NIAGARA MOHAWK

NMP-2848

NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

January 28, 1981

Mr. Boyce H. Grier, Director
United States Nuclear Regulatory
Commission - Region I
631 Park Avenue
King of Prussia, Pennsylvania 19406

RE: Docket No. 50-220
LER 80-34

Dear Mr. Grier:

In accordance with Nine Mile Point Nuclear Station Unit #1 Technical Specifications, we hereby submit the following Licensee Event Report in accordance with Section 6.9.2b(3), Observed inadequacies in the implementation of administrative or procedural controls which threaten to cause reduction of degree of redundancy provided in reactor protection systems or engineered safety feature systems.

This report was completed in the format designated in NUREG-0161, dated July 1977.

Very truly yours,

Thomas E. Lempges

Thomas E. Lempges
Vice President
Nuclear Generation

jl/
Attachments (3 copies)
xc: Director, Office of I&E (30 copies)
Director, Office of MIPC (3 copies)

A002 S/1

(7-77)

LICENSEE EVENT REPORT

CONTROL BLOCK: | | | | | | | (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

0	1	N Y N M P 1 (2)	0 0 - 0 0 0 0 0 - 0 0 (3)	4 1 1 1 1 (4)	(5)
7	8	9 LICENSEE CODE 14	15 LICENSE NUMBER 25	26 LICENSE TYPE 30	57 CAT 58

CON'T

0	1	REPORT SOURCE L (6)	0 5 0 0 0 2 2 0 (7)	1 2 2 9 8 0 (8)	0 1 2 8 8 1 (9)
7	8	60	61 DOCKET NUMBER 68	69 EVENT DATE 74	75 REPORT DATE 80

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

0 2 During normal operation two procedures (one a Fuel Handling procedure and one an

0 3 Instrument Surveillance procedure for gaseous system leak rate testing) were not

0 4 SORC reviewed within the seven day time period for temporary changes as required

0 5 by Technical Specifications. This had no environmental safety effects.

0 6

0 7

0 8

	SYSTEM CODE	CAUSE CODE	CAUSE SUBCODE	COMPONENT CODE	COMP. SUBCODE	VALVE SUBCODE
0 9	Z Z (11)	X (12)	X (13)	Z Z Z Z Z Z (14)	Z (15)	Z (16)

(17) LER/RO REPORT NUMBER	EVENT YEAR		SEQUENTIAL REPORT NO.		OCCURRENCE CODE	REPORT TYPE		REVISION NO.
	8 0	—	0 3 4	/	0 3	L	—	0

ACTION TAKEN	FUTURE ACTION	EFFECT ON PLANT	SHUTDOWN METHOD	HOURS (22)	ATTACHMENT SUBMITTED	NPRD-4 FORM SUB.	PRIME COMP. SUPPLIER	COMPONENT MANUFACTURER
X (18)	X (19)	Z (20)	Z (21)	0 0 0 0	N (23)	N (24)	Z (25)	Z 9 9 9 (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

1 0 The time period for SORC review was exceeded due to an oversight of the due date

1 1 required. The review was performed shortly thereafter with all approvals com-

1 2 pleted. For future prevention a tickler systems for items needing SORC review

1 3 is being implemented.

1 4

	FACILITY STATUS	% POWER	OTHER STATUS (30)	METHOD OF DISCOVERY	DISCOVERY DESCRIPTION (32)
1 5	C (28)	0 9 2 (29)	N/A	Z (31)	N/A

	ACTIVITY RELEASED	CONTENT OF RELEASE	AMOUNT OF ACTIVITY (35)	LOCATION OF RELEASE (36)
1 6	Z (33)	Z (34)	N/A	N/A

PERSONNEL EXPOSURES

	NUMBER	TYPE	DESCRIPTION (39)
1 7	0 0 0 (37)	Z (38)	N/A

PERSONNEL INJURIES

	NUMBER	DESCRIPTION (41)
1 8	0 0 0 (40)	N/A

LOSS OF OR DAMAGE TO FACILITY (43)

	TYPE	DESCRIPTION
1 9	Z (42)	N/A

PUBLICITY

	ISSUED	DESCRIPTION (45)	NRC USE ONLY
2 0	N (44)	N/A	

8102100620

NAME OF PREPARER Paul Harrison PHONE: (315)343-2110, ext. 1212

GPO 917-026

80051 30359

NES 81A0405

P

INSERVICE INSPECTION

TEN-YEAR PROGRAM PLAN BOOK

NINE MILE POINT UNIT 1

Prepared For

NIAGARA MOHAWK POWER CORPORATION

Syracuse, New York

By

NUCLEAR ENERGY SERVICES, INC.
Danbury, Connecticut 06810

Prepared by: A. Uziel G. Guasco

Approved by: A. Yoli, Proj. Mgr.

Approved by: L.A. Johnson, ISI Prog. Mgr

Approved by: W.J. Manion, Dir. QA

Date: September 17, 1976

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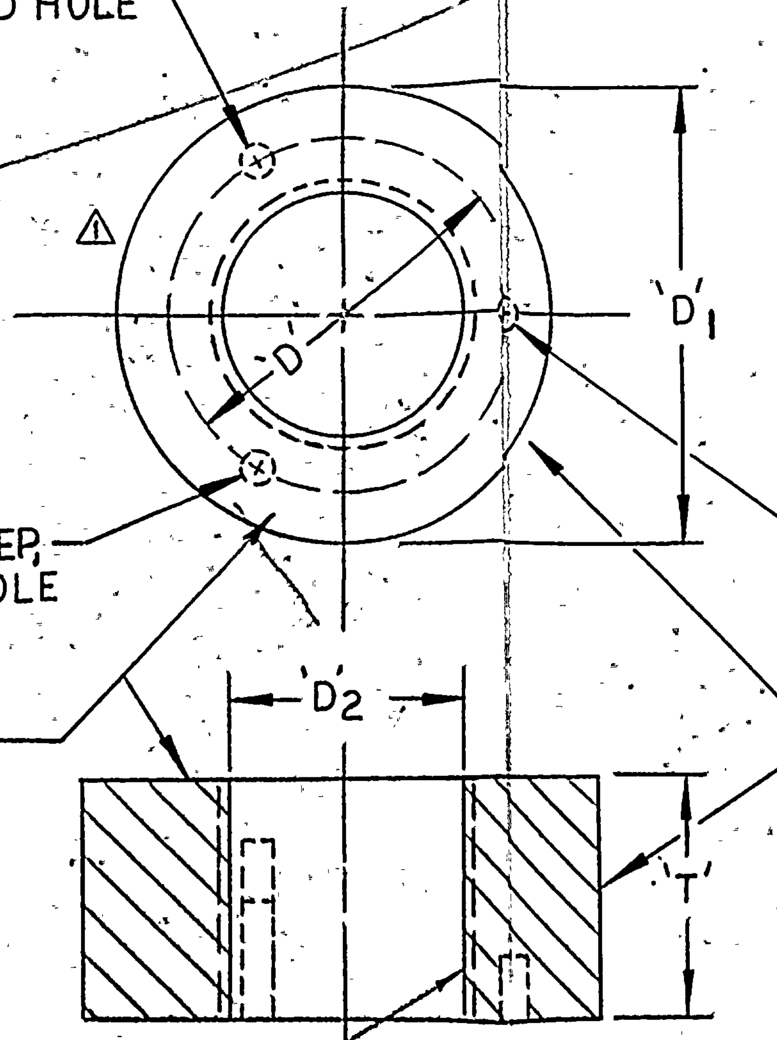
REVISIONS					
ZONE	LTR	DESCRIPTION	CHK'D	DATE	APPROVED
	1	CRA # 227	JH	03-10-77	AHY

APPROVED ISSUE



NOTES:

1- MATERIAL: ALLOY STEEL PER SA-193.

2- SPARE NUTS FROM NINE MILE STORE ROOM CAN BE USED. △1

REFERENCE STANDARD	D	D_1	D_2	T	A (3/4T)	B (1/2T)	C (1/4T)	MAT'L
PIN-6.25	7 3/4"	9 3/8"	6"	7"	5 1/4"	3 1/2"	1 3/4"	NOTE 1
PIN-2.0	1 1/2"	3"	-	2"	1 1/2"	1"	.1/2"	NOTE 1

△1 △1

TERA APERTURE CARD

ITEM	QTY	CODE IDENT	PART NUMBER	DESCRIPTION	MAT'L	MAT'L SPEC

PARTS LIST

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIM ARE IN INCHES. TOL: FRAC. ± 1/64 DEC X = ±.03 XX = ±.010 XXX = ±.005 ANGLES ± 1°, SURFACE FINISH 63/

DEBURR AND BREAK SHARP EDGES

MATERIAL —//—

FINISH —//—

SIGNATURES		DATE
DRAWN	W. HATCH, JR	12/11/75
CHECKED	A. UZIEL	12/11/75
APPROVED	J. Rouce	12/15/75
ENGINEER	W. J. Mannon	12/12/75
APPROVED DESIGN ACTIVITY	5530-300	
APPROVED	A H Yoh	12/12/75

