

1988 INSERVICE EXAMINATION OF SELECTED CLASS 1 AND CLASS 2 PIPING AND COMPONENTS AT HOPE CREEK GENERATING STATION

120

VOLUME I FINAL REPORT WITH APPENDICES SwRI Project 1259

Prepared for

Public Service Electric and Gas Company Nuclear Department P. O. Box 236 Hancocks Bridge, New Jersey 08038

April 1988

Prepared by

E huran

80920026 ADOC

PDR

Edward J. Feige Project Engineer Engineering and Analysis Section

Approved by

unk Rom

David F. Rosow Acting Director Department of NDE Services Nondestructive Evaluation Science and Technology Division

ABSTRACT

An inservice examination (ISI) of selected Class 1 and Class 2 piping and components of Public Service Electric and Gas Company's (PSE&G) Hope Creek Generating Station was performed by Southwest Research Institute (SwRI) personnel during the Spring 1988 refueling outage. This ISI effort was limited in scope to components selected as a part of the overall examination effort scheduled for the first ISI. The balance of the examination areas scheduled in the Examination Plan for the 1988 Inservice Examination of Hope Creek Generating Station will be scheduled for the upcoming mini-outage in 1989.

The ISI was performed utilizing magnetic particle (MT), liquid penetrant (PT), and manual ultrasonic (UT) nondestructive examination (NDE) techniques.

In addition to the examinations scheduled for the first refueling outage, preservice examinations were performed on four Class 2 piping welds. These additional welds were the result of the placement of flanges in the Residual Heat Removal piping system.

During the MT examination of check valves F074A, F074B, and F074 Spare, linear indications were recorded and reported to PSE&G on Customer Notification Forms 1 through 5. In one area, the PT examination method was utilized at PSE&G's request to substantiate the relevance of the MT indication. These indications were removed by light grinding.

No reportable indications were observed by SwRI personnel as a result of the UT and PT examinations.

In addition to the NDE activities, SwRI performed thickness measurements on the F074A and F074B check valves, and Main Steam Relief Valve AB-PSV-F013A. The thickness measurements taken on these components were for information only. Measurements were used by PSE&G to verify that areas of light grinding did not violate manufacturer's minimum wall thickness.



TABLE OF CONTENTS

Page

VOLUME I -- FINAL REPORT WITH APPENDICES

ABST	RACT	
LLU	STRAT	ON
ABBR	REVIA	IONS
ι.	INTE	ODUCTION
	Α.	Applicable Documents
	В.	Examination Areas
Π.	DISC	USSION OF EXAMINATION ACTIVITIES
	А.	Pre-Outage Planning
	B.	Examination Procedures and Personnel
. 1	C.	Examination Activities
	D.	Examination Results
	E.	Equipment
	F.	Materials
	G.	UT Calibration Blocks
ш.	SUM	MARY OF EXAMINATIONS
	А.	Explanation of Field Data Records
	B.	Nondestructive Examination Summary Tables

APPENDICES

A Weld Identification Drawing	- Class 1	
-------------------------------	-----------	--

- B Weld Identification Drawings Class 2
- C Southwest Research Institute Nuclear Projects Operating Procedures

v

- D Southwest Research Institute Nondestructive Testing Procedures
- E Ultrasonic Calibration Block Drawings
- F Certificates / Personnel Qualifications
- G Material and Equipment Certifications
- H Customer Notification Forms
- I Examinations Performed for Information Only

VOLUME II--FIELD DATA

Feedwater Reactor Recirculation System Feedwater Nozzle Bore Residual Heat Removal System Calibration Records 190000 Series Linearity Verification Records



ILLUSTRATION

Figure		Page
1	Explanation of Summary Table Format	 8

ABBREVIATIONS

AB		Main Steam System
AE		Feedwater System
ASME		American Society of Mechanical Engineers
Aug		Augmented Examination
BB		Nuclear Boiler and Recirculation System
BC		Residual Heat Removal System
Catgy		
CCW		
CD		Contribution Description
CNF		Contraction Matthewards and Design
CRC		Corrosion Resistant Clad
CRT	2	and the material
CW		
	*	
DAC	*	
dB	*	Decibel(s)
deg	*	Degree(s)
Dev	*	Deviation
EPRI	*	
Exam		Examination
Geom		Geometric
HAZ		Heat-Affected Zone
Insig	*	Insignificant
ISI	*	Inservice Examination
LD		Longitudinal Seam Weld Extending Downstream
LDI		Longitudinal Seam Weld Extending Downstream on the Inside Radius of an Elbow
LDO		Longitudinal Seam Weld Extending Downstream on the Outside Radius of an Elbow
Lo		Zero Reference Location
LU	-	Longitudinal Seam Weld Extending Upstream
LUI	÷.	Longitudinal Seam Weld Extending Upstream on the Inside Radius of an Elbow
LUG	2	Longitudinal Seam Weld Extending Upstream on the Outside Radius of an Elbow
MHz		Megahertz
	*	
MT	*	Magnetic Particle Examination
NDE	*	1 idestructive Examination
NDT	*	adestructive Testing
No.	*	Number
NQAP	*	
NQAPM		Nuclear Quality Assurance Program Manual
NRC	×	Nuclear Regulatory Commission
PSE&G	÷	Public Service Electric and Gas Co.
PSI		Preservice Examination
PT	*	Liquid Penetrant Examination
QA		Quality Assurance
Rev	4	Revision
RL		Refracted Longitudinal
RPV		Reactor Pressure Vessel
Rx	0	Reactor Building
Sect		Section
	1	
SPC		Special Research Institute
SwRI	*	Southwest Research Institute
UT	. *	Manual Ultrasonic Examination







L INTRODUCTION

During the spring 1988 refueling outage, Southwest Research Institute (SwRI) personnel performed nondestructive examinations (NDE) of selected Class 1 and Class 2 piping and components of the Hope Creek Generating Station. These examinations constitute a part of the first inservice examination (ISI) of the first cycle of the first period of the first inspection interval.

A. Applicable Documents

The ISI was conducted in accordance with the following documents:

- Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, "Rules for Inservice Inspection of Nuclear Power Plant Components," 1983 Edition with Addenda through Summer 1983
- Hope Creek Generating Station Technical Specifications
- SwRI Final Plan 17-1259, "Long-Term Inservice Examination Plan for Class 1 and Class 2 Components and Piping for Hope Creek Generating Station, Revision 1," dated December 1987
- Examination Plan for the 1988 Inservice Examination of Hope Creek Generating Station
- SwRI Nuclear Quality Assurance Program Manual (NQAPM), Revision 2, with all applicable changes
- SwRI Plan 87-PEG-HCP-1-1-0, "Project Plan for the Nondestructive Examinations to be Performed at Hope Creek Generating Station," dated December 1987

B. Examination Areas

Selected piping and components in the following Class 1 and Class 2 systems were examined by SwRI personnel utilizing NDE techniques:

Class 1

Feedwater System Main Steam System Reactor Recirculation System

Class 2

Residual Heat Removal System

II. DISCUSSION OF EXAMINATION ACTIVITIES

A. Pre-Outage Planning

In order to assure efficient performance of the ISI, SwRI devoted a concentrated effort toward planning and preparation for the examination activities. This included review of the Long-Term Plan (LTP), determining nondestructive testing (NDT) procedures, reviewing ultrasonic calibration blocks for compliance to Code and procedure requirements, and developing the Examination Plan and Mechanized Scan Plan. Such planning activities were conducted by SwRI's Engineering staff, with assistance provided by the Engineering Analysis Section, the NDE Field Applications Section, and Quality Assurance (QA) Section.

An Examination Plan was developed to provide the basis for the ISI in one comprehensive document. It provided a listing of the examination areas, copies of all procedures, calibration block drawings, weld identification figures, and other information pertinent to the performance of the ISI.

The Examination Plan was reviewed and approved by PSE&G prior to SwRI's arrival on site.

The Class 1 and Class 2 components were selected for examination in accordance with the LTP for Hope Creek. Additional components were scheduled for examination at the request of PSE&G.

B. Examination Procedures and Personnel

The NDE activities were performed using liquid penetrant (PT), magnetic particle (MT), and manual ultrasonic (UT) techniques. These examinations were performed by SwRI personnel in accordance with SwRI procedures which had been preapproved by PSE&G personnel.

SwRI operating procedures were utilized to provide guidelines and controls for performance of onsite examination activities. This included procedures for weld joint identification marking, indication recording, records control, data comparison, and resolution of indications. Copies of these procedures are included in Appendix C.

The SwRI NDT procedures were written to conform to the requirements of the applicable sections of the ASME Boiler and Pressure Vessel Code and SwRI's NQAPM. Some procedures were amended for specific examination purposes with deviations. These deviations were necessary to incorporate examination requirements unique to the Hope Creek Generating Station. The deviations used are noted on the individual examination data sheets, NDE Summary Tables, and copies of the deviations are located with their respective NDT procedures in Appendix D.

SwRI examination personnel were certified in accordance with SwRI Nuclear Quality Assurance Procedure 11-1, "Special Process Control," which incorporates the guidelines of SNT-TC-1A of the American Society for Nondestructive Testing and ASME Section XI. Copies of examiner certifications are included in Appendix F.

C. Examination Activities

This section provides a discussion of the various onsite NDE activities performed during the ISI. A discussion of equipment and materials used for these examinations appears in Subsection E of this report.

1. Liquid Penetrant Examinations

Solvent removable, visible dye PT examinations were performed by SwRI personnel on Class 1 piping welds. These examinations were performed on reactor recirculation piping circumferential and longitudinal seams. In addition, the PT method was used to confirm the relevance of an MT indication during feedwater check valve examinations.

2. Magnetic Particle Examinations

Both dry MT and fluorescent MT examinations were utilized on components. Fluorescent MT was performed on the inside surfaces of the feedwater check valves. The dry MT examination technique was used on the outside surfaces of the valves and on class 2 piping welds.

3. Ultrasonic Examinations

UT examinations were performed by SwRI personnel on components, including feedwater nozzles, valves, and piping. Various UT techniques were used to perform the examinations including the following techniques.

- a. A 0-degree lamination scan (UTOL) was used for detection of laminar reflectors which might affect interpretation of angle-beam results. A 0-degree calibration was also used for component thickness determination.
- b. . O-degree scan (UTOW) was used for detection of reflectors in the weld when limitations restrict angle-beam examinations.
- c. For austenitic welds, a 45-degree angle-beam scan was used for detection of reflectors oriented parallel to the weld.

For ferritic welds, a UT45 degree scan was used to detect reflectors oriented parallel to the weld. Determination of angle beam to be used was made by the Level II examiner and was based upon which angle provided the best coverage of the examination area.

- d. Angle-beam scans, using a 45-degree search unit directed parallel to the weld (UT45T), were used for detection of reflectors oriented transverse to the weld.
- e. For corrosion resistant clad austenitic piping, a 45-degree refracted longitudinal, pitch-catch technique was utilized to provide Code coverage of the examination area.
- f. Feedwater nozzle bore examinations were performed utilizing a combination of wedges and angles. The determination of angles to provide optimum coverage was obtained through calculation and the application of transducer/wedges to the calibration block. Verification of the technique was performed by maximizing the reflective response from the notch reflectors of known size at various locations along the length of the bore. This technique provided assurance of a quality examination.

...

D. Examination Results

During the dry MT and fluorescent MT examinations of the feedwater check valves (F074A, F074B, and F074 Spare) 19 linear indications were found on the inside surface of the valves (detected with fluorescent MT) and five linear indications were detected on the outside surfaces of the check valves. These indications were reported to PSE&G under Customer Notification Forms (CNFs) 1 through 5. No recordable indications remained after light grinding.

No reportable indications were found as a result of UT and PT examinations.

During the ISI, certain examination limitations were noted and reported to PSE&G personnel on CNFs 11, 14, and 15. These limitations were the result of welded attachments and support interferences.

A detailed summary table for CNFs generated as a result of manual examinations during the ISI is contained in Appendix H. This table presents information on each CNF, such as the examination area, the nature of the reportable indication, the disposition, and the Section XI evaluation/acceptance criteria.

In accordance with IWB-3120 of Section XI, all examination data were compared with results of the preservice examination. The comparisons were determined to be satisfactory.

Appendix I contains documentation for examinations performed for information only. This appendix contains the data for the F074 spare valve and thickness measurements performed on relief valve AB-PSV-F013A.

E. Equipment

The NDE equipment used during the ISI to perform the examinations of the selected components is discussed below.

1. Manual Equipment

a. Sonic FTS MK I

Sonic FTS MK I ultrasonic instruments were used for the UT examinations and thickness gauging of materials. They were also used as an aid in obtaining acoustic characteristics/properties through measurements of transmission and attenuation of ultrasound in materials.

To assure proper instrument linearity and operation, SwRI certified each Sonic FTS MK I prior to use at Hope Creek, as specified in the NQAPM. Copies of certifications for those instruments utilized at Hope Creek are contained in Appendix G.

b. Transducers

Prior to use at Hope Creek, each transducer was given a frequency profile and beam spectrum analysis and certified to be within SwRI's acceptance standards. This analysis is performed at a minimum of every 6 months to verify that each transducer is performing within standards. A copy of each transducer's certification is contained in Appendix G.



Information on the actual transducer used for any specific examination may be determined by reviewing the data sheets and referenced calibration sheets in the field data volumes.

c. Magnetic Particle Examination Equipment

Hand-held alternating current magnetic particle yokes were used for MT examinations. Enorescent MT examinations were performed utilizing a portable hand-held black light.

F. Materials

In addition to the equipment previously discussed, certain materials were required to conduct the examinations. All materials contacting the examination surface (i.e., glycerine, pipe marking pencils, penetrants, etc.) were tested and cortified to be within acceptable sulfur and halogen limits prior to use at Hope Creek. Certifications for these materials are contained in Appendix G.

G. UT Calibration Blocks

Pipe and vesuel calibration blocks were utilized to calibrate the U and an entry of the selected welds. Drawings of the various calibratic, blocks used are contained in Appendix E.

III. SUMMARY OF EXAMINATIONS

This section provides a discussion of the field data records and a summary of the NDE activities performed at Hope Creek.

A. Explanation of Field Data Records

The results of the examinations and calibrations performed by SwRI personnel were recorded on standard SwRI forms. Copies of these completed documents are included as part of this report. The original records will be retained in the SwRI Data Storage Facility.

The field data records for each weld or area are assembled in a package preceded by a summary sheet. The examination areas and summary sheet numbers correspond to those listed in the Summary Table. A general explanation of the individual field data forms follows.

The instance ents used in performing UT examinations were calibrated prior to use, then verified again at specified intervals during the examinations and upon completion of the examinations. The calibration parameters were recorded on the appropriate calibration record sheet as specified in the applicable NDT procedure. The documented calibration and calibration verification provide immediate assurance that the examinations were performed using properly calibrated instruments.

The results of the examinations were recorded on the applicable data record sheets as specified in the Examination Plan. The information documented on these forms describes the parameters associated with those indications which were greater than the recording levels specified in the applicable NDT procedures.

The size, location, and nature of reflectors were determined by analyzing the indication parameters recorded on the forms described above. The analysis is documented on SwRI Indication Resolution Decord Sheets, which are included as part of each data package.

B. Nondestructive Examination Summary Tables

The following section is the Nondestructive Examination Summary Table (Summary Table). The Summary Table lists the areas that were examined by SwRI personnel during this ISI. See Figure 1 for an explanation of the Summary Table format. Isometric figures depicting the location of Class 1 and Class 2 components are contained in Appendices A and B, respectively.

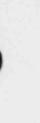


ASHE SECT XT	ASHE SECT XI CAIGY	NTLD HUHULU FXAIINATIUN ARFA		t xAn. ME findo	SWR1 PROCEDURE ND.781V.	3000002 R 3002 F 1 MUMPLE R	N 1 0 N H 5 E 1 C 6	0 E H E H B F	HT CARKS
									The remarks column is used to describe any pertinent features of the exami- nation such as limitations, report- able results, CNFs, etc. Ultrasonic calibration blocks are also listed here.
							in the equation of the equatio	these if to ling umn. ort. m to exam "GEO ermin indi tion cati	alts of the examination are indicated columns. The absence of indications or greater than the appropriate re- level is shown by an "X" in the "NOREC" The "INSIG" column is not used in this The presence of ultrasonic indications be the result of a geometric feature of ination area is indicated by an "X" in M" column. The presence of indications ted to be other than geometric in nature cated by an "X" in the "OTHER" column. al information pertaining to "OTHER" ons (CNFs, Code acceptability, etc.) contained in remarks.
						which se	erves he da	i as ita r	rences the eramination summary sheet a cover sheet for the data package and ecord numbers, the examiners, and any S.
5.00					This colu the exami		the	appl	icable SwRI NDT procedure used for
S				The NDE	method us	ed during	g the	e exa	mination is listed in this column.
1.1		Each examination a Appendices A and I	rea is listed in	this colum	n. Detail	s of the	weld	i i de	ntification system are contained in

Figure 1. Explanation of Summary Table Format







REACTOR PRESSURE VESSEL (SEE "IGURES A-1 & A-2)

REMARKS		SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMI- NATION TO BE PERFORMED USING MECHANIZED EQUIPMENT. SCAN PLAN EXAMINATION NO. 1. ***BASIC CALIBRATION BLOCK*** VB-CSCL-6.75-38-HPC(M2)	SCHEDULED EXAMIMATION POST- PONED TO 1999 OUTAGE. EXAMI- NATION TO RE PERFORMED USING MECHANIZED EQUIPMENT. SCAN PLAN EXAMINATION NO. 2. ***BASIC CALIFARATION BLOCK*** V8-CSCL-6.75-38-HPC(#2)	SCYEDULED EXAMINATION POST- POWED TO 1989 OXIAGE. EXAMI- NATION TO BE PERFORMED USING MECHANIZED EQUIPMENT. SCAN PLAN EXAMINATION NO. 3. ***BASIC CALIBRATION BLOCK*** VB-CSCL-6.75-38-HPC(#2)	SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMI- NATION TO BE PERFORMED USING MECHANIZED EQUIPMENT. SCAN PLAN EXAMINATION ND. 4. ***BASIC CALIBRATION BLOCK*** VB-CSCL-6.75-38-HPC(#2)
N 1 0 0 N G 1 8 S E H C G M R	* * *				
SUMMARY SHEET NUMBER		100185	100195	100200	100205
SURI PROCEDURE NO./REV.	*	100-6/2	700-6/34 100195	700-6/34	700-6/34
EXAM. METHOD	9 2 2 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	UT01. UT04 UT60	UTOL UTON UTGN UTGO	UT0L UT0N UT60	UT0L UT0V UT45 UT60
WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION	MOZZLE TO SHELL WELD	RPV1-WIA NOZZLE TO SHELL 28" LOOP A RECIRC OUTLET AT 0 DEG.	RPVI-WZA MOZZLE TO SHELL 12" RECIRC INLET AT 30 DEG.	KPV1-W2B NOZZLE TO SMELL 12" RECIRC INLET AT 60 DEG.	RPVI-WZC WOZZLE TO SMELL 12" RECIRC INLET AT 90 DEG.
ASME SECT XI CATGY		2	0.8	0.8	0-8
ASME SECT XI LITEM NO		83.90	83.90	63.90	83.90

PAGE

•

PAGE 10

.

.

ONTD)							
SME				SURI		NI O ONGT RSEH	
TEM NO	SECT XI CATGY	EXAMINATION AREA IDENTIFICATION				and the second se	REMARKS
	******	NOZZLE TO SHELL WELD					
		(CONTD)					
3.90	8-D	RPV1-N2J NGZZLE TO SHELL 12" RECIRC INLET AT 300 DEG.	UTOL UTOM UT45 UT60	700-6/34	100235		SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMI- NATION TO BE PERFORMED USING MECHANIZED EQUIPMENT. SCAN PLAN EXAMINATION NO. 5. ***BASIC CALIBRATION BLOCK*** VB-CSCL-6.75-38-MPC(#2)
3.90	8-0	RPV1-N2K NOZZLE TO SHELL 12" RECIRC INLET AT 330 DEG.	UTOL UTOU UT45 UT60	700-6/34	100240		SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMI- NATION TO BE PERFORMED USING MECHANIZED EQUIPMENT. SCAN PLAN EXAMINATION NO. 6. ***BASIC CALIBRATION BLOCK*** VB-CSCL-6.75-38-HPC(#2)
3.90	8-0	RPV1-N5A NOZZLE TO SHELL 10" CORE SPRAY INLET AT 120 DEG.	UTOL UTOL UT45 UT60	700-6/34	100295		SCHEDULED EXAMINATION POST- PONEE TO 1989 OUTAGE. EXAMI- NATION TO BE PERFORMED USING MECHANIZED EQUIPMENT. SCAN PLAN EXAMINATION NO. 7. ***BASIC CALIBRATION BLOCK*** VB-CSCL-6.75-38-HPC(#2)
3.90	8-0	RPV1-N58 NOZZLE TO SHELL 10" CORE SPRAY INLET AT 240 DEG.	UTOL UTOW UT45 UT60	700-5/34	100300		SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMI- NATION TO BE PERFORMED USING MECHANIZED EQUIPMENT. SCAN PLAN EXAMINATION NO. 8. ***BASIC CALLURATION BLOCK*** VB-CSCL-6.75-38-HPC(#2)

0

2 () Z



REACTOR PRESSURE VESSEL (SEE FIGURES A-1 & A-2)

PAGE 11

1

REMARCS	SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMI- NATION TO BE PERFORMED USING MECHANIZED EQUIPMENT. SCAN PLAN EXAMINATION NOS. 9 AND 10. ***BASIC CALIBRATION BLOCK*** IR-CSCL-50-HPC	SCHEDULED EXAMINATION POST- PONED TO 1909 OUTAGE. EXAMI- NATION TO BE PERFORMED USING MECHANIZED EQUIPMENT. SCAN PLAN EXAMINATION NOS. 11 AND 12. ***BASIC CALIBRATION BLOCK*** IR-CSCL-50-HPC	SCHEDULED EXAMINATION PCST- POMED TO 1989 OUTAGE. EXAMI- WATION TO BE PERFORMED USING MECHANIZED EQUIPHENT. SCAN PLAN EXANJMATION NOS. 13 AND 14. BASIC CALIBRATION BLOCK*** IR-CSCL-50-HF3	SCHEDULED EXAMINATION POST- POMED TO 1989 OUTAGE. EXAMI- NATION TO BE PERFORMED USING MECHANIZED EQUIPMENT. SCAN PLAN EXAMINATION NOS. 15 AND 14.
M 1 0 N 6 1 0 N 6 1 0 E 0 E 0 E				
SUMMARY SHEET NUMBER	1004.08	100410	100415	100420
SURT PROCEDURE NO./REV.	700-6/34 100408	700-6/34 100410	700-6/34 100415	700-6/14 100420
EXM. NETHOD	UT24 UT34	UT18 UT23	UT18 UT23	UT18 UT23
WELD MANBER AND/OR WELD MANBER AND/OR	WOZZLE INSIDE RADIUS SECTION RPV1-MIAIR INSIDE RADIUS SECTION	RPV1-W221R INSIDE RADIUS SECTION	RPV1-M2BIR INSIDE RADIUS SECTION	RPV1-N2CIR LASIDE RADIUS SECTION
ASHE SECT XI CATGY	0	°.	0-8	0.8
(COMTD) ASHE SECT XI TTEM NO	63.100	83.100	83.100	83,100 8-0

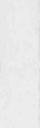
16. ***BASIC CALIBRATION BLOCK*** IR-CSCL-50-HPC

GONTD) ASHE ASHINITION AREA IDENTIFICATION B3.100 B-D RPV1-NZJIR ASECTION ASTO ASU1-NZJIR ASECTION B3.100 B-D RPV1-NZJIR ASECTION ASECTION ASECTION B3.100 B-D RPV1-NZJIR ASECTION ASECTION B3.100 B-D RPV1-NZMIR ASECTION					
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	FICATION EXAM.	SURI PROCEDURE NO./REV.	SUMMARY SHEET NUMBER	N 1 0 N 2 0 N 2 1 0 0 N 2 1 0 0 N 2 0 0 0 N 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	REMARKS
· · · · ·	ION	8. 5. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9.	5 8 9 1 1 9		
2 2 2					
• •	UIT18 UIT23	700-6/34 100450	100450		SCHEDULED EXAMINATICA POST- POMED TO 1989 OUTAGE. EXAMI- NATION TO BE PERFORMED USING MECHANIZED EQUIPMENT. SCAN PLAN EXAMINATION NOS. 17 AND 18. ***BASIC CALIBRATION BLOCK***
0-8	UT18 UT23	700-6, 34 100455	100455		SCHEDULED EXAMINATION POST- POMED TO 1989 OUTAGE. EXAMI- NATION TO BE PERFORMED USING MECHANIZED EQUIPMENT. SCAN PLAN EXAMINATION NOS. 19 AND 20. ***BASIC CALIBRATION BLOCK*** IR-CSCL-50-HPC
	2210 7110	700-6/34 100510	100510		SCHEDULED EXAMINATION POST- POMED TO 1989 OUTAGE. EXAMI- NATION TO BE PERFORMED USING MECHANIZED EQUIPMENT. SCAN PLAM EXAMINATION NOS. 21 AND 22. ***BASIC CALIBRATION BLOCK*** IR-CSCL-50-HPC

HOPE CREEK GENERATING STATION, UNIT 1

•





			POST- EXXMI- USTING SCAN 3 AND		L	1 B
	REMARKS		SCHEDULED EXAMINATION POST- POMED TO 1989 OUTMGE, EXAMI- NATION TO BE PERFORMED USING MECHANIZED EQUIPMENT, SCAN PLAN EXAMINATION NO. 23 AND 24. ***BASIC CALIBRATION BLOCK*** IR-CSCL-50-MPC		SCHEDULED ENAMINATION POST- POMED TO 1909 OUTAGE. UT EXAMINATION TO BE PERFORMED USING INTRASPECT 1/PC-2 SYSTEM. ***BASIC CALIBRATION 3LOCK*** SE-CSCL-2.350-59-HPC SE-SS-2.25-60-HPC	SCHEDULED EXAMIMATION POST- PONED TO 1989 OUTAGE. UT EXAMIMATION TO BE PERFORMED USING INTRASPECT 1/PC-2
	NI 0 NGT RSEN CGMR					
	SUMMARY SHEET NUMBER	2 8 8 8 8 8	100515		1006.35	\$79000
	SURI PROCEDURE NO./REV.		700-6/34 100515		200-1/70 100635 DEV. 3 B00-117/2 DEV. 1	200-1/70 100645 DEV. 3 800-117/2 DEV. 1
	EXAM. METHOD	6 6 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	UT17 UT22	OZZLE WELDS	PT AUT45 AUT45T	PT AUT45 AUT45
REACTOR PRESSURE VESSEL (SEE F'SURES A.4 & A-2)	WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION	NOZZLE INSIDE RADIUS SECTION (CONTD)	RPV1-WSBIR IMSIDF RADIUS SECTION	NCZZLE TO SAFE-END AND SAFE-END TO NOZZLE WELDS	RPV1-WTASE MOZZLE TO SAFE-END	RPV1-WZASE SAFE-END TO MOZZLE
ESSURE V	ASHE SECT XI CATOT				1	1
REACTOR PR	ASHE SECT XI	4 9 9 9 9 9 9 9	\$3.100		85.10	85.10

SYSTEM. ***BASIC CALIBBATION BLOCK*** SE-CSCL-1.35-57-HPC SE-SS-1.45-58-HPC

REACTOR PRESSURE VESSEL (SEE FIGURES A-1 & A-2)

(CONTD)

				-	4	
				REMARKS		
				2	1	
				*	÷	
				끮	1	
				-	ſ.	
					÷	
à	-	=	i.	æ		
-	-	-	0			
	-		-		1	
2		-		~	٥.	
*	0	œ	w	9	*	
		-			*	
		3	-	85	2	
		2	w	8	÷	
		UMMARY	SHEET	高	1	
		5	ũ,	NUMBER	÷	
			PROCEDURE SI	NO./REV.	×	
			3	-	1	
			a	Ω.		
		-	3	2	1	
		196	2	-		
		3	8	묥	1	
			-	-	0	
					i	50
				8	2	3
				王	÷	-
			5	10	2	
			a	METHOD		-
						2
					3	22
					З.	3
					1	-
				莱	. 8.	-
				2	4	-
				-	1	
				а	- 5	~
				-	1	5.60
			*	-	- 6	*
			9	5	1	98
			6	3	÷	0
			킃	8	1	클
			ELD NUMBER AND/OR	EXAMINATION AREA IDENTIFICATIO	÷	HOZZLE TO SAFE-END AND SAFE-END TO NOZZLE WELD
			1	2	2	물
				3	3	Ģ
			5	2	÷	ŵ
			*		2	1
			-	=	1	ų,
			-	-	1	0
			3			-
				×	- 2	-
				3	2	12
				-	÷.	1
					3	2
					1	1
			SECT XI		1	
			2	25	3	
		*	5	2	1	
		5	14	CATGY	1	
		-				
			SECT XI	TEM NO	化化过度过度 医子宫的变化分子的 法有法有有有关 的复数法律有关 医胆管的 医中心的 化分子 化合物 化合物 医白眼的 化合物 化合物 化合物 化合物 化合物 化合物	
			×	*	1	
		14	-	*	3	
		3	3	12	1	
		*	-	-	X	

(CONTD)

SAFE-2ND TO WOZT RPV1-N285E 1-8

85.10

200-1/70 100650 800-117/2 DEV. 1 DEV. 3 AUT45T AUT45 F.

EXAMINATION TO BE PERFORMED

USING INTRASPECT 1/PC-2

SYSTEM.

PONED TO 1989 OUTAGE. UT

SCHEDULED EXAMINATION POST-

200-1/70 100655 DEV. 3 ł

RPV1-N2CSE SAFE-END TO NOZZLE

85.10 8-F

800-117/2 DEV. 1 AUT45T AUT45

DEV. 3 800-117/2 DEV. 1 AUT45 1d

> SAFE-END TO NOZZLE RPV1-N2JSE

85.10 8-4

200-1/70 100685

BASIC CALIBRATION BLOCK SE-CSCL-1.35-57-HPC EXAMINATION TO BE PERFORMED SCHEDULED EXAMINATION POST-PONED TO 1989 OUTAGE. UT SE-CSCL-1.35-57-HPC USING INTRASPECT 1/PC-2 SE-SS-1.45-58-HPC

EXAMINATION TO BE PERFORMED SCHEDULED EXAMINATION POST-POWED TO 1989 OUTAGE. UT USING INTRASPECT 1/PC-2 SYSTEM.

SE-SS-1.45-58-HPC

BASIC CALIBRATION BLOCK SE-CSCL-1.35-57-HPC SE-SS-1.45-58-HPC

9



HOPE CREEK GENERATING STATIOM, UNIT 1 SUMMARY OF NONDESTRUCTIVE EXAMINATIONS CLASS 1 COMPONENTS

REACTOR PRESSURE VESSEL (SEE FIGURES A-1 & A-2)

(CONTD)

DCMMDAC	
8 1 0 8 6 1 0 0 8 6 1 0 0 8 6 1 0 0 8 6 1 0 6 1 0 6 1 0 6 1 0 6 1 0 6 1 0 6 1 0 6 1 0 6 1 0 0 6 1 0 0 6 1 0 0 0 0	
SHEET	
SMRT PROCEDURE	23
EXAM.	IE MELDS
MELD NUMBER AND/OR	WOZZLE TO SAFE-END AND SAFE-END TO NOZZLE WELDS
ASME SECT XI	W022LE
ASHE SECT XI	

建石灰石 医发育者的复数使变多体发展的变化 医外外球的

(CONTD)

85.10

PT 200-1/70	AUT45 800-117/2
DEV. 3	AUT451 UK** :
PV1-WZKSE AFE-END TO WOZZLE	

85.10 8-F RPV1-N5ASE NOZZLE TO SAFE-END

PT 200-1/70 100745 DEV. 3 MUT45 800-117/2 MUT451 DEV. 1 PT 200-1/70 100747 DEV. 3 MUT45 800-117/2 MUT451 DEV. 1

> RPV1-N5ASEX SAFE-END TO SAFE END EXT

85.10 8-F

SCHEDULED EXAMINATION POST-POMED TO 1969 OUTAGE. UT EXAMINATION TO BE PERFORMED USING INTRASPECT 1/PC-2 SYSTEM. ***BASIC CALIBRATION BLOCK*** SE-SS-1.45-58-HPC SE-SS-1.45-58-HPC SCHEDULED EXAMINATION POST-POWED TO 1999 OUTAGE. UT EXAMINATION TO BE PER-OBNED USING INTRASPECT 1/PC-2 SYSTEM. ***BASIC CALIBBATION BLOCK*** SE-CSCL-1.35-52-HPC SE-IN-1.25-53-HPC SCHEDULED EXAMINATION POST-PONED TO 1999 OUTAGE. UT EXAMINATION TO BE PERFORMED USING INTRASPECT 1/PC-2 SYSTEM.

STATEST CALIBRATION BLOCK*** SE-CSCL-1.35-52-NPC SE-IN-.750-73-NPC

SUMMARY OF NONDESTRUCTIVE EXAMINATIONS HOPE CREEK GENERATING STATION, UNIT 1 CLASS 1 COMPONENTS

KEACTOR PRESSURE VESSEL (SEE FIGURES A-1 & A-2)

(CONTD)

0 H C T R S E H C G M R SUMMARY NO./REV. NUMBER PROCEDURE SHEET SWRI METHOD EXAM. EXAMINATION AREA IDENTIFICATION WELD NUMBER ANC ''OR SECT XI CATGY ASME ITEM NO SECT XI ASME

WOZZLE TO SAFE-END AND SAFE-END TO NOZZLE WELDS

(CONTD)

NOZZLE TO SAFE-END RPV1-W585E 8-8 85.10

200-1/70 100750 DEV. 3 800-117/2 DEV. 1 AUT45T AUT45 Fq

200-1/70 100752 DEV. 3 800-117/2 AU145 1d

SAFE-END TO SAFE END EXT

RPV1-N58SEX

8-b

85.10

DEV. 1 AUT457

SXAMINATION TO BE PERFORMED SCHEDULED EXAMINATION POST-5 SE-CSCL-1.35-52-HPC SE-14-1.25-53-HPC POWED TO 1989 OUTAGE.

BASIC CALIBRATION BLOCK

EXAMINATION TO BE PERFORMED SCHEDULED EXAMINATION POST-

USING INTRASPECT 1/PC-2

SYSTEM.

POWED TO 1989 OUTAGE. UT

BASIC CALIBRATION BLOCK SE-CSCL-1.35-52-HPC USING INTRASPECT 1/PC-2 SE-IN-. 750-73-NPC SYSTEM.

SCHEDULED EXAMINATION POST-PONED TO NEXT REFUELING OUTAGE. EXAMINE 30 NUTS.

OUTAGE. UT EXAMINATION TO BE SCHEDULED EXAMINATION POST-PERFORMED WITH PSEEG TRANS-PONED TO NEXT REFUELING

DUCER NO 2719. ***BASIC CALIPRATION BLOCK*** 6-.828-8-CS-43-HPC

UT60 UT88

RPV1-STUDS (1-92) CLOSURE STUDS 8-6 1

CLOSURE NUTS 8-6-1 86.10 86.20

CLOSURE HEAD BOLTING

W

DEV. 1,2

300-2/42

100865

800-20/1 100875 800-104/2

RPV1-1WUTS (1-92)

0

REMARKS

PAGE





PAGE 17 REACTOR PRESSURE VESSEL (SEE FIGURES A-1 & A-2) (CONTD) $(\alpha, \alpha) = (\alpha, \gamma, \alpha) = (\alpha, \alpha)$ NI O ONGT ASME ASME SWRI SUMMARY R S E H SECT KI SECT KI WELD NUMBER AND/OR EXAM. PROCEDURE SHEET E I O E ITEM NO CATGY EXAMINATION AREA IDENTIFICATION METHOD NO./REV. NUMBER C G M R REMARKS CLOSURE HEAD BOLTING ****************** (CONTD) ****** SCHEDULED EXAMINATION POST-86.40 8-G-1 RPV1-THDF UTO 609-5/43 100880 THREADS IN FLANGE PONED TO NEXT REFUELING OUTAGE. EXAMINE THREADS IN FLANGE WHERE MADE ACCESSIBLE BY REMOVAL OF STUDS. ***BASIC CALIBRATION BLOCK*** 6-.828-8-CS-43-HPC 86,50 8-G-1 RPV1-CM8 VT-1 900-7/14 100881 SCHEDULED EXAMINATION POST-CLOSURE WASHERS DEV. 1 PONED TO NEXT REFUELING OUTAGE. EXAMINE 30 WASHERS.

PAGE 18

********	*******	*************				NI O ONGT	
ASME SECT XI	ASME SECT XI		EXAM.	SWR1 PROCEDURE	SUMMARY SHEET	R S E H E I O E	
ITEM NO	CATGY	EXAMINATION AREA IDENTIFICATION PUMP BOLTING	METHOD	NO./REV.	NUMBER	CGMR	REMARKS
86.180	8-6-1	RCPA-18LT (1-16) STUDS	UT0 UT45 UT60 UT70 UT88	800-97/3	101005		SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. UT EXAMINATION TO BE PERFORMED WITH PSEAG TRANDUCER NOS. 2665 2666, 2667 AND 3386. ***BASIC CALIBRATION BLOCK***
86.200	B-G-1	RCPA-TOLT (1-16) NUTS AND WASHERS	vī-1	900-7/14 DEV. 1	101010		3500-8-CS-44-HPC RCP-STUD-CS-76-HPC





MAIN STEAM SYSTEM PIPING (FIGURES LISTED BELOW)

每年後 家庭 医黄属 医黄属 医黄素 医黄素 医子宫 医子宫 医子宫 医白泽耳氏 医白白 医白白色 医白白色 医白白色

REWARKS	SCHEDULED EXAMINATION POST- POMED TO 1989 OUTAGE. ***BASIC CALIBRATION BLOCK* 8-CS-160906-32-NPC
0	
SUMMARY SHEET MUMBER	132005
KI C KAM. SURI SUMMARY R S E N PROCEDURE SHEET E I O E WETHOD NO./REV. NUMBER C G M R	300-1/35 132005 0EV. 2 600-41/16 0EV. 1
EXM. METHOD	MI SPIN
LINE 1-AB-8008A-030C (FIGURE A-4)	1 BRANCH CONNECTION TO PIPE GE-PS-N-A3-J
ASME SECT XI CATGY	2
ASHE SECT XI TTEN NO	8-11 8-1

2 PIPE TO FLANGE GE-PS-N-A3-K 69.11 8-1

300-1/35 102010 0EV. 2 600-41/16 DEV. 1

UT45 .

...

SCHEDULED EXAMINATION POST-POWED TO 1989 OUTAGE.

****BASIC CALIBRATION BLOCK*** 8-C5-160-.906-32-NPC

FEEDWATER SYSTEM PIPING (FIGURES LISTED BELOW)

.

	REMARKS	化碳化合物 化化合物 化化合物 化合物 化合物化合物	AUGMENTED EXAMINATION PER- FORMED AT THE DECHECT OF	PSE&G. NINE LINEAR INDICA-	TIOWS ON THE INSI'VE SUBFACE O VALVE BOOP AND THREE LINEAR INDICATIONS ON THE OUTSIDE	SURFACE. SEE CWF 1 AND 4. REEXAMINATION AFTER LIGHT	UNTINUING REVEALED NO RECORD- ABLE INDICATIONS. THICKNESSES ON THE VALVE BODY TAKEN FOR	INFORMATION ONLY.	SCHEDULED EXAMINATION POST- POWED TO 1989 OUTAGE.		AUGMENTED EXAMINATION PER-
0 1 8	E 1 0 E C G M R	4 4 8	* • •		*						× -
		* *			×						×.
COMMAN		4 8 8 8 8 8	104302						104.715		104802
Suel	PROCEDURE NO./REV.	6. 8. 6. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7.	300-1/35 NFV 2	300-2/42	DEV. 1,2				300-1/35 104715 DEV. 2		300-1/35 104802 X
	EXXM. WETHOD		м	18					¥		×
9. 唐尚 别是在书书书书书书书书书书书书书书书书书书书书书书书书书书书书书书书书书书书书	MELD NUMBER AND/OR EXAN'MATLON AREA IDENTIFICATION	LINE 1-ME-24DLA-035 (FIGURE A-13)	TAUG VALVE CHV-F07483						31.6 LUG	LINE 1-AE-246LA-036 (FIGURE A-14)	TAUG
š	SECT XI CATGY		K/A						1-1-1		8/A
	- 0		AUG						810.10 8-K-1 3LC LUG		AUG 8

300-1/35 104602 ----X AUGMENTED ECAMINATION PER-DEV. 2 X ---- FORMED AT THE REQUEST OF 300-2/42 -----X PSE4G. NIME LINEAR INDICA-OEV. 1,2 X ---- TIONS ON THE INSIDE SURFACE OF THE VALVE AND TWO LINEAR INDICATIONS ON THE OUTSIDE SURFACE. SEE CNF'S 2 AND 5. REEXAMINATION AFTER LIGHT GRINDING REVEALED NO RECOMD-ABLE INDICATIONS. THICKNESSES ON THE VALVE BODY TAKEN FOR INFOMMETTION ONLY.

¥

VALVE (HV-F074A)

37

「四時間」

PAGE 20

J





NUCLEAR BOILER AND RECIRCULATION SYSTEM PIPING (FIGURE LISTED BELOW)

REMARCS	SCHEDULED EXAMINATION POST- POMED TO 1989 OUTAGE. CORROSION RESISTANT CLADDING OM PIPE SIDE.	***BASIC CALIBRATION BLOCK*** SE-SS-2.25-60-HPC 28-SS-CRC-68-HPC 28-SS-CRC-68-HPC 56CHEDULED EXAMINATION POST- POWED TO 1987 OUTAGE. CORROSION RESISTANT CLADDING ADJACENT TO CINCUMFERENTIAL WELD.	***BASIC CALIBBATION BLOCK*** 28-55-X-1.200-30-HPC 28-55-X-1.200-30-HPC 28-55-X-1.200-30-HPC	
0 1 0 0 4 0 1 0 6 8 6 4 0 6 8 6 4	•		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
SUMMARY SUEET NUMBER	105600	105605	105715	105720
SUR1 PROCEDURE WO./REV.	200-1/70 DEV. 3 600-31/23 DEV. 1 800-100/2 DEV. 1	200-1/70 DEV.3 600-31/23 DEV.1 800-100/2	200-1/70 105715 DEV. 3 600-31/23 DEV. 1	200-1/70 DEV. 3 600-31/23 DEV. 1
EXAM. NETHOD	PT UT45 UT457 UT457 UT457	PT UT45 UT451 UT451 UT451	PT UT45 UT45T	PT UT45 UT45T
WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION	1 SAFE END TO PIPE FSK-P-169-1-R1	TLD LONGTUDINAL SEAM DOMNSTREAM	7 PIPE TO ELBOM 761E350-7-85-1-A2(A)	TUU LONGITUD'NAL SEAM UPSTREAM
ASME SECT XI CATGY	2	2	2	2
ASHE SECT XI TTEM NO	11.08	89.12	11.98	89.12

8ASIC CALIBRATION BLOCK 28-55-X-1.200-30-HPC

PAGE 21

-

	1.00	
UNIT 1	INATION.	
LION,	EXAMI	STS
STAI	IVE	ONE
ING	RUCT	S S
GENERAL	NONDEST	CLASS 1
EEK	5	~
8	ARY	
HOPE	Man IS	

0
3
0
-
붋
-
8
2
55
-
22
-
140
a .
S.
-
6
-
10
꾩
Ξ.
ā
Ξ.
G .
20
*
60
12
5
Ξ.
**
-
8
=
-
-
2
9
R
5
Ξ.
*
-04
ч.
ж.
-
- 266
-
-
12
22
-
-
2
100
-
0
-

(CONTD)

	REMARKS				
		-			
0 8 9 0					
- 28 49					
RORW	0				
SUMMARY	NUMBER				
SURE SUMMARY PROCEDURE SHEET	NO./REV.				
EXM.	METHOD				
	ITEM NO CATGY EXAMINATION AREA IDENTIFICATION METHOD NO./REV. NUMBER	LINE 1-88-28VCA-012 (FIGURE A-18)	医安布马克 医弗鲁克曼氏 医弗鲁克曼氏 医皮皮 医皮皮 医皮皮 医子宫	(COMTD)	
ASME SECT XI	CATGY				
ASHE ASHE	TEM NO				

	BASIC CALIBRATION BLOCK 28-55-X-1.200-30-MPC	***BASIC CALIBRATION BLOCK*** 28-55-X-1,200-30-NPC		CORROSION RESISTANT CLADOING ON PIPE SIDE. ***BASIC CALIBRATION BLOCK***	CORROSION RESISTANT CLADDING ADJACENT TO CIRCUNFERENTIAL WELD.
	* **	* * *			
	105725	105730		105800	105805
	200-1/70 105725 DEV. 3 600-51/23 DEV. 1	200-1/70 105730 DEV. 3 600-31/33 DEV. 1		200-1/70 105800 DEV. 3 800-100/2 DEV. 1	200-1/70 105805 DEV. 3 600-31/23 DEV. 1 BEV. 1 DEV. 1
	14 UT45 UT45	14 U145 U145		71 UTON UT45 UT451	71 0145 0145 01455 01455
(CUMID)	71.DT LONG. SEAM DOWNSTREAM ON INSIDE BEND OF ELBOW	7100 LONG. SEAM DOMNSTREAM ON OUTSIDE BEND OF ELBOW	LINE 1-88-28VCA-013 (FIGURE A-18)	POME TO PIPE FSK-P-169-6	110 LONGITUDINAL SEAN DOWNSTREAN
	2	2		2	2
	8.12 8-1	89.12		11.98	89.12



BASIC CALIBRATION BLOCK 28-55-Y-1.200-30-MPC 28-55-CRC-68-MPC

.



NUCLEAR BOILER AND RECIRCULATION SYSTEM PIPING (FIGURE LISTED BELOW)

PAGE 23

ITEM NO	SECT XI CATGY	WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION		SWR1 PROCEDURE NO./REV.	SHEET NUMBER	EIOE	REMARKS
		LINE 1-88-12VCA-013J (FIGURE A-19)					
89.11	14	5 PIPE TO SAFE END FSK-P-169-18	PT UT45 UT45T UT45 UT45T	200-1/70 DEV. 3 600-31/23 DEV. 1 800-100/2 DEV. 1			SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. CORROSION RESISTANT CLADDING ON PIPE SIDE.
							12-SS-CRC-47-HPC SE-SS-1.45-58-HPC
89.12	8-2	SLU LONGITUDINAL SEAM UPSTREAM	PT UT45 UT45T UT45 UT45T	200-1/70 DEV. 3 600-31/23 DEV. 1 800-100/2 DEV. 1			SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. CORROSION RESISTANT CLADDING ADJACENT TO CIRCUMFERENTIAL WELD. ***BASIC CALIBRATION BLOCK*** 12-SS-K720-13-HPC 12-SS-CRC 47-HPC
		LINE 1-BB-12VCA-013K (FIGURE A-19)					
89.11	8-1	5 PIPE TO SAFE END FSK-P-169-19	PT UT45 UT45T UT45 UT45T	200-1/70 DEV. 3 600-31/23 DEV. 1 800-100/2 DEV. 1			SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. CORROSION RESISTANT CLADDING ON PIPE SIDE.

NUCLEAR BOILER AND RECIRCULATION SYSTEM PIPING (FICURE LISTED BELOW)

(CINOO)

iq.

				÷		
			68	÷.		
			붋	2		
			5	1		
			REMARKS	-		
			1			
0		-	*	1		
	a m	0	*	4		
-	38 40	***	13			
*	0 *	-	0	*		
	SUPPORT Y	SHEET	NUMBER			
		-	Ξ.	ŝ		
	Suel	PROCEDURE SHEET	NO./REV. NUMBER	· · · · · · · · · · · · · · · · · · ·		
		EXAM.		医非正式子宫 化子子子子子子子子子子子子子子子子子子子子子子子子子子子子子子子子子子子		
				1		
				1		
				ŝ.	-	s.
			*	ŝ	0	ξ.
			2	2	1	χ.
			12	1	*	2
			0	1	*	8
			Ξ.	3	3	ŝ.
		8	=	1	3	2
		2	8	1	5	2
		WELD NUMBER AND/OR	EXAMINATION AREA IDENTIFICATION	1	LINE 1-88-12VCA-013K (FIGURE A-19)	·····································
		2	1	÷	6	ŝ.
		3	2	4	5	ŝ.
		문	2	1	4	1
		2	-	1	8	3
		2	8	ŝ	6	ŝ.
		3	2	2	7	τ.
		*	5	1		2
		-	8	÷	Ŧ	ŝ.
			а.	ŝ.	-	а.
			a	1	*	2
			7	1	=	3
					7	1
		×		-		
	144	SECT XI	AIGT	-		
	8	3	N.I.	-		
	*	-	0	1		
		-	ITEM NO C	5		
		×	×	4		
	144	-	*	-		
	5	SECT XI	15	1		
	*	-	-	1		

(CONTD)

89.12 8-1

200-1/70	DEV. 3	600-31/23	DEV. 1
14		0145	U145T
	UPSTREAM		
54.0	LONGITUDINAL SEAM		

106670 800-100/2 DEV. 1 UT45T UT45T

CORROSION RESISTANT CLADDING ADJACENT TO CIRCUMFERENTIAL PONED TO 1989 OUTAGE. WELD.

SCHEDULED EXAMINATION POST-

k

8ASIC CALIBRATION BLOCK 12-55-X-.720-13-HPC 12-55-CRC-47-HPC

LINE 1-58-28VCA-014 (FIGURE A-16)

COMPOSIÓN RESISTANT CLADDING UPCTDEAN/DOUNCTDEFAM		***BASIC CALIBRATION BLOCK*** 28-SS-CRC-68-MPC	CORROSION RESISTANT CLADDING ADJACENT TO CIRCUMFERENTIAL
k X K	***		* * *
×	• *		×
200-1/70 106790 X			200-1/70 106795 UEV. 3
01/1	1		3
200-	800-100/2 DEV. 1		200-1/ UEV. 3
14	UT45T UT45T		I.
5 PIDE TO PIDE	7966.916-80-1-82(88)		SLU LONGITUDINAL SEAN UPSTREAN
7-8			7-8
89.11			BP.12

89.12

WELD. * * * * 0EV. 1 800-100/2 600-31/23 DEV. 1 15210 1145 11451 11451

BASIC CALIBRATION BLOCK 28-SS-X-1.200-30-HPC

28 -SS-CRC-68-HPC





SUMMART OF NONDESTRUCTIVE EXAMINATIONS HOPE CREEK GENERATING STATION, UNIT 1 CLASS 1 COMPONENTS

0 N G T R S E N E 1 0 E C G M R 0 * * * PROCEDURE SHEET NUMBER NO./REV. NUCLEAR BOILER AND RECIRCULATION SYSTEM PIPING (FIGURE LISTED BELOW) NETHOD EXAM. UELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION LINE 1-88-28VCA-014 (FIGURE A-16) SECT XI CALGY ASME SECT XI 11EM NO (CONTD) ASME

REMARKS

(CONTD)

21° he

12 INCHES DUE TO PIPE SUPPORT SCHEDULED FOR A LATER OUTAGE. EXAMINATION LIMITED TO 7 OF INTERFERENCE. COVERAGE OF REMAINING PORTION TO BE * * * * * * . · . . 106800 800-100/2 600-31/23 200-1/70 DEV. 1 DEV. 3 UT45T UT45 5716 t LONGITUDINAL SEAM DOWNSTREAM SLD 2

BASIC CALIBRATION BLOCK

28-55-X-1.200-30-MPC

28-55-CRC-68-HPC

CORROSION RESISTANT CLADDING

DEV. 1

UT457

ADJACENT TO CIRCUMFERENTIAL

WELD.

LINE 1-88-12VCA-014A (FIGURE A-17)

107165 200-1/70 DEV. 3 800-100/2 600-31/23 DEV. 1 DEV. 1 15510 UT451 UT451 UT45 t PIPE TO SAFE END 761£350-15-15 úh. 7-8 80.11

COMPOSION RESISTANT CLADDING ON PIPE SIDE.

SCHEDULED EXAMINATION POST-

POWED TO 1989 OUTAGE.

U1451 0145 t, LONGITUDINAL SEAN UPSTREAM 2010 7-8

89.12

BASIC CALIBBATION BLOCK 12-55-CRC-47-NPC SCHEDULED EXAMINATION POST-SE-55-1.45-58-HPC

107170

200-1/70

DEV. 3

600-31/23

DEV. 1

CORROSION RESISTANT CLAUDING ADJACENT TO CIRCUMFERENTIAL POWED TO 1989 OUTAGE.

WELD.

800-100/2 DEV. 1

15210

BASIC CALIBRATION BLOCK 12-55-x-.720-13-HPC 12-SS-CRC-47-MPC

Ŕ PAGE

NUCLEAR BOILER AND RECIRCULATION SYSTEM PIPING (FIGURE LISTED BELOW)

REMARKS	SCHEDULED EXAMINATION POST- POMED TO 1989 OUTAGE. CORROSIOM RESISTANT CLADDING ON PIHE SIDE. BASIC CALIBRATION BLOCK 12-55-CRC-47-MPC SE-55-1,45-58-MPC	SCHEDULED EXAMINATION POST- POMED TO 1989 OUTAGE. CORROSION RESISTANT CLADDING ADJACENT TO CIRCIMFERENTIAL MELD. ***SASIC CALIBRATION BLOCK*** 12-55-42-170-13-NPC 12-55-CRC-47-NPC	SCHEDULED EXAMINATION POST- POMED TO 1989 OUTAGE. CORROSION MESISTANT CLADDING ON PIPE SIDE.
# 1 0 8 5 6 4 6 1 0 6 6 1 0 6			
SUPPORT STREET	107265	107270	\$9£201
Suel PROCEDURE WO./REV.	200-1/70 107265 2EV. 3 6600-31/23 0EV. 1 8500-100/2 0EV. 1	200-1/70 DEV. 3 DEV. 3 600-31/23 DEV. 1 B00-100/2 DEV. 1	200-1/70 107365 DEV. 3 600-31/25 DEV. 1 800-100/2 DEV. 1
EXM. RETIOD	PT UT451 UT451 UT451 UT451 UT451	PT UI451 UI451 UI451	14 1145 1145 1145 1145 1145
WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION LINE 1-68-12VCA-0148 (FIGURE A-17)	S PIPE TO SAFE END FSK-P-170-16-RG	SLU LONGITUDINAL SEAN UPSTREAM	5 PIPE TO SAFE END FSK-P-170-17
ASHE SECT NI CANGY	2	2	2
ASHE ASHE	11.08	89.12	11.08

8ASIC CALIBRATION BLOCK 12-55-CRC-4/7-8PC 5E-55-1,45-58-NPC





27

PAGE

MUCLEAR BOILER AND RECIRCULATION SYSTEM PIPING (FIGURE LISTED BELOW) (CONTD)

0

	1
50	1
	÷
	2
REMARKS	1.
	8.
0 N G T R S E N E 1 O E C G M R	*
C C M C T	×
6 m 10 43	9 - E
0 M G T SJARI SJAWARY R S E H EXAM. PROCEDURE SHEET E I O E METHOD NO./REV. NJABER C G M R	
	8
3 8	2
8 4 8	8.1
<u>독</u> 발 폭	5
0.01 2	8
642	8
8.5	2
8 Q	1
_ H C	2
80.	1
389	2
	1
	÷
	5
K =	8.1
50	2
₩ x	*
	8
	1
	ţ.
	2
8	12
NII	4-17)
CATTON	(71-A 3
ICATION	RE A-17)
FICATION	CURE A-17)
OR TIFICATION	1GURE A-17)
D/OR ENTIFICATION	(FIGURE A-17)
MD/OR DEWTIFICATION	(FIGURE A-17)
AND/OR IDENTIFICATION	4C (FIGURE A-17)
R AND/OR CA IDEMTIFICATION	014C (FIGURE A-17)
BER AND/OR REA IDENTIFICATION	-014C (FIGURE A-17)
UMBER AND/OR AREA IDEWIJFICATION	CA-014C (FIGURE A-17)
NUMBER AND/OR M AREA IDENTIFICATION	NCA-014C (FIGURE A-17)
D NUMBER AND/OR ION AREA IDENTIFICATION	12VCA-014C (FIGURE A-17)
LD NUMBER AND/OR ITOM AREA IDENTIFICATION	1-12VCA-014C (FIGURE A-17)
VELD NUMBER AND/OR MATJON AREA IDENTIFICATION	88-12VCA-014C (FIGURE A-17)
VELD NUMBER AND/OR INATION AREA IDENTIFICATION	-88-12VCA-014C (FIG38E A-17)
VELD NUMBER AND/OR ANIMATION AREA IDENTIFICATION	1-88-12VCA-014C (FIGURE A-17)
VELD NUMBER AND/OR MANIMATION AREA IDENTIFICATION	E 1-88-12VCA-014C (FIGURE A-17)
VELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION	INE 1-88-12VCA-014C (FIGURE A-17)
	LINE 1-88-12VCA-014C (FIGURE A-17)
	LINE 1-88-12VCA-014C (FIGURE A-17)
	LINE 1-88-12VCA-014C (FIGURE A-17)
	LINE 1-88-12VCA-014C (FIGURE A-17)
	LINE 1-88-12VCA-014C (FIGURE A-17)
ASHE SECT XI CATGY	LINE 1-88-12VCA-014C (FIGURE A-17)
ASHE SECT XI CATGY	LINE 1-88-12VCA-014C (FIGURE A-17)
ASHE SECT XI CATGY	LINE 1-88-12VCA-014C (FIGURE A-17)
ASHE SECT XI CATGY	LINE 1-88-12VCA-014C (FIGURE A-17)
ASHE SECT XI CATGY	LINE 1-88-12VCA-014C (FIGURE A-17)
	LINE 1-88-12VCA-014C (FIGURE A-17)

(COMID)

LONGITUDINAL SEAM UPSTREAM SLU 7-8 89.12

200-1/70 107370 600-31/23 0EV. 1 800-100/2 DEV. 1 PT UT45 UT451 UT451 UT451

SCHEDULED EXAMINATION POST-POWED TO 1989 OUTAGE. CORROSION RESISTANT CLADDING ADJACENT TO CIRCUMFERENTIAL

WELD. ***BASIC CALIBRATION BLOCK*** 12-55-Y-.720-13-HPC

SUMMARY OF WONDESTRUCTIVE EXAMINATIONS HOPE CREEK GENERATING STATION, UNIT 1

.

ı

CLASS 1 COMPONENTS

(FIGURES LISTED BELOW) REACTOR CORE SPRAY SYSTEM PIPING

0

REMARKS R 5 E H E 1 0 E C 6 M R 0 4 6 7 * * * NUMBER SUMMARY PROCEDURE SHEET WO./REV. SME METHOD EXAM. EXAMINATION AREA IDENTIFICATION LINE 1-8E-120LA-001 (F1GURE A-33) WELD NUMBER AND/OR SECT XI CATGY N S S SECT XI 176M MO ASME

500-1/35 109335 800-117/2 DEV. 1 DEV. 2 AUT45T AUT45 ¥ PIPE TO REDUCER 1-P-86-014-6 2 7-8 89.11

LINE 1-86-100LA-001 (FIGURE A-33)

REDUCER TO SAFE-END EXT 1-P-36-014-7-61 74

89.11

300-1/35 109350 800-117/2 DEV. 1 DEV. 2 AUT451 AUT45 ¥

BASIC CALIBRATION BLOCK EXAMINATION TO BE PERFORMED SCHEDULT" EXAMINATION POST-POWED TL 1989 OUTAGE. UT 10-CS-B0-.594-10-MPC USING INTRASPECT 1/PC-2 SYSTEM.

SE-CSCL-1.35-52-HPC

BASIC CALIBRATION BLOCK

12-CS-80-_.688-14-IIPC

EXAMINATION TO BE PERFORMED

USING INTRASPECT 1/PC-2

SYSTEM.

SCHEDULED EXAMINATION POST-

POWED TO 1989 OUTAGE. UT

BASIC CALIBRATION BLOCK EXAMINATION TO BE PERFORMED SCHEDULED EXAMINATION POST-POWED TO 1989 CUIAGE. UT USING INTRASPECT 1/PC-2 SYSTEM.

300-1/35 109530

H

PIPE TO REDUCER 1-P-BE-015-6-82

2

7-8

89.11

LINE 1-8E-120LA-023 (FIGURE A-34)

800-117/2

DEV. 2

DEV. 1

AU1451

AUT45

12-CS-80- ..688-14-HPC

EXAMINATION TO BE PERFORMED SCHEDULED EXAMINATION POST-POWED TO 1989 OUTAGE. UT USING INTRASPECT 1/PC-2

BASIC CALIBRATION BLOCK 10-CS-80-.594-10-NPC SYSTEM.







7.0 89.11

REDUCER TO SAFE-END EXT 1-P-86-015-7-81

AUT451 AUT45 ¥





STANDBY LIQUID CONTROL SYSTEM (BH)

EXMAND		SCHEDULED EXAMIMATION POST- POWED TO 1989 OUTAGE. EXAMIMATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI- NATION.	SCHEDULED EXAMINATION POST- POMED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI- MATION.	SCHEDULED EXAMINATION POST- POMED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI- NATION.	SCHEDULED EXAMINATION POST- POMED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PRCGRAM. BASELINE EXAMI- NATION.	SCHEDULED EXAMINATION POST- POWED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI- MATION.	SCHEDULED EXAMINATION POST- POMED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI- MATION.
N 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0							
SUMMARY SHEET NUMBER		112000	112010	112020	112030	112040	112050
SURI PROCEDURE NO./REV.	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	200-1/70 112000 DEV. 3	200-1/70 112010 DEV. 3	200-1/70 112020 DEV. 3	200-1/70 112030 DEV. 3	200-1/70 112040 DEV. 3	200-1/70 112050 DEV. 3
EXM. METHOD		ε	ł	Ħ	ł	E.	E.
	1-88-2CCA-011 (FIGURE A-39)	WALVE TO PIPE	2 PINE TO TEE	STEE TO REDUCER	ANINE TO PIPE	PIPE TO ELBOW	6 ELBOW TO PIPE
ASME SECT XI CATGY		2	2	z	z	2	2
ASHE SECT XI ITEM NO		11.08	11.98	11.98	89.11	11.98	89.11

I TIMU	NATIONS	
TION,	EXAMI	KTS.
STA	TIVE	POWER
T1NG	TRUC	80
GENERA	NONDES	CLASS 1
CREEK	RY OF	Ĩ
340H	SUPPOR	

2

PAGE

STANDBY LIQUID CONTROL SYSTEM (BH)

(CONTD)

REMARKS # 1 0 0 N G T 8 S E N E 1 0 E C G M R * * * * SURI SUMMARY PROCEDURE SHEET NO./REV. NUMBER METHOD EXAM. WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION 1-8H-2CCA-011 (FIGURE A-39) SECT XI CALGY ASM SECT XI TTEM NO ASA

(CONTD)

t d PIPE 10 TEE * 7-8 89.11

200-1/70 112060 DEV. 3

ISI PROGRAM. BASELINE EXAMI-SCHEDULED EXAMINATION POST-EXAMINATION AREA ADDED TO POWED TO 1989 OUTAGE. WATION.

1-8H-1.50CCA-011 (FIGURE A-39)

89.11

200-1/7G 112300 DEV. 3 h REDUCER TO PIPE -7-8

112310 200-1/70 DEV. 3 14

2 PIPE 10 TEE

7-8

89.11

200-1/70 112330 DEV. 3 t

J414 01 331

...

F-8

89.11

SCHEDULED EXAMINATION POST-EXAMINATION AREA ADDED TO POWEE TO 1989 OUTAGE.

EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI-

KATION.

SCHEDULED EXAMINATION POST-

POWED TO 1989 OUTAGE.

ISI PROGRAM, BASELINE EXAMI-

WATTON.

EXAMINATION AREA ADDED TO

SCHEDULED EXAMINATION POST-

POWED TO 1989 OUTAGE.

ISI PROGRAM. BASELINE EXAMI-WATTON.





STANDEY LIQUID CONTROL SYSTEM (BM) (CONTD) ADME ASME ASME ASME ASME AND/COR EXAM.

0

ISI PROGRAM. BASELINE EXAMI-ISI PROGRAM. BASELINE EXAMI-ISI PROGRAM. BASELINE EXAMI-ISI PROGRAM. BASELINE EXAMI SCHEDULED EXAMINATION POST-SCHEDULED EXAMINATION POST-SCHEDULED EXAMINATION POST-SCHEDULED EXAMINATION POST-SCHEDULED EXAMINATION POST-EXAMINATION AREA ADDED TO EXAMINATION AREA ADDED TO EXAMINATION AREA ADDED TO EXAMINATION AREA ADDED TO EXAMINATION AREA ADDED TO POWED TO 1989 OUTAGE. REMARKS WATION. WATION. RATION. WATTON. 0 N G T R S E N E 1 0 E SUMMARY NO./REV. NUMBER 200-1/70 112340 DEV. 3 200-1/70 112350 DEV. 3 200-1/70 112370 DEV. 3 200-1/70 112360 DEV. 3 112360 PROCEDURE SHEET 200-1/70 DEV. 3 METHOD EXAM. Ľ, 1d Ľ, 1d I. EXAMINATION AREA IDENTIFICATION 1-8H-1.50CCA-011 (FIGURE A-39) WELD NUMBER AND/OR P196 10 ELBOW P1PE TO ELBOW PIPE TO ELBOW ELBOW TO P1PE 6 ELBON TO P1PE (CONITD) ۴., ÷. ÷ wh. SECT NI CATGY 2 7-8 7.8 7-8 7-8 SECT XI ITEM NO 89.11 89.11 89.11 89.11 89.11 ASM

ISI PROGRAM. BASELINE EXAMI-NATION.

SUMMARY OF NONDESTRUCTIVE EXAMINATIONS HOPE CREEK GENERATING STATION, UNIT 1 CLASS 1 COMPONENTS

2

PAGE

STANDBY LIGUID CONTROL SYSTEM (BH)

(CONTD)

REMARKS	
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
	Ş., 1
* * * * *	8
SJAMMARY SHEET NJMBER	
Surt Summary PROCEDURE SHEET NO./REV. NUMBER	
EXM.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
MELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION	1-88-1.50CCA-011 (FIGURE A-39)
W LS	1-88-
ASHE ASH SECT XI SEC TTEN M) CAL	

(CONTD)

7-8

89.11

200-1/70 112390 DEV. 3 t, ELBOW TO P1PE 2

11 PIPE TO ELBOW

200-1/70 112400 DEV. 3 i.

89.11

200-1/70 112410 DEV. 3 1d

ELBOW TO P1PE

2

7-8

89.11

ISI PROGRAM. BASELINE EXAMI-

WATION.

EXAMINATION AREA ADDED TO

POWED TO 1989 OUTAGE.

TST PROGRAM. BASELINE EXAMI-

WATION.

EXAMINATION AREA ADDED TO

POWED TO 1989 OUTAGE.

SCHEDULED EXAMINATION POST-

SCHEDULED EXAMINATION POST-

200-1/70 112412 DEV. 3 Ľ,

3d1d 01 3d1d

124

7.4

89.11

206-1/70 112414 DEV. 3 r.

128 P1PE 10 P1PE

-

89.11

EXAMINATION AREA ADDED TO 151 PROCRAM. BASELINE EXAMI-ISI PROGRAM. BASELINE EXAMI-SCHEDULED EXAMINATION POST-SCHEDULED EXAMINATION POST-EXAMINATION AREA ADDED TO "YOMED TO 1989 OUTAGE. POWED 10 1989 OUTAGE. KATION. NATION.

ISI PROGRAM. BASELINE EXAMI-SCHEDULED EXAMINATION POST-EXAMINATION AREA ADDED TO POWED TO 1989 OUTAGE. WATTON.





STANDBY LIGUID CONTROL SYSTEM (BH)

(CONITD)

	REMARKS	
0		
SUMMARY	NUMBER	
Sue :	NETHOD NO./REV. NUMBER	
L'AN	METHOD	
ACC N MANDER AND CON	EXAM	1-8H-1.SCCA-011 (FIGURE A-39)
ASM ACT N	CATGY	
NON NO	TTEN NO CATGO	

(COMID)

112418
200-1/70 DEV. 3
E.
120 COUPLING TO PIPE
2
11.08

200-1/70 112420 DEV. 3 Ľ. PIPE TO ELBOW 2

7.4

89.11

209-1/70 112480 DEV. 3 t,

19 TEE TO PIPE

2

89.11

ISI PROGRAM, BASELINE EXAMI-SCHEGULED EXAMINATION POST-SCHEDULED EXAMINATION POST-POWED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO EXAMINATION AREA ADDED TO POWED TO 1989 OUTAGE. WATTON.

ISI PROGRAM. BASELINE EXAMI

MATION.

EXAMINATION AREA ADDED TO

POWED TO 1989 OUTAGE.

SCHEDULED EXAMINATION POST-

ISI PROGRAM. BASELINE EXAMI-SCHEDULED EXAMINATION POST-EXAMINATION AREA ADDED TO POWED TO 1989 OUTAGE. WATION.

ISI PROCRAM. BASELINE EXAMI-

151 PROGRAM. BASELINE EXAMI-SCHEDULED EXAMINATION POST-EXAMINATION AREA ADDED TO POWEE TO 1989 OUTAGE.

200-1/70 112490 DEV. 3

ta

20 PIPE TO VALVE

74

69.11

NATION.

NATION.

-PAGE

UNIT 1 INATIONS
EXAM
TIVE PONEA
TRUC COM
GENERA NONDES
EEK
CR
HOPE

ASME SECT XI WELD NUMBER AMD/OR CATGY EXAMINATION AREA IDENTIFICATION	1-SH-1.50CCA-011 (FIGURE A-39) (CONTD)	21 VALVE TO PIPE	21LUG	22 PIPE TO ELBOW	23 ELBOK TO HIPE	23A PIPE TO COUPLING
AMD/OR IDENTIFICATION	1GuRE A-39)					
EXAN. METHOD		Id	Id	14	14	14
SURI PROCEDURE 40./REV.		200-1/70 DEV. 3	200-1/70 DEV. 5	200-1/70 DEV. 3	200-1/70 DEJ. 3	200-1/70 112521 DEV. 3
SUMMARY SHEET NUMBER		112500	112505	112510	112520	112521
R S S S S S S S S S S S S S S S S S S S						
REMARKS		SCHEDULED EXAMINATION POST- POMED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM, BASELINE EXAMI- NATION.	SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMINATION AREA ADDED T(ISI PROGRAM. BASELINE EXAMI- NATION.	SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI- NATION.	SCHEDULED EXAMINATION POST- PONED TO 19"9 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI- NATION.	SCHEDULED EXAMINATION POST- PONED TO 1999 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI- NATION.



35 PAGE

~		
35	1	
66	6	
-	4	
1		
×	. 6	
544	. *	
100	18	
(75		
20	18.	
10	2	
1	4	
8	2	
25	2	
-	4	
8	2	
8	12	
-	÷.	
0	4	
-		
3	16	
0	18.	
-	1	
-	18	
100	×.	1.12
20		2
00		9
9	12	12
- 5	- 5	一天
	2.	8
10	2	2
-	1	

建建学建学 医

					* * *			
					1			
				XS	i			
				EMARKS	;			
				REM	-			
0	-	*	w	œ				
	9	w	0	×	1			
***	×	S	-	9				
*	0	æ	-	0	*			
		RY		œ	-			
		ş	EE	BE	1			
		3	SHEET	R	-			
			PROCEDURE 5	1	:			
			B	REV	-			
		RI	8	5				
		S	R	NO.	i			
			÷.	E S	i			
			X	METHOD	-			
			-	*				
					**			
					-			
				S	1			
				E	-	5	1	
				10	1	N.	1	
			œ	-	1	*	-	
			0/0	ENT	i	N.	1	
			WELD NUMBER AND/OR	XAMINATION AREA IDENFIFICATION	-	-8H-1.50CCA-011 (FIGURE A-39	1	
			œ	EA		GF	-	
			9	AR	-	E	1	
			R	×	1	-	1	
			9	II	Î	3	1	
			¥	NA.	1	50	1	
				N	-	÷	-	
				B	i	8	1	
				7	ł	-	-	
			SECT XI		-			
		*	L	ATGY	-			
		-		9	**			
			SECT XI	9	1			
			1	TEM N				
		NS	EC	TE	-			
		*	~	-	1			

(CONTD) *****

238

r-8

89.11

	112523	
DEV. 3	200-1/70 112523 DEV. 3	
	μ	
COUPLING TO PIPE	23C PIPE TO COUPLING	
	۲-8	
	11.08	

200-1/70 112524 DEV. 3 230 COUPLING TO PIPE

Id

F-8

89.11

200-1/70 112525 DEV. 3 Ы

236 PIPE TO COUPLING

F-8

89.11

PONED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI-SCHEDULED EXAMINATION POST-NATION.

ISI PROGRAM. BASELINE EXAMI-NATION.

SCHEDULED EXAMIN, IION POST-POWED TO 1989 OUTAGE.

200-1/70 112522

Id

EXAMINATION AREA ADDED TO

ISI PROGRAM. BASELINE EXAMI-NATION. SCHEDULED EXAMINATION POST-EXAMINATION AREA ADDED TO PONED TO 1989 OUTAGE.

EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI-SCHEDULED EXAMINATION POST-PONED TO 1989 OUTAGE. NATION.

EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI-SCHEDULED EXAMINATION POST-PONED TO 1989 OUTAGE. NATION.

F-8

89.11

23F COUPLING TO PIPE

Id

200-1/70 112526 DEV. 3

HOPE CREEK GENERATING STATION, UNIT 1 SUMMARY OF NONDESTRUCTIVE EXAMINATIONS CLASS 1 AUGMENTED EXAMINATIONS

PAGE 36

	SECT XI	WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION	EXAM. METHOD	SWRI PROCEDURE NO./REV.	SHEET	NIO NGT RSEH EIOE CGMR	REMARKS
NUREG	0619	RPV1-N4A NOZZLE BORE SECTION	UT22RL UT45	800-94/2 CFV. 1	112900	x	
							BASIC CALIBRATION BLOCK FW-N4-MOCKUP-75R-HPC
NUREG	0619	RPV1-N48 NOZZLE BORE SECTION	UT22RL UT45	800-94/2 DEV. 1	112905	x x	LIMITED EXAMINATION DUE TO WELDED THERMO PADS AND INSTRU- MENTATION WIRE INTERFERENCE. ***BASIC CALIBRATION BLOCK*** FW-N4-MOCKUP-75R-NPC
JUREG	0619	RPV1-N4C NOZZLE BORE SECTION	UT22RL UT45	800-94/2 DEV. 1	112910	x x	
							BASIC CALIBRATION BLOCK FW-N4-MOCKUP-75R-HPC
NUREG	0619	RPV1-N4D NOZZLE BORE SECTION	UT22kL UT45	800-94/2 DEV. 1	112915	x	LIMITED EXAMINATION DUE TO WELDED THERMO PAD INTER- FERENCE. ***BASIC CALIBRATION BLOCK*** FW-N4-MOCKUP-75R-HPC
NUREG	0619	RPV1-N4E NOZZLE BORE SECTION	UT22RL UT45	800-94/2 DEV. 1	112920	x x	
							BASIC CALIBRATION BLOCK FW-N4-MOCKUP-75R-HPC
NUREG	0619	RPV1-N4F NOZZLE BORE SECTION	UT22RL UT45	800-94/2 DSV. 1	112925	x x	
							BASIC CALIBRATION BLOCK

FW-N4-MOCKUP-75R-HPC

.





MAIN	STEAM	SYSTEM P	PIPING	(FIGURES	LISTED	BELOW)
		********		********		*****

ASME SECT XI ITEM NO	ASME SECT XI CATGY	WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION	EXAM. METHOD	SWRI PROCEDURE NO./REV.	SUMMARY SHEET NUMDER	N R R R R R R R R R R R R R R R R R R R	S E	T H E	REMARKS
******		LINE 1-AB-26088-021 (FIGURE 8-4)							
c3.20	C-C	2PS1 PIPE SUPPORT 1-P-AB-01-103-2	MT	300-1/35 DEV. 2	201217				SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.

