Reportable Indications ☑

Reportable Indications ☐

Non Relevant Indications ☐

Reviewed by:

Level:

Date:

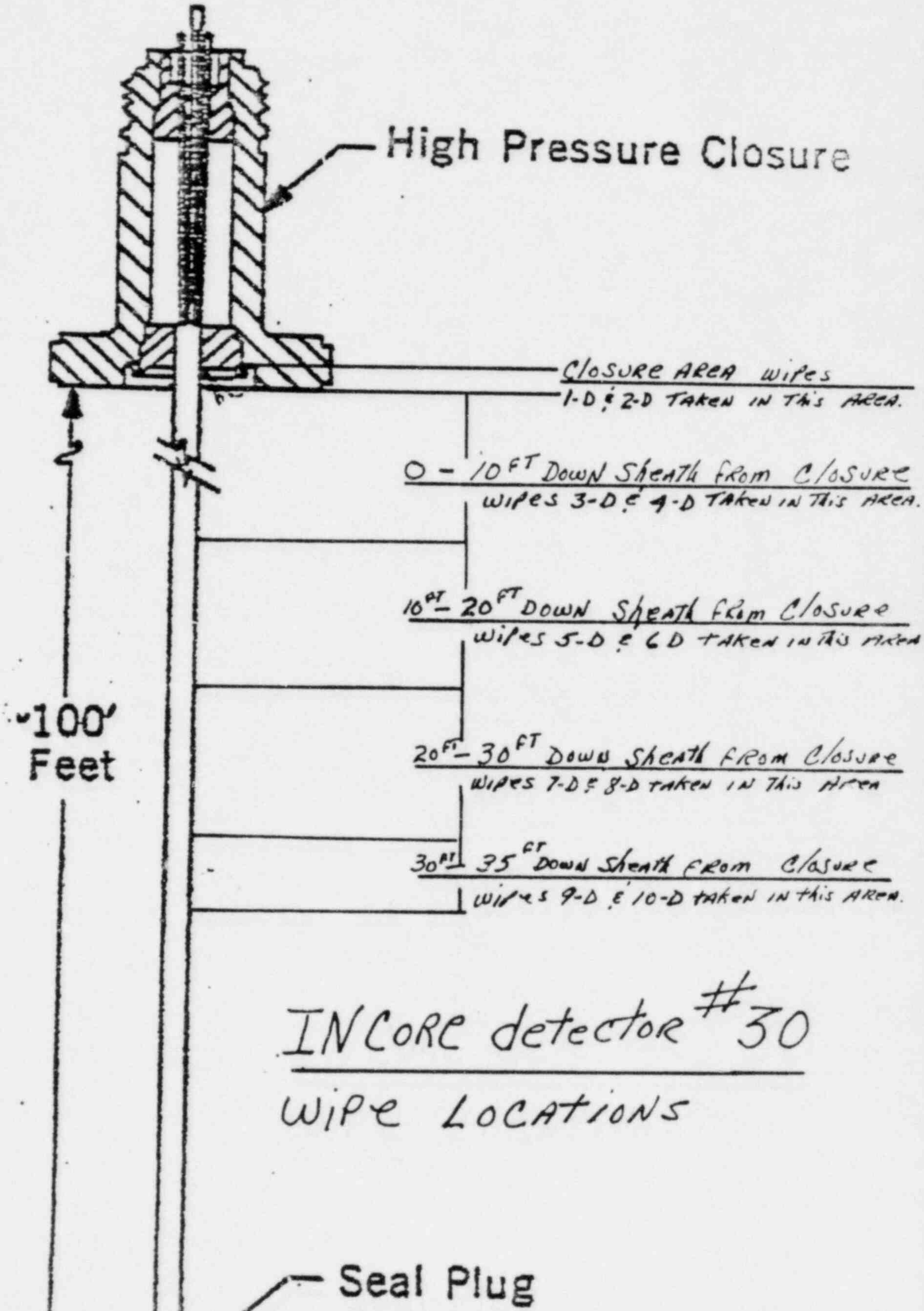
Page of

NDE Request No. N.A.