AUTOMATION INDUSTRIES, INC.
NUCLEAR ENERGY SERVICES

TITLE: CALIBRATION REFERENCE STANDARDS, NUTS NMPC, NINE MILE

SIZE	CODE IDENT NO.	DRAWING NO.	REV
B	78446	80B0827	1

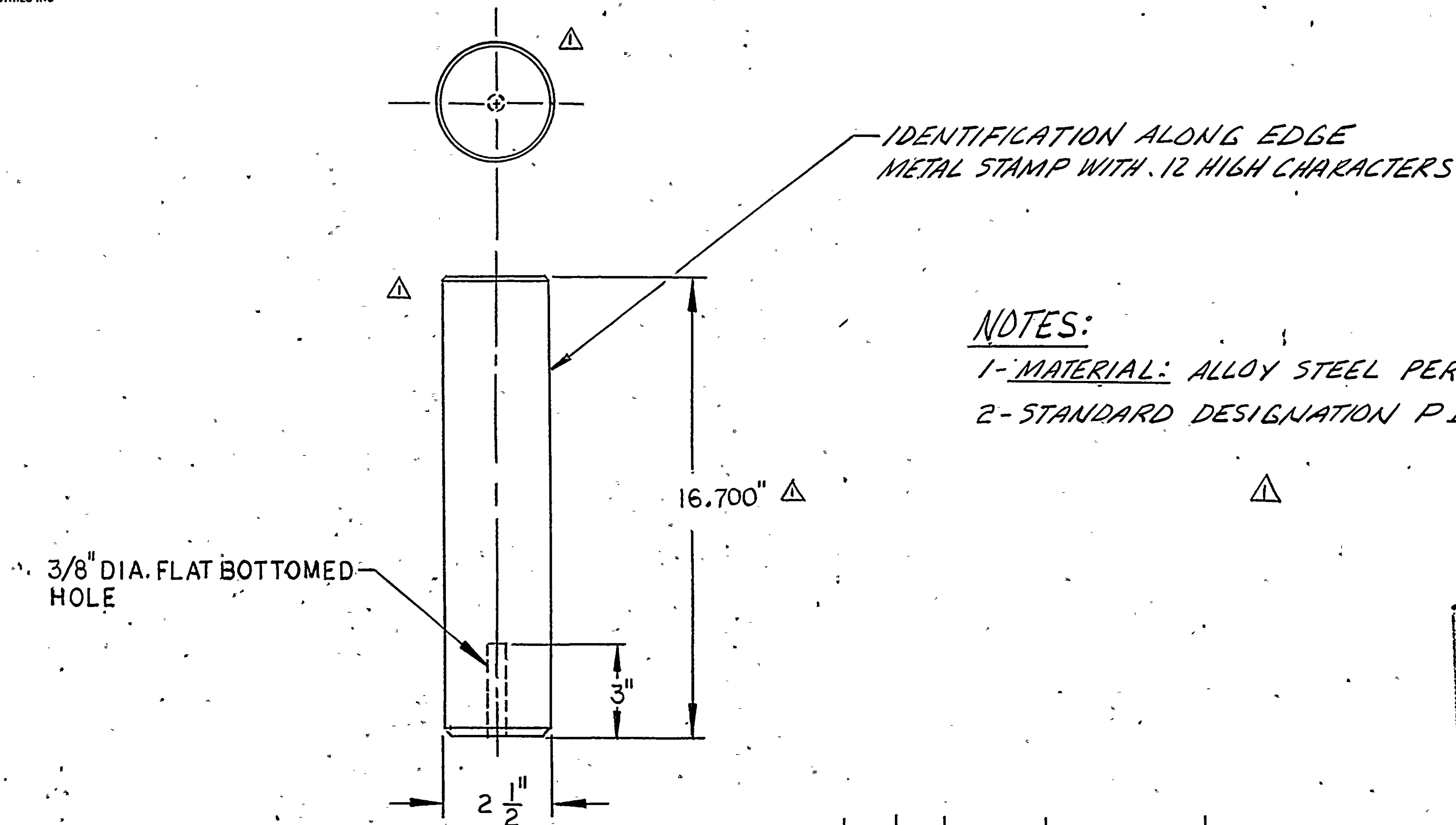
SCALE —//— SHEET

00B-044

REPROVEL

REVISIONS

ZONE	LTR	DESCRIPTION	CHK'D	DATE	APPROVED
	1	CRA # 227	2U	03-10-76	aHY



NOTES:

1- MATERIAL: ALLOY STEEL PER SA-193.

2- STANDARD DESIGNATION P1S-2.5.

APPROVED ISSUE

ITEM	QTY	CODE IDENT	PART NUMBER	DESCRIPTION	MAT'L	MAT'L SPEC

PARTS LIST

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIM ARE IN INCHES. TOL: FRAC. ± 1/64 DEC X = ±.03 XX = ±.010 XXX = ±.005 ANGLES ±1°, SURFACE FINISH 63
DEBURR AND BREAK SHARP EDGES

MATERIAL —//—

FINISH —//—

SIGNATURES		DATE
DRAWN	W. HATCH, JR.	12/11/75
CHECKED	A. UZIEL	12/11/75
APPROVED	J. Rance	12/15/7.
ENGINEER	W J Manson	12/12/7
APPROVED DESIGN ACTIVITY	5530-300	
APPROVED	a H Yoli	12/12/75

AUTOMATION INDUSTRIES, INC.
NUCLEAR ENERGY SERVICES

TITLE CALIBRATION REFERENCE STANDARD FOR VALVE STUDS NMPC, NINE MILE

SIZE	CODE IDENT NO.	DRAWING NO.	REV
B	78446	80B0828	1

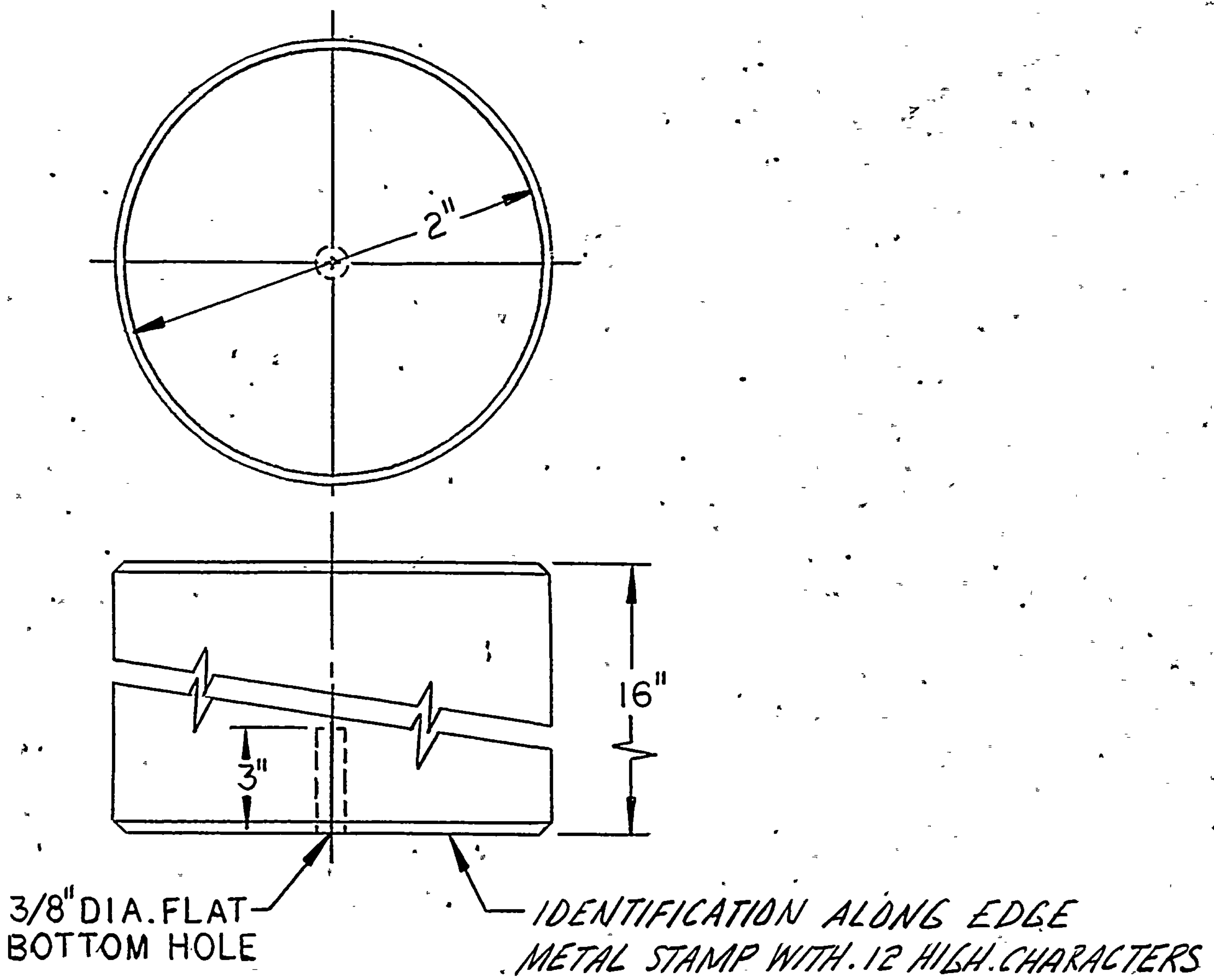
SCALE —//— SHEET

00B-044

REPROVEL 440M Buffalo, New York Printed in U.S.A.

REVISIONS

ZONE	LTR	DESCRIPTION	CHK'D	DATE	APPROVED
	1	CRA # 227	ZU	03-10-77	AHY



NOTES:
1- MATERIAL: ALLOY STEEL PER SA-194.
2- STANDARD I.D. P15-2.0.

⚠1

APPROVED ISSUE

ITEM	QTY	CODE IDENT	PART NUMBER	DESCRIPTION	MAT'L	MAT'L SPEC

PARTS LIST

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIM ARE IN INCHES. TOL: FRAC. ± 1/64
DEC X = ±.03 XX = ±.010 XXX = ±.005
ANGLES ± 1°, SURFACE FINISH 63 ✓
DEBURR AND BREAK SHARP EDGES
MATERIAL —//—
FINISH —//—

SIGNATURES		DATE
DRAWN	W. HATCH, JR.	12/12/75
CHECKED	A. UZIEL	12/12/75
APPROVED	J. Lance	12/15/75
ENGINEER		
	W. J. Mason	12/12/75
APPROVED DESIGN ACTIVITY	5530-300	
APPROVED	A. H. Yale	12/12/75