ION, UNIT 1	EXAMINATIONS	S
STATION	-	COMPONENTS
GENERATING	ESTI	CLASS 2 COM
HOPE CREEK	SUMMARY OF	-

PAGE 38

RESIDUAL HEAT REMOVAL SYSTEM PIPING (FIGURES LISTED BELOW)

			. 1				. 1
REMARKS		SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.	SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.	18-CS-X- ,500-22-HPC	SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM IN ACCORDANCE WITH CODE CASE N-408. BASELINE EXAMINATION. ***BASIC CALIBRATION BLOCK**** 16-CS-40500-20-HPC		SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.
M 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0							
SUMMARY Sheet NUMBER		202352	20235		202550		202810
SURI SUMMAR PROCEDURE SMEET NO./REV. NUMBER		300-1/35 202352 DEV. 2	300-1/35 202355 DEV. 2 600-41/16 DEV. 1		300-1/35 202550 DEV. 2 600-41/16 DEV. 1		500-1/35 202810 LEV. 2 600-41/16 DEV. 1
EXAM. METHOO		¥	MT UT45		MT UTOL UT45T		MI UT45
WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION	LINE 1-8C-18682-0048 (FIGURE 8-8)	SPS1 PIPE SUPPORT 1-P-BC-01-M17	8 PIPE TO ELBOW 1-8C-004-508-C	LINE *-8C-16G88-004 (FIGURE 8-11)	1 TEE TO PIPE 1-P-8C-013-6	LINE 1-8C-12G88-0048 (FIGURE 8-8)	3 ELBOM TO PIPE 1-P-8C-010-19-C2
ASME SECT XI CATGY	8 8 8 8 8 8 8 8 8 8	з-5	C-F-2		C-F-2		C-F-2
ASME SECT XI LTEM NO		C3.20	05.51		12.51		C5.51



BASIC CALIBRATION BLOCK 12-CS-STD-.375-12-HPC







ONTD)							
						NI O ONGT	
ECT XI TEM NO		WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION		SWRI PROCEDURE NO./REV.	SHEET NUMBER		REMARKS
		LINE 1-8C-18G88-019A (FIGURE 8-13 & 1	8-14)				
3.20	A STOLEY AND A STOLEY	23LG(1-4) LUG 1-P-8C-01-H09	MT	300-1/35 DEV. 2	203360		SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.
		LINE 1-8C-8088-025 (FIGURE 8-15)					
5.51	C-F-2	1 VALVE TO PIPE 1-P-FD-001-11		300-1/35 DEV. 2 600-41/16 DEV. 1			SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.
				DEV. 1			***BASIC CALIBRATION BLOCK*** 8-CS-100594-8-HPC
5.51	C-F-2	3 PIPE TO EI 804 1-8C-025-572-8		300-1/35 DEV. 2 600-41/16 DEV. 1			SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.
							BASIC CALIBRATION BLOCK 8-CS-100594-8-HPC
5.51	C-F-2	128 PIPE TO FLANGE	NT UTOL UT45	300-1/35 DEV. 2 600-41/16 DEV. 1		x	
			UT45T			x	***BASIC CALIBRATION BLOCK*** 8-CS-100594-8-HPC
5.51	C-F-2	12C FLANGE TO PIPE	MT UTOL UT45 UT451	300-1/35 DEV. 2 600-41/16 DEV. 1		x x	
			01421				***BASIC CALIBRATION BLOCK*** 8-CS-100-,594-8-HPC

ONTD)								
	SECT XI	WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION	EXAM. METHOD	SWRI PROCEDURE NO./REV.	SHEET	E 1	GT EH OE	
		LINE 1-8C-8D88-029 (FiGURE 8-19)						
5.51	C-F-2	1A PIPE TO FLANGE	MT UTOL UT45 UT45T	300-1/23 600-41/8 DEV. 1-4		X - X -		
5.51	C-F-2	18 FLANGE TO PIPE	MT UTOL UT45 UT45T	360-1/23 600-41/8 DEV. 1-4	and the second se	x - x - x - x -	11	10/02/87.
		LINE 1-8C-20HB8-049 (FIGURE 8-23)						
5.51	C-F-2	38 PIPE TO VALVE 1-P-8C-002-8	MT UTOL UT45 UT45T	300-1/35 DEV. 2 600-41/16 DEV. 1				SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM IN ACCORDANCE WIT CODE CASE N-408. BASELINE EXAMINATION. ***BASIC CALIBRATION BLOCK*** 20-CS-STD3/5-23-HPC
		LINE 1-8C-18G88-0508 (FIGURE 8-36)						
sst	C-F-2	1 TEE TO PIPE 1-BC-050-S02-J	MT UT45	300-1/35 DEV. 2 600-41/16 DEV. 1				SCHEDULED EXAMINATION POST- PONED TO 1989 DUTAGE.





RESIDUAL	HEAT REM	DVAL SYSTEM PIPING (FIGURES LISTED BELD	W)				
(CONTD)							
						N 1 0	
						ONGT	
ASHE	ASHE			SWRI	SUMMARY		
		WELD NUMBER AND/OR	EXAM.			and the second	
		EXAMINATION AREA IDENTIFICATION				CGMR	REMARKS
	******	***************************************			******		
		LINE 1-8C-18G88-063A (FIGURE 8-25)					
c5.51	C-F-2	17	MT	300-1/35	206280		SCHEDULED EXAMINATION POST-
		TEE TO PIPE		DEV. 2			PONED TO 1989 OUTAGE.
		1-BC-063A-S09-E		600-41/16			EXAMINATION AREA ADDED TO
			UT45	DEV. 1			ISI PROGRAM IN ACCORDANCE WITH
			UT45T				CODE CASE N-408. BASELINE
							EXAMINATION.
							BASIC CALIBRATION BLOCK
							18-CS-X500-22-HPC
		LINE 1-8C-18G88-066A (FIGURE 8-31 & 8-	725				
		LINE 1-DC-10000-000A (FIGURE 0-31 & D	JC)				
CS 51	C-F-2		HT	300-1/35	207060		SCHEDULED EXAMINATION POST-
63.31	C.1.2	PIPE TO VALVE		DEV. 2	201000		PONED TO 1989 OUTAGE.
		1-P-8C-021-13	11745	600-41/16			FORED TO THOP OUTAGE.
		I P BC VET 13	0145	DEV. 1			
				0.1.1			***BASIC CALIBRATION BLOCK***
							18-CS-X-,500-22-HPC
C5.51	6-8-2	7	MT	300-1/35	207080		SCHEDULED EXAMINATION POST-
C5.51	C-F-2		MT	300-1/35 DEV 2	207080		SCHEDULED EXAMINATION POST-
C5.51	C-F-2	PIPE TO ELBOW		DEV. 2			SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.
C5.51	C-F-2		MT UT45	DEV. 2 600-41/16			
C5.51	C-F-2	PIPE TO ELBOW		DEV. 2			PONED TO 1989 OUTAGE.
(5.51	C-F-2	PIPE TO ELBOW		DEV. 2 600-41/16			
c5.51	C-F-2	PIPE TO ELBOW		DEV. 2 600-41/16			PONED TO 1989 OUTAGE.
	C-F-2 C-C	PIPE TO ELBOW 1-P-BC-021-18	UT45	DEV. 2 600-41/16			PONED TO 1989 OUTAGE.
		PIPE TO ELBOW 1-P-BC-021-18	UT45	DEV. 2 600-41/16 DEV. 1			PONED TO 1989 OUTAGE. ***BASIC CALIBRATION 8:OCK*** 18-CS-X500-22-HPC

RESIDUAL HEAT REMOVAL SYSTEM PIPING (FIGURES LISTED BELOW)

(CONTD)

REMARKS		SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.	***BASIC CALIBRATION BLOCK*** 6-CS-160719-42-HPC
N I O N G T O N G T O N G T O N G T O C C G N G T O C C G N R C C C G N R C C C G N R C C C G N R C C C G N R C C C G N R C C C G N R C C C G N R C C C G N R C C C G N R C C C C C N R C C C C N R C C C C N R C C C C			
ROKMO			
SUMMARY SHEET JUMBER		208000	
SURI SUMMARY PROCEDURF SHEET NO./REV. JUMBER		300-1/35 208000 DEV. 2 600-41/16 DEV. 1	
EXAM. METHOD		NT UT45	
WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION	LINE 1-8C-6588-074A (FIGURE 8-18)	1 BRANCH CONNECTION TO PIPE 1-8C-074-501-K	LINE 1-8C-18G88-075 (F1.JURE 8-34)
ASME SECT XI CATGY		C5.51 C-F-2	
IX ON		-	
ASME SECT XI LTEM NO		0.5	

LINE 1-8C-18G88-075 (F1_URE 8-3

SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. ***BASIC CALIBRATION BLOCK*** 18-CS-X500-22-HPC	SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. ***BASIC CALIBRATION BLOCK*** 18-CS-X500-22-HPC	SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.
300-1/35 2081:0 DEV. 2 600-41/16 DEV. 1	300-1/35 208120 DEV. 2 600-41/16 DEV. 1	300-1/35 208155 0EV. 2
NT 45	571N	и
C5.51 C-F-2 3 ELEON TO PIPE 1-BC-075-503-F	5 ELEON TO VALVE 1-P-8C-017-5	C3.20 C-C 111.6 (1-8) LUG 1-P-8C-03-805
C-F-2	C5.51 C-F-2 5 E4	C-C
5.5	C5 51	C3.20







REACTOR CORE SPRAY SYSTEM PIPING (FIGURES LISTED BELOW)

and the second s	SECT XI CATGY	WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION		SWRI PROCEDURE NO./REV.	SHEET	EIOE	REMARKS
		LINE 1-BE-14G88-008 (FIGURE 8-40)					
c5.51	C-F-2	5 PIPE TO ELBOW 1-P-BE-001-1-R3		300-1/35 DEV. 2 600-41/16 DEV. 1			SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.
							BASIC CALIBRATION BLOCK 14-CS-STD375-16-NPC
c5.51	C-F-2	8 ELBOW TO PIPE 1-8E-008-S01-D	MT UT45	300-1/35 DEV. 2 600-41/16 DEV. 1			SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.
							BASIC CALIBRATION BLOCK 14-CS-STD375-16-HPC
c3.20	C-C	12PS1 PIPE SUPPORT 1-P-BE-001-15	MT	300-1/35 DEV. 2	209257		SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.
		LINE 1-8E-12G88-017 (FIGURE 8-47)					
C5.51	C-F-2	4 VALVE TO PIPE 1-P-8E-006-3	MT UT45	300-1/35 DEV. 2 600-41/16 DEV. 1			SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.
							BASIC CALIBRATION BLOCK 12-CS-STD375-12-HPC
C5.51	C-F-2	5 PIPE TO ELBOM 1-BE-017-S02-B	MT UT45	300-1/35 DEV. 2 600-41/16 DEV. 1			SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE.
							BASIC CALIBRATION BLOCK 12-CS-STD375-12-HPC

N I O REACTOR CORE SPRAY SYSTEM PIPING (FIGURES LISTED BELOW) (CONTD) ****

	REMARKS			
		4		
	OK.	*		
9 10 0		٩.		
N N H	CGWR	ţ,		
		ĵ,		
RY	œ	1		
M L	8	1		
5 4	-	1		
SURI SUMMARY PROCEDURE SHEET	×			
LL CK		:		
10	EV I	-		
	N.	1		
¥ 2		1		
S a	×	3		
		1		
1 C .	8	ł.		
	웊	÷		
	METHOD	1		
ũ	x	4		

LIFT D NUMBER AND/OR	EXAMI	1. 日本市大学生大学生主要的学生学生主要的学生学生学生主要的	LINE 1-8E-16Hb8-044 (FIGURE 8-48)	
			LINE 1-8E-16Hb8-044 (FIGURE 8-48)	
		- 日本县南京东南京东南京东南京东南京省市东南京东南市东南市东南市 医金属属	LINE 1-BE-16HbB-044 (FIGURE 8-48)	
		- 日本县南京县南京市中东东南省东南南省东南省南京市市东南市市东南市 法法有关财产	LINE 1-BE-16H68-044 (FIGURE 8-48)	
ASHE SECT XI	CATGY	- 日本在来来来来来来来来来来来来来来来来来来来来来来来来来来来来来来。 医法耳耳耳氏 计	LINE 1-8E-16Hb8-044 (FIGURE 8-48)	
ASHE SECT XI	CATGY	"你是这是这是是是这个事实是有这些是是不是这些是这些是是是是这些是这些是这些是,这些这些这些, 化化化	LINE 1-8E-16H68-044 (FIGURE 8-48)	
	CATGY	"是是这是是是是是是是是是是是是是是是是是是是是是是是是是是是是是是是是是是	LINE 1-8E-16Hb8-044 (FIGURE 8-48)	

SCHEDULED PONED TO	EXAMINATIO	ISI PROGR	CODE CASE
210600			
300-1/35 2 DEV. 2	600-41/16	DEV. 1	
м	UTOL	UT-S	U1451
1 WOZZLE TO ELBOW	1-P-8E-013-7-R1		
C-F-2			
C5.51			

SCHEDULED EXAMINATION POST-PONED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM IN ACCORDANCE WITH CODE CASE N-408. BASELINE EXAMINATION. ***BASIC CALIBRATION BLOCK*** 16-CS-STD-.375-19-HPC







HIGH PRESSURE COOLANT INJECTION SYSTEM PIPING (FIGURES LISTED BELOW)

PAGE 45

	SECT XI	WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION	EXAM.	SWRI PROCEDURE NO./REV.	SHEET	EI	GEO	T H E	REMARKS
		LINE 1-8J-16H88-001 (FIGURE 8-55)							
c5.51	C-F-2	1 VALVE TO PIPE	UTOL	300-1/35 DEV. 2 600-41/16 DEV. 1					SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM IN ACCORDANCE WITH CODE CASE N-408. BASELINE EXAMINATION. ***BASIC CALIBRATION BLOCK*** 16-CS-STD375-19-HPC
		LINE 1-8J-14088-003A (FIGURE 8-52)							
C5.51	C-F-2	4 ELBOM TO PIPE 1-P-BJ-002-18	MT UT45	300-1/35 DEV. 2 600-41/16 DEV. 1					SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. ***BASIC CALIBRATION BLOCK*** 14-CS-100938-18-HPC
C3.20	C-C	7LG (1-8) LUG 1-P-8J-01-H04	NT	300-1/35 DEV. 2	211435				

.

PAGE 46					- 19	
W			REMARKS		SCHEDULED EXAMINATION POST- PONED TO 1989 OUIAGE.	***BASIC CALIBRATION BLOCK*** 10-03-100-,719-11-HPC
		0 1 9				÷.,
		N I O N G R S E	C G			
UNIT 1		SUBMARY	SHEET NUMBER		213005	
HOPE CREEK GENERATING STATION, UNIT 1 SUMMARY OF NONDESTRUCTIVE EXAMINATIONS CLASS 2 COMPONENTS		Surt	PROCEDURE SHEET NO/REV. NUMBER		300-1/35 213005 DEV. 2 600-41/16	DEV. 1
X GENERATI IF NONDESTR CLASS 2 0			EXAM. METHOD	4 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	NT UT45	
NOPE CREE	HPCI SYSTEM - TURBINE STEAM (FIGURES LISTED BELOW)		WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION	LINE 1-FD-10088-0028 (FIGURE 8-59)	2 PIPE TO ELBOM 1-FD-002-S01-C	
	- TUR	8	SECT XI SECT XI ITEM NO CATGY		CS.51 C-F-2 2 P1	
	YSTEM	-	XI S	:	0	
	PCI S	in the second	SECT		05.51	



CRD SYSTEM-SCRAM DISCHARGE HEADER (FIGURES LISTED BELOW)

		violinnut induct (risonic croite occord)					
	SECT XI	WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION		SWRI PROCEDURE NO./REV.	SHEET	EIOE	REMARXS
******		LINE 1-8F-12EL8-040 (FIGURE 8-62)					
C5.51	C-F-2	1 FLANGE TO PIPE	UTOL	300-1/35 DEV. 2 600-41/16 DEV. 1			SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI- NATION. ***BASIC CALIBRATION BLOCK*** 12-CS-80688-14-HPC
C5.51	C-F-2	2 PIPE TO TEE		300-1/35 DEV. 2 600-41/16 DEV. 1			SCHEDULED EXAMINATION POST- PONED TO 1989 QUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI- NATION. ***BASIC CALIBRATION BLOCK*** 12-CS-80688-14-HPC
c5.51	C-F-2	3 FLANGE TO PIPE		300-1/35 DEV. 2 600-41/16 DEV. 1			SCHEDULED EXAMINATION POST- PONED 13 1989 OUTAGE. EXAMINATICH AREA ADDED TO ISI PROGRAM. BASELIME EXAMI- NATION. ***BASIC CALIBRATION BLOCK*** 12-CS-80688-14-HPC
c5.51	C-F-2	4 PIPE TO TEE		300-1/35 DEV. 2 600-41/16 DEV. 1			SCHEDULED EXAMINATION POST- PONED TO 1989 QUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI- NATION. ***BASIC CALIBRATION BLOCK*** 12-CS-80688-14-HPC

CONTD)							
ASME SECT XI	SECT XI	WELD NUMBER AND/OR EXAMINATION AREA IDENTIFICATION		SWR1 PROCEDURE NO./REV.	SHEET	EIOE	REMARKS
		LINE 1-8F-12EL8-040 (FIGURE 8-62)					
		(CONTD)					
c5.51	C-F-2	S TEE TO PIPE	MT UTOL UT45 UT45T	300-1/35 DE ' 2 600-41/16 DEV, 1			SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXANI- NATION. ***BASIC CALIBRATION BLOCK*** 12-CS-80688-14-HPC
c5.51	C-F-2	6 PIPE TO ELBON	NT UTOL UT45 UT45T	300-1/35 DEV. 2 600-41/16 DEV. 1			SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI- NATICN. ***BASIC CALIBRATION BLOCK*** 12-CS-80688-14-HPC
5.51	C-F-2	7 ELSON TO PIPE	NT UTOL UT45 UT45T	300-1/35 DEV. 2 600-41/16 DEV. 1			SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI- NATION. ***BASIC CALIBRATION BLOCK*** 12-CS-80688-14-NPC
c5.51	C-F-2	8 PIPE TO CAP	MT UTOL UT45 UT45T	300-1/35 DEV. 2 600-41/16 DEV. 1	214570		SCHEDULED EXAMINATION POST- PONED TO 1989 OUTAGE. EXAMINATION AREA ADDED TO ISI PROGRAM. BASELINE EXAMI- NATION. ***BASIC CALIBRATION BLOCK*** 12-CS-80588-14-HPC



CRD SYSTEM-SCRAM DISCHARGE HEADER (FIGURES LISTED BELOW)

CONTD)							
				SWRI	-	NI O ONGT RSEN	
ASME	ASME SECT X1	WELD NUMBER AND/OR	EXAM.			ELOE	
		EXAMINATION AREA IDENTIFICATION	METHOD			CGMR	REMARKS
	******	***************************************					
		LINE 1-8F-12ELF-041 (FIGURE 8-62)					
5.51	C-F-2		HT	300-1/35	214580		SCHEDULED EXAMINATION POST-
		FLANGE TO PIPE		DEV. 2			PONED TO 1989 OUTAGE.
			UTOL	600-41/16			EXAMINATION AREA ADDED TO
			UT45	DEV. 1			ISI PROGRAM. BASELINE EXAMI-
			UT45T				NATION.
							BASIC CALIBRATION BLOCK 12-CS-80688-14-HPC
(5.51	C-F-2	2	HT	300-1/35	214590		SCHEDULED EXAMINATION POST-
		PIPE TO TEE		DEV. 2			PONED TO 1989 OUTAGE.
			UTOL	600-41/16			EXAMINATION AREA ADDED TO
			UT45	DEV. 1			ISI PROGRAM. BASELINE EXAMI-
			UT45T				NATION.
							BASIC CALIBRATION BLOCK 12-CS-80638-14-HPC
05.51	C-F-2	3	MT	300-1/35	214600		SCHEDULED EXAMINATION POST-
		FLANGE TO PIPE		DEV. 2			PONED TO 1989 OUTAGE.
			UTOL	600-41/16			EXAMINATION AREA ADDED TO
			UT45	DEV. 1			ISI PROGRAM. BASELINE EXAMI-
			UT45T				NATION.
							BASIC CALIBRATION BLOCK
							12-CS-80688-14-HPC
C5.51	C-F-2		MT	300-1/35	214610		SCHEDULED EXAMINATION POST-
		PIPE TO TEE		DEV. 2			PONED TO 1989 OUTAGE.
			UTOL	600-41/16			EXAMINATION AREA ADDED TO
			UT45	DEV. 1			ISI PROGRAM. BASELINE EXAMI-
			UT4ST				NATION.
							BASIC CALIBRATION BLOCK

CRD SYSTEM-SCRAM DISCHARGE HEADER (FIGURES LISTED BELOW) (CONTD) NI O ONGT ASME ASME SUR1 SUMMARY R S E H SECT XI SECT XI WELD NUMBER AND/OR EXAM. PROCEDURE SHEET E I O E ITEM NO CATGY EXAMINATION AREA IDENTIFICATION METHOD NO. /REV. NUMBER C.G.M.R. REMARKS LINE 1-8F-12ELF-041 (FIGURE 8-62) (CONTD) ****** C5.51 C-F-2 5 MT 300-1/35 214620 SCHEDULED EXAMINATION POST-TEE TO PIPE DEV. 2 PONED TO 1989 OUTAGE. UTOL 600-41/16 EXAMINATION AREA ADDED TO UT45 DEV. 1 ISI PROGRAM. BASELINE EXAMI-UT45T NATION. ***BASIC CALIBRATION BLOCK*** 12-CS-80-.688-14-HPC C5.51 C-F-2 6 MT 300-1/35 214630 SCHEDULED EXAMINATION POST-PIPE TO ELBOW DEV. 2 PONED TO 1989 OUTAGE. 600-41/16 UTOL EXAMINATION AREA ADDED TO UT45 DEV. 1 ISI PROGRAM. BASELINE EXAMI-UT45T NATION. ***BASIC CALIBRATION BLOCK*** 12-CS-80-.688-14-HPC C5.51 C-F-2 7 300-1/35 214640 SCHEDULED EXAMINATION POST-MT DEV. 2 ELBOW TO PIPE PONED TO 1989 OUTAGE. UTOL 600-41/16 EXAMINATION AREA ADDED TO UT45 CEV. 1 ISI PROGRAM. BASELINE EXAMI-UT45T NATION. ***BASIC CALIBRATION B'OCK*** 12-CS-80-.688-14-HPC C5.51 C-F-2 8 MT 300-1/35 214650 SCHEDULED EXAMINATION POST-PIPE TO CAP DEV. 2 PONED TO 1989 OUTAGE. UTOL 600-41/16 EXAMINATION AREA ADDED TO UT45 DEV. 1 ISI PROGRAM. BASELINE EXAMI-**UT45T** NATION. ***BASIC CALIBRATION BLOCK***

PAGE 50

12-CS-80-.688-14-HPC



PAGE 51

INFORMATIONAL EXAMINATION PERFORMED AT THE REQUEST OF PSEGG

	REMARKS	ONE LINEAR INDICATION ON THE	SEE CNF 3. PT EXAMINATION	CATION FOR INFORMATION ONLY.	REEXAMINATION AFTER LIGHT GRINDING REVEALED NO RECORD-	ABLE INDICATIONS.
		1	×	×		
- 2 0 -			1	*		
		1	~			
SUMMARY	NUMBER	990100				
Surt	NC./REV.	300-1/35	300-2/42	200-1/70	DEV. 3	
CVAN	METHOD	М	ш	μ		
ACC N MANDER AND ICO	EXAMINATION AREA IDENTIFICATION	VALVE (HV-FO74 SPARE)				
;						
ASHE						
	2 9	1				
ASME	LIEN NO					

---- VALVE (A8-PSV-F013A)

UI

9902000

O DEGREE THICKNESSES TAKEN IN AREA OF GRINDING FOR INFOR-MATION ONLY. APPENDIX A

WELD IDENTIFICATION DRAWINGS - CLASS 1



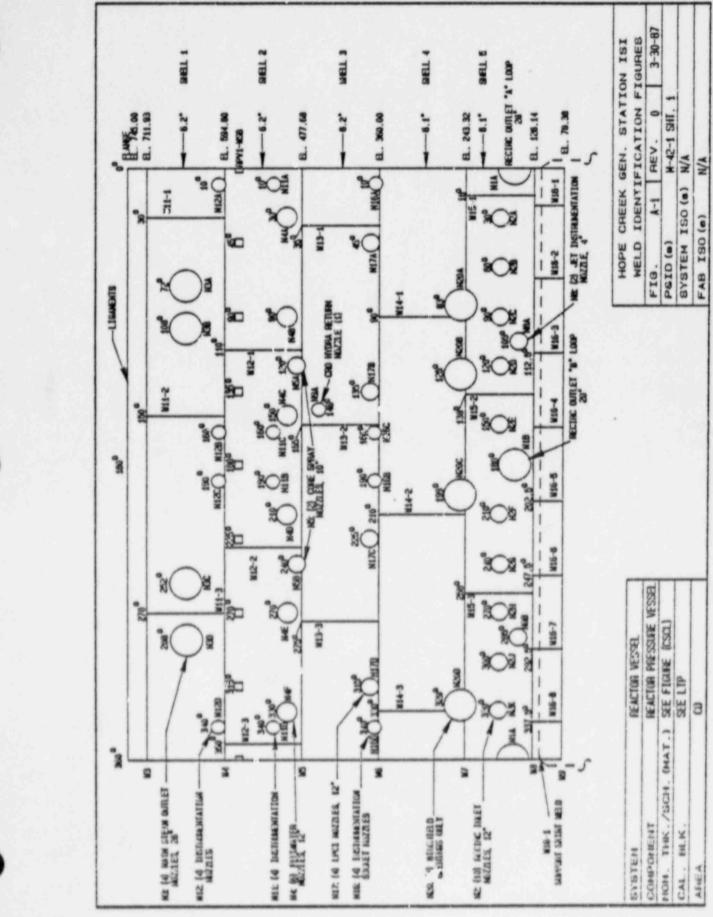
APPENDIX A

WELD IDENTIFICATION DRAWINGS - CLASS 1

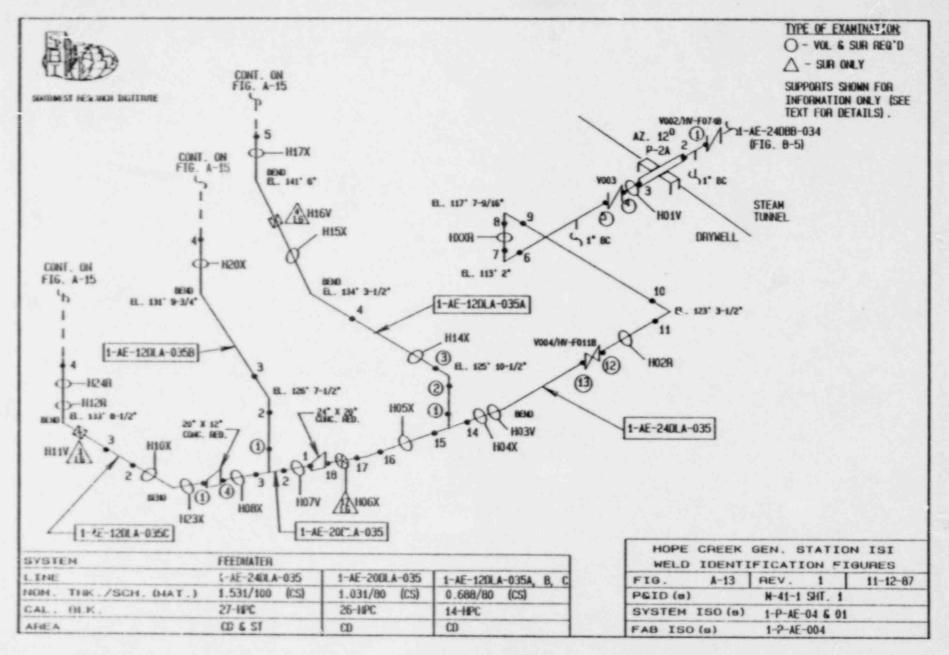
Table of Contents

Figure	System	Line No.	Page
A-1	Reactor Vessel		A-1
A-13	Feedwater	1-AE-24DLA-035; 1-AE-20DLA-035; 1-AE-12DLA-035A,B C	A-2
A-14	Feedwater	1-AE-24DLA-036; 1-AE-20DLA-036; 1-AF-12DLA-036D,E,F	A-3
A-16	Recirculation "B" Loop	1-BB-28VCA-011, -014; 1-BB-22VCA-014; 1-BB-4VCA-011, -014; 1-BB-1.25VCA-011	A-4
A-18	Recirculation "A" Loop	1-BB-28VCA-012, -013; 1-BB-22VCA-013; 1-BB-4VCA-012, -013; 1-BB-1.25VCA-012	A-5





A=1

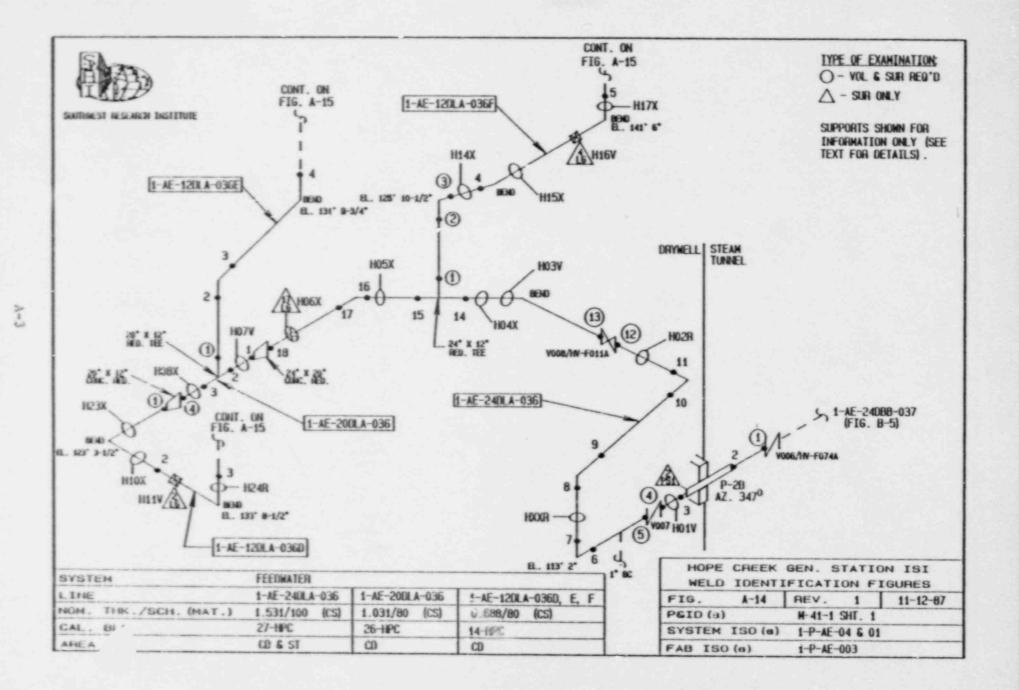


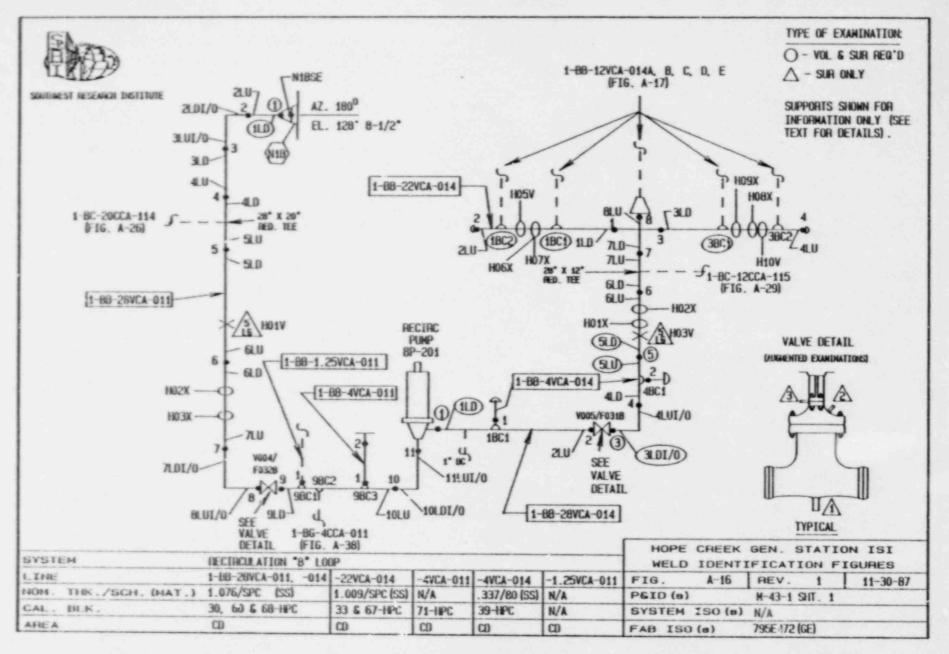


•







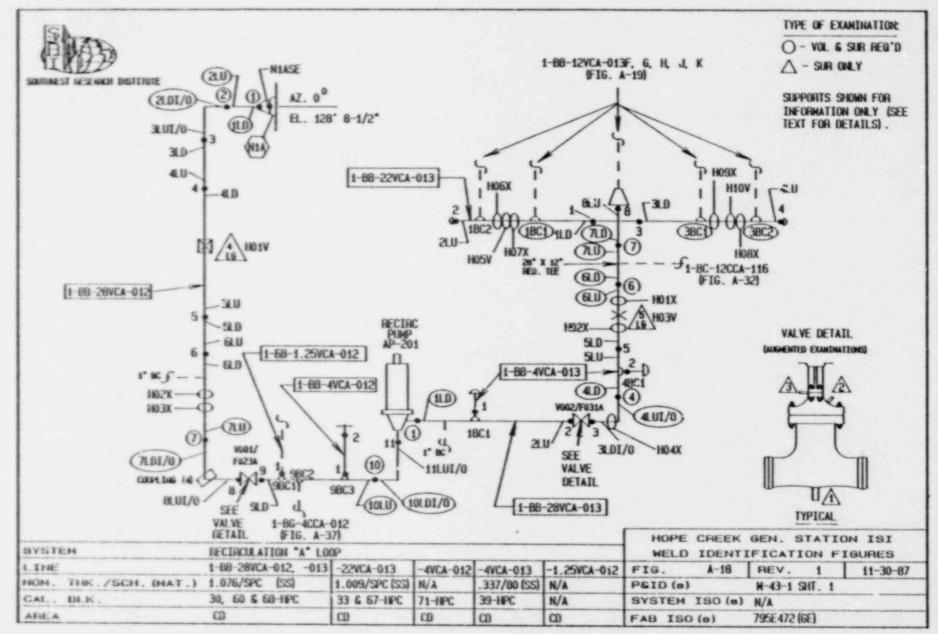


>

1







1-5

APPENDIX B

WELD IDENTIFICATION DRAWINGS - CLASS 2

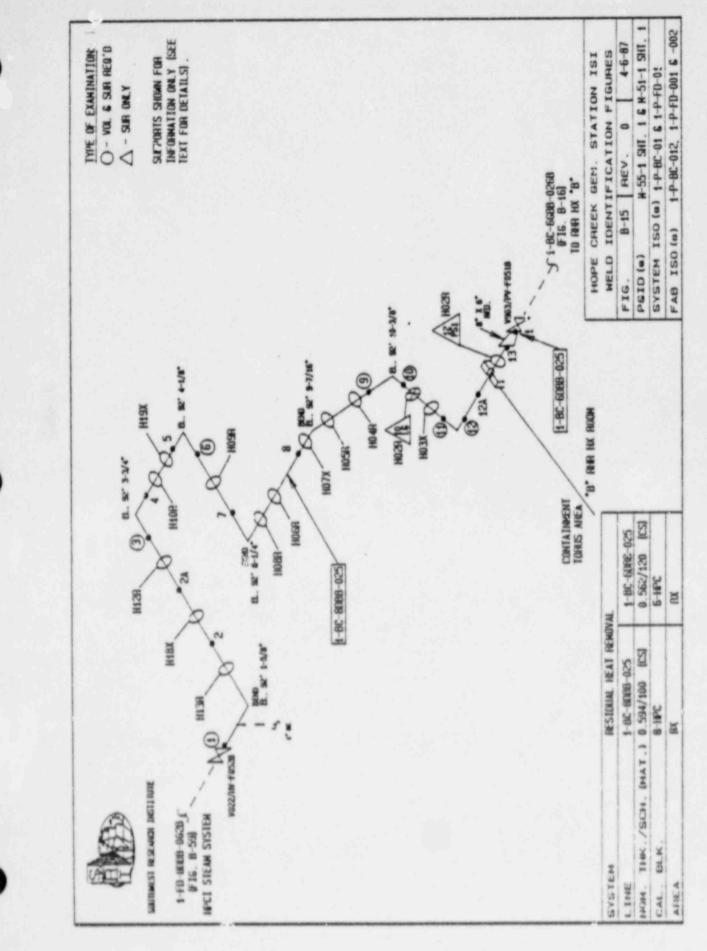
APPENDIX B

WELD IDENTIFICATION DRAWINGS - CLASS 2

Table of Contents

Figure	System	Line No.	Page
B-15	Residual Heat Removal	1-BC-8DBB-025; 1-BC-6DBB-025	B-1
B-19	Residual Heat Removal	1-BC-8DBB-029; 1-BC-8GBB-074; 1-BC-6DBB-029; 1-BC-6GBB-074B	B-2





8

.

.

100.6

.

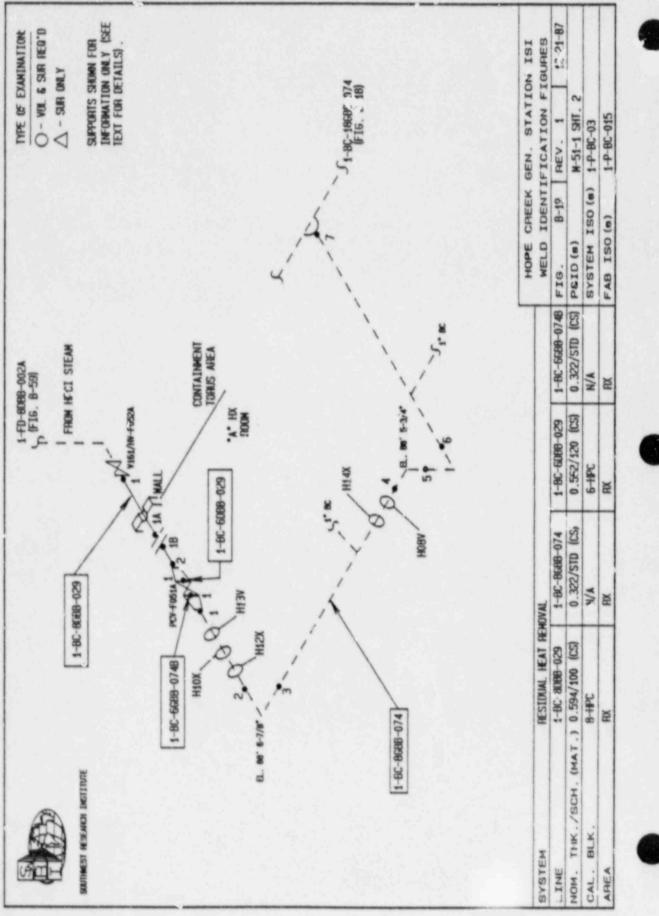
.

- 14

.

8

8-1



B-2



SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECTS OPERATING PROCEDURES

APPENDIX C

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECTS OPERATING PROCEDURES

Table of Contents

Procedure No./Rev.	Title
IX-FE-101-4	Deviations to Nuclear Projects Operating Procedures
IX-FE-103-2	Weld Joint Identification Marking on Nuclear Power Plant Piping
IX-FE-110-3	"Black Light" Intensity Measurements
IX-FE-116-2	Recording Data from Direct Visual, Liquid Penetrant, and Magnetic Particle Examinations
IX-FE-117-4 Change 1	Recording Indications During Ultrasonic Examinations of Pre-sure- Retaining Components
IX-FE-125-0	Recording Indications in Accordance with NRC Regulatory Guide 1.150
IX-FE-131-0	Comparison of inservice Examination Data
IX-FE-132-0	Ultrasonic Indication Resolution Procedure
X-FE-101-3	Onsite NDE Records Control
X_E-109-0	Indication Evaluation Guidelines
XIII-AG-101-2	Control of Nuclear Inspection Equipment and Materials
XVII-AG-101-3	Date Storage and Retrieval

C-I

	S	L	-	
1	ñ	5	1	1
6	Ϋ́,	ð	-	-5
- 2		-	10	10

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECTS OPERATING PROCEDURE

IX-FE-101-4

July 1986

Page 1 of 6

Title

DEVIATIONS NO NUCLEAR PROJECTS OPERATING PROCEDURES

EFFECTIVITY AND APPPOVAL

Revision ______ of this procedure became effective on July 29, 1986 This procedure consists of the pages and changes listed below.

Page No	Change	Date Effective
1-6	N/A	July 29, 1986

Supersedes Procedure No. IX-FE-101-3					
Approvals			19		
Written By Hervinel	Date 21 July 19 86	Technical Review	0ate		
Manager of Q.A. Same Malats	Date 28 July 1986	Coggizant Director MUMLE. Jack	Date 1/29/86		

SwRI Form GA-408-1

SOUTHWEST RESEARCH INSTITUTE

IX-FE-101-4



NUCLEAR PROJECTS OPERATING PROCEDURE

July 1986

Page 2 of 6

DEVIATIONS TO NUCLEAR PROJECTS OPERATING PROCEDURES

1. PURPOSE

1.1 The purpose of this operating procedure is to establish guidelines and controls for deviations to Nuclear Projects Operating Procedures which may be required due to changing technology, applicable code changes or interpretations, plant or component design, customer requirements, or special cases.

2. SCOPE AND APPLIC: ION

- 2.. This procedure applies to Nuclear Projects Operating Procedures.
- 2.2 Application of deviations shall be as described within the Procedure Deviation (applicable revision of SwRI Form FE-4, sample attached).

3. RESPONSIBILITY

- 3.1 The Director of the Department of Engineering Services, Nondestructive Evaluation Science and Technology Division shall be responsible for the implementation of this procedure, and for the qualification and approval of Operating Procedure Deviations.
- 3.2 The Project Manager, Project Engineer, Team Supervisor, or other cognizant rersons using the procedure shall be responsible for initiating the request for a deviation to the operating procedure.
- 3.3 The Manager of Quality Assurance shall be responsible for reviewing and approving proposed deviations to operating procedures against the requirements of this procedure.

4. PROCEDURE

- 4.1 The Assistant Director of the Department of Engineering Services, Nondestructive Evaluation and Technology Division, shall assign responsibility for preparing the procedure deviation.
 - 4.1.1 The Procedure Deviation shall have, but not be limited to the following information:
 - (1) Procedure Number and Revision
 - (2) Affected Examination Areas



SOUTHWEST RESEARCH INSTITUTE

IX-FE-101-4



NUCLEAR PROJECTS OPERATING PROCEDURE

July 1986

Page 2 of 6

- (3) Paragraphs to be deviated from
- (4) Rationale for Deviation
- 4.1.2 Deviation numbers shall be assigned by the Support and Administration Section and shall be in numerical sequence beginning with "1" for each procedure revision.
- 4.2 Each Procedure Deviation shall be accompanied by an applicable revision of SwRI Form FE-37 "Certificate of Procedure/Deviation Qualification" (sample attached).
- 4.3 Procedure deviations shall be reviewed as follows:
 - (a) NDE procedure deviations shall be reviewed by a Level IJ" to determine relevance, technical accuracy, and effect on procedure qualification. Normally this review shall be by a designated representative of the same group that provided technical review of that procedure. If the deviation is determined to affect the procedure qualification, the deviation shall be qualified in accordance with Procedure IX-FE-107. After his review, the Level III shall sign the Technical Review blocks of both the Procedure Deviation and the accompanying SwRI Form FE-37 and forward them to the Manager of Quality Assurace 1.
 - (b) Non-NDE procedure deviations shall be given a technical review by a person having an adequate understanding of the requirements and intent of the deviation, who does not administratively report to the author, and is a representative of the same group that performed technical review of the affected procedure.
- 4.4 The Manager of Quality Assurance shall verify that the deviation is in compliance with this procedure, sign both the Procedure Deviation and the accompanying SwRI Form FE-37 as reviewed and approved, and forward them to the Department Director.
- 4.5 If approved, the Department Director shall sign the procedure deviation and forward both the procedure deviation and accompanying SwRI Form FE-37 to the Support and Administration Section representative, who will be responsible for number verification, initialing, reproduction, copy distribution, and filing of the original document.

SwRI Form QA 3-2

SOUTHWEST RESEARCH INSTITUTE

IX-FE-101-4



NUCLEAR PROJECTS OPERATING PROCEDURE

July 1986

Page 4 of 6

- 4.6 The Procedure Deviation may be used upon receipt of the final approved deviation and site approval of the deviation. Alternatively, if necessary, the deviation may be used after obtaining verbal approval by the person performing the Technical Review as well as site approval. As a minimum, a handwritten copy of the deviation identifying the Level III giving verbal approval shall be on site to be used until the approved copy is received. In this case, the date of verbal approval shall be indicated on the procedure deviation. Should the deviation be ultimately not approved, all areas examined using the proposed deviation will then be reexamined utilizing approved procedures.
- 4.7 The deviation number shall be recorded, where applicable, in conjunction with the appropriate Nuclear Projects Operating Procedure number on those records requiring the recording of the procedure number.
- 4.9 A copy of the Procedure Deviation shall be attached to the applicable procedure when conducting examinations in accordance with the deviation.

5.0 RECORDS

÷.

Operating procedure deviations and any other documents generated in accordance with this procedure controlling the performance of onsite critical services shall be retained for the period specified in the contract with the Client. These records shall be indexed, filed, and maintained in the Data Storage Facility of the Support and Administration Section, Nondestructive Evaluation and Technology Division.

	S	EST RESEAR	CH INSTITUTE	IX-FE-101- July 1986 Page 5 of
	Procesure Swall-NOT-	PROCEDUR	E DEVIATION	Page 1 of Deviation
	and the second se	oon areas are affected by this devisio	6A:	
	ספקאינים קראשטאוס אילי	ria shak be deviated from as indicate	d:	
1	1			
	Rationale for deviation			
	Rationale for Deviation			
	Assonava for sevenors			
	Rationale for Deviation			ΞA
	Rationale for Deviations	Care	APPROVAUS	5.A 2408:
				Zacer Xee C Xo Date:
			Technical Review:	Zater

IX-FE-101-4 July 1986

R

NUCLEAR PROJECTS OPERATING PROCEDURE

Page 6 of 6

CERTIFICATE OF PROCEDURE/DEVIATION QUALIFICATION

APPUCABLE ASME CODE	SECTION	APPENDIX	ADCENDA	
	and the second			
THER REQUIREMENTS				
24RT		APPUCABLE		
Daviation No.	Cate Effective	APPLICABLE	Denation A	Heats YES O NO
			Qualification	
If seviation affects qualification				
		and the second second second		
PERF ::				
certify that: (CHEC)	WHERE APPLICABLE			
certify that: (CHEC)	notenure C cervation	Saturfies the o	ode requirements	e stated above.
Cartify that: CHEC	tocedure C ceviation kaminatione performed ments within its purpose	a satisfies the o in accordance with scope.	n this procedure	• C peviation C satisf
CHEC	ocequire ceviation kaminations performed ments within its purpose a permonstrations perfor	satisfies the o in accordance with scope, med were represent	in this procedure	e stated above. • C deviation C satisf notitions and adequatery refle
CHECI	boadure cevision kaminations performed ments within its purpose a cemonstrations perfor reness of this or robure	satisfies the of in accordance with scope.	in this procedure rative of field con	• C peviation C satisf
CHECK CHECK	ocequire ceviation kaminations performed ments within its purpose a permonstrations perfor	satisfies the of in accordance with scope.	in this procedure rative of field con	• C peviation C satisf
	bologications performed ments within its purpose a semonstrations performed reness of this pricedure occoure seviation itenty (Attached) a Reference (Attached)	satisfies the o n accordance wit socole. med were represent dewation has been qual	in this procedure rative of field con	• C peviation C satisf
	boadure ceviation kaminations performed ments within its purpose al personstrations perfor- reness of this prikation reness of this prikation desture ceviation fainty (Attached) a Reference (Attached) firmed Raws (Attached)	satisfies the o n accordance wit socole. med were represent dewation has been qual	in this procedure rative of field con	• C peviation C satisf
	bologications performed ments within its purpose al personstrations perfor reness of this pricedure oceoure deviation illanty (Attached) a Reference (Attached) bration (Attached)	Sabafies the o in accordance with scope. Theo were recresent cervation C has been qua	in this procedure rative of field con	• C peviation C satisf
	boadure ceviation kaminations performed ments within its purpose al personstrations perfor- reness of this prikation reness of this prikation desture ceviation fainty (Attached) a Reference (Attached) firmed Raws (Attached)	Sabafies the o in accordance with scope. Theo were recresent cervation C has been qua	in this procedure rative of field con	• C peviation C satisf
CHECK CALL CHECK C	bologications performed ments within its purpose al personstrations perfor reness of this pricedure oceoure deviation illanty (Attached) a Reference (Attached) bration (Attached)	Sabafies the o in accordance with scope. Theo were recresent cervation C has been qua	in this procedure rative of field con	• C peviation C satisf
CHECK CHECK This or Free si Course Co	Coedure ceviation kaminations performed ments within its purpose a cemonstrations perfor- reness of this pricedure ocepure ceviation isanty (Attached) a Aeterance (Attached) bration (Attached) sical Demonstration (Atta Sical Demonstration (Attached) Sical Demonstration (Attached)	Sabefies the o in accordance with scope. Theorem recresent cervation C has been out	n this procedure rative of field con lified by:	 Bevietion C setter articities and adequaters refle DATE
CHECK CALL CHECK C	Coedure ceviation kaminations performed ments within its purpose a cemonstrations perfor- reness of this pricedure ocepure ceviation isanty (Attached) a Aeterance (Attached) bration (Attached) sical Demonstration (Atta Sical Demonstration (Attached) Sical Demonstration (Attached)	Sabefies the o in accordance with scope. Theorem recresent cervation C has been out	n this procedure rative of field con lified by:	 Bevietion C setter articities and adequaters refle DATE
CHECK CHECK This or Free si Course Co	Coedure ceviation kaminations performed ments within its purpose a cemonstrations perfor- reness of this pricedure ocepure ceviation isanty (Attached) a Aeterance (Attached) bration (Attached) sical Demonstration (Atta Sical Demonstration (Attached) Sical Demonstration (Attached)	Sabefies the o in accordance with scope. Theorem recresent cervation C has been out	n this procedure rative of field con lified by:	 Bevietion C setter articities and adequaters refle DATE
Centrify that: CHEC This pr Centrify that: CHEC This pr Centrify that: Check Chack Check C	Coedure Cervation caminations performed ments within its purpose is permonstrations perfor- reness of this pricedure ocepure Cervation isanty (Attached) is Aeterence (Attached) bration (Attached) sical Demonstration (Atta E OR LEVEL II) forms to SwiRt Quarty A	Sabefies the o in accordance with scope. The overe recresent C deviation C C has been dual tache VI	n this procedure rative of field con lified by:	 avvietion C setter articine and adequaters reflection DATE ots.
CHECK CHECK This or Free si Course Co	Coedure Cervation caminations performed ments within its purpose is permonstrations perfor- reness of this pricedure ocepure Cervation isanty (Attached) is Aeterence (Attached) bration (Attached) sical Demonstration (Atta E OR LEVEL II) forms to SwiRt Quarty A	Sabefies the o in accordance with scope. The overe recresent C deviation C C has been dual tache VI	n this procedure rative of field con lified by:	 Bevietion C setter articities and adequaters refle DATE



SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECTS OPERATING PROCEDURE

IX-FE-103-2 October 1981 Page 1 of 6

Title

WELL JOINT IDENTIFICATION MARKING ON NUCLEAR POWER PLANT PIPING

EFFECTIVITY AND APPROVAL

Revision ______ of this procedure became effective on <u>Nov. 16,1981</u>. This procedure consists of the pages and changes listed below.

Page No

Change

Date Effective

1 through 6

November 16, 1981

Approvals			- ser
Herter C. Knowler	- 10/30/91	Sten Walter	Date 700.5, 1981
Manager of C.A.	Date 1/13/81	Cognizant Director 1 Alach	Date (1/14/81

IX-FE-103-2



NUCLEAR PROJECTS OPERATING PROCEDURE

October 1981

Page 2 of 6

\$

WELD JOINT IDENTIFICATION MARKING ON NUCLEAR POWER PLANT PIPING

1.0 PURPOSE

This procedure describes the weld joint identification marking of nuclear power plant piping, attachments and components.

- 2.0 SCOPE AND APPLICATION
 - The method of locating weld joints and marking the respective identification numbers and zero reference points (Lo) adjacent to the welds is described herein.
 - (2) Nuclear power plant piping shall be marked with an electric or pneumatic engraver, low stress punch, or marking pencil as specified by the customer.
 - 2.1 Applicable Documents

SwRI Nuclear Quality Assurance Program Manual (NQAPM).

3.0 RESPONSIBILITY

- (1) The Director of the Department of Engineering Services within the Quality Assurance Systems and Engineering Division shall be responsible for preparation, review, and approval of this procedure.
- (2) The Project Manager shall be responsible for the implementation of this procedure in accordance with the NQAPM in effect on the date this procedure is approved.
- (3) Marking equipment and methods described in this procedure shall be approved by the customer before use.
- (4) The examiner shall be responsible for implementing the requirements of this procedure.

IX-FE-103-2



NUCLEAR PROJECTS OPERATING PROCEDURE

October 1981

Page 3 of 6

4.0 PROCEDURE

4.1 General

In addition to the requirements of this procedure, the policies, practices, and rules of the nuclear plant shall be followed in the execution of the marking operation.

- 4.2 Personnel
 - Personnel marking piping and components shall have sufficient instruction and experience in use of the equipment and application of the techniques as specified by the Project Manager.
 - (2) Personnel shall have received appropriate training and indoctrination for proper control of radioactive materials if the marking is to be conducted after the plant has been in operation.
- 4.3 Equipment
 - (1) The equipment to be used shall be a commercial electric or pneumatic engraver, low stress punch, or marking pencil.
 - (2) The engraver's tip shall be manufactured of commercial-grade diamond or tungsten carbide material.
- 4.4 Weld Joint Identification
 - The area to be marked shall be free of weld spatter, rust, rough surfaces, or any other condition which would prevent clear marking.
 - (2) Each weld joint shall be marked on the main run pipe with the appropriate identification number.
 - (3) The L₀ reference mark (-0-) for each weld shall be located in accordance with Paragraph 4.6 of this procedure.
 - (4) The depth of weld joint identification marking and zero reference (L₀) marking shall not exceed the limits established by the customer.

IX-FE-103-2



NUCLEAR PROJECTS OPERATING PROCEDURE

October 1981

Page 4 of 6

(5) If weld joint inaccessibility prevents use of the equipment or methods described in this procedure, other zero reference or weld joint identification number locations may be used as considered necessary and acceptable by the Team Supervisor or Inspection Engineer. Under these circumstances, the provisions of Paragraph 4.6 will not apply and a description of the zero reference used shall be entered on the examination record for that weld joint.

4.5 Weld Joint Identification Number Placement (W.J.I. No.) (Figure 1)

To the extent practicable, weld joint identification numbers shall be located adjacent to the zero reference point (L_0) , but outside the examination area.

4.6 Determination of Zero Reference Location on Welds

The following rules shall be observed in determining the zero reference location (L_0) on discumferential, longitudinal and branch connection piping welds and welded piping lugs and piping supports. If more than one rule is applicable, the lowest numbered rule shall be applied. The term "horizontal component" relates to any pipe positioned at other than 90° from the horizontal.

- <u>Rule 1</u>. For any pipe having a horizontal component at the weld, use the top centerline of the pipe.
- (2) <u>Rule 2</u>. If a pipe is vertical at the weld (no horizontal component) and the weld is either an elbow-to-Z or a Z-to-elbow, where Z is any piping component other than an elbow, use the centerline of the outside radius of the elbow.
- (3) <u>Rule 3.</u> If a pipe is vertical at the weld (no horizontal component) and the weld is a pipe-to-pipe, elbow-to-elbow, Z-to-pipe, or pipe-to-Z, where Z is any piping component other than an elbow, use an extension of the centerline of the outside radius of the elbow above the weld.
- (4) <u>Rule 4</u>. If in Rule 3 there is no elbow above the weld, use an extension of the centerline of the outside radius of the elbow below the weld.

SwRI Form '2A 3-2

IX-FE-103-2



NUCLEAR PROJECTS OPERATING PROCEDURE

October 1981

Page 5 of 5

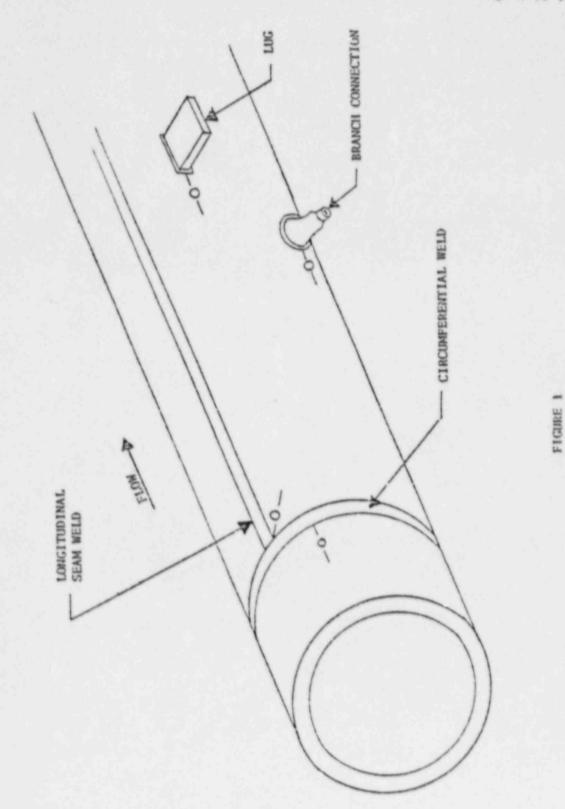
- (5) <u>Rule 5</u>. If Rule 3 or Rule 4 cannot be used because no elbows are visible, choose the most convenient location. When referring to Rule 5, describe the method for establishing L₀ on the examination record.
- (6) <u>Rule 6</u>. For branch connection piping welds (sweepolet, weldolet, etc.) and for welded lugs and pipe supports, use the upstream intersection of the weld and the centerline of the branch connection, lug, or support, as applicable.
- (7) <u>Rule 7</u>. For a longitudinal weld intersecting a circumferential weld, use the junction (near or inside edge of the circumferential weld) of the longitudinal with the circumferential.

5.0 ACCEPTANCE STANDARDS

The weld will be considered suitably marked after the personnel performing the marking has verified that:

- The zero reference mark (=0=) is located in accordance with Paragraph 4.6 and 4.4(5).
- (2) The weld identification number is the same as shown on the proper isometric drawing contained in the Examination Plan.
- (3) The zero reference mark (-0-) and the weld joint identification number are legible and are within the depth limits established by the customer.

IX-FE-103-2 October 1981 Page 6 of 6



SOUT	HWEST RESEARCH INS NUCLEAR PROJEC OPERATING PROCED	URE A	X-FE-110-3 ugust 1986 age 1 of 5
Title	"BLACK LIGHT" INTENSITY		age tot 5
	EFFECTIVITY AND A		
Revision <u>3</u> of thi changes listed below.	s procedure became effective on Aug 26	5, 1986. This procedure cons	ists of the pages an
Page No	Change		ate Effective
1 - 5		Au	gust 1986
Supersedes Procedure N	1X-FZ-110-2		SA .
Approvals			1 -
Written By DWF Stur	will 1986	We the dia	0ate 18211 1914
Manager of Q.A.	H for BEM 8/25/86 /	izant Director	Date
	here I PEAN AL	110 - 11 - 1 - 1	0/

IX-FE-110-3



NUCLEAR PROJECTS OPERATING PROCEDURE

August 1986

Page 2 of 5

"BLACK LIGHT" INTENSITY MEASUREMENTS

1. PURPOSE

This procedure provides the information and detailed steps necessary to ensure proper measurement of the "black light" (long wave ultraviolet light) intensity for fluorescent magnetic particle or penetrant examinations utilizing a black light.

2. SCOPE AND APPLICATION

This procedure shall be used for the measurement of the black light intensity utilizing a Blak-Ray J-221 Long Wave Ultraviolet Intensity Meter.

- 2.1 Applicable Documents
 - (1) SwR1 Nuclear Quality Assurance Program Manual (NQAPM)
 - (2) The applicable SwRI Nuclear Projects Operating Procedure for examinations requiring a black light

3. RESPONSIBILITY

- The Director of the Department of Engineering Services, Nondestructive Evaluation Science and Technology Division, shall be responsible for the preparation, review, approval, and control of this procedure.
- (2) The Project Manager shall by responsible for the implementation of this procedure in accordance with the NQAPM specified in the applicable SwRI Project Plan.
- (3) The examiner shall be responsible for implementing the requirements of this procedure.
- (4) The Manager of the Support and Administration Section, Nondestructive Evaluation Science and Technology Division, shall be responsible for storage of records generated in accordance with this procedure.

IX-FE-110-3



NUCLEAR PROJECTS OPERATING PROCEDURE

August 1986

Page 3 of 5

4. PROCEDURE

4.1. Personnel

- Personnel measuring black light intensity shall be certified in accordance with SwRI NQAP 11-1, "Special Process Control."
- (2) Examinations shall be conducted as required by the applicable SwRI Nuclear Projects Operating Procedure.

4.2 Equipment

The following equipment shall be utilized for measurements:

- Blak-Ray J-221 Long Wave Ultraviolet Intensity Meter with sensor cell
- (2) J-223 Extension Cord (4 foot)
- (3) 50107 Contrast Filter
- 4.3 Measurement

The black light intensity at the surface under examination shall be determined:

- (1) At least every 8 hours
- (2) Whenever lighting conditions change
- (3) Whenever the work location is changed

NOTES

The meter face shall be upright for all readings and meter zero verification. The meter zero shall be checked with the sensor cell unplugged. If the reading is not 0, the calibration screw below the scale shall be used to adjust the scale to zero.

The examiner shall ensure that the sensor cell, filter faces and black light lens are clean before measurements are taken, since any film of dust, oil or other sediment may affect the reading.

R

NUCLEAR PROJECTS OPERATING PROCEDURE

IX-FE-110-3 August 1986

Page 4 of 5

The Blak-Ray J-221 Long Wave Ultraviolet Intensity Meter shall be utilized as follows:

- (3) Plug the extension cord into the top of the meter housing with the red and black plugs aligned with their corresponding holes for proper polarity.
- (4) Repeat step (3) plugging the extension cord into the sensor cell.
- (5) Select the "B" *cale by moving the switch on top of the meter housing to "B."
- (6) Darken the area to the condition that will prevail during the actual examination and place the sensor cell directly on the surface to be examined.
- (7) After a black light warm-up time of no less than five minutes, move the black light from a minimum distance of 16 inches to a maximum distance of 22 inches from the sensor cell, while observing the "B" scale, until a reading can be taken.

NOTE

The "B" scale range is incremented from 10 to 60. To obtain a reading in microwatts per square centimeter, multiply the reading by 100. For example, if the reading is 20, multiply 20 by 100 to obtain 2,000 microwatts per square centimeter.

- (8) A second reading shall be taken using the 50107 contrast filter over the sensor cell with the black light located the same distance as the first reading.
- (9) Subtract the second reading from the first. The difference shall be a minimum of 800 microwatts per square centimeter.
- (10) If the second reading on the "B" scale remains at 10 or below, the switch on top of the meter housing shall be moved to "A"; a reading shall be obtained from the "A" scale with the filter over the sensor cell. The black light remains at the same distance as during the first reading.

IX-FE-110-3

SP

NUCLEAR PROJECTS OPERATING PROCEDURE

August 1986

Page 5 of 5

NOTE

The "A" scale range is incremented from 0 to 12. To obtain a reading in microwatts per square centimeter, multiply the reading by 100. For example, if the reading is 8, multiply 8 by 100 to obtain 800 microwatts per square centimeter.

(11) Repeat step (9).

The distance, during an examination, from the face of the black light to the examination surface shall not exceed the distance at which the black light intensity was measured.

5. RECORDS

The difference of the two readings and the distance from the face of the black light to the sensor cell during the reading shall be recorded on the applicable SwRI Examination Record.

R	n.			
1	68	3	×.	l
11		h	2	1
	7	20	-	Į
	-6-	1000	H.	

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECTS OPERATING PROCEDURE

LX-FE-116-2

July 1986

Page 1 of 8

Title

RECORDING DATA FROM DIRECT VISUAL, LIQUID PENETRANT, AND MAGNETIC PARTICLE EXAMINATIONS

EFFECTIVITY AND APPROVAL

Revision _ 2 of this procedure became effective on 29 July 1986. This procedure consists of the pages and changes listed below.

Page No

1 - 8

Change

Date Effective

29 July 1986

Supersedes Procedure No. IX-FE-116-1				
Approvais			14	
Written By DWFourwell	Date 12 July 1985	Technical Review EAR Russeher	Date 23 July 1996	
Manager of QA.	Date 28 July 19 PG	Cognizant Director Jule	Late TATSU	

SwRI Form QA-408-1

IX-FE-116-2



NUCLEAR PROJECTS OPERATING PROCEDURE

July 1986

Page 2 of 8

RECORDING DATA FROM DIRECT VISUAL, LIQUID PENETRANT, AND MAGNETIC PARTICLE EXAMINATIONS

1. PURPOSE

This procedure provides the technical information and detailed steps required for recording data from direct visual, liquid penetrant, and magnetic particle examinations.

2. SCOPE AND APPLICATION

Data from direct visual, liquid penetrant, and magnetic particle examinations of components, welds, heat-affected zones, and adjacent base material shall be recorded in accordance with this procedure.

- 2.1 Applicable Documents
 - Southwest Research Institute (SwRI) Nuclear Quality Assurance Program Manual (NQAPM)
 - (2) The applicable SwRI Nuclear Projects Operating Procedure for the examination being conducted

RESPONSIBILITY

- (1) The Director of the Department of Engineering Services, Nondestructive Evaluation Science and Technology Division, shall be responsible for the preparation, review, approval, and control of this procedure.
- (2) The Project Manager shall be responsible for the implementation of this procedure in accordance with the NQAPM specified in the applicable SwRI Project Plan.
- (3) The examiner shall be responsible for implementing the requirements of this procedure.
- (4) The Manager of Support and Administration, Nondestructive Evaluation Science and Technology Division, shall be responsible for the storage of records generated in accordance with this procedure.

4. PROCEDURE REQUIREMENTS

 Personnel utilizing this procedure shall be certified in accordance with Nuclear Quality Assurance Procedure NQAP 11-1 or NQAP 11-2, whichever is applicable.

IX-FE-116-2



NUCLEAR PROJECTS OPERATING PROCEDURE

July 1986

Page 3 of 8

(2) Examinations shall be conducted as required by the applicable SwRI Nuclear Projects Operating Procedures.

5. PROCEDURE

5.1 Definitions

L measurements - Measurements recorded at the centerline of the weld and parallel to the weld for nontransverse indications.

Lo location - The origin for L measurements.

W measurements - Measurements recorded on either side of the weld, perpendicular to the weld for nontransverse indications.

Wo location - The origin for W measurements.

5.2 Weld Length

Weld length, when required, shall be measured with a steel measuring tape and the distance recorded in inches and common fractions to the nearest 1/16 inch.

5.2.1 Circumferential and Nozzle-to-Shell Welds

Weld length shall be measured along the weld centerline.

5.2.2 Longitudinal Welds

Weld length shall be measured along the weld centerline.

The weld length shall be 12 inches when only 12 inches of the longitudinal weld is required to be examined. Enter the notation "12 inches" in the appropriate space provided on the examination record. For longitudinal welds less than 12 inches, enter the weld length examined.

5.2.3 Branch Connection Welds, Lugs, Supports and Other Similarly Welded Attachments with Fillet Type Weld Surfaces

> Weld length shall be measured on the component surface at the junction of the weld fusion line and the component surface, i.e., vessel or pipe surface.

IX-FE-116-2



NUCLEAR PROJECTS OPERATING PROCEDURE

July 1986

Page 4 of 8

5.3 L Measurements

L measurements shall be recorded in inches and common fractions, to the nearest 1/16 inch.

L measurements for components with a flow direction, other than branch connection and nozzle-to-shell, shall be made clockwise looking in the direction of the flow. Branch connections and nozzle-toshell measurements shall be made clockwise, as viewed at angle perpendicular to the component to which the branch connection or nozzle is welded to. Measurements for components without a flow direction shall be made clockwise as viewed from above the vertical component or clockwise as viewed from an identified end of a horizontal component. The end of the horizontal component referenced to determine clockwise shall be recorded in the REMARKS section of the applicable SwRI Examination Record.

L measurements for longitudinal welds shall be made along the weld centerline from Lo.

L measurements shall be made clockwise as viewed from the top side of the stud, bolt, but or washer; or as viewed from an identified end of the component. L measurements for other non-welded components, e.g., cladding patches, shall be made from an Lo described on the appropriate SwRI Examination Record.

5.3.1 Circumferential, Nozzle-to-Shell and Longitudinal Welds

L measurements shall be made along the weld centerline to the geometric center of the indication using one of the following methods:

- Measurements shall be made directly from Lo using a steel measuring tape.
- (2) Marks shall be made and labeled every 5 inches as measured from Lo using a steel measuring tape. Measurements shall be made from these marks using a 6-inch steel rule or a steel measuring tape.
- (3) The steel measuring tape shall be affixed to the weld centerline with zero at Lo. Measurements shall then be made directly.

IX-FE-116-2



NUCLEAR PROJECTS OPERATING PROCEDURE

July 1986

Page 5 of 8

5.3.2 Branch Connection Welds

L measurements shall be made along the weld fusion line on the component surface, i. e., pipe or vessel surface, to the geometric center of the indication using one of the following mathods:

- Measurements shall be made directly from Lo using a steel measuring tape.
- (2) Marks shall be made and labeled every 5 inches as measured from Lo using a steel measuring tape. Measurements shall be made from these marks using a 6 inch steel rule or steel measuring tape.

5.3.3 Lugs, Supports, and Other Similar Welded Attachments With Fillet Type Weld Surfaces

L measurements shall be made along the weld fusion line on the component surface, i.e., pipe or vessel surface, to the geometric center of the indication using one of the following methods:

- Measurements shall be made directly from Lo using a steel measuring tape.
- (2) Marks shall be made and labeled every 5 inches as measured from Lo using a steel measuring tape. Measurements shall be made from these marks using a 6 inch steel rule or steel measuring tape.

5.3.4 Studs, Bolts, Nuts, Washers and Other Non-Welded Components

L measurements shall be made directly from Lo to the geometric center of the indication with a steel measuring tape or 6 inch steel rule.

5.4 W Measurements

 $\mathbb R$ measurements shall be recorded in inches and common fractions to the nearest 1/16 inch.

5.4.1 Circumferential, Nozzle-to-Shell and Longitudinal Welds

W measurements shall be made perpendicular to the weld centerline from Wo to the geometric center of the indication using a 6 inch steel rule or steel measuring tape.

IX-FE-116-2



NUCLEAR PROJECTS OPERATING PROCEDURE

July 1986

Page 6 of 8

5.4.2 Branch Connection Welds

The component surface used to determine Wo shall be identified in the REMARKS section of the applicable SwRI Examination Record. W measurements shall be made perpendicular to the weld fusion line from Wo to the geometric center of the indication using a 6 inch steel rule or steel measuring tape.

5.4.3 Supports and Other Similarly Welded Attachments With Fillet Type Weld Surfaces

The component surface used to determine Wo shall be identified on the applicable SwRI Examination Record. W measurements shall be made perpendicular to the weld fusion line from Wo to the geometric center of the indication using a 6 inch steel rule or steel measuring tape.

5.4.4 Studs, Bolts, Nuts, Washers, and Other Non-Welded Components

W measurements shall be made from Wo to the geometric center of the indication. W measurements for studs or bolts with heater holes, nuts, and washers shall be made with a steel measuring tape or 6 inch steel rule from the top edge of the bore or heater hole and continue down the component. W measurements for studs or bolts without heater holes shall be made with a steel measuring tape or 6 inch steel rule from the top center of the component. Measurements for other types of non-welded components, e.g., cladding patches, shall be made from Wo determined by the examiner and described on the appropriate SwRI Examination Record.

5.5 Indication Types

Indications shall be recorded on the applicable SwRI Examination Record as rounded, linear, or as a group of rounded indications. Further information about the indication shall be recorded under the REMARKS section of the applicable SwRI Examination Record.

5.5.1 Rounded Indications

A rounded indication shall be an indication which is less than three times as long as it is wide.

IX-FE-116-2



NUCLEAR PROJECTS OPERATING PROCEDURE

July 1986

Page 7 of 8

5.5.2 Linear Indications

A linear indication shall be an indication which is equal to or greater than three times as long as it is wide.

5.5.3 Group of Rounded Indications

The size of the area and the number of rounded indications required to be recorded, when applicable, shall be as stipulated in the applicable SwRI Nuclear Projects Operating Procedure.

5.6 Indication Size

The size of an indication shall be measured to the nearest 1/32 inch with a 6 inch steel scale or steel measuring tape.

5.6.1 Rounded Indications

Round indications or indications closer to being round than elliptical shall be measured at the maximum diameter. Elliptical indications shall be measured across the maximum length and maximum width.

5.6.2 Linear Indications

Linear indications shall be measured along the length of the indication.

5.7 Abbreviations

Appropriate abbreviations (listed below) which describe the indication location with respect to Wo shall be entered on the applicable SwRI Examination Record with the measurements.

- (1) Up/Upstream = Up
- (2) Down/Downstream Dn
- (3) Clockwise CW
- (4) Counterclockwise CCW
- (5) Centorline = Q

IX-FE-116-2 July 1986



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 8 of 8

100 0

- (6) Vessel side = V
- (7) Lug or support side L or S
- (8) Pipe Side P
- (9) Other symbols with descriptions entered in the Remarks section may be the as approved by the Team Teader.

6. RECORDS

Required records shall be specified in the applicable SwRI Nuclear Projects Operating Procedure

Documents generated in accordance with this procedure shall be stored as specified in the SwRI Project Plan. The customer shall receive copies of these documents in the Examination Report, unless specified otherwise in the SwRI Project Plan.

SwAI Form QA 3-2

٩.,

-

-



SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECTS OPERATING PROCEDURE

Cha (g. 1 IX-FE-117-4

January 1986

Page 1 of 12

Title

RECORDING INDICATIONS DURING ULTRASONIC EXAMINATION OF PRESSURE-RETAINING COMPONENTS

EFFECTIVITY AND APPROVAL

Revision _4 _____ of this procedure became effective on ______ 9/17/85 . This procedure consists of the pages and changes listed below.

Page No	Change	Date Effective
1	Change 1	January 1986
2 through 4		September 1985
5 through 6	Change 1	January 1986
7 through 8		September 1985
9 through 9a	Change 1	January 1986
10 through 12		September 1985

Supersedes Procedure No. IX-FE-117-3			3A CD
Approvals		Maria de Contrata de Carlos de Carlos	15-
Written By	Date 17Jan 86	Nester Min	0ate 17 for 36
Manager of Q.A. Our Witchard	Date ZI January 1986	DALLA PALICE Extendion WITE	Date 1/21/86

SwRI Form QA-4-8-1

IX-FE-117-4



NUCLEAR PROJECTS OPERATING PROCEDURE

September 1985



RECORDING INDICATIONS DURING ULTRASONIC EXAMINATION OF PRESSURE-RETAINING COMPONENTS

1. PURPOSE

This procedure specifies the methods for measuring and recording search unit location and maximum signal amplitude data during ultrasonic examination of pressure-retaining components. When the 1974 ASME Code with respective Addenda is used for vessel examinations, it applies to vessels less than 2-1/2 inches in thickness. When the 1977 through 1983 ASME Code with respective Addenda is used for vessel examinations, it applies to vessels 2 inches or less in wall thickness.