Method Ind. No Visual/0-199 P.T./200-399 M.T./400-599 Other/600-799

00925

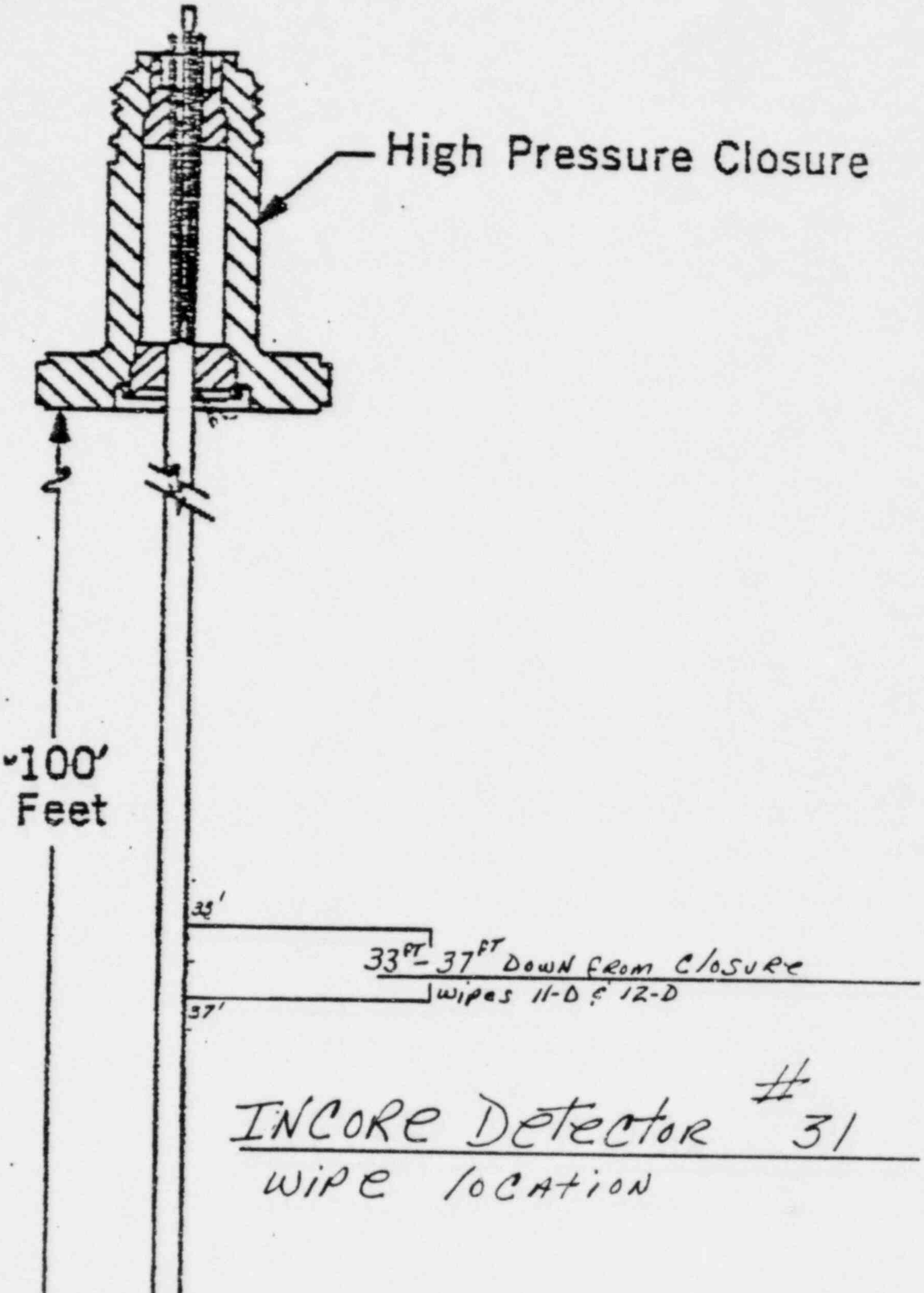
TASK #7 test #22



INCORE detector #30

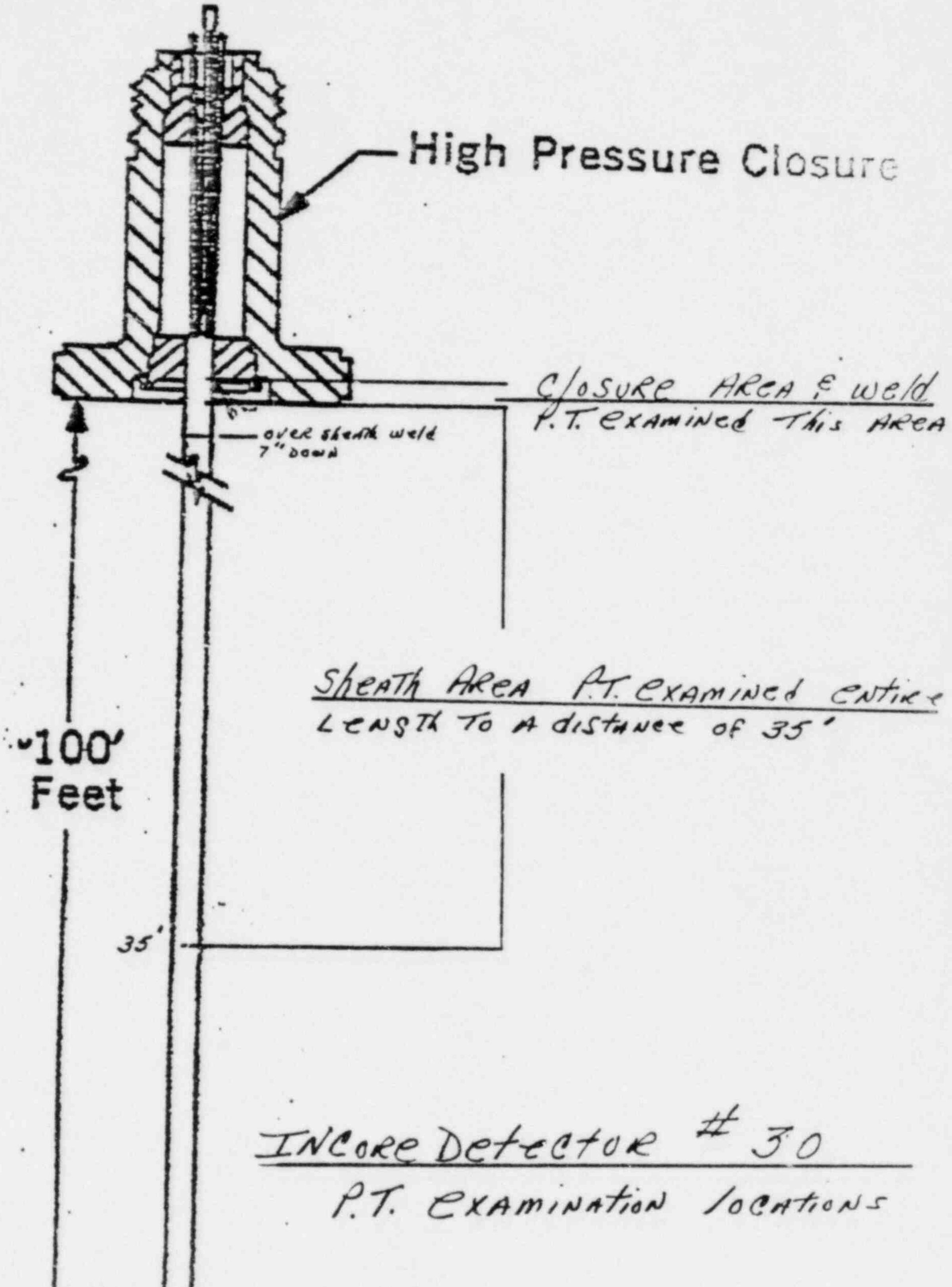
WIPE LOCATIONS

TASK #7 Test #22



INCORE Detector #31