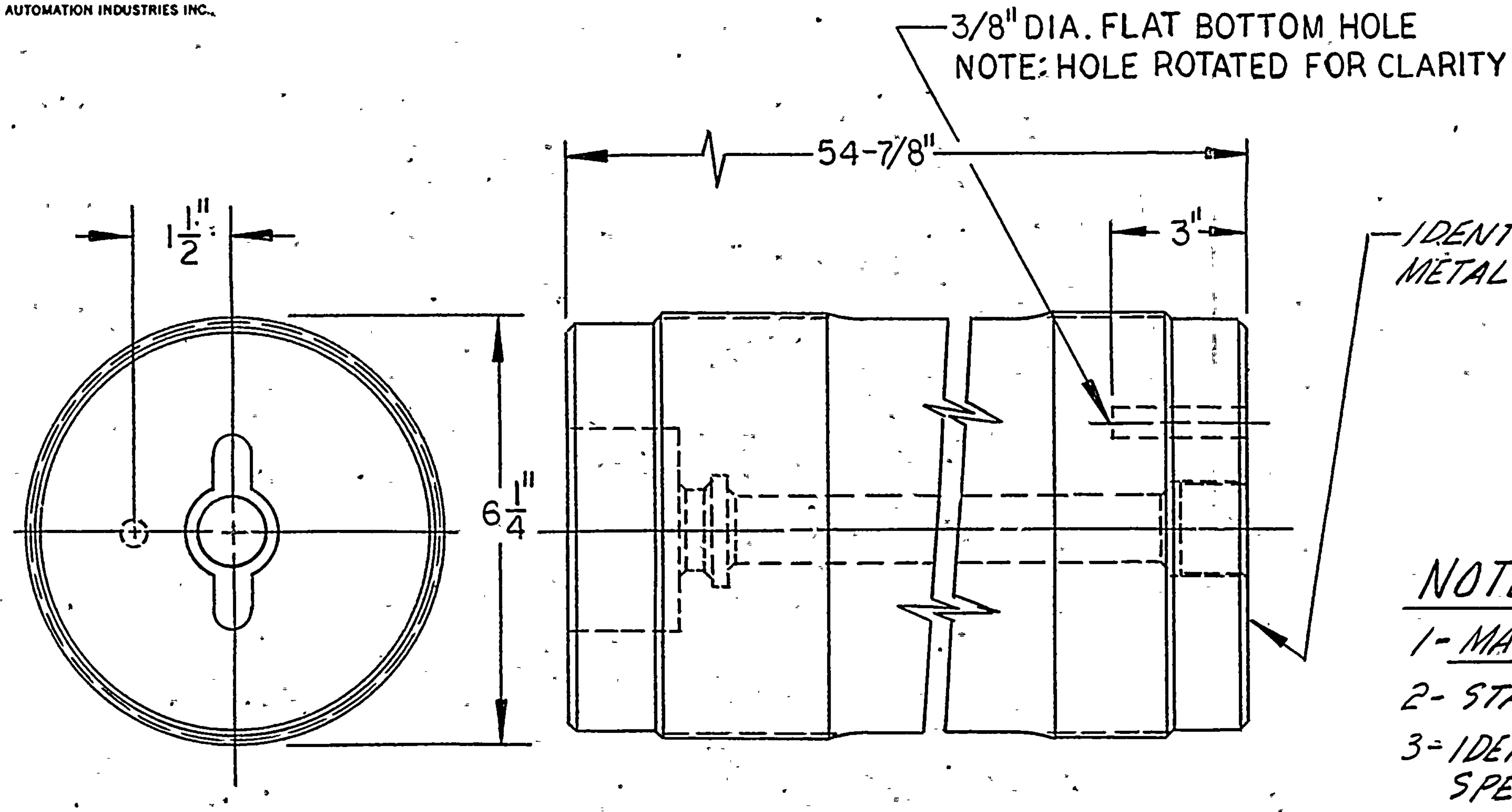
AUTOMATION INDUSTRIES, INC.
NUCLEAR ENERGY SERVICES

TITLE
CALIBRATION REFERENCE STANDARD, VALVE STUDS
NMPC, NINE MILE

SIZE	CODE IDENT NO.	DRAWING NO.	REV
B	78446	80B0830	1
SCALE —//—		SHEET	

00B-044

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



NOTES:

1- MATERIAL: ALLOY STEEL PER SA-193.

2- STANDARD I.D. P15-6.25.

3- IDENTIFICATION TO INCLUDE HEAT NO., SPEC. NO., GRADE & BLOCK I.D. STAMPED ON SAMPLE HALF W/O HOLE.

4- SPARE STUD FROM NINE MILE STORE ROOM TO BE USED.

APPROVED ISSUE

ITEM	QTY	CODE IDENT	PART NUMBER	DESCRIPTION	MAT'L	MAT'L SPEC

PARTS LIST

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIM ARE IN INCHES. TOL: FRAC. ± 1/64
DEC X = ±.03 XX = ±.010 XXX = ±.005
ANGLES ±1°, SURFACE FINISH 63
DEBURR AND BREAK SHARP EDGES

MATERIAL —//—

FINISH —//—

SIGNATURES		DATE
DRAWN	W. HATCH, JR.	12/12/75
CHECKED	A. UZEL	12/12/75
APPROVED	J. Rance	12/15/75
ENGINEER	W J Mann	12/12/75

APPROVED DESIGN ACTIVITY 5530-300

APPROVED a H Yoh 12/12/75

AUTOMATION INDUSTRIES, INC.
NUCLEAR ENERGY SERVICES

TITLE: CALIBRATION REFERENCE STANDARD, C.H. STUD NMPC, NINE MILE

SIZE	CODE IDENT NO.	DRAWING NO.	REV
B	78446	80B0831	0

SCALE —//— SHEET

00B-044

DOCUMENT/ PAGE PULLED

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8005130359-03

APPENDIX N

NRC REGULATORY GUIDE 1.26

Revision 2
June 1975

U.S. NUCLEAR REGULATORY COMMISSION

REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 1.26

QUALITY GROUP CLASSIFICATIONS AND STANDARDS FOR WATER-, STEAM-, AND RADIOACTIVE-WASTE-CONTAINING COMPONENTS OF NUCLEAR POWER PLANTS*

A. INTRODUCTION

General Design Criterion 1, "Quality Standards and Records," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Licensing of Production and Utilization Facilities," requires that structures, systems, and components important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. Section 50.55a, "Codes and Standards," of 10 CFR Part 50 requires that components of the reactor coolant pressure boundary be designed, fabricated, erected, and tested in accordance with the requirements for Class 1[1] components of Section III of the ASME Boiler and Pressure Vessel Code or equivalent quality standards. This guide describes a quality classification system related to specified national standards that may be used to determine quality standards acceptable to the NRC staff for satisfying General Design Criterion 1 for other safety-related components containing radioactive material, water, or steam in water-cooled nuclear power plants. The Advisory Committee on Reactor Safeguards has been consulted concerning this guide and has concurred in the regulatory position.

B. DISCUSSION

After reviewing a number of applications for construction permits and operating licenses and after discussions with representatives of professional societies and industry, the NRC staff has developed a quality classification system for safety-related components containing radioactive material, water, or steam in water-cooled nuclear power plants. The system consists of four quality groups, A through D, methods for assigning components to these quality groups, and the specific quality standards applicable to each quality group. The initial portion of this system is described in §50.55a of 10 CFR Part 50, which requires that components of the reactor coolant pressure boundary be designed, fabricated, erected, and tested to the highest available national standards; this corresponds to the quality standard required for quality Group A of the NRC system. This guide describes a method for determining acceptable quality standards for the remaining safety-related components containing radioactive material, water, or steam, i.e., quality Group B, C, and D components. Other systems not covered by this guide, such as instrument and service air, diesel engine and its generators and auxiliary support systems, diesel fuel, emergency and normal ventilation, and fuel handling, should be designed, fabricated, erected, and tested to quality standards commensurate with the safety function to be performed. Evaluation to establish the quality group classification of these other systems should include consideration of the guidance provided in regulatory positions C.1 and C.2 of this guide.

C. REGULATORY POSITION

1. The Group B quality standards given in Table 1 of this guide should be applied to water- and steam-containing pressure vessels, heat exchangers (other than turbines and condensers), storage tanks, piping, pumps, and valves that are either part of the reactor coolant pressure boundary defined in §50.2(v) but excluded from the requirements of §50.55a[2] pursuant to footnote 2 of that section or are not part of the reactor coolant pressure boundary, but part of:

[1]Editions prior to 1971 of the ASME Boiler and Pressure Vessel Code, Section III, "Nuclear Power Plant Components," use the term Class A in lieu of Class 1.

*Lines indicate substantive changes from previous issue.

[2]Group A quality standards that are required for pressure-containing components of the reactor coolant pressure boundary are specified in Section 50.55a of 10 CFR Part 50.

a. Systems or portions of systems[3] important to safety that are designed for (1) emergency core cooling, (2) postaccident containment heat removal, or (3) postaccident fission product removal.

b. Systems or portions of systems[3] important to safety that are designed for (1) reactor shutdown or (2) residual heat removal.

c. Those portions of the steam systems of boiling water reactors extending from the outermost containment isolation valve up to but not including the turbine stop and bypass valves[4] and connected piping up to and including the first valve that is either normally closed or capable of automatic closure during all modes of normal reactor operation. Alternatively, for boiling water reactors containing a shutoff valve (in addition to the two containment isolation valves) in the main steam line and in the main feedwater line, Group B quality standards should be applied to those portions of the steam and feedwater systems extending from the outermost containment isolation valves up to and including the shutoff valve or the first valve that is either normally closed or capable of automatic closure during all modes of normal reactor operation.

d. Those portions of the steam and feedwater systems of pressurized water reactors extending from and including the secondary side of steam generators up to and including the outermost containment isolation valves and connected piping up to and including the first valve (including a safety or relief valve) that is either normally closed or capable of automatic closure during all modes of normal reactor operation.

e. Systems or portions of systems[3] that are connected to the reactor coolant pressure boundary and are not capable of being isolated from the boundary during all modes of normal reactor operation by two valves, each of which is either normally closed or capable of automatic closure.

2. The Group C quality standards given in Table 1 of this guide should be applied to water-, steam-, and radioactive-waste-containing pressure vessels, heat exchangers (other than turbines and condensers), storage tanks, piping, pumps, and valves not part of the reactor coolant pressure boundary or included in quality Group B but part of:

a. Cooling water and auxiliary feedwater systems or portions of these systems[3] important to safety that are designed for (1) emergency core cooling, (2) postaccident containment heat removal, (3) postaccident containment atmosphere cleanup, or (4) residual heat removal from the reactor and from the spent fuel storage pool (including primary and secondary cooling systems). Portions of these systems that are required for their safety functions and that (1) do not operate during any mode of normal reactor operation and (2) cannot be tested adequately should be classified as Group B.

b. Cooling water and seal water systems or portions of these systems[3] important to safety that are designed for functioning of components and systems important to safety, such as reactor coolant pumps, diesels, and control room.

c. Systems or portions of systems[3] that are connected to the reactor coolant pressure boundary and are capable of being isolated from that boundary during all modes of normal reactor operation by two valves, each of which is either normally closed or capable of automatic closure.[5]

d. Radioactive waste treatment, handling, and disposal systems,[6] except those portions of these systems whose postulated failure would not result in conservatively calculated potential offsite doses that exceed 0.5 rem to the whole body or its equivalent to any part of the body. For those systems located in Seismic Category I structures, only single component failures need be assumed. (However, no credit for automatic isolation from other components in the system or for treatment of released material should be taken unless the isolation or treatment capability is designed to the appropriate seismic and quality group standards and can withstand loss of offsite power and single failure of an active component.) Parts of these systems beyond the processing steps (such as monitoring tanks) may be classified as Group D if the plant Technical Specifications limit inventories to levels which, if released, would not result in conservatively calculated potential offsite doses that exceed 0.5 rem to the whole body or its equivalent to any part of the body.