SCOPE AND APPLICATION

Recording search unit location and maximum signal amplitude data for straight- and angle-beam ultrasonic examinations of ligaments, bolting, vessel and piping welds, heat-affected zones, and adjacent base material using manual, contact, and pulse-echo techniques shall be in accordance with this procedure.

2.1 Applicable Documents

- Southwest Research Institute Nuclear Quality Assurance Program Manual (NQAPM)
- (2) The SwRI nuclear projects operating procedures for the ultrasonic examinations being conducted

3. RESPONSIBILITY

- (1) The Director of the Department of Engineering Services, Nondestructive Evaluation Science and Technology Division, shall be responsible for the preparation, review, approval, and control of this procedure.
- (2) The Project Manager shall be responsible for the implementation of this p cedure in accordance with the NQAPM specified in the applicable SwRI Project Plan.
- (3) The examiner shall be responsible for implementing the requirements of this procedure.
- (4) The Manager of the Support and Administration Section, Nondestructive Evaluation Science and Technology Division, shall be responsible for storage of records generated in accordance with this procedure.

IX-FE-117-4

R

NUCLEAR PROJECTS OPERATING PROCEDURE

September 1985

Page 3 of 12

4. PROCEDURE REQUIREMENTS

- Personnel utilizing this procedure shall be certified in accordance with SwRI NQAP 11-1, Special Process Control.
- (2) Examinations shall be conducted as required by the applicable SwRI nuclear projects operating procedures.

5. PROCEDURE

- 5.1 Weld Lengths, and L and W Measurements
 - (1) Weld lengths, if required, shall be measured with a steel measuring tape and the distance shall be recorded in inches and common fractions to the nearest 1/16 inch. Weld length measurements shall start at L_0 .
 - (2) Weld lengths for circumferential and longitudinal welds shall be measured along the centerline of the weld.
 - (3) Weld length for branch connections and fillet-type welds shall be measur the examination surface at the junction of the weld and the examination surface.
 - (4) L and measurements shall be recorded in inches and common fractions to the nearest 1/16 inch using a steel ruler or a steel measuring tape.
 - (5) Shear-wave angle-beam L measurements will be made to the axial center of the search unit and W measurements will be made to the search unit exit point.
 - (6) Straight-beam distance amplitude correction (DAC) L and W measurements shall be made to the axial center of the search unit at the same locations using the same methods as nontransverse angle-beam measurements.
 - (6) Straight-beam weld examinations will record the search unit location as "on-weld/up" or "on-weld/down" when the search unit is not on the weld centerline.

5.2 Metal Path Measurements

Metal path measurements shall be recorded in inches and decimal fractions to the nearest 0.1 inch.

E IX-FE-117-4



NUCLEAR PROJECTS OPERATING PROCEDURE

September 1985

Page 4 of 12

5.3 Amplitude Movements

- Signal amplitude shall be recorded as a percent of DAC at the primary reference level. The percent of DAC shall be determined from Table 2.
- (2) Maximum signal amplitude shall be attained by search unit manipulation.
- (3) Amplitudes of signals shall be measured in decibels (dB) above or below DAC by adjusting the gain control until the peak indication amplitude coincides with the DAC line.

5.4 Reference Points

For circumferential, longitudinal, and fillet-type welds, reference points shall be made and labeled every 5 inches from Lo.

5.5 Crown Width and Height for Fillet Welds

The crown height and width for fillet welds shall be measured as shown in Sketch 1

5.6 Tangential Scans

The angle-beam search unit to be used for circumferential, longitudinal, and branch connection welds shall be placed on the base metal with the search unit wedge touching the edge of the weld crown and the sound beam directed tangentially into the weld at a 45° $\pm 10^{\circ}$ angle. Measurements for tangential scanning are described in Sketch 2 of this procedure.

5.7 Circumferential Welds L and W Measurements

(1) Nontransverse L and transverse W measurements for circumferential welds shall start at L₀ or from reference points. Measurements for components with a flow direction shall be made clockwise, looking in the direction of flow. Measurements for components without a flow direction shall be made clockwise, as viewed from above for a vertical component or clockwise as viewed from an identified end of a horizontal component. The end of a horizontal component referenced to determine clockwise shall be recorded on the applicable examination record.

<u>Change 1</u> IX-FE-117-4 Jan ary 1986



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 5 of 12

- (2) Nontransverse L and transverse W measurements shall be made along the weld centerline from L_o or reference points. Transverse L and nontransverse W measurements shall be made perpendicular to the weld from the weld centerline.
- (3) L and W measurements for straight-beam and angle-beam indications shall be made at each location as required in Table 1 and Table 2.
- (4) L measurements for straight-beam lamination indications shall be made within 1/4 inch of each edge of the laminar-type reflector and from successive scans across the reflector in increments no greater than 1 inch. A laminar reflector may require L and W measurements from two areas as required by the applicable nuclear projects operating procedure. W measurements shall be made within 1/4 inch of the edges of the laminartype reflector at each point requiring L measurements.

5.8 Longitudinal Welds L and W Measurements

- Nontransverse L and transverse W measurements shall be made along the weld centerline starting from L_o or reference points.
- (2) Transvers, L and nontransverse W measurements shall be made from the welk centerline perpendicular to the weld.
- (3) L and W measurements for straight-beam and angle-beam indications shall be made at each location as required in Table 1 and Table 2.
- (4) L measurements for straight-beam lamination indications shall be made within 1/4 inch of each edge of the laminar-type reflector and from successive scans across the reflector in increments no greater than 1 inch. A laminar reflector may require L and W measurements from two areas as required by the applicable nuclear projects operating procedure. W measurements shall be made within 1/4 inch of the edges of the laminartype reflector at each point requiring L measurements.

5.9 Branch Connection and Fillet-Type Welds L and W Measurements

(1) Nontransverse L and transverse W measurements for branch connections and fillet-type welds shall start at L₀ or from reference points, and shall be made clockwise along the examination surface and weld junction. Clockwise shall be determined by viewing the weld perpendicular to the component to which the branch connection or fillet-type attachment is welded.



NUCLEAR PROJECTS OPERATING PROCEDURE

Change 1 IX-FE-117-4 January 1986

Page 6 of 12

- (2) Transverse L and nontransverse W measurements shall be made perpendicular to the weld fusion line to the axial center of the search unit.
- (3) L and W measurements for straight-beam and angle-beam indications shall be made at each location as required in Table 1 and Table 2.
- (4) L measurements for straight-beam lamination indications shall be made within 1/4 inch of each edge of the laminar-type reflector and from successive scans across the reflector in increments no greater than 1 inch. A laminar reflector may require L and W measurements from two areas as required by the applicable nuclear projects operating procedure. W measurements shall be made within 1/4 inch of the edges of the laminartype reflector at each point requiring L measurements.

5.10 Bolting L and W Measurements

- (1) L measurements for straight-beam examination of studs and nuts and for angle-beam examination of studs conducted from the heater hole shall be made clockwise from L₀ as viewed from above the component or clockwise as viewed from an identified end of the component. W measurements for straight-beam and angle-beam heater hole examinations shall be made from the edge of the bore or heater hole of an identified end or the center of an identified end to the exit point of the angle-beam search unit, or the axial center of the straight-beam search unit.
- (2) L measurements for angle-beam examinations of nuts from the outer surface shall be made from the outer edge of an identified end. W measurements for angle-beam examinations of nuts shall be made clockwise from L₀ as viewed from an identified end.
- (3) L and W measurements for straight-beam and angle-beam indications shall be made at each location as required in Table 1.

5.11 Ligaments L and W Measurements

(1) L measurements shall be made clockwise along the vessel and seal surface junction as viewed from above the vessel to the axial center of the search unit. W measurements shall be made from the edge of the seal surface and the inside surface of the vessel to the axial center of the search unit.



IX-FE-117-4



NUCLEAR PROJECTS OPERATING PROCEDURE

September 1985

- Page 7 of 12
- (2) L and W measurements for straight-beam and angle-beam indications shall be made at each location as required in Table 1.

5.12 Examination Limitations

Scanning limitations shall be recorded as required by Paragraphs 5.12.1 and 5.12.2. L measurements shall be made to the axial center of the search unit. W measurements shall be made to the axial center of the straight-beam search unit or to the exit point of the angle-beam search unit.

5.12.1 Straight Beam

Limitations encountered during performance of the straightbeam lamination examination shall be recorded in accordance with the following:

- (1) When the lamination examination can be performed from both sides of the weld, the limitations should be recorded on the lamination examination record as "none."
- (2) When a weld cannot be examined from one side due to configuration, the limitations should be recorded as "no examination on the (up, down, CW, CCW, etc.) side due to configuration."
- (3) When a partial examination is performed from one side or the other of a weld, the limitations for the lamination examination record should refer to the anglebeam examination record. The reference to the anglebeam examination may be recorded as "same as angle beam" or "see angle-beam limitations."

Limitations shall be recorded for straight-beam DAC calibrations. The maximum limitation in the W direction shall be recorded. The minimum point and the maximum point of the limitation shall be recorded in the L direction.

5.12.2 Angle Beam

Limitations shall be recorded for angle-beam examinations. For examinations which utilize two angles, the limitations of the search whit with the larger limitations shall be recorded. The maximum limitation in the W direction shall be recorded. The minimum point and the maximum point of the limitation in the L direction shall be recorded.

S.R.

NUCLEAR PROJECTS OPERATING PROCEDURE

IX-FE-117-4

September 1985

Page 8 of 12

5.13 Abbreviations

Appropriate abbreviations (listed below) which describe the search unit location with respect to the weld centerline or edge shall be entered on the applicable SwRI Examination Record with the measurements.

- (1) Up/Upstream Up
- (2) Down/Downstream Dn
- (3) Clockwise CW
- (4) Counterclockwise CCW
- (5) Centerline G
- (6) Vessel side V
- (7) Lug or support side L or S
- (8) Pipe side = P
- (9) Other symbols with descriptions entered in the REMARKS section may be used as approved by the Team Supervisor.

6. RECORDS

Required records shall be specified in the applicable SwRI nuclear projects operating procedure.

Document: generated in accordance with this procedure shall be stored as specified in the SwRI Project Plan. The customer shall receive copies of these documents in the Examination Report, unless specified otherwise in the SwRI Project Plan.

SOUTHWEST RES	EARCH	INSTITU	JTE
---------------	-------	---------	-----

NUCLEAR PROJECTS OPER ATING PROCEDURE

Change 1 IX-FE-117-4

January 1986

Page 9 of 12

		Table 1	1.4.2.3
	1974 CODE R	ECORDING REQ	UIREMENTS
	50% W1	Wmax	50% ×2
quired L Positions			
10%			
1002**			
x		х*	
100%**			
50%			
197	7 THROUGH 1983	CODE RECORD	ING REQUIREMENTS
	100% W1	Wmax	100% W2
quired L Positions			
56%			
100%**			
ax	X* **	X*	X* **
1002**			
50%			
Metal path also req *Only required for		ndications	

SOUTI	HWEST RESEA			Change 1 IX-FE-117-4 January 1986 Page 9a of 12
		Table 2		
	1974 CODE 1	RECORDING REQ	UIREMENTS	
	For Notch Calib	cations on Th	in Wall Piping+	
	50% W1	Wmax	50% W2	
Required L Po	sitions			
L ₁ 20%				
L1 50%**				
Lmax		X*		
L2 50%**				
L ₂ 20%				" 한 바람은 감사님 문제
*Metal path a **Only require +Calibrations	lso required ed for nongeometric is to notch sensitivity 1977 THROUGH 1983	when holes		
	For Notch Calibr			
	50% W1	Wmax	50% W2	
Required L Pos		uax	6	
-1 20%				
L1 50%**				
Lmax	X* **	X*	X* **	
L2 50%**				
L ₂ 20%				
*Metal path al **Only require +Calibrations	lso required ed for nongeometric i to notch sensitivity	ndications when holes a	are stipulated by	v Code

SwRI Form QA 3-2

L



NUCLEAR PROJECTS OPERATING PROCEDURE

IX-FE-117-4

September 1985

Page 10 of 12

Table 2

DAC vs. dB Conversion Chart

%DAC	dB	%DAC
100	0	100
90	1	112
80		125
70	2 3	141
63	4	159
56	5	178
50	6	200
45	7	224
40	8	251
36	9	282
32	10	316
28	11	355
25	12	400
2.2	13	447
20	14	501
18	15	562
16	16	631
14	17	708
13	18	794
11	19	891
10	20	1000

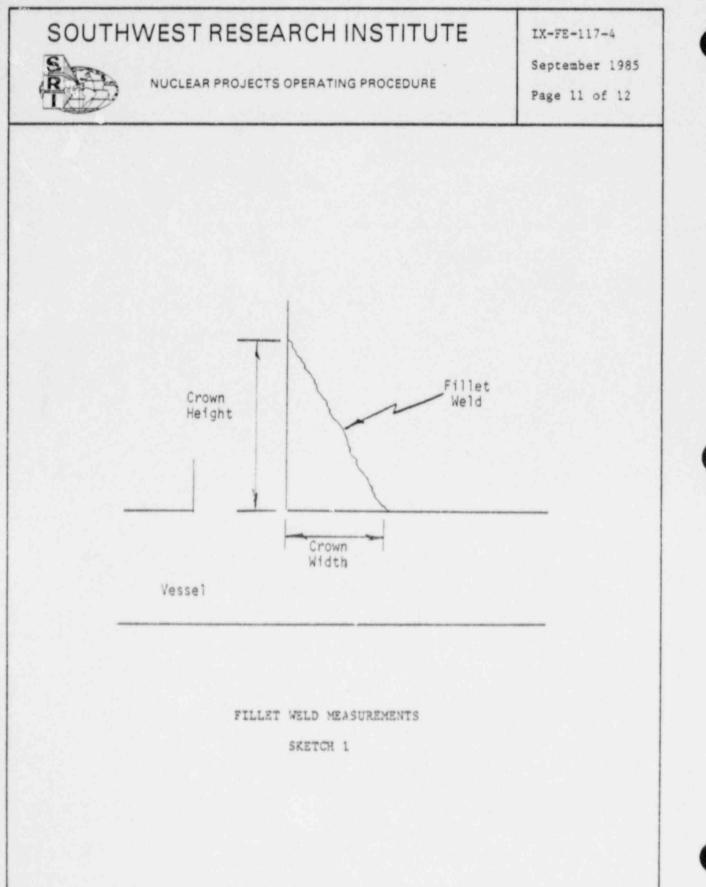
Percent DAC of an amplitude below DAC, which must be increased in amplitude by the dB number change to equal DAC, is read in the column on the left.

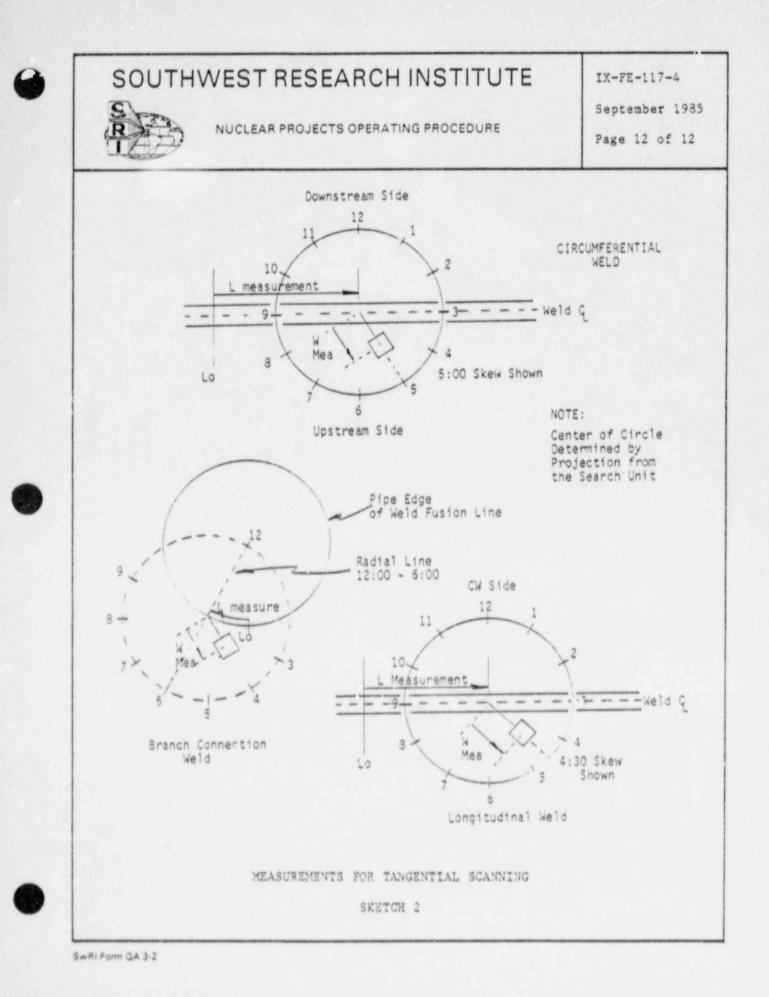
For example, an indication is increased in amplitude by 13 dB to equal the DAC curve; therefore, the indication is 22 percent of DAC.

Percent DAC of an amplitude above DAC, which must be decreased in amplitude by the dB number change to equal DAC, is read in the column on the right.

For example, an indication is decreased in amplitude by 13 dB to equal the DAC curve; therefore, the indication is 447 percent of DAC.







	EST RESEARCH INSTITUTE NUCLEAR PROJECTS OPERATING PROCEDURE	IX-FE-125-0 February 1987 Page 1 of 13
Title RECORDING INDIC	CATIONS IN ACCORDANCE WITH NRC REGU	LATORY GUIDE 1.150
	EFFECTIVITY AND APPROVAL	
Revision of this proce changes listed below.	edure became effective on <u>Feb 17, 1987</u> . Thi	s procedure consists of the pages a
Page No	Change	Date Effective
1 - 13		February 1987
Sub. sedes Procedure No.	N/A	SA
Sub. sedes Procedure No. Approvals		FL
	N/A Date 6 Feb. 1987 Heater L	

IX-FE-125-0

R

NUCLEAR PROJECTS OPERATING PROCEDURE

February 1987

Page 2 of 13

RECORDING INDICATIONS IN ACCORDANCE WITH NRC REGULATORY GUIDE 1.150

1. PURPOSE

This procedure provides the technical information and detailed steps required for measuring and recording search unit location and signal amplitude data during manua' ultrasonic examinations of reactor pressure vessel welds in accordance with Nuclear Regulatory Commission (NRC) Regulatory Guide 1.150.

2. SCOPE AND APPLICATION

This procedure is intended to be used only for the recording of search unit locations and signal amplitudes and shall not be used for sizing of indications.

This procedure is applicable to straight- and angle-beam examinations of clad or unclad ferritic reactor pressure vessel welds, heat-affected zones, and adjacent base material using manual, contact, and pulse-echo ultrasonic techniques.

3. APPLICABLE DOCUMENTS

- (1) NRC Regulatory Guide 1.150, Revision 1, Appendix A, entitled "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations"
- (2) Southwest Research Institute (SwRI) Nuclear Quality Assurance Program Manual (NQAPM)
- (3) The applicable SwRI procedures required for the ultrasonic reactor pressure vessel examinations being conducted

4. RESPONSIBILITY

- (1) The Director of the Department of Engineering Services, Nondestructive Evaluation Science and Technology Division, shall be responsible for the preparation, review, control, and approval of this procedure.
- (2) The Project Manager shall be responsible for the implementation of this procedure in accordance with the NQAPM specified in the applicable SwRI Project Plan.

IX-FE-125-0

R

NUCLEAR PROJECTS OPERATING PROCEDURE

February 1987

Page 3 of 14

- (3) The examiner shall be responsible for implementing the requirements of this procedure.
- (4) The Manager of Support Services, Nondestructive Evaluation Science and Technology Division, shall be responsible for storage of records generated in accordance with this procedure.

5. PROCEDURE REQUIREMENTS

- Personnel utilizing this procedure shall be certified in accordance with SwRI NQAP 11-1, "Special Process Control."
- (2) Examination shall be conducted as required by the applicable SwRI procedures.

6. PROCEDURE

- 6.1 Weld Lengths, and L and W Measurements
 - (1) Weld lengths, if required, shall be measured with a steel measuring tape and the distance shall be recorded in inches and common fractions to the nearest 1/16 inch. Weld length measurements shall start at L₀ or at a determined, identifiable reference point.
 - (2) L and W measurements shall be recorded in inches and common fractions to the nearest 1/16 inch using a 6-inch steel ruler or a steel measuring tape.
 - (3) Shear-wave angle-beam L measurements will be made to the axial center of the search unit and the W measurements will be made to the search unit exit point.
 - (4) Straight-beam distance amplitude correction (DAC) L and W measurements shall be made to the axial center of the search unit at the same locations using the same methods as nontransverse angle-beam measurements.
 - (5) For straight-beam weld examinations, the search unit location shall be recorded as "on weld/up," "on weld/down" or "on weld/cw," "on weld/ccw" when the search unit is not on the weld centerline.

IX-FE-125-0



NUCLEAR PROJECTS OPERATING PROCEDURE

February 1987

Page 4 of 13

6.2 Metal Path Measurements

Metal path measurements shall be recorded in inches and decimal fractions to the nearest 0.1 inch.

- 6.3 Amplitude Movements
 - (1) Signal amplitude shall be recorded in percent of DAC at the primary reference level. The percent DAC shall be determined from Table 1.
 - (2) Maximum signal amplitude shall be attained by search unit manipulation.
 - (3) Amplitudes of signals shall be measured in decibels (dB) above or below DAC by adjusting the gain control until the peak indication amplitude coincides with the DAC line.

6.4 Reference Points

NOTE

When the presence of high levels of radiation makes the layout of reference points impracticable, the following steps shall only be performed in areas where indications have been detected. However, the radial lines required by Paragraph 6.4.3 are necessary to maintain the correct search unit orientation.

- 6.4.1 Circum erential Butt Welds
 - (1) Reference points with a maximum spacing of 10 inches shall be drawn on the weld centerline, except vesselto-flange welds examined from the seal surface. Vesselto-flange welds shall have reference points with a maximum spacing of 10 inches as measured at the junction of the flange seal surface and inside surface of the vessel. Each reference point shall be laid out and identified on the vessel in inches from L₀ or from a determined, identifiable reference mark.

6.4.2 Longitudinal Welds

(1) Reference points with a maximum spacing of 10 inches shall be drawn on the weld centerline. The reference points shall be laid out from the centerline of the intersecting circumferential weld above or as designated for horizontal vessels.

SwRI Form QA 3-2

IX-FE-125-0

R

NUCLEAR PROJECTS OPERATING PROCEDURE

February 1987

Page 5 of 13

(2) Each reference point shall be identified on the vessel in inches from L₀ or from a determined, identifiable reference mark.

6.4.3 Nozzle-to-Shell Welds

 Two reference circles shall be drawn around each nozzle. The radii of the circles shall be a whole number of inches from the nozzle centerline.

NOTE

The radius of a reference circle can be calculated by measuring the circumference of the nozzle boss and dividing this distance by 6.28. This result is the radius of the nozzle (measured to the outside surface). The distance from the nozzle boss to the reference circle plus the radius of the nozzle equals the reference circle radius.

- (2) A concentric reference circle around each nozzle which encompasses the scan area shall be marked on the shell and referenced to the centerline of the respective nozzle by indicating its radius. The location of the 0° azimuth of each nozzle shall be noted on the appropriate SwRI Examination Record. The 0°, 90°, 180°, and 270° azimuths shall be marked on the shell along the concentric reference circle in a clockwise direction as viewed from the vessel exterior. Each 30° of azimuth for nozzle welds with a radius greater than 4 inches, each 15° of azimuth for nozzle welds greater than 12 inches, and each 5° of azimuth for nozzles greater than 24 inches shall be marked along the reference circle. Radial lines extending to the outer reference circle shall be drawn through each azimuth marked. The azimuth points and radial lines shall be used to maintain the correct search unit orientation and not for measurements.
- (3) A concentric reference circle shall also be marked within 1/2 inch of the weld centerline. Every 10 inches around this inner circle shall be marked on the vessel and utilized for measurements.

IX-FE-125-0



NUCLEAR PROJECTS OPERATING PROCEDURE

February 1987

Page 6 of 13

6.5 Circumferential Welds L and W Measurements

- (1) Nontransverse L and transverse W measurements for circumferential welds shall start at L₀ or at other determined reference points and be rade clockwise for outside surface examinations and counterclockwise for inside surface examinations. Clockwise direction shall be determined as viewed from above a vertical vessel or clockwise as viewed from an identified end of a horizontal vessel. The end of the horizontal vessel used shall be recorded in the applicable SwRI Examination Record.
- (2) Nontransverse L and transverse W measurements shall be made along the weld centerline from L₀ or from other reference points. Transverse L and nontransverse W measurements shall be made perpendicular to the weld from the weld centerline.
- (3) L and W measurements for straight-beam and angle-beam indications shall be made at each location as required in Tables 2, 3, and 4.

6.6 Vessel-to-Flange From the Seal Surface L and W Measurements

- (1) Nontransverse L measurements shall start at L₀ or at other reference points and be made clockwise as viewed from above the vessel or from an identifiable end and will be described on the SwRI Examination Record. Nontransverse W measurements shall be made from the junction of the flange seal surface and the inside surface of the vessel to the axial center of the search unit.
- (2) Nontransverse L measurements shall be made along the junction of the flange seal surface and inner surface of the vessel from L₀ or from other reference points to the axial center of the search unit.
- (3) L measurements shall be made to the maximum amplitude point, at the end points of the indication as determined by 20% of DAC, and, except for geometric indications, from successive scans in increments no greater than 1/4 inch.
- (4) L and W measurements for indications shall be made at the W_{max} position. W measurements other than W_{max} shall not be recorded when examining vessel-to-flange welds from the seal surface.

IX-FE-125-0

R

NUCLEAR PROJECTS OPERATING PROCEDURE

February 1987

Page 7 of 13

6.7 Longitudinal Welds L and W Measurements

- (1) Nontransverse L and transverse W measurements for longitudinal welds shall be made along the weld centerline starting from Lo or from other reference points. Lo for longitudinal welds in vessels shall be the centerline of the intersecting circumferential weld above the longitudinal weld being examined. For longitudinal welds in horizontal vessels, an identified end of the vessel shall be designated as the top and the location recorded on the applicable SwRI Examination Record.
- (2) Transverse L and nontransverse W measurements shall be made from the weld centerline perpendicular to the weld.
- (3) L and W measurements for straight-beam and angle-beam indications shall be made at each location as required in Tables 2, 3, and 4.
- 6.8 Nozzle-to-Shell Weld L and W Measurements
 - (1) Nontransverse L and transverse W measurements for nozzle-toshell welds shall start at L₀ or at other reference points and be made clockwise for examinations from the outside surface and counterclockwise for examinations from the inside surface. Clockwise or counterclockwise shall be determined by viewing the weld from a position which is perpendicular to the vessel surface. Measurements shall be made along the inner reference circle.
 - (2) L and W measurements shall be made from or along the inner surface reference circle located within 1/2 inch of the weld centerline.
 - (3) Transverse L and nontransverse W measurements shall be order perpendicular to the weld from the inner reference cicle.
 - (4) L and W measurements for straight-beam and angle-besu indications shall be made as required in Tables 2, 3, and 4.

6.9 Examination Limitations

Scanning limitations shall be recorded as required by 6.9.1 and 6.9.2. W measurements shall be made to the search unit exit point for angle-beam or axial center for straight-beam search units. L measurements shall be made to the axial center of the search unit.

IX-FE-125-0



NUCLEAR PROJECTS OPERATING PROCEDURE

February 1987

Page 8 of 13

EXCEPTION

Nozzle-to-shell weld examinations conducted from the shell side only shall not be considered limited examinations.

6.9.1 Straight Beam

Limitations encountered during performance of the straightbeam lamination examination shall be recorded in accordance with the following:

- (1) When the lamination examination can be performed from both sides of the weld, the limitations should be recorded on the lamination examination record as "none."
- (2) When a weld cannot be examined from one side due to configuration, the limitations should be recorded as "no examination on the (up, down, cw, ccw, etc.) side due to configuration."
- (3) When a partial examination is performed from one side or the other of a weld, the limitations for the lamination examination record should refer to the angle-beam examination record. The reference to the angle-beam examination may be recorded as "same as angle beam" or "see angle-beam limitations."

Limitations shall be recorded for straight-beam DAC calibrations. The maximum limitation in the W direction shall be recorded. The minimum limitation in the W direction shall only be recorded when necessary. The minimum point and the maximum point of the limitation shall be recorded in the L direction.

6.9.2 Angle Beam

Limitations shall be recorded for angle-beam examinations. For examinations which utilize two angles, the limitations of the search unit with the larger limitations shall be recorded. The maximum limitation in the W direction shall be recorded. The minimum limitation in the W direction shall be recorded only when applicable. The minimum point and the maximum point of the limitation in the L direction shall be recorded.

IX-FE-125-0



NUCLEAR PROJECTS OPERATING PROCEDURE

February 1987

Page 9 of 13

6.10 Abbreviations

Appropriate abbreviations which describe the search unit location with respect to the weld centerline or edge (listed below) shall be entered on the applicable SwRI Examination Record with the measurements.

- (1) Up/Upstream Up
- (2) Down/Downstream Dn
- (3) Clockwise CW
- (4) Centerline C
- (5) Counterclockwise CCW
- (6) Vessel side of centerline V
- (7) Other symbols with descriptions entered in the Remarks section may be used as approved by the Team Supervisor.

7. RECORDS

Required records shall be specified in the applicable SwRI procedure.

Documents generated in accordance with this procedure shall be stored as specified in the SwRI Project Plan. The customer shall receive copies of these documents in the Examination Report, unless specified otherwise in the SwRI Project Plan.



NUCLEAR PROJECTS OPERATING PROCEDURE

Table 1

IX-FE-125-0

February 1987

Page 10 of 13

		Table 1	
DAC	vs. dB	Conversion	n Chart
ZDAC		DB	ZDAC
100 90 80 70 63 56 50 45 40 36 32 28 25 22 20 18 16 14 13 11		0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	100 112 125 141 159 178 200 224 251 282 316 355 400 447 501 562 631 708 794 891 1000

Percent DAC of an amplitude below DAC, which must be increased in amplitude by the dB number change to equal DAC, is read in the column on the left.

For example, an indication is increased in amplitude by 13 dB to equal the DAC curve; therefore, the indication is 22 percent of DAC.

Percent DAC of an amplitude above DAC, which must be decreased in amplitude by the dB number change to equal DAC, is read in the column on the right.

For example, an indication is decreased in amplitude by 13 dB to equal the DAC curve; therefore, the indication is 447 percent of DAC.



NUCLEAR PROJECTS OPERATING PROCEDURE

IX-FE-125-0

February 1987

Page 11 of 13

Table 2

Required L and W Recording for Indications

NOTES

Ultrasonic planar surface reflectors obtained at 50% or greater of the response from the square notch shall be recorded to the L and W limits of 50% of the notch amplitude.

For indications determined to be caused by geometry, the basis for this determination shall be described and documented.

Each location requiring a W measurement shall also have the metal path recorded.

When an examination is performed from the unclad side of a clad vessel with a first half-vee calibration only, indications observed past the 4/8 vee-path shall not be recorded.

Straight-beam indications whose length and depth from the surface are oriented within 10° of a plane parallel to the surface of the component shall be considered laminar flaws and shall be recorded as follows:

L and W Recording for Lamination Indications

L measurements for straight-beam lamination indications shall be made to the edges of the laminar-type reflector and from successive scans across the reflector in increments no greater than 1 inch. A laminar reflector will require measurements from the two areas, where the intermediate indication equals the remaining backwall and at the points, if any, of total loss of backwall. W measurements shall be made to the edges of the laminar-type reflector at each point requiring L measurements.

NOTES

The area of 50% loss of backwall shall be utilized for determining the extent of interference with the angle-beam examination.

The area of total loss of backwall shall be utilized for determining the acceptance/rejection requirements of Section XI of the ASME Code.

Straight-beam indications which are not laminar flaws shall be considered as planar and shall be recorded at 50% DAC.

IX-FE-125-0

NUCLEAR PROJECTS OPERATING PROCEDURE

February 1987 Page 12 of 13

Table 3

Required L and W Recording for Indications (Cont'd)

All geometric and nongeometric indications detected within the outer 75% of the through-wall thickness of the vessel wall, as measured from the inside surface, and only the geometric indications within the inner 25% of through-wall thickness shall be recorded as follows:

(1) Indications 50% to 100% DAC

	502W1	Wmax	50% 2
L150%		х	
Lmax	х	х	х
L250%		х	

Indications Greater Than 100% DAC (2)

	Ψ.		Wa
	1/2 max	Wmax	1/2 max
L150%		х	
Lmax	x	х	х
L250%		X	

X = Positions requiring W measurements

Nongeometric indications shall also be recorded along their length in scan increments no greater than 1/4 inch for angle-beam and every 9/10 of search unit dimension for straight-beam examination. Each location requiring an L measurement shall also have the W measurements and metal paths recorded.

IX-FE-125-0

R

NUCLEAR PROJECTS OPERATING PROCEDURE

February 1987 Page 13 of 13

Table 4

Required L and W Recording for Indications (Cont'd)

All nongeometric indications within the inner 25% of through-wall thickness shall be recorded as follows:

	20% DAC	50% DAC	100% DAC	>100 DAC 1/2 Max	WMAX	>100 DAC 1/2 Max	100% DAC	50% DAC	20% DAC
20% L1	х				x				x
50% L1	x	х			х			х	х
100% L1	x	x	х		х		х	х	х
L MAX	х	х	х	х	х	х	х	х	х
100% L2	х	х	х		х		х	х	Х
50% L2	х	х			х			х	х
20% L2	x				х				х

X = Positions requiring W measurements

Additionally, these indications shall be recorded along their length in scan increments no greater than 1/4 inch. Each location requiring an L measurement shall also have the W measurements and metal paths recorded.

Sour	THWEST RESEARCH I ISTITUTE NUCLEAR PROJECTS OPERATING PROCEDURE	IX-FE-131-0 March 1986 Page 1 of 3
îtle	COMPARISON OF INSERVICE EXAMIN	ATION DATA
	EFFECTIVITY AND APPROVAL	
Revision of th changes listed below.	his procedure became effective on 7 Mar 1986 . This proc	edure consists of the pages a
Page No	Change	Date Effective
1-4	0	March 1986
		그는 신문화 문
upersedes Procedure	No.	SA a
oprovals		
rittep-By	Date Technical Review	Jate
John Ration	mallo 3/2/86 theater de	tea 6mm
lanager of Q.A.	Date Cognizant Director	10 0 Date

SwRI Form GA-408- I

Ŀ

IX-FE-131-0 March 1986



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 2 of 2

COMPARISON OF INSERVICE EXAMINATION DATA

IX-FE-131-0

1. PURPOSE

The purpose of this procedure is to provide the technical information and detail steps required for the correlation of inservice examination data results.

2. SCOPE AND APPLICATION

This procedure applies to inservice examination results recorded during direct visual, liquid penetrant, magnetic particle, and ultrasonic examinations. The examination results shall be compared with previous examination results in accordance with this procedure.

Ultrasonic indications shall be resolved in accordance with the applicable revision of SwRI Nuclear Projects Operating Procedure IX-FE-132.

In some cases a comparison may not be practicable due to significant changes in techniques and/or specific variables such as search unit frequency, instruments, examination angle, recording technique, or calibration blocks, or previous data may not be available.

3. APPLICABLE DOCUMENTS

- SwRI Nuclear Projects Operating Procedures for the examinations being conducted
- (2) ASME Boiler and Pressure Vessel Code, Section XI, the Edition and Addenda specified in the SwRI Project Plan.
- (3) SwRI Nuclear Quality Assurance Program Manual (NQAPM)

4. RESPONSIBILITY

- (1) The Director of the Department of Engineering Services, Nondestructive Evaluation Science and Technology Division, shall be responsible for the preparation, review, approval, and control of this procedure.
- (2) The Project Manager shall be responsible for the implementation of this procedure in accordance with the NQAPM specified in the applicable SwRI Project Plan.
- (3) The data analyst (Level II or Level III) shall be responsible for implementing the requirements of this procedure.

0

IX-FC-131-0

NUCLEAR PROJECTS OPERATING PROCEDURE

Page 3 of 3

March 1986

(4) The Managor of the Support and Administration Section, Nondestructive Evaluation Science and Technology Division, shall is responsible for storage of records generated in accordance with this procedure.

5. PERSONNEL QUALIFICATION

(1) Data Analysts shall be certified as Level II or Level III examiners in accordance with SwRI NQAP 11-1, "Special Process Control," and/or NQAP 11-2, "Procedure for Certifying Visual Examination Personnel," as applicable.

6. DATA COMPARISON

Inservice nondestructive examination res 'ts shall be compared with recorded results of the preservice examination and prior inservice examinations (PSI, ISI, special examinations, etc.). As a minimum, the following steps shall be performed.

- 6.1 Review prior data to determine the presence and location of flaws. If flaws were not present in previous data, confirm the absence of flaws in present data. If flaws were present in previous data, the existence and location of these flaws shall be verified in the current data. The following information shall then be compared to determine growth or stability.
- 6.1.1 For ultrasonic indications, the length, thru wall, and amplitude data shall be compared.
- 6.1.2 For surface and visual indications, the length of the flav indication shall be compared.

7. DOCUMENTATION

The results of the flaw indication comparison shall be documented on the SwRI Indication Resolution Record sheet to the extent necessary.

8. RECORDS

Disposition of documents generated in accordance with this procedure shall be as required by the applicable SwRI Nuclear Projects Operating Procedure utilized for the examination.

	NUCLE	EARCH INSTITUTE AR PROJECTS NG PROCEDURE	IX-FE-132-0 February 198 Page 1 of 4
Title	ULTRASONIC IN	DICATION RESOLUTION PRO	DCEDURE
	EFF	ECTIVITY AND APPROVAL	
Revision of changes listed below		fective on 7 Mar 1986 . Th	is procedure consists of the pages a
Page No		Change	Date Effective
1-4		0	February 1986
Supersedes Procedure	N 0.		SA.2
Supersedes Procedure Approvals	N 0.		SA D
	,	Pate Technical Review 15/86	SA Date Ming 6 MA

LX-FE-132-0



NUCLEAR PROJECTS OPERATING PROCEDURE

February 1986

Page 2 of 4

ULTRASONIC INDICATION RESOLUTION PROCEDURE

IX-FE-132-0

1. PURPOSE

The purpose of this procedure is to describe the methodology to be applied for the investigation, evaluation, and resolution of indications recorded during preservice and inservice examinations of nuclear power plant welds, base materials, components, or vessels.

2. SCOPE AND APPLICATION

This procedure applies to indications found during manual ultrasonic examinations performed during a preservice or inservice examination.

3. APPLICABLE DOCUMENTS

- ASME Boiler and Pressure Vessel Code, Section XI, the Edition and Addenda specified in the SwRI Project Plan
- (2) The Nuclear Projects Operating Procedure (NPOP) applicable to the examination
- (3) SwRI Nuclear Quality Assurance Program Manual (NQALA)

4. RESPONSIBILITY

- (1) The Director of the Department of Engineering Services, Nondestructive Evaluation Science and Technolog, Division, shall be responsible for the preparation, review, approval, and control of this procedure.
- (2) The Project Manager shall be responsible for the implementation of this procedure in accordance with the NQAPM specified in the applicable SwRI Project Plan.
- (3) The data analyst (Level II or III) shall be responsible for implementing the requirements of this procedure.
- (4) The Manager of the Support and Administration Section, Nondestructive Evaluation Science and Technology Division, shall be responsible for storage of records generated in accordance with this procedure.

IX-FE-132-0



NUCLEAR PROJECTS OPERATING PROCEDURE

Fabruary 1986

Page 3 of 4

5. FERSONNEL CERTIFICATION

Personnel resolving indications shall be certified as Level II or Level III examiners in accordance with SwRI NQAP 11-1, "Special Process Control."

6. DEFINITIONS

- <u>Investigate</u>: Perform the necessary tasks to determine the shape, identity, and location of indications (plotting, review of radiographs, reexaminations, etc.).
- (2) <u>Evaluation</u>: Perform the required calculations to determine the acceptance or rejection of indications investigated and found to be the result of a flaw.
- (3) <u>Resolution</u>: The formal documentation of investigations and/or evaluations performed on recorded indications.

7. INVESTIGATION

When investigating an indication, the following should be considered where practical and deemed necessary:

- 7.1 Determine the general location of the indication using L and W measurements, metal path, and measured beam angle.
- 7.2 Take outside and/or inside surface profiles using a contour gauge and ultrasonic thickness measurements. Profiles should be taken in line with the maximum amplitude position of the indication. Thickness measurements should be taken at maximum intervals of 1/4 inch, except where inside surface contour is essentially flat and can be verified by scanning over the surface.
- 7.3 Review previous examination data, including construction radiographs.
- 7.4 Review fabrication drawing for geometry and weld preparation profile.

7.5 Plot the indication location on a scale drawing of component using the surface profiles and ultrasonic thickness measurements taken in the specific area of : a indica ion and the information specified in 7.1 above.



SwRI Form QA 3-2

IX-FE-132-0



NUCLEAR PROJECTS OPERATING PROCEDURE

February 1986

Page 4 of 4

- 7.6 Determine repair history of component.
- 7.7 Perform supplemental nondestructive examinations. Use of supplemental examination methods are at the investigator's discretion, but may include radiography, surface methods, visual inspection, or alternative ultrasonic techniques. Some of the ultrasonic techniques which may be considered are:
 - (1) multiple beam angles
 - (2) different wave modes
 - (3) "creeping" wave technique
 - (4) SLIC-40 technique

8. EVALUATION

The evaluation of indications investigated and determined to be res lting from a flaw shall convist of reviewing the original data and of all data generated in accordance with Section 7 of this procedure. Any investigation and/or calculations necessary to determine whether the recorded indication is acceptable or rejectable shall be documented as described in Section 9 of this procedure.

9. RESOLUTION

The steps used to evaluate and/or investigate an indication shall be documented on the Indication Resolution Record. When used, the following will be referenced:

- (1) indication plots
- (2) calculations
- (3) cross section profiles
- (4) supplemental examination data
- (5) radiographs
- (6) sketches
- (7) photographs

The Indication Resolution Record shall contain the signature and level of certification of the individual performing the evaluation and/or resolution and final review by a Level II or Level III.

10. RECORDS

Disposition of documents generated in accordance with this procedure shall be as required by the applicable SwRI Nuclear Projects Operating Procedure utilized for the examination.

SwAl Porm QA 3-2

	HWEST RESEARCH INSTITUTE NUCLEAR PROJECTS OPERATING PROCEDURE	X-FE-101-3 August 1985 Page 1 of 6
Title	ONSITE NDE RECORDS CONTROL	
	EFFECTIVITY AND APPROVAL	
Revision <u>3</u> of this changes listed below.	procedure became effective on <u>8/5/85</u> . This pro-	cedure consists of the pages ar
Page No	Change	Date Effective
1-6		August 5, 198
Supersides Procedure No X-FE-101-2		SA FL
		FL.

S R

NUCLEAR PROJECTS OPERATING PROCEDURE

August 1985

X-FE-101-3

Page 2 of 6

ONSITE NDE RECORDS CONTROL

1. PURPOSE

This procedure describes the onsite control processes for nondestructive examination records (data) generated in the field during preservice (PSI) and inservice (ISI) examinations.

2. SCOPE AND APPLICATION

- 2.1 This procedure describes the flow of data records used to document the results of nondestructive examinations performed. Data records include original data sheets, summary sheets, resolution sheets, strip charts, magnetic tapes, video tapes, and other information as defined by the Inspection Engineer or Team Supervisor.
- 2.2 This procedure provides guidance to personnel of the NDE Field Services Section who are assigned the responsibility of proparing, reviewing, or otherwise using data records while in the field performing a preservice or inservice examination.
- 2.3 Functional steps are provided in this procedure to explain the flow of the records.

3. RESPONSIBILITY

- The Director of the Department of Engineering Services, Quality Assurance Systems and Engineering Division, shall be responsible for t's preparation, review, approval, and control of this procedure.
- (2) The Project Manager shall be responsible for the implementation of this procedure in accordance with the NQAPM specified in the applicable SwRI Project Plan.
- (3) The Inspection Engineer shall be responsible for implementing the requirements of and ensuring compliance with this procedure.
- (4) The Manager of the Support and Administration Section, Quality Assurance Systems and Engineering Division, shall be responsible for storage of records generated in accordance with this procedure.

X-FE-101-3 August 1985 Page 3 of 6



NUCLEAR PROJECTS OPERATING PROCEDURE

PROCEDURE

- 4.1 Original Data Sheets
 - Original data sheets, are to be serialized either at SwRI or at the site.
 - (2) Original data sheets shall be filled out at the examination location and during the examination time.
 - (3) The filled-out original data sheets shall be returned to the team staging area (office, trailer, etc.) on a periodic basis (at meal time, at the end of the day, upon leaving controlled areas) during an ISI or a PSI, and an entry shall be made into a daily log indicating that the examinations have been performed.
 - (4) The original data sheets shall then be placed into the To-Be-Reviewed File.
 - (5) The review process is performed as follows:
 - (a) The original data sheets shall be checked for completeness, accuracy, and consistency of the data.
 - (b) If clarification or correction of any entry on the original data sheets is required, the original data sheets shall be returned to the examiner.
 - (c) After clarifications or corrections, if any, have been made and initialed by the examiner, the reviewer shall sign each original data sheet which does not contain indications requiring evaluation/resolution.
 - (6) The original data sheets which have been reviewed and signed shall be moved to the To-Be-Summarized File. See Paragraph 4.1(9).
 - (7) Original data sheets which contain indications requiring evaluation/resolution shall be placed in the To-Be-Resolved File.
 - (a) Original data sheets in the To-Be-Resolved File which document visual or surface examinations shall be handled as follows:

SwRI Form QA 3-2

X-FE-101-3



NUCLEAR PROJECTS OPERATING PROCEDURE

August 1985

Page 4 of 6

- (1) The Original data sheets shall be reviewed, signed by the reviewer, and used to generate a Customer Notification Form (CNF). (The CNF shall be completed according to NQAP 13-1.)
- (2) Copies of original data sheets shall be made and attached to the CNF.
- (3) A log shall be maintained of CNFs issued and their status.
- (4) The original data sheets are then placed in the To-Be-Summarized File. See Paragraph 4.1(9).
- (b) Original data sheets in the To-Be-Resolved File which document ultrasonic examinations shall be used to resolve the indications according to Paragraph 4.3 and shall then be processed as specified in Paragraphs 4.1(5) and 4.1(1).
- (8) When a computer is used to record results and generate summary sheets, data shall be fed into the computer. The computer will generate the cummary shorts at the completion of all required examinations of an exam_nation area.
- (9) If the computer is not used to generate summary sheets, data pl ced in the To-Be-Summarized File shall be summarized according to Paragraph 4.2 and filed with the summary sheet in the or final data volumes.

4.2 Summary Sl. ets

- Summary sheets, are to be serialized either at SwRI or at the site.
- (2) Summary sheets shall be completed for each examination area. In certain cases (studs, nuts, etc.), one summary sheet may be used for more than one examination area.
- (3) Summary sheets shall be completed prior to the conclusion of site activities for each examination area for which examination requirements have been completed.
- (4) Summary sheets shall be filed with the data in the original data volumes.

X-FE-101-3



NUCLEAR PROJECTS OPERATING PROCEDURE

August 1985

Page 5 of 6

4.3 Resolution Sheets

- Resolution sheets, are to be serialized either at SwRI or at the site.
- (2) The Level II or Level III examiner shall take the steps necessary to resolve the ultrasonic indications and complete a resolution sheet describing the results of his analysis. Any additional documentation required to support the resolution shall be attached.
- (3) Original data sheets and resolution records with indications requiring no further action shall be placed in the To-Be-Reviewed File and processed as specified in Paragraphs 4.1(5) and 4.1(6).
- (4) Data with indications requiring further action shall be handled in a manner established by the Director of the Department of Engineering Services.
- (5) Indications which have been deemed reportable and require customer disposition shall be reported on a CNF form. The CNF shall be completed in accordance with SwRI NOAP 13-1.

4.4 Strip Charts, Magnetic Tapes, Video Tapes

- Strip charts, magnetic tapes, and video tapes being generated during mechanized ultrasonic examinations shall be identified with a sequence number and with the examination areas for which they contain data.
- (2) During the resolution of any indications, the strip charts and tapes may be used by the Level II or Level III examiner, as needed.
- (3) The strip charts and tapes are then prepared for transmittal to SwRI.

4.5 Customer Data Review

The customer, at his option, may elect to review and approve the original NDE data prior to its shipment to SwRI.



X-FE-101-3



NUCLEAR PROJECTS OPERATING PROCEDURE

August 1985 Page 6 of 6

5. RECORDS

- 5.1 Prior to departing the site at the completion of a preservice or inservice examination, the original data package with the exception of trip charts, magnetic tapes, and videotapes shall be reproduced and a copy(ies) shall be transmitted to the appropriate site personnel. At no time will data be reproduced for this transmittal before the required examinations for a particular area are complete, the data have been reviewed, and the summary sheets have been completed.
- 5.2 After completion of site activities (or at other times deemed appropriate by the Inspection Engineer or Team Supervisor), the original data package shall be transmitted to SwRI in accordance with the latest revision of SwRI Nuclear Projects Operating Procedure XVII-AG-101.

SOUTH	WEST RESEARCH INSTITUTE NUCLEAR PROJECTS OPERATING PROCEDURE	X-FE-109-0 September 198 Page 1 of 3
Title	INDICATION EVALUATION GUIDELI	NES
	EFFECTIVITY AND APPROVAL	
Revision of this pl changes listed below.	rocedure became effective on <u>9/17/85</u> . This pr	ocedure consists of the pages and
Page No	Change	Date Effective
1 through 3		9/17/85
upersedes Procedure No.		SA
Supersedes Procedure No.		FLD
Supersedes Procedure No. Approvals Written By	Date Technical Review	FLD Date
Approvais	nderson Dete Technical Review	FLD Date 16509
Approvais	allowed I while the second	FLD Date

X-FE-109-0



NUCLEAR PROJECTS OPERATING PROCEDURE

September 1985

Page 2 of 3

INDICATION EVALUATION GUIDELINES

1. PURPOSE

The purpose of this guideline is to describe the general methodology to be applied for the evaluation of ultrasonic indications detected during preservice or inservice examinations.

2. SCOPE AND LIMITATIONS

This guideline applies to ultrasonic indications found during manual or mechanized examinations of welds and base material in vessels, piping, pumps, valves and bolting.

This guideline is intended to provide a consistent approach to the evaluation of indications. It is recognized that all steps in this guideline may not apply to every indication and in some instances additional steps may be required. Each indication should be evaluated on a case-by-case basis.

Sizing is not considered part of this guideline.

3. PERSONNEL REQUIREMENTS

Personnel evaluating indications shall be certified Level II or Level III in accordance with SwRI NQAP-11-1 "Special Process Control."

For the examination and resolution of IGSCC-susceptible welds in austenitic piping, examiners shall be qualified by EPRI (or equivalent) training.

4. EVALUATION PROCESS

In evaluating an indication, the following should be considered where practical and deemed necessary:

- 4.1 Evaluate the location of the indication with reference to L₀ and W₀ measurements and metal path.
- 4.2 Take outside and inside surface profiles using a contour gage and ultrasonic thickness measurements. Profiles shall be taken in line with the maximum amplitude position of the indication. Thickness measurements shall be taken at maximum intervals of 1/4 inch, except where inside surface contour is essentially flat, and can be verified by scanning over the surface.
- 4.3 Review previous examination data, including construction radiographs.

X-FE-109-0



NUCLEAR PROJECTS OPERATING PROCEDURE

September 1985

Page 3 of 3

- 4.4 Review fabrication drawing for geometry and weld preparation profile.
- 4.5 Plot metal path on scale drawing of component.
- 4.6 Determine repair history of component.
- 4.7 Perform supplemental nondestructive examinations. Use of supplemental examination methods are at the evaluator's discretion, but may include radiography, surface methods, visual inspection or alternative ultrasonic techniques. Some of the ultrasonic techniques which may be considered are:
 - (1) multiple beam angles
 - (2) different wave modes
 - (3) "creeping" wave technique
 - (4) SLIC-40 technique

5. RECORDS

The steps used to evaluate an indication shall be documented on the Indication Resolution Record or similar document. When used, the following will be referenced:

- (1) indication plots
- (2) calculations
- (3) cross section profiles
- (4) supplemental examination data
- (5) radiographs
- (6) sketches
- (7) photographs

The Indication Resolution Record shall contain the signature and level of certification of the individual performing the evaluation and final approval by a Level II or Level III.

	WEST RESEARCH INSTITUTE NUCLEAR PROJECTS OPERATING PROCEDURE	XIII-AG-101-2 September 198 Page 1 of 12
Title CONTROL OF N	UCLEAR INSPECTION EQUIPMENT AND MATERI	ALS
	EFFECTIVITY AND APPROVAL	
Revision of this pr changes listed below.	ocedure became effective on 10/4/82 . This prov	cedure consists of the pages an
Page No	Change	Date Effective
1-12	0	September 1982
		SA
Approvais		SA
Approvais Written 3y	Date Technical Review	SA CA Date
Written 3y		Date
and the second		CK

XIII-AG-101-2



NUCLEAR PROJECTS OPERATING PROCEDURE

September 1982

Page 2 of 12

CONTROL OF NUCLEAR INSPECTION EQUIPMENT AND MATERIALS

1. PURPOSE

1.1 The purpose of this operating procedure is to provide control for the storage, inventory, issue, shipment, and return to stock of examination equipment and materials.

SCOPE AND APPLICATION

- 2.1 The scope of this procedure is the control of nuclear examination equipment to ensure the integrity of equipment and materials used during the examination of nuclear power plant components. See NPOP VII-AG-102 for control of Search Units.
 - Controls are further required to ensure that maximum utilization is made of available equipment, i.e., equipment is not "lost" in the Radiation Control facility, delayed or misplaced during transit from job site to maintenance shops, or allowed to remain out of circulation for long periods of time while being used for research and development projects. The flow chart illustrates the control and process of nuclear inspection equipment (Attachment 1).
- 2.3 This procedure is applicable to, but not limited to, control of the following equipment and materials:
 - (1) Ultrasonic Examination Materials and Equipment
 - (2) Plastic Wedges
 - (3) Penetrant Examination Materials
 - (4) Magnetic Particle Examination Materials and Equipment
 - (5) Eddy Current Examination Equipment and Standards
 - (6) Mechanized Examination Equipment
 - (7) Data Acquisition Systems
- 2.4 The following documents form a portion of this procedure as applicable.
 - 2.4.1 SwRI Nuclear Quality Assurance Program Manual (NQAPM).
 - 2.4.2 Swal Radiological Health and Safety Manual.

SwRI Form 2A 3-2

XIII-AG-101-2



NUCLEAR PROJECTS OPERATING PROCEDURE

September 1982

Page 3 of 12

.

3. <u>RESPONSIBILITY</u>

- 3.1 The Vice President of the Quality Assurance Systems and Engineering Division shall designate one or more secure areas to be used for equipment and materials storage as control facilities.
- 3.2 Control facilities shall be operated by a Stock Clerk and an Equipment Clerk. The Stock Clerk will be under the supervision of Inventory Control Traffic Manager who will be responsible for inventory storage and issue of examination materials. The Equipment Clerk, under the supervision of the Supervisor, Administration Control, will be responsible for inventory, storage, issue and retrieval of controlled equipment.
- 3.3 Responsible users, such as Team Supervisors, shall be responsible for compiling a list, using SwkI Form SS-17 Equipment Control/ Shipping List (Attachment 2), of equipment and materials required for each job or project. They shall be responsible for shipment of the equipment to the job site, security while at the job site, reshipment upon completion of the job, documentation of faulty equipment, and turn-in of equipment and unused materials.
- 3.4 The Division Health Physicist or his representative shall be responsible for accepting equipment and materials returned from an inservice examination, its decontamination, and returned to its proper storage facility.
- 3.5 The Assistant Manager, Technical Activities Group, or his alternate shall be responsible for providing minimum maintenance turnaround time and for providing current certifications as required for nuclear examination equipment.

. PROCEDURE

- 4.1 New Equipment
 - 4.1.1 Newly purchased or fabricated critical equipment shall be inspected in accordance with SwRI Operating Procedure VII-AG-101 prior to being routed to the appropriate control facility.



SwRI Form CA 3-2

XIII-AG-101-2 September 1982



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 4 of 12

- 4.1.2 An identification number (serial number) will be assigned to noncapital equipment which does not have a manufacturer's serial number.
- 4.1.3 Upon completion of proper identification, new equipment will be listed on the control facility inventory records.
- 4.1.4 Once new equipment is properly identified and inventoried, it will be issued to the appropriate maintenance facility for an operational check and certification in accordance with NQAPM Procedure NQAP 10-1. The maintenance facility will return the equipment, along with copies of certifications generated, to the control facility. The new equipment may then be issued for nuclear inspection work.

4.2 Equipment and Materials Issue

- 4.2.1 When it is determined that equipment and/or materials are to be removed from the appropriate control facility, with the exception of equipment routed through the maintenance facilities (Paragraph 4.6.3), the Team Supervisor or Responsible User will compile a list or required equipment and materials needed using Form SS-17. The responsible supervisor shall complete each blank at the top portion of the form with no exceptions. On the second part of the form, he will list quantity and nomenclature of each item of equipment or materials required and indicate those which require certifications.
- 4.2.2 When the Team Supervisor or Responsible User has initiated Form SS-17, he may assign any technicise to draw and pack the equipment. The technician will present Form SS-17 to the appropriate control facility, and the Clerk will issue the material or equipment. The Clerk will enter appropriate serial number and estimated replacement cost of each item on Form SS-17 as the equipment is issued. He will also supply copies of appropriate certifications as required.
- 4.2.3 When requested equipment and materials have been issued, the technician will sign each Form SS-17, indicating that he has received the items for the responsible supervisor, and shall notify the QA Section so they can review the equipment and certifications.



R

NUCLEAR PROJECTS OPERATING PROCEDURE

XIII-AG-101-2 September 1982

Page 5 of 12

4.2.4 The Equipment Clerk will distribute Form SS-17 as follows:

- Copy 1 (white): Forward to the Division Shipping Agent
- (2) Copy 2 (yellow): Give to the person receiving the equipment
- (3) Copy 3 (pink): Retain for control purposes
- (4) Copy 4 (goldenrod): Will be given to QA when QA inspection is required. If a QA inspection is not required, this copy will be destroyed.

4.3 Equipment Packing and Shipping

- 4.3.1 If the equipment and/or materials are to be shipped from the Institute grounds, the technician will pack each item in numbered shipping containers. He will then enter the container number in the appropriate Box No. space on Form SS=17.
- 4.3.2 If the equipment is to be shipped by freight, a box count must be made and each box must be weighed. Shipping labals must be completed and affixed to each shipping container.
- 4.3.3 When the packing has been completed, the technician will return Copy 2 of Form SS-17 to the responsible supervisor who retains this copy for accountability of equipment while in his possession.
- 4.3.4 If equipment is to be shipped by freight, the responsible supervisor will contact the Requisitioning Agent, who will arrange for shipping and for the proper shipping documents to be completed.
- 4.3.5 The responsible supervisor will review Form SS-17, with special emphasis placed on ensuring that appropriate certifications are available for each item that requires certification.
- 4.4 Onsite Control
 - 4.4.1 The Team Supervisor or Project Engineer shall assume responsibility for the security of equipment once it has been drawn from the control facility. At the job site, he will obtain a secure area to be used for equipment storage

SwRI Form QA 3-2

XIII-AG-101-2



NUCLEAR PROJECTS OPERATING PROCEDURE

September 1982

Page 6 of 12

and will arrange for issue of the equipment or materials as the work load demands. He will ensure that equipment placed into onsite storage after use is dry and clean and that any equipment damaged or found to be inoperative or out of tolerance is tagged with a Form SS-19, "Hold Tag", to indicate its condition (Attachment 3).

- 4.5 Decontamination
 - 4.5.1 Equipment being returned from an inservice inspection must be delivered to a radiation control area immediately upon return to the Institute. This equipment will be controlled in accordance with SwRI Radiological Health and Safety Manual, Paragraph 5.2.
- 4.6 Equipment/Material Turn-in
 - 4.6.1 Upon completion of a project or the return to the Institute of equipment used off the grounds, the equipment will be returned to the control facility. (See Paragraph 4.6.2 when returning from an inservice examination.) As each item is checked in, the Equipment Clerk will enter the date in the Date Returned block of copy 3 of the Form SS-17. He will also initial in the Date Returned block of copy 2 of the Form SS-17 when requested.
 - 4.6.2 Expendable materials such as Penetrant Examination Material and Magnetic Particle Examination Materials will be returned to the stock room. When the Stock Clerk can determine that the material has not been used and identifying data is available to trace the material to the appropriate certificates and to the original purchase order, he will credit the appropriate job site by processing an appropriate store requisition.
 - 4.6.3 Equipment and material being returned from an inservice examination must be delivered to a radiation control area immediately upon return to the Institute. The Health Physicist representative will inventory equipment and material and acknowledge responsibility for it. Equipment and material that is not contaminated or that is decontaminated will be returned to the appropriate storage facility according to 4.6.1 and 4.6.2 above. Equipment that cannot be decontaminated will be stored in the appropriate control area and the Health Physicist representative will inform the Assistant



XIII-AG-101-2

September 1982



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 7 of 12

Director, Engineering Services Division, and the Equipment Control Clerk in writing of the nomenclature and the serial number of the equipment, and the site the equipment came from.

- 4.6.4 The Equipment Clerk will check each item for disposition. Equipment requiring repair, cleaning, or recertification/ recalibration within the next 30 calendar days will be taken to the appropriate maintenance facility.
- 4.6.5 When repair and/or certification is completed, the item will be returned to the control facility and placed in stock for reissue.

4.7 Special Issue Requirements

- 4.7.1 Occasionally it will be necessary for a Team Supervisor who is in the field to request that equipment be checked cut and sent to him. When this circumstance arises, he will contact the Examination Activities Coordinator or his alternate and make his needs known. The Examination Activities Coordinator or his alternate will initiate Form SS-17 and draw, pack, and ship the equipment. He will perform the review and enclose Copy 2 of Form SS-17 in the shipping container so that the Team Leader will have a record of what was actually shipped.
- 4.7.2 If equipment is to be shipped from one job location to another without returning to the Institute, a packing list will be made using Form SS-17. One copy will be retained by the responsible person making the shipment, one copy will be enclosed with the shipment, and one copy will be returned to the control facility at the Institute. The responsible supervisor will review the Form SS-17 to ensure that certificates were included as required.

4.8 Lost or Destroyed Equipment

4.8.1 In the event any item other than normally consumable materials is lost or destroyed while it is signed out of the control facility, the responsible supervisor will initiate a memorandum addressed to the Assistant Diroctor, Engineering Services Division, with a copy to the Manager of Support and Administration and the Supervisor, Administration Control. The memorandum will identify the equipment and describe the circumstances involved with its loss or destruction.

SwRI Form QA 3-2

XIII-AG-101-2 September 1982



NUCLEAR PROJECTS OPERATING PROCEDURE

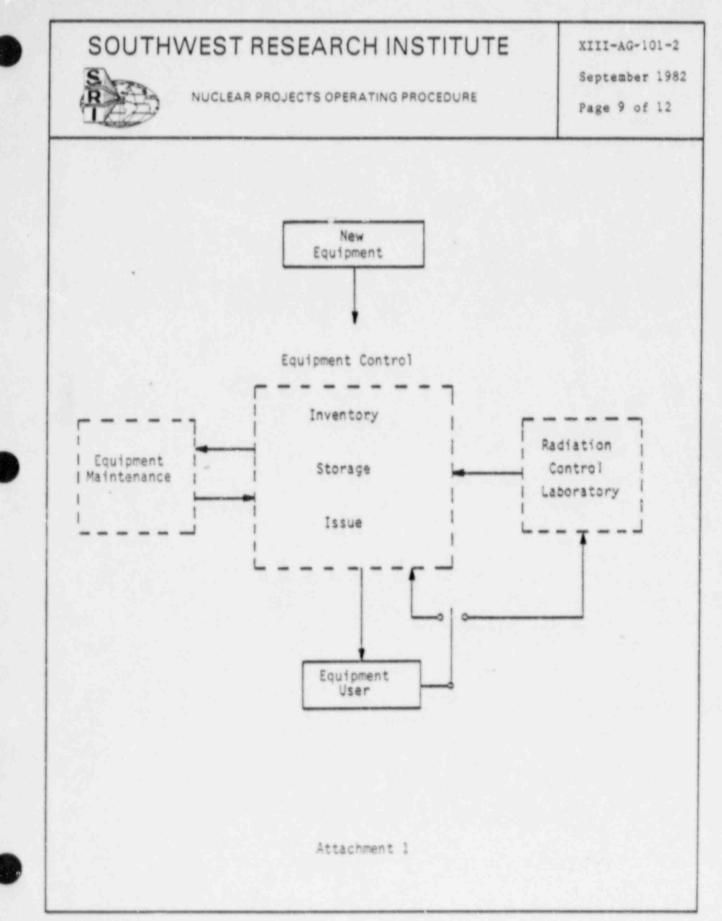
Page 8 of 12

4.9 Recall of Equipment for Recalibration

4.9.1 When notified that a particular piece of equipment is due recalibration, the Equipment Clerk will determine the location of the equipment by reviewing his equipment inventory records. If the equipment is located within the stock room, he will take the equipment to the appropriate certifying facility. When the equipment has been issued, he will notify the Assistant Manager, Technical Activities Group, or other responsible supervisor by completing a Form SS-42 (Attachment 4). The Activity Coordinator or responsible supervisor will ensure the equipment is sent to the Equipment Clerk on or before the recalibration date. The Equipment Clerk will then take it to the appropriate certifying facility.

Note: If a particular piece of equipment is being used in a non-critical application, it need not be returned until completion of the project.

- 5. RECORDS
 - 5.1 Copy 3 of Form SS-17 shall be maintained by the control facility for a minimum of six months after the last item on the form was turned in.
 - 5.2 SwRI Form SS-42 may be destroyed upon return of equipment to the stock room.
 - 5.3 The Equipment Clerk will maintain a file of current equipment certification records. An adequate number of copies will be included for issue during equipment issue.



SwRI Form QA 3-2

S R

NUCLEAR PROJECTS OPERATING PROCEDURE

XIII-AG-101-2 September 1982 Page 10 of 12

			CONTROL /			615	sт		DATE	PAGES
ROJEC	T NO.	BITE		DATE REQUIRE	0			\$H1		NOD
ESPON	SINCE SUPER	VISOR		1			-	APP	NOX. RETUR	IN SATE
Clavino 34	-		NOMENCLATV	*1	GUANTITY (\$504ED	¥0#	c087	CANTS CANTS CANDID	RETURN	DATÉ
-								_		
-					-	-		_		
+		_				_	-	_		
+										
+		_			-					
+					-	-				
-					-	-	_			
-					+	-	-	-		
+					-	-		-		
				TOTAL	1	-				

This Form is a 4 copy form, Page 1 is white, Page 2 is yellow, Page 3 is pink, and Page 4 is goldenrod.

Attachment 2

SAMPLE FORM



September 1982 NUCLEAR PROJECTS OPERATING PROCEDURE Page 11 of 12 HOLD Said Form SS-19 DO NOT USE 2 11 1 REASON FOR HOLD NAME

SOUTHWEST RESEARCH INSTITUTE

XIII-AG-101-2

Attachment 3

SAMPLE FORM

SwRI Form QA 3-2

NUCLEAR PROJECTS OPERATING PROCEDURE

SR

	CALIBRATIO	N NOTICE	
	PROM		DAYE
THE EQUIPMENT LISTED BELD PLEASE RETURN THIS EQUIP POSSIBLE	WENT TO THE	REGALIBRATION AB	HOICATED TOOM AS
-	BERAL NUMBER	RECALIBRATION DATE	LOCATION
weather weather the local states and the second states and the			
			and the second secon
and see the second s			
			and the second se
and the second se			
The second s	sector designment with the sector designment of the	And a state of the	Stream in the state of the super-

XIII-AG-101-2

September 1982

Page 12 of 12

Recalibration Notice (SwRI Form SS-42)

> Attachment 4 SAMPLE FORM

1.1

	NUCLEA	RCH INSTITUTE R PROJECTS G PROCEDURE	XVII-AG-101-3 November 1987 Page 1 of 7
litie	DATA	STORAGE AND RETRIEVAL	
		TIVITY AND APPROVAL	
changes listed below.	his procedure became effec		procedure consists of the pages and Date Effective
Page No	altyler	<u>Change</u>	Neveabor 2087
1-7	4/2		30 November 1987
upersedes Procedure XVII-AG-101-2	No.		SA FLD
upersedes Procedure XVII-AG-101-2 Ipproveis Written By Sonaldh	Date	7-87 Shully H.	Heller 11/2-18

XVII-AG-101-3



NUCLEAR PROJECTS OPERATING PROCEDURE

November 1987

Page 2 of 7

DATA STORAGE AND RETRIEVAL

1. INTRODUCTION

1.1 This procedure establishes a system for the control and the orage of data for nuclear power plant components classified by ANSI N45.2.9, "Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants." This operating procedure satisfies the requirements of Appendix B to 10CFR50, Criterion XVII, and the SwRI Nuclear Quality Assurance Program Manual.

1.2 Scope and Application

- 1.2.1 The scope of this procedure is limited to the documentation of nuclear power plant examinations performed by NDE Field Services, Nondestructive Evaluation Science and Technology Division, and to other documentation as designated by the Vice President, Nondestructive Evaluation Science and Technology Division.
- 1.2.2 This procedure applies to the Data Control Clerk, Team Supervisors, Inspection Engineers, and all other personnel who enter documents into and receive them from the Data Storage Facility.
- 1.2.3 Other divisions of the Institute may store quality assurance records for nuclear power plants in the Data Storage Facility. Once these records have been entered in the facility, they will be controlled according to this procedure.

1.3 <u>Responsibility</u>

- 1.3.1 The Manager of Support and Administrative Services within the Nondestructive Evaluation Science and Technology Division shall be responsible for the implementation and control of this procedure.
- 1.3.2 The Data Control Clerk for Support and Administrative Services shall be responsible for controlling, filing, and maintaining documentation covered by this procedure in the Data Storage Facilities. The Data Clerk shall assume this responsibility when documents are received in accordance with Paragraphs 2.1, 2.2, and 2.3.

XVII-AG-101-3



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 3 of 7

- 1.3.3 Team Supervisors, Inspection Engineers, or their designated alternates shall be responsible for ensuring completeness and accuracy of docume station being entered into the Data Storage Facility (see Section 2).
- 1.3.4 The Manager of Support and Administrative Services, or a representative, shall routinely review the performance of the Data Storage Facility against the requirements of this procedure.

1.4 Data Storage Facility Description

The Data Storage Facility for SwRI-retained quality assurance records is located in Building 139. The construction of the facility in Building 139 is concrete block with steel vault door. The facility has a temperature control device to regulate temperature and humidity.

2. PROCEDURE

- 2.1 Examination data and related material being sent to SwRI will be listed on Form SS-1, "Data Records Transmittal and Receipt" (see page 7). Upon completion of the form and its arrival with the data at the Institute, they will be delivered to the Data Control Clerk.
- 2.2 Upon receipt of the 'ata, the Data Control Clerk will use the transmittal form as a check'sst to ensure that all material listed has been received. The Data Clerk will inventory the data by preparing a listing of Summary Sheet numbers or by entering the Summary Sheet number on a weld table. The Data Clerk will also ensure that each Examination Data Sheet listed on each Summary Sheet is in the Data Package. In those cases where a Summary Sheet is not used or has not been prepared at the time of receipt of the data, the Data Clerk will prepare a listing showing the serialized number of each 'ata sheet received. The completed inventory will be filed in Section. A of the file system. In addition, the Data Control Clerk will ensure that all documentation to be stored contains the following:
 - (1) Reactor Site Name
 - (2) Date of Record Entry
 - (3) <u>Descrip on of Material</u>. Video tapes, strip charts, and computer disks will identify the examination to which they relate and will be numbered. This information is entered by the Team Supervisor, the Inspec ion Engineer, or their designated alternates.

SwRI Form QA 3-2

XVII-AG-101-3



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 4 of 7

The Data Control Clerk will then enter the data into the Data Storage Facility.

- 2.3 PSI and ISI reports, other nuclear power plant examination reports, examination plans, etc. relating to a particular reactor will be furnished to the Data Control Clerk by the Report Coordinator.
- 2.4 Other records may be furnished to the Data Control Clerk for storage when approved by the Vice President, Nondestructive Evaluation Science and Technology Division.
- 2.5 Items being removed from the Data Storage Facility shall be signed out. Original field data will be returned to the Data Storage Facility at the end of each day. If these data need to be used after normal working hours, special arrangements will be made with the Data Control Clerk. Other items may be signed out for the period required. The individual withdrawing data or other material shall be responsible for its safekeeping and return.
- 2.6 The Data Storage Facility will be maintained in a neat and orderly manner. Records will be inside file cabinets or bookcases. Loose papers, drawings, etc. shall be placed in folders, binders, or envelopes for filing.

3. <u>RECORDS</u>

- 3.1 The Data Control Clerk will maintain an up-to-date list of records covered by this procedure and a list of their respective locations.
- 3.2 Data maintained in the Data Storage Facility will be retained for the periods indicated in Appendix A or according to written instructions furnished to the Data Control Clerk at the time the records are placed into the Data Storage Facility. The period of retention will in no circumstance be shorter than the time specified in the applicable contract.
- 3.3 Project Managers should review the records in the Data Storage Facility relating to closed projects to determine their ultimate dispositioning; i.e., return of records to client upon termination of contract, continuous storage in the Data Storage Facility, etc. Decisions should be coordinated with the appropriate Director, and the Data Control Clerk should be notified in writing. The Data Control Clerk will comply with the written instructions.







R

NUCLEAR PROJECTS OPERATING PROCEDURE

November 1987

Page 5 of 7

Retention Period

Lifetime of the

transferred to the

Plant (; until

Client

APPENDIX A

The following is a list of documentation and its retention periods as maintained by Data Control in the Data Storage Facilities.

Record Type

 PSI, ISI, and other examination reports, which include:

> Personnel certifications Search unit, material, and instrument certifications Zero reference location Weld identification isometric drawings Calibration standards Nondestructive testing procedures

(2) PSI, ISI, and other examination data, which include:

> Original data Video tapes Computer disks Eddy current data Eddy current tapes Strip charts Equipment calibration sheets

(3) PSI, ISI, and other examination plans

 Logs, drawings, and summaries created by fiel crews during an ISI or PSI

(5) General information that would be of value in conducting future ISIs

(6) Photographs relating to nuclear power plants

Lifetime of the Plant or until transferred to the Client

Lifetime of the Plant or intil trans ed to the Client

Lifetime of the Plant or until transferred to the Client

Lifetime of the Plant or until transferred to the Client

As determined by the Project Manager

SwRI Form QA 3-2

S	01	JTH	WEST	RESEAR	RCH	INSTITUTE	
---	----	-----	------	--------	-----	-----------	--

XVII-AG-101-3

R

NUCLEAR PROJECTS OPERATING PROCEDUPE

November 1987

Page 6 of 7

- (7) Copies of procedures; personnel, material, and instrument certifications; and other report data
- (8) Other general information that will not provide valuable information in conducting future ISIs

Destroy 6 months after issuance of Final Report

Destroy after 2 years

XVII-AG-101-3



NUCLEAR PRO. TTS OPERATING PROCEDURE

November 1987

Page 7 of 7

90M	SITE PROJECT NO	T01	DATA CONTROL CLERK DIVISION 17 SWR
CHECX		IN OF DATA RE	
APPLICABLE BOX			NO. OF VOLUMES
	EXAMINATION DATA SHEP J		
	CERTIFICATIONS		NO. OF VOLUMES
	EXAMPLATION PLAN		NO. OF VOLUMES
	MECHANIZED SCAN PLAN		NO OF VOLUMES
	VIDED TAPES		NO. OF TAPES
	STRIP CHARTS		NO. OF ROLLS
		1.1.1.1	
OTHER DATA AND C	COMMENTS		
SIGNA TURE :			

SwRI Form QA 3-2

APPENDIX D

SOUTHWEST RESEARCH INSTITUTE NONDESTRUCTIVE TESTING PROCEDURES

APPENDIX D

SOUTHWEST RESEARCH INSTITUTE NONDESTRUCTIVE TESTING PROCEDURES

Table of Contents

.