wipe location

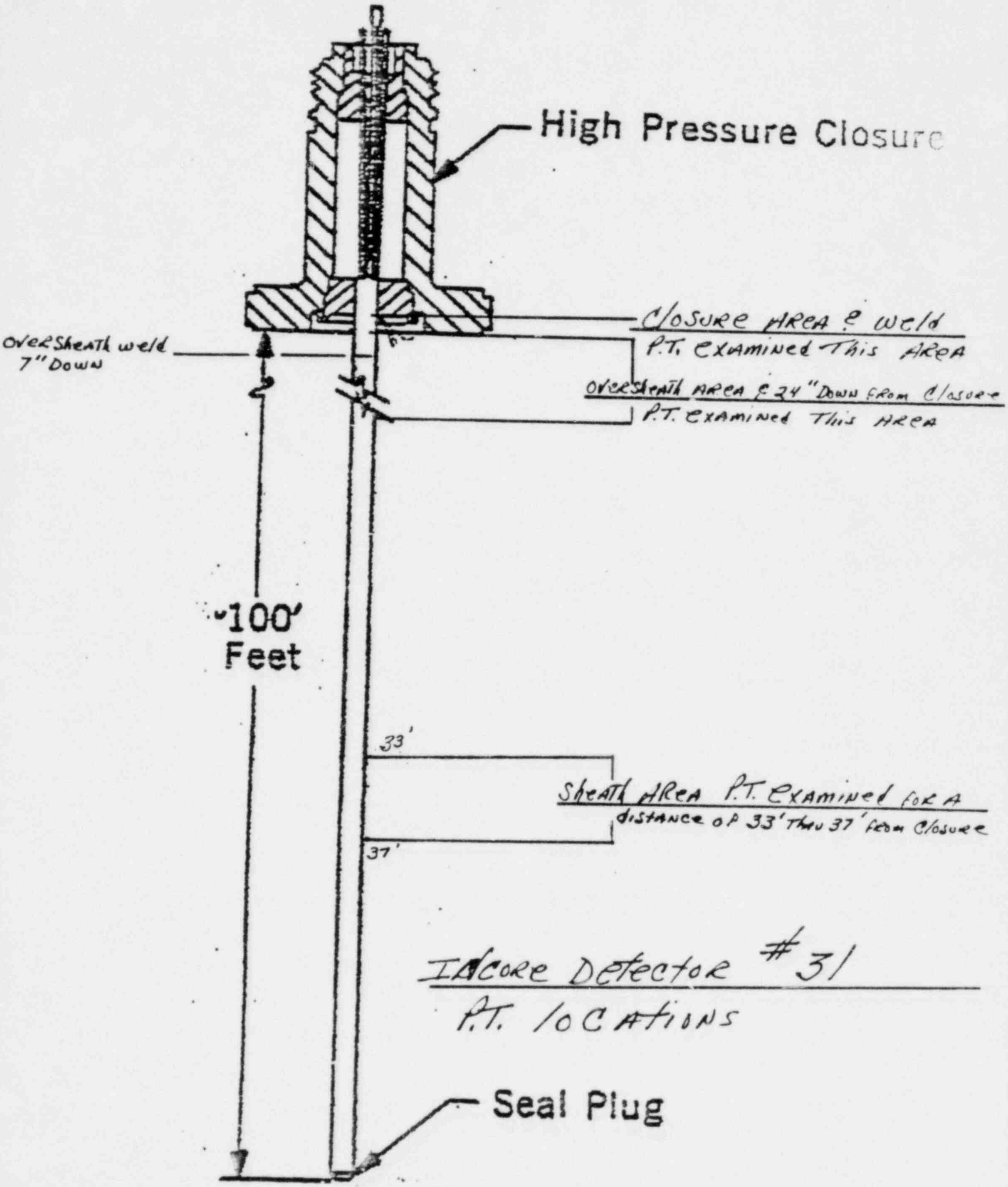
TASK #7 Test #22



INCore Detector # 30

P.T. examination locations

TASK #7 Test #22



InCORE Detector #31
P.T. locations

TEST

23

TEST COMPLETION REVIEW SHEET

Task #7 Inspection/Test: 23

Inspected Item: Vent Valve Thermocouple Nozzle

Type of Inspection: Eddy Current

Inspection and Test Plan: This nozzle is Inconel 600 B-167 tube welded to the reactor vessel and to a A-182 F304 SS flange. This inspection will also include the HAZ at the bi-metal weld.