---

[3] The system boundary includes those portions of the system required to accomplish the specified safety function and connected piping up to and including the first valve (including a safety or relief valve) that is either normally closed or capable of automatic closure when the safety function is required.

[4] The turbine stop valve and turbine bypass valve, although not included in quality Group B, should be subjected to a quality assurance program at a level generally equivalent to quality Group B.

[5] Components in influent lines may be classified as Group D provided they are capable of being isolated from the reactor coolant pressure boundary by an additional valve which has high leaktight integrity.

[6] The regulatory position regarding quality group classifications for these systems is under review. In the proposed revision specific components may be assigned to appropriate quality groups commensurate with the need to protect the health and safety of the public and operating personnel. A separate regulatory guide will be developed and issued to replace this subsection of Regulatory Guide 1.26.

e. Other systems not covered by items 2.a through 2.d above that contain or may contain radioactive material and whose postulated failure would result in conservatively calculated potential offsite doses (using meteorology as recommended by Regulatory Guides 1.3 (Revision 2), "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors," and 1.4 (Revision 2), "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors") that exceed 0.5 rem to the whole body or its equivalent to any part of the body. For those systems located in Seismic Category I structures, only single component failures need be assumed. (However, no credit for automatic isolation from other components in the system or for treatment of released material should be taken unless the isolation or treatment capability is designed to the appropriate seismic and quality group standards and can withstand loss of offsite power and a single failure of an active component.)

3. The Group D quality standards given in Table 1 of this guide should be applied to water- and steam-containing components not part of the reactor coolant pressure boundary or included in quality Groups B or C but part of systems or portions of systems that contain or may contain radioactive material.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the staff's plans for utilizing this regulatory guide.

Except in those cases in which the applicant proposes an alternative method for complying with specified portions of the Commission's regulations, the quality group classifications and standards described herein will be used in the evaluation of submittals for operating license or construction permit applications docketed after January 1, 1975.

If an applicant wishes to use this regulatory guide in developing submittals for applications docketed on or before January 1, 1975, the pertinent portions of the application will be evaluated on the basis of this guide.

TABLE 1

Components	QUALITY STANDARDS		
	Quality Group B	*Quality Group C*	*Quality Group D*
Pressure Vessels	ASME Boiler and Pressure Vessel Code, Section III, "Nuclear Power Plant Components,"[a,b,c] Class 2	ASME Boiler and Pressure Vessel Code, Section III, "Nuclear Power Plant Components,"[a,b,c] Class 3	ASME Boiler and Pressure Vessel Code, Section VIII Division 1
Piping	As above	As above	ANSI B31.1, Power Piping
Pumps	As above	As above	Manufacturer's standards
Valves	As above	As above	ANSI B31.1
Atmospheric Storage Tanks	As above	As above	API-650, AWWA D100, or ANSI B96.1
0-15 psig Storage Tanks	As above	As above	API-620

[a]See Section 50.55a for guidance with regard to the Code and Addenda to be applied.
[b]ASME Code N–symbol need not be applied.
[c]The specific applicability of code cases will be covered separately in other regulatory guides or in Commission regulations, where appropriate. Applicants proposing the use of code cases not covered by guides or regulations should demonstrate that an acceptable level of quality and safety would be achieved.

APPENDIX J

RECORDS AND REPORTS

APPENDIX J

Records and Reports

The record system developed and implemented by NES shall be consistent with the requirements of ANSI N45.2.9, Requirements for Collection, Storage and Maintenance of Quality Assurance Records for Nuclear Power Plants. This record system shall be set up and maintained at the Nine Mile Point Unit 1 Plant.

The control of the inspection data obtained in the field shall be in accordance with CONAM Inspections' Document Number 25-DC-001, Inservice Inspection Data Control System, Revision 1, July 24, 1975 with the following objectives:

(1) To insure performance of all required examination

(2) To provide a current indication of the status of examinations

(3) To prevent the loss of data sheets

(4) To verify the completeness and accuracy of all submitted data

(5) To identify and correct inspection difficulties as they are reported on the data sheets

Following the completion of each inspection a detailed report will be submitted to the owner, as required by Article IWA-6000 of Section XI of the ASME Boiler and Pressure Vessel Code. The examination report shall be prepared by NES and will include, as a minimum, the following details:

(1) A chronological summary of all inspections made that will reference the test and calibration records, and other documents that verify the tests. This summary will also certify that the tests were performed in accordance with all the applicable codes and specifications.

(2) Copies of all calibration records, examination records, examination read-outs, examination results, and isometrics properly catalogued and cross referenced.

(3) Copies of all procedures used

(4) Copies of the engineering analyses which characterize reportable indications in accordance with the method of Section XI of the ASME Code, the evaluation of the reportable indication with respect to determining its acceptance or rejection (in accordance with the Standards of Sections III and XI of the ASME Code), and a repair method which meets the requirements of Sections III, IX and XI of the ASME Code.

(5) Examination personnel certifications

Photographs will be included where required for clarification of access or to show significant observations and/or indications.

APPENDIX K

EVALUATION CRITERIA

APPENDIX K

Evaluation Criteria

Evaluation shall be made of any indications detected during the ten-year inspection interval at the Nine Mile Point Unit 1 plant as required by Article IWA-3000 of Section XI. Since the 1974 Edition of Section XI of the ASME Boiler and Pressure Code (including the 1974 Summer Addenda) is not complete in that evaluation criteria for particular components or examination categories are still in preparation, evaluation shall be made for materials and welds specified in Section III applicable to the construction of the component in order to determine disposition.

Table K-1 is a list of the various code examination categories and the applicable evaluation criteria to be used for the inspection made during the first ten-year inspection interval at Nine Mile Point, Unit 1, as required by the 1974 Edition of Section XI of the ASME Boiler and Pressure Vessel Code.

The Class A Criteria are taken from table IWB-3410,"Evaluation Standards", of Article IWB-3000 of Section XI of the ASME Code.

Since the corresponding sections for Class B and Class C component examination evaluation, (Articles IWC-3000 and IWD-3000 respectively) are in course of preparation as of this writing, the appropriate evaluation criteria used for Class A components will be applied to Class B and Class C component examinations as well.

It is the intent of the program to utilize, to the extent possible, the latest evaluation criteria which will be included as part of Section XI during the ten-year interval.

TABLE K-1 EVALUATION CRITERIA

Examination Category	Evaluation Criteria Used
B-A	Section XI (including Summer 1974 Addenda), IWB-3510
B-B, B-C, C-A	, IWB-3511
B-D, C-B	, IWB-3512
B-F, B-J, B-O, C-F, C-G	, IWB-3514
B-G-1	, IWB-3515
B-I-1	, IWB-3517
All other categories requiring volumetric examination	, and Section III, as applicable.
All categories requiring surface examination	Section III (1974), NB-2500 as applicable
All categories requiring visual examination (including hydrostatic)	Section III (1974) as applicable

APPENDIX L

PERSONNEL QUALIFICATION REQUIREMENTS

APPENDIX L

Personnel Qualification Requirements

Personnel performing non-destructive examination operations shall be qualified with a procedure prepared in accordance with SNT-TC-1A for the applicable examination technique and methods as required by Subarticle IWA-2300(a) of Section XI of the ASME Boiler and Pressure Vessel Code.

The following CONAM Inspection procedures provide uniform programs of qualification and certification for the examination personnel for the non-destructive examination methods indicated.

(1) CVEP-PSIS, Procedure for Certifying Visual Examination Personnel for Preservice/Inservice Examination, January 1973

(2) CVIP-1, Procedure for Certifying Visual Weld Inspection Personnel, Revision 2, November 1973

(3) CPTP-1, Procedure for Certifying Penetrant Test Personnel, Revision 3, April 1975

(4) CUTP-1, Procedure for Certifying Ultrasonic Test Personnel, Revision 1, September 1970.

APPENDIX M

ASME CODE SECTION XI (1974 AND SUMMER 1974 ADDENDA)

ASME BOILER AND PRESSURE VESSEL CODE

An American National Standard

SECTION XI

Rules for Inservice Inspection of Nuclear Power Plant Components

1974 EDITION

July 1, 1974

ASME BOILER AND PRESSURE VESSEL COMMITTEE
SUBCOMMITTEE ON NUCLEAR POWER
SUBGROUP ON INSERVICE INSPECTION

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
UNITED ENGINEERING CENTER
345 EAST FORTY-SEVENTH STREET, NEW YORK, N.Y. 10017

Date of Issue – July 1, 1974
(Includes all Addenda dated December 1973 and earlier)

Library of Congress Catalog Card Number: 56-3934
Printed in the United States of America

Adopted by the Council of The American Society of Mechanical Engineers, 1914.
Revised 1940, 1941, 1943, 1946, 1949, 1952, 1953, 1956, 1959, 1962, 1965, 1968, 1971, 1974

1974 ASME BOILER AND PRESSURE VESSEL CODE

An American National Standard

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*Available in bound and loose-leaf versions. The bound version is necessary for ASME Certification.

Code Cases

The Boiler and Pressure Vessel Committee meets regularly to consider requests for interpretations of the Code and to consider rulings for conditions encountered requiring special provisions. Those which have been adopted are in the 1974 Case Book. Modifications will be sent automatically to the purchasers of the Case Book up to the publication of the 1977 Edition.

Addenda

Colored-sheet Addenda, which include additions and revisions to individual Sections of the Code, are published twice a year and will be sent automatically to purchasers of the applicable Sections up to the publication of the 1977 Code. Purchasers of the bound versions of the Sections will receive bound Addenda. Purchasers of the loose-leaf versions of the Sections will receive replacement pages approximately 3 months after the bound version is published.

Addenda Color Legend

Pink	Summer 1974	Blue	Winter 1975
Green	Winter 1974	Salmon	Summer 1976
Yellow	Summer 1975	Gray	Winter 1976

FOREWORD

The American Society of Mechanical Engineers set up a committee in 1911 for the purpose of formulating standard rules for the construction of steam boilers and other pressure vessels. This committee is now called the Boiler and Pressure Vessel Committee.

The Committee's function is to establish rules of safety governing the design, fabrication, and inspection during construction of boilers and unfired pressure vessels, and to interpret these rules when questions arise regarding their intent. In formulating the rules, the Committee considers the needs of users, manufacturers, and inspectors of pressure vessels. The objective of the rules is to afford reasonably certain protection of life and property and to provide a margin for deterioration in service so as to give a reasonably long safe period of usefulness. Advancements in design and material, and the evidence of experience have been recognized.

The Boiler and Pressure Vessel Committee deals with the care and inspection of boilers and pressure vessels in service only to the extent of providing suggested rules of good practice as an aid to owners and their inspectors.