.

Procedure No./Rev.	Title
SwRI-NDT-200-1/70 Dev. 3	Solvent-Removable Liquid Penetrant Color Contrast Examination
SwRI-NDT-300-1/23	Dry Powder Magnetic Particle Examination
SwRI-NDT-300-1/35 Dev. 2	Dry Powder Magnetic Particle Examination
SwRI-NDT-300-2/42 Devs. 1, 2	Fluorescent Magnetic Particle Examination
SwRI-NDT-600-31/23 Dev. 1	Manual Ultrasonic Examination of Austenitic Pressure Piping Welds
SwRI-NDT-600-41/8 Devs. 1, 2, 3, 4	Manual Ultrasopic Examination of Ferritic Pressure Piping Welds
SwRI-NDT-600-41/16 Dev. 1	Manual Ultrasonic Examination of Ferritic Pressure Piping Welds
SwRI-NDT-800-94/2 Dev. 1	Manual Ultrasonic Examination of Cylindrical and Conical Sections of BWR Feedwater Nozzles
SwRI-NDT-800-100/2 Dev. 1	Manual Ultrasonic Examination of Corrosion-Resistant Clad Piping Welds at Hope Creek

. 1

8

	PRO	CEDURE	DEVIATION	Page 1 of p Page
Procedure SwRI-NDT- 200-			Revision No.	Deviation No.
the second second second second second second second	1 nination areas are affected !	by this deviation	70	3
Liquid penetran	t examinations to be perf	ormed in accor	dance with this procedure.	
The following parag	graphs shall be deviated fro	m as indicated:		
Change Section 8	8 Recording Criteria to re	ad as follows:		
8. RECORDING	G CRITERIA			
	shall be recorded in acco Projects Operating Proc		e techniques outlined in the 16.	applicable revision
8.1 Line	ar Indications			
			SwRI Liquid Penetrant Exar ith the recording criteria tab	
No	ominal Wall Thickness (Inches)		rall Indication Length ined in Attached Figure 1 (Inches)	
1.0	ss than 1.0) to less than 2.5 5 and greater		1/8 3/16 1/4	
(Continued on P	and the second se			
Rationale for deviati This deviation in		eria as request	ed by Public Service Electric	c and Gas Company.
Deviation Affects Qualification	YES NO		qualific	deviation is determined to affect the procedure cation, the deviation shall be qualified in sunce with Procedure IX-PE-107.
		APPROVAL	S	SA FLD
Written by:		Date:	Technical Review	1. Andle tel # ans ar
zaway)	f Derge	15FE8.88	Verbal Approval Given?	Y's No Date:
Janager of Q.A.: 7		Date: 2/15/88	Bridy L. Lagleder	for DER 15Feb 58
RI FORM FE-4-6			0 0	0

-

PROCEDURE DEVIATION Procedure SwRI-NDT-200-1 Revision No. 70 Visition No. 3 Page 2 of 2

The following paragraphs shall be deviated from as indicated (Cont.):

NOTE

For Preservice examination, indications with a length of 1/16 inch in ferretic piping less than .312 inches in thickness shall be recorded.

Rounded indications shall be recorded based on diameters corresponding to the linear indication recording criteria and reported to the customer for disposition.

When conditions limit the area of examination, the limitations shall be recorded.





South	NUC	LEAR P	ROJECT	S		Rey Jui	RI-NDT-20 vision 70 ne 1987 ge 1 of 1)
Title SOLVENT-REMO	VABLE LIQ:	JID PENET	RANT COLOR	CONTRAS	ST EXAM		<u>se i ot i</u>	
Revision <u>70</u> of this pro be effective concurrently.	cedure bacam		TY AND APP		ner revision	ns of the b	ase docume	nt may
Approvals							S	FLD
Written By M Change	hui	Date 10-54 1987			d'	7	1	te I_ 1987
Manager of Q.A. Strum Mas	la S	- Date 18 Jun 19 P	E Mila	ht Director	1.7	lack	04	12/0
The following inform Deviation No.	nation may b	e used for co	nveniance. Co	mpletion o	of this port	ion is not	mandatory.	
Date Effective	-							
Procedure Section(s) Affected								
Notes:								•

SwRI-NDT-200-1 Revision 70 June 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 2 of 16

SOLVENT-REMOVABLE LIQUID PENETRANT COLOR CONTRAST EXAMINATION

SWRI-NDT-200-1

1. PURPOSE

This procedure provides the technical information and detailed steps required to ensure proper liquid penetrant examination of nonporous austeritic or carbon steel materials in accordance with the applicable American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Codes.

- 2. SCOPE AND APPLICATION
 - (1) The color contrast method of solvent-removable liquid penetrant examination shall be employed as specified in this procedure for detection of surface discontinuities in austenitic or carbon steel material.
 - (2) Components and welds to be examined are specified in the applicable Southwest Research Institute (SwRI) Examination Plan.

3. APPLICABLE DOCUMENTS

- (1) ASME Boiler and Pressure Vessel Code, Section XI, 1983 Edition with Addenda through Summer 1983, "Rules for Inservice Inspection of Nuclear Power Plant Components"
- (2) ASME Boiler and Pressure Vessel Code, Section V, 1983 Edition with Addenda through Summer 1983, "Nondestructive Examination"
- (3) SwRI Nuclear Quality Assurance Program Manual (NQAPM)
- 3.1 Applicable Examination Record

SwRI-NDTR Form No. 17-11, revision dated 1-3-79

4. RESPONSIBILITY

(1) The Director of the Department of Engineering Services, Nondestructive Evaluation Science and Technology Division, shall be responsible for the preparation, review, approval, and control of this procedure.

SwRI-NDT-200-1 Revision 70 June 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 3 of 16

- (2) The Project Manager shall be responsible for the implementation of this procedure in accordance with the NQAPM specified in the applicable SwRI Project Plan.
- (3) The examiner shall be responsible for implementing the requirements of this procedure.
- (4) The Manager of the Support and Administration Section, Nondestructive Evaluation Science and Technology Division, shall be responsible for storage of records generated in accordance with this procedure.

5. PERSONNEL AND EQUIPMENT

5.1 Personnel Certification

Personnel performing examinations shall be certified in accordance with SwRI NQAP 11-1, "Special Process Control."

5.2 Material/Equipment Certification

The penetrant materials used shall be certified for residual sulfur content and total residual halogens in accordance with SD-129 and SD-808 of Article 24, Section V.

Certified reports for all surface contact materials to be used for penetrant examinations, giving batch numbers and analysis results, shall be obtained from the supplier. Copies of the certified reports shall be retained with the examination records.

Equipment used to measure surface and penetrant temperature shall have been calibrated and certified, and shall display a valid calibration tag as required by NQAP 10-1.

5.3 Materials and Equipment

The following materials and equipment shall be used for examinations performed in accordance with this procedure:

- (1) Precleaner Spotcheck, Type SKC-S
- (2) Penetrant Spotcheck, Type SKL-HF/SKL-S or SKL-HF/S
- (3) Penetrant Remover Spotcheck, Type SKC-S
- (4) Developer Spotcheck, Type SKD-S
- (5) A thermometer, certified as described in Paragraph 5.2



R

NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-200-1 Revision 70 June 1987

Page 4 of 16



5.4 Safety Precautions

Safety precautions in accordance with instructions furnished with each manufacturer's penetrapt material shall be observed. Highly volatile solvents shall be used cautiously since the vapors may be toxic and the liquids may irritate the skin. Extreme care should be exercised in handling highly flammable solvents.

6. EXAMINATION METHOD

6.1 Surface Condition

Unless otherwise specified by the customer, all penetrant examinations shall be performed on components in their final surface condition.

The surface to be examined and all adjacent areas within 1 inch shall be dry and free from dirt, grease, lint, scale, welding flux, weld spatter, oil, paint, or any other extraneous matter to the extent that it shall not obscure surface openings or otherwise interfere with the examination.

CAUTION

Blasting with shot or dull sand may peen discontinuities on the surface and shall not be used.

NOTE

Where surface conditions are not in accordance with Paragraph 6.1 and correction is not feasible, SwRI will conduct the examination only at the request of the customer. The specific surface condition and its probable effect on the examination shall be noted on the SwRI Liquid Penetrant Examination Record.

6.2 Preexamination Cleaning

The surface to be examined and adjacent areas within at least 1 inch shall be thoroughly washed with precleaner in such a manner that foreign material and contaminants are removed.

The examination surface shall then be wiped dry with a lint-free cloth or absorbent paper, allowing a minimum of 5 minutes for complete evaporation.

SWRI-NDT-200-1 Revision 70 June 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 5 of 16

6.3 Temperature Readings

After preexamination cleaning and before application of penetrant, the temperature of the examination surface and penetrant shall be measured and recorded on the SwRI Liquid Penetrant Examination Record. The serial number of the thermometer used shall also be recorded. The temperature of the penetrant and the surface shall not be below 60°F nor above 125°F throughout the examination period.

Application of Penetrant 6.4

Co

The penetrant shall be taken from a pressurized container to ensure its purity. It shall be applied by brushing or spraying and shall evenly cover all areas of the surface being examined.

The allowable minimum and maximum penetrant dwell times shall be as follows:

omponent Temperature (°F)	Dwell Time (Minutes)
60-70	20-30
71-90	10-30
91-100	10-20
101-125	10-15

When examinations are to be performed on components whose temperature is below 60°F or above 125°F, this procedure shall be qualified in accordance with the requirements of Section V, Article 6, Subarticle T-647.

The penetrant shall not be allowed to dry. If drying occurs, the penetrant shall be removed and the process repeated, starting with the preexamination cleaning of Paragraph 6.2.

Removal of Excess Penetrant 6.5

Initially, the excess penetrant shall be removed by wiping the surface with clean, dry, lint-free cloths or absorbent paper until most traces of excess penetrant have been removed.

A clean, dry, lint-free cloth or absorbent paper shall then be moistened with penetrant remover, and the surface shall be wiped lightly until all remaining traces of excess penetrant have been removed. Extreme care shall be employed to avoid the use of an excessive amount of remover in order to preclude the removal of penetrant from discontinuities.

The surface shall not be flushed nor receive direct application of remover prior to the application of the developer.



SwRI Form QA 3-2

SwRI-NDT-200-1 Revision 70 June 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 6 of 16

6.6 Drying

The surface shall be completely dry prior to the application of the developer.

Drying time shall be a minimum of 5 minutes to a maximum of 30 minutes after the excess penetrant has been removed.

6.7 Application of Developer

After sufficient agitation of the pressurized container to ensure that the particles in suspension are dispersed, a smooth, uniform layer of the suspended powder shall be sprayed onto the surface.

The developer shall be used sparingly. The proper developer thickness will dry to a thin, translucent layer. If the coating is too thick, it may mask indications. The examination surface shall be observed during the application of the developer to monitor the behavior of indications which tend to bleedout profusely.

Final interpretation of indications shall be made a minimum of 7 minutes to a maximum of 30 minutes after the developer has been applied.

7. EXAMINATION

7.1 Examination Areas

- (1) The examination area for Class 1 and 2 longitudinal and circumferential welds shall be the weld and adjacent base material for a distance of 1/2 inch on each side of the weld as shown in attached Figure 1.
- (2) Class 1 longitudinal welds shall be examined along the entire length of the weld during the preservice examination and for at least one pipe-diameter length or 12 inches, whichever is less, from the fusion line of the intersecting circumferential weld during inservice examinations.
- (3) Class 2 longitudinal welds shall be examined for at least 2-1/2t length from the fusion line of the intersecting circumferential weld during preservice and inservice examinations.

SwRI-NDT-200-1 Revision 70 June 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 7 of 16

(4) The examination area for Class 2 branch connections shall be the weld and 1/2 inch of base material on each side of the weld fusion line, and for Class 1 branch connections the examination area shall be as shown in Figure 2.

EXCEPTION

If the Class 2 branch connection is a set-in type, the examination area shall be the weld, 1/2 inch of base material on the main run pipe side from the weld fusion line, and the base material on the branch pipe side from the weld fusion line to the end of the radius section.

- (5) The examination area for Class 1 and 2 support attachments, integral attachment welds, and support circumferential weld joints shall be the weld and 1/2 inch of base material on each side of the weld fusion line as shown in Figure 3 or Figure 4, as applicable.
- (6) The examination area for Class 1 socket welds in piping shall be the weld, 1/2 inch of base material on the pipe side, and 1.0 inch of base material on the fitting side as shown in attached Figure 1.
- (7) The examination area for control rod drive housing welds shall be as shown in attached Figure 5.
- (8) The Examination areas for vessel head-to-flange weld joints shall be as shown in Figure 4.
- (9) The examination areas for Class 2 nozzles shall be as shown in Figure 6.

7.2 Examination Methods

Examinations shall be performed by placing the eye within 24 inches of the surface to be examined and at an angle no less than 30 degrees with the surface to be examined. A mirror may be used to improve the angle. In addition to general lighting, additional illumination of the examination area shall be provided at right and oblique angles to expose indications. The illumination shall be adequate to ensure no loss of sensitivity.



SwRI Form QA 3-2

SwRI-NDT-200-1 Revision 70 June 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 8 of 16

If the examination surface is sufficiently large to preclude complete examination within the prescribed times, the surface shall be examined in suitable increments.

7.3 Postexamination Cleaning

The developer and penetrant shall be removed by wiping the surface thoroughly with cloths saturated with a suitable solvent. Spraying directly on the examination areas with pressurized containers shall be allowed for postexamination cleaning.

The surface shall then be wiped dry with clean, lint-free cloths or absorbent paper.

7.4 Reexamination

Indications that are believed to be nonrelevant shall be reexamined to verify whether actual defects are present. Surface conditioning may precede the reexamination. Nonrelevant indications and broad areas of pigmentation that would mask indications are unacceptable.

NOIE

Indications that are obviously nonrelevant such as stamp marks or radiograph punch marks, shall only be recorded as a general remark on the SwRI Liquid Penetrant Examination Record.

8. RECORDING CRITERIA

Indications shall be recorded in accordance with the techniques outlined in the applicable revision of SwRI Nuclear Projects Operating Procedure IX-FE-116.

8.1 Linear Indications (Class 1 and Class 2)

Linear indications in welds, base material, and support attachments shall be recorded on the SwRI Liquid Penetrant Examination Record and reported to the customer in accordance with the recording criteria table below:

Nom. Wall Thickness (Inches)	Overall Indication Length As Defined in Attached Figure 7 (Inches)
Less than 1.0	1/8
1.0 to less than 2.5	3/16
2.5 and greater	1/4



SwRI-NDT-200-1 Revision 70 June 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 9 of 16

EXCEPTION

In Class ? nozzles, the following linear indications shall be recorded: any linear indication greater than 1/16 inch long for materials less than 5/8 inch thick, greater than 1/8 inch long for materials from 5/8 inch to less than 2 inches thick, and 3/16 inch long for material 2 inches and greater in thickness.

8.2 Rounded Indications (Class 2)

Rounded indications shall be recorded as follows:

- Rounded indication with dimensions greater than 1/8 inch for thicknesses less than 5/8 inch and dimensions greater than 3/16 inch for thicknesses 5/8 inch and greater.
- (2) Four or more rounded indications in a line separated by 1/16 inch or less.
- (3) Yen or more indications in any six square inches of area whose major dimension is no more than 6 inches with the dimensions taken in the most unfavorable location relative to the indications being evaluated.

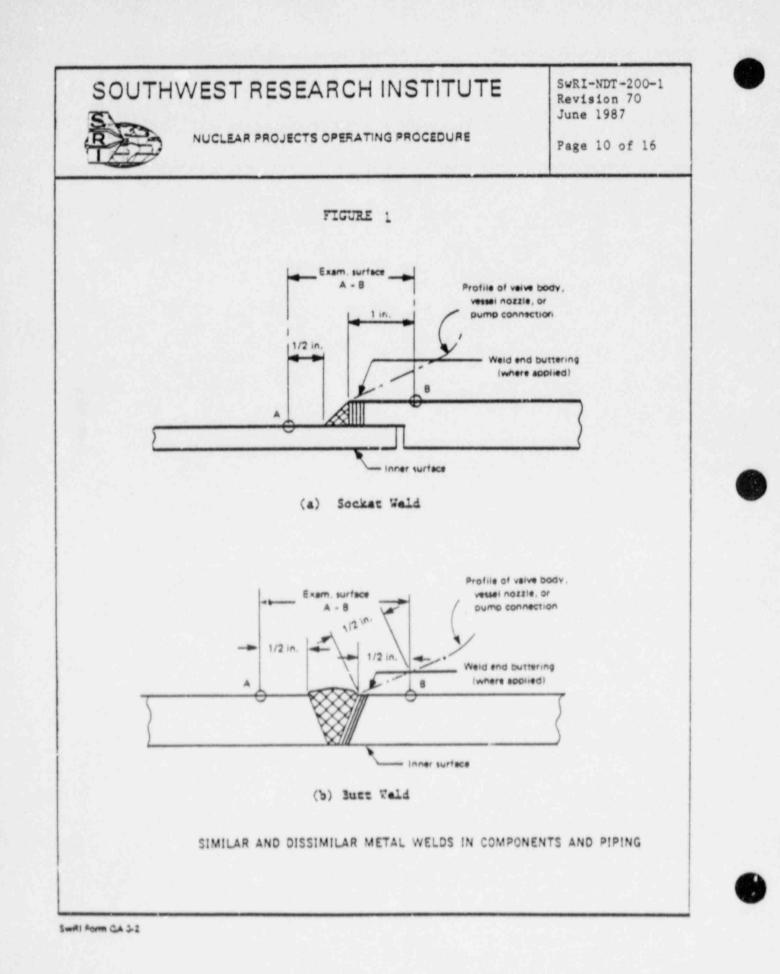
When conditions limit the area of examination, the limitations shall be recorded.

9. EVALUATION

Initial evaluation of reportable indications shall be performed by SwRI personnel, and shall be conducted in accordance with the applicable ASME Boiler and Pressure Vessel Code, Section XI, Article IWA-3000. Final evaluation and disposition of reportable indications shall be the responsibility of the customer.

10. RECORDS

Documents generated in accordance with this procedure shall be stored as specified in the SwRI Project Plan. The customer shall receive copies of these documents in the Examination Report, unless specified otherwise in the SwRI Project Plan.



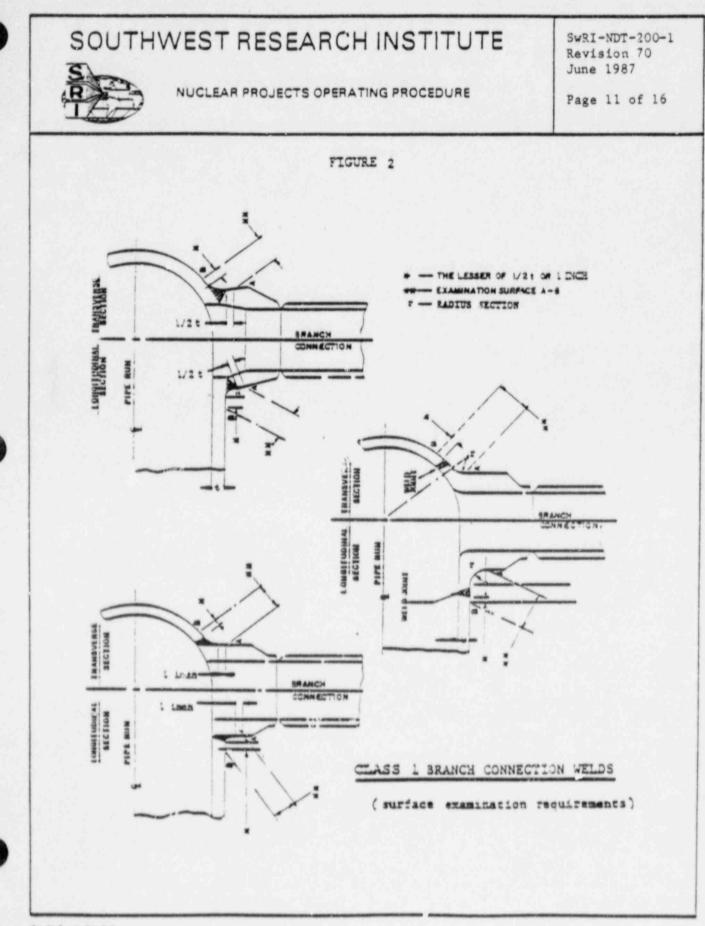
.

1

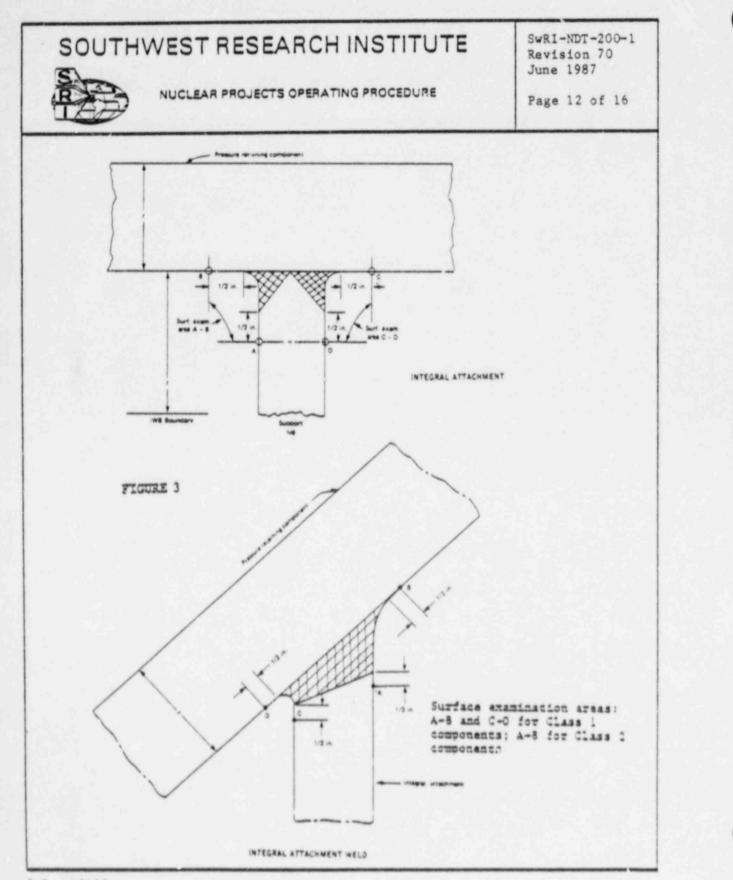
0.

.

8



SwAI Form QA 3-2



.

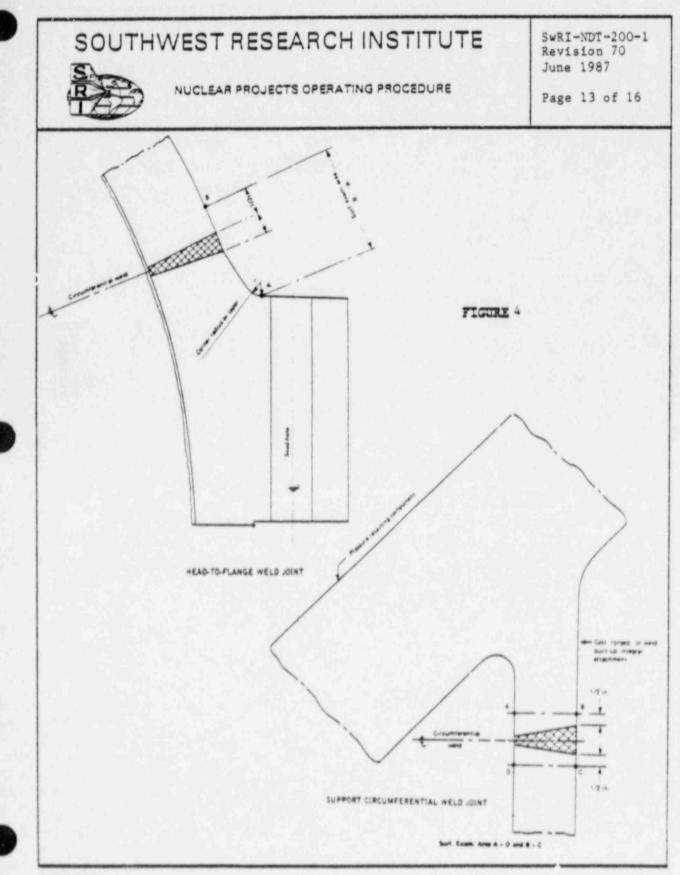
3

Switt form CA 3-2

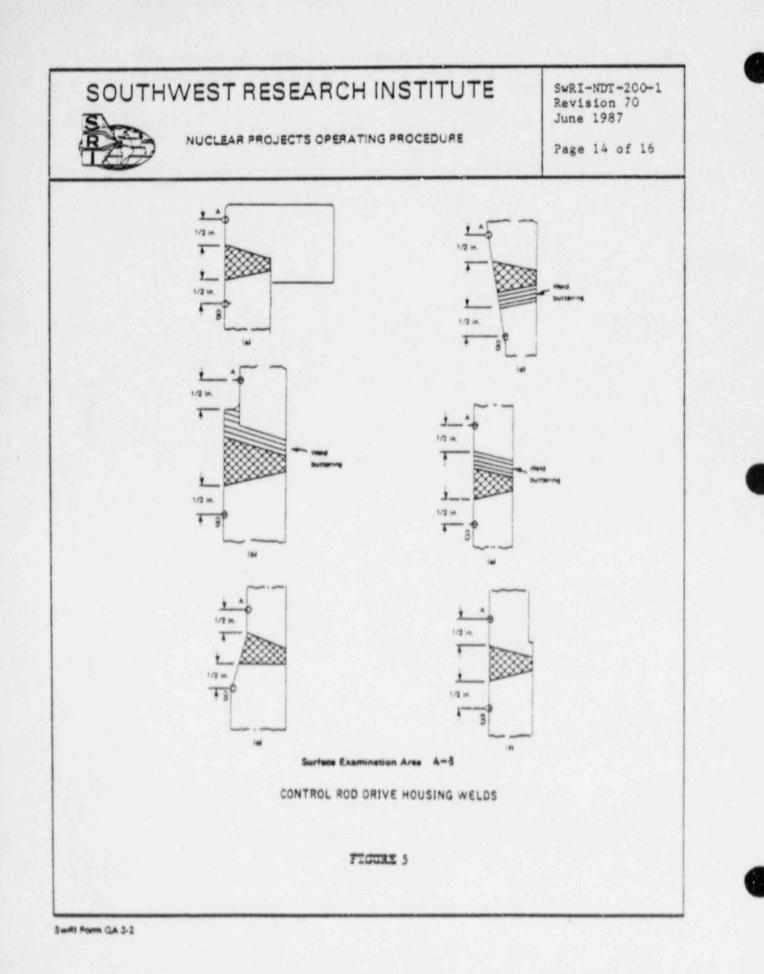
1.

M

.



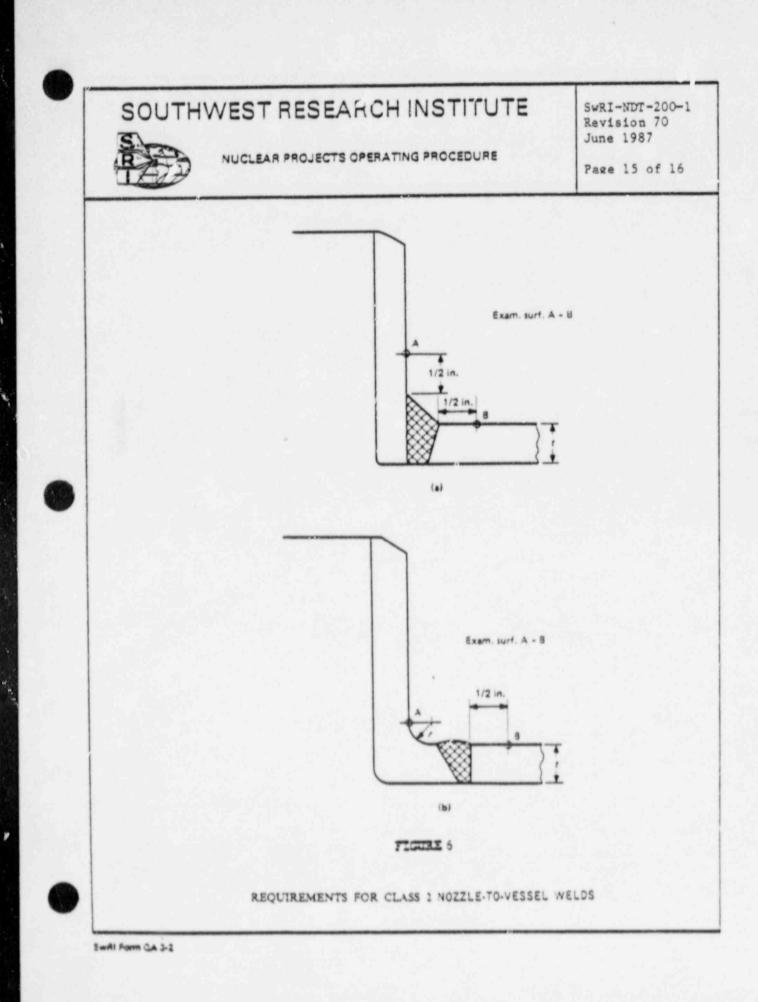
Swift Form CA J-2



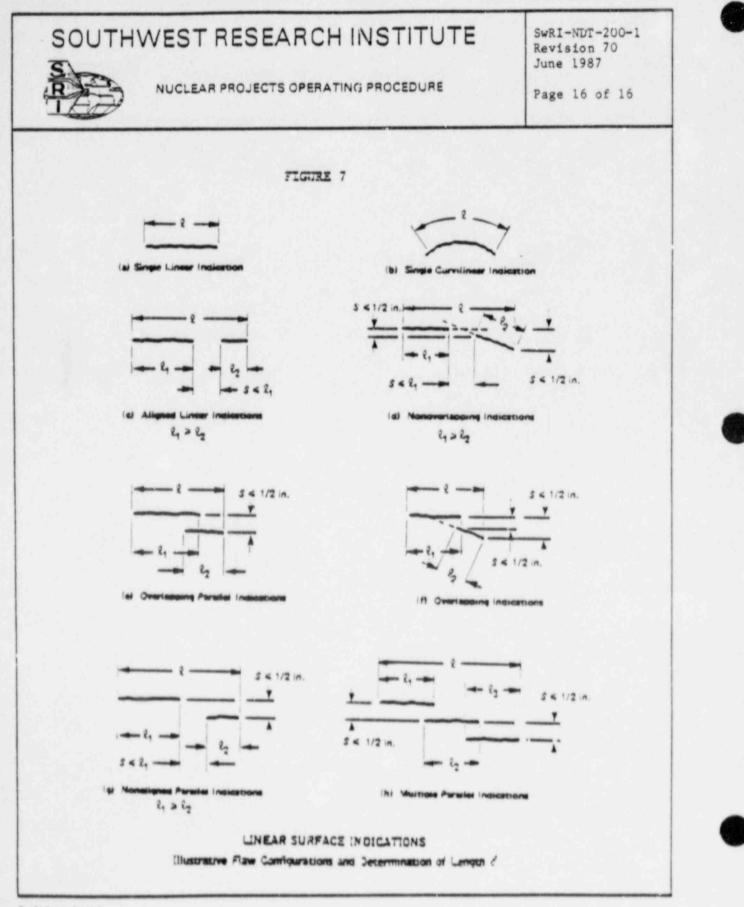
•

1 1 m

.



· ····



SwiRt Form CA 3-2

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECTS OPERATING PROCEDURE Page 1				
Title DRY POWDER MAGNETIC	PARTICLE EXAMINA	ATION		
Revision <u>23</u> of this procedure be effective concurrently.		AND APPRC VAL	visions of the base	document ma
				SA Q.
Approvais Written By DhFournell	Date 21 July 81	Technical Review	Adum	0ate 275
Manager of Q.A. Sun Matilo	Date 28 5 / 81	Cogginant Director	Flack	Date 1/24
The following information	may be used for conven	tience. Completion of thi	s portion is not ma	ndatory.
Deviation No.				
Date Effective				
Procedure Section(s) Affected				
Notes:				

4

....



NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-300-1 Revision 23 July 1981

Page 2 of 10

DRY POWDER MAGNETIC PARTICLE EXAMINATION

SwRI-NDT-300-1

1.0 PURPOSE

-

-

This procedure provides the technical information and detailed steps required to ensure proper dry powder magnetic particle examinations of ferromagnetic materials in accordance with the applicable ASME Boiler and Pressure Vessel Codes.

2.0 SCOPE AND APPLICATION

- This procedure shall be utilized for the dry powder magnetic particle examination of ferromagnetic materials employing alternating current (AC) yoke techniques.
- (2) Areas to be examined shall be components, longitudinal and circumferential welds, butt and fillet welds of branch connections, and support attachments as specified in the applicable SwRI Examination Plan.

2.1 Applicable Documents

The following documents form a part of this procedure as applicable:

- ASME Boiler and Pressure Vessel Code, Section XI, 1977 Edition, with Addenda through Summer 1978, "Rules for Inservice Inspection of Nuclear Power Plant Components."
- (2) ASME Boiler and Pressure Vessel Code, Section V, 1977 Edition, with Addenda through Summer 1978, "Nondestructive Examination."
- (3) SwRI Nuclear Quality Assurance Program Manual (NQAPM).

SwRI-NDT-300-1 Revision 23 July 1981

S. Do

NUCLEAR PROJECTS OPERATING PROCEDURE

Page 3 of 10

3.0 RESPONSIBILITY

- (1) The Director of the Department of Engineering Services, Quality Assurance Systems and Engineering Division, shall be responsible for the preparation, review, approval, and control of this procedure.
- (2) The Project Manager shall be responsible for the implementation of this procedure in accordance with the NOAPM specified in the applicable SwRI Project Plan.
- (3) The examiner shall be responsible for implementing the requirements of this procedure.
- (4) The Manager of Support and Administration Section of the Quality Assurance Systems and Engineering Division, shall be responsible for storage of records generated in accordance with this procedure.

4.0 CODE UND PROCEDURE REQUIREMENTS

The requirements listed below shall be applied when performing dry powder magnetic particle examinations.

Requi	lrements	Section
(1)	Materials, shapes, or sizes to be examined	2.0 & 7.0
(2)	Type of magnetization to be used	5.0
(3)	Equipment .	5.0
(4)	Surface preparation (0460, and cleaning)	7.0
(5)	Ferromagnetic particle. No ce red	5.0
(6)	Magnetization current	2.0 4 5.0
(7)	Demagnetization	7.0

NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-300-1 Revision 23 July 1981

Page 4 of 10

7.0

(9) Personnel Certification

5.0 PERSON: SL AND EQUIPMENT

Coverage

(8)

5.1 Personnel Certification

Personnel shall be certified in accordance with SwRI NQAP 11-1, ""pecial Process Control."

2.2 Equipment

- AC electromagnetic yokes with a minimum lifting power of 10 pounds with a pole spring of 3 to 6 inches shall be used.
- (2) Dry magnetic particles shall be utilized as the examination medium. The color selected shall provide adequate contrast with the background of the examination area.
- (3) Dry magnetic particles shall be selected from the following:
 - (a) Magnaflux Rec No. 8A Powder
 - (b) Magnaflux Gray No. 1 Powder
 - (c) Magnaflux Black No. 3A Powder
 - (d) Dry magnetic particles equivalent to those specified above may be used.
- (4) Devices normally used for application of dr gnetic particles are listed below.
 - (a) Magnetic Particla Puffer Bottle, Model PB=1.

(b) Magnaflux Pneumatic Applicator.

朝天

NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-300-1 Revision 23 July 1981

Page 5 of 10

5.3 Calibration Block

A calibration block of a ferromagnetic material weighing a minimum of 10 pounds shall be used to confirm the lifting power of AC yokes.

6.0 CALIBRATICN METHOD

6.1 Calibration

The applicable calibration block described in Paragraph 5.3 of this procedure shall be used to verify proper operation of the AC electromagnetic yoke:

- (1) At the start of a series of examinations
- (2) With any substitution of examination personnel
- (3) With any substitution of power source
- (4) At least every 4 hours during the examination
- (5) At the finish of a series of exam'nations
- (6) At any time when, in the opinion of the examiner, there is doubt as to the proper operation of the yoke.

The time that an AC electromagnetic yoke is verified shall be encered on the "SwRI Magnetic Particle Examination Record."

7.0 EXAMINATION

7.1 Examination Area

The examination area for circumferential and longitudinal welds shall be the weld and adjacent base material for 1/2 inch to either side of the weld fusion line.

SwRI-NDT-300-1 Revision 23 July 1981



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 6 of 10

The examination area for branch connections shall include the weld and the base material on the main run pipe side of the wold for the lesser of 1 inch or 1/2t; the examination area on the branch connection side of the weld shall include the base material for the area shown in Sketch 1.

The examination area for support attachments shall include the weld and base material of the main run pipe for a distance of 1/2 inch and the base material of the support attachment for 1/2 inch.

Examinations shall be performed on components in the final surface condition.

7.2 Surface Preparation

The examination area of welds and adjacent base materials shall be free from sharp surface irregularities such as deep valleys between stringer beads.

The examination area shall be clean and dry. The examination area and minimum of 1 inch on each side of the examination area shall be free from oil, sand, rust, grease, paint, slag, loose scale, or other surface conditions which may mask indications of unacceptable discortinuities.

After slag removal, as-welded surfaces shall be considered suitable, without grinding, if the weld contour blends into the base material without undercutting.

NOTE

Where surface conditions are not _n accordance with Paragraph 7.2 and correction is not feasible, SwRI will conduct the examination only at the request of the customer. The specific surface condition and its probable effect on the examination shall be noted in the "SwRI Magnetic Particle Examination Record."

SA DO

NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-300-1 Revision 23 July 1981

Page 7 of 10

7.3 Examination Method

Variable electromagnetic yoke pole spacing shall be a maximum of 9.0 inches, measured on the material surface between the centerline of the poles. The straight line distance measured between the centerline of the poles shall not exceed 6.0 inches under any circumstances.

The dry magnetic particles used shall be applied by lightly dusting a small quantity over the examination area. If a pneumatic applicator is used, the excess shall be removed with a gentle stream of air.

Examinations shall be conducted using the "Continuous Method." The AC electromagnetic yoke shall remain accivated during the application and removal of excess material.

The AC electromagnetic yoke shall be applied twice in the examination area. The second examination shall be conducted with the lines of magnetic flux approximately at right angles to the first application. Overlap shall be sufficient to ensure the entire examination area is covered.

7.4 Postexamination Cleaning

Arrangements shall by made with the customer for postexamination removal of dry magnetic particles.

Demagnetization of the examination area is not required.

S.O RECORDING CRITERIA

Indications shall be recorded in accordance with the techniques outlined in SwRI Nuclear Projects Operating Procedure IX-FE-116, "Recording Data From Direct Visual, Liquid Penetrant, and Magnetic Particle Examinations."

8.1 Welds and Base Material

The following indications shall be recorded on the appropriate "SwRI Magnetic Particle Examination Tecord" and reported to the customer:

SwRI-NDT-300-1 Revision 23 July 1981

朝了

NUCLEAR PROJECTS OPERATING PROCEDURE

Page 8 of 10

Nom. Wall	Indication Length
Thickness	or Diameter
(Inches)	(Inches)
<1.0	1/8
1.0 to <2.0	3/16
2.0 and greater	1/4

8.2 Support Attachments

The following indications shall be recorded on the appropriate "SwRI Magnetic Particle Examination Record" and reported to the customer:

New. Wall	Indication Length
Thickness	or Diameter
(Inches)	(Inches)
5/8 to < 2.0	3/16
2.0 and greater	1/4

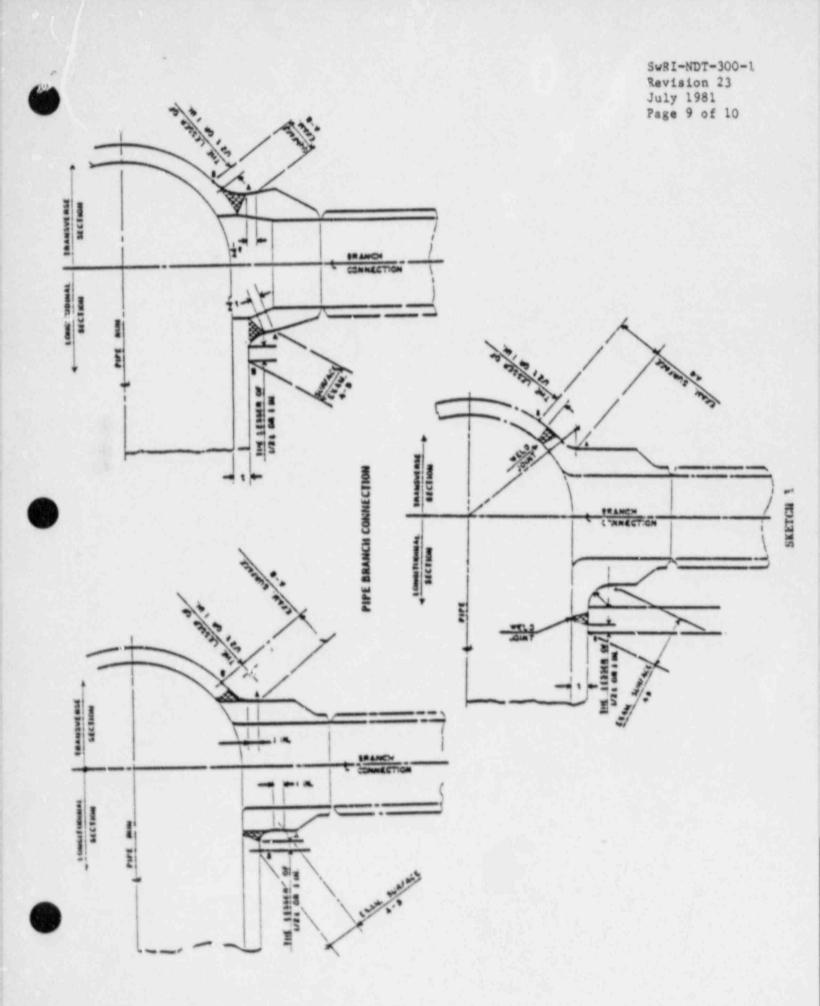
9.0 EVALUATION

Evaluation of reportable indications shall be the responsibility of the customer, or customer's representative, and shall be conducted in accordance with Section XI, Article IWA-3000 of the ASME Boiler and Pressure Vessel Code. The applicable year and Addenda of the Code shall be as specified in Paragraph 2.1.

10.0 RECORDS

The customer shall receive copies of documents generated in accordance with this procedure in the examination report.

Permanent documents generated in accordance with this procedure shall be retained as a portion of the examination report. The examination report shall be stored by the Manager of the Support and Administration Section, Quality Assurance Systems and Engineering Division, in the Data Storage Facility for the period specified by the contractual agreement with the customer.



PROJECT No :		SITE :			DATE: (DAY - MO - YE	DATE: (DAY-MO-YR) TIME: (24 HR. CLOCK) EXAM STARTED: EXAM ENDED:		SHEET No.:			
EXAMINATION AREA (SYSTEM/COMPONENT)	LINE / SUBASSEMBLY:		IDENTIFICATION: Lo LOCATION:		We LOCATION :					
EXAMINER		SNT LEVE	No. EVEL REV. DEV. IFICATION DISTANCE FROM BLACK LIGHT TO SENSOR CELL IN DLACK LIGHT OUTPUT		SURFACE FINISH:	WELD 1	TYPE (FLOW)	(-FLOW) MAGNETIZATION YOKE SPACING: YOKE BRAND: SERIAL No.:			
EXAMINER		SNT LEVE			BRAND	WET	DRY				
CALIBRATION BLOCK SERIAL No.: WEIGHT :	CALIBRAT	ON VERIFICA			DISTANCE FROM BATCH No.: P BLACK LIGHT TO SENSOR TYPE: N		SCENT D NOD YESD	SURFACE TEMP. THERMOMETER SERIAL No.:	۰F		
BLACK LIGHT BRAND: SERIAL No :	BRAND:				DLACK LIGHT OUTPUT				BLACK LIGHT OUTPUT TIME : INITIALS	VERIF.	MATERIAL APPLICATION:
IND No. L	w	LOCATION	ROUND OR	SIZE DIA. OR LENGTH	REMARKS:				INI.		
EXAMINATION AREA	LINITATIO	I: (IF NONE	E SO STAT	TE)					Revision 2 July 1981 Page 10 of		
REVIEWED BY:					SNT LEVEL	DATE	:	PAGE	on 23 981 0 of 10		

FORM No. SWRI NOTR 17 - 12 (REV. 11-26-79)





PROCEDURE	DEVIATION
-----------	-----------

	S	5	-	
6	<u>R</u>	1	P-	5
-	14	-	0	2

Procedure SwRI-NDT- 300-1 Revision No.

Page 1 of

2

Pages

The following examination areas are affected by this deviation:

Deviation 2 supersedes Deviation 1. Magnetic particle examinations to be performed in accordance with this procedure.

The following paragraphs shall be deviated from as indicated:

Change Paragraph 7.3 Examination Method to Read as follows:

7.3 Examination Method

Variable electromagnetic yoke pole spacing shall be a maximum of 9.0 inches, measured on the material surface between the centerline of the poles. the straight line distance measured between the centerline of the poles shall be no greater than 6.0 inches and shall not exceed the distance used during calibration verification.

The dry magnetic particles used shall be applied by lightly dusting a small quantity over the examination areas. If a oneumatic applicator is used, the excess shall be removed with a gentle stream of air.

The AC electromagnetic yoke shall remain activated during the application and removal of excess material.

(Continued on Page 2)

Rationale for deviation:

This deviation incorporates examination technique and recording criteria as requested by Public Service Electric and Gas Company.

Deviation Affects Qualification	YES NO	YES NO I ouslification is determined 13 output of the deviation shall be accordance with Procedure IX-FE		e qualified in
		APPROVALS		SA FLD
Written by:		Duce: 15168.89	Technical Review: Mc Galles Just	Date: 2-15-88
Manager of Q.A.: mein	245/48	Date:	Verbai Approval Given? Ves 🛛 No Cognizant Director:	Date:
J.C. Julie	inh	2/15/33	Eddy L. Cafeder for DER	15Feb88
WRI FORM FE-4-6			0 0	

PROCEDURE DEVIATION Procedure SwRI-NDT-300-1 Revision No. 35 Deviation No. 2 Page 2 of 2

The following paragraphs shall be deviated from as indicated (Cont.):

7.3 Examination Method (Cont.)

The AC electromagnetic yoke shall be applied twice in the examination area with the lines of flux at right angles (in the case of welds, the magnetic flux will be induced when the component configuration permits, parallel and transverse to the weld). Overlap shall be sufficient to ensure the entire examination area is covered.

NOTE

Broad areas of particle accumulation which might mask indications from discontinuities are unacceptable, and shall be cleaned and reexamined.

Change Section 8 Recording Criteria to Read as follows:

8. <u>RECORDING CRITERIA</u>

Indications shall be recorded in accordance with the techniques outlined in the applicable revision of SwRI Nuclear Projects Operating Procedure IX-FE-116.

8.1 Linear Indications

Linear indications shall be recorded on the SwRI Magnetic Particle Examination Record and reported to the customer for disposition in accordance with the recording criteria table below:

Nominal Wall Thickness (Inches)	Overall Indication Length as Defined in Attached Figure 1 (Inches)
Less than 1.0	1/8
1.0 to less than 2.5	3/16
2.5 and greater	1/4

NOTE

For Preservice examination, indications with a length of 1/16 inch in ferritic piping less than .312 inches in thickness shall be recorded.

Rounded indications shall be recorded based on diameters corresponding to the linear indication recording criteria and reported to the customer for disposition.

When conditions liz .it the area of examination, the limitations shall be recorded.







SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECTS OPERATING PROCEDURE Page 1					
Title DRY POWDE	R MAGNETI	C PARTICLE EX	AMINATION		
EF Revision <u>35</u> of this procedure became e be effective concurrently.		AND APPROVAL ec 11, 1987		the base docur	nent may
Approvals				[FLD
Written By DWFournell	Date 1 Dec. 1987	Technical Review	Die		Date 9 DEC 1987
Manager of Q.A. Q	Date 11 Dec 1487	Cognitant Direct	"J. Flack		Date 12/11/87
The following information may be us Deviation No.	sed for conver	sience. Completion	of this portion is	not mandator	,
Date Effective				-	
Procedure Section(s) Affected					
Notes:					

SwRI-NDT-300-1 Revision 35 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 2 of 13

DRY POWDER MAGNETIC PARTICLE EXAMINATION

SwRI-NDT-300-1

1. PURPOSE

This procedure provides the technical information and detailed steps required to ensure a proper dry powder magnetic particle examination of ferromagnetic material in accordance with the applicable American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Codes.

2. SCOPE AND APPLICATION

- This procedure shall be utilized for the dry powder magnetic particle examination of ferromagnetic materials employing alternating current (AC) yoke techniques.
- (2) Areas to be examined shall be ferritic components, longitudinal and circumferential welds, support attachments, and butt and fillet welds of branch connections as specified in the applicable Southwest Research Institute (SwRI) Examination Plan.

3. APPLICABLE DU JUMENTS

- (1) ASME Boiler and Pressure Vessel Code, Sectior XI, 1983 Edition with Addenda through Surmer 1983, "Rules for Inservice Inspection of Nuclear Power Plant Components"
- (2) ASME Boiler and Pressure Vessel Code, Section V, 1985 Edition with Addenda through Summer 1983, "Nondestructive Examination"
- (3) SwRI Nuclear Quality Assurance Program Manual (NQAPM)
- 3.1 Applicable Examination Record

SwRI-NDTR Form No. 17-12, revision dated 11-26-79

4. RESPONSIBILITY

(1) The Director of the Dopartment of Engineering Services, Nondestructive Evaluation Science and Technology Division, shall be responsible for the preparation, review, approval, and control of this procedure.





NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-300-1 Revision 35 December 1987

Page 3 of 13

- (2) The Project Manager shall be responsible for the implementation of this procedure in accordance with the NQAPM specified in the applicable SwRI Project Plan.
- (3) The examinar shall be responsible for implementing the requirements of this procedure.
- (4) The Manager of the Support and Administration Section, Nondestructive Evaluation Science and Technology Division, shall be responsible for storage of records generated in accordance with this procedure.

5. PERSONNEL AND EQUIPMENT

5.1 Personnel Certification

Personnel shall be certified in accordance with SwRI NQAP 11-1, "Special Process Control."

- 5.2 Equipment
 - (1) AC electromagnetic yokes to be utilized shall have a lifting power of 10 pounds or greater at a pole spacing of 3 to 6 inches. Each yoke shall be calibrated at least once a year, or whenever the yoke has been subjected to any repair, periodic overhaul, or damage, or has not been used for a year or more.
 - (2) A calibration block of a ferromagnetic material weighing a minimum of 10 pounds shall be used to confirm the lifting power of AC yokes.
 - (3) Dry magnetic particles shall be utilized as the examination medium. The color selected shall provide adequate contrast with the examination area.
 - (4) Dry magnetic particles shall be selected from the following:
 - (a) Magnaflux Red No. 8A Powder
 - (b) Magnaflux Grey No. 1 Powder
 - (c) Magnaflux Black No. 3A Powder
 - (d) Dry magnetic particles equivalent to those specified above may also be used.

SwRI-NDT-300-1 Revision 35 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 4 of 13

- (5) Devices normally used for application of dry magnetic particles are listed below:
 - (a) Magnetic Particle Puffer Bottle, Model PB-1
 - (b) Magnaflux Pneumatic Applicator

6. CALIBRATION

The applicable calibration block described in Paragraph 5.2 of this procedure shall be used to verify the proper operation of the AC electromagnetic yoke:

- (1) Pr'or to a series of examinations
- (2) With any substitution of examination personnel
- (3) With any substitution of the AC power source
- (4) At least every 4 hours during the examination
- (5) At the completion of a series of examinations
- (6) When the proper operation of the yoke is in doubt
- (7) At the maximum pole spacing to be used during the examination

All electromagnetic yoke verification times shall be entered on the SwRI Magnetic Particle Examination Record.

7. EXAMINATION

7.1 Examination Area

Components, parts, and methods of examination shall be as specified in ASME Boiler and Pressure Vessel Code, Section XI, Tables IWB-2500 and IWC-2500.

> (1) The examination area for Class 1 and Class 2 Longitudinal and circumferential welds and support attachments shall be the weld and adjacent base material for a distance of 1/2 inch on each side of the weld.

R

NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-300-1 Revision 35 December 1987

- (2) Class 1 longitudinal welds shall be examined along the entire length of the weld during the preservice examination and for at least one pipe-diameter length or 12 inches, whichever is less, from the fusion line of the intersecting circumferential weld during inservice examinations.
- (3) Class 2 longitudinal welds shall be examined for at least 2-1/2t length from the fusion line of the intersecting circumferential weld during preservice and inservice examinations.
- (4) The examination area for Class 1 branch connections shall be as shown on attached Figure 1.
- (5) The examination area for Class 2 branch connections shall be the weld and 1/2 inch of base material on each side of the weld fusion line.

EXCEPTION

If the Class 2 branch connection is a set-in type, the examination area shall be the weld, 1/2 inch of base material on the main run pipe side from the weld fusion line, and the base material on the branch pipe side from the weld fusion line to the end of the radius section.

- (6) The examination area for Class 1 and 2 support attachments, integral attachment welds, and support skirt circumferential weld joints shall be the weld and 1/2 inch of base material on each side of the weld fusion line as shown in Figures 2 and 3.
- (7) The examination area for Class 1 socket welds in piping shall be the weld, 1/2 inch of base material on the pipe side, and 1.0 inch of base material on the fitting side.
- (8) The examination areas for vessel head-to-flange weld joints shall be as shown in Figure 3.
- (9) The examination areas for Class 2 nozzles shall be as shown in Figure 4.

7.2 Surface Preparation

Examination shall be performed on components in the final surface condition.

R

NUCLEAR PROJECTS CPERA'TING PROCEDURE

SwRI-NDT-300-1 Revision 35 December 1987



Page 6 of 13

The examination area of welds and adjacent base materials shall be free of sharp surface irregularities such as deep valleys between stringer beads.

The examination area and a minimum of 1 inch on each side of the examination area shall be clean, dry, and free of oil, sand, rust, grease, slag, loose scale, or other surface conditions to the extent that they shall not mask indications of unacceptable discontinuities.

After slag removal, as-welded surfaces shall be considered suitable, without grinding, if the weld contour blends into the base material without undercutting.

NOTE

When surface conditions are not in accordance with the above and correction is not feasible, SwRI will conduct the examination only at the request of the customer. The specific surface condition and its effect on the examination shall be noted on the SwRI Magnetic Particle Examination Record. At the examiner's option, without precluding the requirements of Section 7.2 of this procedure, a magnetic particle indicator as described in Paragraph T-754 of ASME Section V may be used to rify the adequacy of the magnetizing field.

7.3 Examination Me. Jd

Variable electromagnetic yoke pole spacing shall be a maximum of 9.0 inches, measured on the material surface between the centerline of the poles. The straight line distance measured between the centerline of the poles shall be no greater than 6.0 inches and shall not exceed the distance used during calibration verification.

The dry magnetic particles used shall be applied by lightly dusting a small quantity over the examination area. If a pneumatic applicator is used, the excess shall be removed with a gentle stream of air.

The AC electromagnetic yoke shall remain activated during the application and removal of excess material.

The AC electromagnetic yoke shall be applied twice in the examination area. The second examination shall be conducted with the lines of magnetic flux approximately at right angles to the first application. Overlap shall be sufficient to ensure the entire examination area is covered.

NOTE

Broad areas of particle accumulation which might mask indications from discon-



NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-300-1 Revision 35 December 1987

7.4 Postexamination Cleaning

Arrangements shall be made with the customer for postexamination removal of dry magnetic particles.

Demagnetization of the examination area is not required.

8. RECORDING CRITERIA

Indications shall be recorded in accordance with the techniques outlined in the applicable revision of SwRI Procedure IX-FE-116.

8.1 Linear Indications (Class 1 and Class 2)

Linear indications shall be recorded on the SwRI Magnetic Particle Examination Record in accordance with the following table and reported to the customer:

Nom. Wall Thickness (Inches)	Overall Indication Length As Defined in Attached Figure 5 (Inches)
Less than 1.0 1.0 to less than 2.5	1/8 3/16
2.5 and greater	1/4

8.2 Rounded Indications (Class 2)

Rounded indications shall be recorded as follows:

- Rounded indication with dimensions greater than 1/8 inch for thicknesses less than 5/8 inch and dimensions greater than 3/16 inch for thicknesses 5/8 inch and greater
- (2) Four or more rounded indications in a line separated by 1/16 inch or less
- (3) Ten or more indications in any six square inches of area whose major dimension is no more than 6 inches with the dimensions taken in the most unfavorable location relative to the indications being evaluated

When conditions limit the area of examination, the limitations shall be recorded.

SwRI Form QA 3-2

R

NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-300-1 Revision 35 December 1987



Page 8 of 13

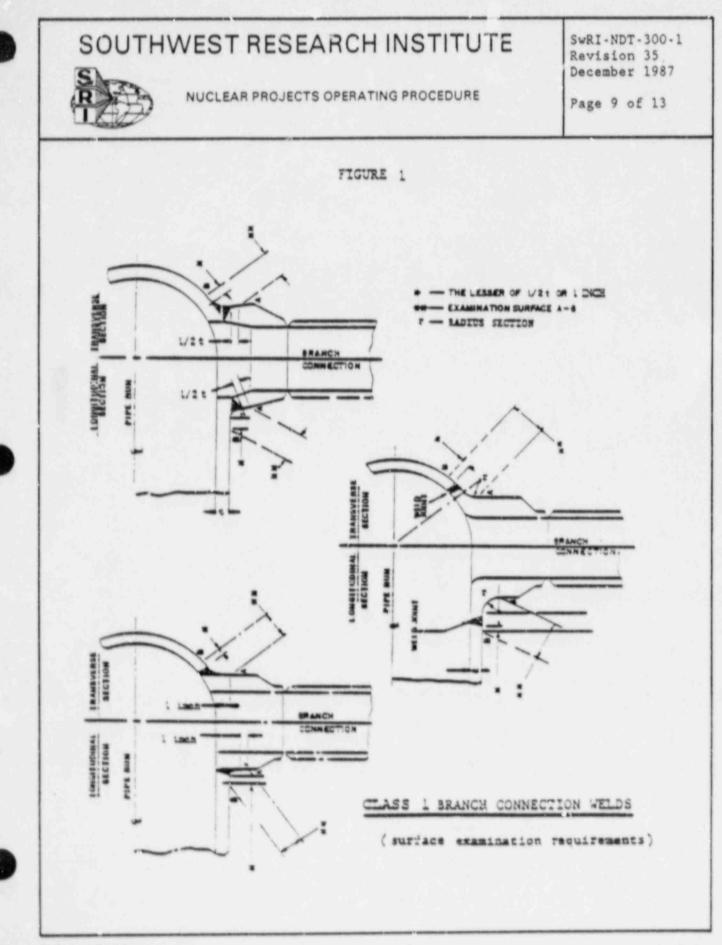
9. EVALUATION

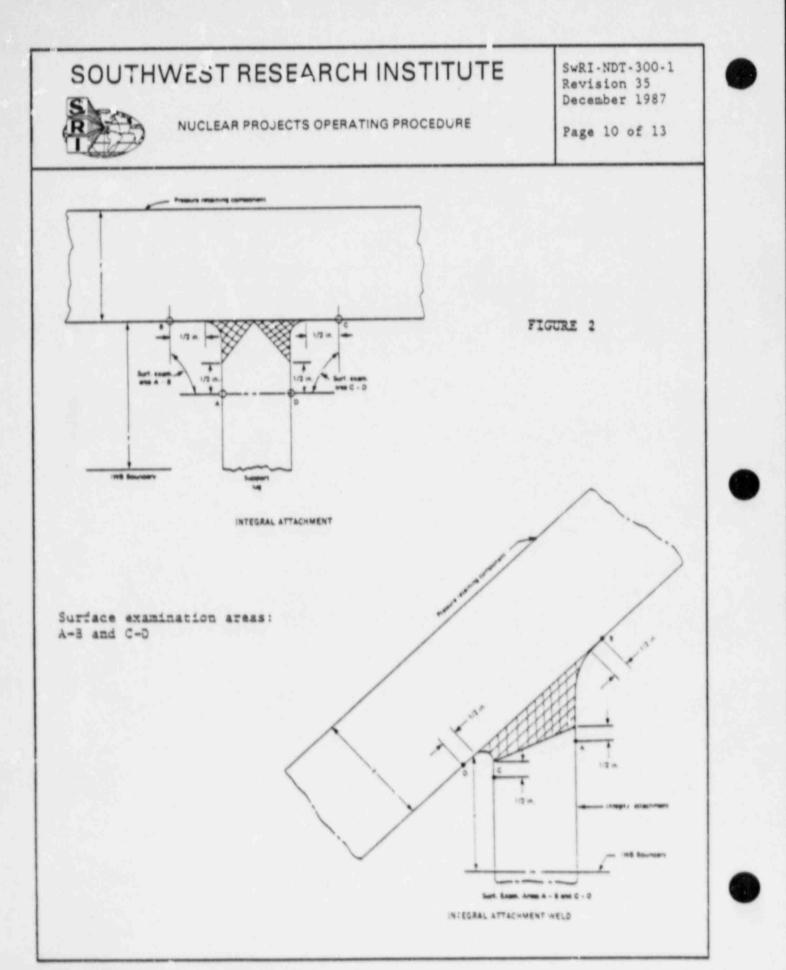
Initial evaluation of reportable indications shall be performed by SwRI personnel, and shall be conducted in accordance with the applicable ASME Boiler and Pressure Vessel Code, Section XI, Article IWA-3000. Final evaluation and disportion of reportable indications shall be the responsibility of the customer.

10. RECORDS

Documents generated in accordance with this procedure shall be stored as specified in the SwRI Project Plan. The customer shall receive copies of these documents in the Examination Report, unless specified otherwise in the SwRI Project Plan.





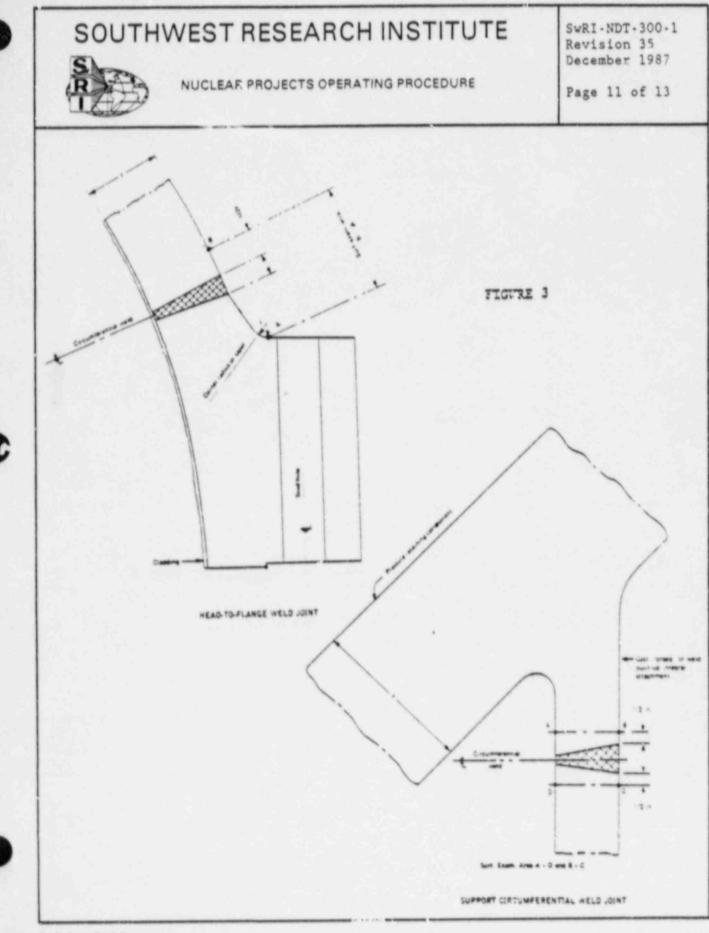


ſ

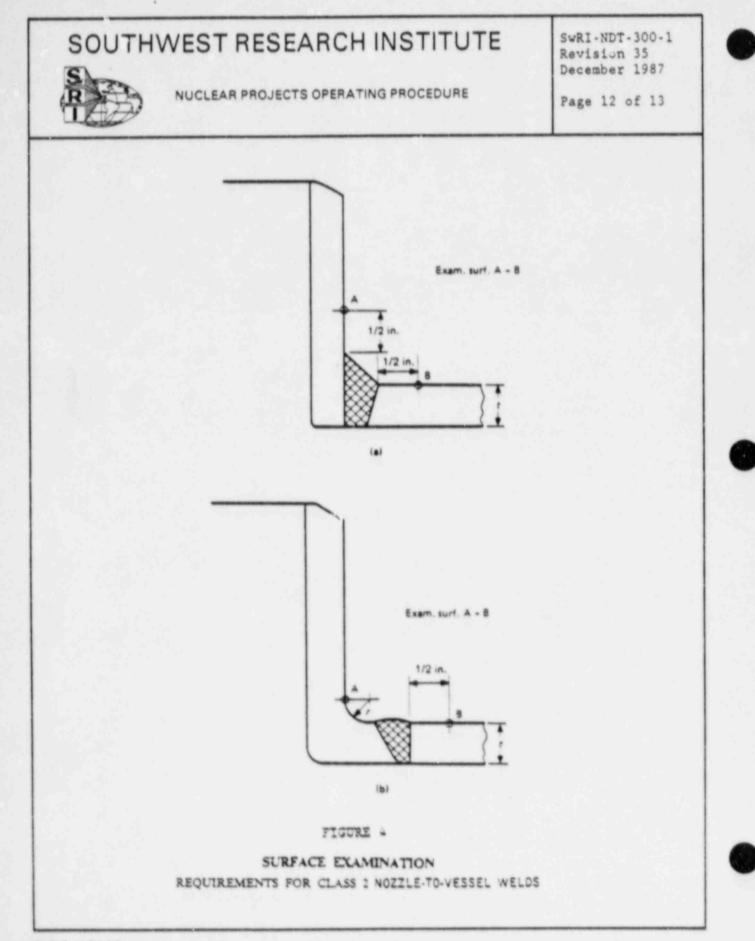
SwRI Form QA 3-2

8

÷



SwRI Form GA 3-2



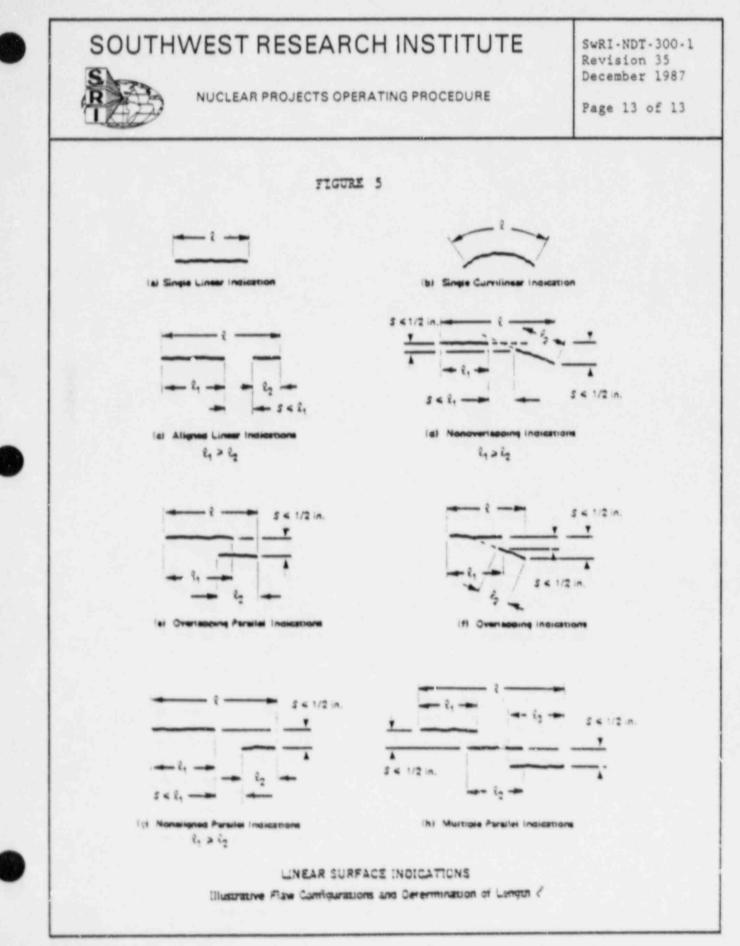
3

C

SwAl Form QA 3-2

.

*



SwRI Form QA 3-2

		PROCE	DURE DE	VIATION		Page 1 of	1 Page
Procedure SwRI-NDT-	300-2			Revision No. 42	Devi	iation No.	
	examination	areas are affected by	this deviation:	1			
Fluoresce procedure		ic particle ex.	aminations ;	performed in acco	ordance wit	th this	
The following	peregrephs s	hall be deviated from	as indicated:				
Change 5.	6 to read	as follows:					
the second second	rmometer						
The	calibrate	ter to be used and certifie	d and shall	ing the component display a valid	calibratio	on tag as	
		NQAP 10-1.					
				•			
				•			
				•			
				•			
Rationale for c	Sevietion:			•			
		fies the temper	ature requi	rements of the C	ode.		
		fies the temper	ature requi	rements of the C	ode.		
		fies the temper	ature requi	rements of the C	ode.		
		fies the temper	ature requi	rements of the C	ode.		
		fies the temper	ature requi	rements of the C	ode.		
	nge clari	fies the temper		rements of the C	I the deviation is	Genermined to affe Severation shall be o	sualified in
This chan Deviation Affe	nge clari				I the deviation is	deviation shall be of Procedure (X-FE-10	sualified in
This chan Deviation Affe Qualification	nge clari	YES NO	APPROVALS Oate:	Technical Review:	If the deviation is puzzification, the o nocordance with if	deviation shall be o Procedure (X-FE-10	pusified in 17.
This chan Deviation Affe Qualification	nge clari	YES NO	APPROVALS	Technical Review:	t the servation a sustitution of a sustitution of the servation of the ser	sevecion shell be o	SA FL
This chan Deviation Affe Qualification	nge clari	YES D NO	APPROVALS	Technical Review:	t the servation a sustitution of a sustitution of the servation of the ser	Severation shell be of Processure IX-FE-10	SA FL
This chan Deviation Affe Qualification Written by: Manager of C	nge clari	YES D NO	APPROVALS	Technical Review:	t the servation a sustitution of a sustitution of the servation of the ser	Severation shell be of Processure IX-FE-10	SA FL Oate: Date: N/

....

۵.

]

823)	PRO	CEDURE D	EVIATION		Page 1 of _ Page
Procedure			Revision No.	De	viation No.
SwRI-NDT- 300-2	stion areas are affected		42		2
			ed in accordance with	h this procedu	re.
The following paragra	phs shall be deviated fr	orn as indicated:			
Change Paragraph	5.3 Magnetic Particle	es to read as follow	vs:		
5.3 Mainetic Par	ticles				
fluores		ill provide adequa	tilized as the examina ate contrast with the a characteristics.		
Certifi obtain	mended in SE-709, "S ed reports for magnet	tandard Recomm ic particles, giving or by scheme analy	table liquid medium i ended Practice for ma g batch numbers and a vsis of the batch to be amination records.	gnetic Particle analysis result	e Examination." is, shall be
magne	tic particle material.	med utilizing Ma	maglo No. 14AM aero	osol - package	l fluorescent
(Continued on Pag	(e 2)				
			examination techniqy	ie and recordi	ng criteria
Deviation Affects Qualification	YES NO			qualification, the d	setermined to affect the procedu eviation shall be qualified in rocedure (X-FE-107
		APPROVALS			SA FL
Written by:		Date:	Technical Review:	Ob Jush	Date: 2-15-38 Date:
		1.146.2.2.24	Verbai Approval Given	17 D Yes	
Manager of Q.A.		Date:	Cognizant Director:	and the second sec	Date:

4

.

.

PROCEDURE DEVIATION Procedure SwRI-NDT-300-2 Revision No. 42 Deviation No. 2 Page 2 of 2

The following paragraphs shall be deviated from as indicated (Cont.):

Change 7.3(4) under 7.3 Examination Method to Read as Follows:

7.3(4) The AC electromagnetic yoke shall be applied twice in each examination area with the lines of flux at right angles (in the case of welds, the magnetic flux will be induced when component configuration permits, parallel and transverse to the weld). Sufficient overlap shall ensure the entire examination area is covered.

Change Section 8, Recording Criteria to Read as follows:

8. <u>RECORDING CRITERIA</u>

Indications shall be recorded in accordance with the techniques outlined in the applicable revision of SwRI Nuclear Projects Operating Procedure IX-FE-116.

8.1 Linear Indications

Linear indications shall be recorded on the SwRI Liquid Penetrant Examination Record and reported to the customer for disposition in accordance with the recording criteria table below:

Nominal Wall Thickness (Inches)	Overall Indication Length as Defined in Attached Figure 1 (Inches)
Less than 1.0	1/8
1.0 to less than 2.5	3/16
2.5 and greater	1/4

NOTE

For preservice examinations, indications with a length of 1/16 inch in ferretic piping less than .312 inches in thickness shall be recorded.

Rounded indications shall be recorded based on diameters corresponding to the linear indication recording criteria and reported to the customer for disposition.

When conditions limit the area of examination, the limitations shall be recorded.

8.2 <u>Recording Criteria for Pressure Retaining Bolting</u>

The following indications shall be recorded on the appropriate SwRI Magnetic Particle Examination Record and reported to the customer for disposition:

- (1) Nonaxial linear indications greater than 1/4 inch in length
- (2) Axial indications greater than 1 inch in length

When conditions limit the area of examination, the limitations shall be recorded.

SOUT	NUC	LEAR PR	UINSTITUT OJECTS DCEDURE	E	SwRI-NDT- Revision June 1987 Page 1 of	42
Title	FLUORESCE	INT MAGNETI	C PARTICLE EX	AMINATION		
Revision <u>42</u> of this be effective concurrently	procedure becam		AND APPROVA		f the base docum	nent may
Approvals					[sa FLD
Written the My Ha		Date 10-Jul 1987	Technical Revie	die.		Dare 15 fran 1980
Manager of Q.A.		Date Il June 1987	Cognizant Dire	J. Hash		Date
Deviation No.	tormation may be	e used for conve	mience. Completi			,
Date Effective						
Procedure Section(s) Affected						
Notes:						

SwRI-NDT-300-2 Revision 42 June 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 2 of 9

FLUORESCENT MAGNETIC PARTICLE EXAMINATION

SWRI-NDT-300-2

1. PURPOSE

This procedure provides the technical information and detailed steps required to ensure proper fluorescent magnetic particle examinations of ferromagnetic materials in accordance with the applicable American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Codes.

2. SCOPE AND APPLICATION

This procedure shall be utilized for the fluorescent magnetic particle examination of ferromagnetic materials, employing alternating current (AC) yoke techniques.

Areas to be examined shall be studs, nuts, cap screws, and other ferritic components specified in the applicable Southwest Research Institute (SwRI) Examination Plan.

3. APPLICABLE DOCUMENTS

- (1) ASME Boiler and Pressure Vessel Code, Section XI, 1983 Edition with Addenda through Summer 1983, "Rules for Inservice Inspection of Nuclear Power Plant Components"
- (2) ASME Boiler and Pressure Vessel Code, Section V, 1983 Edition with Addenda through Summer 1983, "Nondestructive Examination"
- (3) NRC Regulatory Guide 1.65, entitled "Materials and Inspections for Reactor Vessel Closure Studs"
- (4) SwRI Nuclear Quality Assurance Program Manual (NQAPM)
- 3.1 Applicable Examination Record

SwRI-NDTR Form No. 17-12, revision dated 11-26-79

RESPONSIBILITY

 The Director of the Department of Engineering Services, Nondestructive Evaluation Science and Technology Division, shall be responsible for the preparation, review, approval, and control of this procedure.