	YES	NO
1. Is the work scope in agreement with the B&W Engineering Information Record?	✓	
2. Was there an approved inspection/test procedure used for this examination?	✓	
3. Does the results of the examination agree with the acceptance criteria called out in the inspection/test procedure?	✓	
4. Does the quantity of items inspected agree with the minimum requirements called out in the procedure? (Accessible quantity inspected 1 Minimum required 1.)	✓	

Note: If any of the answers to (1), (2), (3), or (4) are no, a written explanation must be attached.

	YES	NO
5. Based upon the results of this examination, were there any repairs made to the item(s) being inspected, or recommendations for repairs or replacements?		✓
6. Does there exist any unresolved discrepancies that have not been (reported) processed for future resolution?		✓

Note: If any of the answers to (5) and (6) are yes, a written description must be attached.

7. B&W EIR No. 51-1132498-00

8. Task #7 Procedure No. STP-1-82-0016

Reviewer's Signature Rodney [illegible]

Inter-Office Memorandum

GPU Nuclear

ate April 26, 1982
ISI/M82019

ubject Eddy Current Examination of the Thermocouple Vent Valve Nozzle (Task #7, Test #23)

o N. C. Kazanas

Location Parsippany

Eddy Current examination was performed on the Thermocouple Vent Valve Nozzle on April 15, 1982. This examination was performed in accordance with B&W Procedure ISI-412, Rev. 0. This examination revealed NO recordable or rejectable indications.

Two (2) B&W Inspectors performed the examination under the direct surveillance of Materials Technology personnel and Met-Ed Engineer Rick Barley. A review of the certifications of the eddy current equipment and calibration standard material certification was performed with acceptable results. Also, a review of the data sheet and eddy current calibration sheet #001 was performed by myself and found acceptable.

This examination is considered complete and acceptable and meets all the requirements set forth in B&W's Document 51-1132498-00.

Rodney Turner

Rodney Turner
NDE Specialist

RT:ef

cc: C. Cowfer
J. Potter
G. Rhodrick
M. Zeise

BWNP-20516 (3-81)

BABCOCK & WILCOX

NUCLEAR POWER GENERATION DIVISION

INSERVICE INSPECTION PROCEDURE

EDDY CURRENT MULTIFREQUENCY

CALIBRATION SHEET

SHEET NO. 001

CUSTOMER: GENERAL PUBLIC UTILITIES

CONTRACT NO.: 599-7239-07-20

PROCEDURE: ISI- 417 Rev. 0

STEAM GENERATOR N/A

STATION/UNIT NO.: T.M.I / Unit #1

MF DB/N 24139 FILL IN VALUES

CH-1 MIZ-12

FREQUENCY: 1 0

PHASE: 3 6 2

GAIN: 4 0

BAL ☐

DIFF/ABS ☐

990 350 KHZ ☐

350 100 KHZ ☒

99 35 KHZ ☐

35 10 KHZ ☐

D/B# 24141

CH-2 MIZ-12

FREQUENCY: 3 0

PHASE: 2 2 7

GAIN: 4 5

BAL ☐

DIFF/ABS ☐

990 350 KHZ ☐

350 100 KHZ ☒

99 35 KHZ ☐

35 10 KHZ ☐

D/B# 24140

UPPER MIXER MIZ-12 MIXER

2 0 0

Y-PHASE

3 0 0

Y GAIN 10

X-PHASE

X GAIN 0

3 1 3

OUT PHASE

D/B# 24145

CH-3 MIZ-12

FREQUENCY: 1 0

PHASE: 3 6 2

GAIN: 4 0

BAL ☐

DIFF/ABS ☐

990 350 KHZ ☐

350 100 KHZ ☒

99 35 KHZ ☐

35 10 KHZ ☐

D/B# 24142

CH-4 MIZ-12

N/A

FREQUENCY

PHASE

GAIN

BAL ☐

DIFF/ABS ☐

990 350 KHZ ☐

350 100 KHZ ☐

99 35 KHZ ☐

35 10 KHZ ☐

D/B# N/A

LOWER MIXER MIZ-12 MIXER

Y-PHASE

Y GAIN

X-PHASE

X GAIN

OUT PHASE

D/B# N/A

PROBE

P/N A 590 F

S/N 9282

TYPE: DIFFERENTIAL

SIZE: .590"

LENGTH: 100'

MANUFACTURER ZETEC

HP STRIP CHART RECORDER

IDENTIFICATION

MF: DB# 24049

VERT: DB# 24065

HORIZ: DB# 24066

GAIN

VERT: 100 MV/D

HORIZ: 200 MV/D

SPEED 5 MM/SEC

EXTENSION CABLES

CABLE NO.: 1

LENGTH: 100'

CABLE NO:

LENGTH:

H.P. TAPE RECORDER

DB#: 24135

SPEED: 3 3/4 IN/SEC.