The rules established by the Committee are not to be interpreted as approving, recommending, or endorsing any proprietary or specific design or as limiting in any way the manufacturer's freedom to choose any method of design or any form of construction that conforms to the Code rules.

The Boiler and Pressure Vessel Committee meets regularly to consider requests for interpretations and revisions of the rules. Inquiries must be in writing and must give full particulars in order to receive consideration. Requests for interpretations which are of a routine nature may be executed by the Secretary of the Boiler and Pressure Vessel Committee without reference to a subcommittee. All other requests are first referred to the proper subcommittee for consideration and for recommendation of action by the Main Committee. The action of the Main Committee becomes effective only after confirmation by letter ballot of the Committee and approval by the Council of the Society.

Committee rulings of general interest are published in *Mechanical Engineering* as Code Cases, and inquirers are advised of the action taken. Code revisions approved by the Committee are published in *Mechanical Engineering* as proposed addenda to the Code to invite comments from all interested persons. After final approval by the Committee and adoption by the ASME Council, they are printed in the addenda supplements to the Code.

Code Cases may be used in the construction of components to be stamped with the ASME Code symbol beginning with the date of their approval by the ASME Council.

After Code revisions are approved by Council they may be used beginning with the date of issuance shown on the addenda. Revisions become mandatory as minimum requirements six months after such date of issuance, except for boilers or pressure vessels contracted for prior to the end of the six-month period.

Manufacturers and users of components are cautioned against making use of revisions and Cases that are less restrictive than former requirements without having assurance that they have been accepted by the proper authorities in the jurisdiction where the component is to be installed.

Each state and municipality in the United States and each province in the Dominion of Canada that adopts or accepts one or more Sections of the Boiler and Pressure Vessel Code is invited to appoint a representative to act on the Conference Committee to the Boiler and Pressure Vessel Committee. Since the members of the Conference Committee are in active contact with the administration and enforcement of the rules, the requirements for inspection in this Code correspond with those in effect in their respective jurisdictions. The required qualifications for an Authorized Inspector under these rules may be obtained from the administrative authority of any

state, municipality, or province which has adopted these rules.

The Boiler and Pressure Vessel Committee in the formulation of its rules and in the establishment of maximum design and operating pressures considers materials, construction, method of fabrication, inspection, and safety devices. Permission may be granted to regulatory bodies and organizations publishing safety standards to use a complete Section of the Code by reference. If usage of a Section, such as Section IX, involves exceptions, omissions, or changes in provisions, the intent of the Code might not be attained.

Where a state or other regulatory body, in the printing of any Section of the ASME Boiler and Pressure Vessel Code, makes additions or omissions, it is recommended that such changes be clearly indicated.

The National Board of Boiler and Pressure Vessel Inspectors is composed of chief inspectors of states and municipalities in the United States and of provinces in the Dominion of Canada that have adopted the Boiler and Pressure Vessel Code. This Board, since its organization in 1919, has functioned to uniformly administer and enforce the rules of the Boiler and Pressure Vessel Code. The cooperation of that organization with the Boiler and Pressure Vessel Committee has been extremely helpful. Its function is clearly recognized and, as a result, inquiries received which bear on the administration or application of the rules are referred directly to the National Board. Such handling of this type of inquiry not only simplifies the work of the Boiler and Pressure Vessel Committee, but action on the problem for the inquirer is thereby expedited. Where an inquiry is neither clearly an interpretation of the rules nor a problem of application or administration, it may be considered both by the Boiler and Pressure Vessel Committee and the National Board.

It should be pointed out that the state or municipality where the Boiler and Pressure Vessel Code has been made effective has definite jurisdiction over any particular installation. Inquiries dealing with problems of local character should be directed to the proper authority of such state or municipality. Such authority may, if there is any question or doubt as to the proper interpretation, refer the question to the Boiler and Pressure Vessel Committee.

The Specifications for base materials given in Section II, Parts A and B, are identical with or similar to those of The American Society for Testing and Materials. The Specifications for welding materials given in Section II, Part C, are identical with or similar to those of The American Welding Society. Use of the materials described in these Specifications is covered by the rules in one or more Sections of the ASME Boiler and Pressure Vessel Code. All materials allowed by these various Sections and used for construction within the scope of their rules shall be furnished in accordance with ASME Materials Specifications contained in Section II except where otherwise provided in Code Cases or in the applicable Section of the Code. Materials covered by these Specifications are acceptable for use in items covered by the Code Sections only to the degree indicated in the applicable Section. Materials for Code use should preferably be ordered, produced, and documented on this basis; however, material produced under an ASTM Specification may be designated as complying with the corresponding ASME Specification, provided the latter Specification is indicated to be identical with the ASTM Specification for the Grade, Class, or Type produced, and provided the material is confirmed as complying with the ASTM Specification by material test report or certification of compliance from the material manufacturer.

STATEMENT OF POLICY ON THE USE OF CODE SYMBOLS IN ADVERTISING

The American Society of Mechanical Engineers established a series of symbols for the marking of boilers, pressure vessels, and nuclear power plant components, such as vessels, piping, pumps and valves, and certain appurtenances which have been constructed and inspected in compliance with the ASME Boiler and Pressure Vessel Code. It is the aim of the Society to maintain the standing of the Code Symbols for the benefit of the users, the enforcement jurisdictions and the holders of the symbols who comply with all requirements. Based on that objective, the following policy has been established on the usage in advertising of facsimiles of the symbols and reference to Code construction.

The American Society of Mechanical Engineers does not "approve," "certify," "rate", or "endorse" any product or construction and there shall be no statements or implications which might so indicate. A manufacturer holding a Code Symbol and a Certificate of Authorization may state in advertising literature that its products "are built in accordance with the requirements of the ASME Boiler and Pressure Vessel Code," or "meet the requirements of the ASME Boiler and Pressure Vessel Code."

The ASME Symbol shall be used only for stamping and name plates as specifically provided in the Code. However, facsimiles may be used for the purpose of fostering the use of such construction. Such usage may be by an association or a society, or by a holder of a Code Symbol who may also use the facsimile in advertising to show that clearly specified products will carry the symbol. General usage is permitted only when *all* of a manufacturer's products are constructed under the Rules.

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FOREWORD TO SECTION XI

INTRODUCTION

Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, of the ASME Boiler and Pressure Vessel Code is addressed to provide rules for the examination, testing, and inspection of Class 1, 2, and 3 components and systems in a nuclear power plant. Application of this Section of the Code begins when the requirements of Section III, Rules for Construction of Nuclear Power Plant Components, have been satisfied.

GENERAL

The rules of this Section constitute requirements to maintain the nuclear power plant and to return the plant to service, following plant outages, in a safe and expeditious manner. The rules require a mandatory program of examinations, testing, and inspections to evidence adequate safety. The rules also stipulate duties of the Authorized Inspector to verify the mandatory program has been completed, permitting the plant to return to service in an expeditious manner.

OWNER RESPONSIBILITIES

The Owner of the nuclear power plant is assigned the responsibilities to develop a program which will demonstrate conformance to the requirements of this Section of the Code. Responsibilities assigned the Owner include the requirements to provide access in the design and arrangement of the plant to conduct the examination and tests. The Owner's responsibilities include developing plans and schedules, including detailed examination and testing procedures for filing with the enforcement and regulatory authorities having jurisdiction at the plant site.

Conduct of the program of examinations and tests, system leakage and hydrostatic pressure tests, as well as performance tests of pumps and valves, are assigned as Owner responsibilities. The Owner is responsible for recording the results of the examinations and tests, including corrective actions required and the actions taken.

DUTIES OF THE AUTHORIZED INSPECTOR

Section XI differs from Section VI, *Care and Operation of Heating Boilers,* and Section VII, *Care of Power Boilers,* in that the rules for Inservice Inspection of Nuclear Power Plants are mandatory, while the other two Sections are Recommended Practices. Duties of the Authorized Inspector are assigned by Section XI, to verify, assure, or witness, that the responsibilities of the Owner and the mandatory requirements of this Section are met. Duties of the Authorized Inspector include witnessing the pressure testing, reviewing nondestructive examination procedures, reviewing repair programs, and verifying that the visual examinations and tests on pumps and valves have been completed and the results recorded. Listed as one of the duties is the prerogative of the Inspector to require requalification of any operator or procedure when he has reason to believe the requirements are not being met.

ORGANIZATION OF SECTION XI

DIVISIONS: This Section of the Code, hereinafter referred to as this Section, consists of three Divisions, as follows:

Division 1 Rules for Inspection and Testing of Components of Light-Water Cooled Plants

Division 2 Rules for Inspection and Testing of Components of Gas-Cooled Plants (In course of preparation)

Division 3 Rules for Inspection and Testing of Components of Liquid-Metal Cooled Plants (In course of preparation)

SUBSECTIONS: The Divisions are broken down into Subsections which are designated by capital letters, preceded by the letters IW in Division 1, by the letters IG in Division 2, and by the letters IM in Division 3.

Division 1 consists of Subsections covering the following aspects of the rules:

Subsection	Title
IWA	GENERAL REQUIREMENTS
IWB	CLASS 1 COMPONENTS
IWC	CLASS 2 COMPONENTS
IWD	CLASS 3 COMPONENTS
IWE	CONTAINMENT (In course of preparation)
IWF	COMPONENT SUPPORTS (In course of preparation)
IWG	CORE INTERNAL STRUCTURES (In course of preparation)
IWP	PUMPS
IWV	VALVES

Divisions 2 and 3 are in course of preparation.

Subsections are divided by Articles, Subarticles, Paragraphs, and where necessary, into Subparagraphs.

ARTICLES: Articles are designated by the applicable letters indicated above for the Subsections, followed by Arabic numbers, such as: IWA-1000, IWA-2000, etc. Insofar as possible, Articles dealing with the same general topics are given the same number in each Subsection, in accordance with the following general scheme:

Article Number	Title
1000	Scope and Responsibility
2000	Examination and Inspection
3000	Evaluation of Examination Results
4000	Repair Procedures
5000	Systems Pressure Tests
6000	Records and Reports

Attention of users of this Section is directed to the fact that the numbering of the Articles and the material thereunder may not be consecutive. Such discontinuity is recognized and is not the result of editorial or printing errors. An attempt has been made, insofar as possible, to follow a uniform outline in the various Subsections and Articles. Due to the fact that the complete outline may cover phases not applicable to a particular Subsection or Article, the rules have been prepared with gaps in the numbering. It is believed that, in this way, cross-referencing between parts of this document is made easier and use of the rules facilitated since, in general, the same subject appears under the same number and subnumber throughout.

SUBARTICLES: Subarticles are numbered in units of 100, such as IWA-1100, IWA-1200, etc.