SwRI Form QA 3-2

4.

SwRI-NDT-300-2 Revision 42 June 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 3 of 9

- (2) The Project Manager shall be responsible for the implementation of this procedure in accordance with the NQAPM specified in the applicable SwRI Project Plan.
- (3) The examiner shall be responsible for implementing the requirements of this procedure.
- (4) The Manager of the Support and Administration Section, Nondestructive Evaluation Science and Technology Division, shall be responsible for storage of records generated in accordance with this procedure.

5. PERSONNEL AND EQUIPMENT

5.1 Personnel Certification

Personnel performing examinations shall be certified in accordance with SwRI NQAP 11-1, "Special Process Control."

5.2 Yokes

AC electromagnetic yokes to be utilized shall have a lifting power of 10 pounds or greater at the maximum pole spacing that will be used. Each yoke shall be calibrated at least once a year or whenever the yoke has been subjected to any repair, periodic overhaul, damage, or has not been used for a year or more.

5.3 Magnetic Particles

- A fluorescent magnetic suspension shall be utilized as the examination medium. It shall fluoresce with a color that will provide adequate contrast with the area being examined when illuminated by an ultraviolet lamp of suitable characteristics.
- (2) Magnetic particles shall be suspended in a suitable liquid medium in the concentration recommended in SE-709, "Standard Recommended Practice for Magnetic Particle Examination." Certified reports for magnetic particles, giving batch numbers and analysis results, shall be obtained from the supplier or by sample analysis of the batch to be used. Copies of the certified reports shall be retained with the examination records.
- (3) Examinations shall be performed by utilizing one of the materials from the following list:

SwRI Form QA 3-2

SwRI-NDT-300-2 Revision 42 June 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 4 of 9

- Magnaglo No. 20A fluorescent powder concentrate in a deionized water suspension
- (b) Magnaglo No. 14A fluorescent powder concentrate in a deionized water suspension with water conditioner WA-2A
- (c) Magnaglo No. 14AM aerosol-packaged fluorescent magnetic particle material
- (4) If not premixed, the magnetic particle suspension shall be mixed in accordance with the manufacturer's instructions.

5.4 Lighting

A black light shall be used when conducting examinations in accordance with this procedure. The black light intensity shall be measured at the examination surface at least every 8 hours and whenever the work location is changed and whenever the power is interrupted. These measurements shall be in accordance with the applicable revision of SwRI Procedure IX-FE-110. The time of the black light intensity measurements shall be entered on the SwRI Magnetic Particle Examination Record.

5.5 Calibration Block

A calibration block of a ferromagnetic material weighing a minimum of 10 pounds shall be used to confirm the lifting power of AC yokes in accordance with Section V, Article 7, Subparagraph T-733.

5.0 Thermometer

The thermometer to be used for measuring the calibration block and component temperatures shall be calibrated and certified and shall display a valid calibration tag as required by NQAP 10-1.

6. CALIBRATION

.

6.1 Calibration

- (1) The applicable calibration block described in Paragraph 5.5 shall be used to verify proper operation of the magnetic particle yoke when any of the following occurs:
 - (a) Prior to a series of examinations
 - (b) With any substitution of examination personnel

R

NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-300-2 Revision 42 June 1987

Page 5 of 9

- (c) With any substitution of the AC power source
- (d) At least every 4 hours during the examination
- (e) At the completion of a series of examinations
- (f) When the proper operation of the yoke is in doubt
- (g) At the maximum pole spacing to be used for examination
- (2) All magnetic particle yoke verification times shall be entered on the SwRI Magnetic Particle Examination Record.

EXAMINATION

7.1 Examination Areas

Examinations shall be performed on materials in their completed condition.

The entire surface of studs and bolts or cap screws and the entire outer surface of nuts shall be examined.

The examination area for components other than threaded components, shall be as described in the applicable SwRI Examination Plan.

7.2 Surface Preparation

It shall be the responsibility of the customer to ensure that the examination area and, where required, a minimum of one inch on each side shall be clean, dry, free from oil, sand, rust, grease, paint, slag, loose scale or other conditions to the extent that it shall not mask the indication of unacceptable discontinuities.

NOTE

When surface conditions are not in accordance with the above and correction is not feasible, SwRI will conduct the examination only at the request of the customer. The specific surface condition and its effect on the examination shall be noted on the SwRI Examination Record.



SwRI Form QA 3-2

SwRI-NDT-300-2 Revision 42 June 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 6 of 9

CAUTION

Extreme care should be exercised to prevent damage to threaded components during handling and examination.

7.3 Examination Method

The fluorescent magnetic particle examination shall be conducted as

follows:

- (1) Examinations shall be made in a darkened area and shall commence approximately 5 minutes after the space is darkened, in order for the examiner's eyes to adjust.
- (2) A black light, as described in Paragraph 5.4 of this procedura, shall be used to illuminate the examination area. A minimum of 5 minutes shall be allowed for warm-up.
- (3) The examination surface temperature, which shall be no higher than 135°F, shall be measured and recorded on the SwRI Magnetic Particle Examination Record.
- (4) The AC electromagnetic yoke shall be applied twice in each examination area. The second application shall be conducted with the lines of magnetic flux approximately at right angles to those used in the first application. Sufficient overlap shall ensure the entire examination area is covered.
- (5) The magnetizing current shall remain on continuously during application of the magnetic suspension medium, while the excess is being drained, and during the observation.
- (6) The magnetic particle suspension shall be applied by flooding the surface of the examination area and then allowing the excess to drain off.
- (7) After draining, the area being examined shall be observed for indications of discontinuities while the fluorescent lamp is directed from various angles so that the entire surface of the examination area is illuminated.

NOTE

Broad areas of particle accumulation which might mask indications from discontinuities are unacceptable, and shall be cleaned and reexamined.

SwRI Form QA 3-2

SOUTHWEST RESEARCH INS	TITU	TE
------------------------	------	----

SwRI-NDT-300-2 Revision 42 June 1987 .

.

R

NUCLEAR PROJECTS OPERATING PROCEDURE

Page 7 of 9

(8) Variable electromagnetic yoke spacing shall not exceed the distance used during calibration verification.

(9) Demagnetization of the examination area is not required.

7.4 Postexamination Cleaning

Arrangements shall be made with the customer for postexamination removal of fluorescent magnetic particle materials.

8. RECORDING CRITERIA

Indications shall be recorded in accordance with the techniques outlined in the applicable revision of SwRI Procedure IX-FE-116.

8.1 Pressure Retaining Bolting Greater Than 2 Inches in Diameter

The following indications shall be recorded on the appropriate SwRI Magnetic Particle Examination Record and reported to the customer:

- (1) Nonaxial linear indications greater than 1/4 inch in length
- (2) Axial indications greater than 1 inch in length
- 8.2 Components Other Than Pressure Retaining Bolting
- 8.2.1 Linear Indications (Class 1 and Class 2)

Linear indications shall be recorded on the SwRI Magnetic Particle Examination Record in accordance wi the following table and reported to the customer:

Nom. Wall Thickness (Inches)	Overall Indication Length As Defined in Attached Figure 1 (Inches)
Less than 1.0 1.0 to less than 2.5	1/8 3/16
2.5 and greater	1/4



SwRI-NDT-300-2 Revision 42 June 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 8 of 9

8.2.2 Rounded Indications (Class 2)

Rounded indications shall be recorded as follows:

- Rounded indication with dimensions greater than 1/8 inch for thicknesses less than 5/8 inch and dimensions greater than 3/16 inch for thicknesses 5/8 inch and greater
- (2) Four or more rounded indications in a line separated by 1/16 inch or less
- (3) Ten or more indications in any 6 square inches of area whose major dimension is no more than 6 inches with the dimensions taken in the most unfavorable location relative to the indications being evaluated

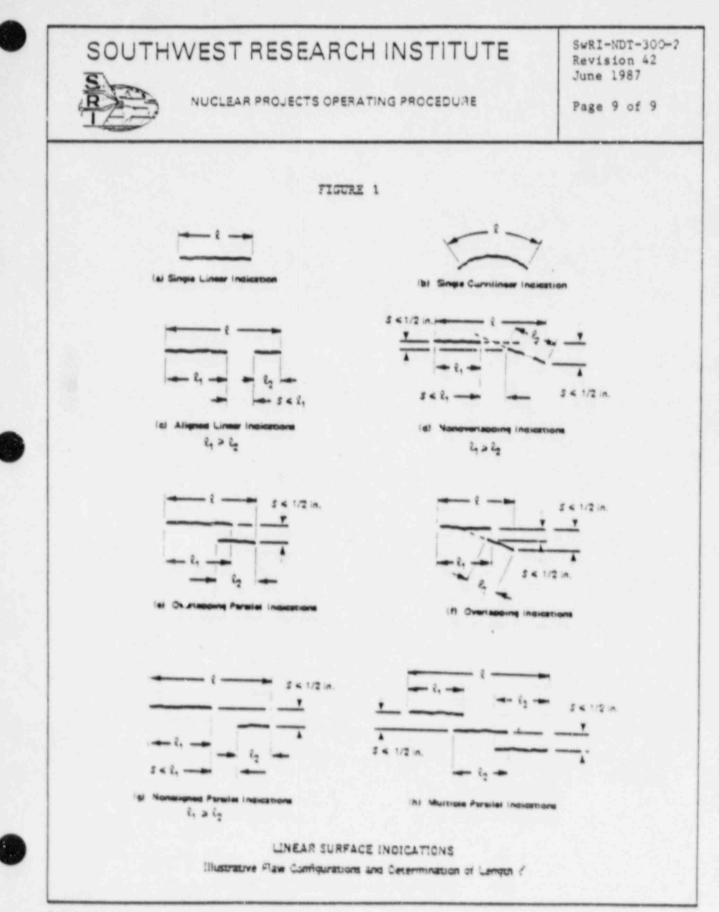
When conditions limit the area of examination, the limitations shall be recorded.

9. EVALUATION

Initial evaluation of reportable indications shall be performed by SwRI personnel, and shall be conducted in accordance with the applicable ASME Boiler and Pressure Vessel Code, Section XI, Article IWA-3000. Final evaluation and disposition of reportable indications shall be the responsibility of the customer.

10. RECORDS

Documents generated in accordance with this procedure shall be stored as specified in the SwRI Project Plan. The customer shall receive copies of these documents in the Examination Report, unless specified otherwise in the SwRI Project Plan.



Swill Form CA 3-2

PROCEDURE	DEVIATION	

	-		
đ	100		
		ε.	

		Page 1 of 1 Pages
Procedure	Revision No.	Deviation No.
SWRI-NDT- 600-31	23	1

Page 1 of

The following examination areas are affected by this deviation:

Angle beam examinations performed in accordance with this procedure.

The following paragraphs shall be deviated from as indicated.

Change Paragraph 6.6.2 to Read as follows:

6.6.2 Verification of Calibration Reflectors at Scanning Speed and Notch Comparison

(1)The examiner shall verify the presence of the calibration reflector at scanning speed.

It is not necessary to assure that this check confirms the signal amplitude at 100% of reference level, but merely to demonstrate that the signals from the calibration reflectors are readily observable at scanning speed.

The following statement shall be documented on the SwRI Sonic Instrument Calibration Record and initialed:

"Calibration reflectors have been verified at scanning speed."

(2)A notch and side drilled hole comparison shall be performed to verify notch sensitivity. The sensitivity will be established on an inside surface notch by setting the signal amplitude at the level of the DAC curve and marking with an X. Record the gain setting under Instrument Setting.

Rationale for deviation:

This deviation incorporates the comparison of notches and side drilled holes as requested by Public Service and Gas Company.

Deviation Affects YES NO			If the deviation is determined to i qualification, the deviation shall t accordance with Procedure IX-FE	e qualified in		
1				APPROVALS		SA FLO
Written by:	Ser	J		0ate: 15 FEB 3 B	Technica Review: Mc andle turks	00191 2-/6-9% Date:
Manager of Q.A.:	Britz	тет		Oate: 1672698	Cognizant Director:	0ate: 16Fel-88



	RESEARCH CLEAR PRO RATING PRO	JECTS	SwRI-NDT Revision December Page 1 of	23 1987
Title MANUAL ULTPASONIC	EXAMINATION	OF AUSTENITIC PRESSURE	PIPING WELDS	
	EFFECTIVITY	AND APPROVAL		
Revision 23 of this procedure beca be effective concurrently.	ame effective on <u>D</u>	ec 22, 1987 Other revision	s of the base docum	ent may
			s	FLD
A more supply				1 mar
Approvals Written By ERRmachen For DWF	Date 12/22/97	Technical Review		ste
Written By ER uncher For DWF Manager of Q.A.	12/22/57 Date	E R machen 9 Cognizint Director	a JTA I.	
Written By ERAnacher For DWF Manager of Q.A. Clingelhard for TC	Date 12/22/07	E R machen 9 Cognizint Director		ste 2/22/57 Pate 2/22/8-
Written By ERAnacher For DWF Manager of Q.A. Clingelhard for TC	Date 12/22/07	Cognizint Director		ste 2/22/57 Pate 2/22/8-
Written By ERA machine For Durf Manager of Q.A. Clingelhardt for TC The following information may Deviation No.	Date 12/22/07	Cognizint Director		ste 2/22/57 Pate 2/22/8-
Written By ERAmachen For Durf Manager of Q.A. Clingelhard for TC The following information may	Date 12/22/07	Cognizint Director		ste 2/22/57 Pate 2/22/8-

.

6

ø

8

SwRI-NDT-600-31 Revision 23 December 1987



MUCLEAR PROJECTS OPERATING PROCEDURE

Page 2 of 22

MANUAL ULTRASONIC EXAMINATION OF AUSTENITIC PRESSURE PIPING WELDS

SwRI-NDT-600-31

1. PURPOSE

This procedure provides the technical information and detailed steps required to ensure a proper manual ultrasonic examination of similar or dissimilar metal welds and adjacent base material in clad or unclad austenitic pressure piping in accordance with the applicable American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Codes.

2. SCOPE AND APPLICATION

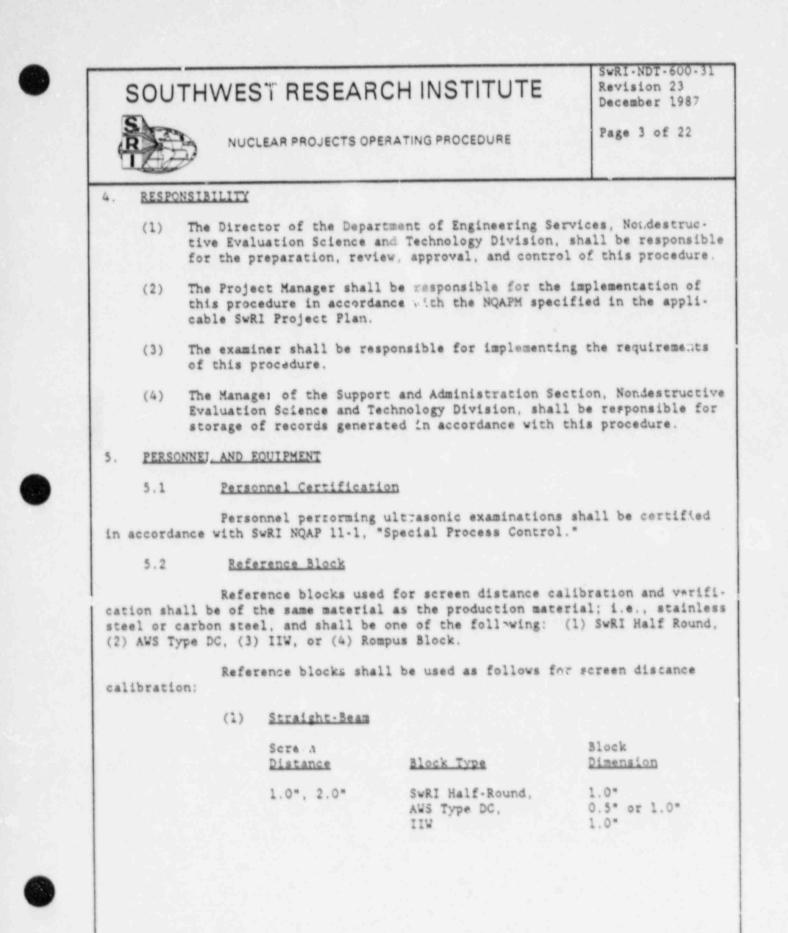
Manual, contact, pulse-echo, shear-wave angle-beam, and longitudinal-wave straight-beam ultrasonic techniques shall be utilized for the examination of austenitic pressure piping welds and adjacent base material in a nominal thickness range of greater than 0.4 to 5.0 inches.

Welds to be examined in wrought austenitic material shall be similar or dissimilar metal circumferential welds, longitudinal pipe welds, and branch connection full-penetration butt welds as specified in the applicable Southwest Research Institute (SwRI) Examination Plan.

3. APPLICABLE DOCUMENTS

- ASME Boiler and Pressure Vessel Code, Section XI, 1983 Edition with Addenda through Summer 1983, "Rules for Inservice Inspection of Nuclear Power Plant Components"
- (2) ASME Boiler and Pressure Vessel Code, Section V, 1983 Edition with Addenda through Summer 1983, "Nondestructive Examination"
- (3) SwRI Nuclear Quality Assurance Program Manual (NQAPM)
- 3.1 Calibration and Examination Records

SWRI-NDTR Form No.	<u>Revision Date</u>
17-18	3-14-79
17-19	12-1-83
17-25	7-10-80
17-37	2-13-80
17-89	8-19-80
17-90	8-19-80



SwAI Form QA 3-2

89



1

65

NUCLEAR PROJECTS OPERATING PROCEDURE

December 1987 Page 4 of 22

Revision 23

SWRI-NDT-600-31

	2.5", 5.0"	SwRI Half-Round, AWS Type DC IIW	1.0" 1.0" 1.0"
	10.0*	IIV	4.0"
(2)	Angle-Beam		
	Screen Distance	Block Type	Block Dimension
	2.0", 2.5", 5.0"	SwRI Half-Round AWS Type DC Rompus	1.0" Radius 1.0" and 2.0" Radii
	10.0*	SwRI Half-Round AWS Type DC Rompus IIW	1.0" Radius 1.0" and 2.0" Radii 4.0" Radius
	20.0*	IIW	4.0" Radius

5.3 Basic Calibration Block

Side-drilled basic calibration hole reflectors, in accordance with Section V of the ASME Boiler and Pressure Vessel Code, shall be placed in a block manufactured from the same product form, and material specification and heat treatment as one of the materials being joined.

The basic calibration block thickness shall be determined by the average wold thickness of the piping to which the rearch unit is applied and Article 5, Section V. When a basic calibration block of the same thickness as t is not available and where t is 1 inch or less, the basic calibration block thickness shall be no more than 25% thinner than t or shall be closer to t than the 3/4-inch thick alternate calibration block allowed by Article 5.

For calibration blocks for dissimilar metal welds, the material selection shall be based on the material on the side of the weld from which the examination will be conducted. If the examination will be conducted from both sides, calibration reflectors shall be provided in both materials.

Where two or more base material thicknesses are involved, the calibration block thickness shall be of a size sufficient to contain the entire examination metal path.



SwRI-NDT-600-31 Revision 23 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 5 of 22

Where the component material is clad, the block shall be clad by the same welding procedure as the production part. Where the automatic method is impractical, deposition of clad shall be by the manual method.

The surface finish of the basic calibration block shall be representative of the surface finish of the piping to be examined.

Flat basic calibration blocks or blocks of essentially the same curvature as the part to be examined may be used when contact surface curvatures are greater than 20 inches in diameter.

A curved basic calibration block shall be used to establish distance amplitude correction (DAC) curves for examinations on contact surfaces in the range of curvature from 0.9 to 1.5 times the basic calibration block diameter, when contact surface curvature is 20 inches in diameter or less.

The curvature of the main run pipe shall be used to establish the requirements for the basic calibration block curvature for the examination of branch connection welds.

Approved drawings of basic calibration blocks to be used in accordance with this procedure are contained in the applicable SwRI Examination Plan.

5.4 Search Units

Search units shall be selected from the following:

(1) Straight-Beam

Average Weld Thickness

Nominal Search Unit Size

Greater than 0.4" to 2.0" 1.0" to 3.0" 2.0" to 4.0" 3.0" to 5.0" 1/4" Round 3/8" Round 1/2" Round 3/4" to 1" Round

(a) The nominal straight-beam longitudinal-wave search unit frequency for austenitic piping shall be 1.5 MHz or 2.25 MHz, and 2.25 MHz for carbon steel.



SwRI-NDT-600-31 Revision 23 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 6 of 22

(2) Angle-Beam

Average Weld Thickness

Maximum Nominal Search Unit Size

 Greater than 0.4" to
 1/4" x 1/4", 1/4" Round

 less than 0.5"
 3/8" x 3/8", 3/8" Round

 0.5" to 2.0"
 3/8" x 1/2", 1/2" Round

 0.75" to 4.0"
 1/2" x 1/2", 1/2" Round

 Greater than 2.0" to 5.0"
 1/2" x 1", 3/4" Round

- (a) The nominal angle-be.s shear-wave search unit frequency for examination of austenitic piping shall be 2.25 MHz for 1/4 inch search units and 1.5 MHz for search units greater than 1/4 inch in size.
- (b) The nominal angle-beam shear-wave search unit frequency for the carbon steel side of dissimilar piping welds shall be 2.25 MHz.
- (c) Search unit wedges shall be fabricated to produce 45° ±2° refracted shear-wave when examining circumferential piping welds, or branch connections. A 60° ±2° refracted shear-wave shall be used only to augment the examination.
- (d) For examination of longitudinal piping welds, search unit wedges shall be fabricated to produce 45° ±2° refracted shear waves.
- (e) The exit point of the sound beam and the actual refracted beam angle of shear-wave search units shall be determined on an IIW block or a Rompus block. The exit point shall be marked on the search unit wedge.
- (f) 1/4" x 1/4" or 1/4" round search units may be used for angle-beam calibrations when examining 4-inch diameter piping.

5.5 Ultrasonic Instrument

The examiner shall use a Sonic FTS Mark I ultrasonic instrument which shall be aligned and shall display a valid alignment calibration tag as required by NQAP 10-1.

SwRI-NDT-600-31 Revision 23 December 1987

11



5.6

NUCLEAR PROJECTS OPERATING PROCEDURE

Page 7 of 22

Couplant

- USP-grade glycerine or reactor grade water shall be used when performing ultrasonic calibrations and examinations in accordance with this procedure.
- (2) USP-grade glycerine shall be certified for sulfur content and total halogens in accordance with SD-129 and SD-808 of Article 24, Section V. The residual amount of total sulfur or halogens shall not exceed 1% by weight. Reactor grade water, when used, shall be supplied by the customer.
- (3) Couplant materials used for examinations shall be the same as used for the calibration.

5.7 Thermometer

The thermometer to be used for measuring the calibration block and component temperatures shall be calibrated and certified and shall display a valid calibration tag as required by NQAP 10-1.

6. CALIBRATION METHOD

6.1 Instrument Linearity

Ultrasonic instrument linearity shall be verified prior to each period of extended use or every 3 months, whichever is less, in accordance with Paragraphs 6.1.1 and 6.1.2. Data required shall be recorded on the SwRI Instrument Linearity Verification Record and the sheet number shall be referenced on each applicable SwRI Sonic Instrument Calibration Record.

NOTE

The setting of the damping control shall be recorded in REMARKS on the SwRI Instrument Linearity Verification Record. The damping control shall be in the same position during linearity verification, calibrations and examinations or a new linearity verification shall be performed.

6.1.1 Screen Height Linearity

(1) Position a shear-wave search unit on a calibration block to obtain indications from the 1/2T and 3/4T holes, or use a straight-heam search unit on any calibration block that provides coplitude differences.



SwRI-NDT-600-31 Revision 23 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 8 of 22

- (2) Adjust the search unit position to give a 2:1 ratio between the two indications, with the larger indication set at 80% of full screen height (FSH) and the smaller indication at 40% of FSH.
- (3) Without moving the search unit, set the larger indication to 100% of FSH; record the amplitude of the smaller indication, estimated to the nearest 1% of FSH.
- (4) Successively set the larger indication from 100% to 20% of FSH in 10% increments (or 2 dB steps if a fine control is not available); observe and record the smaller indication estimated to the nearest 1% of FSH at each setting. The reading must be 50% of the larger amplitude within 5% of FSH.

6.1.2 Amplitude Control Linearity

 Position a shear-wave or straight-beam search unit on a calibration block to obtain maximum amplitude from an applicable reflector.

NOTE

The primary reference level sensitivity should be within the highest and lowest gain settings used during amplitude control linearity verifications. The highest and lowest gain settings used during the amplitude control linearity verifications shall be recorded in the Remarks column of the applicable SwRI Linearity Verification Records.

> (2) Without moving the search unit, set the indication to the required percent of FSH and increase or decrease the dD as specified below. The estimated signal shall be recorded to the nearest 1% of FSH and shall fall within the limits of the following table:

dB Control Change*	Indication Limits. * of FSH
+ 6 dB	32 to 48%
-12 dB	16 to 248
* 6 dB	64 to 96%
+12 dB	64 20 96%
	Change* - 6 dB -12 dB + 6 dB

*Minus denotes decrease in amplitude; plus denotes increase.

SwRI Form QA 3-2

٠

SwRI-NDT-600-31 Revision 23 December 1987

6.2

NUCLEAR PROJECTS OPERATING PROCEDURE

Page 9 of 22

Calibration

The ultrasonic calibration shall be completed prior to the examination.

The REJECT control shall be maintained in the O position.

The FREQ MHz control shall be curned to 1 when a 1.5-MHz search unit is used and to 2 with a 2.25-MHz search unit.

The centerline of the search unit shall be at least 1-1/2 inches from the nearest side of the calibration block. Rotating the beam into the corner formed by the hole and the side of the block may produce a higher amplitude at a longer beam path. This beam path shall not be used for calibration.

The type and length of the search unit cable shall be recorded on the SwRI Sonic Instrument Calibration Record, and all other information blocks on the form shall be filled in.

The average weld thickness shall be used to determine the correct calibration block and search units for examinations with geometric restrictions such as piping or components which may be thicker than the nominal pipe size, examinations limited to one side of the weld or wide weld crowns. The Level II or III examiner shall ensure that complete coverage of the examination volume is obtained. Additional calibration vee-path positions and larger screen sizes may be required to assure this coverage.

6.2.1 <u>Temperature</u>

The calibration block temperature shall be within 25°F of the component temperature and shall be recorded on the SwRI Sonic Instrument Calibration Record for the initial calibration and each verification. The surface temperature of the component to be examined shall be taken prior to and after performing each examination and shall be recorded on the applicable SwRI Examination Record.

6.3 Calibration for Circumferential Butt Welds

6.3.1 Straight-Beam Distance Calibration

The screen distance chosen shall be the shortest applicable size to include at least 1/4t beyond the thickest production material to which the search unit is applied. Observing back reflections from the applicable reference block, set up the required linear sound path distance along the screen baseline.



SwRI-NDT-600-31 Revision 23 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 10 of 22

Screen distance calibration shall be selected from the following sizes: 1.0", 2.0", 2.5", 5.0" and 10.0".

6.3.2 Angle-Beam Distance, Calibration

The screen distance chosen shall be the shortest applicable size to include at least 1/8 vee-path past the anticipated examination range. Observing radius echoes from the applicable reference block, set up the required linear sound path distance along the screen baseline.

Screen distance calibration for angle beam shall be selected from the following sizes: 2.0", 2.5", 5.0", 10.0", and 20.0".

If a 60° shear-wave angle-beam is required to augment the examination, and the same instrument is used for both 45° and 60° examinations, the screen distance calibration shall be conducted as follows:

- The screen distance size shall be determined by the angle-beam search unit requiring the longer examination range.
- (2) Position the 45° search unit on the appropriate reference block and record all required reference block entries on the appropriate SwRI Sonic Instrument Calibration Record.
- (3) Without changing the calibrated screen distance, repeat step (2) with the 60° search unit.
- (4) No attempt shall be made to compensate for the delay difference between 45° and 60° screen distance calibrations. This difference shall be considered when resolving indications.
- 6.3.3 Straight-Beam Distance Amplitude Correction

A DAC curve shall be established by utilizing responses from the basic calibration holes.

6.3.3.1 Production Material 1 Inch or Less in Thickness

- Position the straight-beam search unit to obtain maximum response from the 1/2T hole, and set this response to 80% ±5% of FSH.
- (2) Draw a straight horizontal line on the instrument screen at this amplitude to extend a distance equal to the nominal thickness of the production material.



SwAl Form QA 3-2

SWRI-ND1-600-31 Revision 23 December 1987

NUCLEAR PROJECTS OPERATING PROCEDURE

Page 11 of 22

(3) Signal amplitudes for indications recorded shall be referenced as a percentage of this line.

6.3.3.2 Production Material Greater Than 1 Inch in Thickness

(1) Position the straight-beam search unit to obtain maximum response from the calibration hole selected from the following, that produces the highest amplitude:

Hole

1/4T 1/2T (if present) 3/4T

- (2) Set this response to the primary reference level of 80% ±5% of FSH and mark its amplitude on the instrument screen.
- (3) Without changing the gain controls, obtain maximum response from the remaining calibration holes; mark and join all amplitude points with a smooth curved line that shall extend 1/4T beyond the last qualified calibration point.

6.3.4 Angle-Beam Distance Amplitude Correction

If a curved block is used, DAC curves for the examination of circumferential welds shall be constructed by utilizing the responses from the holes oriented perpendicular to the axis of the basic calibration block.

6.3.4.1 Unclad Material

- (1) Position the 45° search unit to obtain commun response from the calibration hole and vee-path position selected from a minimum of three ver-path positions required to cover the entire examination area, the first of which must be situated prior to the lower 1/3t volume and the last at the end or after the 1/3t volume.
- (2) Set this response to the primary reference level of 80% ±5% of FSH and mark its amplitude on the instrument screen.
- (3) Without changing the gain controls, obtain maximum response from the remaining required vee-path positions. Mark and join all amplitude points with a smooth curved line that shall encompass the examination area not to extend more than 1/8 vee-path past the last qualified calibration node.

Swill Form QA 3-2

SwRI-NDT-600-31 Revision 23 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 12 of 22

(4) If a 60° shear-wave angle-beam is required to augment the examination, repeat steps (1) through (3) using a 60° search unit.

EXCEPTION

If the configuration of the weld is such that the above calibration is not the most appropriate to provide coverage from two directions of the examination volume C-D-E-F as depicted in Figure 1, then a calibration may be established which uses any vee-path position required to obtain complete coverage of the examination area. Consideration shall be given to previous examination data to ensure that equivalent calibrations are performed where practicable.

6.3.4.2 Clad Piping

(1) Position the 45° search unit to obtain maximum response from the calibration hole and the vee-path position, selected from the following, that produces the highest amplitude:

Hole		X	ee-Path Positions
1/4T 1/2T 3/4T	(if	present)	1/8 2/8 3/8

- (2) Set this response to the primary reference level of 80% ±5% of FSH and mark its amplitude on the instrument screen.
- (3) Without changing the gain controls, obtain maximum response from the remaining vee-path positions; mark and join all amplitude points with a smooth curved line that shall extend 1/8 vee-path beyond the last qualified calibration point.
- (4) If a 60° shear-wave angle-bear is required to augment the examination, repeat steps (1) through (3) with a 60° search unit.
- 6.4 Calibration for Branch Connection and Longitudinal Seam Welds

6.4.1 Straight-Beam Distance Calibration

The straight-beam distance calibration shall be the same as that described in Paragraph 6.3.1.

SwRI-NDT-600-31 Revision 23 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 13 of 22

6.4.2 Angle-Beam Distance Calibration

The screen distance chosen shall be the shortest applicable size to include at least 1/8 vee-path past the anticipated examination range. Observing the radius echoes from the applicable reference block, obtain the required linear sound path distance along the screen baseline.

6.4.3 Straight-Beam Distance Amplitude Correction

The straight-beam distance amplitude correction shall be the same as that described in Paragraph 6.3.3.

6.4.4 Angle-Beam Distance Amplitude Correction

If a curved block is utilized, DAC curves shall be constructed by utilizing the responses from the basic calibration holes oriented axially with the basic calibration block.

6.4.4.1 Unclad Material

This calibration shall be the same as that described in Paragraph 6.3.4.1, steps (1) through (3), using only the 45' search unit.

6.4.4.2 Clad Piping

This calibration shall be the same as that described in Paragraph 6.3.4.2, steps (1) through (3), using only the 45° search unit.

6.5 Secondary DAC Calibrations

If any point on the DAC curve (within the examination volume) does not appear at 20% of FSH or greater, a secondary DAC curve shall be constructed as follows:

- (2) All secondary DAC curves shall contain at lease 2 points.
- (2) The DAC point at 20% of FSH or greater, adjacent to a DAC point that falls below 20% of FSH, shall be brought to the primary reference level and marked on the instrument screen. The other point(s), previously at less than 20% of FSH, shall be marked on the screen and all points connected with a smooth curved line. The gain setting for this secondary DAC curve shall be recorded on the appropriate SwRI Sonic Instrument Calibration Record.

SwRI-NDT-600-31 Revision 23 December 1987





NUCLEAR PROJECTS OPERATING PROCEDURE

Page 14 of 22

EXCEPTIONS

When the first DAC point is the only point above 20% of FSH, the next highest point shall be brought to the primary reference level and marked on the instrument screen. The other points previously at less than 20% of FSH shall be marked on the screen and all points connected with a smooth curved line.

6.6 Calibration Verification

6.6.1 Sweep Range and DAC Curve Verification

Sweep range calibration shall be verified on the appropriate reference block; and DAC curve calibration, if applicable, shall be verified on the appropriate basic calibration block:

- (1) Prior to a series of examinations
- (2) With any substitution of the same type or length of search unit cable
- (3) With any substitution of power utilizing the same type source; e.g., a change of batteries
- (4) At least every 4 hours during the examination
- (5) At the completion of a series of examinations
- (6) Whenever the validity of the calibration is in doubt

6.6.2 Verification of Calibration Reflectors at Scanning Speed

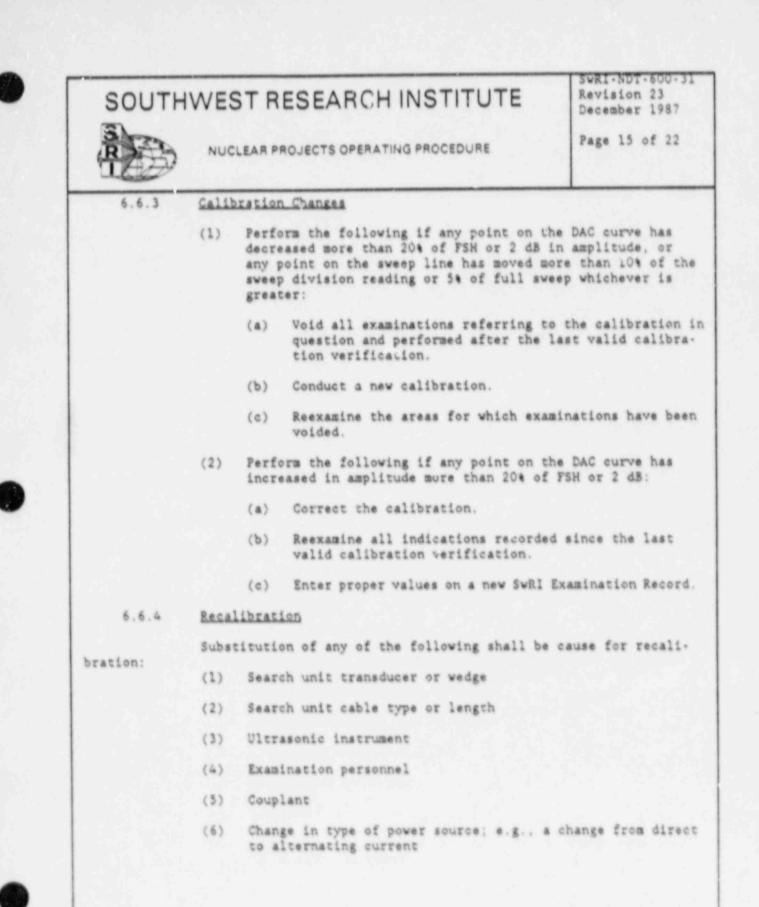
The examiner shall verify the presence of the calibration reflector at scanning speed.

NOTE

It is not necessary to assure that this check confirms the signal amplitude at 100% of reference level, but merely to demonstrate that the signal from the calibration reflectors are readily observable at scanning speed.

The following statement shall be documented on the SwRI Sonic Instrument Calibration Record and initialed:

"Calibration reflectors have been verified at scanning speed."



SwAl Form QA 3-2

SWRI-NDT-600-31 Revision 23 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 16 of 22

7. EXAMINATION

7.1 Examinat

7.1.1 Circumferential and Longitudinal Butt Welds in Piping

Scanning of the weld and base material shall be adequate to ensure complete two-directional coverage for 1/3t from the inside surface of the pipe as shown in Figure 1. The base material shall be examined for a distance of 1/4 inch as measured from the outside surface fusion line on each side of the weld.

Class 1 longitudinal welds shall be examined along the entire length of the weld during the preservice examination and for at least one pipe-diameter length or 12 inches, whichever is less, from the fusion line of the intersecting circumferential weld during inscrvice examinations.

Class 2 longitudinal welds shall be examined for at least 2-1/2t length from the fusion line of the intersecting circumferential weld during preservice and inservice examinations.

7.1.2 Butt Welds of Branch Connections

Scanning of the weld ind base material shall be adequate to ensure complete coverage for 1/3t from the inside surface of the pipe as shown in Figure 2. The base material shall be examined for a distance of 1/4 inch measured from the outside surface fusion line on the main run pipe side of the weld.

7.2 Surface Condition

The contact surfaces shall be free from weld spatter, roughness, or other conditions which interfere with free movement of the search unit or impair the transmission of ultrasound.

7.3 Indication Length Zero Reference (Lo) Location

Areas to be examined in accordance with this procedure shall have an Lo marked in accordance with the applicable revision of SwRI Procedure IX-FE-103.

7.4 Scanning

When practicable, scanning shall be performed at a minimum gain setting of 2 times the reference level sensitivity.



SWRI-NDT-600-31 Revision 23 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 17 of 22

Instrument gain setting for scanning shall be determined on the basic calibration block as follows for each primary reference level utilized:

- (1) With the instrument at the primary reference level, manipulate the search unit on the basic calibration block to obtain a signal of 40% of FSH from a calibration reflector (side-drilled hole).
- (2) Add 6 dB gain by utilizing the 6 dB switch (if present), the fine gain control, or a coubination of the fine and coarse gain controls and choose any method that yields a signal response within ±2 dB of 80% FSH.
- (3) This amplitude and method shall be recorded on the SwRI Sonic Instrument Calibration Record and shall be used during the valid calibration period for all scanning at 2 times the reference level sensit vity.

Scanning overlap shall be a minimum of 25% of the search unit piezoelectric element dimension perpendicular to the direction of the scan.

The search unit movement rate shall not exceed 3 inches per second. While scanning, the search unit shall be oscillated approximately ±20°.

7.5 Thickness Measurements and Lamination Scan

Screen distance calibration for these examinations shall be conducted in accordance with Paragraph 6.3.1.

7.5.1 Thickness Measurements

Thickness measurements shall be taken at a minimum of three points adjacent to Lo for longitudinal and circumferential welds (on the centerline of the weld and at one point in the base material on each side of the weld). Thickness measurements shall be taken at a minimum of two points adjacent to Lo for branch connection welds (one on the base material of the main run pipe, and one on the base material of the branch connection). If these measurements cannot be taken adjacent to Lo, the location of the measurements shall be recorded on the appropriate SwRI Examination Record.

7.5.2 Base Material Lamination Scan

A lamination scan using longitudinal-wave shall be performed. This scan shall cover as much as practical of the area through which the angle-beam passes. The lamination scan shall be conducted as follows:



SwRI-NDT-600-31 Revision 23 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 18 of 22

 Scanning shall be performed at a gain setting that gives an initial backwall amplitude of 80% ±5% FSH.

EXCEPTION

If performed previously, a lamination scan is not required except in the area(s) where a lamination was previously recorded.

- (2) To record an intermediate indication, obtain a backwall reflection signal from an indication-free area and adjust this signal to 80% ±5% of FSH. Record the intermediate indication when its amplitude is equal to the remaining backwall reflection. Areas of total loss of backwall reflection accompanying the intermediate echo shall also be recorded.
- 7.6.1 Angle-Beam Examination for Indications Parallel with the Weld

Angle-beam examinations for circumferential welds shall be accomplished using the required refracted shear-wave from both sides of the weld. For this examination, the sound-beam shall be directed perpendicularly into the weld to detect indications parallel with the weld. Calibration for these examinations shall be in accordance with Paragraphs 6.3.2 and 6.3.4.

Angle-beam examinations for longitudinal welds shall be accomplished using the required refracted shear-wave from both sides of the weld. For this examination, the sound-beam shall be directed perpendicularly into the weld to detect indications parallel with the weld. Calibration for this examination shall be in accordance with Paragraphs 6.4.2 and 6.4.4.

7.6.2 Alternate Examination

A shear-wave angle-beam examination shall be conducted as required to assure complete coverage from both sides of the circumferential or longitudinal weld. Any areas of the weld not receiving complete coverage from both sides shall be examined from one side of the weld with the required shear-wave(s) and a straight-beam longitudinal-wave applied to the surface of the weld crown in the affected areas. Calibration for the longitudinal wave search unit shall be in accordance with Paragraphs 6.3.1 and 6.3.3.

SwRI-NDT-600-31 Revision 23 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 19 of 22

Angle-Beam Examination for Indications Perpendicular to the Weld

Calibration for these examinations shall be in accordance with Paragraphs 6.3.2 and 6.3.4 for circumferential welds, and Paragraphs 6.4.2 and 6.4.4 for longitudinal and branch connection welds.

A shear-wave angle-beam examination shall be conducted on each weld by placing the search unit on the weld and lt base metal adjacent to each weld with the sound beam directed into and parallel with the weld to detect indications perpendicular to the weld. The entire length of the weld and base material within 1t of the weld shall be scanned with the search unit beam directed in this manner from two opposing directions.

The search unit shall then be placed on the base metal with the search unit sound beam directed tangentially into the weld at a 45° ±10° angle. The entire length of the weld and adjacent base material shall be scanned with the search unit beam directed in this manner on each accessible side of the weld from two opposing directions. Geometric root ripple echoes occurring at the same metal path distance as flaws adjacent to the weld root are to be expected. A flaw must be distinguished from root ripple by its greater echo amplitude compared to the amplitude of the root ripple at the same location. A flaw indication adjacent to the weld root tends to mask out several facets of the root ripple and travels along the baseline through the root ripple package.

7.7 Examination of Butt Welds of Branch Connections

7.7.1 Angle-Beam Examination for Indications Parallel with the Weld

A shear-wave angle-beam examination shall be accomplished from the main run pipe side of the weld. For this examination, the sound beam shall be directed perpendicularly into the weld to detect indications parallel with the weld. Calibration for these examinations shall be in accordance with Paragraphs 6.4.2 and 6.4.4.

7.7.2 Angle-Beam Examination for Indications Perpendicular to the Weld

The angle-beam examination for indications perpendicular to the weld shall be the same as the examination described in Paragraph 7.6.3.

7.8 Postexamination Cleaning

Arrangements shall be made with the customer for postexamination removal of couplant materials.



SWRI FOR OA 3-2

SwRI-NDT-600-31 Revision 23 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 20 of 22

8. RECORDING CRITERIA

Indications shall be recorded in accordance with the techniques outlined in the applicable revision of SwRI Procedure IX-FE-117.

All ultrasonic reflectors, regardless of signal amplitude, not attributable to geometry shall be recorded and investigated by a Level II or a Level III examiner to determine the shape, identity, and location of the reflector. Examples of nongeometric reflectors are those which are slightly removed from the weld root and/or chamfer, mask the root indications, are transverse to the weld, or have linear dimensions with side branches.

Ultrasonic reflectors attributable to geometry and producing a response greater than 50% of the reference level shall be recorded on the appropriate SwRI Ultrasonic Examination Record and investigated. Recordable indications attributable to geometry shall be recorded only once, even if the amplitude of the indication drops below the required recording amplitude along the weld. These indications shall be investigated by a Level II or a Level III examiner to determine the shape, identity, and location of the reflector.

If indications that have been recorded as geometry have been investigated and found to be nongeometric reflectors, the entire weld shall be reexamined and all nongeometric reflectors and other reflectors not previously recorded at least cnce shall be recorded.

Indications investigated and found to be other than geometrical in nature, regardless of the amplitude, shall be reported to the customer for evaluation.

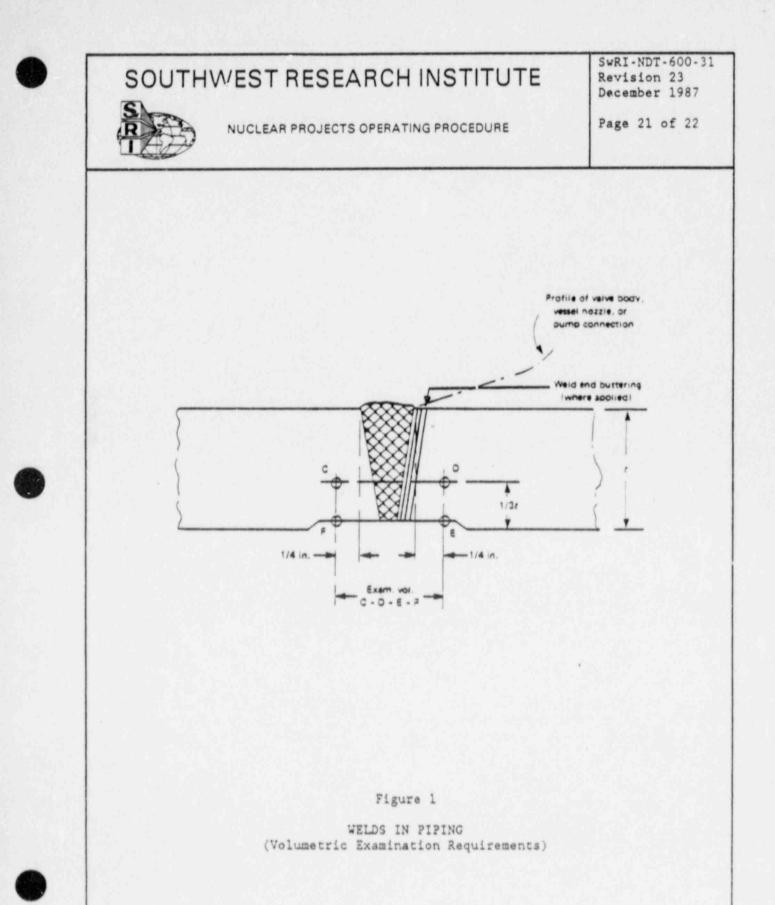
Scanning limitations shall be recorded.

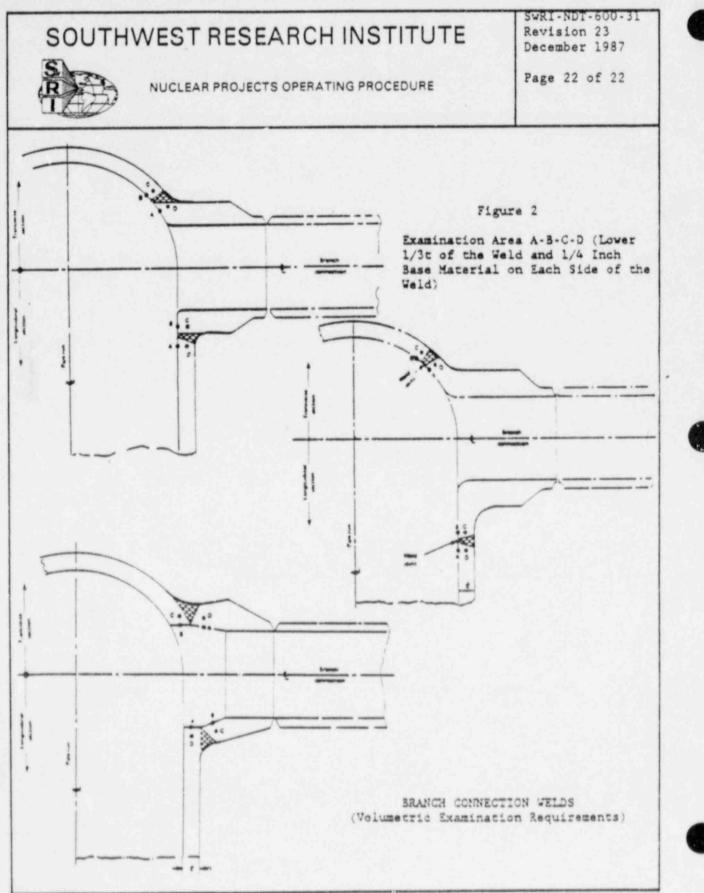
9. EVALUATION

Initial evaluation of reportable indications shall be performed by SwRI personnel, and shall be conducted in accordance with the applicable ASME Boiler and Pressure Vessel Code, Section XI, Article IWA-3000. Final evaluation and disposition of reportable indications shall be the responsibility of the customer.

10. RECORDS

Documents generated in accordance with this procedure shall be stored as specified in the SwRI Project Plan. The customer shall receive copies of these documents in the Examination Report, unless specified otherwise in the SwRI Project Plan.





I	A	Ð	SITE	Hope Creek			PS1	8		URE/REVISIO	N NO.
-		DEVIAT	CNNC	DEVIATION PAGE NO	OATE REQUE	STED:	EXAMINA	_		100-41/0	
N N	3	UEVIA	1	1 or 1		ber 1984				1984	
	Fa	SECTION	NISI AFFECTE	COLUMN TWO IS NOT THE OWNER OF TAXABLE PARTY.		PROCED	UREPAGE	(S):			
+	2			6						11	OF:
pector and	March ul	ECAMIN	A TION AREAL	S)AFFECTED: Fertitic pr	essure pip	ing weld	3				
DATE DATE WANTMENT DU	1/ NOVIL		proposed, add	uested that the paragraphia titional sheets may be used if agraph 6.4.1.1 as	I necessary1:	The above prox	sedure/ nev	sion be d	evented fro	m as follows lu	se exect
à	1		Vertific	ation of Calibra	tion Reflec	tors at	Scanni	ng Spe	eed		
AGER	Munto	lo Be	The examiner shall verify the presence of the calibration reflector at scanning speed.								
DATE DAMANAGER	V M.C.	0	amp litud	ot necessary to a ie at 100% of ref nal from the cali y speed.	arance lave	1, but a	eraly	to der	nonstra	te that	
DA	31.00			lowing statement tion Record and i		cumented	on th	e SwR	I Sonid	Instrume	in t
TECHNICAL REVIEW	Klarthe Res		"Calibra	ation Reflectors	have been v	verified	at Sca	aning	Speed.	11	
DATE	30000	JUSTI		nation complies							. 57
RECHRISTED BY	OWTOW WIT		of the c	alibration refle	ctors under	procedur	al scar	ming	condi ::	ions.	

ÎÆ		SITE Hope Creek							PSI	8	PRO	CEDURE/REVISION NO. 600-41/8	
~	9	DEVIATIO	N NO.	1	EVIATION	2	0.:	DATE REQUES		EXAMINA	TION P	ERIOS:	1984
-	FL	SECTION	S) AFFECT	TED:		6			PROCED	URE PAGE	(\$):		10 and 11 of 19
DEPANIMENI DIRECTON DATE	1. 1 Marth 62	CEVIATI	ON: It is n	mate	rial th	ragraphi	8.5 S	in farriti	c press	sure pi	ping		r than the nomina
_	111	-											
DATE	Zuplay	Add	the f	01104				nder 6.2					than the nominal
DA MANAGER	1 Sum Mark	the	V-path	post	erial t	foll	ess red	, calibra to obtain	n comp	shall b	e est	cabl	Ished which use f the examination
DAIE	2W					and the second se	-	Calibrat:		e do e	or and	near	at 20% of FSH or
-	1	gr	eater,	a se	condary	DAC	cur	ve shall h	e cons	tructe	i as	follo	ws:
TECHNICAL REVIEW	Nieto. Muy				(1)	All	sec	ondary DAG	Curve	s shal.	L con	tain	at least 2 points
DAIL	14 Nov		nis dev	iati	on clar	ifies	ch	e examina	tion c	overage			
ROUSTEDBY	HTEWER	Addaman + Hicknesses of geometric restrictions.											

SwRI-NDT-600-41/8 Deviation 2 Page 2 of 2

(2) The DAC point at 20% of FSH or greater, adjacent to a DAC point that falls below 20% of FSH, shall be brought to the primary reference level and marked on the instrument screen. The adjacent point(s), previously at less than 20% of FSH, shall be marked on the screen and all points connected with a smooth curved line. The gain setting for this secondary DAC curve shall be recorded on the appropriate SwRI Sonic Instrument Calibration Record.

EXCEPTIONS

When the first DAC point is the only point above 20% of FSH, the next highest point shall be brought to the primary reference level and marked on the instrument screen. The other points previously at less than 20% of FSH shall be marked on the screen and all points connected with a smooth curved line.

DF:	PRC	CEDURE DE	VIATION	Page	1 of 2
Procedu	79 (00 ()		Revision 8	Deviation	
	DT. 600-41 wing examination areas are affected		0		3
Manua	l ultrasonic examinatio dance with this procedu	on of ferritic p	iping welds to be	examined in	
	wing paragraphs shall be deviated f e (1) of 6,2,3,1 to rea				
(1)	Position the applicabl on the basic calibrativee-path position, sel highest amplitude:	le 45 degree or lon block to obt	ain maximum respon	nse from the	
	Vee	-Path Positions			
	2/8, 3/8, 6/8 1/8, 3/8, 5/8, 7/ 1/8, 2/8, 3/8 on1				
This thick verify	e for deviation: deviation clarifies the nesses or geometric res y the detectability of tions.	trictions and c	omplies with the 1	NRC's request !	to
		10100550			ISA.
		10000	VALC		-F
Written 0	" DWFensuell	Date: 14 March 1987	VALS Technical Review:	E Ming	Date: Date:

SwRI-NDT-600-41/8 Deviation 3 Page 2 of 2

Add the following EXCEPTION under 6.2.3.2:

For components that are significantly thicker than the nominal production material thickness, calibrations shall be established which use the V-path positions required to obtain complete coverage of the examination area.

Change 6.3 to read as follows:

Secondary DAC Calibrations

If all points on the DAC curve do not appear at 20% of FSH or greater, a secondary DAC curve shall be constructed as follows:

- (1) All secondary DAC curves shall contain at least 2 points.
- (2) The DAC point at 20% of FSH or greater, adjacent to a DAC point that falls below 20% of FSH, shall be brought to the primary reference level and marked on the instrument screen. The adjacent point(s), previously at less than 20% of FSH, shall be marked on the screen and all points connected with a smooth curved line. The gain setting for this secondary DAC curve shall be recorded on the appropriate SwRI Sonic Instrument Calibration Record.

Exceptions

When the first DAC point is the only point above 20% of FSH, the next highest point shall be brought to the primary reference level and marked on the instrument screen. The other points previously at less than 20% of FSH shall be marked on the screen and all points connected with a smooth curved line.

Add paragraph 6.4.1.1 as follows:

Verification of Calibration Reflectors at Scanning Speed

The examiner shall verify the presence of the calibration reflector at scanning speed.

Note

It is not necessary to assure that this check confirms the signal amplitude at 100% of reference level, but merely to demonstrate that the signal from the calibration reflectors are readily observable at scanning speed.

The following statement shall be documented on the SwRI Sonic Instrument Calibration Record and initialed:

"Calibration Reflectors have been verified at Scanning Speed."

朝	PR	OCEDURE D	EVIATION	Page f	2
Procedure SwRI-NDT-	600-41		Revision 8	Deviation	4
Manual	ultrasonic examin ar.ce with this pr	ation of ferri	tic piping welds	to be examined in	
	DEVIATION SUPERCI		<u>3</u> .		
Chang	ge (1) of 6.2.3.1 t	to read as fol:	lows:		
(1)	vee-path position highest amplitude 2/8, 3/8, 6/ 1/8, 3/8, 5/	ibration block n, selected fro e: <u>Vee-Path Pos</u> /8	to obtain maximum om the following, sitions 2/8 is not present	response from th which produces th	e
thicknes	viation clarifies sses or geometric the detectability	restrictions a of the calibra	nd complies with tion reflectors un	the NRC's request nder procedural so	to
Written by:		Date:	OVALS	at 2.11	PLL Date:
	DWFenswell	21 May 1985	Verbai Approval Given?	E Yes E No	Date: N/A
				and the second	N/A

SWAI FORM FE-4-8

SwRI-NDT-600-41/8 Deviation 4 Page 2 of 2

Add the following EXCEPTION under 6.2.3.1 and 6.2.3.2:

For components that are significantly thicker than the nominal production material thickness, calibrations shall be established which use the V-path positions required to obtain complete coverage of the examination area.

Change 6.3 to read as follows:

Secondary DAC Calibrations

If all points on the DAC curve do not appear at 20% of FSH or greater, a secondary DAC curve shall be constructed as follows:

- (1) All secondary DAC curves shall contain at least 2 points.
- (2) The DAC point at 20% of FSH or greater, adjacent to a DAC point that falls below 20% of FSH, shall be brought to the primary reference level and marked on the instrument screen. The adjacent point(s), previously at less than 20% of FSH, shall be marked on the screen and all points connected with a smooth curved line. The gain setting for this secondary DAC curve shall be recorded on the appropriate SwRI Sonic Instrument Calibration Record.

Exceptions

When the first DAC point is the only point above 20% of FSR, the next highest point shall be brought to the primary reference level and marked on the instrument screen. The other points previously at less than 20% of FSH shall be marked on the screen and all points connected with a smooth curved line.

Add paragraph 6.4.1.1 as follows:

Verification of Calibration Reflectors at Scanning Speed

The examiner shall verify the presence of the calibration reflector at scanning speed.

Note

It is not necessary to assure that this check confirms the signal amplitude at 100% of reference level, but merely to demonstrate that the signal from the calibration reflectors are readily observable at scanning speed.

The following statement shall be documented on the SwRI Sonic Instrument Calibration Record and initialed:

"Calibration Reflectors have been verified at Scanning Speed."

SOUTH	SwRI-NDT-600-4 Revision 8 November 1984 Page 1 of 19			
Title MANUAL ULTRASONI	C EXAMINATION OF I	FERRITIC PRESS	URE PIPING WE	ELDS
Revision <u>8</u> of this proc be effective concurrently.		TY AND APPROVAL		the base document may
Approvais				SA FLD
Written By DWFEWIL	() Date 31 Cct. 1984	Technical Revie	- Ilia	Date 3100+ 1484
Maringer of Q.A.	Date	Cog Ant Dire	etor 1 1/a	el 21/1/84
The following inform Deviation No.	nation may be used for con	nvenience. Completio	on of this portion	is not mandatory.
Date Effective				
Procedure Section(s) Affected				
Notes:				



NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-600-41 Revision 8 November 1984



Page 2 of 19

MANUAL ULTRASONIC EXAMINATION OF FERRITIC PRESSURE PIPING WELDS

SwRI-NDT-600-41

1. PURPOSE

This procedure provides the technical information and detailed steps necessary to ensure a complete and accurate manual ultrasonic examination of ferritic pressure piping welds and the adjacent base material in accordance with the applicable ASME Boiler and Pressure Vessel Code.

2. SCOPE AND APPLICATION

Class 1 and Class 2 full-penetration pressure piping butt welds and the adjacent base material in the nominal thickness range of from 0.2- to 6.0-inches shall be examined.

Manual, contact, pulse-echo, shear-wave angle-beam, and longitudinal-wave straight-beam ultrasonic techniques shall be utilized for the examination of clad or unclad piping welds and adjacent base material.

Welds to be examined shall be circumferential and longitudinal ferritic pipe welds and set-in type branch connection butt welds as specified in the applicable SwRI Examination Plan.

3. APILICABLE DOCUMENTS

- ASME Boiler and Pressure Vessel Code, Section XI, 1977 Edition with Addenda through Summer 1978, "Rules for Inservice Inspection of Nuclear Power Plant Components"
- (2) SwRI Nuclear Quality Assurance Program Manual (NQAPM)

3.1 Applicable Calibration and Examination Records

SWRI-NDTR Form No.	Revision Date
17-89	8-19-80
17-90	8-19-80
17-25	7-10-80
17-19	12-1-83
17-18	7-31-75
17-37	2-13-80

SwRI-NDT-600-41 Revision 8 November 1984



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 3 of 19

4. RESPONSIBILITY

- The Director of the Department of Engineering Services, Quality Assurance Systems and Engineering Division, shall be responsible for the preparation, review, approval, and control of this procedure.
- (2) The Project Manager shall be responsible for the implementation of this procedure in accordance with the NQAPM specified in the applicable SwRI Project Plan.
- (3) The examiner shall be responsible for implementing the requirements of this procedure.
- (4) The Manager of the Support and Administration Section, Quality Assurance Systems and Engineering Division, shall be responsible for storage of records generated in accordance with this procedure.

5. PERSONNEL AND EQUIPMENT

5.1 Personnel Certification

Personnel performing examinations in accordance with this procecure shall be certified in accordance with SwRI NQAP 11-1, "Special Process Control."

5.2 Reference Block

Reference blocks used for screen distance calibration and verification shall be made of carbon steel and shall be one of the following: (1) SwRI Half-Round, (2) AWS Type DC, or (3) IIW.

5.3 Basic Calibration Block for Circumferential, Longitudinal, and Branch Connection Welds

The basic calibration block shall be fabricated from material of the same nominal diameter and of the same nominal wall thickness or pipe schedule as the pipe to be examined. This material shall be from one of the materials specified for the piping being joined by the weld. The finish on the surfaces of the basic calibration block shall be representative of the surface finishes of the piping.

When the examination is to be performed from only one side of the weld, the calibration block material shall be of the same specification as the material on that side of the weld. If material of the same specification is not available, material of similar chemical analysis, tensile properties, and metallurgical structure may be used.

SwRI-NDT-600-41 Revision 8 November 1984



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 4 of 19

The curvature of the main run pipe shall be used to establish the requirements for the basic calibration block curvature for the examination of branch connection welds.

Calibration reflectors for 12/8 vee-path (N-path) calibrations shall be notches machined on the outside and inside surfaces of the basic calibration block. The notches shall be in accordance with approved drawings of the basic calibration block and Appendix III of Section XI.

Calibration reflectors for 1/2 vee-path examinations shall be a minimum of two equal-diameter, axially drilled holes located at 1/41 and 3/4T, and the inside surface notch.

Approved drawings of basic calibration blocks to be used in accordance with this procedure are in the applicable SwRI Examination Plan.

- 5.4 Search Units
 - (1) Search units shall be selected from the following:
 - (a) Straight-Beam

Nominal Production Material Thickness

Nominal Search Unit Size

Nominal Search Unit Size

or	less	1/4"	Round
to	3.0"	3/8"	Round
to	4.0"	1/2"	Round
to	6.0"	3/4"	or 1" Round

(b) Angle-Beam

2.0" 1.0" 2.0" 3.0"

Nominal Production Material Thickness

 1.0" or less
 1/4" x 1/4", 1/4" Round

 0.4" to 2.0"
 3/8" x 3/8", 3/8" Round

 0.75" to 4.0"
 1/2" x 1/2", 1/2" Round

 2.0" to 6.0"
 1/2" x 1", 3/4" Round

(2) Search unit wedges shall be fabricated as required to produce 45° ±2° or 60° ±2° refracted shear-waves.



R

NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-600-41 Revision 6 November 1984

Page 5 of 19

- (3) The exit point of the sound beam and the actual refracted beam angle of shear wave search units shall be determined on an IIW block. The exit point shall be marked on the search unit wedge.
- (4) The nominal search unit frequency shall be 2.25 MHz.

5.5 Ultrasonic Instrument

The examiner shall use a Sonic FTS Mark I ultrasonic instrument which shall be aligned and shall display a valid alignment calibration tag as required by NQAP 10-1.

5.6 Thermometer

The thermometer to be used for measuring the calibration block and component temperatures shall be calibrated and certified and shall display a valid calibration tag as required by NQAP 10-1.

5.7 Couplant

- USP-grade glycerine or deionized water (with or without wetting agent) shall be used when performing ultrasonic calibrations and examinations in accordance with this procedure.
- (2) USP-grade glycerine shall be certified for sulfur content and total halogens in accordance with ASTM D-129-64 and ASTM D-808-63. The residual amount of total sulfur or halogens shall not exceed 1% by weight. Deionized water, when used, shall be supplied by the customer.
- (3) Couplant materials used for examinations shall be the same as used for the calibration.

6. CALIBRATION METHOD

The ultrasonic calibration shall be completed prior to the examination.

The FREQ MHz control shall be turned to 2.

The REJECT control shall be maintained in the O position during calibration and examination.



SwRI-NDT-600-41 Revision 8 November 1984



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 6 of 19

The type and length of the search unit cable shall be recorded on the SwRI Sonic Instrument Calibration Record and all other information blocks on this form shall be filled in.

The centerline of the search unit shall be at least 3/4 inch from the nearest side of the block. Rotating the beam into the corner formed by the hole and the side of the block may produce a higher amplitude at a longer beam path. This beam path shall not be used for calibration.

The nominal piping production material thickness shall be used to determine the correct calibration block and search units for the exemitations with geometric restrictions such as piping or components which may be thicker than the nominal pipe size, examinations limited to one side of the weld or wide weld crowns. The Level II or Level III examiner shall ensure that complete coverage of the examination area is obtained. Additional calibration vee-path positions, different angles, and larger screen sizes which may be required to assure this coverage, shall be used for the examination from either side of the weld.

6.1 Instrument Linearity

Ultrasonic instrument linearity shall be verified, as a minimum, within one day before and one day after performing all required ultrasonic examinations during a preservice examination, an outage or every three months, whichever is less, in accordance with Paragraphs 6.1.1 and 6.1.2. Data required shall be recorded on the SwRI Instrument Linearity Verification Record and the sheet number shall be referenced on each applicable SwRI Sonic Instrument Calibration Record.

The calibration verification of Paragraph 6.4.1 shall constitute a valid check of the instrument linearity. If a calibration verification does not fall within the tolerances required by Paragraph 6.4.2 due to instrument failure, an instrument linearity check must be performed prior to continuing examinations and all components examined since the last valid calibration verification shall be reexamined.

NOTE

The setting of the damping control shall be recorded in REMARKS on the SwRI Instrument Linearity Verification Record. The damping control shall be in the same position during linearity verification, calibrations, and examinations, or a new linearity verification shall be performed.

- 6.1.1 Amplitude Linearity
 - Position a search unit on a basic calibration block and obtain at least two indications on the instrument screen.

0

SwRI-NDT-600-41 Revision 8 November 1984

R

NUCLEAR PROJECTS OPERATING PROCEDURE

Page 7 of 19

- (2) Adjust the search unit position to give a 2:1 ratio between the two indications with the larger indication set at 80% of full screen height (FSH) and the smaller indication set at 40% of FSH.
- (3) Without moving the search unit, set the larger indication to 100% of FSH and record the amplitude of the smaller indication, estimated to the nearest 1% of FSH.
- (4) Successively set the larger indication from 100% to 20% of FSH in 10% increments (or 2 dB steps if a fine control is not available); record the smaller indication estimated to the nearest 1% of FSH at each setting. The reading must be 50% of the larger amplitude within 5% of FSH.

6.1.2 Amplitude Control Linearity

- Position a search unit on a basic calibration block to obtain maximum amplitude from an applicable reflector.
- (2) Without moving the search unit, set the indication to the required percent of FSH and increase or decrease the dB as specified below. The signal shall be recorded to the nearest 1% of F and shall fall within the limits of the iollowing table.

Indication Set at % of FSH	dB Control*	Indication Limits, % of FHS
80%	-6dB	32 to 48%
80%	-12dB	16 to 24%
40%	+6dB	64 to 96%
20%	+12dB	64 to 96%

*Minus denotes decrease in amplitude; plus denotes increase.

6.1.3 Temperature Requirements

The temperature of the basic calibration block shall be within 25°F of the component temperature and shall be recorded on the SwRI Sonic Instrument Calibration Record for the initial calibration and each verification.

The surface temperature of the component to be examined shall be taken prior to performing an examination and shall be recorded on the applicable SwRI Examination Record.

SwRI-NDT-600-41 Revision 8 November 1984



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 8 of 19

6.2 <u>Calibration</u>

6.2.1 Straight-Beam Distance Calibration

The screen distance chosen shall be the shortest applicable size to include at least 1/4t beyond the thickest production material to which the search unit is applied.

Observing back reflections from the applicable reference block, set up the required linear sound path distance along the screen baseling.

NOTE

A straight beam distance amplitude calibration, using calibration reflectors shall not be established with this procedure.

6.2.2 Angle-Beam Distance Calibration

The screen distance chosen shall be the shortest applicable size to include at least 1/8 vee-path past the anticipated examination range.

Observing radius echoes from the applicable reference block, set up the required linear sound path distance along the screen baseline.

6.2.3 Angle-Beam Distance Amplitude Correction

Thickness measurements in accordance with Paragraph 7.5 and crown width measurements taken in accordance with the applicable revision of N clear Projects Operating Procedure IX-FE-117 shall be used to determine the shear-wave angle that provides the required coverage, as depicted in SKETCH 1. These physical measurements, the angle chosen, determined method of coverage, and identification of the Level II or the Level III examiner shall be recorded on the SwRI Straight Beam Lamination Examination Record.

Only one angle shall be required for the examination. A 45° angle-seam search unit with a 1/2 vee-path calibration shall be utilized if complete coverage is obtained. A 60° angle-beam search unit with a 1/2 vee-path calibration does not obtain complete coverage. A 45° search unit with a calibration extending to the 12/8 vee-path position (N~path) shall be used when the 45° or the 60° 1/2 vee-path calibration does not obtain complete coverage. The 1/2 vee-path calibration may be extended to include additional vee-path positions if the calibration obtained is equal to or better than the N-path calibration.



NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-600-41 Revision 8 November 1984

Page 9 of 19

EXCEPTIONS

For Lxaminations on clad material and for 45° transverse examinations only the 1/2 voigeth calibration shall be used. Only a 45° 1/2 vee-path or N-path calibration shall be utilized for examination of longitudinal or branch connection welds.

6.2.3.1 Angle-Beam Distance Amplitude Correction (1/2 Vee-Path)

NOTE

The slope of the distance amplitude correction (DAC) curve shall be constructed from the holes parallel to the axis of the basic calibration block. The notch perpendicular to the axis of the curved basic calibration block shall be utilized to establish sensitivity when examining circumferential welds or for transverse examinations on longitudinal or branch connection welds. The axial notch shall be used to establish sensitivity when examining longitudinal or branch connection welds or for transverse examinations on circumferential welds.

The 1/2 vee-path DAC calibration shall be constructed as follows:

(1) Position the applicable 45° or 60° angle-beam search unit on the basic calibration block to obtain maximum response from the vee-path position, selected from the following, which produces the highest amplitude:

Vee-Path Positions

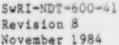
2/8, 3/8, 6/8

1/8, 3/8, 5/8, 7/8 (when 2/8 is not present)

1/8, 2/8, 3/8 only for clad material and 45° transverse examination (extrapolated to 4/8)

- (2) Set this response to 80% ±5% of FSH. Mark this amplitude on the instrument screen and record these gain settings under REMARKS.
- (3) Without adjusting the gain controls obtain maximum response from the remaining applicable hole(s); mark and join all amplitude points with a smooth curved line.

SwRI Form QA 3-2





NUCLEAR PROJECTS OPERATING PROCEDURE

November 1904



EXCEPTION

When the curvature of the calibration block precludes obtaining a maximum response from each vee-path position, all calibration points need not be utilized, provided that complete coverage can be accomplished with the obtainable calibration points.

> (4) Establish the sensitivity from the inside surface notch by setting the indication amplitude at the level of the DAC curve. This is the primary reference level and the notch amplitude shall be marked with an X. Record the primary reference level gain settings under INSTRUMENT SETTINGS.

6.2.3.2 Alternate Angle-Beam DAC (N-Path)

NOTE

The notches perpendicular to the axis of the curved basic calibration block shall be utilized to establish sensitivity when examining circumferential welds. The axial notches shall be used to establish sensitivity when examining longitudinal or branch connection welds.

> (1) Position the 45° angle-beam search unit on the calibration block to obtain maximum response from the vee-path position selected from the following, which produces the highest amplitude:

> > Vee-Path Positions

4/8, 8/8, 12/8

- (2) Set this response to 80% ±5% of FSH and mark this amplitude on the screen. The gain controls shall not be adjusted once this primary reference response has been established.
- (3) Obtain maximum response from the remaining vee-path positions; mark and join all amplitude points with a smooth curved line which shall not extend more than 1/8 vee-path beyond the last qualified calibration point.

6.3 Secondary DAC Calibrations (N-Path)

If all points on the 12/8 vee-path (N-path) DAC curve do not appear at 20% FSH or greater, a secondary DAC curve shall be constructed as follows:

SwRI-NDT-600-41 Revision 8 November 1984



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 11 of 19

- (1) Secondary DAC curves shall contain at least 2 points.
- (2) The DAC point at the 8/8 vee-path position shall be brought to the primary reference level and marked on the instrument screen. The 12/8 vee-path position, previously at less than 20% of FSH, shall be marked on the screen and all points connected with a smooth curved line. The instrument gain settings for this secondary DAC curve shall be recorded on the appropriate SwRI Sonic Instrument Calibration Record.

EXCEPTION

When the 8/8 vee-path position is set at the primary reference level, and the 12/8 vee-path position is below 20% of FSH, a secondary DAC curve is not required.

6.4 Calibration Verification

b.4.1 Sweep Range and DAC Curve Verification

Sweep range calibration shall be verified on the appropriate reference block; and DAC curve calibration, if applicable, shall be verified on the appropriate calibration block:

- (1) Prior to a series of examinations
- (2) With any substitution of the same type and length of search unit cable
- (3) With any substitution utilizing the same type of power source; e.g., a change of batteries
- (4) At least every 4 hours during the examination
- (5) At the completion of a series of examinations
- (6) Whenever the validity of the calibration is in doubt

6.4.2 Calibration Changes

(1) Perform the following if any point on the DAC curve has decreased more than 20% of FSH or 2 dB in amplitude or if any point has moved on the sweep line more than 10% of the sweep division reading:

R

NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-600-41 Revision 8 November 1984



Page 12 of 19

- (a) Void all examinations referring to the calibration in question and performed after the last valid calibration verification.
- (b) Conduct a new calibration.
- (c) Reexamine the areas for which examinations have been voided.
- (2) Perform the following if any point on the DAC curve has increased more than 20% of FSH or 2 dB in amplitude:
 - (a) Correct the calibration.
 - (b) Reexamine all indications recorded since the last valid calibration verification.
 - (c) Enter proper values on a new SwRI Examination Record.
- 6.4.3 Recalibration

Substitution of any of the following shall be cause for recalibration:

- (1) Search unit wedge or transducer
- (2) Search unit type or length
- (3) Ultrasonic instrument
- (4) Examination personnel
- (5) Couplant
- (6) Change in type of power source; e.g., a change from direct to alternating current
- 7. EXAMINATION

7.1 Examination Areas

7.1.1 Circumferential and Longitudinal Butt Welds in Piping

Circumferential and longitudinal ferritic butt welds with a nominal thickness of 0.2- to 6.0-inches shall be examined from the outside

SwRI Form QA 3-2



NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-600-41 Revision 8 November 1984

surface of the pipe. Product forms to be examined shall include extruded, drawn, and rolled material.

Scanning of the weld and base material shall be adequate to ensure complete coverage for 1/3t from the inside surface of the pipe. The base material shall be examined for a distance of 1/4 inch from the outside surface fusion line on each side of the weld. See attached Sketch 1 for coverage.

Class 1 longitudinal welds shall be examined along the entire length of the weld during the preservice examination and for at least one pipediameter length or 12 inches, whichever is less, from the fusion line of the intersecting circumferential weld during inservice examinations.