CALIBRATION STANDARD

ID#: THERMO Couple Nozzle

AS BUILT DWG. NO.: N/A

SYSTEM RESPONSE FIGURE NO.: N/A

EXAMINATION SPEED - PROBE SPEED VERIFIED TO BE LESS THAN 14 INCHES PER SECOND DURING RETRACTION

MIZ-12 DISPLAY

PLACE "X" IN DEPRESSED BUTTONS.

Y/DIV: 4 ☐ 2 ☐ 1 ☒ .5 ☐ OFF ☐

LOWER MIX: Y-SET ☐ H-SET ☐ SP-[illegible] ☐ OUT ☐

UPPER MIX: Y-SET ☐ H-SET ☐ SP-[illegible] ☐ OUT ☒

CH-1 ☐ CH-2 ☐ CH-3 ☒ CH-4 ☐

D/B: 24103

M.F.: 24081

CALIBRATION TIME/DATE	DATA SHEET PAGE NO.	LEVEL II	REMARKS
1440 15 APR. 82	001	RL	INTIAL CAL.
1510 15 APR. 82	001	RL	FINAL CAL.

EDDY CURRENT DATA FORM 600

BABCOCK & WILCOX
NUCLEAR POWER GENERATION DIVISION

BWNP-20496-1(11-81)

CUSTOMER/SITE: GENERAL Public utilities / T.M.I.
CONTRACT NO.: 599-7239-07-20
COMPONENT: Reactor Vessel
DESCRIPTION: VenT VALVE Thermocouple Nozzle
CAL. STD.: Thermocouple Nozzle
CAL. SHEET: 001
THICKNESS: .218"
DATE: 15 APR. 82
EXAMINER: Robert Laughlin
ID#: L9644
LEVEL: II
PROCEDURE: 15 / 412 Rev. 0
F.C.A.(S): N/A
EXAMINER: D.D. Byrd
ID#: B2224
LEVEL: I

ROW NO.	TUBE COLUMN	TAPE/ FT.METER	TAPE/CHART NO.	CAL. CHECK	REMARKS	INDICATION			INDICATION			INDICATION			INDICATION		
						LOC	TYPE	%TWD	LOC	TYPE	%TWD	LOC	TYPE	%TWD	LOC	TYPE	%TWD
					Wx - Thermocouple venT												
					valve Nozzle - OK												

INDICATION DESIGNATIONS

(1) O.D. LONG. CRACK
(2) DING
(3) CHATTER
(4) LOOPS
(5) LTS-1
(6) LTS-2
(7) LTS-B
(8) MISC.
(9) SPECIAL TUBES
(10) I.D. INDICATION
(11) O.D. WEAR-THINNING
(12) PLUGGED
(13) REMOVED
(14) STABILIZED
(15) UTS-C1
(16) UTS C2
(17) UTS C3
(18) O.D. INDIC.
(19) I.D. LONG CK
(20) PERMEABILITY

NOTES:

1. TBR-INDICATES TUBE TO BE RERUN: PRELIMINARY DATA FOR INFORMATION ONLY; SEE FINAL DATA ON RERUN
2. CONFIRMATION-INDICATES DEFECT/TUBE NUMBER IS CONFIRMED.
3. PV-INDICATES MANIPULATOR POSITION VERIFICATION.

EVALI BY: Robert Laughlin
LEVEL: II
EVALUATED: 15 APRIL 82
INSPECTED FROM ☐ INLET ☐ OUTLET
PAGE OF 1
REVIEWED BY: Robert Laughlin
LEVEL: II
REVIEWED: 15 APRIL 82
FIGURE NO.: N/A
REV.