SUBSUBARTICLES: Subsubarticles are numbered in units of 10, such as IWA-2130, and may have no text. When a number such as IWA-1110 is followed by text, it is considered a Paragraph.

PARAGRAPHS: Paragraphs are numbered in units of 1, such as IWA-2131, IWA-2132, etc., and when minor subdivisions of them are desirable, they are indicated by lower case letters in parentheses.

SUBPARAGRAPHS: Subparagraphs are designated by adding a decimal followed by one or more digits to the Paragraph numbers, such as IWA-1111.1, IWA-1111.2, etc. when they are major subdivisions of a Paragraph or, when they are minor subdivisions, they may be designated by lower case letters in parentheses, such as IWA-1111(a), IWA-1111(b), etc.

REFERENCES: References used within this Section generally fall into one of five categories, as explained below.

REFERENCES TO OTHER PORTIONS OF THIS SECTION: When a reference is made in a rule to another article, subarticle, or paragraph number, it is intended that all numbers, subsidiary to that to which reference is made, shall be included. For example, reference to IWA-2000 includes all material in Article IWA-2000; reference to IWA-2200 includes all material in Subarticle IWA-2200; reference to IWA-2220 includes all Paragraphs IWA-2220 through IWA-2222.

REFERENCES TO OTHER SECTIONS OF THIS CODE: Other Sections of this Code referred to in this Section are as follows:

1. SECTION II. MATERIALS SPECIFICATIONS

(a) When a requirement relative to a material is stipulated in this Section to be in accordance with a specification, such as SA-105 (for ferrous materials) or such as SB-160 (for nonferrous materials), it shall be understood to mean the material specification of the number given as found in Section II of this Code.

(b) When a requirement relative to examination or testing of a material is stipulated in this Section to be in accordance with a specification, such as SA-370, for example, it shall be understood

to mean the specification of the number given as found in Section II of this Code.

(c) Materials conforming to ASTM specifications may be used in accordance with the provisions of the last paragraph of the Foreword.

2. SECTION III. NUCLEAR POWER PLANT COMPONENTS

In this Section, a reference to an Article, paragraph, figure, or table of Section III relative to nuclear power plant component design or construction requirements shall be understood to mean the designated Article, paragraph, figure, or table of Section III of this Code. Such references are prefixed with the letter N.

3. SECTION V. NONDESTRUCTIVE EXAMINATION

In this Section, a reference to an Article, paragraph, figure, or table of Section V relative to nondestructive examination of materials or welds shall be understood to mean the designated Article, paragraph, figure, or table of Section V of this Code. Such references are prefixed with the letter T.

4. SECTION IX. WELDING AND BRAZING QUALIFICATIONS

In this Section, a reference to a paragraph, figure, or table of Section IX relative to welding qualifications requirements shall be understood to mean the designated paragraph, figure, or table in Section IX, 1974 Edition, of this Code. Such references are prefixed with the letter Q.

REFERENCES TO SPECIFICATIONS AND STANDARDS OTHER THAN PUBLISHED IN SECTIONS OF THIS CODE

(a) Specifications for examination methods and acceptance standards to be used in connection with them are published by the American Society for Testing and Materials and are designated by the letters "ASTM" followed by the serialization for the particular specification or standard. For example, a reference to ASTM-E-185-70 shall be understood to mean the specification, so designated, published by the American Society for Testing and Materials.[1]

(b) Recommended practices for qualifying and certifying nondestructive testing personnel are published by the American Society for Nondestructive Testing. These documents are designated SNT-TC-1A.[2] A reference to SNT-TC-1A shall be understood to mean the practice and its supplements, so designated, 1968 Edition, unless otherwise specified.

REFERENCES TO GOVERNMENT REGULATIONS

(a) U. S. Federal regulations issued by executive departments and agencies, as published in the *Federal Register*, are codified in the Code of Federal Regulations.[3] Title 10 of the Code of Federal Regulations contains the regulations promulgated on the subject of "Atomic Energy." The abbreviated reference "10 CFR 50" shall be understood to mean "Title 10, Code of Federal Regulations, Part 50."

(b) The U. S. Atomic Energy Commission (USAEC) issues *Regulatory Guides* to describe methods acceptable to the USAEC regulatory staff of implementing specific parts of the USAEC's regulations and, in some cases, to delineate techniques used by the staff in evaluating specific problems or postulated accidents and to provide guidance concerning certain of the information needed by the regulatory staff in its review of applications for permits and licenses. *Safety Guides* and *Information Guides* previously issued by the USAEC will be reissued as *Regulatory Guides* as they are revised. A reference to a *Regulatory Guide*,[4] *Safety Guide*, or *Information Guide* shall be understood to mean the Guide as noted in the *Federal Register*.

REFERENCES TO APPENDICES

Two types of Appendices are used in this Section and are designated Mandatory (those containing requirements that must be followed) and Nonmandatory (those that provide useful information or guidance in the use of this Section). Mandatory Appendices are designated by a prefix which is a Roman numeral. This is followed by an Arabic number, such as 1.2 in the case of tables, but if the Appendix is mainly text, the succeeding number consists of four digits or more as in the case of the texts of the Articles and Subarticles of this Section. The same methods of designation are used for Nonmandatory Appendices except that the prefix is a capital letter, such as A. References such as "Table I-1.2" or "II-1030" shall be understood to mean references to Mandatory Appendices I and II, respectively, of this Section. References, such as "B-1030" or "Table C-1.1" shall be understood to mean references to Nonmandatory Appendices B and C, respectively, of this Section.

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[1]ASTM Standards are published by American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

[2]SNT-TC-1A is published by the American Society for Nondestructive Testing, 914 Chicago Avenue, Evanston, Illinois 60202.

[3]Codes of Federal Regulations are published by the Office of the Federal Register, National Archives and Records Service, General Service Administration, and may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

[4]Regulatory Guides, Safety Guides and Information Guides are published by and may be obtained from the U. S. Atomic Energy Commission, Washington, D.C. 20545, Attention: Director of Regulatory Standards.

DIVISION 1

RULES FOR INSPECTION AND TESTING OF COMPONENTS OF LIGHT-WATER COOLED PLANTS

SUBSECTION IWA

GENERAL REQUIREMENTS

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ARTICLE IWA-1000
SCOPE AND RESPONSIBILITY

IWA-1100 SCOPE

(a) This Division defines the rules and requirements for inservice inspection[1] of Class 1, 2, and 3 pressure-retaining components[2,3] (and their supports) and inservice testing of pumps and valves in light-water cooled nuclear power plants.

(b) This Division categorizes the areas subject to inspection and defines responsibilities, provisions for accessibility, examination methods, examination techniques and procedures, personnel qualifications, frequency of inspection, records, evaluation of inspection results, disposition, and repair requirements.

IWA-1200 JURISDICTION

The jurisdiction and requirements of this Section apply to individual components and complete nuclear power plants that have met all the requirements of the construction Code, at the point in time the requirements have been completed, and irrespective of the physical location. Where portions of systems, or plants, are completed at different times, jurisdiction of this Section may be assumed on only those portions on which all of the construction requirements have been met.

IWA-1300 COMPONENTS SUBJECT TO INSPECTION

(a) The inspection requirements of this Division shall apply to all Class 1, 2, and 3 pressure-retaining components except for those specifically excluded.

(b) The components include all pressure vessels, piping, pumps, and valves as defined by system group classification criteria of regulatory authorities having jurisdiction at the nuclear power plant site.

[1]"Inservice Inspection" includes preservice requirements unless a distinction is made in the text.

[2]"Pressure-Retaining Components" is described in NA-1120.

[3]Classes 1, 2 and 3 refer to components constructed in accordance with the rules for Classes 1, 2, and 3, respectively, of Section III.

IWA-1400 OWNER'S RESPONSIBILITY

Performance of the inservice inspections required by this Division shall be the responsibility of the Owner[1] of the nuclear power system.[2] This responsibility shall include the following:

(a) The Owner of the nuclear power plant is responsible for determining the appropriate Code Class(es) for each component[3] of the nuclear power plant,

(b) the design and arrangement of the system components to include allowance for adequate clearances for the conduct of the examinations,

(c) the preparation of plans and schedule and filing with enforcement and regulatory authorities having jurisdiction at the plant site,

(d) the development and preparation of written examination instructions and procedures, including diagrams or system drawings delineating the identification and extent of areas of components subject to examination,

(e) verification of the qualifications of personnel who perform the examinations required by this Division for the specific levels of responsibility in accordance with IWA-2300,

(f) the possession of an arrangement with an Authorized Inspection Agency to provide inspection services,

(g) the performance of the detailed examinations of all pressure-retaining components as required,

(h) the recording of all inspection and examination and test results that provide a basis for evaluation and facilitate comparison with the results from subsequent examinations,

[1]As used throughout this Section, the word "Owner" refers to the organization responsible for the operation, maintenance, safety, and power generation of the nuclear power system.

[2]A nuclear power system is that part of a nuclear power plant or unit that serves the purpose of producing or controlling the output of nuclear energy from nuclear fuel.

[3]Classification criteria are specified in 10 CFR 50, and in AEC Regulatory Guide 1.26, "Quality Group Classification and Standards."

(i) the evaluation of the results of each examination and test,

(j) the maintenance of adequate records of inspections, examinations, and tests performed, such as radiographs, diagrams, drawings, inspection data, and personnel qualifications,

(k) the retention of all inspection and examination and test records for the service lifetime of the component examined.

IWA-1500 ACCESSIBILITY

Provisions for accessibility shall include the following considerations:[1]

[1]Design considerations other than access provisions may be applicable to specific system components to render inservice inspections practical (e.g., surface finish of components subject to crud or corrosion product buildup, material selection to minimize activation in service, shielding from irradiation effects, etc.).

(a) Access for the Inspector or examination personnel and equipment necessary to conduct the examinations,

(b) removal and storage of structural members, shielding components, insulating materials, and other equipment and components required to perform the specified visual observations, examinations, and tests,

(c) installation and support of handling machinery (e.g., hoists or other handling equipment) where required to facilitate removal, disassembly and storage of equipment, components, and other materials,

(d) conduct of alternative examinations to those specified herein in the event structural defects or indications are revealed that may require such alternative examinations,

(e) performance of necessary operations associated with repair or replacement of system components in the event structural defects or indications are revealed that may require such repairs or replacements.

ARTICLE IWA-2000
EXAMINATION AND INSPECTION

IWA-2100 GENERAL

IWA-2110 DEFINITIONS

(a) *Examination*—denotes the performance of all visual observation and nondestructive testing such as radiography, ultrasonic, liquid penetrant, and magnetic particle methods.