Class 2 longitudinal welds shall be examined for at least 2-1/2t length from the fusion line of the intersecting circumferential weld during preservice and inservice examinations.

7.1.2 Branch Connection Butt Welds in Piping

Full penetration butt welds of branch connections in pressure piping greater than 0.2 to 6.0 inches nominal thickness shall be examined from the outside surface of the pipe when required. Only set-in branch connections shall be examined with this procedure.

See attached Sketch 2 for examination coverage of branch connection welds.

7.2 Surface Condition

The contact surfaces shall be free from weld spatter, roughness, or other conditions that interfere with free movement of the search unit or impair the transmission of ultrasound.

7.3 Indication Length Zero Reference (Lo) Location

Areas to be examined in accordance with this procedure shall have an Lo marked in accordance with the applicable revision of Nuclear Projects Operating Procedure IX-FE-103.

7.4 Scanning

When practicable, scanning shall be performed at a minimum gain setting of 2 times the reference level sensitivity.



SwRI Form QA 3-2

SwRI-NDT-600-41 Revision 3 November 1984



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 14 of 19

Instrument gain setting for scanning shall be determined on the calibration block as follows for each primary reference level utilized:

- With the instrument at the primary reference level, manipulate the search unit on the calibration block to obtain a signal from a reflector of 40% FSH.
- (2) Add 6 dB of gain by utilizing the 6 dB switch (if present), the fine control, or a combination of the fine and coarse gain controls and choose any method which yields a signal response within ±2 dB or 80% FSH.
- (3) This amplitude and method shall be recorded on the SwRI Sonic Instrument Calibration Record and shall be used during the valid calibration period of all scanning at 2 times the reference level sensitivity.

The search unit movement rate for scanning shall not exceed 6 inches per second.

Scanning overlap shall be a minimum of 10% of the search unit piezoelectric element dimension perpendicular to the direction of scan.

7.5 Thickness Measurements

Thickness measurements shall be taken at a minimum of three points adjacent to Lo for longitudinal and circumferential welds (on the centerline of the weld and at one point in the base material on each side of the weld), and at a minimum of two points adjacent to Lo for branch connection welds (one on the base material of the main run pipe, and one on the base material of the branch connection). Locations of measurements which cannot be taken adjacent to Lo, shall be recorded on the appropriate SwRI Examination Record. The examiner should take additional measurements when the crown height varies significantly or if other thickness changes are observed.

Screen distance calibration for this examination shall be conducted in accordance with Paragraph 6.2.1. Measurements shall be taken and recorded by placing the straight-beam search unit on the examination surface and observing the position of the back-wall reflection on the instrument screen.

7.5.1 Base Material Lamination Scan

Before the initial angle-beam examination, a lamination scan using straight-beam longitudinal-wave shall be performed covering the entire area through which the angle-beam is to be passed. Screen distance calibration



SwRI-NDT-600-41 Revision 8 November 1984



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 15 of 19

for this examination shall be conducted in accordance with Paragraph 6.2.1. The first back reflection shall be maintained at an amplitude between 50% and 90% of FSH.

Intermediate echoes having an amplitude equal to or greater than the remaining back reflection shall be recorded.

To record an intermediate indication, obtain a back reflection signal from an indication-free area and adjust this signal to $80\% \pm 5\%$ of FSH. Record the intermediate indication when its amplitude is equal to the remaining back reflection. Areas of total loss of back reflection accompanying the intermediate echo shall also be recorded.

NOTE

Attenuation measurements shall not be performed. The crown height and crown width shall be measured and recorded on the appropriate SwRI Examination Record.

- 7.6 Examination of Circumferential and Longitudinal Butt Welds in Piping
- 7.6.1 Angle-Beam Examination for Indications Parallel with the Weld

A 1/2 vee-path using a 45° or a 60° refracted shear-wave or a 12/8 vee-path using a 45° refracted shear-wave shall be accomplished, as applicable, from one or both sides of the weld, whichever obtains complete coverage.

The sound beam shall be directed perpositicularly into the weld to detect indications parallel with the weld. Calibration shall be as described in Paragraphs 6.2.2 and 6.2.3.

NOTE

A 45° 12/6 •path examination shall be conducted if a 45° or a 60° 1/2 veepath examination does not obtain complete coverage.

7.6.2 Angle-Beam Examination for Indications Perpendicular to the Weld

The 1/2 vee-path angle-beam examination shall be conducted on each weld by placing the 45° search unit on the weld surface with the sound beam directed into and parallel with the weld. Scanning shall be performed in two directions on the weld.

Calibration shall be as described in Paragraphs 6.2.2 and 6.2.3.



SWRI Form QA 3-2

R

NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-600-41 Revision 8 November 1984

Page 16 of 19

..7 Examination of Branch Connection Butt Welds

7.7.1 Angle-Beam Examination for Indications Parallel with the Weld

A shear-wave angle-beam examination shall be accomplished from the main run pipe side of the weld. For this examination, the sound beam shall be directed perpendicularly into the weld to detect indications parallel with the weld. Calibration for these examinations shall be in accordance with Paragraph 6.2.3.

7.7.2 Angle-Beam Examination for Indications Perpendicular to the Weld

The angle-beam examination for indications perpendicular to the weld shall be the same as the examination described in Paragraph 7.6.2.

7.8 Postexamination Cleaning

Arrangements shall be made with the customer for postexamination removal of couplant materials.

8. RECORDING CRITERIA

Indications shall be recorded in accordance with the techniques outlined in the applicable revision of SwRI Nuclear Projects Operating Procedure IX-FE-117.

Ultrasonic reflectors producing a response greater than 50% of the reference level shall be recorded on the appropriate SwRI Examination kecord.

Indications greater than 50% of the reference level attributable to geometry shall be recorded only once, even if the amplitude of the indication fluctuates above and below the required recording amplitude along the weld. These indications shall be investigated by a Level II or a Level III examiner to determine the shape, identity, and location of the reflector.

If indications, which have been recorded as geometry, have been investigated and found to be nongeometric reflectors, the entire weld shall be reexamined, recording all nongeometric reflectors and other reflectors not previously recorded at least once.

Indications greater than 100% of the reference level shall be investigated by a Level II or a Level III examiner to determine the shape, identity, and location of the reflector.

The end points of the indication, as determined by 100% DAC, shall be recorded.

SwRI Form QA 3-2



NUCLEAR PROJECTS OPERATING PROCEDURE

SwRI-NDT-600-41 Revision 8 November 1984

Page 17 of 19

Indications investigated and found to be other than geometrical in nature, shall be reported to the customer for evaluation.

Scanning limitations shall be recorded.

9. EVALUATION

Evaluation of indications shall be the responsibility of the customer and shall be conducted in accordance with Article IWA-3000, Section XI, of the applicable ASME Boiler and Pressure Vessel Code.

10. RECORDS

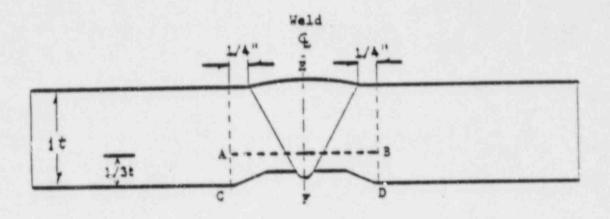
Documents generated in accordance with this procedure shall be stored as specified in the SwRI Project Plan. The customer shall receive copies of these documents in the Examination Report, unless specified in the SwRI Project Plan.

SwRI-NDT-600-41 Revision 8 November 1984

Page 18 of 19



SKETCH 1



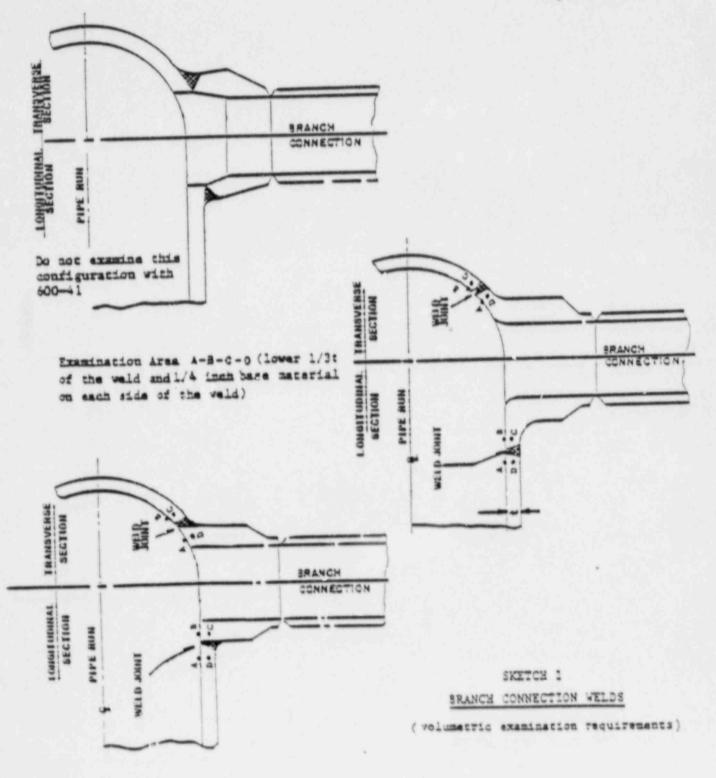
EXAMINATION VOLUME A-8-C-D

η.

Examination Area for Circumferential and Longitudinal Butt Welds in Piping

SwRI-NDT-600-41 Revision 8 November 1984

Page 19 of 19



	S.ì	1	-	
1	R	3	2	9
1	\mathbf{D}	4	b	y
-	-	202	-	-

PROCEDURE DEVIATION

					Page 1 of 3 Page
Procedure SwRI-NDT- 800-94			Revision No. 2	Devia	tion No.
The following examinati BWR Feedwater not		by this deviation			
The following paragraph Change in Paragraph	hs shall be deviated from h 5.4:	m as indicated:			
Average Thickness					
1.0° to 7.0° 1 3/0° to 12.0° 1	1/2* x 1/2* or 1/2* rou 1/2* x 1* or 1* round	ind			
Change second para	graph, first sentence	to read:			
"The wedges for the wave.	nozzle taper examina	tion shall be d	esigned to produce a 45° \pm	2 ⁰ refracted	shear-
Delete third paragra	ph entirely.				
Delete fourth paragr	aph, first sentence				
Change fourth parag	graph, second sentenc	e to read:			
"The wedges for the	nozzle boss examinat	ion shall produ	ace 22° ± 2° reflected long	tudinal-wave	
(Continued on follow	ving pages)				
changes in calibration:	on block design requi	res new calibre	tion techniques.		
Deviation Affects Qualification	YES 🖾 NO				mined to affect the procedure to an affect the procedure to a field in equilified in edure (X-FE-107.
		APPROVAL	s		SA FLD
Wetten by:	2 10	Date:	Technical Review:	_	Date: 3.15-85
Jamist Ile G	hale	3-11-88	Verbai Approval Given?	A D Yes	No 3-11-55
Manager of Q.A.:	. 0	Date:	Cognizant Director:	2	Date:
J.C. Julian	reh	3/16/88	Unit Frank	Coston	3/16/38

PROCEDURE DEVIATION Procedure SwRI-NDT-800-94 Revision No. 2 Deviation No. 1 Page 2 of 3

The following paragraphs shall be deviated from as indicated (Cont.):

Change Paragraph 6.5 read:

ANGLE-BEAM LONGITUDINAL-WAVE CALIBRATION

The refracted longitudinal-wave search unit described in 5.4 shall be positioned on the nozzle boss to obtain a peak amplitude response from Notch-B (see Sketch 1). Adjust the instrument gain to set the notch amplitude at $80\% \pm 5\%$ FSH. This shall be the primary reference level.

Mark the position and amplitude of this reflector on the CRT. Position the search unit to obtain a peak amplitude response from Notch-A. Mark the position and amplitude of Notch-A on the CRT.

Draw a horizontal line on the CRT starting 1 inch in metal path before Notch-B and extending across the screen at the reference level line to 1 inch beyond Notch-A.

Change Paragraph 6.6 to read:

ANGLE-BEAM SHEAR-WAVE CALIBRATION

The refracted shear-wave search unit described in 5.4 shall be positioned on the nozzle taper to obtain a peak amplitude response from Notch-D (see Sketch 1). Adjust the instrument gain to set the notch amplitude at $80\% \pm 5\%$ FSH. This shall be the primary reference level.

Mark the position and amplitude of this reflector on the CRT. Position the search unit to obtain a peak amplitude response from Notch-C. Mark the position and amplitude of this reflector on the CRT. Draw a smooth line joining the two calibration points.

Delete Paragraph 6.7 entirely.

Change Paragraph 7.3.1 to read:

ANGLE-BEAM LONGITUDINAL-WAVE EXAMINATION FOR INDICATIONS PARALLEL TO THE NOZZLE AXIS

Place the 22⁰ search unit on the nozzle boss area with the sound beam direction perpendicular to the nozzle axis. Scan the entire length and circumference of the nozzle boss from two opposing directions.

Change Paragraph 7.3.2 to read:

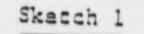
ANGLE-BEAM SHEAR-WAVE EXAMINATION FOR INDICATIONS PARALLEL TO THE NOZZLE AXIS

Place the 45^o search unit on the nozzle taper area with the sound beam directed down towards the nozzle inside surface. When the sound beam is normal to the inside surface, back-reflection signals will appear evenly spaced on the CRT.

Skew the search unit off axis 45° and scan the entire tapered surface around the circumference from two opposing directions.

Delete Paragraph 7.3.3 entirely.

PROCEDURE DEVIATION Procedure SwRI-NDT-800-94 Revision No. 2 Deviation No. 1 Page 3 of 3





Basic Calibration Block

Title MANUAL ULTRASONIC EXAMINATION OF CYLINDRICAL AND CONICAL SECTIONS OF BWR FEEDWATER NOZZLES EFFECTIVITY AND APPROVAL Revision 2 of this procedure became effective on Feb. 15, 1988Other revisions of the base document me be effective concurrently. Approvals Written By Jule Jule Jule Jule Jule Jule Jule Jule	神子	sou	N	UCLI	EARP	RO	JECTS CEDURE			Rev	ision	-800-9 1 2 1988
MANUAL ULTRASONIC EXAMINATION OF GYLINDRICAL AND CONICAL SECTIONS OF BWR FEEDWATER NOZZLES EFFECTIVITY AND APPROVAL Revision	-			-			020011			Pag	e 1 c	of 13
Revision 2 of this procedure became effective on Feb. 15, 1988 Other revisions of the base document matched be effective concurrently. Approvals SA Main reported as a report of a revision of the base document matched became effective on the effective on the base document matched became effective on the effective on the base document matched became effective on the effective on the base document matched became effective on the effective became effective on the effective became effective effective became effective effective became effective became effective effe	Title					N O	F CYLINDR	ICAL AN	D CONI	CAL SEC	TIONS	
Approvals SA Approvals FL Written B Date 08 Technical Review Date 25 Mar. ger et 0. A. 7Mm 2/15/157 Date 21/15/188 Mar. ger et 0. A. 7Mm 2/15/157 Date 21/15/188 The following information may be used for convenience. Completion of this portion is not mandatory. Date 15/188 Date Effective Date 21/15/188				EF	FECTIV	ITY /	AND APPRO	VAL				
Approvals FL Written Bin Date S Technical Review Date Auge Date S Technical Review Date Amen Jeres Jeres Jeres Date Mar sper of Q.A. Thm suisting Date Cognizant Director Date JC. Juliwick 2/15/88 OWNy L. Utified on for DFR Date The following information may be used for convenience. Completion of this portion is not mandatory. Deviation No.	Revision be effective	2 of this	s procedure l y:	became e	ffective o	n <u>F</u>	eb. 15, 1	<u>9</u> 88 _{Othe} ,	revisions	of the bas	e docur	nent may
Written By Date Pate Technical Review Date Ayle Date 15Feb James J. Mc Aulle Jewlet or Date Mar. year of O.A. Thim suister Date Cognizant Director Date J.C. Juliwick 2/15/88 OMMy L. Ugledun for DFR Date The following information may be used for convenience. Completion of this portion is not mandatory. Date Date Date Effective Date Date Date Date	Anneusia										_	SAFL
I.C. Juliviek 2/15/88 Killy L. Lilfleden for DFR 155et The following information may be used for convenience. Completion of this portion is not mandatory. Deviation No.		Sp	نعمه		Date	88	Technical R		de	terefet	7	Date 25-8
The following information may be used for convenience. Completion of this portion is not mandatory. Deviation No. Date Effective Procedure Section(s)						128			den p	N DFA	e	Date 15Fel-3
Date Effective	The	following in	nformation n	nay be us			\mathcal{O}		0			γ.
Procedure Section(s)	Deviation No.											
	Date Effective											
	a contract of the second	tion(s)										
Votes:	lotes:							_				

SwRI-NDT-800-94 Revision 2 February 1988



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 2 of 13

MANUAL ULTRASONIC EXAMINATION OF CYLINDRICAL AND CONICAL SECTIONS OF BWR FEEDWATER NOZZLES

SWRI-NDT-800-94

1. PURPOSE

This procedure provides the technical information and detailed steps necessary to ensure a proper manual ultrasonic examination of cylindrical and conical sections of BWR feedwater nozzles from the outside surface, in accordance with the applicable American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Codes.

2. SCOPE AND APPLICATION

Manual examinations shall be performed using shear-wave and longitudinalwave angle-beam, contact, pulse-echo, ultrasonic techniques.

The examination of cylindrical sections of feedwater nozzles in the thickness range of 1.0 to 12.0 inches is described in this procedure. Cylindrical sections to be examined shall be as specified in the applicable Southwest Research Institute (SwRJ) Examination Plan.

3. APPLICABLE DOCUMENTS

- (1) ASME Boiler and Pressure Vessel Code, Section XI, 1983 Edition with Addenda through Summer 1983, "Rules for Inservice Inspection of Nuclear Power Plant Components"
- (2) ASME Boiler and Pressure Vessel Code, Section V, 1983 Edition with Addenda through Summer 1983, "Nondestructive Examination"
- (3) SwRI Nuclear Quality Assurance Program Manual (NQAPM)
- 3.1 Applicable Calibration and Examination Records

SWRI NDTR Form No.	Revision Date
17-19	12-1-83
17-89	8-19-80
17-90	8-19-80
17-37	2-18-80

SwRI-NDT-800-94 Revision 2 February 1988



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 3 of 13

4. RESPONSIBILITY

- (1) The Director of the Department of Engineering Services, Nondestructive Evaluation Science and Technology Division, shall be responsible for the preparation, review, approval, and control of this procedure.
- (2) The Project Manager shall be responsible for the implementation of this procedure in accordance with the NQAPM specified in the applicable SwRI Project Plan.
- (3) The examiner shall be responsible for implementing the requirements of this procedure.
- (4) The Manager of the Support and Administration Section. Nondestructive Evaluation Science and Technology Division, shall be responsible for storage of records generated in accordance with this procedure.

5. PERSONNEL AND EQUIPMENT

5.1 Personnel Certification

Personnel performing ultrasonic examinations shall be certified in accord nce with SwRI NQAP 11-1, "Special Process Control."

5.2 Reference Blocks

Reference blocks used for screen distance calibration shall be of the same basic material as the production material, carbon steel, and shall be one of the following: (1) SwRI Half-Round, (2) AWS Type DC, or (3) IIW.

5.3 Basic Calibration Blocks

Calibration reflectors shall be notches placed in a basic calibration block as shown in Sketch 1. Basic calibration blocks shall be manufactured from one of the following: (1) the component nozzle dropout; (2) the component prolongation; or (3) material of the same specification, product form, and heat treatment as one of the materials bing joined. The basic calibration block material shall be determined by the production material to which the search unit is applied. Notch reflectors shall be in accordance with opproved drawings contained in the applicable SwRI Examination Plan.

5.4 Search Units

Angle-beam (shear-wave or longitudinal-wave) search units shall be selected from the following table:

SwRI-NDT-800-94 Revision 2 February 1988



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 4 of 13

Average Thickness

1.0" to 3.0" 2.0" to 7.0" 3.0" to 12.0" Nominal Search Unit Size

(A) 3/8" Round
(B) 1/2" x 1/2", 1/2" Round

(C) 1/2" x 1"

The wedges for Zone 1 examinations (see Sketch 1) shall be designed to produce a $45^{\circ} \pm 2^{\circ}$ angle-beam shear wave. The exit point and shear wave angle of the search unit shall be determined on an IIW Block.

The wedges for Zone 2 examinations (see Sketch 1) shall be designed to produce a 55° ±2 angle-beam shear wave. These wedges shall also be designed with a skew angle of 45° and shall be used for both clockwise and counterclockwise scanning. The exit point and actual shear-wave angle of the search unit shall be determined on an JIW block.

The wedges for Zone 3 examinations (see Sketch 1) shall be designed such, that the contact faces of the wedges for circumferential scans shall conform to the curvature of the cylindrical sections of the nozzle. These wedges shall produce a 22° ±2° angle-beam longitudinal-wave. The exit point of the wedge shall be determined on an IIW or DC reference block. The refracted angle shall be measured on an IIW block or basic calibration block.

The nominal search unit frequency shall be 2.25 MHz.

5.5 Ultrasonic Instrument

The examiner shall use a Sonic FTS Mark I ultrasonic instrument, which shall be aligned and shall display a valid alignment calibration tag as required by NQAP 10-1.

- 5.6 Couplant
 - USP-grade glycerine or deionized water shall be used when performing ultrasonic calibrations and examinations in accordance with this procedure.
 - (2) All couplants other than deionized water shall be certified for sulfur content and total halogens in accordance with D-129 and D-808 of Article 24, Section V. The residual amount of total sulfur or halogens shall not exceed 1% by weight. Deionized water, when used, shall be supplied by the sustomer.
 - (3) Couplant materials used for examinations shall be the same as used for the calibration.

SwRI-NDT-800-94 Revision 2 February 1988



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 5 of 13

5.7 Thermometer

The thermometer to be used for measuring the calibration block and component temperatures shall be calibrated and certified and shall display a valid calibration tag as required by NQAP 10-1.

6. CALIBRATION

6.1 Instrument Linearity

Ultrasonic instrument linearity shall be verified prior to each period of extended use or every three months, whichever is less, in accordance with Paragraphs 6.1.1 and 6.1.2. Pata required shall be recorded on the SwRI Instrument Linearity Verification Record and the sheet number shall be referenced on each applicable SwRI Sonic Instrument Calibration Record.

NOTE

The setting of the damping control shall be recorded in REMARKS on the SwRI Instrument Linearity Verification Record. The damping control shall be in the same position during linearity verification, calibrations and examinations or a new linearity verification shall be performed.

6.1.1 Screen Height Linearity

- (1) Position a shear-wave search unit on a calibration block to obtain indications from the 1/2T and 3/4T holes or use a straight-beam search unit on any calibration block that provides amplitude differences.
- (2) Adjust the search unit position to give a 2:1 ratio between two indications, with the larger indication set at 80% of full screen height (FSH) and the smaller indication at 40% of FSH.
- (3) Without moving the search unit, set the larger indication to 100% of FSH; record the amplitude of the smaller indication, estimated to the nearest 1% of FSH.

SwRI-NDT-800-94 Revision 2 February 1988



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 6 of 13

(4) Successively set the larger indication from 100% to 20% of FSH in 10% increments (or 2 dB steps if a fine control is not available); observe and record the smaller indication estimated to the nearest 1% of FSH at each setting. The reading must be 50% of the larger amplitude within 5% of FSH.

6.1.2 Amplitude Control Linearity

 Position an angle-beam or a straight-beam search unit on a calibration block to obtain maximum amplitude from an applicable reflector.

NOTE

The primary reference level sensitivity should be within the highest and lowest gain settings used during amplitude control linearity verifications. The highest and lowest gain settings used during the amplitude control linearity verifications shall be recorded in the Romarks column of the applicable SwRI Linearity Verification Records.

> (2) Without moving the search unit, set the indication to the required percent of FSH and increase or decrease the dB as specified below. The estimated signal shall be recorded to the nearest 1% of FSH and shall fall within the limits of the following table:

Indication Set at % of FSH	dB Control Change*	Indication Limits. % of FSH
80%	- 6 dB	32 to 48%
80%	-12 dB	16 to 24%
40%	+ 6 dB	64 to 96%
20%	+12 dB	64 to 96%

*Minus denotes decrease in amplitude; plus denotes increase.

6.1.3 Calibration Method

The ultrasonic calibration shall be completed prior to the examination.

The REJECT control shall be maintained in the O position during calibration and examination.

The FREQ MHz control shall be turned to 2.

SwRI-NDT-800-94 Revision 2 February 1988



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 7 of 13

The type and length of the search unit cable shall be recorded on the SwRI Sonic Instrument Calibration Record, and all other information blocks on the form shall be filled in.

6.2 <u>Temperature</u>

The calibration block temperature shall be within 25°F of the component temperature and shall be recorded on the SwRI Sonic Instrument Calibration Record for the initial calibration and each verification. The surface temperature of the component to be examined shall be taken prior to performing and upon completion of each examination and shall be recorded on the appropriate SwRI Ultrasonic Examination Record.

6.3 Angle-Beam Longitudinal-Wave Distance Calibration

Prior to the preliminary distance calibration, remove the curved wedge from the sharch unit, discribed in 5.4(C). Observing back reflections from the 1-inch dimension of an IIW Block, set up a linear sound path distance of 5 inches along the baseline of the instrument screen. Remount and couple the search unit on the curved wedge and position it on the 4-inch radius of the IIW Block. Delay the 4-inch reflection to the 0 major screen division on the instrument screen which now represents 4 to 9 inches.

6.4 Angle-Be m Shear Wave Distance Calibration

Observing the radius echoes from an applicable reference block set up a linear sound path distance of 5, 10, or 20 inches along the screen base line.

6.5 Angle-Beam Longitudinal-Wave Zone 3 Calibration

The angle-beam longitudinal-wave search unit described in 5.4(C) shall be positioned to obtain a response from Noton B (see Sketch 1). This response shall be set to a primary reference level of 80% ±5% FSH. Position the search unit to obtain a response from Notoh A. Draw a line joining both calibration points. A line shall be drawn on the instrument screen of at least 1-inch prior to Notch B. Note and verify the presence of Notches C and D.

6.6 Angle-Beam Shear: Wave Zone 2 Calibration

The angle-beam shear-wave search unit described in 5.4(B) shall be positioned to obtain a response from Notch E (Sketch 1). This response shall be set to the primary reference level of 80% ±5% FSH. Position the search unit to obtain a response from Notch D. Draw a line joining both calibration points.

SwRI-NDT-800-94 Revision 2 February 1988





NUCLEAR PROJECTS OPERATING PROCEDURE

Page 8 of 13

6.7 Angle-Beam Shear-Wave Zone 1 Calibration

The angle-beam shear-wave search unit described in 5.4(A) shall be positioned to obtain maximum response from Notch F (Sketch 1). This response shall be set to the primary reference level of 80% ±5% FSH. Position the search unit to obtain a response from Notch E. Draw a line joining both calibration points.

6.8 Calibration Verification

6.8.1 Frequency of Instrument Calibration Verification

Sweep range and sensitivity calibration shall be verified by using the appropriate basic calibration block, if the wedge does not require removal from the search unit, when any of the following occurs:

- (1) Prior to a series of examinations
- (2) With any substitution of the size type and length of search unit cable
- (3) With any substitution utilizing the same type of power source; e.g., a change of batteries
- (4) At least every 4 hours during the examination
- (5) the completion of a series of examinations
- (5) Whenever the validity of the calibration is in doubt
- 6.8.2 Verification of Calibration Reflectors at Scanning Speed

The examiner shall verify the presence of the calibration reflector at scanning speed.

NOTE

It is not necessary to assure that this check confirms the signal amplitude at 100% of reference level, but merely to demonstrate that the signal from the calibration reflectors are readily observable at scanning speed.

The following statement shall be documented on the SwRI Sonic Instrument Calibration Record and initialed:

"Calibration reflectors have been verified at scanning speed."

SwRI-NDT-800-94 Revision 2 February 1988



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 9 of 13

6.8.3 Calibration Changes

- (1) Perform the following if any calibration point has decreased more than 20% or 2 dB in amplitude, or any calibration point has moved on the sweep line more than 10% of the sweep division reading or 5% of full sweep, whichever is greater:
 - (a) Void all examinations referring to the calibration in question and performed after the last valid calibration verification.
 - (b) Conduct a new calibration.
 - (c) Reexamine the areas for which examinations have been voided.
- (2) Perform the following if any calibration point has increased in amplitude more than 20% or 2 dB:
 - (a) Correct the calibration.
 - (b) Reexamine all indications recorded since the last valid calibration verification.
 - (c) Enter proper values on a new SwRI Ultrasonic Examination Record.

6.8.4 Recalibration

Substitution of any of the following shall be cause for recalibration:

- (1) Search unit wedge or transducer
- (2) Search unit cable type or length
- (3) Ultrasonic instrument
- (4) Examination personnel
- (5) Couplant
- (6) Change in type of power source; e.g., a change from direct to alternating current

SwRI-NDT-800-94 Revision 2 February 1988



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 10 of 13

7. EXAMINATION

7.1 Examination Area

The straight and conical cylindrical sections of feedwater nozzles in the thickness range of 1.0 to 12.0 inches shall be examined from the outside surface. Thickness of the straight cylindrical section including cladding shall be the wall thickness of the section of the component containing the nozzle to be examined.

7.2 Surface Conditions

The contact surfaces must be free from weld spatter, roughness, or other conditions which interfere with free movement of the search unit or impair the transmission of ultrasound.

7.3 Examination Method

7.3.1 Angle-Beam Longitudinal-Wave Examination for Indications Parallel to the Nozzle Axis in Zone 3

Examine Zone 3 of the nozzle by utilizing the angle-beam longitudinal-wave search unit with the sound beam directed perpendicular to the axis of the nozzle. The entire length and circumference of Zone 3 shall be examined with the sound beam directed in this manner from two opposing directions. Calibration for this examination shall be in accordance with Paragraphs 6.3 and 6.5.

7.3.2 Angle-Beam Shear-Wave Examination for Indications Parallel to the Nozzle Axis in Zone 2

Examine Zone 2 of the nozzle with the angle-beam shear-wave search unit directing the sound beam tangentially to the axis of the nozzle to ensure proper sound-beam orientation. The entire length and circumference of Zone 2 shall be examined with the sound beam directed in this manner from two opposing directions. Calibration for this examination shall be in accordance with Paragraphs 6.4 and 6.6.

7.3.3 Angle-Beam Shear-Wave Examination for Indications Parallel to the Nozzle Axis in Zone 1

Examine Zone 1 of the nozzle by utilizing the angle-beam shearwave search unit directing the sound beam perpendicular to the axis of the nozzle. The entire length and circumference of Zone 1 shall be examined with the sound beam directed in this manner from two opposing directions. Calibration for this examination shall be in accordance with Paragraphs 6.4 and 6.7.



SwRI-NDT-800-94 Revision 2 February 1988



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 11 of 13

NOTE

Skewing the transducer will be required to ensure coverage of all zones.

7.6 <u>Scanning Parameters</u>

When practicable, scanning shall be performed at a minimum gain setting of two times the reference level sensitivity.

Instrument gain setting for scanning shall be determined on the basic calibration block as follows for each primary reference level utilized:

- With the instrument at the primary reference level, manipulate the search unit on the basic calibration block to obtain a signal of 40% FSH from a calibration reflector (notch).
- (2) Add 6 dB of gain by utilizing the 6 dB switch (if present), the fine gain control, or a combination of the fine and coarse gai, controls and choose any method that yields a signal response within ±2 dB of 80% FSH.
- (3) This amplitude and method shall be recorded on the SwRI Sonic Instrument Calibration Record and shall be used during the valid calibration period for all scanning at two times the reference level sensitivity.

Scanning overlap shall be a minimum of 10% of the search unit piezoelectric element dimension perpendicular to the direction of scan.

The search unit movement rate for scanning shall not exceed 6 inches per second during the examination unless the calibration is verified at the scanning speed to be used.

7.5 Postexamination Cleaning

Arrangements shall be made with the customer for postexamination removal of couplant materials.

8. RECORDING CRITERIA

Indications shall be recorded in accordance with the techniques outlined in the applicable revision of SwRI Procedure IX-FE-117.

The end points of the indication, as determined by 100% DAC, shall be recorded.

SwRI-NDT-800-94 Revision 2 February 1988



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 12 of 13

Ultrasonic reflectors producing a response 50% or greater of the reference level shall be recorded on the appropriate SwRI Examination Record.

Indications producing a response 100% or greater of the reference level shall be investigated by a Level II or a Level III examiner to determine the shape, identity, and location of the reflector.

Indications 100% or greater of the reference level investigated and found to be other than geometrical in nature shall be reported to the customer for evaluation.

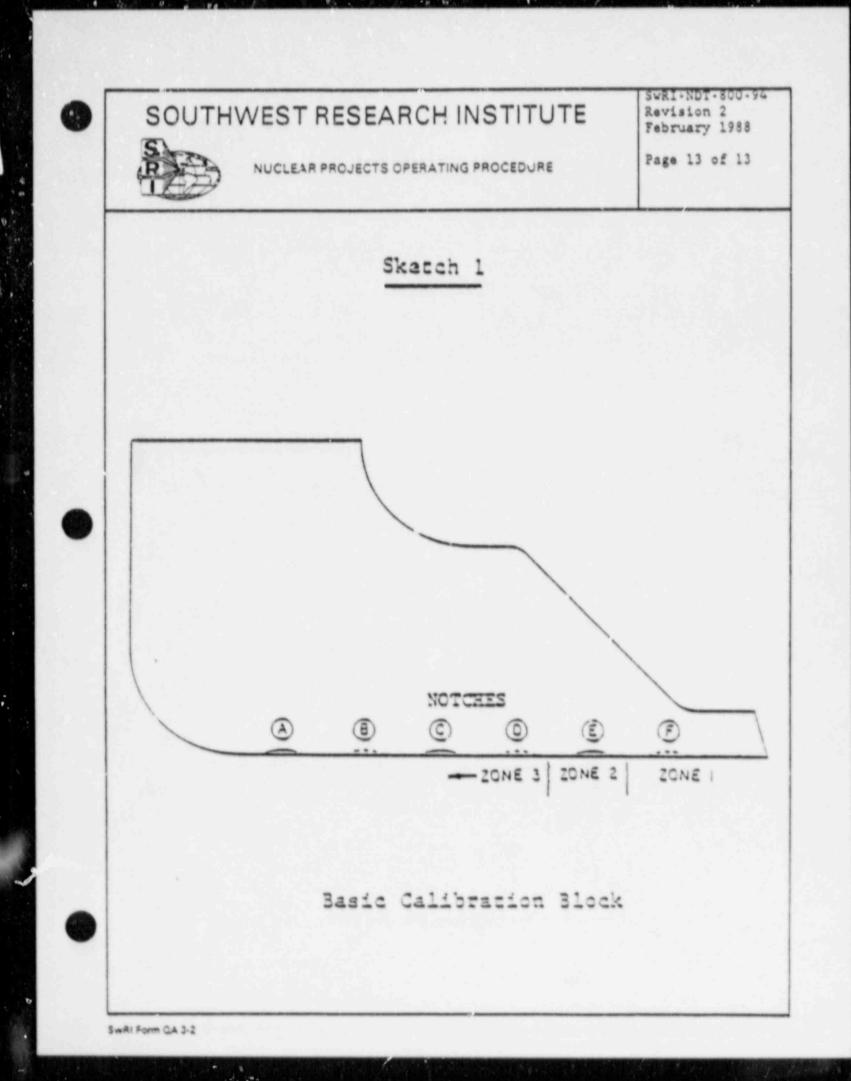
Scanning limitations shall be recorded.

9. EVALUATION

Initial evaluation of reportable indications shall be performed by SwRI personnel, and shall be conducted in accordance with the applicable ASME Boiler and Pressure Vessel Code, Section XI, Article IWA-3000. Final evaluation and disposition of reportable indications shall be the responsibility of the customer.

10. RECORDS

Documents generated in accordance with this procedure shall be stored as specified in the SwRI Project Plan. The customer shall receive copies of these documents in the Examination Report, unless specified otherwise in the SwRI Project Plan.



.

C

- 1	2	
. 1	20572	
-	R	
	THAN	
	- Andrew	

Ì

PROCEDURE DEVIATION

.

Procedure	Revision No.	Deviation No.
SwRI-NDT- 800-100	2	1
processing of the second	property in the second s	personal second s

The following examination areas are affected by this deviation:

7.1.3 Inservice Examination Areas.

The following paragraphs shall be deviated from as indicated:

Change Paragraph to read as follows:

For inservice examinations, the lower 1/3 volume (base material plus cladding) shall be examined for the length of the cladding plus 1/4 inch on each end. The area defined by E, F, G, and H in Figure 1 is the area to be examined.

Extent of volume examined changed at the req and Gas Company.		quest of Public Service Electric	
Deviation Affects YED NO	2	If the deviation is determined to ouelification, the deviation shall accordance with Procedure (X-F	be qualified in
	APPROVALS		SA FLD
Written by:	Date:	Technical Review: Roucher	Date: 4 Feb 55
Edward & Star	4588.99	Verbai Approval Given? 🖸 Yes 🖾 No	Date:
Managar of Q.A.: 128 J.C. Julipovil	Sate Mag?	David Frank Roson	Date: 2/6/88

SWRI FORM FE-

Rationale for deviation:

NUCL	EAR PRO	JECTS	E	R D	ecember	2 1987
				ions of the t	base docume	nt may
						FLD
ull	Date 14 Dec. 1987	1.4		Jerlo		ate Dest7
1		Mayne.	1 . Ale	reh	15	10 1/57
						-
	NUCL OPERA UAL ULTRASC CLA beedure became	UAL ULTRASONIC EXAMIN CLAD PIPING WI EFFECTIVITY becedure became effective on _D UAL Date 14 Dec. 1987 Date 12/10/87	NUCLEAR PROJECTS OPERATING PROCEDURE VAL ULTRASONIC EXAMINATION OF COR CLAD PIPING WELDS AT HOPE EFFECTIVITY AND APPROVAL Detedure became effective on Dec 21, 1987 Dete 14 Dec. 1987 Date 1987 Date Cognitant Direc Upper 12/18/87	Dete Technical Review UAL ULTRASONIC EXAMINATION OF CORROSION-I CLAD PIPING WELDS AT HOPE CREEK EFFECTIVITY AND APPROVAL Decedure became effective on Dec 21, 1987. Other revis Decedure became effective on Dec 21, 1987. Other revis UL Date Technical Review UL Date Technical Review UL Date Cognifant Director Date Cognifant Director UL Date Technical Marker J. J.	UAL ULTRASONIC EXAMINATION OF CORROSION-RESISTANT CLAD PIPING WELDS AT HOPE CREEK EFFECTIVITY AND APPROVAL Deteoure became effective on Dec 21, 1987. Other revisions of the t Date 14 Dec. 1987 James M. Gulle Jewiltz Date Cognifant Director UL Date Cognifant Director 12/10/87 Mayue J. Hack	NUCLEAR PROJECTS OPERATING PROCEDURE Revision December Val. ULTRASONIC EXAMINATION OF CORROSION-RESISTANT CLAD PIPING WELDS AT HOPE CREEK Page 1 of UAL ULTRASONIC EXAMINATION OF CORROSION-RESISTANT CLAD PIPING WELDS AT HOPE CREEK EFFECTIVITY AND APPROVAL Decedure became effective on Dec 21, 1987. Other revisions of the base docume Si Juli Date IN Dec. IN Dec. IN Dec. IN Dec. IN Dec. Technical Review IN Dec. IN Dec. IN Dec. IN Dec. Different to ite to ite to ite IN Dec.

SwRI Form QA-40A-0

SwRI-NDT-800-100 Revision 2 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 2 of 18

MANUAL ULTRASONIC EXAMINATION OF CORROSION-RESISTANT CLAD PIPING WELDS AT HOPE CREEK

SWRI-NDT 800-100

1. PURPOSE

This procedure provides the technical information and detailed steps required to ensure a proper manual ultrasonic examination of welds and adjacent base material in corrosion-resistant clad pressure piping at the Hope Creek Generating Station in accordance with the applicable American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Codes.

2. SCOPE AND APPLICATION

Welds and adjacent base material in corrosion-resistant clad piping with a nominal thickness range of greater than 0.4 to 5.0 inches shall be examined in accordance with this procedure.

Manual, contact, pulse-echo, longitudinal-wave straight-beam and refracted longitudinal-wave angle-beam ultrasonic techniques shall be utilized for these examinations.

Welds to be examined shall be as specified in the applicable Southwest Research Institute (SwRI) Examination Plan.

This procedure is intended to be used only for instrument calibration, examination, and the recording of indications, and shall not be used for the sizing of indications.

3. APPLICABLE DOCUMENTS

- (1) ASME Boiler and Pressure Vessel Code, Section XI, 1983 Edition with Addenda through Summer 1983, "Rules for Inservice Inspection of Nuclear Power Plant Components"
- (2) ASME Boiler and Pressure Vessel Code, Section V, 1983 Edition with Addenda through Summer 1983, "Nondestructive Examination"
- (3) SwRI Nuclear Quality Assurance Program Manual (NQAPM)

SwRI-NDT-800-100 Revision 2 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 3 of 18

3.1 Calibration and Examination Records

WRI-NDTR Form No.	Revision Date
17-18	3-14-79
17-19	12-1-83
17-25	7-10-80
17-37	2-18-80
17-89	8-19-80
17-90	8-19-80

4. <u>RESPONSIBILITY</u>

51

- (1) The Director of the Department of Engineering Services, Nondestructive Evaluation Science and Technology Division, shall be responsible for the preparation, review, approval, and control of this procedure.
- (2) The Project Manager shall be responsible for the implementation of this procedure in accordance with the NQAPM specified in the applicable SwRI Project Plan.
- (3) The examiner shall be responsible for implementing the requirements of this procedure.
- (4) The Manager of the Support and Administration Section, Nondestructive Evaluation Science and Technology Division, shall be responsible for storage of records generated in accordance with this procedure.

5. PERSONNEL AND EQUIPMENT

5.1 Personnel Certification

Personnel performing ultrasonic examinations shall be certified in accordance with SwRI NQAP 11-1, "Special Process Control."

5.2 <u>Reference Block</u>

The reference block used for screen distance calibration and verification shall be of the same material as the production material, stainless steel, and shall be an AWS Type DC.

5.3 Basic Calibration Block

The basic calibration block shall be fabricated from material of the same nominal diameter and of the same nominal wall thickness or pipe schedule as the pipe to be examined. This material shall be from one of the

SwAl Form QA 3-2

SwRI-NDT-800-100 Revision 2 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 4 of 18

materials specified for the piring being joined by the weld. The finish on the surfaces of the basic calibration block shall be representative of the surface finishes of the piping.

When the examination is to be performed from only one side of the weld, the calibration block material shall be of the same specification as the material on that side of the weld. If material of the same specification is not available, material of similar chemical analysis, tensile properties, and metallurgical structure may be used.

Calibration reflectors for the examinations shall be three equaldiameter end-drilled holes, three equal-diameter side-drilled holes, located at 1/4T, 1/2T and 3/4T, and two notches (one transverse and one axial) machined on the inside surface of the basic calibration block.

Approved drawings of basic calibration blocks to be used in accordance with this procedure are contained in the applicable SwRI Examination Plan.

5.4 Search Units

Search units shall be selected from the following:

(1) Straight-Beam

Nominal Production Material Thickness

Nominal Search Unit Size

2.0*	or	less	1/4*	Round	
1.0*	to	3.0*	3/8*	Round	
2.0*	to	4.0*	1/2*	Round	
3.0*	to	5.0*	3/4*	or 1*	Round

(a) The nominal straight-beam longitudinal-wave search unit frequency for examining austenitic material shall be from 1.5 MHz up to and including 2.5 MHz.

(2) Angle-Beam

- Search unit wedges shall be fabricated to produce 45* ±2* refracted longitudinal waves in austenitic material.
- (b) The exit point of the sound beam and the actual refracted beam angle of refracted longitudinal-wave search units shall be determined on an IIW block. The exit point shall be marked on the search unit wedge.

SwRI-NDT-800-100 Revision 2 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 5 of 18

- (c) The nominal angle-beau refracted longitudinal-wave search unit size shall be 1/4" x 1/2" dual.
- (d) The actual angle-beam refracted longitudinal-wave search unit frequency for examining austenitic material shall be from 1.5 up to and including 2.5 MHz. Other search unit frequencies may be used only if they produce equivalent or superior results.
- (e) The transducer used for each thickness and diameter shall be selected from Appendix 1.

5.5 Ultrasonic Instrument

The examiner shall use a Sonic FTS Mark I ultrasonic instrument which shall be aligned and shall display a valid alignment calibration tag as required by NQAP 10-1.

- 5.6 Couplant
 - USP-grade glycerine shall be used when performing ultrasonic calibrations and examinations in accordance with this procedure.
 - (2) USP-grade glycerine shall be certified for sulfur content and total halogens in accordance with D-129 and D-808 of Article 24, Section V. The residual amount of total sulfur or halogens shall not exceed 1% by weight.
 - (3) Couplant materials used for examinations shall be the same as used for the calibration.

5.7 Thermometer

The thermometer to be used to measure the calibration block and component terperatures shall be calibrated and certified and shall display a valid calibration tag as required by NQAF 10-1.

- 6. CALIBRATION METHOD
 - 6.1 Instrument Linearity

Ultrasonic instrument linearity shall be verified prior to each period or extended use or every three months, whichever is less, in accordance with Paragraphs 6.1.1 and 6.1.2. Data required shall be recorded on the

SWRI-NDT-800-100 Revision 2 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

applicable SwRI Instrument Linearity Verification Record, and the sheet number shall be referenced on each applicable SwRI Sonic Instrument Calibration Record.

NOTE

The setting of the damping control shall be recorded in REMARKS on the SwRI Instrument Linearity Verification Record. The damping control shall be in the same position during linearity verification, calibrations, and examinations or a new linearity verification shall be performed.

- 6.1.1 Amplitude Linearity
 - (1) Position an angle-beam search unit on a basic calibration block to obtain indications from the 1/2T and 3/4T holes or use a straight-beam search unit on any calibration block that provides amplitude differences.
 - (2) Adjust the search unit position to give a 2:1 ratio between two reflectors, with the larger reflector set at 80% of full screen height (FSH) and the smaller reflector set at 40% of FSH.
 - (3) Without moving the search unit, set the larger reflector to 100% of FSH, and record the amplitude of the smaller reflector, estimated to the nearest 1% of FSH.
 - (4) Successively set the larger reflector from 100% to 20% of FSH in 10% increments (or 2 dB steps if a fine control is not available); observe and record the smaller reflector estimated to the nearest 1% of FSH at each setting. The reading must be 50% of the larger amplitude within 5% of FSH.
- 6.1 Amplitude Control Linearity
 - Position a straight-beam or angle-beam search unit on a calibration block to obtain maximum amplitude from an applicable reflector.

NOTE

The primary reference level sensitivity should be within the highest and lowest gain settings used during amplitude control linearity verifications. The highest and lowest gain settings used during the amplitude control linearity verifications shall be recorded in the Remarks column of the applicable SwRI Linearity Verification Records.



SwRI-NDT-800-100 Revision 2 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

(2) Without moving the search unit, set the indication to the required percent of FSH and increase or decrease the dB as specified below. The estimated signal shall be recorded to the nearest 1% of FSH and shall fall within the limits of the following table:

Indication Set at % of FSH	dB Control Change*	Indication Limits. % of FSH
80%	- 6 d.B	32 to 48%
80%	-12dB	16 to 24%
40%	+6dB	64 to 96%
20%	+12dB	64 to 96%

*Minus denotes decrease in amplituds; plus denotes increase.

6.2 <u>Calibration</u>

The ultrasonic calibration shall be completed prior to the examination.

The REJECT control shall be maintained in the O position during calibration and examination.

The FREQ MHz control shall be turned to the setting of 1 for 1.5 MHz search units and to 2 for the 2.25 to 2.5 MHz search units for straightbeam calibrations and examinations.

The FREQ MHz control shall be turned to the setting of 5 for all angle-beam calibrations and examinations.

The instrument gain controls shall not be changed once the primary reference response has been established.

Rotating the beam into the corner formed by the hole and the side of the calibration block while setting up the distance amplitude correction may produce a higher amplitude at a longer beam path. This beam path shall not be used for calibration.

The type and length of the search unit cable shall be recorded on the SwRI Sonic Instrument Calibration Record, and all other information blocks on the form shall be filled in.



SwRI-NDT-800-100 Revision 2 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 8 of 18

6.2.1 <u>Temperature</u>

The temperature of the calibration block shall be within 25°F of the component temperature and shall be recorded on the SwRI Sonic Instrument Calibration Record for the initial calibration and each verification.

The surface temperature of the component to be examined shall be taken prior to performing and after completion of an examination and shall be recorded on the applicable SwRI Examination Record.

6.3 Calibration Method

6.3.1 Straight-Beam Distance Calibration

The screen distance chosen shall be the shortest applicable size to include at least 1/4t beyond the thickest production material to which the search unit is applied. Observing back reflections from the applicable reference block, set up the required linear sound path distance along the screen baseline.

6.3.2 Longitudinal-Wave Angle-Beam Distance Calibration

- (1) Position an appropriate straight-beam longitudinal-wave search unit described in Paragraph 5.4(1) on the AWS DC reference block. Observe the back reflection on the instrument screen and set up the required linear sound path distance along the baseline of the screen, which shall be the shortest applicable size to include at least 1/8 vee-path past the anticipated examination range.
- (2) Using the same instrument, position the angle-beam refracted longitudinal-wave search unit described in Paragraph 5.4(2) on the AWS DAC reference block and observe the signal from the radius. Using only the delay control, adjust this signal to the appropriate location on the instrument screen baseline.

NOTES

Examiners should be able to identify the required longitudinal-wave signal, since a shear-wave signal may also be present on the screen.

The longitudinal waves will damp on the radius. The shear component of the ultrasonic waves generated will not damp on the radius.

SwRI-NDT-800-100 Revision 2 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 9 of 18

6.3.3 Staight-Beam Distance Amplitude Correction

A . 7 cur e shall be established by utilizing responses from the basic calibratio. holes.

 Position the straight-beam search unit to obtain maximum response from the calibration hole selected from the following, that produces the highest amplitude:

1	1	4	T	
1	1	2	T	
3	1	4	Ť	

12 . 2 . .

- (2) Set this response to the primary reference level of 50% ±5% of FSH and mark its amplitude on the instrument screen.
- (3) Without changing the gain controls, obtain maximum response from the remaining calibration holes; mark and join all amplitude points with a smooth curved line which shall extend 1/4T beyond the last qualified calibration point.
- 6.4 Angle-Beam Distance Amplitude Correction (1/2 Vee-Path)

NOTE

The slope of the distance amplitude correction (DAC) curve shall be constructed from the holes parallel to the axis of the basic calibration block. The notch perpendicular to the axis of the curved basic calibration block shall be utilized to establish sensitivity when examining circumferential welds or for transverse examinations on longitudinal welds. The axial notch shall be used to establish sensitivity when examining longitudinal welds or for transverse examinations on circumferential welds.

> Position the 45' search unit to obtain a maximum response from the vee-path position selected from the following, that produces the highest amplitude:

Vee-Path Positions



(2) Set this signal to 50% 15% of FSH and mark its amplitude on the screen.

Swill Form CA 3-2

SwRI-NDT-800-100 Revision 2 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 10 of 18

- (3) Obtain maximum response from the remaining vea-path positions; mark and join all amplitude points with a smooth curved line which shall extend 1/8 vee-path beyond the last qualified calibration point.
- (4) Establish the sensitivity from the inside surface notch by setting the indication amplitude at the level of the DAC curve. This primary reference amplitude shall be marked with an X and recorded under INSTRUMENT SETTINGS.
- 6.5 Calibration Verification

6.5.1 Sweep Range and DAC Curve Verification

Sweep range calibration shall be verified on the appropriate reference block; DAC curve calibration, if applicable, shall be verified on the appropriate basic calibration block:

- (1) Prior to a series of examinations
- (2) With any substitution of the particular search unit cable used in calibration
- (3) With any substitution utilizing the same type of power source; e.g., a change of batteries
- (4) At least every 4 hours during the examination
- (5) At the completion of a series of examinations
- (6) Whenever the validity of the calibration is in doubc

6.5.2 Verification of Calibration Reflectors at Scanning Speed

The examiner shall verify the presence of the calibration reflectors at scanning speed.

NOTES

It is not Decessary to assure that this check confirms the signal amplitude at 100% of reference level, but merely to demonstrate that the signals from the calibration reflectors are readily observable at scanning speed.

The following statement shall be documented on the SwRI Sonic Instrument Calibration Record and initialed:

"Calibration reflectors have been verified at scanning speed."

SwRI-NDT-800-100 Revision 2 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 11 of 18

6.5.3 Calibration Changes

- (1) Perform the following if any point on the DAC curve has decreased more than 20% of FSH or 2 dB in amplitude, or any point on the sweepline has moved more than 10% of sweep division reading or 5% of full sweep, whichever is greater:
 - (a) Void all examinations referring to the calibration in question and performed after the last valid calibration verification.
 - (b) Conduct a new calibration.
 - (c) Reexamine the ereas for which examinations have been voided.
- (2) Perform the following if any point on the DAC curve has increased in amplitude more than 20% of FSH or 2 dB:
 - (a) Correct the calibration.
 - (b) Reexamine all indications recorded since the last valid calibration verification.
 - (c) Enter proper values on a new SwRI Examination Record.

.5.4 Recalibration

Substitution of any of the following shall be cause for recalibration:

- (1) Search unit transducer or wedge
- (2) Search unit cable type or length
- (3) Ultrasonic instrumenc
- (4) Examination personnel
- (3) Couplant
- (6) Change in type of power source; e.g., a change from direct to alternating current

SwRI-NDT-800-100 Revision 2 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 12 of 18

7. EXAMINATION

7.1 Examination Areas

7.1.1 Welds in Corrosion-Resistant Clad Piping

Welds ' 'sion-resistant clad piping with a nominal thickness of greater than 0.4 ... inches shall be examined from the outside surface of the pipe.

7.1.2 Preservice Examination Areas

When specified in the applicable examination plan for preservice examinations only, the lower 1/3 volume (base material plus cladding) shall be examined for the length of the cladding plus 1/4 inch on each end. This is to provide a complete baseline data package for comparison with any inservice examinations of this volume. The area defined by E, F, G, and H in Figure 1 is the area to be examined.

NOTE

The I.D. clad/base material fusion line should be determined with an angle-beam technique.

7.1.3 Inservice Examination Areas

For inservice examinations, the required weld volume and 1/4 inch of material from the outside surface weld fusion line on each side of the weld, defined by A, B, C, and D in Figure 1, shall be examined.

NOTE

The metal path corresponding to the lower 1/3 examination volume shall be clearly marked on the instrument screen. Determination of this volume shall be made for each weld based on the preservice or inservice examination requirements and on thickness measurements taken in accordance with Paragraph 7.5.

7.1.4 Longitudinal Weld; in Corrosion-Resistant Clad Piping

In conjunction with the examination of circumferential welds, any portion of an intersecting longitudinal weld located under the clad overlay adjacent to the circumferential weld will be examined and the results entered on a separate SwRI Examination Report.

SwkI-ND" 800-100 Revision 2 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 13 of 18

7.2 Surface Condition

The contact surfaces shall be free from weld spatter, roughness, or other conditions which interfere with free movement of the search unit or impair the transmission of ultrasound.

7.3 Indication Length Zero Reference (Lo) Location

Areas to be examined in accordance with this procedure shall have an L_0 marked in accordance with the applicable revision of SwRI Procedure IX-FE-103.

7.4 Scanning

When possible, scanning shall be performed at a minimum gain setting of 2 times the reference level sensitivity.

Instrument gain setting for scanning shall be determined on the basic calibration block as follows for each primary reference level utilized:

- (1) With the instrument at the primary reference level, maripulate the search unit on the basic calibration block to obtain a signal of 40% of FSH from a calibration reflector (sideirilled hole).
- (2) Add 6 dB gain by utilizing the 6 dB switch (if present), the fine gain control, or a combination of the fine and coarse gain controls, and choose any method which yields signal response within ±2 dB of 80% FSH.
- (3) This amplitude and method shall be recorded on the SwRI Sovic Instrument Calibration Record and shall be used for all scanning during the valid calibration period.

Scanning overlap shall be a minimum of 25% of the search unit piezoelectric element dimension perpendicular to the direction of the scan.

The search unit movement rate shall not exceed 3 inches per second.

7.5 Lamination Scan and Thickness Measurements

EXCEPTION

If performed previously, a lamination scan is not required except in the area(s) where a lamination was previously recorded.



SwRI-NDT-800-100 Revision 2 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 14 of 18

A straight-beam longitudinal-wave lamination scan shall be performed covering the entire area through which the angle beam passes. Screen distance calibration for this examination shall be conducted at a gain setting that produces an initial backwall amplitude of 80% ±5% FSH.

Intermediate echoes having an amplitude equal to or greater than the remaining back reflection shall to recorded as follows:

Obtain a back reflection signal from an indication-free area and adjust this signal to 80% ±5% of FSH. Record all intermediate in fections with amplitudes equal to or greater than the remaining back reflection on the appropriate SwRI Examination Record. Areas of total loss of back reflection accompanying the intermediate echo shall also be recorded.

Thickness measurements shall be taken at a minimum of three points adjacent to L_0 (on the centerline of the weld and at one point in the base material on each side of the weld) and shall be recorded on the appropriate SwRI Examination Record. Locations of measurements which cannot be taken adjacent to L_0 shall also be recorded.

NOTE

Due to the cladding, actenuation measurements shall not be performed.

7.6 Examination of Butt Welds in Piping

7.6.1 Angle-Beam Examination for Indications Parallel with the Weld

Angle-beam examinations for circumferential welds shall be accomplished using the required angle-beam search unit from both sides of the weld. For this examination, the sound-beam shall be directed perpendicularly into the weld to detect indications parallel with the weld. Calibration for these examinations shall be in accordance with Paragraphs 6.3.2 and 6.4.

7.6.2 Alternate Examination

Any areas of the weld not receiving complete coverage from each side of the weld shall be examined from the accessible side of the weld with the required argle-beam search unit, and with a straight-beam search unit applied to the surface of the weld crown in the affected areas. Calibration for the straight-beam longitudinal-wave search unit shall be in accordance with Paragraphs 6.3.1 and 6.3.3.

7.6.3 Angle-Beam Examination for Indications Perpendicular to the Weld

A refracted longitudinal-wave angle-beam examination shall be conducted on each weld by placing the required search unit on the weld crown



SwRI-NDT-800-100 Revision 2 December 1987



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 15 of 18

with the sound beam directed into and parallel with the weld to detect indications perpendicular to the weld. The entire length and width of the weld shall be scanned with the search unit beam directed in this manner from two opposing directions.

7.6.4 Angle-Bean Examination for Indications in Base Material Perpendicular to the Weld

A refracted longitudinal-wave angle-beam examination shall be conducted on the adjacent base material on each side of the weld by placing the required search whit on the base material with the sound beam directed parallel with the weld to detect indications perpendicular to the weld. The base material area as described in Paragraphs 7.1.2 and 7.1.3 shall be scanned with the search unit directed in this manner from two opposing directions.

7.7 Postexamination Cleaning

Arrangements shall be made with the customer for postexamination removal of couplant materials.

8. RECORDING CRITERIA

CAUTION

The minimum shear metal path shall be determined prior to the examination. Extreme care shall be exercised in recording signals at or past this metal path to preclude recording of shear indications.

Indications shall be recorded in accordance with the techniques outlined in the applicable revision of SwRI Procedure IX-FE-117.

Ultrasonic reflectors within the examination volume as marked on the instrument screen in accordance with Paragraph 7.1.2 or 7.1.3 that produce a response greater than 50% of the reference level shall be recorded on the appropriate SwRI Ultrasonic Examination Record.

Indications greater than 50% of the reference level attributable to geometry shall be recorded only once, even if the amplitude of the indication drops below the required recording amplitude along the weld. These indications shall be investigated by a Level II or a Level III examiner to determine the shape, identity, and location of the reflector.

If indications that have been recorded as geometry have been investigated and found to be nongeometric reflectors, the entire weld shall be reexadined, recording all nongeometric reflectors and other reflectors not previously recorded at least once.



SwRI Form CA 3-2

SwRI-NDT-800-100 Revision 2 December 1987

45



NUCLEAR PROJECTS OPERATING PROCEDURE

Page 16 of 18

Indications investigated and found to be other than geometrical in nature, regardless of the amplitude, shall be reported to the customer for evaluation.

Sizing of indications shall ont be conducted with the procedure.

Scanning limitations shall be mecorded.

9. EVALUATION

Initial evaluation of reportable indications shall be performed by SwRI personnel, and shall be conducted in accordance with the applicable ASME Boiler and Pressure Vessel Code, Section XI, Article IWA-3000. Final evaluation and disposition of reportable indications shall be the responsibility of the customer.

10. RECORDS

Documents generated in accordance with this procedure shall be stored as specified in the SwRI Project Plan. The customer shall receive copies of these documents in the Examination Report, unless specified otherwise in the SwRI Project Plan.



SwRI-NDT-800-100 Revision 2 December 1987

Ć

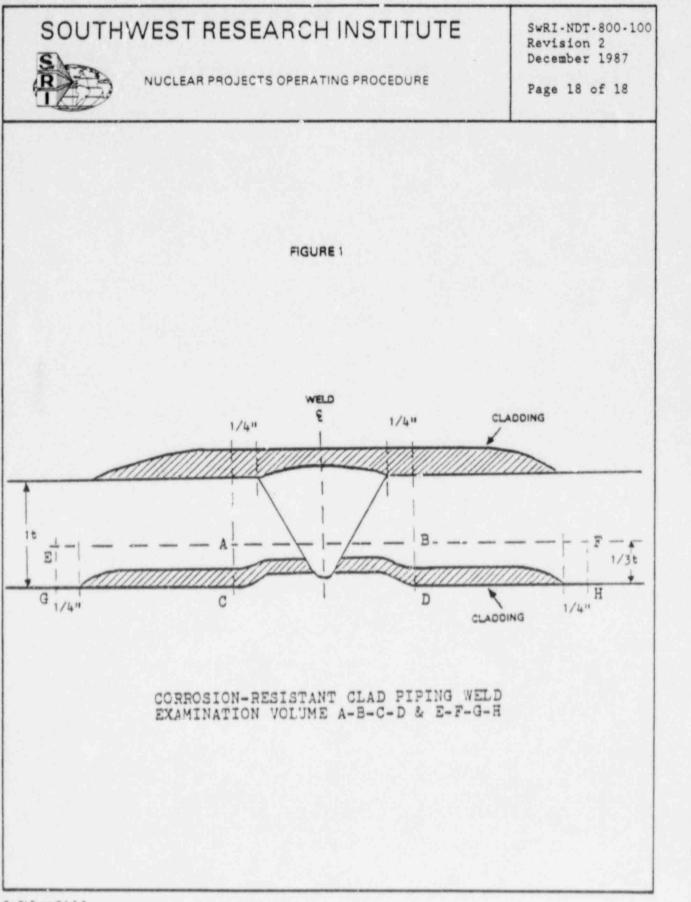
2

Page 17 of 18

NUCLEAR PROJECTS OPERATING PROCEDURE

APPENDIX 1

Pipe Diameter	Nominal Pipe Thickness	Crossover (Focus) Depth
12"	.68"	.75*
20*	1.0"	.75" to 1.5"
22*	1.08"	1.0" to 1.5"
28*	1.08"	1.5*



SwRI Form QA 3-2

APPENDIX E

ULTRASONIC CALIBRATION BLOCK DRAWINGS



APPENDIX E

ULTRASONIC CALIBRATION BLOCK DRAWINGS

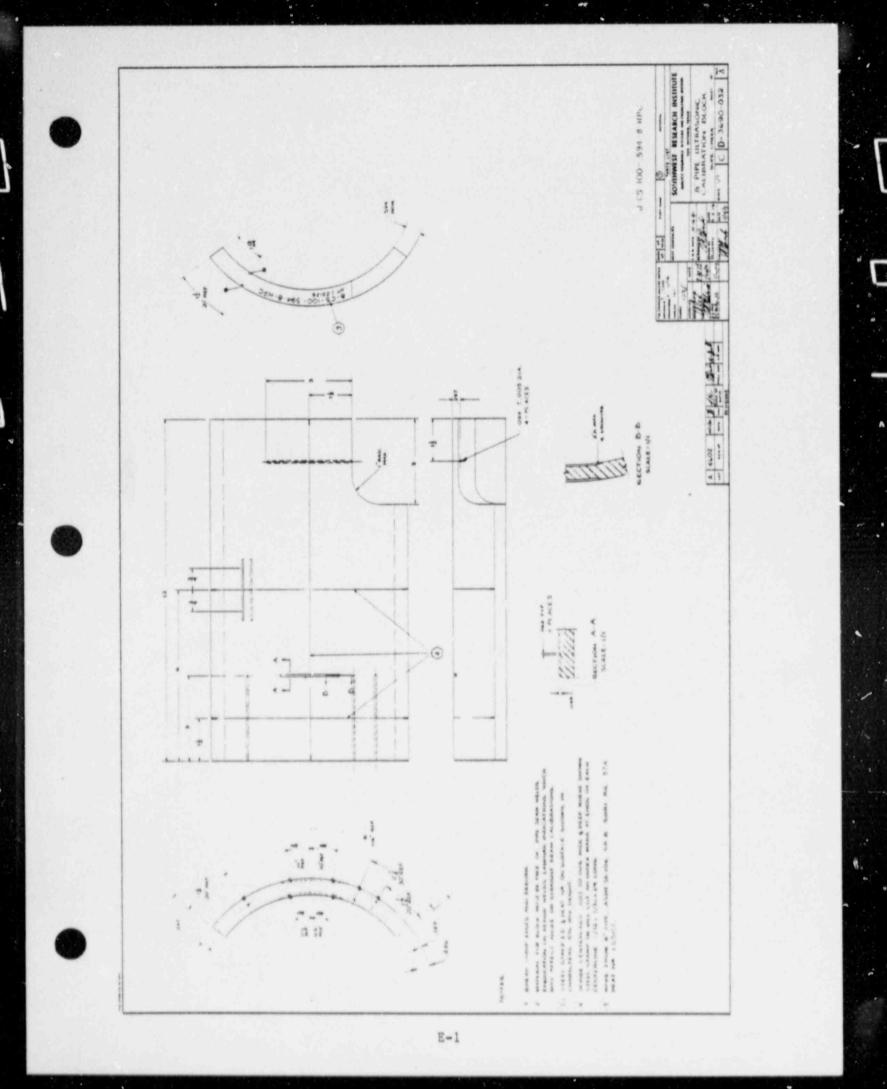
Table of Contents

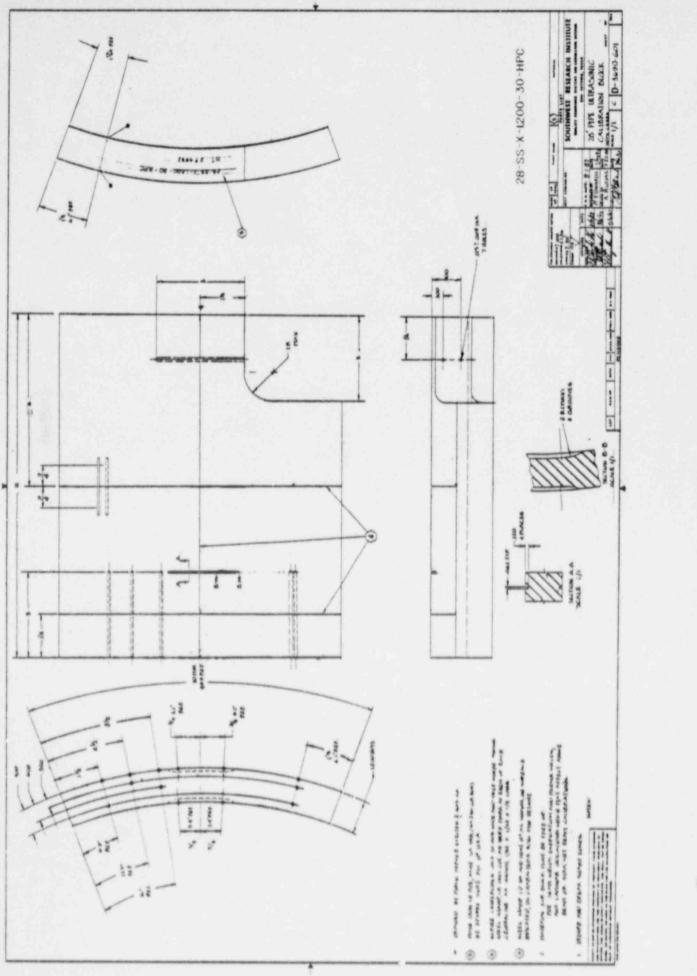
Calibration Block No.	Drawing No.	Page
8-CS-100594-8-HPC	D-3690-932A	E-1
28-SS-X-1.200-30-HPC	D-3690-601	E-2
28-SS-CRC-68-HPC	D-3690-636	E-3
FW-N4-MOCKUP-75R-HPC	D-3690-645A	E-4



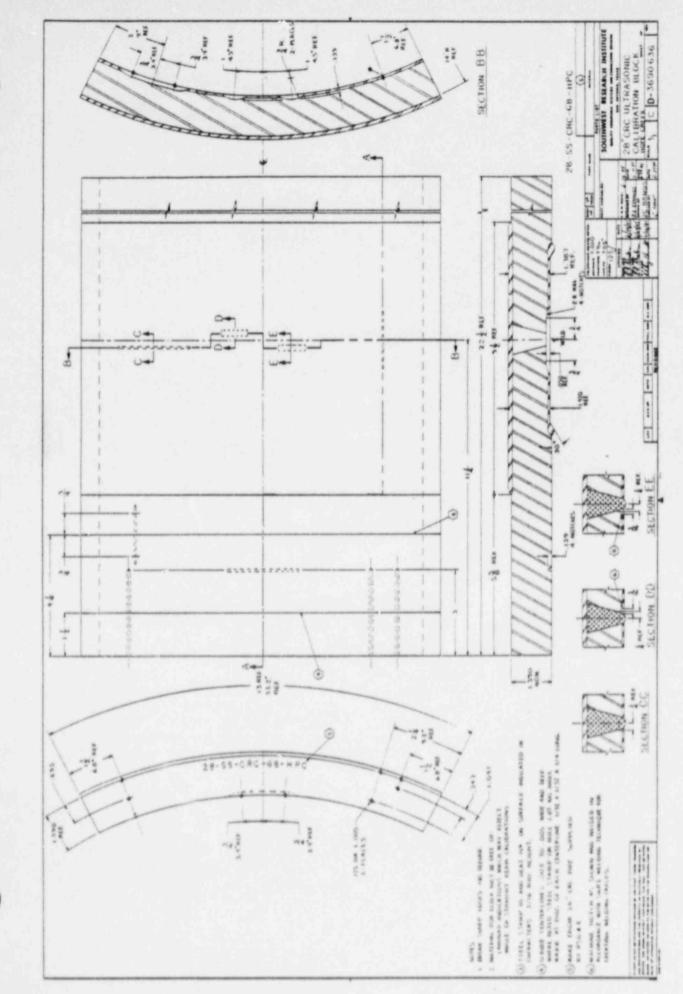




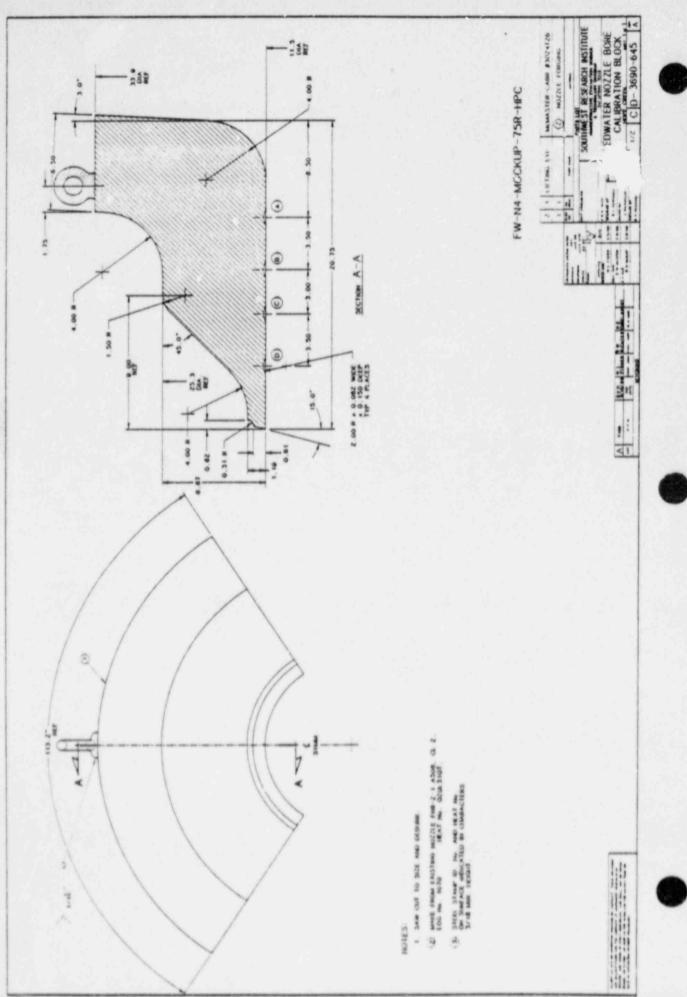




E-2



E-3



E-4

APPENDIX F

CERTIFICATES OF PERSONNEL QUALIFICATIONS



APPENDIX F

CERTIFICATES OF PERSONNEL QUALIFICATIONS

Table of Contents

Name	MT	PT	UT	Page
Duran, L.	I•		П	F-1
Feige, E. J.	п	п	-	F-3
Fine, R. H.	п	п	п	F-5
Forman, R. O.	п		П	F-8
Littlefield, C. F.	п	-	п	F-10
Roberds, B. A.	ш	-	П	F-12
Spiess, L. D.	п	п	Ш	F-14



R NONDESTRUC STATEMENT	ESEARCH INSTITUTE TIVE EXAMINATION OF CERTIFICATION
The Director of the Department of Engineering Services. Nondestr <u>Leroy Duran</u> is qualified as festing in accordance with the requirements of SwRI Nuclear Qua TC-1A. 1975 and 1980 fditions. Certification Valid only Certification Limitations:	Level A 12 GALLEGA
Special Qualifications (if any): None	
Expiration Date: 10/19/90 Signed:	An excitation of the second seco
And a second second descent descent for the control of the second second second second second second second sec	3, AND EXPERIENCE HISTORY
EDUCATION:	DEGREE TRAINING (This method and level): GRAD Date Completed Hours: 6 Location: SwRT
The individual has have dragted with	months COMPANY FROM TO
of experience in this examination method on the date of or Some of the experience may have been accrued simultaneously NDE methods (at least 25% was in this method).	with other
of experience in this examination method on the date of or Some of the experience may have been accrued simultaneously NDE methods (at least 25% was in this method). VISUAL ACUITY	AND COLOR PERCEPTION
of experience in this examination method on the date of or Some of the experience may have been accrued simultaneously NDE methods (at least 25% was in this method). VISUAL ACUITY	with other AND COLOR PERCEPTION 2 inches in at least one eye (using corrective lenses if specified below), a this method. Dete Corr. Req. Verified by
The individual is capable of reading Jaeger Number 1 letters at 1 can distinguish and differentiate contrast between colors used in	with other AND COLOR PERCEPTION 2 Inches in at least one eye (using corrective lenses if specified below), a this method. Oete Corr. Req. Verified by Cete Corr. Req. Verified by CERTIFICATION HISTORY: THIS LEVEL
of experience in this examination method on the date of or some of the experience may have been accrued simultaneously NDE methods (at least 25% was in this method). VISUAL ACUITY The individual is capable of reading Jaeger Number 1 letters at 1 can distinguish and differentiate contrast between colors used in OCate Care Venified by Venified by MOST RECENT EXAMINATION GRADES Specific: N/A Practical: N/A N/A	with other AND COLOR PERCEPTION 2 inches in at least one eye (using corrective lenses if specified below), a this method. Dete Corr. Req. Verified by
of experience in this examination method on the date of or some of the experience may have been accrued simultaneously NDE methods (at least 25% was in this method). VISUAL ACUITY The individual is capable of reading Jaeger Number 1 letters at 1 can distinguish and differentiate contrast between colors used in 0/24/4 7/87 NO Heidi Gutierrez // NO MOST RECENT EXAMINATION GRADES Scores WEIGHT General: N/A N/A	with other

SwAI Form CA-11-1

-

F=1

R NONDESTRUCTIV	SEARCH INSTITUTE VE EXAMINATION F CERTIFICATION
C 14 1975 and 1980 Editors	tive Evaluation Science and Technology Division, cartifies that verinUltrasonic v Assurance Procedure 11-1, which incorporates the guidelines of SNT- only while employed by SWRI
oecial Qualifications (if any):None	
spiration Date:	Date: Jeur 23, 1987
EDUCATION, TRAINING, A	AND EXPERIENCE HISTORY
DUCATION: NAME YEARS DEG High School Commonwealth of Va. 4 GF Idoitional: Maicr Field of Study	Hours: 44 Location: SwRI
ate employed by SwRI:7/30/84 he individual has been credited with11	
VISUAL ACUITY AND	D COLOR PERCEPTION
he individual is capable of reading Jaeger Number 1 letters at 12 ind an distiriguish and differentiate contrast between colors used in this 8/26/86 Corr. Red. 8/26/86 Corr. Red. 1/17/87 No Heidi Gutierrez ///	ches in at least one eve lusing corrective lenses if specified below), and method. Date Corr. Reg. Verified by
MOST RECENT EXAMINATION GRADES	CERTIFICATION HISTORY: THIS LEVEL
Scores Weight Seneral: * 70.00 0.3 Seecific: * 75.00 0.3	DATE Initial Certification: 1/23/87 Recertification: Recertification: Recertification:
**** 92.00 0.4 Iomoosite 80.30 1.0 Date: *1/7/87; **1/15/87; **1/16/87 Responsible Leve III: 22/3 1.0 1.0	Recercification:

1 vAI Form CA-11.7

the discourse of the discourse of the second se	of Conference Ser	None Marrie	annumber funition	ion Science and Technolog	v Division, certifies that
Edward J. Feige		in munified	an Level A.L.	in maxileta	C LULLAUAC
esting in accordance with the C-14, 1975 and 1980 Editions.					
artification Limitations:	Certifica	tion va.	lid only w	hile employed b	y SWRI
oeciai Qualifications (if any): -	None				
apiration Data: A	01/14/29				
Malui	1 - Flar	le		Core: 1/15/87	
Signed: Director, D	Department of Engin	neering Servi	NAME OF TAXABLE PARTY AND ADDRESS OF TAXABLE PARTY.		
	EDUCAT	ION. TRAIN	ING. AND EXPER	RIENCE HISTORY	
OUCATION:	NAME	YEARS	DEGREE	TRAINING (This method	and level: 6/12/81;
	OD P.S. (MI		GRAD	Date Completed 5/2	9/84: 1/6/87
Additional's Remarks Busin	o St. Univ.	(Minn)	4 B.S.	Hours: 12: 0	Location: SWRI
Major Field of Study Busi	ness Adm. W	Manage	centration		
TH C	OUD FEAFFAAAA				the subscription of the su
	1				and the second second
ate employed by SwRI:4	/07/80			Previous NDE experience	e (if used for qualification):
		4	months	Previous NDE experience	e (if used for qualification):
The inclividual has been credits if experience in this exemine	d with	4 the date of	months cartrification.		
The inclividual has been credite of experience in this examination forme of the experience may h	ad with	4 the date of	months cartrification.	COMPANY	
The inclividual has been credite of experience in this examination forme of the experience may h	ad with	4 the date of simultaneous	months certification. ay with other	None	
The individual has been credite of experience in this examina forme of the experience may h IOE methods (at least 25% wi	ed with	4 the date of simultaneous	months certification. ay with other Y AND COLOR P	COMPANY None	FROM TO
Data employed by SwRI: <u>4</u> The individual has been credits of experience in this examina Some of the experience may h NOE mathods (at least 25% wi The individual is capable of rea	id with	4 the date of simultaneous UAL ACUIT er 1 letters a	months carofication. ay won other Y AND COLOR P t 12 inches in at k	COMPANY None	FROM TO
The individual has been credite of experience in this examina Some of the experience may h NOE methods (at least 25% wi	id with	4 the date of simultaneous UAL ACUIT er 1 letters a	months carofication. ay won other Y AND COLOR P t 12 inches in at k	COMPANY None	FROM TO
The individual has been credite of experience in this examina some of the experience may h VDE methods (at least 25% with The individual is capable of rea	id with	4 the date of simultaneous UAL ACUIT er 1 letters a	months carufication. ay with other Y AND COLOR P t 12 inches in at it in this method.	COMPANY NOTIE	FROM TO
The individual has been credite of experience in this examina some of the experience may h NDE methods (at least 25% with The individual is capable of ree can distinguish and differentiation Date Corr. Rep.	ed with ation method on the reve been accrued as in this method). VIS iding Jaeger Numbe a contrast between Ventiled a	4 the date of simultaneous UAL ACUIT er 1 letters a colors used	months carufication. ay with other Y AND COLOR P t 12 inches in at it in this method.	COMPANY None	FROM TO
The individual has been credite if experience in this examination forme of the experience may h IOE methods (at least 25% with the individual is capable of rea- can distinguish and differentiation Date Corr. Rep. 10/02/86 Yes E	ed with	4 the date of simultaneous UAL ACUIT er 1 letters a colors used	months carufication. ay with other Y AND COLOR P t 12 inches in at it in this method.	COMPANY NOTIE	FROM TO
The individual has been credite if experience in this examination forme of the experience may h IOE methods (at least 25% with the individual is capable of rea- can distinguish and differentiation Date Corr. Rep. 10/02/86 Yes E	ed with	4 the date of simultaneous UAL ACUIT er 1 letters a colors used	months carufication. ay with other Y AND COLOR P t 12 inches in at it in this method.	COMPANY NOTIE	FROM TO
The individual has been credite of experience in this examinations forme of the experience may high methods lat least 25% with the individual is capable of realist the individual is capable of rea	ed with	4 the date of simultaneous UAL ACUIT er 1 letters a colors used Trez (LG a g	months carufication. ay with other Y AND COLOR P t 12 inches in at it in this method.	COMPANY NOTIE	FROM TO
The individual has been credite if experience in this examination forme of the experience may h IOE methods (at least 25% with the individual is capable of real can distinguish and differentiation 10/02/86 Yes B 10/09/87 Yes B	id with	4 the date of simultaneous UAL ACUIT er 1 letters a colors used Trez (LG a g	months certification. av with other Y AND COLOR P t 12 inches in at it in this method.	COMPANY NOTIC PERCEPTION SERCEPTION SERCEPTION SERCEPTION SERCEPTION CERTIFICATION HISTO	FROM TO
The individual has been credite if experience in this examinations of the experience may hild methods lat least 25% with the individual is capable of realized differentiation differentiation differentiation of the capable of realized differentiation di differentiation differentiation di differentiatio	d with soon method on to veve been accrued as in this method). VIS iding Jaeger Numbe a contrast between Ventiled 2 iding Gutier commin Gaudi CAMINATION GRA DRES 00	4 the date of simultaneous UAL ACUIT er 1 letters a colors used Tez /// a 20/2 20/2	months certification. av with other Y AND COLOR P t 12 inches in at it in this method.	COMPANY NOTIC PERCEPTION elest one eye (using correct ate Corr. Req. CERTIFICATION HISTO Artofication:	FROM TO
The individual has been credite if experience in this examinations of the experience may hild methods lat least 25% with the individual is capable of realized the individual is capable of realized the individual is capable of realized to the individual is capable. The individual is capable of realized to the individual is	d with	4 the date of simultaneous UAL ACUIT er 1 letters a colors used <u>Tez //c</u> e <u>UAL ACUIT</u> er 1 letters a colors used <u>Tez //c</u> e <u>UAL ACUIT</u> e <u>UAL A</u> E <u>UAL A</u> E <u>UA</u>	months certification. ay with other Y AND COLOR P t 12 inches in at le in this method. De Intel C. Recent	COMPANY None PERCEPTION elest one eye (using correct ate Corr. Req. CERTIFICATION HISTO Artification: fication:	FROM TO
The individual has been credits of experience in this examinations forme of the experience may hit IOE methods (at least 25% with The individual is capable of rea- can distinguish and differentiation Date Corr. Reg. 10/02/86 Yes E 10/09/87 Yes E 10/09/87 Yes E Score MOST RECENT E Score General: <u>90.</u> Specific: <u>85.</u> Frectical: <u>94</u>	d with	4 the date of simultaneous UAL ACUIT er 1 letters a colors used Te z //La e Dess WEIGHT	months certification. ay with other Y ANO COLOR P t 12 inches in at le in this method.	COMPANY None PERCEPTION east one eye (using correct atte Corr. Req. CERTIFICATION HISTO Aroficetion: ficetion: ficetion:	PROM TO
The individual has been credite of experience in this examination forme of the experience may high methods lat least 25% with the individual is capable of realized differentiation of the individual is capable of realized d	d with	4 the date of simultaneous UAL ACUIT er 1 letters a colors used <u>Tez //c</u> e <u>UAL ACUIT</u> er 1 letters a colors used <u>Tez //c</u> e <u>UAL ACUIT</u> e <u>UAL A</u> E <u>UAL A</u> E <u>UA</u>	months certification. By with other Y AND COLOR P t 12 inches in at k in this method. Da	COMPANY None PERCEPTION east one eye (using correct atte Corr. Req. CERTIFICATION HISTO Artification: fication: fication: fication:	PROM TO
The Individual has been credits of experience in this examine Some of the experience may h VOE methods (at least 25% with the Individual is capable of rea- can distinguish and differentiation 10/02/86 Yes H 10/09/87 Yes H 10/09/87 Yes H 10/09/87 Yes H Specific: 90, Specific: 85, Frectical: 85, Composite B6, 1/0	d with	4 the date of simultaneous UAL ACUIT er 1 letters a colors used <u>Tez //c</u> e <u>UAL ACUIT</u> er 1 letters a colors used <u>Tez //c</u> e <u>UAL ACUIT</u> e <u>UAL A</u> E <u>UAL A</u> E <u>UA</u>	months certification. any with other Y AND COLOR P t 12 inches in at k in this method. Da in this method. Da invitel C Recertific Recertific Recertific Recertific	COMPANY None PERCEPTION east one eye (using correct atte Corr. Req. CERTIFICATION HISTO Artification: fication: fication: fication: fication:	PROM TO
The Individual has been credits of experience in this examine Some of the experience may h vOE methods (at least 25% with The Individual is capable of rea- can distinguish and differentiate Date Corr. Rep. 10/02/86 Yes E 10/09/87 Yes B MOST RECENT E Specific: 35. Srectica: 35. Srectica: 35.	d with	4 the date of simultaneous UAL ACUIT er 1 letters a colors used <u>Tez //c</u> e <u>UAL ACUIT</u> er 1 letters a colors used <u>Tez //c</u> e <u>UAL ACUIT</u> e <u>UAL A</u> E <u>UAL A</u> E <u>UA</u>	months cerufication. ay with other Y AND COLOR P t 12 inches in at le in this method. Da in this method. Da invest C Receruf Receruf Receruf	COMPANY None PERCEPTION east one eye (using correct atte Corr. Req. CERTIFICATION HISTO Artification: fication: fication: fication:	PROM TO

Swill Form QA-11-7

SR	SOUTHWEST P NONDESTRUC STATEMENT	CTIVE EXAN	NINATION	
The Director of the Department of E Edward J. Feige Feeting in accordance with the requi TC-1A, 1975 and 1980 Editions. Certification Limitations:	is qualified as	Level II	Procedure 11-1, which inco	metrant porates the guidelines of SNT
pecial Qualifications (if any):N	one			
signed: Albert R. W.	8/26/89		Deter <u>8/27/86</u>	
	EDUCATION, TRAININ	G. AND EXPER	IENCE HISTORY	
Additional: Mankato S*. Major Field of Study Business	. (Minn) 4 Univ. (Minn) 4	B.S.	TRAINING (This method a Date Completed 07/ Hours: 12: 6	29/81: 06/17/86
The individual has been credited with of experience in this examination Some of the experience may have b NDE - mode (at least 25% was in	method on the date of ca seen accrued simultaneously		COMPANY SwRI Peabody Testing	FROM TO 4/77 8/78 1/75 10/75
	VISUAL ACUITY	AND COLOR P	ERCEPTION	
10/02/86 Yes Heid				Ventified by
MOST RECENT EXAMI	NATION GRADES	11	CERTIFICATION HISTORY	THIS LEVEL
Scores 36.67 Specific: 100.00 Practical: 99.00 Composite 95.60 Date: 06/17/86 Responsible Level III: 7.8	WEGHT 0.3 0.3 0.4 1.0 4 4 4 4 4 4 4 4 4 4 4 4 4	Recercifi Recercifi Recercifi Recercifi Recercifi	cation: cation: cation:	OATE 05/11/82 08/26/86
		REMARKS		
*Hutchinson Area Voc. Nondestructive Testin	Contraction of the second s	ears		

Swill Form QA-11-7

R	5	NONDESTRUC	ESEARCH INSTITUTE TIVE EXAMINATION OF CERTIFICATION	
Russell Testing in accordance TC-1A 1975 and 19	H. Fine ce with the requirements 180 Editions.	of SwRI Nuclear Qua	uctive Evaluation Science and Te evel <u>II</u> in <u>Magt</u> lity Assurance Procedure 11-1, w only while employed	netic Particle which incorporates the guidelines of S
Special Qualification	s of any None			
Expiration Date A	UMU 2	ael	Date: 1/25/19	
			AND EXPERIENCE HISTORY	
Additional: Phoe	NAME Dover H.S. (NJ) enix School of W welding	YEARS C 4 Velding 2 mo C	GRAD Date Complete	method and level): d <u>6/11/8L; 6/16/87</u> .0ocation: <u>SWRI</u>
of experience in the experience	een credited with his examination method ence may have been acc ast 25% was in this meti	on the date of cer inied simultaneously v hod).	tification. <u>None</u>	FROM TO
		VISUAL ACUITY A	NO COLOR PERCEPTION	
can distinguian and	differentiate contrast ben Reg. Ven Ves Heidi Guti		Data Corr Reg.	Venfied by
	and the second se	0.04055	CERTIFICATION	HISTORY: THIS LEVEL
MOST	RECENT EXAMINATION	UNADES	and present of the second seco	
MOST General: Specific: Practical: Composite Date: Responsible Level I	SCORES 86.68 75.00 96.00 86.90 6/16/87 6/16/87	WEIGHT 0.3 0.3 0.4 1.0	Initial Certification: Recertification: Recertification: Recertification: Recertification: Recertification: Recertification:	09/01/81 09/10/84
Generai: Specific: Prectical: Composite Date:	SCORES 86.68 75.00 96.00 86.90 6/16/87	WEIGHT 0.3 0.3 0.4 1.0 0.4 1.0	Recercification: Recercification: Recercification: Recercification: Recercification:	09/01/81 09/10/84

SwRI Form CA-11-7

	ment of Engineering Co.	There is a second to be a second to	Assurance Summe	me and Engineering Division, cartifies that	
Russell H. F1	ne is qualified a	as Lovel	11	inin	NAME AND ADDRESS OF OWNER, ADDRESS
atting in accordance with NT-TC-1A, 1975 and 1986	S E distance			ce Procedure 11-1, which incorporates the	guidelines of
artification Limitations:	Certif:	ication .	valid only	while employed by SwRI	
	None				
pecial Qualifications (if a	nyl:				
xpiration Data: A	10/03/	38			
Wall	112 7 th	new		- 10/0/15	- 1. milli
Director, Pe	partment of Engineerin	ng Services			
	EDUCA	ATION, TRAIN	ING. AND EXPE	RIENCE HISTORY	
UCATION:	NAME	YEARS	DEGREE	TRAINING (This method and leve):	
sh School Dover	H.S. (NJ)	4	GRAD	Data Comparted 12/5/78:10/11/	82:10/1/85
	ix School of	Welding	2 mo.C/COM	Hours: 8: 1: Location: S	WRI
ajor Field of Study	Iding				
successive management with the successive				the second s	
	00/11/199	,			
empikiyed by SwiRI: _	02/14/77	1		Previous NDE experience (if used for qui	sification):
	2	1		Previous NDE experience (if used for que COMPANY FF.OM	aufication): TO
individual has been crec memorie of in this examin	sited with3	sate of certifica	months		
e employed by SwRI: individual has been crex expense of in this examinate expenses may have moving up team 25 % was	sited with3 nation method on the d	sate of certifica	mion. Some	COMPANY FROM	
individual has been crex xoene: ce in this examin he expanence may hav	sited with 3 nation method on the d re been accrued simult in this method).	sate of certification	other NCE	COMPANY FROM	
individual has been crec xperie: os in this exami he exparience may hav hods (at least 25 % wes	Sited with 3 hation method on the d re been accrued simult in this method).	sate of certifica teneously with VISUAL ACUIT	other NOE	COMPANY FROM None	то
individual has been crec xperie: ce in this sxemi the expanience may hav thoos (at least 25% wes e individual is capable o	sited with <u>3</u> nation method on the d re been accrued simult in this method). V f reacting Jaeger Numb	Sate of certifica teneously with VISUAL ACUIT for 1 letters at 1	rsion, Some other NCE TY AND COLOR 12 inches in st less	COMPANY FROM	то
individual has been crec xperie: os in this exami he exparience may hav thods (at least 25 % wes	sited with <u>3</u> nation method on the d re been accrued simult in this method). V f reacting Jaeger Numb	Sate of certifica teneously with VISUAL ACUIT for 1 letters at 1	rsion, Some other NCE TY AND COLOR 12 inches in st less	COMPANY FROM None	то
individual has been crec xperie: ce in this exami he expanience may hav hode (at least 25% wea e individual is capable o	sited with <u>3</u> nation method on the d re been accrued simult in this method). V f reacting Jaeger Numb	Sate of certifica teneously with VISUAL ACUIT for 1 letters at 1	roon. Some other NDE TY AND COLOR 2 loches in at less this method.	COMPANY FROM None PERCEPTION at one ave (using corrective lenses if specifie	TO
individual has been crex xoene: os in this sxami he expanence may hav noce (at least 25 % wes e individual is capable o n distinguish and differe Date Corr. Red.	sited with 3 nation method on the d re been accrued simult in this method). V I reading Jaeger Numb ntists contrast between Vanfie	Sate of certifica teneously with VISUAL ACUIT for 1 letters at 1 h colors used in ad by	roon. Some other NDE TY AND COLOR 12 Inches in at less this method.	COMPANY FROM None	TO
individual has been crex zoene: os in this sxami he expanence may hav node (at least 25 % wea e individual is capable o n distinguish and differe Date Corr. Red.	Sited with 3 nation method on the d re been accrued simult in this method).	Sate of cardifica canadualy with VISUAL ACUM Nor 1 letters at 1 h colors wand in a colors wand in id by idi Gutie	TY AND COLOR	COMPANY FROM None PERCEPTION at one ave (using corrective lenses if specifie	TO
individual has been crex xoener.ce in this examin he expanses may hav hods (at least 25% wes e individual is capable o t distinguish and differe Date Corr. Reg. 31/85 Yes (nea /18/86 Yes (nea	Sited with 3 nation method on the d re been accrued simult in this method).	Sarce of certifica taneously with VISUAL ACUM VISUAL A	TY AND COLOR	COMPANY FROM None PERCEPTION at one ave (using corrective lenses if specifie	TO
individual has been crex xpener ce in this examin he expanence may hav node (at least 25% wes e individual is capable o h distinguish and differen Date Corr. Red. <u>31/85 Yes (nea</u> <u>18/86 Yes (nea</u> <u>723/87 Yes</u>	Sited with 3 hatson method on the d re been accrued simult in this method).	Sate of cardifica canaously with VISUAL ACUM or 1 letters at 1 a colors used in a colors is a color	TY AND COLOR	COMPANY FROM None PERCEPTION at one ave (using corrective lenses if specifie	TO d below), and
individual has been crex xpener ce in this examin he expanence may hav node (at least 25% wes e individual is capable o h distinguish and differen Date Corr. Red. <u>31/85 Yes (nea</u> <u>18/86 Yes (nea</u> <u>723/87 Yes</u>	Sited with3 nation method on the d re been accrued simult in this method).	Sate of cardifica canaously with VISUAL ACUM or 1 letters at 1 a colors used in a colors is a color	TY AND COLOR	COMPANY FROM Non.e	TO
individual has been crex zoene: ce in this examin he expanence may hav node (at least 25% wes e individual is capable o h distinguish and different Date Corr. Red. <u>31/85 Yes (nea</u> <u>/18/86 Yes (nea</u> <u>/23/87 Yes</u> <u>MOST RECER</u>	Sited with3 nation method on the d re been accrued simult in this method).	Sate of cardifica canadualy with VISUAL ACUM or 1 latters at 1 a colors wand in a colors wand in idi Gutie nnie Cauc traz & CA ACES	roon. Some other NOS TY AND COLOR 2 inches in at less this method.	COMPANY FROM Non.e	TO d believe), and 24 (EL Cate / 19/79
individual has been crex xpene: ce in this examin he expanence may hav noce (at least 25% wes e individual is capable o a distinguish and differen Date Corr. Red. <u>31/85 Yes (nea</u> <u>18/86 Yes (nea</u> <u>18/86 Yes (nea</u> <u>123/87 Yes</u> <u>MOST RECEI</u> enersi: <u>*</u>	Sited with 3 nation method on the d re been accrued simult in this method).	Ante of certifica teneously with VISUAL ACUM or 1 letters at 1 colors used in ad by idi Gutic nnic Cauc traz A.Co WEIGHT 0.3 0.3 0.3	rison. Some other NOE TY AND COLOR 2 inches in at less this method.	COMPANY FROM Non.e	TO d below), and 24 (EL Cate /19/79 /12/82
individual has been crek xpener: ce in this examin he expansence may hav hods (at least 25% wes a individual is capable o i distinguian and differe Date Corr. Req. <u>31/85 Yes (nea</u> <u>/18/86 Yes (nea</u> <u>/23/87 Yes</u> <u>MOST RECER</u> enersi: <u>*</u> rectical: <u>*</u>	Sited with3 nation method on the d re been accrued simult in this method).	Ante of certifica teneously with VISUAL ACUM or 1 letters at 1 colors used in a colors used in to colo	roon. Some other NOE TY AND COLOR 2 inches in at less this method.	COMPANY FROM Non.e	TO d believe), and 24 (EL Cate / 19/79
individual has been crek xpener: ce in this examin he expansence may hav hods (at least 25% wes a individual is capable o i distinguian and differe Date Corr. Req. <u>31/85 Yes (nea</u> <u>/18/86 Yes (nea</u> <u>/23/87 Yes</u> <u>MOST RECER</u> enersi: <u>*</u> rectical: <u>*</u>	Sited with 3 nation method on the d re been accrued simult in this method).	Ante of certifica teneously with VISUAL ACUM or 1 letters at 1 colors used in ad by idi Gutic nnic Cauc traz A.Co WEIGHT 0.3 0.3 0.3	rison. Some other NOE TY AND COLOR 2 inches in at less this method.	COMPANY FROM Non.e	TO d below), and 24 (EL Cate /19/79 /12/82
individual has been crex xpene: ce in this examin he expanence may hav noce (at least 25% wes e individual is capable o a distinguish and differen Date Corr. Red. <u>31/85 Yes (nea</u> <u>18/86 Yes (nea</u> <u>18/86 Yes (nea</u> <u>18/86 Yes (nea</u> <u>123/87 Yes</u> <u>MOST RECEI</u> eneral: <u>*</u> pecific: <u>*</u> omposite: <u>*</u>	Sited with3 arison method on the d re been accrued simult in this method).	Ante of certifica teneously with VISUAL ACUM or 1 letters at 1 colors used in a colors used in to colo	rison. Some other NOE TY AND COLOR 2 inches in at less this method.	COMPANY FROM Non.e	TO d below), and 24 (EL Cate /19/79 /12/82
individual has been crex xpener ce in this examin he expanence may hav node (at least 25% wes e individual is capable o h distinguish and differen Date Corr. Red. <u>31/85 Yes (nea</u> <u>18/86 Yes (nea</u> <u>18/86 Yes (nea</u> <u>123/87 Yes</u> <u>MOST RECEI</u> enersi: <u>*</u>	Sited with3 arison method on the d re been accrued simult in this method).	Ante of certifica teneously with VISUAL ACUM or 1 letters at 1 colors used in a colors used in to colo	rison. Some other NOE TY AND COLOR 2 inches in at less this method.	COMPANY FROM Non.e	TO d below), and 24 (EL Cate /19/79 /12/82

R	SOUTHWEST RESEARCH NONDESTRUCTIVE EXA STATEMENT OF CERTI	MINATION	
The Director of the Department of Engineer <u>Russell H. Fine</u> Testing in accordance with the requirements TC-1A 1975 and 1980 Editions. Certification Limitations: <u>Certific</u>	s of SwRI Nuclear Quality Assuran	in <u>Ultrason</u> ce Procedure 11-1, which inc	1c orborates the guidelinas of SN
Special Qualifications (if any):None			
1			
Signed:	di	Date: 1-19-88	
Director. Department o			
EDUCATION NAME	YEARS DEGREE	TRAINING (This method 12/21/78; 2/5/82 Date Completed	; 1/11/85; 1/13/88
Additional: Phoen <u>ix School of b</u> Major Field of Study <u>Welding</u>	ELGINE 2 DOS L/COMP.	Hours: 36; 8; 11	Location: SUPT
Date employed by SwRI:2/14/1		Previous NDE experience	FROM TO
of experience in this examination method Some of the experience may have been ac NDE methods (at least 25% was in this me	on the date of certification. crued simultaneously with other	None	
	VISUAL ACUITY AND COLOR	PERCEPTION	
The individual is capable of reading Jaeger can distinguish and diffurentiate contrast be Date Corr. Reg. Ve 6/ <u>23/87 Yes</u> <u>Bonnie (</u>	rween colors used in this method.		ve lensos ir specified berown, a Verified by
MOST RECENT EXAMINATION SCORES	WEIGHT	CERTIFICATION HISTO	OATE
General: 88.37		Cartification:	2/26/29
Scientific: 94.00	NAMES AND ADDRESS OF TAXABLE PARTY.	theation:	2/15/82
Practical: 97.50 Composite 93.71	1.0	cheation	1/25/85
Composite		efication:	11 121 00
Date: 1/19/88		ofication:	
	1. 1/14/09	ufication:	
Responsible Lever III: Prove R man	Recer	trication	A 19-Years concerning the second second
Responsible Level III: Responsible Level III: Responsible Level III:	197		
Responsible Level III:R. Anes	REMARKS		

 $\overline{r} = 7$

٠

R NONDESTRUCT	SEARCH INSTITUTE IVE EXAMINATION F CERTIFICATION
Testing in accordance with the requirements of SwRI Nuclear Qualit (C.1.4, 1975 and 1980 Editions.	otive Evaluation Science and Technology Division, certifies that we II in Magnetic Particle ty Assurance Procedure 11-1, which incorporates the guidelines of SMT nly while employed by SWRI
great dualingations if any:	Care: 10/20/56
EDUCATION, TRAINING,	AND EXPERIENCE HISTORY
Hon Schory Stuttgart American H.S.*3 GT	GREE TRAINING (This method and level): 7/13/82; RAD Oate Completed 10/29/85; 10/6/86 O Hours: 12; 6
sta employed by SwRI:12/06/76	Previous NOE experience (if used for qualification):
he individual has been credited with3 experience in this examination method on the date of certificate of the experience may have been accrued simultaneously with CE methods (at loast 25% was in this method). VISUAL ACUITY AND	months COMPANY FROM TO Notice
The individual has been credited with3 of experience in this examination method on the date of certif some of the experience may have been accrued simultaneously with ICE methods (at loast 25% was in this method). VISUAL ACUITY AND	months fication. In other COMPANY FROM TO Nothe O COLOR PERCEPTION when in at least one ever (using corrective lenses if specified below), and
The individual has been credited with3 fexperience in this examination method on the date of certificate of the experience may have been accrued simultaneously with ICE methods (at loast 25% was in this method). VISUAL ACUITY AND The individual is capable of reading Jaeger Number 1 letters at 12 in an distinguish and differentiate contrast between colors used in this 8/18/36 Yes Heidi Gutiertos (24	months fication. In other COMPANY FROM TO Nottle D COLOR PERCERTION ches in at least one eve (using corrective lenses if specified below), and method.
The individual has been credited with3 of experience in this examination method on the date of certor iome of the experience may have been accrued simultaneously with IOE methods (at loast 25% was in this method). VISUAL ACUITY AND The individual is capable of reading Jaeger Number 1 letters at 12 LA can distinguish and differentiate contrast between colors used in this 8/18/36 Yes Reidi Gusterros (24 7/12/37 Yes Reidi Gusterros (24 7/12/37 Yes Reidi Gusterros (24 7	COMPANY FROM TO fication. Nottle

Swill Form Gaille?

3
5.5
R
Annual Annual of

SOUTHWEST RESEARCH INSTITUTE NONDESTRUCITVE EXAMINATION STATEMENT OF CERTIFICATION

The Director of the Department of Engineering Services. Quality Assurance Systems and Engineering Division, certifies that Randall O. Forman is qualified as Level II in Ultrasonic Terong in accordance with the requirements of SwRI Nuclear Quality Assurance Procedure 11-1, which incorporates the guidelines of SNT-TC-1A, 1975 and 1980 Editions. Certification valid only while employed by Swer Cartification Limitations: __ None Special Qualifications (if any): 01/20/8 Expiration CaterA 1/20 ann Date: Signed: Directors Department of Engineering Services EDUCATION, TRAINING, AND EXPERIENCE HISTORY TRAINING (This method and level): 12/21/78; YEARS DEGREE NAME EDUCATION: Care Completed 04/23/82: 01/24/85 High School Stuttzart American 2.5.* 3 CRAD -House 56; 6 Locardon: SWRI Additioner: Moore Head State Univ.

Maxor Feed of Study General Academics *Germany

VISUAL ACUITY AND COLOR PERCEPTION

Previous NCE experience (if used for qualification):

FROM

TO

The individual is capable of reading Jaeger Number 1 letters at 12 inches in at least one ave (using corrective lenses if specified below), and can distinguish and differencess contrast between opens used in this method.

Cate Corr. Red. Vermed by 8/03/34 Yes Heidi Gutierrez A.JA 03/05/35 Yes Heidi Gutierrez A.JA 8/13/86 Yes Heidi Gutierrez.JA	7/17/87 Yes H	(eidi Gutiertes All
MOST RECENT EXAMINATION GRADES	CERTIFICATION HI	STORY: THIS LEVEL
SCORES WEIGHT Generat: 95.56 0.3 Specific: 90.25 0.3 Practical: 98.00 0.4 Composena: 94.95 1.0 Carte: 01/24/85 1.0	Initial Carofication: Recercification: Recercification: Recercification: Recercification: Recercification:	05/11/79 04/27/82 01/30/85
Hote! This individual has received 10000 statement of Qualification is on i		by 1771 and the 10.

Swiki Form CA-11-5

	SEARCH INSTITUTE TVE EXAMINATION OF CERTIFICATION
he Director of the Department of Engineering Services. Nondestruk <u>Charles R. Littlefield</u> is qualified as Le esting in accordance with the requirements of SwRi Nuclear Qualif C-14 1975 and 1980 Editions. ertification Limitations. <u>Certification valid only</u>	TY Assurance Procedure 11-1, which incorporates the guidelines of SNT
oecial Qualifications lif anvi: <u>None</u>	
innes: Mary & Tagledingor DER	Date: 15 Feb 58
Director. Decentment of Engineering Services	Oute: Out 0.0
EDUCATION, TRAINING.	AND EXPERIENCE HISTORY
Highlands H.S. 3 GR	IGREE TRAINING (This method and level): RAD Date Completed 09/11/85; 01/19/88 Hours: 16; 4 Location: SWRI
he individual has been credited with3 f experience in this examination method on the date of certi ome of the experience may have been accrued simultaneously wi IDE methods (at least _5% was in this method).	fication. None
VISUAL ACUITY AN	O COLOR PERCEPTION
Date Corr. Reg. Venfield by M	nches in at least one eve lusing corrective lenses if specified below), and a method. Date Corr. Reg. Verified by
MOST RECENT EXAMINATION GRADES	CERTIFICATION HISTORY: THIS LEVEL
SCORES WEIGHT 93.40 0.3 Specific: 75.00 0.3 Practical: 97.00 0.4 Composite 39.32 1.0 Date: 02/15/88 2/15-55	CATE Initial Certification: Initial Certification: 02./15/88 Recertification:
I. H. Blagchar	EMARKS

SOUTHWEST RESEA NONDESTRUCTIVE STATEMENT OF CI	EXAMINATION
The Director of the Department of Engineering Services. Nondestructive Charles R. Littlefield is qualified as Level Testing in accordance with the requirements of SwRI Nuclear Quality As TC.1A. 1975 and 1980 Editions. Certification Limitations: Certification valid on.	II IN UILFASCULL
Special Qualifications (if any): None	
Expiration Date: 01/23/90 Signed:	Dara J341 23, 1987
EDUCATION, TRAINING, AND	
EDUCATION: NAME YEARS DEGREI High School Highlands H.S. (Tx) 3 GRAD Additional: San Antonio College 1 NO Major Field of Study <u>Basic Studies</u>	Date Completed1/16/87
Data employed by SwRI: $7/30/84$ The individual has been credited with 11 mon of expenence in this examination method on the date of certification Some of the experience may have been accrued simultaneously with ot NDE methods (at least 25% was in this method).	on. None
VISUAL ACUITY AND CO	DLOR PERCEPTION
The individual is capable of reading Jaeger Number 1 letters at 12 inches can distinguish and differentiate contrast between colors used in this mer <u>9/12/86 No. Heidi Gutierrez ALG</u> <u>9/11/87 No. Heidi Gutierrez ALG</u> <u>9</u>	Date C vr. Red. Vernifed by
MOST RECENT EXAMINATION GRADES	CERTIFICATION HISTORY: THIS LEVEL
SCORES WEIGHT General: * 87.50 0.3 Scecific: ** 85.00 0.3 Practical: *** 97.50 0.4 Composite 90.80 1.0 Date: *1/7/87; **1/15/87; ***1/16/87 Responsible Level III: # R A market / 1/22/27	Initial Certification: 01/23/87
a. d. Auescher	and the second of the second balance in the second s

ertification Limitations: Certification valid only Shile employed by SWRI decisi Qualifications if anvi: None spiration Date: 1/21/90 spiration Date: 1/21/90 Directer: Decisi Coulifications if anvi: Directer: Decisi Coulifications if anvi: Directer: Decisi Coulifications if anvi: Directer: Decisi Coulifications Services EDUCATION: NAME VEARS DEGREE TRAINING IThis method and level: Directer: DUCATION: NAME YEARS DEGREE TRAINING IThis method and level: Desite Completed 1/26/84: 1/9/87 High School 'Accounting 'Accounting 3 Masor Field of Study Accounting Accounting 3 months months f excensence in this method. 3 VISUAL ACUITY AND COLOR PERCEPTION The individual is capable of reading Jaeger Number 1 letters at 12 inched in at least one eye lusing corrective lenses if specified below: VISUAL ACUITY AND COLOR PERCEPTION The individual is capable of reading Jaeger Number 1 letters at 12 inched in at least one eye lusing correct	SOUTHWEST RESEARCH INSTITUTE NONDESTRUCTIVE EXAMINATION STATEMENT OF CERTIFICATION	
Detail Gualifications if any: 1/21/90 spiration Date 1/21/90 Spiration Date 1/21/90 Directs/ Department of Engineering Services DucAtion, Ttaining, And Experience History DUCATION: NAME YEARS Spiration Struct 4 GRAD Asion Field of Study Acci St. Mary's Univ. 2 NO Asion Field of Study 01/12/81 Previous NDE experience (if used in qualification): Date employed by SwRI: 01/12/81 Previous NDE experience (if used in qualification): Come of the experience may have been accrued simultaneousy with other NOTE NOTE VISUAL ACUITY AND COLOR PERCEPTION NOTE NOTE Visual Acturity and Color Perception NOTE NOTE Visual Acturity And Color Perception Note Note Visual Acturity and Color Perception Note Note Vistread of reeqing Jaeger Number 1 letters at 12 incher i	Barbara A. Roberds is qualified as Level in Magnetic articles esting in accordance with the requirements of SwRI Nuclear Quality Assurance Procedure 11-1, which incorporates the guidelin	-
DUCATION: NAME YEARS DEGREE TRAINING (This method and level): Ingh School 'Accounting 4 GRAD Data Completed 1/26/84: 1/9/87 Asior Field of Study Accounting 101/12/81 Data Completed 1/26/84: 1/9/87 Maior Field of Study Accounting 3 months If asperance in this examination monod on the date of certification: COLIPANY FROM TO Note 1 VISUAL ACUITY AND COLOR PERCEPTION Note Note VISUAL ACUITY AND COLOR PERCEPTION Visual Acuity and ifferentiate contrast between colors used in this method. Data Con. Reg. Verified by 9/22/86 Cort, Reg. Verified by Verified by Data Certification: Data 01/21/87 MOST RECENT Examination GRADES CERTIFICATION HISTORY: THIS LEVEL Data Certification: 01/21/87 General: *73.33 0.3 Recentification: 01/21/87 Recentification: 01/21/87 Recentification: 31.22 3.0 A Recentification: 01/21/87 Recentification: 31.22 3.0 Certification: 01/21/87 <t< th=""><th>cecial Qualifications in any:</th><th></th></t<>	cecial Qualifications in any:	
DUCATION: NAME YEARS DEGREE TRAINING (This method and level): tigh School 'ACC 'St. Mary's Univ. 2 MO Date Completed 1/26/84: 1/9/87 Asior Field of Study Account ing MO Date Completed 1/26/84: 1/9/87 Asior Field of Study Account ing Mo Mo Account ing Mo Mo Mo Mo Index employed by SwRI: 01/12/81 Previous NDE experience with is qualification): Mo The individual has been credited with 3 months Mo Mo VisUAL ACUITY AND COLOR PERCEPTION Mo Mo Mo Mo VisUAL ACUITY AND COLOR PERCEPTION Most Recent field by Mo Mo Mo 9/22/86 Corty Red. Notifier res //g Date Cort Red. Verified by 9/16/87 Yas Beedid Guitint res //g	EDUCATION, TRAINING, AND EXPERIENCE HISTORY	
Assessment 3 months CC.APANY FROM TO If experience in this examination m=thod on the date of certification: Note Note Note IOE methods lat least 25% was in this method). VISUAL ACUITY AND COLOR PERCEPTION Note Note VISUAL ACUITY AND COLOR PERCEPTION VISUAL ACUITY AND COLOR PERCEPTION Note Note VISUAL ACUITY AND COLOR PERCEPTION VISUAL ACUITY AND COLOR PERCEPTION Note Note VISUAL ACUITY AND COLOR PERCEPTION VISUAL ACUITY AND COLOR PERCEPTION Note Note International is capable of reading Jaeger Number 1 letters at 12 inched in at least one eye lusing corrective lenses if specified belowil, and tended definition and differentiate contrast between colors used in this method. Date Corr. Reg. Verified by 9/16/87 Yes Heidi Gutierrez //// Date Corr. Reg. Verified by 9/16/87 Yes Weight Initial Certification: 01/21/87 Date 01/21/87 General: *73.33 0.3 Recertification: 01/21/87 Date 01/21/87 General: *1/8/87 ; *#1/9/87 1.0 Recertification: 01/21/87 Recertification: <	Mason H.S. 4 GRAD Data Completing 1/26/84: 1/9/87	
The individual is capable of reading Jaeger Number 1 letters at 12 inched in at least one eve lusing corrective lenses if specified below), and can distinguish and differentiate contrast between colors used in this method. 9/ <u>22/86</u> Cort, Red. Verified by Date Corr. Red. Verified by 9/ <u>16/87</u> Yes Heidi Gutlerrez AAC Date Corr. Red. Verified by Date Corr. Red. Ver	The individual has been credited with3monthsCCLAPANYFROM	TO
9/22/86 Cort Hed. Heidi Gutierrez //G 9/16/87 Yes Heidi Gutierrez //G WOST RECENT EXAMINATION GRADES CERTIFICATION HISTORY: THIS LEVEL MOST RECENT EXAMINATION GRADES CERTIFICATION HISTORY: THIS LEVEL Scores WEIGHT Initial Certification: 04/03/84 General: *73.33 0.3 *80.00 0.3 Recertification: 01/21/87 Practical: *89.00 0.4 Recertification: 01/21/87 Practical: *1/8/87: *#1/9/87 Recertification:		below), and
SCORES WEIGHT DATE General: *73.33 0.3 Initial Certification: 02/03/84 Specific: *80.00 0.3 Recertification: 01/21/87 Practical: *89.00 0.4 Recertification: 01/21/87 Composite 81.33 1.0 Recertification: 01/21/87 Composite 81.33 1.0 Recertification: 01/21/87 Composite 81.33 1.0 Recertification: 01/21/87 Responsible Level III: 0.3 1.0 Recertification: 01/21/87 Responsible Level III: 0.3 1.0 Recertification: 01/21/87	9/22/86 Yes Heidi Gutierrez /10	
SCORES WEIGHT DATE General: *73.33 0.3 Initial Certification: 02/03/84 Specific: *80.00 0.3 Recertification: 01/21/87 Practical: *89.00 0.4 Recertification: 01/21/87 Composite 81.33 1.0 Recertification: 01/21/87 Composite 81.33 1.0 Recertification: 01/21/87 Composite 81.33 1.0 Recertification: 01/21/87 Responsible Level III: 0.3 1.0 Recertification: 01/21/87 Responsible Level III: 0.3 1.0 Recertification: 01/21/87		
Specific: 480,00 0.3 Recentification: Practical: ##89.00 0.4 Recentification: Composite 81.59 1.0 Recentification: Date: *1/8/87: *#1/9/87 Recentification:	SCORES WEIGHT DATE DATE 0./03/ *73.33 0.3 Initial Certification: 02/03/	84
Date:	Specific: #80,00 0.3 Recentification: Practical: #89,00 0.4 Recentification:	
z. a. Suescher	Date: <u>*1/8/87: **1/9/87</u> Recertification:	
DEMACAQ	a, a, Alescar	
	REMARKS	

STATEMENT	ESEARCH INSTITUTE TIVE EXAMINATION OF CERTIFICATION
The Director of the Department of Engineering Services. Nondestr Barbara A. Roberds is qualified as in Testing in accordance with the requirements of SwRI Nuclear Qua TC-1A, 1975 and 1980 Editions. Certification valid of Certification Limitations:	Level in
Special Qualifications lif anyl: None	
Expiration Der 106/27/89 Signed:	Cere: 4/27/86
	AND EXPERIENCE HISTORY
EDUCATION: NAME YEARS OF High School Mason High School 4 SAC; St.Mary's Univ. 2 Major Field of Study Accounting	CEGREE TRAINING (This method and level): GRAD Oste Completed 06/24/83; 06/11/86 NO Hours: 64; 20 Location:
Dete employed by SwRI: 01/12/81 The individual has been credited with 24 of experience in this examination method on the date of ce Some of the experience may have been accrued simultaneously in NDE methods (at less: 25% was in this method).	Previous NDE experience (if used for qualification): months NORE FROM TO FROM TO
	ND COLOR REPORTION
VISUAL ACUITY A	
The individual is cacable of reading Jaeger Number 1 letters at 12 can distinguish and differentiate contrast between colors used in the 10/21/85 Yes Heidi Gutierrez Au 9/22/86 Yes Heidi Gutierrez Au 9/16/87 Yes Heidi Gutierrez Au	Linches in at least one sive lusing corrective lenzes if specified below his method. Data Corr. Reg. Ventiled by
The individual is capable of reading Jaeger Number 1 letters at 12 can distinguish and differentiate contrast between colors used in the 10/21/85 Yes Heidi Gutierrez // 9/22/86 Yes Heidi Gutierrez // 9/16/87 Yes Heidi Gutierrez // MOST RECENT EXAMINATION GRADES SCORES WEIGHT	Dete Cart. Reg. Ventied by CERTIFICATION HISTORY: THIS LEVEL
The individual is capable of resound Jaeger Number 1 letters at 12 can distinguish and differentiate contrast between colors used in the second secon	Linches in at least one sive lusing corrective lenzes if specified below his method. Date Corr. Reg. Ventiled by CERTIFICATION HISTORY: THIS LEVEL Initial Certification: 07/13/83 05/27/35
The individual is capable of resound Jaeger Number 1 letters at 12 can distinguish and differentiate contrast between colors used in the 10/21/85 Yes Heidi Gutierrez & <u>9/22/86 Yes Heidi Gutierrez & 9/16/87 Yes Heidi Gutierrez & MOST RECENT EXAMINATION GRADES Scores WEIGHT * 91.11 0.3 General: * 73.99 0.3</u>	Linches in at least one sive lusing corrective lenzes if specified below this method. Deta Corr. Reg. Ventiled by CERTIFICATION HISTORY: THIS LEVEL OATE Initial Certification: Recertification: Recertification: Recertification:
The noividual is capable of reading Jaeger Number 1 letters at 12 can distinguish and differentiate contrast between colors used in the 10/21/85 Yes Heidi Gutierrez Adv 9/22/86 Yes Heidi Gutierrez Adv 9/16/87 Yes Heidi Gutierrez Adv MOST RECENT EXAMINATION GRADES Scores Weight * 91.11 0.3 General: * 73.99 0.3 Specific: * 73.99 0.3 Practical: **98.00 0.4 Composite	Linches in at least one sive lusing corrective lenzes if specified below his method. Date Corr. Reg. Ventiled by CERTIFICATION HISTORY: THIS LEVEL 0ATE Initial Certification: 07/13/83 Recentification: 06/27/36
The individual is capable of reading Jaeger Number 1 letters at 12 can distinguish and differentiate contrast between colors used in the 10/21/85 Yes Heidi Gutierrez & <u>9/22/86 Yes Heidi Gutierrez & 9/16/87 Yes Heidi Gutierrez & MOST RECENT EXAMINATION GRADES Scores WEIGHT * 91.11 0.3 General: * 73.99 0.3</u>	Linches in at least one sive lusing corrective lenzes if specified below his method. Dete Carr. Reg. Ventiled by CERTIFICATION HISTORY: THIS LEVEL Initial Certification: Recertification:
The individual is capable of reading Jaeger Number 1 letters at 12 can distinguish and differentiate contrast between colors used in the 10/21/85 Yes Heidi Gutierrez Adv 9/22/86 Yes Heidi Gutierrez Adv 9/16/87 Yes Heidi Gutierrez Adv MOST RECENT EXAMINATION GRADES Scores Weight + 91.11 0.3 General: + 73.99 0.3 Specific: + 73.99 0.3 Specific: + 73.99 0.3 Specific: + 898.00 0.4 Composite _ 88.73 1.0	Linches in at least one sive lusing corrective lenzes if specified below his method. Date Cart. Reg. Ventiled by CERTIFICATION HISTORY: THIS LEVEL OATE O7/13/83 05/27/35 Recertification: Re

SwRI Form QA-11-7

Testing in accordance with the requirements of SwRI Nuclear Quaith TC-14, 1975 and 1980 Editions. Certification Limitations: <u>Certification valid only</u>	tive Evaluation Science and Technology Division, certifies that vel II in <u>Magnetic Particle</u> v Assurance Procedure 11-1, which incorporates the guidelines of SNT-
Special Qualifications (if any): Note	v while employed by SwRI
Expiration Date: 02/15/91	
Signes: Maly C. Galleden for DFR Director Department of Engineering Services	Date: 15 Feb 38
	AND EXPERIENCE HISTORY
EDUCATION: NAME YEARS DEG High School John Jay H.S.(TX) 4 GRA Additional: Hallmark Aero 1 A&S Major Field of StudyAlrframe & Power Plant	Date Completed
Date employed by SwRI: 05/16/83 The individual has been credited with 3 of experience in this examination method on the date of certification of the experience may have been accru.d simultaneously with DE methods (at least 25% was in this method).	ication. None
VISUAL ACUITY AND	D COLOR PERCEPTION
08721/34 ^{Corr} No. Betty Aldridge 7 ^M 07/29/36 No. Betty Aldridge 7 ^M	C-POILS FOR NOR BELLY AVERFILLE
MOST RECENT EXAMINATION GRADES	CERTIFICATION HISTORY: THIS LEVEL
SCORES WEIGHT General: 96.7 0.3 Specific: 95.0 0.3 Practical: 90.0 0.4 Composite 93.51 1.0 Cate: 02/15/88 2/15/88 Responsible Level III: Practical: 3/15*/95*	DATE Initial Certification: Recertification: Recertification: Recertification: Recertification: Recertification: Recertification: Recertification:
P. H. Russman	Recentification:
	MARKS

R NONDESTRUC	RESEARCH INSTITUTE CTIVE EXAMINATION OF CERTIFICATION
The Director of the Department of Engineering Services, Nondestr Lyle D. Spiess is qualified as Testing in accordance with the requirements of SwRI Nuclear Qua TC-1A 1975 and 1980 Editions. Certification Umitations: <u>Certification valid on</u>	Lever in Liquid Penetrant anty Assurance Procedure 11-1, which incorporates the guidelines of S?
Scecial Qualifications (if any): None	
Expiration Date Signed: Director Desertment of Engineering Services	2 DK = 15 Feb 88
	AND EXPERIENCE HISTORY
Additional: Major Field of Study Additional: Major Field of Study	
he individual has been credited with4 f expenience in this examination method on the date of cer ome of the experience may have been accrued simultaneously w IDE methods (at least 25% was in this method).	with other
VISUAL ACUITY A	ND COLOR PERCEPTION
Ar distinguish and differentiate cont ast between colors used in th Oate Corr Reg. Venfied by 4 08/21/84 No Betty Aldridge // 07/22/85 No Betty Aldridge //	Date Corr. Reg. Ventied by ph 07/01/07 No Besty Aldridge
MOST RECENT EXAMINATION GRADES	CERTIFICATION HISTORY THIS LEVEL
SCORES WEIGHT 33.4 0.3 Severifie: 20.0 0.3	DATE Initial Certification: 02/11/85 Recertification: 02/15/88 Recertification: 02/15/88
90.0 0.4 composite 91.02 1.0 care: 02/15/38 02/15/38 tesponsible Level III: Second and a conclusion of the conclusion of	Recercification:

Expiration Date: A/19/91 Signed: Director. Department of Engineering Services EDUCATION: NAME YEARS DEGREE High School John Jay HS (TX) 4 GBAD	n Ultrasonic ce Procedure 11-1, which incorporates the guidelines of SNT- employed by SWRI Date: <u>1-19-88</u>
Expiration Date: AV19/91 Signed:	ERIENCE HISTORY
Director Department of Engineering Services EDUCATION: NAME YEARS DEGREE High School John Jay HS (TX) 4 GRAD	ERIENCE HISTORY
EDUCATION: TRAINING, AND EXP EDUCATION: NAME YEARS DEGREE High School John Jay HS (TX) 4 GRAD	
EDUCATION: NAME YEARS DEGREE	
Additional: Hallmark Aero <u>l</u> <u>A&P</u> Major Fielu of Study <u>Airframe & Power Plant</u>	Date Completed 2/25/85; 1/13/88 Hours: 60; 11 Location: SURT
Date employed by SwRI: $5/16/83$ The individual has been credited with 22 months of experience in this examination method on the date of certification. Some of the experience may have been accrued simultaneously with other VDE methods (at least 25% was in this method).	Previous NDE experience lif used for qualification): COMPANY FROM TO None
VISUAL ACUITY AND COLOR	PERCEPTION
The individual is capable of reading Jaeger Number 1 letters at 12 inches in a can distinguish and differentiate contrast between colors used in this method.	
MOST RECENT EXAMINATION GRADES	CERTIFICATION HISTORY: THIS LEVEL
SCORES WEIGHT General: 93.02 0.3 Specific: 98.00 0.3 Practical: 100.00 0.4 Composite 97.31 1.0 Cate: 1/19/88 Recent	DATE Certification: 4/9/85 tification: 1/19/88 tification:
E.H. Ruescher	tification:
REMARKS	

APPENDIX G

MATERIAL AND EQUIPMENT CERTIFICATIONS

APPENDIX G

~

Dago

1

R

-

Data

MATERIAL AND EQUIPMENT CERTIFICATIONS

Table of Conter in

MATERIAL

ł

۱

.....

Type		Date	Page
Pencils, Berol, Prismacolor White #938	Log #2337B	03 Mar 88	G-1
Glycerine, Lot #TA861201, Log #2444		13 Aug 87	G-2
Sonotrace 40, Batch #8767, Log #2453		29 Jun 87	G-3
Magnaflux No. 1 Gray Powder, Batch #84L022, Log #1918B		18 Nov 84	G-4
Magnaflux 8A Red Powder, Batch #84F012, Log #1921A		14 Jun 84	G-5
Magnaflux 8A Red Powder, Batch #85H	'006, Log #2053A	03 Jul 85	G-6
Magnaflux 14AM Prepared Bath, Batch	#87D051, Log #2450B	29 Apr 87	G-7
Magnaflux Spotcheck Cleansr/Removes	r, SKC-S, Batch #897H067,		
Log #2471		28 Aug 87	G-8
Magnaflux Spotcheck Developer, SKD-S	5, Batch #87F047,		
Log #2450A		17 Jun 87	G-9
Magnaflux Spotcheck Penetrant, SKL-H	IF/S, Batch #84L058,		
Log #1955C		26 Dec 84	G-10
EQUIPMENT			
Brand	Serial No.	Date	Page
Dayton Quick-Ten.» Pyrometer	086	15 Jan 88	G-11

Dayton Quick-Ten." Pyrometer	086	15 Jan 88	G-11
Amprobe Fastemp Pyrometer	120	11 Jan 88	G-13
Amprobe Fastemp Pyrometer	133	15 Jan 88	G-15
Amprobe Fastemp Pyrometer	158	15 Jan 88	G-17
Blak-Ray J-221 Longwave			
Ultraviolet Intensity Meter	26059	26 Oct 87	G-19
Magnetic Particle Weight Calibration			
Block, 11.3 lbs.	B-170198-11,-23	17 Mar 81	G-21
Electromagnetic Particle Yoke, Whiteline	WL-1-10	17 Dec 87	G-25
E.ectromagnetic Particle Yoke, Whiteline	WL-1-11	17 Dec 87	G-26
Electromagaetic Particle Yoke, Whiteline	WL-1-12	20 Jul 87	G-27
Sonic FTS MK I	01111E	02 Feb 88	G-29
Sonic FTS MK I	01116E	04 Sep 87	G-31
Sonie FTS MK I	01121E	21 Dec 87	G-33
Sonie FTS MK I	774226	19 Nov 87	G-35

APPENDIX G

2

-

٢

100

MATERIAL AND EQUIPMENT CERTIFICATIONS

Table of Contents (Cont'd)

TRANSDUCERS

6

0

4

Brand	Serial No.	Date	Page
Aerotech	C01485	13 Jan 88	G-37
Aerotech	JD1760	15 Jan 88	G-38
Aerotech	O13718	14 Sep 87	G-39
SwRI	685M	27 Oct 87	G-41
SwRI	1795	22 Jan 88	G-43
SwRI	1800	15 Jan 87	G-45
SwRI	2158	23 Sep 87	G-47
SwRI	2680	24 Nov 87	G-49
SwRI	2831	08 Jan 88	G-51
SwRI	KB4	07 Jan 88	G-52

1

March 3, 1988

Mr. J.H. Wilson Quality Assurance Systems & Engineering Southwest Research Institute 6220 CuleFra Road San Antonio, TX 78238

Dear Siri

The analysis that you requested on two marking pencils has been completed. The results are as follows:

Code	(ASTM D-129)	Chlorine, % wt. (ASTM D-808)
Berol Prismacolor Black 935	0.00 4 0.00	0.02 & 0.02
Berol Prismacolor White 938	0.05 6 0.04	0.06 & 0.06

If you have any questions concerning these test results, please contact me.

Sincerely,

Rock a Banen

Ralph W. Bowen, Principal Scientist Petroleum Products Research Dept. Automotive Products & Emissions Res.

SwRI	
2. 0	27396
P. S.	374192
100	11210



yge

POST OFFICE DRAWER 28812 + 6220 CULEBRA ROAD + SAN ANTONIO. TEXAS, USE 14284 + 8121 484 5111 + TELEX 244848

Augus: 13, 1987

Mr. J.H. Wilson Quality Assurance Systems & Engineering Southwest Research Institute 6220 Culebra Road San Antonio, TX 78238

Dear Sir:

The chemical analysis that you requested on one sample of Glycerine has been completed. The results are as follows:

Code	Log 2444 Lot # TA861201 Run #1 Run #2	
	Run #1	Run #2
Sulfur, % wt. (ASTM D-129)	0.03	0.00
Chlorine, % wt. (ASTM D-808)	0.00	0.00

If you have any question concerning these test results, please contact me.

Sincerely,

Villa Com

Ralph W. Bowen, Principal Scientist Petroleum Products Research Dept. Automotive Products & Emissions Res.

ygc

CC: S. Heller

Swill.	a setting
2. 8.	31598
7. 1.	374921
100 .	2444

SAN ANTONIO. TEXAS DALLAS TEXAS+DETROIT MICHIGAN+HOUSTON TEXAS+WASHINDTON 20 SRANCH OFFICES: Chicago, Illinois Philadeichia, Penneyivania

International Testing Laboratories, Inc. Maisnal John and Conciling Engineers Weighers, Samplers and Assayers 578-582 MARKET STREET NEWARK. N. J. 07105 2+2 * ASCTIN: 1172.

*nins: 139147

REPORT OF TEST

No. \$29146

DATE June 29, 1987

From Echo Ultrasound R.D. 4, Box 76 Lewistown, Penn. 17044

Sample of : Sonotrace 40

Marked : Batch No. 8767 Spec. ASTM-D-129 and D-808 Purchase Order No. 22515-DAL

Results :

Halogens	:	31.6	nnn
Sulphur	:	3.2	חקק

I, David N. Hoffman, do hereby certify that the above is true and correct.

Sag1		
P. 0.,	35618	
P. B.,	374435	
105	2456	1

IN Rotary Public Connission expires August 13, 1982

Ta

Echo Ultrasound Lewistown, Penn.

The liability of the international Taxing Laboratories, loswith respect to the service charges for howas, shall is no reast shows the same of the investor. Our respect permaints of the respin tonal only. Information manuales hereas is not to be represented same with our INTERNATIONAL TESTING LABORATORIES. INC.

Sworn to and subscribed before me this 29th day of June,10

Donal 1 House

MAGNAFLUX Corporation 1300 West Lawrence Avenue Chicago IL 60656 Telephone 312-661-8000

MAGNAFLUX Date: November 13, 1984 TOI Purchase Order No. _ We hereby certify that the Magnetic Particle Inspection Material type _, Batch No. 841022 No. 1 Gray Powder meets the requirements of the following specifications: A. ASME Boiler and Pressure Vessel Code, Section V, 1980 Edition, Nondestructive Examination, with Summer 1980 through Winter 1982 Addenda. Paragraph T-753 (a) and Article 25 as applicable. B. ASME Boiler and Pressure Vessel Code, Section V, 1983 Edition, Nondestructive Examination, with Addenda through Winter, 1983, Paragraphs T-723, T-728(a) and Article 25. C. ASTM E 709-80, Paragraphs 5.1, 6.2, and 6.3. D. NAVSEA 250-1500-1, Rev. 10 June 1979 and Rev. 11, May 1983. Paragraph 12.4.1.5. E. MIL-1-6868E, 27 February 1975, Paragraphs 5.1, 5.2 and 5.3. F. MIL-STD-271E(SHIPS), ACN-1, 24 October 1980, Paragraphe 4.2.8, 4.3.2.3, and 4.3.3.1. G. MIL-STD-271E(SHIPS), NTR-1E, 16 June 1978, Paragraph 4.3.2.3. H. MIL-STD-2132(SH), 16 January, 1981, Faragraph 4.2.1.3 and Appendix A. Paragragh 50.4. We further certify that this material does not contain mercury as a basic element and no mercury bearing equipment was used in its manufacture. Baten numbers appear on labels of bulk containers.

2x81 2. 0. 44630 2. 8. <u>273765</u> 203 <u>1918 B</u>

GEO manhacional Corporation

۱

e de

.

MAGNAFLUX CORPORATION

J. Butta U

A. S. Britton - Manager, Chemical Quality Control W. G. Blankenship - Director of Quality Assurance

Form No. 1565A R-7/84

HARARUN CONSERVE TES ANTICIANS ANTIC CONSERVES ANTICIA

MAGNAFLUX

Date: June 14, 1984

TC:

Purchase Order No. ____

We hereby certify that the Magnetic Particle Inspection Material type

meets the requirements of the following specifications:

- A. ASME Boiler and Pressure Vessel Code, Section V, 1980 Edition, Nondestructive Examination, with Summer 1980 through Winter 1982 Addenda, Paragraph T-753 (a) and Article 25 as applicable.
- B. ASME Boiler and Pressure Vessel Code, Section V, 1983 Edition, Nondestructive Examination, with Addenda through Winter, 1983, Paragraphs 7-723, T-725(a) and Article 25.
- C. ASTM E 709-30, Paragraphs 6.1, 6.2, and 6.3.
- C. NAVSEA 250-1500-1, Rev. 10 June 1979, Paragraph 12.4.1.6.
- E. MRL-1-6368E, 27 February 1976, Paragraphs 5.1. 5.2 and 3.3.
- F. MIL-STD-27:EISHIPS: ACN-1, 24 October 1911. Paragraphs 4.2.6, 4.3.2.3, and 4.3.3.1.
- G. MEL-STD-2718(SHIPS), NTR-18, 16 June 1973, Paragraph 4.3.2.3.
- H. MIL-STD-213013HI, 16 January, 1931, Paragraph S.G.I.J and Appendix A, Paragragh 2014.

We further certify that this material does not contain mercury as a basic element and numercury bearing equipment was used in its manufacture.

Batch numbers appear on labels of bulk containers.

2421	124124
5,0,,	777775
24 24	1001 1

MAGNAFLUX CORFORATION

1 Bitta

A. S. Britten - Hanager, Chemica, Quauty Control P. C. Blankimship - Director of Quality Hesurance

Form No. 1967A R-2/24

GEC international Corp. 18:15

1/17	GNAFLUX	
		Date: July 3,1985
TOI		
	Order No.	
	y certify that the Magnetic Pa A Red Powder	rticle Inspection Material type
the second secon	e requirements of the following	
	ASUE Boiler and Pressure Ver	stel Code, Section V, 1980 Edition. with Summer 1980 through Winter 1982 Addends.
з.	ASME Boiler and Pressure Ver	usel Code, Section V, 1983 Edition. with Addenda through Winter, 1984.
	ASTM E 109-80, Faragraphs 6	.1, 6.2, and 8.3.
D.	NAVSEA 250-1500-1, Rev. 10 Paragraph 12.4.1.8.	June 1979 and Rev. 11, May 1983,
	MIL-1-6868E, 27 February 197	6. Paragraphs 5.1, 5.2 and 5.3.
ξ.	MIL-STD-271E(SHIPS), ACN-1 and 4.3.3.1.	., 24 October 1980, Paragrapha 4.2.8, 4.3.2.3,
G.		12, 16 June 1978, Paragraph 4.3.2.3.
н.	MIL-STD-2132(SH), 16 Januar Paragyagh 50.4.	y, 1981, Paragraph 4.2.1.3 and Appendix
We Jurth mercury	er certify that this material do bearing equipment was used in	es not contain mercury as a basic element and no its manufacture.
Batch nu	mbers appear on labels of bulk	containers.
		MAGNAFLUX CORPORATION
		AI Bitt
	1441	A. S. Britton - Manager, Quality Control
	1.2 55934	W. G. Blankenship - Director of Quality Assurance
	3. 2. 323828 100 2053A	Form No. 1565A R-8/85
	No. 4 Concernational Address of the second s	

	Date: April 29, 1987
TO:	
Purchase Order No.	
We hereby certify that the Magnetic Particle 142M Prenared Bath Bat	e Inspection Material type teh No. 87D051
meets the requirements of the following spec	ifications:
A. ASME Boiler and Pressure Vessel C Nondestructive Sxamination, Parag as applicable.	Code, Section V, 1986 Edition, Traphs T-723, T-728(b) and Article 25
B. ASTM E 709-30, Paragraphs 8.1, 8.1	2, 6.4, 6.4.2, 6.4.4.2 and 6.4.5.1.
C. MIL-STD-1949, 1 August, 1985. Par	agraphs 4.10.1, 4.10.1.2 and 4.10.2
D. MIL-STD-271E(SHIPS), NTR-1E, 16	June 1978, Paragraph 4.3.2.3.
E. ML-STD-2132A(SH), 10 September 6.2.2.5, 6.2.2.8, and 8.2.2.7.	1984, Paragraph 6.2.1.3, 6.2.2.3, 6.2.2.4,
F. The flash point of the material is on Pensky-Marten's Closed Cup Method	d (ASTM D-93).
G. The vehicle meets the requirements Ammendment 2, 21 January 1986.	of DOD-F-87935, 21 January 1988 and
We further certify that this material does not mercury bearing equipment was used in its ma	contain mercury as a basic element and r nufacture.
Baton numbers appear on labels of bulk contain	ners and on the bottom of aerosol cans.
	NAFLEX CORPORATION
2. 3. 35689	A) Bit

MAGNAFLUX Corporat - 1300 West Lawrence Avenue Chicago' IL F***6 Telephone 312-867-8000 MAGNAFLUX Sata: August 28. 1987 Purchase Order No. subject Spotcheck Cleaner/Remover type: SKC-S Batch No. \$7H067 We hereby certify that when tested at the time of manufacture, the above material: 1. Meets the requirements of and has been tested for sulfur and halogens according to: (a) ASME Boiler and Pressure Versel Code, 1983 Edition, Section V, Nondestructive Examination, including all Addenda through Winter 1983 Addendum, Paragraph 7-623 and Article 24 as applicable. (b) ASNE Soiler and Pressure Vessel Code, 1986 Edition, Section V, Nondestructive Examination, Paragraph T-625 and Article 24 as applicable. (c) ASTN 2-165-80, Paragraph 7.1. (d) NAVSEA 250-1500-1 (Rev. 10 June 1979 and Rev. 11 May 1983) Paragraphs 12.5.1.1 and 12.5.1.1.1. (e) MIL-STD-2718, (31 October 1973) and ACN-1 (24 October 1980). Paragraph 5.3.1. (f) MIL-STD-271E, NTR-1E, June 16, 1978, Paragraph 5.3. (c) MIL-STD-2132 (SH), 16 January, 1981, Paragraphs 5.1.2, 5.1.3 and 5.1.4 or 5.1.5 and Appendix B, Paragraph 30. (h) ADT Standard F3-67, May 1974 and October 1975 including Amendments 1 (4-6-76) and 2 (2-9-78). Article 6, Paragraph T-30. (1) General Electric P.F. 9000, Rev. 1 (2-21-40) Paragraphs 2.3 and 2.4. wt. 1 of residue Cleaner residue (see Note 1) 0.0014 ______ 2/100g. 0.0011 ______ 2/100 ml. 2. We further certify that this material down not contain mercury as a basic element, and no mercury bearing component was used in its manufacture. MAGNAFLUX CORFORATION Sail 41095 9.0 785 2. 3 247 CABUTANCE. 200 Plamoottil . Quality Control Chemist NOTES:
 1. Our batch number appears on the bottom of all spray containers and on the label of all other containers.
 2. Most specifications require test results stated in percent but some require parts per million (PFM). To convert "percent" figures to "parts per allion" more the decimal FDM (PFM). To convert "percent" figures to "parts per allion" more the decimal FDM (PFM).
 3. NANEA SD-1800-1, MIL-STD-171, MIL-STD-112, ROT FJ-6T and ASME Section V all require that materials be subject to a procedure to evaporate off volatile solvents before analysis for sulfur and helpgen. According to these specifications, only those results shall be reported.
 4. The above certification gives the results obtained at the time of manufacture. Age and use may alter the properties of any material. Porm No. 1549 8-1/87

Charlon all and the charlon the second and the second and

MAGNAFLUX	June	17.	19.8*

PUTCARSE	Groet No.		***			
	Spotchetk	Developer	Type:	580-2	Batch No.	877047

We hereby certify that when tested at the time of manufacture, the showe material:

1. Meets the requifements of and has been tested for sulfur and halogens according to:

- (a) ASME Boiler and Pressure Vessel Code, 1983 Edition, Section V, Nondestructive Examination, including all Addenda through Winter 1983 Addendum, Paragraph 7-625 and Article 24 as applicable.
- (b) "ASMS Boiler and Pressure Vessel Code, 1988 Edition. Section V, Nondestructive Examination, Parsgraph 7-625 and Article 14 as applicable.
- (c) ASTN E-185-80, Paragraph 7.1.
- (d) NAVSEA 250-1800-1 (Rev. 10 June 1979 and Rev. 11 May 1983) Paragraphs 12.8.1.1 and 12.8.1.1.1.
- (e) MIL-STD-1718, (31 October 1973) and ACN-1 (34 October 1980), Paragraph 3.3.1.
- (f) MIL-STD-271E, NTR-1E, June 16, 1978, Paragraph 5.3.
- (g) MIL-STD-2132 (SH), 16 January, 1911, Paragraphs 5.1.2, 5.1.3 and 5.1.4 or 5.1.5 and Appendix B, Paragraph 30.
- (h) RDT Standard 95-57. Way 1974 and October 1975 including Amendments 1 (4-6-76) and 2 (2-9-78), Article 6, Paragraph 7-30.
- (1) General Electric P.S. 9000, Rev. 2 (2:11:40) Paragraphs 2.3 and 2.4."

the following test results were obtained:

2422

123

Cleaner residue (see Note 2)- SIA g/100 ml.

we further certify that this material does not contain mercury as a basic element, and no nercury basing anuiragor was used in its manufacture.

MAGNAFLUX CORFORATION 2. 0. 35699

2. 2. 374429 had some 12.5.2.6.8. 111111111 2450A Plassottil . Quality Control Clienist

NOTES:

 Our batch number appears on the bottom of all spray containers and on the label of all other containers.
 Most specifications require test results systed in percent but some require parts per allion (PPM). To convert "percent" figures to "perts per allion" more the decimal four places to the right.
 NAVSEA 150-1500-1. WILSTD-171. WILSTD-1121. RDT 91-87 and ASME Section V all require that materials be subject to a procedure to exporting to these solutions, only those rescues higher than 0.005 glob g shall be analyted for sulfur and halographic properties.
 The above certification gives the results obtained at the time of manufacture. Age and use may alter the properties of any paterial.

Form the. 1248 8-1.17

N	MAGNAFLUX	
		Date: December 26, 1984
		53808
		1. 8. 37384/
	e Order No.	103 1035C
STATIST	Spotcheck Penetrant , Type: SKL-	RF/S
	by cartify that when tasted at the time of samu	facture, the above material:
	is the requirements of and has been tested for su	ifur and halogens according to:
(*)	ASHE Boiler and Pressure Vessel Code, 1980 Edit Estamination, with Summer 1980 through Winter 19 Article 14 as applicable.	tion, Section V, Nondestructive 82 Addenda, Paragraph 7-644, and
(3)	ASME Boiler and Pressure Vessel Code, 1983 Edi Examination, including all Addenda through Wint and Article 14 as applicable.	tion, Soction V. Nondestructive mer 1983 Addandum, Paragraph 7-625
	ASTN 8-165-40, Paragraph 7.1. MIL-STD-1718, (31 Getober 1973) and ACM-1 (24 G	
	MIL-STD-171E, MTR-LE, June 15, 1978, Paragraph	
(#)	MIL-STD-2132 (SR), 16 January, 1981, Paragraphs and Appendix 3, Paragraph 10.	5.1.2, 5.1.3 and 5.1.4 or 5.1.5
(g)	ADT Standard F3-47, May 1974 and October 1975 : and 2 (2-9-75), Article 6, Paragrapa 7-10.	including Amendments 1 (4-6-76)
The fol	liowing test results were obtained:	
Sulf	fur: 0.0110 wt. 1 of residue. Halogen:	NA we. 1 of residue
	amer residue (see Note 1) \$/100	£/100 BL.
	ts the requirements of MIL-1-15135C (Amendment 3	
	a not contain serviry as a basic element, and to its samufacture.	
	HARTAFLER CORPORATE	
	6.1.0	atte
		ager, Chemical Quality Control
	1. Our batch number appears on the bottom of a line of all other containers.	11 spray containers and on the
	 Most specifications require test results st. require parts per million (FPM). To conver 	t "percent" figures to "parts
	per million" nove the decimal four plates t 1. Mil-STD-171, Mil-STD-1132, MDT 93-67 and AD	o the right. ME Section 7 all require that
	satarials be subject to a procedure to evan before unalreis for sulfur and halogen. Ac	orate off volatile solvents cording to these
	specifications, only those residues higher mainted for sulfur the talogen. Lover res	Lauss shall be reported.
	 The above certification gives the results o samufacture. Age and use may alter the pro 	
		Form No. 1368 + Lav. 5/34

Y

4

.

.

9



SOUTHWEST KESEARCH INSTITUTE

Calibration Record

ITEM Dayton, Quick Temp	SOURCE DIV 17
MODEL 33666 SIN 320270	SWRINO
PLUG-INS. ETC. Prober 036	
	and the second

		STANDA	RDS		
Slandard No.	MFOR Model	Description	\$/N	Cal. Due	Cal Rec No.
	Taylor (18-89-+)	Thermometer	6315576	2-11-89	02148
	Taylor (77-131"		6412821	4.3-39	02247

ENVIRONMENT: Temperature 740 Humidity 35% Location getter T. Bldg. 68. SvRI

PROCEDURE

Essentially as outlined in MFGRS Service Manual _____

3 SvRI Nuclear Projects Operating Procedures XII-AG-105-2

CONCLUSION

Item within tolerance. No adjustment was necessary.

C liem ADJ repaired to tolerance

RECORD

3 Item within limits of above procedure, see data sheet

Calibration was in accord with requirements of MIL-STD-45662, MIL-Q-9858 and MIL-C-45208. Measurements are traceable to the National Bureau of Standards. Inspection and test data are on (ile and available for inspection.