(b) *Inspection*—denotes verifying the performance of examinations by an Inspector representing a State or Municipality of the United States, Canadian Province, Authorized Inspection Agency, or other enforcement authorities having jurisdiction over the nuclear power components at the plant site.

(c) *Flaw indication*—denotes the evidence or signal obtained by application of a nondestructive examination that may reveal the presence of a flaw. Flaw indications include cracks, slag inclusions or segregates, aligned or clustered porosity, lack of weld penetration, lack of weld fusion, and laminations or combinations thereof.

(d) *Inspector*—denotes an "Authorized Inspector" as defined in IWA-2130.

(e) *Enforcement authority*—denotes a regional or local governing body such as a State or Municipality of the United States or Canadian Province empowered to enact and enforce boiler code legislation.

(f) *Regulatory authority*—denotes a Federal Government agency, such as the United States Atomic Energy Commission, empowered to issue and enforce regulations concerning the design, construction, and operation of nuclear power plants.

IWA-2120 DUTIES OF THE INSPECTOR

(a) It is the duty of the Inspector to witness or otherwise verify all the examinations and pressure tests required by this Division for Class 1 components and for Class 2 components where required. The Inspector shall also make any additional investigations necessary to verify that all applicable requirements have been met.

(b) It is the duty of the Inspector to assure himself that the nondestructive examination methods used follow the techniques specified in this Division. The Inspector shall also assure himself that the examinations are performed in accordance with written qualified procedures and by personnel employed by the Owner or his agent and qualified in accordance with SNT-TC-1A and IWA-2300. The duties of the Inspector include checking with his Inspection Specialists for the technical content and requirements of the examination procedures and the qualification procedures of nondestructive examination personnel.

(c) It is the duty of the Inspector to assure himself that the inservice tests required on pumps and valves (IWP and IWV) have been completed and the results recorded.

(d) It is the duty of the Inspector to assure himself that the examinations and tests required for Class 3 components and systems (IWD-1000) have been conducted and the results recorded.

(e) The Inspector has the right at any time to require requalification of any procedure or operator when the Inspector has reason to believe the requirements are not being met.

(f) The examination records shall be certified by the Inspector only after he has satisfied himself that all the requirements have been met and that the records are correct.

(g) The Inspector shall review the repair program to determine compliance with the requirements of this Division.

(h) It is the duty of the Inspector to assure himself that the welding procedures employed during the repair and the welding operators are qualified in accordance with IWA-4000 and that all nondestructive examination methods used comply with requirements in IWA-2200 and IWA-2300.

IWA-2130 QUALIFICATION OF INSPECTORS, INSPECTION SPECIALISTS, AND INSPECTION AGENCIES

(a) The inspection required by this Division shall be performed:

(1) when the nuclear power plant is in the United States by an Inspector employed by a State or Municipality of the United States or an Inspector regularly employed by an insurance company authorized to write boiler and pressure vessel insurance in the United States; or

(2) when the nuclear power plant is in Canada by an Inspector employed by a Canadian Province or where authorized by the Province in which the nuclear power plant is located by an Inspector regularly employed by an insurance company licensed to write boiler and pressure vessel insurance in that Province; or

(3) by an Inspector employed by other enforcement authorities in the United States or Canada having jurisdiction over the designated nuclear power plant.

(b) Any Inspector who performs inspections required by this Division shall have first been qualified by written examination pursuant to the legislation or rules of a State of the United States, the legislation of a Canadian Province, or the rules of another authority having jurisdiction over a nuclear power plant at the installation location and that has adopted this Division. The Inspector shall not be an employee of the Owner or his agent.

(c) The following rules shall apply to inspection agencies:

(1) An Authorized Inspection Agency is one designated as such by the appropriate legal authority of a State or Municipality of the United States or a Province of Canada. The agency employs the Inspectors who perform inspections required by this Division. The agency may be a State or Municipality of the United States, a Province of Canada, or an insurance company authorized to write boiler and pressure vessel insurance in that jurisdiction.

(2) Any inspection agency performing the required inspections shall, in addition to Inspectors, maintain a staff of Inspection Specialists, each of whom shall have demonstrated his qualifications by passing an ASME approved nondestructive testing examination in one or more methods of nondestructive examination, and the special tests required by ASME for knowledge of Section XI and familiarity with Section III.

(d) The Inspectors, Inspection Specialists, and staff, as an organization, shall be competent in the application and evaluation of all nondestructive examination methods listed in this Division. The Inspection Specialists shall be available as needed for consultation and support of the Inspectors.

IWA-2140 ACCESS FOR INSPECTOR

The Owner shall arrange for an Inspector to have access to all parts of the plant necessary for making the required inspection. The Owner shall keep the Inspector informed of the progress of the preparatory work necessary to permit inspections and shall notify him reasonably in advance of when the components will be ready for any required inspections.

IWA-2200 EXAMINATION TECHNIQUES AND PROCEDURES

Methods, techniques, and procedures for the inservice inspections are titled *visual, surface,* and *volumetric.* Each term describes a general method permitting a selection of different techniques or procedures restricted to that method to accommodate varying degrees of accessibility and radiation levels, and the automation of equipment to perform the examinations.

IWA-2210 VISUAL EXAMINATION

(a) A visual examination is employed to provide a report of the general condition of the part, component, or surface to be examined, including such conditions as scratches, wear, cracks, corrosion, or erosion on the surfaces; misalignment or movement of the part or component; or evidence of leaking.

(b) Visual examination shall be conducted in accordance with Article 9 of Section V, except that lighting shall be sufficient to resolve the $1/32$ in. line.

IWA-2211 Replication

Surface replication methods shall be considered acceptable, provided the surface resolution is at least equivalent to that obtainable by the visual observation.

IWA-2212 Cleaning

Visual examinations that require clean surfaces or decontamination for valid interpretation of results shall be preceded by appropriate cleaning processes.[1]

[1]Since cleaning specifications and standards are not yet fully developed, it is recommended that special investigations and precautions be taken before any cleaning process is used.

IWA-2220 SURFACE EXAMINATION

A surface examination is specified to delineate or verify the presence of surface or near surface cracks or discontinuities. It may be conducted by either a magnetic particle or a liquid penetrant method where the surface condition, material, and accessibility permit such an examination.

IWA-2221 Magnetic Particle Examination

Magnetic particle examination shall be conducted in accordance with Article 7 of Section V.

IWA-2222 Liquid Penetrant Examination

Liquid penetrant examination shall be conducted in accordance with Article 6 of Section V.

IWA-2230 VOLUMETRIC EXAMINATION

A volumetric examination is for the purpose of indicating the presence of subsurface discontinuities with a method or technique capable of examining the entire volume of metal contained beneath the surface to be examined.

IWA-2231 Radiographic Examination

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

IWA-2232 Ultrasonic Examination

Ultrasonic examination shall be conducted in accordance with the provisions of Appendix I. Where Appendix I (I-1200) is not applicable, the provisions of Article 5 of Section V shall apply.

IWA-2240 ALTERNATIVE EXAMINATIONS

Alternative examination methods, combination of methods, or newly developed techniques may be substituted for the methods specified in this Division, provided the results yield demonstrated equivalence or superiority to the satisfaction of the Inspection Specialist.

IWA-2300 QUALIFICATIONS OF NONDESTRUCTIVE EXAMINATION PERSONNEL

(a) Personnel performing nondestructive examination operations shall be qualified with a procedure prepared in accordance with SNT-TC-1A for the applicable examination technique and methods.

(b) For nondestructive examination methods not covered by SNT-TC-1A documents, personnel shall be qualified by the Owner or his agent to comparable levels of competency by subjection to comparable examinations on the particular method involved; for example, leak testing. The practical portion of SNT-TC-1A shall be performed using the Owner's procedure(s) on part(s) representative of the Owner's plant.

IWA-2400 INSPECTION INTERVALS

(a) The examinations and pressure tests required by IWB, IWC, and IWD shall be completed during each ten-year interval of service, hereinafter designated the inspection interval. These inspection intervals represent calendar years after the reactor facility has been placed into commercial service. The interval may be extended by as much as one year to permit inspections to be concurrent with plant outages. For plants that are out of service continuously for one year or more, an inspection interval may be extended for an equivalent period.

(b) The frequency for inservice testing pumps and valves is specified in Subsections IWP and IWV.

ARTICLE IWA-3000
STANDARDS FOR EXAMINATION EVALUATIONS

IWA-3100 EVALUATION

(a) Evaluation shall be made of any indications detected during any inservice examination as required by and in accordance with the rules and regulations of IWB-3000 for Class 1 components, IWC-3000 for Class 2 components, or IWD-3000 for Class 3 components.

(b) Where acceptance standards for a particular component or Examination Category are in the course of preparation, evaluation shall be made of any indications detected during any inservice examination that exceed the acceptance standards for materials and welds specified in the Section III edition applicable to the construction of the component in order to determine disposition. Such disposition shall be subject to review by the enforcement authority having jurisdiction at the plant site.

(c) Alternatively, acceptance standards for Examination Category B-A may be used for Examination Categories B-B, B-C, B-D, C-A, and C-B; standards for these categories are in the course of preparation.

ARTICLE IWA-4000
REPAIR PROCEDURES

IWA-4100 SCOPE

(a) This Article contains rules for the repair of the pressure-retaining boundary of components.

(b) Owners are responsible to document and maintain a Quality Assurance Program (NA-4000) for the repair program.

(c) If rules for a particular repair are not specified in this division, repairs may be performed in accordance with the provisions of the Code applicable to the construction of the component.

IWA-4200 REPAIRS

IWA-4210 PRESSURE TEST

After repairs by welding on the pressure retaining boundary of components (except repairs on cladding), a pressure test shall be performed in accordance with the provisions of IWA-5000.

IWA-4220 RE-EXAMINATION

Re-examinations shall include the method that detected the flaw requiring repair and shall be used to establish a new preservice record.

IWA-4230 PROCEDURE REVIEW

All repair procedures shall be subject to review by the enforcement authorities having jurisdiction at the plant site.

IWA-4240 MODIFICATIONS, REPLACEMENTS, ADDITIONS, AND ALTERATIONS

(a) When components, either prior to operation or during the service lifetime require modifications to satisfy the requirements of this Division, the repair and inspection procedures of this Division shall be used to effect the modification.

(b) In the event that components in service are to be replaced, or components are to be added to a system, the welds attaching the component to the system shall be constructed in accordance with these repair and inspection procedures.