		SIGNED	allow / Proverse	Florence
		DATE	15 JAN	58
NUMBER:	02224			15 522 88

UBJECT Calibration St. 4. 5X600 OSC S/N 220270	DATE 15 JAN 88 BY R Plann
Checked only on high range at p	oints indicated below:
53666, Quick-temp Reading	Standard Indication
47 ·F	450°F
106°7	10700
1204	121.0 7
Indication at Room Temperature	after 1 hour Stabilization period:
······································	· · · · · · · · · · · · · · · · · · ·
Dayton Quick Temp	Standard
~ 4'0/=	72.2%
No	and the second
the second state and an or maked the second	
an employed a second annual second	
management of the work of antipart of	
the second	
an interaction of the second second second second	
	PC-4
and all the second s	and the second s

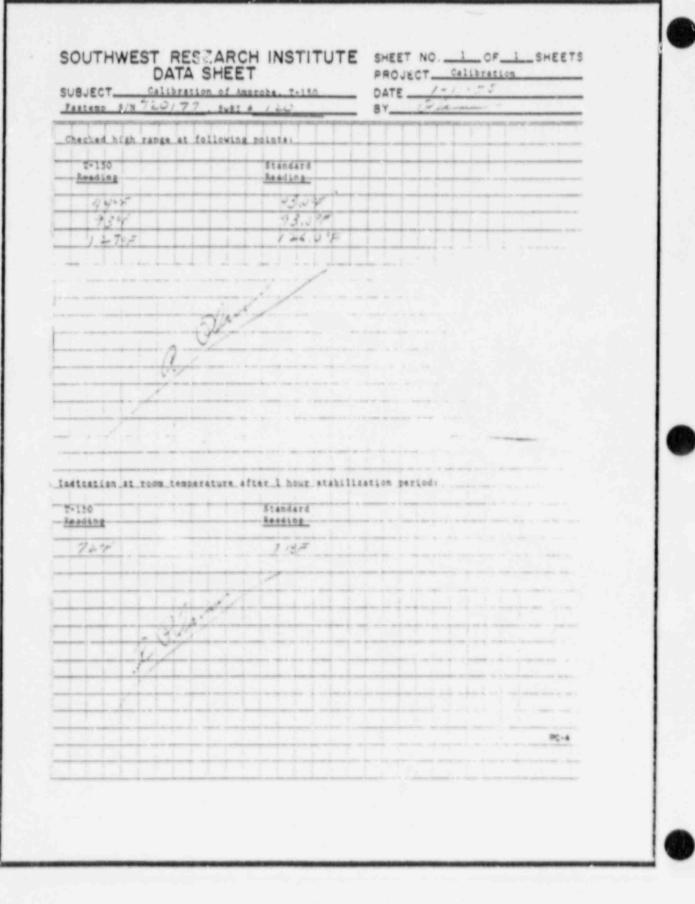


SOUTHWEST RESEARCH INSTITUTE

Calibration Record

the second se	50 S/N			SOURCE	
L IG-INS, ETC	Probe #	120			
HEGRE TOLER	ANCE WITHW	3 . F of STAN	PARD IN SILAT	Tan	
		STANDA	RDS		
Standard No.	MFGR Model	Description	\$/N	Cal. Due	al. Rec. No.
	Taylor (18-89-5)	Thermometer	6385516	2-11-84	02/98
	Taylor(1)-131"	Thermometer	44#2821	4-3-17	022477
ENVIRO	NMENT: Tempera	1410 72 Room All	92 Hun	nidiry <u>LS %</u>	,
ENVIRO	NMENT: Temperat	Arean All	≁ Hum ldg. 68, SwRI	nidiry <u> </u>	,
ENVIRO	NMENT: Temperal Location	PROCED		sidiry <u> </u>	,
	NMENT: Temperal Location tially as outlined in M	PROCED	URE	nidiry <u>259</u> ,	,
C Essen		PROCED FGRS Service Man			,
C Essen	tially as outlined in M	PROCED FGRS Service Man			,
C Essen	tially as outlined in M	PROCED FGRS Service Man			,
C Essen	tially as outlined in M	PROCED FGRS Service Man			
C Essen	tially as outlined in M	PROCED FORS Service Mani cts Operating	URE .ai Procedure_XII-		
□ Essen ⊄ _ <u>Svi</u>	tiaily as outlined in M I Nuclear Projei	PROCED FORS Service Mani tts Operating) CONCLU	URE ai Procedure XII- SION		
C Essen CX _Svi	tially as outlined in M	PROCED FORS Service Mani the Operating CONCLU djustment was nece	URE ai Procedure XII- SION		,

RECORD NUMBER: 03570 NEXT CALIBRATION DUE: 7-0170





SOUTH WEST RESEARCH INSTITUTE

Calibration Record

MODEL T-150 S/N 510675	5	SOURCE	
PLUG-INS. ETC. Prote # 133		5 W KI NO	
MEGRE TOLERANCE WITH 3. F of	TAWARD IN D'24	nen	
the second se	DARDS		
Standard No. MFGR Model Description Taylor (18-89-9) Thermomete		Cal. Due	Cal. Rec. No.
Taylor (15-39-5) Thermomete	E 63F5516	2-11-19	02191
Taylor (77-131") The rmome to	x 64#2821	4-3-19	0224
	7407 4	35%	
ENVIRONMENT: Temperature	7 Bldg. 68. Sw81	midity	-
	CEDURE		
Essentially as outlined in MFGRS Service			
CE _ SWRI Muclear Projects Operati	ug Procedure XII	*46+105+2	
CON	CLUSION		
Item within tolerance. No adjustment was	necessary.		
Item ADJ/repaired to tolerance			
T Item within limits of above p	rocedure, see da	ta sheet.	
	III STD AMAS MIL	O-9858 and MIL	-C-45208. M
Calibration was in accord with requirements of 1 surements are traceable to the National Bureau of St for inspection.	endards. Inspection an	d test data are on I	
surements are traceable to the National Bureau of St	endards. Inspection an	d test data are on I	
surements are traceable to the National Bureau of St for inspection.	endards. Inspection an	d test data are on I	
surements are traceable to the National Bureau of St		diesi data are on l <u>Lange</u> P. 5 JAN 18 8	lan-

SUBJECT Calibrat		PROJECT DATE BY	r y	
checked high range at	following points:			
T-150 <u>Reading</u>	Standard <u>Reading</u>			
44 05	11.84		and the second second second	
24.17	94040		ningeneral second	
126.07	123.0%			
T-150 Reading	ereture efter 1 hour stabili Standard Reading	ation period:		
7-150	Standard	ation period:		
T-150 Reading	Standard <u>Rosding</u> 72 246			
T-150 Reading 7245	Standard Reading 74 244			
T-150 Reading	Standard Reading 74 2-4			
T-150 Reading 7245	Standard <u>Ressing</u> 72 2 4			
T-150 Reading 7245	Standard <u>Ressing</u> 72 2 4			
T-150 Reading 7245	Standard Reading 72 242			
T-150 Reading 7245	Standard <u>Rending</u> 72			
T-150 Reading 7245	Standard Reading 74 2-4			



SOUTHWEST RESEARCH INSTITUTE

Calibration Record

ITEM Amprobe, 1	Fastemp	SOURCE _DIV 17
MODEL		SWRINO/58
MEGRS TOLERANCE	WITHIN 3" F of STANDARD	IN SIGAMON

STANDARDS

Standard No.	MFOR Model	Description	5/N	Cal. Due	Cal. Rec. No
	Taylor (18-89-1)	Thermometer	63#5516	2-11-29	02198
	Taylor (77:131")	Thermometer	48#2821	4-3-19	02247

Humidity 75 00 ENVIRONMENT: Temperature Avan All Location Prover TT. Bldg 68. Sw21

PROCEDURE

C Essentially as outlined in MFGRS Service Manual ...

J SvRI Nuclear Projects Operating Procedure III-AG-105-1

CONCLUSION

C Item within tolerance. No adjustr.ent was necessary.

Item ADJ/repaired to tolerance _

Item within limits of above procedure, see data sheet.

Calibration was in accord with requirements of MIL-STD-45662, MIL-Q-9858 and MIL-C-45208. Measurements are traceable to the National Bureau of Standards. Inspection and test data are on file and available for inspection.

SIGNED Quitte Que DATE ISH JAN 88 03196 NEXT CALIBRATION DUE STE JUL 88 RECORD NUMBER: .

JBJECT Calibratio	SHEET	DATE FATE JAN 88 BY REFERENCE	_
Necked high range at fo	Ilowing points,		1997 - 14 - 1
T-150 Reading	Standard Reading		
47.7	45,0%		
120%	N2.09 121.09		
e de ade ade adaméntos (°) - Sana error de acesar en classes		and a second sec	
and the second s			
the charge a second sec	and the second restriction in a loss of		
	and the second		
	1999 - Barris Marine, 1999 - 1		
natcation at room temper	acure after 1 hour erabili	Lastion period:	
	Standard	Lastion pariod:	
ndication at room temper T-130 Reading	Standard Reading	Lastion pariod:	
5-130	Standard	Lation pariod:	
T-130 Reading	Standard Reading	Lation parlod:	
E-130 Reading 	Standard Reading		
T-130 Reading	Standard Reading	Lation parlod:	
E-130 Reading 	Standard Reading		

ULTRAVIOLET RADIOMETER

TEST REPORT NUMBER: 873621 DATE: OCTOBER 26, 1987 INSTRUMENT: UVP J-221, S/N 26059 INSTRUMENT OWNER: SWRI

CONTRACTOR OF CONTRACTOR OF CONTRACTOR AND CONTRACTOR A

SUMMARY OF INSTRUMENT MEASUREMENTS

TEMPERATURE: 74 F.

HUMIDITY: 52%

STANDAR INSTRUME READING	NT		TER UNDER E-CALIBRAT READING		METER UNDER TEST CALIBRATION READING	
300 720 1,100	4 4 4		1,200 1,200 1,200 1,200			
1.100	00 88 03		1,400 5,400 4,000*			
	*****	******		*********	**********************	***
300					380	
1,100	4				1.100	
1-100	8			$\gamma_{1}^{-} = -8^{-1}$	1.120	
5.205	8				4:450	
LOWER B	OUND O	N CALIBI N CALIBI	RATION 15 4 RATION 15 4 TROLINE 055	COD MICROWA	ATTS / SQUARE CENTIMETER TS / SQUARE CENTIMETER TTS / SQUARE CENTIMETER 34441/34427 5 2311291	•••

A REAL PROPERTY AND A REAL

AIP, INC.

0.8 8384 HOLSTON TO RHONE (713) 522-3762

EVALUATION OF PERFIX MANCE CHARACTERISTICS

OF AN ULTRAVIOLET RADIOMETER

STATEMENT OF CERTIFICATION

THE UNDERS, THED REPECT COES CERTURY THAT THE INSTRUMENT DESCRIBED HA. HAU ITS REPROFIANCE EVALUATED ACCORDING TO THE REPORTANCE ACCORDING TO THE REPORTANCE. THE REPORTANCE CHARACTERISTICS OF HE INSTRUMENT DESCRIBED ARE SUMMARIZED AND SETAILED IN THE FOLLWING REPORT. IN MOST CASES & MANUFACTURER'S RECOVERIDE ALISMENT PROCEDURE OR & SUITABLE SLESTITUTE WILL HAVE BEEN FERFORMED PRIOR TO APPLICATION OF THE CERTIFICATION PROCEDURE THE RADIOMETER DESCRIBED IS CALIBRATED BY ELECTRONICALLY ADJUSTING THE INSTRUMENT TO READ WITHIN ISS OF THAT OF THE TRANSFER STANGARD RADIOMETER/PHOTOMETER, DEE-100X E/N DAAAL WITH SENSOR S/N DAA27. THE EQUIRMENT LEED IN THIS CERTIFICATION PROCEDURE IS TRACEABLE TO THE MATIONAL BLAERU OF ETANJARDS.

SERVICES PROVIDED HEREIN ARE IN ACCORDANCE WITH DUR BURLITY AESURANCE PROCRAM GAM-IMET-DE-DI & APPRIVED ON NO CHANGES HAVE BEEN MADE TO THE FROGRAM SINCE THAT GATE THIS CERTIFICATION REPERENCES NON ALSEA

CERTIFICATION OFFICER: CERTIFICATION DATE: EXAIRATION DATE:

ANY TRADE TRADE OF THE ANY OF THE ADDRESS OF THE AD

Ewence en OCTOBER 261 1987

100000-0100

REPORT NUMBER :

APRIL 26, 1986 873621

SWRI MAGNETIC PARTICLE WEIGHT CALIBRATION BLOCK DOCUMENTED CERTIFICATION/WEIGHT VERIFICATION

The following magnetic particle (MP) weight calibration blocks were fabricated by SvRI per drawing 3-70198 B. The 1977 Edition of Section V Article 7 Faragraph T-732-3 of the ASME Boiler and Pressure Vessel Code require alternative current electromagnetic yokes demonstrate a minimum lifting power at the maximum pole spacing of 10-pounds (4.5 kg) minimum.

The following weight blocks were fabricated to weigh 1-pound in excess of the Code requirement. This is a verification that the weights were calculated by accurately measuring the blocks (see attached dimensional sheet) and calculating the cubic inches for each block and multiplying by (.28333) weight per cubic inch for steel. This is a verification that the MP weight calibration blocks also meet the intent of the Code requirement by exceeding the 10-pounds minimum veight.

Block ID No.	Calculated Weight	Weight Stamped on Block
B-70198-10	11.325	11.3
B-70198-11	11.326	11.3
B-70198-12	11.322	11.3
3-70198-13	11.317	11.3
8-70198-14	11.326	11.3
8-70198-15	11.318	11.3
2-70198-16	11.315	11.3
B-70198-17	11.322	11.3
3-70198-18	11.318	11.3
3-70198-19	11.312	11.3
3-70198-20	11.323	11.3
3-70198-21	11.322	11.3
8-70198-22	11.327	11.3
3-70198-23	11,322	11.3
3-70193-24	11.329	11.3
3-70198-25	11,327	11.3
		Allerin

Prepared by:

Robert L. Edwards 3/12/01

Research Engineer

Reviewed by:

Robert E. Engelhardt Mobert E. Engelhardt 3/17/9/ Manager of Quality Assurance



ATTACEMENT

4

Dimensional Results - Drawing B-70198 B (JR #12266)

l

2

ID No.	Thickness	Width	Length
B-70198-10	1.2475	3.9960	8.019
3-70198-11	1.2473	3.9965	8.019
3-70198-12	1.2468	3.9968	8.019
3-70198-13	1.2465	3.9961	8.019
8-70198-14	1.2475	3.9961	8.019
8-70198-15	1.2465	3.9962	8.019
3-70198-16	1.2462	3.9962	8.019
3-70198-17	1.2471	3.9960	8.019
3-70198-18	1.2465	3.9962	8.019
B-70198-15	1.2475	3.9985	8.004
B-70198-20	1.2470	3.9966	8.019
8-70198-21	1.2468	3.9969	8.019
3-70198-22	1.2475	3.9963	8.019
B-70198-23	1.2470	3.9962	8.019
3-70198-24	1.2478	3.9960	8.019
8-70198-25	1.2476	3.9961	8.019
	a second s		

NOTE: Dimensions are in inches

8

SOUTHWEST RESEARCH INSTITUTE INSPECTION AND TEST RESULTS DRAWING NUMBER : JOB REQUEST NO. DATE : PART NUMBER / PART NAME B-70198 12266 3-17-81 SES ATTACKED LITT DIMENSIANAL INSPECTION / TEST RESULTS : (ATTACH DATA SHEETS AS NECESSARY) NUMBER OF ARTICLES INSPECTED OR NUMBER OF CONFORMING ARTICLES NUMBER OF ARTICLES REJECTED 16 16 0 NATURE OF DEFECTS OBSERVED . NONE BASIC CAUSES FOR ARTICLE REJECTION : Cross sector of the sector of the 8 3-17-81 1 BATE 1 Q.A INSPECTION PERFORMED BY (SIGNATURE -----

SOUTHWEST RESEARCH INSTITUTE

+05 - 011 01 0#AWE4 28510 + 8220 CULEBRA #040 + SAN ANTONIO "EX45 USA 18284 + 512 884.5 **** ELEX 18 1357

August 31, 1984

MT WEIGHT CERTIFICATE

This is to verify that the weight stamped on the MT calibration block(s) is the weight of the block before the handle was added. Therfore, the total weight of the block is greater than the weight stamped on it which is greater than ten pounds.

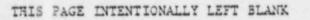
Bruce Mabrito, Manager Quality Assurance



		RESEARCH INS	TION OF			
THIS IS TO HAVE BEEN NUCLEAR F	THIS IS TO VERIFY THAT THE ELECTROMAGNETIC PARTICLE PROBES LISTED BELOW HAVE BEEN CALIBRATED IN ACCORDANCE WITH SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECTS OPERATING PROCEDURE $X/I - FE - 1/4 - 0$.					
MODEL A	NO SERIAL NUMBER	DATE	CALIBRATED BY			
thitelive Mag	Particle yoke WL-1-10	12Dec 87	Shagend			

	CERTIFICAT	RESEARCH IN	ATION OF	
THIS IS TO VI HAVE BEEN NUCLEAR PR	ERIFY THAT THE ELECTROMA CALIBRATED IN ACCORDANCE OJECTS OPERATING PROCED	GNETIC PARTICLE I WITH SOUTHWEST RI URE MI-FE-	PROBES LISTED BELOW ESEARCH INSTITUTE	
MODEL AND	SERIAL NUMBER	DATE	CALIBRATED BY	
teline Mat Fa	infield yoke WX-1-1	11 17 Dec 87	Strayword	
			1	
and the second sec				

	CERTIFICA	RESEARCH INS NON OF CALIBRAT	ION OF
THIS IS TO Y HAVE BEEN NUCLEAR P	CALIBRATED IN ACCORDANCE ROJECTS OPERATING PROCED	GNETIC PARTICLE PR WITH SOUTHWEST RES URE VII-FA-114	CHES LISTED BELOW
MODEL AN	D SERIAL NUMBER	DATE	CALIBRATED BY



t	OPERATIONAL CHECKL	IST FOR SONIC FTS	MK I NO. DITTE	
		RE YT. FE-MADCh	ALIGNMENT OF SONIC FT	S MARK I
	I. CURRENT DRAIN			430
	2. AMPLITUDE LIN	EARITY		1 % F
	3. CALIBRATION OF	GAIN (COARSE) _		OK
	4. CALIBRATION OF	GAIN OB (FINE)		OK
	5. HORIZONTAL LIN	EARITY		/ % FS
	6. CHECKS OF PO	TT AND SWITCHES :		
	FREQUENCY MHZ RANGE FILTER	ok OK	REJECT	
	REP. RATE VIDEO SW DAMPING 6 DB SWITCH	OK OK ØK	DELAY SW	
	7. LOW BATTERY (JUST ON AT	LIGHT ADJUSTMENT :	24	
π	CERTIFICATION			
	ALIGNMENT PERI	FORMED BY	(SIGNATURE-F (SIGNATURE-F FEEFUAR / 17.2.7 (DATE)	

an City	INSTRUMENT		SERIAL NO.	DATE	
Colline -	c Fis	PARKY T	Ø 1111E	2 415 83	83
	AMPLITUDE LINEARITY		0]	CONTROL LINEARITY	
LARGER ECHO	SMALLER ECHO NOMINAL	ACTUAL	% 08	- 6 DB	ch 00
% 001	% 05	50 % FSH	% 08	-12 00	% 00
30 %	45 %	45%	% 0₩	+ 6 08	85 %
. % 09	*0 %	ilinga	20 %	0 BB	\$ 53
10 %	35 %	2590	2		
% 09	30 %	30%0			
50 %	25 %	"25"".			
*0 %	20 %	239/0	DIS	DISTANCE LINEARITY	
30 %	15 %	15 10	ACTUAL THICKNESS	ULTRASONIC MEASURED	ED.
20 %	0% 01	10%			1
			*01	10"	
9	608 8 14 08 SWITCH LINEARITY	ITTY	***	6"	
100 %	- 608		.9	811	
% 001	- 1408	20 %	**	7"	
40 %	+ 608		.9	6"	
% 01	+ 1408	85 %		51	
			• 1	4"	
			n "2 "	62#	
	Place 29 les				
TEST BY	I CICHATURE I				



SONIC FTS MARK I FLAW DETECTOR CALIBRATION

١.	CURRENT DRAIN		4.35 -
2.	AMPLITUDE LINEARITY		1 %
3.	CALIBRATION OF GAIN (COARSE)		31
4.	CALIBRATION OF GAIN DB (FINE) _		5 %
5.	HORIZONTAL LINEARITY		/ %
6.	CHECKS OF POTS AND SWITCHES:		
	FREQUENCY MHZ	REJECT	0.8
	RANGE		1.
	FILTER	MATL. CAL.	OL
	REP. RATE		Cid.
	VIDEO SWO.A.	THRU TRANS - NORM	
	DAMPING		~ la
	6 DB SWITCH	_ 14 DB SWITCH	0.1
$\vec{\tau}_i$	LOW BATTERY LIGHT ADJUSTMENT :		
	(JUST ON AT 10.75 VOLTS)	C.K	
CER	TIFICATION :		
	ALIGNMENT PERFORMED BY	(SIGNATURE)	
		4 SEPT 37	
		(DATE)	

1000				
Carl	INSTRUMENT		SERIAL NO.	DATE
	Saure FIS MK	IK F	D1110 E	18-10-25 10
	AMPLITUDE LINEARITY	TY	CONTR	CONTROL LINEARITY
LARGER ECHO	CHO SMALLER ECHO NOMINAL	ACTUAL	60 %	-6 08
% 001	% 0\$	5 2 % FSH	% 09	-12 DB
% 06	45 %		*0 %	+ 6 DB 7.7 %
% 08	*0 %	2 0%	20 %	+ 12 DB 300 %
10 %	35 %	- 25 /2 		
% 09	30 %	- 1		
\$0 %	25 %	- 1		
40 %	20 %	00 %	DISTAN	DISTANCE LINEARITY
30 %	15 %	25 76	ACTUAL THICKNESS	III TRASONIC MERSINED
20 %	0% 01	10 %		
	60B 8 140B SWITCH LINEARITY	ARITY	"01 "6	.6
% 001	- 603	~/ %		1
% 001	- 1408		۲.	
40 %	+ 608	N 42	•	?
% 01	+ 1408	5/ %	5 10	
			* * N	
TEST BY :	(SIGNATURE)		-	

-	
	S
-	P
07.5	P Z D

SONIC FTS MARK I FLAW DETECTOR CALIBRATION

REF	FLAW DETECTOR	ALIGNMENT OF SC	DNIC FTS MARK
Ŀ	CURRENT DRAIN		+33
2.	AMPLITUDE LINEARITY		/ %
3.	CALIBRATION OF GAIN (COARSE)		OK
4.	CALIBRATION OF GAIN DB (FINE) _	inter en signed	04
5.	HORIZONTAL LINEARITY		/ % F
6.	CHECKS OF POTS AND SWITCHES:		
		_ REJECT	67
	RANGE	DELAY POT	ek.
	FILTERCK	MATL. CAL.	DF,
		DELAY SW.	04
	VIDEO SW	_ THRU TRANS - NOR	
	DAMPING	DEC	- <u>N/4</u>
7.	6 DB SWITCH CC	14 DB SWITCH	
	(JUST ON AT 10.75 VOLTS)	c.k	
CER	TIFICATION :	111	/
	ALIGNMENT PERFORMED BY	(SIGNATURE)	
	2105	(DATE)	

1350 1	INSTRUMENT		SERIAL NO.		DATE
GIVA	SENK MKI		01121E		2IDECET
	AMPLITUDE LINEARITY		CON	TROL LINEARI	TY
LARGER ECH	SMALLER ECHO	ACTUAL	eo %	- 6 DB	_10
100 %	50 %	50 % FSH	80 %	- 12 D8	20
90 %	45 %		40 %	+ 6 DB	
60 %	40 %	-tc	20 %	+ 12 DB	53
70 %	35 %	35			
60 %	30 %	_30			
50 %	25 %	_25			
40 %	20 %	_20	DIST	ANCE LINEAR	ITY
30 %	15 %	15	ACTUAL THICKNESS	UL	TRASONIC MEASURED
20 %	10 %	10			
	6DB & 14DB SWITCH LINEARI	TY	10" 9"	-	10
100%	- 608	- xf2 %			8
100 %	-1408	19 %			7
40 %	+ 608	82 %			6
10 %	+ 14DB	1/2 %		1.1	5
			4"		4
			3"		3
			2"		2
			1		1
	111/11				
TEST BY	(SIGNATURE)				

I	OPE	RATIONAL CHECKLIST FOR	SONIC FTS	MK I No	4226
		ERENCE PROCEDURE	E Ich Dunt,		
	L.	CURRENT DRAIN			4572
	2.	AMPLITUDE LINEARITY .			/ % F
					and the second sec
	3.	CALIBRATION OF GAIN (COARSE)		60
	4.	CALIBRATION OF GAIN	B (FINE) .		<u>ct</u> .
	5.	HORIZONTAL LINEARITY			/ % FS
	6.	CHECKS OF POTS AND	SWITCHES :		
		FREQUENCY MHZ	C.F.	REJECT	21
		RANGE	61	DELAY POT	51
		FILTER	C.F.		12 1.
		REP. RATE	C.K.	DELAY SW.	to the
		VIDEO SW	G.K.	THRU TRANS - NOR	M C. /.
		DAMPING	G.K.		r./A
		6 DB SWITCH	01.	14 DB SWITCH	G.K.
	7.	LOW BATTERY LIGHT AD	JUSTMENT		
		(JUST ON AT 10.75 V	OLTS)	c.t.	
π	CERT	FIFICATION :			
		ALIGNMENT PERFORMED B	×/	(SIGNATURE)	er en
				9 P.C. A.T.	
				(DATE)	

11.1				
3	INSTRUMENT FITS 1221	1. Z	SCRIAL NO.	19 NOU87
	AMPLITUDE LINEARITY		CONTRC	CONTROL LINEARITY
LARGER ECHO	CHO SMALLER ECHO NOMINAL	ACTUAL	% 08	-6 08 38 %
% 001	\$0 %		% 09	-12 08 20%
% 06	45 %	45 7	% 0*	+ 6 08 83 %
80 %	40 %	-	20 %	+ 12 08 80 %
% 01	35 %		2	
% 09	30 %	30		
\$0 %	25 %	25 ?		
*0 %	20 %	20 %	DISTANCE	E LINEARITY
30 %	15 %	15 2	ACTUAL THICKNESS	ULTRASONIC MEASURED
20 %	10 %	10 %		
	608 8 1408 SWITCH LINEARITY	ITY	.0. 6	9.
100 %	- 609	* 87		S
100 %	- 1408	17 %	7"	7
40 %	+ 608	80 %	: 9	.9
% 01	+ 1408		*0	
			** *n	3 K
			"- "-	F
TEST BY	(SIGNATURE)			

NO DIA PLOTI TOURISE CRANSDUCERS TO BE MOUNTED DI LEDGE AND/OR USED FREQUENCY SPECTRUM AND R.F. WAVEFORM ANALYSIS CERT. DATE OPERATOR NEXT CERT. DATE icholson A SU 13 July 38 SEARCH UNIT MANUFACTURER SERIAL NO. CASE STYLE . TEST ANGLE MHZ CRYSTAL SIZE FREQUENCY) uab ULTRASONIC TRANSDUCER ANALYZER SETTINGS 9 XO GAIN TRIM 026 ATTENUATION GATE WIDTH EXT. PULSER DOWN 555 MODE Thru DAMPING ____ 115 _ EXT. TRIGGER DOWN GATE DELAY 6 4 REP. RATE ____ SPECTRUM ANALYZER - R.F. SECTION 1 MHz INPUT ATTENUATION SCAN WIDTH OFF MHZ CENTER FREQUENCY TUNING STABILIZER 0 - 1130 KHz BAND WIDTH RANGE ____ SPECTRUM ANALYZER - I.F. SECTION 0 DISPLAY ADJUST ____ LOG REF. LEVEL MV/DIV OFF AUTOMATIC VIDEO FILTER TRIGGER 2 SCAN TIME/DIV. ___ MILLI SEC TARGET REFLECTOR SWRI SPEC PHOTOGRAPH DATA MINIMUM 1.8 MHZ MHz/DIV _ 3/32 INCH, 1/3 T HOLE IN PT 300 MAXIMUM 2.7 MH2 USEC/CM BLOCK MEASURED FREQUENCY 2. MH 50 MV VOLTS/CM 3/16 INCH, 3/4T HOLE IN E.E.I. BLOCK REVIEWED AND ACCEPTED PLASTIC BALL BLOCK S.D.H. OTHER 1 Section on SIGNATURE Heleon Know DATE Jan 13, 18ft PT 300 bLock

SWRI FORM RD-2-5 CERTIFICATION PERFORMED IN ACCORDANCE WITH XII-RD-101

NO D/A PLOT REQUIRED ON TRANSDUCERS TO BE MOUNTED ON A WEDGE AND/OR USED AS ANGLE BEAM.

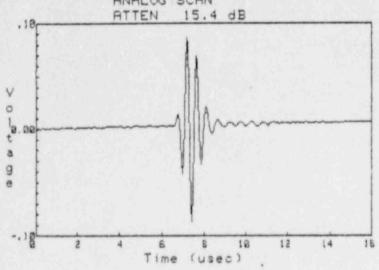
S FREQUENC	Y SPECTRUM AND R.F. W	AVEFORM ANALYSIS			
CERT. DATE	S JAN. 88 OPERATO	R			
And address in the second second second second second and a second s	8 SEARCH UNIT	Nicholson			
	SERIAL NO.	D1760			
CASESTYLE NO.	TEST ANGLE	00			
CRYSTAL SIZE 250" Dual	FREQUENCY	2.25 MH2			
	NIC TRANSDUCER ANALYZER S	A REAL PROPERTY OF THE PARTY OF			
ATTENUATION	SATE WIDTH 453 G				
	MODE <u>Hru</u> D NEP. RATE 115 D	T. TRIGGER DOWN			
	TRUM ANALYZER - R.F. SEC				
	and the second	1 MHz			
CENTER FREQUENCY 5.0 MHZ	SCAN WIDTH TUNING STABILIZER	OFF			
BAND WIDTH 30 KHz	RANGE	0-11			
	TRUM ANALYZER - I.F. SECT	TION			
LOG REF. LEVEL	DIV DISPLAY ADJUST	0 AUTOMATIC			
VIDEO FILTER OFF	TRIGGER	AUTOMATIC			
SCAN TIME/DIV. 2 MIL	SwRI SPEC	PHOTOGRAPH DATA			
TARGET REFLECTOR	MINIMUM 1.8 MHz	1			
3/32 INCH, 1/3 T HOLE IN PT 300	MINIMUM 2.7 MHz	MHz/DIV			
BLOCK	MEASURED FREQUENCY 2.5 MHz	USEC/CM			
3/16 INCH, 3/4T HOLE IN E.E.I. BLOCK					
PLASTIC BALL BLOCK S.D.H. REVIEWED AND ACCEPTED					
P.T. BOOHAK	SIGNATURE Hogeon tim	DATE Jan 15, 1988			
	50				

SWRI FORM RD-2-5 CERTIFICATION PERFORMED IN ACCORDANCE WITH XII-RD-101

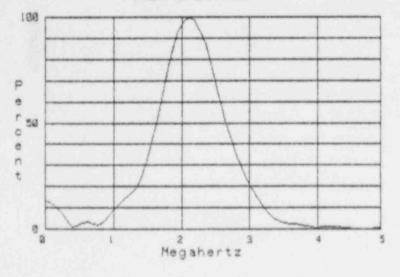
	S.W.R.I. ULTRASONIC TRANSDUCER ANALYSIS REPORT
	T 14, 1987 NEXT CERT DATE: MAR 14, 1988 Page 1 of 2 OR : S. NICHOLSON
	TRANSDUCER INFORMATION
CASE STYLE:	AEROTECH SERIAL NC: 013718 RECT TEST ANGLE = : 0 .50 X 1.0 FREQUENCY = : 2.25
	WAVEFORM AND POWER SPECTRUM INST
TYPE: AEROTECH TYPE: HP WAVEF	MODEL: UTA-2 SERIAL #:1214 ORM RECORDER MODEL: 5180A SERIAL #:2318A00667
	UTA SETTING
ATTENUATION	= :20 MODE = :NORM REP. RATE = :015 EXT. & INT. PULSER : = Switch to INT PULSER EXT. & INT. PULSER : = Switch to INT TRIGGER
	TARGET REFLECTOR INFORMATION
	PLASTIC BALL BLOCK S. D. H.
	FREQUENCY AND SPECTRUM ANALYSIS
ACCEPTABLE MINIMUM = :	MEASURED 1.8 MHz FREQUENCY = : 2.19 MHz MAXIMUM = : 2.7 MH
	ULTRASONIC INST DAC CURVE
TYPE :SONIC	MODEL :MARK I SERIAL No. :01109E Db Setting :63
*************	REVIEWED & ACCEPTED
ц.	signature Sept 14, 1989

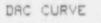
CERTIFICATION PERFORMED IN ACCORDANCE WITH XII-RD-106-0

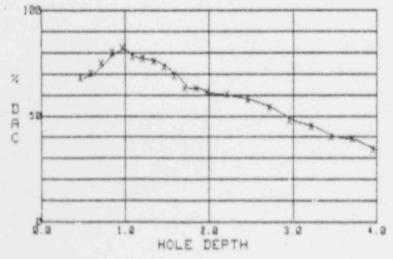
S.W.R.I. ULTRASONIC TRANSDUCER ANALYSIS REPORT MANUFACTURE: AEROTECH SERIAL No: 013718 CERTIFICATION DATE: SEPT 14, 1987 ANALOG SCAN







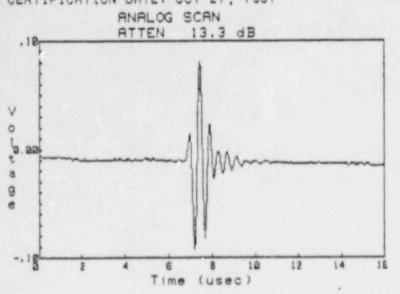




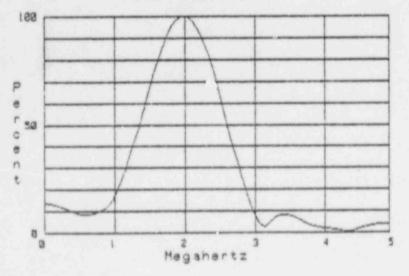


	T 27, 1987 NEXT CERT DATE: APR 27, 1988 Page 1 of 2 TOR : S. NICHOLSON
	TRANSDUCER INFORMATION
MANUFACTURE: CASE STYLE: CRYSTAL SIZE:	SWRI SERIAL NO: 585M
CRYSTAL SIZE:	.50 FREQUENCY = : 2.25
	WAVEFORM AND POWER SPECTRUM INST.
	H MODEL: UTA-2 SERIAL #:1214 FORM RECORDER MODEL: 5180A SERIAL #:2318A00667
	UTA SETTING
ATTENUATION	= :10 MODE = :NORM REP. RATE = :015 EXT. & INT. PULSER : = Switch to INT PULSER
	EXT. & INT. PULSER : = Switch to INT TRIGGER
	TARGET REFLECTOR INFORMATION
	PLASTIC BALL BLOCK S. D. H.
	FREQUENCY AND SPECTRUM ANALYSIS
ACCEPTABLE	MEASURED ACCEPTABLE . 1.8 Mhz FREQUENCY = : 2.03 Mhz MAXIMUM = : 2.7 M
TAITAINALI - I	
	ULTRASONIC INST DAC CURVE
	ULTRASONIC INST DAC CURVE
TYPE :SONIC	MODEL :MARK I SERIAL No. :01109E Db SETTING :
	MODEL :MARK I SERIAL No. :01109E

S.W.R.I. ULTRASONIC TRANSDUCER ANALYSIS REPORT MANUFACTURE: SWRI SERIAL No: 685M CERTIFICATION DATE: OCT 27, 1987









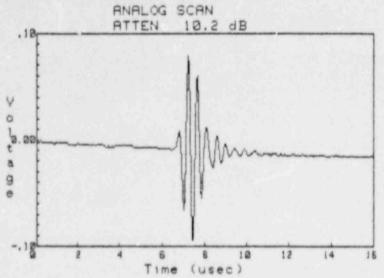
	22, 1988 NEXT C	ERT DATE: JUL	22, 1988	Page 1	of 2
MME OF OPERAT	OR : S. NICHOLSON				
	TRANSDUCE	R INFORMATION			
IANUFACTURE:		SERIAL NO:			
ASE STYLE:		TEST ANGLE			
RYSTAL SIZE:		FREQUENCI	- 1 2123		
	WAVEFORM AND P	OWER SPECTRUM	1051.		
VDE AEDOTEOU	MODEL :	1174-2		214	
VPE: HP WAUEE	ORM RECORDER MODEL :	5180A	SERIAL #:2	318A00557	
ITE. HE WHVEF	ORN RECORDER HODEE.	01000	Statistics # Fig	or one coer	
	UTA SETT				

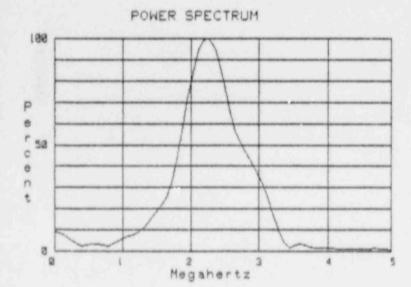
TTENUATION	= :10 MODE	- INORM	850	-	
TIENUMIIUN	EXT. & INT, PULS				
	EXT. & INT. PULS				
	**********************		*****		
	TARGET REF	LECTOR INFORMA	110N		
	PLASTIC BALL BLO	CK S. D. H.			
	FREQUENCY AND	COCOTDUM ANALY			

CCEDTADI E	MEASURED			ACCEPTABLE	
CCEPTABLE	1.8 Mhz FREQUENCY	= : 2.34 Mhz		MAXIMUM = :	2.7

	ULTRASON	IC INST DA	C CURVE		
YPE :SONIC		MARK I	SERIAL No.	:01109E	
	Db SET	NOT APPLICAB	LE SN		
	REVIEW	ED & ACCEPTED			
***********			******	***********	
Herro	m Kin		Jan 22	2, 1884	
- the	m Kum		Vinn	2 , 1988 DATE	
		REQUIRED ON TRANS			
		ED ON A WEDGE AND			

S.W.R.I. ULTRASONIC TRANSDUCER ANALYSIS REPORT MANUFACTURE: SWRI SERIAL No: 1795 CERTIFICATION DATE: JAN 22, 1988

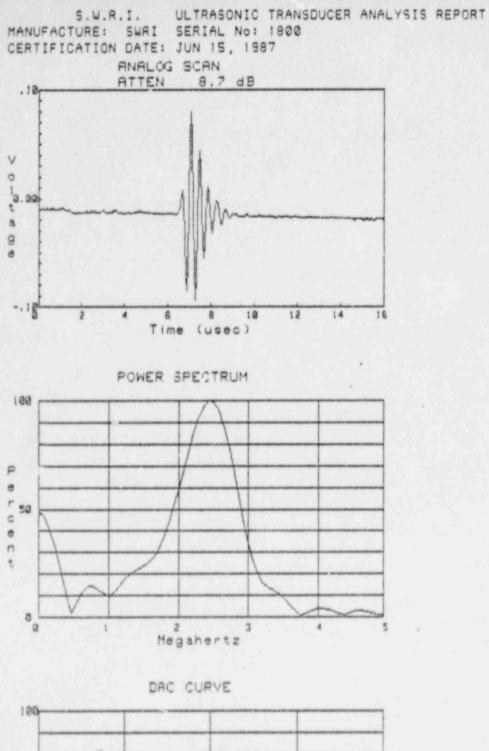


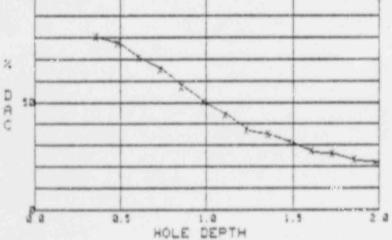


G-44

---- S.W.R.I. ULTRASONIC TRANSDUCER ANALYSIS REPORT CERT DATE: JUN 15, 1987 NEXT CERT DATE: DEC 15, 1987 Page 1 of 2 NAME OF OPERATOR : S. NICHOLSON _____ TRANSDUCER INFORMATION MANUFACTURE: SWRI SERIAL NO: 1800 CASE STYLE: TEST ANGLE = : 0 RECT FREQUENCY = : 2.25 CRYSTAL SIZE: .375 _____ WAVEFORM AND POWER SPECTRUM INST. MODEL: UTA-2 SERIAL #:1214 TYPE: AEROTECH TYPE: HP WAVEFORM RECORDER MODEL: 5180A SERIAL #:2318A00867 UTA SETTING MODE = :NORM REP. RATE = :015 ATTENUATION = :5 EXT. & INT. PULSER : = Switch to INT PULSER EXT. & INT. PULSER : = Switch to INT TRIGGER TARGET REFLECTOR INFORMATION PLASTIC BALL BLOCK S. D. H. FREQUENCY AND SPECTRUM ANALYSIS MEASURED ACCEPTABLE ACCEPTABLE MINIMUM = : 1.8 Mhz FREQUENCY = : 2.50 Mhz MAXIMUM = : 2.7 Mhz ULTRASONIC INST. -- CAC CURVE MODEL :MARK I SERIAL No. :01109E TYPE :SONIC Db SETTING :81 REVIEWED & ACCEPTED June 15, 1927 Hellon 1 DATE SIGNATURE

CERTIFICATION PERFORMED IN ACCORDANCE WITH XII-RD-105-0

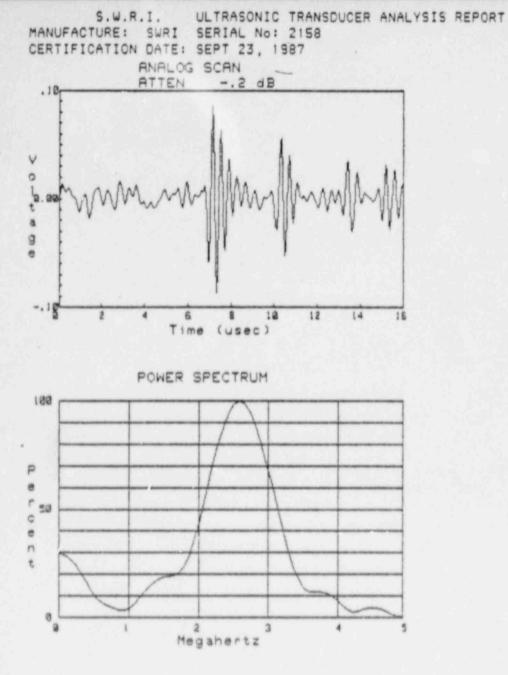




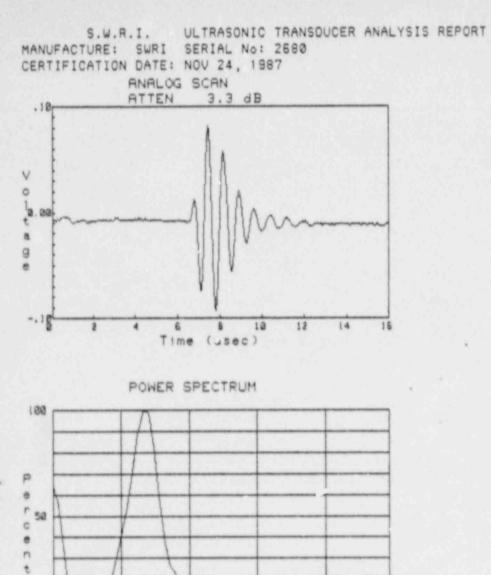
.

S.W.R.I. ULTRASONIC TRANSDUCER ANALYSIS REPORT CERT DATE: SEPT 23, 1987 NEXT CERT DATE: MAR 23, 1988 Page 1 of 2 NAME OF OPERATOR : S. NICHOLSON _____ TRANSDUCER INFORMATION ----MANUFACTURE: SWRI CASE STYLE: RD SERIAL NO: 2158 TEST ANGLE = : 0 CRYSTAL SIZE: .25 DL FREQUENCY = : 2.25 _____ _____ WAVEFORM AND POWER SPECTRUM INST. TYPE: AEROTECH MODEL: UTA-2 SERIAL \$:1214 TYPE: HP WAVEFORM RECORDER MODEL: 5180A SERIAL \$:2318A SERIAL \$:2318A00667 ------UTA SETTING ------_____ REP. RATE = :015 MODE = : THRU ATTENUATION = :3 EXT. & INT. PULSER : = Switch to INT PULSER EXT. & INT. PULSER : . Switch to INT TRIGGER TARGET REFLECTOR INFORMATION OTHER = :1 INCH SECTION ON PT 300 BLOCK _____ FREQUENCY AND SPECTRUM ANALYSIS _____ ACCEPTABLE MEASURED ACCEPTABLE MINIMUM = : 1.8 Mhz FREQUENCY = : 2.66 Mhz MAXIMUM = : 2.7 Mhz ULTRASONIC INST. -- DAC CURVE MODEL :MARK I SERIAL No. :01109E TYPE ISONIC Db SETTING : Not applicable Bi REVIEWED & ACCEPTED The Happet Required on transduces to be mounted on a usedge and/or used as angle beam. su Seft 23, 19.8.2 - Frank la 2 SIGNATURE CERTIFICATION PERFORMED IN ACCORDANCE WITH XII-RD-106-0

G-47



-------- S.W.R.I. ULTRASONIC TRANSDUCER ANALYSIS REPORT CERT DATE: NOV 24, 1987 NEXT CERT DATE: MAY 24, 1988 Page 1 of 2 NAME OF OPERATOR : S. NICHOLSON TRANSDUCER INFORMATION MANUFACTURE: SWRI CASE STYLE: RECT SERIAL NO: 2680 TEST ANGLE = : 0 CRYSTAL SIZE: .375 FREQUENCY = : 1.5 ____ WAVEFORM AND POWER SPECTRUM INST. TYPE: AEROTECH MODEL: UTA-2 TYPE: HP WAVEFORM RECORDER MODEL: 5180A SERIAL #:1214 SERIAL #:2318A00667 ____ UTA SETTING ------ATTENUATION = :3 * INORM REP. RATE = :015 EXT. & INT. r. SER : " Switch to INT PULSER EXT. & INT. PULSER : = Switch to INT TRIGGER TARGET REFLECTOR INFORMATION PLASTIC BALL BLOCK S. D. H. FREQUENCY AND SPECTRUM ANALYSIS ACCEPTABLE MEASURED ACCEPTABLE MINIMUM = : 1.2 Mhz FREQUENCY = : 1.41 Mhz MAXIMUM = : 1.8 Mhz ULTRASONIC INST. -- DAC CURVE MODEL :MARK I SERIA' No. :01109E TYPE :SONIC Db SETTING : NOT APPLICABLE SN REVIEWED & ACCEPTED Nov. 24, 1887 elon SIGNATURE NO D/A PLOT REQUIRED ON TRANSDUCERS TO BE MOUNTED ON A WEDGE AND/OR USED AS ANGLE BEAM. CERTIFICATION PERFORMED IN ACCORDANCE WITH XII JD-108-0



1

*

and the second

S

8

k

2

Megahertz

PAGE 2 of 2



.

5

G-50

4

4

NO D/A PLOT REQUIRED ON TRANSDUCERS TO BE MOUNTED ON A WEDGE AND/OR USED AS ANGLE BEAM

S FREO	UENCY SPECT	RUM AND B.F.	WAVEFOR	MANALYSIS			
CERT. DATE NEXT CERT.	DATE - JUN	BB OPER	ATOR S.	nichelson			
Xtsu 7	July 88 SE	ARCH UNIT					
MANUFACTURER SWR CASESTYLE RECT. CRYSTAL SIZE 3 X.5	I	SERIAL NO Z	45°	2			
ULT	RASONIC TRANS	DUCER ANALYZE	R SETTINGS				
ATTENUATION 38 DAMPING 555 GATE DELAY 456	MODE REP. RATE	459 THRU 115 ALYZER - R.F. S	EXT. PULSER	DOWN			
INPUT ATTENUATION 20 CENTER FREQUENCY 30 KHz	0 mH2	SCAN WIDTH	1 MHz EROFF 0-11				
LOG REF. LEVEL VIDEO FILTEROFF SCAN TIME/DIV2	MV/DIV		0	MATIC			
'TARGET REFLECTOR	R 5	WRI SPEC	PHOT	OGRAPH DATA			
 3/32 INCH, 1/3 T HOLE IN P BLOCK 3/16 INCH, 3/4T HOLE IN BLOCK 	1 300 MAXIMUM	1.8 mile 2.7 mile FREQUENCY 2.0 mi	USEC/CM				
PLASTIC BALL BLOCK S.D.	REVIEWED AND ACCEPTED						
O OTHER		Hegen Ki	Zun DAT	E Jan & 1988			
				Munn			

SWRI FORM RD-2-5 CERTIFICATION PERFORMED IN ACCORDANCE WITH XII-RD-101

TO BE MOUNTED ON A JEDGE AND/OR USED AS ANGLE BEAM.

S	FREQUEN	CY SPECTRUM AN	DR.F.W	AVEFOR	MANALYSIS
TAP .	CERT. DATE NEXT CERT. DATE	6 Jan 88 6 Jun 88 W	OPERATO	SN	lichalson
	* 54 6 Jo	LY 88 SEARCH UN	IT		
MANUFACTURER	Ken Bri Rd	RES SERIAL TEST A FREQUE	NO.	0	42
		NIC TRANSDUCER A	the local division in the local division in the	the literary processing the second second	
DAMPING	555	GATE WIDTH 492	G.		DOWN
SATE DELAY	444	REP. RATE	Đ	T. TRIGGER	DOWN
	SPEC	CTRUM ANALYZER -	- R.F. SEC	TION	
NPUT ATTENUATIO	ту <u>5.0</u> 1 30 кнг	the second se	STABILIZER .	0FF 0-11	
OG REF. LEVEL	and the set of the set	//DIV DIS			
CAN TIME/DIV.	OFF		R	A 1 17 19 4 4	ATIC
TARGET R	EFLECTOR	SwRI SPEC	;	PHOT	OGRAPH DATA
BLOCK 3/16 INCH, 3/	T HOLE IN PT 300	MINIMUM 1.8 MAXIMUM 2.7 MEASURED FREQUENCY	MH2 2.25-MH	MHz/DIV USEC/CM VOLTS/CM	1
BLOCK	81.000 C 5 U	REVIE	WEDAND	ACCEPTED)
OTHER	BLOCKS.D.H.	SIGNATURE Heger			
			50 5¥	sound -	Ins

SWRI FORM RD-2-5 CERTIFICATION PERFORMED IN ACCORDANCE WITH XII-RD-101

APPENDIX H

CUSTOMER NOTIFICATION FORMS



APPENDIX H

CUSTOMER NOTIFICATION FORMS

Table of Contents

CNF No.	Examination Area	Date Opened	Date Closed
1	Valve HVF074B(ID)	04 Mar 88	22 Mar 88
2	Valve HVF074A(ID)	06 Mar 88	23 Mar 88
3	Spare F074	07 Mar 88	23 Mar 88
4	Valve HVF074B(OD)	09 Mar 88	23 Mar 88
5	Valve HVF074A(OD)	09 Mar 88	23 Mar 88
11	1-BB-2BVCA-014-5LD	16 Mar 88	22 Mar 88
14	N4B-B0SS	21 Mar 88	23 Mar 88
15	N4D-B0SS	21 Mar 88	23 Mar 88

•

*CNFs 6 through 10, 12, 13, and 16 were issued under the NRC Bulletin 87-01 Examination Program.

Serial N2. DOO 1. Southwest Research Institute PSEtG Utility CUSTOMER NOTIFICATION FORM SITE HOPE CREEK Part I - SwRI Findings NOT Method DUT DPT SWRI Procedure/Rev 17-1259 Type of Examination Project NQ ONT ORT DET DYT See 2/42 Z ISI PSI Examination Date: 4 MAR 88 DE1 1+2 Nine Eight BR Comments linear indications were recorded on the inside surface of the ferd water check value HUF0748. The linear indications 12 inches in length ranged from 14 to 21 Examination Reference : 120000 120001 Signature of SwRI Representative Date n MARSS Part II - Customer Notification Notification Acknowledged by Date taich 4. 1982 Part III - Indication Disposition by Customer Comments The indication were documented on Public Dificiency Papert HMT-88.1064. Indication 2000 halt gunding Signature of Customer Representative Danelli (i) Kapping Date 3-23-81 Part IV Reexamination Comments Responsed with Fluorecent may particle acceptel. Reexamination Reference 20027, 120017 Signature DOIN 22MARES Pluzio. 1 Dett CNF Closed (Customer Representative Stanature) Dorall Dikate and Date FORM NOTR -CNF -1, Rev-

Seriol Nº. 0002 Southwest Research Institute Utility PSEtG CUSTOMER NOTIFICATION FORM SITE HOPE CREEK Part I- SwRI Findings SwRI Procedure/Rev. NOT Method DUT DPT Type of Examination Project Nº 17-1259 BONT DRT DET DVT 320-2/42 PSI TISI Examination Date 5 MAR 23 0501+2 Comments NINE LINEAR INDICATIONS WERE RECORDED ON THE INSIDE SURFACE OF FEEDWATER CHECK JALVE HV-FOTHA. THESE LINEAR TNOILATIONS RANGED IN LENGTH FROM 3/8 to 144 INCHES Examination Reference : 120011, 120012 Signature of SwRI Representative Date Edward J Jus 6 MAR 88 Part II - Customer Notification Notification Acknowledged by Date Part III - Indication Disposition by Customer comments fuliration were doremented on P.S. Deficience asport HMT. 82-1018, Indications were removed with Signature of Customer Representative Doralli Reput Dote 3-23-37 Part IV Reexamination Comments acceptible re-spon with pluoment M.T. Reexamination Reference 120053, 1200194 Signature Dote Eard & Derd 23 MA299 CNF Closed (Customer Representative Signature) Date

Serial NR. 0003 Southwest Research Institute Utility PSRTG CUSTOMER NOTIFICATION FORM SITE HOPE CREEK Part I - SwRI Findings Type of Examination NOT Method OUT OPT Project Nº 17-1254 Procedure / Rev ZANT DAT DET DVT 300-2/42 PSI D ISI Examination Date: 6 MA-288 DEN 112 Comments SPARE VALUE HU-FOTH HAS ONE RECORDED LINEAR INDICATION, FOLLOSUP EXAMINATION WITH PROCEDURE ZOO-1 170 DEU 3 REJEALED THE SAME . Examination Reference : 120014, 110006 Signature of SwRI Representative Date 7 MAR 83 Elvard & Suns Part II- Customer Notification Date 7 Mar. 88. Notification Acknowledged by Part III - Indidation Disposition by Customer comments This of ene makere was informered tratelish a for your ease the indication SUJE! CNE 122 Lordie This indication was documented on FS not receiptede HMT- 88-1074. The indication grinding and buffer Signature of Customer Representative Darchell 0010 32334 Perspiral. Part IV Reexamination Comments acceptible ne - your performed with fluorescot MIT Reexamination Reference 20040 Signature Date 23 MAR 9.8 CNF Closed (Customer Representative Signature). Dote .. SWRI FORM NOTR -CHF -1. Rev-

Serial N2. 0004 Southwest Research Institute Utility PSEtG CUSTOMER NOTIFICATION FORM SITE HOPE CREEK Part 1 - SwRI Findings Project Nº 17 1259 Tynt of Examination NOT Method OUT OPT Procedure / Rev SMT DRT DET DVT 300 1/35 DPSI CXISI Examination Date: 9MAC88 DEV7 Comments EXAMINATION AREA VALUE HU. FOTAS HAS THREE RECORDABLE LINEAR FNDICATIONS ON THE OUTSIDE OF THE VALVE BODY Examination . Reforence : 120015 Signature of SeFI Representative Edias X 2 Date 9 MARSE Part II - Customer Notification Notification Ac nowledged by Date torus Part III - Indication Disposition by Customer comments The indication were documented on P.S. Deficiency Report HMT 33.1077 Adiation & be neroved with light greating Signature of Customer Representative Doveld D. Project Date 3-23-89 Part IV Reexamination Comments Re-expressional acceptible with may particle Reexamination Reference 120017 Signature Date Elizat Sent 23mar 99 CNF Closed (Customer Representative Signature) Devallingeren Date

Southwest Research Institute Serial Nº. 0005 PSF+G Utility CUSTOMER NOTIFICATION FORM HOPE CREEK Site Part I- SwRI Findings SwRI Procedure/Rev Tyne of Exemination 17-1259 NOT Method OUT OPT Project Nº PSI Z ISI EMT ORT OET OVT Examination Date 9 MAR 38 300.1/35 Comments EXAMINATION AREA VALUE HU.FOTHA HAS TWO RECORDABLE LINEAR INDICATIONS ON THE OUTSIDE OF THE VALVE BODY. Examination Reference : 120016 Signature of SwRI Representative Date Elwand & 9MAR88 Part II- Customer Notification Notification Acknowledged by Date Part III - Indication Disposition by Customer comments The indicatation were docemented on P.S. Deficiences HMT-38-1073 Indications warg remon ike + vinding + bladings Signature of Customer Representative Danell Koppin Date 5-23.27 Part IV Reexamination Comments acceptible regans performed with Reexamination Reference 120008, 120009 Signature Date 2 Jures ZIMARSA Ver 3 0 CNF Closed (Customer Representative Signature) Douglo Frank Date . SWRI FORM NOTR - CNF -1. Rev

Southwest Re	esearch Institute	Serial N2. 0011
CUSTOMER NOT		Unity PSEtG
CUSTOMER NOT		Tana there choken
	Part I - SwRI Find	
Project Nº 17-1259	Tyne of Examination	NDT Method BUT DPT SWRI Procedure/Rev
Examination Date: 15 mAR 88		DMT DRT DET DVT 600-31/23
Comments		DEV.
		B- 28UCA- 014- 560
		EFORMED FROM 7 TO 12
INCHES L	DUE TO PIPE SUP	PORT INTERFERENCE.
1944 (1948)		
Examination Priference	510018	
Signature of SeRI Representativ	and the second descent and the second is second to be a	Jero D Date 16mAV. 88
	Part II- Customer Noti	
Notification Acknowledged by	Unall Whorm	nh. 0011/16 Mar 88
	- Indication Disposition	
Comments Dies. To Ling	constrainte in Ile	seter and the work
		ted at a late Lete
prior to the and		1
January and the second second	Dece Maria	i for the for the second se
Signature of Customer Represent	ative Donallo	Roopul. Dore 3 22.87
	Part IV Reexamin	ation
Comments		
Comments NO A	er-itian in Nig	nized High
Comments NO A	er-plan in Aig	nized Het
Comments NB A	er-plan in Aig	nized Here
Comments NO A	e-plan in Nig	nised Hit
Comments NO A	e-plan in Aig	uised Hit
	e-itim in Nig	nised Rife
Comments NO A	e-plan in Nig	nisel Rek
Reexamination Reference		
Reexamination Reference	- ales	Dote 22mAR99

Serial N2 DOIN Southwest Research Institute Utility 158+6 CUSTOMER NOTIFICATION FORM SITE HOPE CREEK Part I - SwRI Findings NDT Method AUT DPT SWRI Procedure/Rev Typs of Examination Project Nº 17-1259 ONT ORT DET DYT SC-74/2 PSI GISI Examination Date 19 mtc 88 Comments THIS IS NOTIFICATION OF AN EXAMINATION LIM, TATION ON THE NUB NOZZLE WHEN PERFORMING THE ZZ. EXAM FROM THE NOZZLE BOSS, DUE TO WELDED THERMO PADS AND INSTRUMENTATION WIRES. NO EXAM WAS PERFORMED FROM 7 TO 2 O'LIOLK, Examination Reference 8900.59 Dot: 21 MAR 88 Signature of SwRI Representative Edward) De Part II- Customer Notification Notification Acknowledged by David Decompact. Dot: 3-71-88 Part III - Indication Disposition by Customer The limitation are due to pere a anthe counted Comments themappede. They will be commented & the MREG EUS report to the commission Signature of Customer Representative Prall Competi Dote 5-23 85 Reexompation Part IV Comments No nerestim in required Date Reexamination Reference Date Signature Eline 1 sens 23MARAA Date 3-23-83 CNF Closed (Customer Representative Signature)____ - MDEropali

Serial Nº. 0015 Southwest Research Institute Utility PSE+6 CUSTOMER NOTIFICATION FORM SIL HAPK CREEK Part I- SwRI Findings NOT Method OUT DPT SWRI Procedure/Rev Type of Examination Project Nº 17 - 1259 DAT DET DET DVT BOOG4/L PSI NISI Examination Date 19 MARSA DEVI. Comments THIS IS NOTIFICATION OF AN EXAMINATION LIMITATION ON NYD NOZZLE WHEN PERFORMING THE 22° EXAM FROM THE NOZZLE BOSS, DUE TO WELDED THERMO PADS FROM 8:30 TO 9 O'CLOCK, NO EXAMINATION OF THIS AREA WAS PERFORMED Examination Reference: \$90039 Signature of SERI Representative Elevant & Lang Date ZIMARDO Part II - Customer Notification Notification Acknowledged by Small Warant Date Part III - Indication Disposition by Customer comments The limitation are sur to permacantly mounted thermorpade They will be documented in The MARTE Cill report to the Commission Signature of Customer Representative Dorde Coperti Dute 5-53-77 Part IV Reexampration Comments 16 12- 2fam required Duck Reexamination Reference Signature Date Elizia Jacini 23 mAR59 CNF Closed (Customer Representative Signature) Double Whorsh 0010 7.25 53 SURI FORM NOTR -CHF -1. Rev-1

APPENDIX I

EXAMINATIONS PERFORMED FOR INFORMATION ONLY

TO: PSEtG

DATE: 12MAR 98

SUBJECT: THICKNESSES TAKEN ADJACENT TO VALUE BODY ESCAVATIONS.

PER PSETG REQUEST, THICKNESSES WERE TAKEN ADJACENT TO INDICATION ESCAVATIONS IN THE FOLLOWING AREAS (#)!

CHECK VALUE FOTH A - OUTSIDE BODY ESCAVATIONS 1+2 = IND#2 = 2.7' IN SIDE BODY ESCAVATION #9 = T=3.5"

CHECK VALVE FOTHE OUTSIDE BODY IND. #1 = 2.5 GROUVE ESCAVATIONS IND. #1 = 3.2 FLANGE IND. #2 = " IND. #1 = 3.2"

#6 = 2.6" #7 = 3.3" = 3.6 #9 = 3.3" = 4.0"

NOTE: ALL MEASUREMENTS TAKEN FROM O.D.

* SEE ORIGINAL SKETCHES FOR AREA OF FNDICATIONS,

(ALIBRATION \$ 250003





Sw. R. I. EXAMINATION SUMMARY RECORD

	ECT No.:			SITE								SHEET No	
PRO	17-125	9			IOPE	CREE	EK GE	NER	ATING ST	ATION		INFO	
EXAMINATION AREA (SYSTEM/COMPONENT) FEEDWATER				LINE / SU	BASS	EMBL	1. Alt	(IDENTIFICATION) SPARE					
	EXAMINATION	EXAMINATION	EXAMINER			INDIC	ATION		RESOLUTION		REMARKS		
	TYPE	SHEET No.	INITIALS	DATE	N	1	G	0	SHEET No.	CAT NO.	ne want 5		
v	INITIAL EXAMINATION												
1	FOLLOW-UP EXAMINATION								1.1.1				
PT	INITIAL EXAMINATION	120014	LS	6MAR 85				X		0003	Iriside J	latur	
мт 🗵	FOLLOW-UP EXAMINATION								1.1.1.1.1				
UT	0° LAM SCAN												
	0° WELD SCAN												
	45° SCAN												
	45° T SCAN										References		
	60° SCAN												
	60° T SCAN								1.1				
	PT	110006	RF	MMAR 89				X			FOLLOW US TO	MT INSIDE VALUE	
	MT	126020	LS	9 AAR 89				X			INSIDE VALU		
	MT	120021	RF	9 MAR 98	X							FALE OF VALUE BODY	
	NT.	120040	BR	ZZMAR SB	X							OF INDRATION 1	
										1111			
SUM	MARIZED BY	Flor	21	Var	D			1	TE 22mars	S	ONTINUED ON HEET NO. :	PAGE COFL	

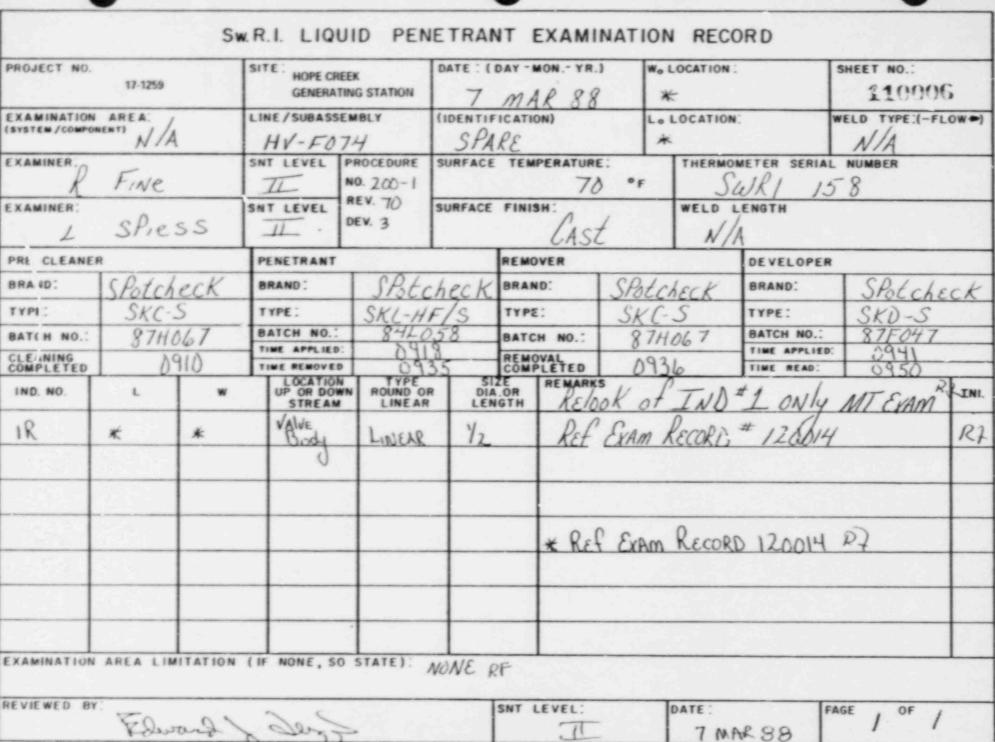




Sw. R. I. MAGNETIC PARTICLE EXAMINATION RECORD DATE: (DAY - MO - YR) SITE TIME (24 HR. CLOCK) SHEET No : PROJECT No. EXAM STARTED: 1950 120014 6 mAR 88 17-1259 HOPE CREEK GENERATING STATION EXAM ENDED: 2.2.20 LINE / SUBASSEMBLY **IDENTIFICATION** Lo LOCATION EXAMINATION AREA We LOCATION : TOP EDGE of UNIVE (SYSTEM/COMPONENT) SPARE SEE DRAWING HV . FOTH 110 SEE DRAWING PROCEDURE SURFACE FINISH: WELD TYPE (---FLOW---MAGNETIZATION AC EXAMINER SNT LEVEL INSIDE SURPRE L SPISSS Last YOKE SPACING: 55/8 No 300-2 12 of VALUE YOKE BRAND: LINE Line EXAMINER SNT LEVEL REV. 42 MATERIAL SERIAL No .: 411-1-10 R Fisse 11 DEV. 1+2 BRAND MAGNAGID WET DRY SURFACE TEMP. 0F CALIBRATION BLOCK BATCH No . 870051 DISTANCE FROM CALIBRATION VERIFICATION FLUORESCENT 1 SERIAL No. BLACK LIGHT TYPE: 14Am NO YEST B70198 11 TIME 1920 MIXED THERMOMETER TO SENSOR IN COLOR: GREEN ALA SERIAL No .: SWR1158 WEIGHT 11.3 LBS INITIALS 2a CELL 17 MIXED WITH BLACK LIGHT OUTPUT VERIF MATERIAL BLACK LIGHT INTENSITY METER BLACK LIGHT OUTPUT DUSTING APPLICATION : BRAND: BLAK PAY BRAND BLAK-RAY 1945 TIME FLOODING M ALA SPRAYING SERIAL No: 26059 µw/cm² SERIAL No total 1100 fr INITIALS ROUND OR SIZE DIA LOCATION IND No. w REMARKS ٤. INI. LINEAR OR LENGTH SEE VALJE SEE 1/2 3 GROUPED tobether 20 LINSAR DRAWING DRAJASC Bedy 0 FLOW 121 10 a. æ GIZINJ OUT AREA. EXAMINATION AREA LIMITATION: (IF NONE SO STATE) NONE LO REVIEWED BY SNT LEVEL DATE: PAGE OF ral 1 7 MAR 88 at

FORM No. SWRI NOTR 17-12 (REV 11-26-75





FORM NO. S. R. I NOTE 17-11 (REV. 1-5-79)

R FINE IL DEV. 1+2 BRAND: MAGUAGIO WET DRY DRY SURFACE TEMP	P	3259		SITE : HOPE CF	REEK GENER	RATING STATION	DATE: (DAY-MO-YR) 9 MAR 88	TIME: (24 HR. CLOCK) EXAM STARTED: 053/ EXAM ENDED: 0539	SHEET No.: 12002	0
L SPIESS II NO. 300-2 REVIEW NO. 300-2 REV. 42 REV. 42		DWENT)	alla					REFERM RECORD"	WO LOCATION: TOP EDGE VAL	JŁ
R Finds IL DEV. 1+2 BRAND: MAGENAGID WET IM DRY II CM: SCRATION - GCK CALIBRATION VERIFICATION DISTANCE FROM BACK LIGHT BRAND: MAGENAGID WET IM DRY II SERIAL NO.: (JL-1) SERIAL NO.: SIGNAY 23 TIME: DS3D DS4D JI DISTANCE FROM BACK LIGHT BATCH NO.: (RTDDS) FLUDRESCENT II SURFACE TEMP. WEIGHT 132B S TIME: DS3D DS4D JI TO SENSOR COLOR: GRED MIXED NOM VESI THERMOMETER BLACK LIGHT INTENSITY METER BLACK LIGHT OUTPUT BLACK LIGHT OUTPUT VERICUL VERIF. MATERIAL DUSTING DISTING BRAND: BLACK LIGHT OUTPUT BLACK LIGHT OUTPUT BLACK LIGHT OUTPUT VERIF. MATERIAL DUSTING DISTING BRAND: BLACK LIGHT OUTPUT BLACK LIGHT OUTPUT BLACK LIGHT OUTPUT VERIF. MATERIAL DUSTING DISTING BRAND: BLACK LIGHT OUTPUT BLACK LIGHT OUTPUT BLACK LIGHT OUTPUT VERIF. MATERIAL DUSTING DISTING BRAND: BLACK LIGHT OUTPUT BLACK LIGHT OUTPUT BLACK LIGHT OUTPUT VERIF. MATERIAL DUSTING N/A SERIAL NO: BLACK LIGHT OUTPUT BLACK LIGHT OUTPUT MATERIAL		5.P.,	\$.5	I		No. 300-2	LAST	INSIDE, SURFACE OF VALUE	YOKE SPACING: 55	
BLACK LIGHT DUTPUT BLACK LIGHT OUTPUT BRAND: BLAK RAY SERIAL NO: BL-13 SERIAL NO: 26059 1100 µw/cm² INITIALS LO FIND N/A SPRAYING D IND NO. L W LOCATION ROUND OR SIZE DIA. IND NO. L W LOCATION ROUND OR LENGTH REMARKS: 1 * BODY LINEAR 3/8 2 of the 3 Graved to Gether Remarks Affective Af	CAL SRAFIG SERIAL NO. 25 70	198 23		ON VERIFICA	110:4	DEV. 1+2. DISTANCE FROM BLACK LIGHT TO SENSOR	BRAND: MAGNAGID BATCH NO: 870051 TSPE: 14 AM	WET C DRY	SERIAL NO.: 412-1 SURFACE TEMP. 76 THERMOMETER	-/0 °F
IND NO. L W LOCATION LINEAR OR LENGTH REMARKS: 1 * * Body LINEAR 3/8 Zolthe 3 Glasted to bether Remarks Body LINEAR 3/8 Zolthe 3 Glasted to bether Remarks Affect Brinding * Ref Fram Reford 120014	BLACK LISH BRAND: B	LAK LAY	INTENSITY PEAND	METER LAK RAY		IGHT OUTPUT	BLACK LIGHT OUTPUT	VERIF. MATERIAL APPLICATION:		,
K * Body LINEAR 78 ZOTTHE 3 GROUPED TOLETHER REMOVED ATTIC BRINDING * Ref EXAM RECORD 120014	IND No.	L	w				REMARKS:			INI.
	1	*	*		LINEAR	3/8	and the second s	the second design of the second se		#5 #5
							0			10 Jo
EXAMINATION AREA LIMITATION: (IF NONE SO STATE) NONE 30	EXAMINATI	ON AREA	IMITATION	I (IF NONE	SO STA	SUOG (IT	30			

FORM No SWAI NOTA 17-12 (REV. 11-26-79)





Sw. R. I MAGNETIC PARTICLE EXAMINATION RECORD

PROJECT No	SITE : HOPE CREEK GENERATING STATION					DATE: (DAY		HR. CLOCK) ARTED: 14-38 IDED: 14-55	SHEET No.: 120010			
EXAMINATION AREA: (SYSTEM/COMPONENT)	ASSEMBLY: - FO 74			SPAR	TION	LoLOCA	and the second se	We LOCATION :				
EXAMINER: B. ROBERDS		SNT LEVEL			PROCEDURE	SURFACE FINISH:		INSIDE	PE (-FLOW-+) SUAFACE IALYE	MAGNETIZATIO YOKE SPACING: YOKE BRAND: 44	55/8 IN	
C. LITTLEFIELD						1.42	BRAND MA		MATERIAL SERIAL			WL-1-10
CALIBRATION BLOCK CA SERIAL No.: B 70/98 23					ION DISTANCE FROM		BATCH No :				SURFACE TEMP. 75 THERMOMETER	
WEIGHT . H. 3 LOS INIT	TIALS &					COLOR: GREEN		MIXED WITH NA		SERIAL NO .: SWAT 086		
BLACK LIGHT INT	ENSITY	METER	R	SLACK L	IGHT	OUTPUT	BLACK LIGHT	TUTTUO 1	VERIF.	MATERIAL	DUSTING	0
BRAND BLAK - AAY BR	AND BLA	E-RA	Y				TIME:	3.3		APPLICATION:	FLOODING	
SERIAL No : AL-13 SEI	RIAL No.	: 26.0	59	120	00	$\mu w/cm^2$		BAR			SPRAYING	
IND No. L	w	LOCAT		ROUND OR		SIZE DIA.	REMARKS					INI.
												Bon
								A GAIN	the second s	I RECORDED	ON DATA	por
							SHEE	T NO. 1	20020	NO RECORD	ABLE	stre
		-					INDICATIONS					Arr
		-										
		-		*	_							
					_							
				-						1.1.1.2.1		
EXAMINATION AREA LIM		: (1F	NONE	SO STA	TE)		i da da					
REVIEWED BY	~	2	in	2			SNT LEVE	L T	DATE:	2 mAr 93	PAGE /	OF /





R FINZ IL NO. EXAMINER L SPIESS IL DEV CALIBRATION BLOCK CALIBRATION VERIFICATION DIS SERIAL NO. 72 DATE DECEMBER 100 BLA	OCEDURE 300-1 V.35 V.2	IDENTIFICATION: SPARE SURFACE FINISH: CAST MATE	NIA WELD TYPE (-FLOW DUTSIDE SURFACE of VALUE	presenter on the second s		
R FINZ II NO. EXAMINER L SPIESS II DEV CALIBRATION BLOCK CALIBRATION VERIFICATION DIS SERIAL NO. 72 DIME DECEMBER 100 BLA	300-/ V.35 V.2	Cast	WELD TYPE (-FLOW-	presenter on the second s	And in case of the local division of the loc	
L SPIESS IT DEV CALIBRATION BLOCK CALIBRATION VERIFICATION DIS SERIAL NO. 72 DUEL DECEMBER 100 BLA	v 2	MATS	DT UNICE	YOKE SPACING: 55/2 IN YOKE BRAND: Whiteling SERIAL No.: W2-1-10 SURFACE TEMP. OF		
N 7 6 7 2 1146 1077 1139 1 1		BRAND MAGNAFLU	WET D PRY P			
	ACK LIGHT	BATCH No.: 84F012 TYPE: 9A	FLUORESCENT	NA THERMOMETER SERIAL No.:		
BLACK LIGHT INTENSITY METER BLACK LIGHT BRAND: NA BRAND: NA NA NA SERIAL NO: SERIAL NO:		BLACK LIGHT OUTPUT VI	A NIA	DUSTING FLOODING SPRAYING	1	
IND No. L. W LOCATION ROUND OR LINEAR	SIZE DIA. OR LENGTH	REMARKS			INI.	
ND RECORDABLE Indi	CATIONS				20	
EXAMINATION AREA LIMITATION: (IF NONE SO STATE)) NO Exe	in woder Riv	ten I Deutificat	ion Piale Pa		

AB. PSV-FOI3A MISRU RELIEF VALVE Leverere BLdg 4220 Rm TO BOBY EL 127 53-34 Na BODY: BOUNGT VALVE BODY TO RICT BRIE 6060 59 5 1.44 1.54 1.4 4.10 172 1.64 1.74 1.4 1.44 1.4 1.4 1.74 1.48 1.38 ev 1.44 1.44 1.15 1.44 1.74 12 1.48 1.72/1.8 143 1.5 1.58 1.8 1.6 11.6 1.6 NO MEASUREMENTS DUE TO STEP/TRANS. Frontispiece 21 MAR 38 1-0 CAL. SHT, # 250011