ARTICLE IWA-5000
SYSTEM PRESSURE TESTS

IWA-5100 GENERAL

IWA-5200 SYSTEM TEST REQUIREMENT

IWA-5210 TEST

(a) The pressure-retaining components shall be visually examined while the system is under the hydrostatic test pressure and temperature. The test pressure and temperature shall be maintained for at least four hours prior to the performance of the examinations.

(b) The hydrostatic test and visual examinations required by Section III are acceptable as a preservice system hydrostatic pressure test.

IWA-5230 TEMPERATURE

The system leakage test and system hydrostatic pressure test shall be conducted at a test temperature that will satisfy the following requirements:

(a) The test temperature for the initial preservice system pressure test shall satisfy the requirements specified in Section III.

(b) The test temperature of IWA-5230(a) shall be modified for inservice system leakage tests and system hydrostatic pressure tests (1) as necessary during the service lifetime of the nuclear power system, following the results obtained from each set of tests of the material specimens withdrawn from the reactor vessel in accordance with the reactor material surveillance program,[1] and (2) as required, to meet the fracture toughness criteria applicable to ferritic materials of system components as specified by the enforcement authorities having jurisdiction at the plant site.

(c) The examinations may be performed after the system pressure has been reduced to a level coincident with a temperature of 200 F.

IWA-5240 EXAMINATION

(a) The examination, which may be conducted without the removal of insulation, shall be performed by inspecting (1) the exposed surfaces of and joints in component insulation to locate evidence of leakage and (2) the floor areas (or equipment) directly underneath components for evidence of accumulated leakage that may drip from components.

(b) Examination of insulation joints along vertical surfaces of vessels, walls, and piping need not be performed, provided the lowest terminal ends of vertical surfaces are examined, and the insulation design is such that any leakages originating along the vertical surfaces can accumulate and leak from the insulation joint at the lowest elevation.

(c) Examination of insulation joints along horizontal surfaces of components shall be conducted at each insulation joint except where accessibility is limited by structural members or other components. In the latter cases, either the insulation shall be removed to permit component examination, or provisions shall be included to channel potential leakages to areas accessible for examination.

(d) At locations where leakages are normally expected and collected (e.g., valve stems, pump seals). the examination shall verify that the leakage collection system is operative.

(e) During the examination, particular attention shall be given to the insulated areas of components constructed of ferritic steels to detect evidence of boric acid residues whose source derives from borated reactor coolant, and which may have accumulated during the service period preceding the examination. In the event boric acid residues are detected, the insulation shall be removed from the components to the extent necessary to permit visual examination of the surfaces wetted by reactor coolant leakage, in

[1]The reactor material surveillance program is specified in 10 CFR 50, Appendix H, "Materials Surveillance Program."

order to detect evidence of corrosion. The following corrective measures shall be applied:

(1) An evaluation of the effect of any corroded area upon the structural integrity of the component shall be performed in accordance with the provisions of IWA-3000.

(2) Repairs of corroded areas or component replacement, if necessary, shall be performed in accordance with the procedures of IWA-4000.

IWA-5250 CORRECTIVE MEASURES

If leakages (other than normal controlled leakages) are detected during the performance of a system pressure test, the source of leakage shall be located, and the area shall be examined to the extent necessary to establish the requirements for corrective action. Repairs or replacement of components shall be performed in accordance with the rules of IWA-4000.

ARTICLE IWA-6000
RECORDS AND REPORTS

IWA-6100 SCOPE

The rules in this Article establish requirements for records and reports developed and maintained by the Owner concerning the inservice inspection of Class 1, 2, and 3 components of the nuclear power plant.

IWA-6200 REQUIREMENTS

IWA-6210 RECORDS FOR CLASS 1, CLASS 2, AND CLASS 3 COMPONENTS

The following records shall be available:

(a) Examination plans and schedules.
(b) Examination results and reports.
(c) Examination methods and procedures.
(d) Evaluations of results.
(e) Corrective actions and repairs.

IWA-6220 REPORTS FOR CLASS 1 AND CLASS 2 COMPONENTS

(a) The Owner shall prepare plans and schedules for inservice inspection that will satisfy the requirements of this Division. Plans and schedules shall be filed with the enforcement and regulatory authorities having jurisdiction at the plant site.

(b) The Owner's inservice inspection reports shall be filed within ninety (90) days after completion of the inservice inspection with the enforcement and regulatory authority having jurisdiction at the plant site.

(c) All information, plans, schedules, and reports relating to inservice inspection of a nuclear power unit shall have a cover sheet providing the following information:

(1) Date.

(2) Name of Owner and address of corporate offices.

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

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

(5) Commercial service date assigned to the nuclear power unit by the Owner.

(d) All inservice inspection reports shall have a summary providing the following information:

(1) The number assigned to the "boiler", "pressure vessel", or component by the State, Municipality, or Province.

(2) National Board Number assigned by the manufacturer to the "boiler", "pressure vessel", or component.

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

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

(5) Date of completion of the Inservice Inspection.

(6) Name or names of the Inspector(s), when required.

(7) Name and mailing address of the employer(s) of the Inspector(s).

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

(9) Signature of Inspector, when required.

(e) All Inservice Inspection reports shall have an Owner's Data Report for Inservice Inspection, Form NIS-1, as shown in Appendix II.

IWA-6230 RECORDS OF PRESSURE TEST

The record of the visual examination conducted during a system leakage test and a system hydrostatic test (IWA-5000) shall consist of itemization of the number and location of leaks found in a system and the actions taken.

IWA-6240 RECORDS OF PUMP AND VALVE INSERVICE TESTS

The record of the inservice tests of pumps and valves shall be in accordance with IWP-6000 and IWV-6000.

SUBSECTION IWB

REQUIREMENTS FOR CLASS 1 COMPONENTS OF LIGHT-WATER COOLED POWER PLANTS

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ARTICLE IWB-1000
SCOPE AND RESPONSIBILITY

IWB-1100 SCOPE

This Subsection defines rules and requirements for inservice inspection of Class 1 pressure-retaining components (and their supports) in light water-cooled power plants.

IWB-1200 COMPONENTS SUBJECT TO INSPECTION

IWB-1210 EXAMINATION REQUIREMENTS

(a) The examination requirements of IWB shall apply to Class 1 pressure-retaining components (and their supports) such as vessels, piping, pumps, and valves.[1]

IWB-1220 COMPONENTS EXEMPTED FROM EXAMINATION

(a) Components may be exempted from volumetric and surface examination (see IWB-1220(c)) if they are located beyond any of the following:

(1) The outermost containment isolation valve,[2,3] in system piping that penetrates primary reactor containment.

(2) The second of two valves[4] normally closed during normal reactor operation in system piping that does not penetrate primary reactor containment.

(3) The reactor coolant safety and relief valves.

(4) For nuclear power reactors of the direct cycle boiling water type, the outermost containment isolation valve in the main steam and feedwater piping.

(b) Components may be exempted from examination (see IWB-1220(c)) if any of the following conditions are met:

(1) Under the postulated condition of loss of coolant from the component during normal reactor operation, the reactor can be shut down and cooled down in an orderly manner assuming makeup is provided by the reactor coolant makeup system[5] only.

(2) The component is or can be isolated from the reactor coolant system by two valves (both closed, both open, or one closed and the other open). Each open valve must be capable of automatic actuation and assuming the other valve is open, its closure time must be such that, under the postulated condition of loss of coolant from the component during normal reactor operation, each valve remains operable and the reactor can be shut down and cooled down in an orderly manner, assuming makeup is provided by the reactor coolant makeup system only.

(3) Component connections, piping, and associated valves (and their supports) are one-inch nominal pipe size and smaller.

(c) Components that are exempted from examination in accordance with IWB-1220(a) and (b) shall be subject to the requirements of Examination Category B-P of Table IWB-2600.

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[1]When a component or a chamber of a component has been optionally upgraded by reclassifying from Class 2 to Class 1, the examination requirements of IWC apply.

[2]Containment isolation valves are those valves in system piping that penetrate the primary reactor containment, and can isolate the system inside of containment from those portions of the same system located outside of containment.

[3]Simple check valves are not acceptable for this purpose, unless capable of automatic actuation upon isolation signal.

[4]Two check valves in series are acceptable.

[5]Normal makeup system are those systems that have the capability to maintain reactor coolant inventory under the respective conditions of startup, hot standby, operation or cooldown, using onsite power.

ARTICLE IWB-2000
EXAMINATION AND INSPECTION

IWB-2100 PRESERVICE INSPECTION

(a) All detailed examinations listed in Tables IWB-2500 and IWB-2600 shall be performed completely, once, as a preservice examination requirement, prior to initial plant startup, except that the examinations shall be extended, in all cases, to include essentially 100% of the pressure-retaining welds.

(b) Shop and field examinations may serve in lieu of the on-site preservice examinations provided:

(1) in the case of vessels only, the examination is performed after the hydrostatic test required by Section III has been completed,

(2) such examinations are conducted under conditions and with equipment and techniques equivalent to those that are expected to be employed for subsequent inservice examinations, and

(3) the shop and field examination records are or can be documented and identified in a form consistent with those required in IWA-6000.

IWB-2400 INSPECTION SCHEDULE

IWB-2410 INSPECTION PROGRAM

IWB-2411 Regular Inspection Program

Inservice examinations may be performed during normal plant outages such as refueling shutdowns or maintenance shutdowns occurring during the inspection interval. Except as specified in IWB-2500 for examinations that may be deferred to the end of the inspection interval, at least 25% of the required examination shall have been completed by the expiration of one-third of the inspection interval (with credit for no more than 33⅓% if additional examinations are completed) and at least 50% shall have been completed by the expiration of two-thirds of the inspection interval (with credit for no more than 66⅔%). The remaining required examinations shall be completed by the end of the inspection interval.

IWB-2412 Alternate Inspection Program

As an alternate inspection program, the following rules may be used in lieu of IWB-2411:

(a) For Examination Category B-D, the first inspection interval shall be redefined as approximately 3⅓ years after the nuclear power unit has been placed into commercial service. The entire required examination of this Category shall be completed at this inspection period. At least one-sixth of the required examination shall have been completed at or near the expiration of the next approximately 3⅓ years and one-third of the required examination shall have been completed at or near the expiration of approximately 6⅔ years. The sequence of this alternate inspection program shall be repeated during each subsequent inspection period.

(b) The category B-A (Table IWB-2500) examinations shall be performed at or near the end of the alternate inspection interval.

(c) The rules of IWB-2411 shall apply for all components not covered by IWB-2412.

(d) The rules for successive inspections of IWB-2420 shall apply.

(e) Programs performed under IWB-2411 shall not be switched to IWB-2412 rules, or vice-versa, for a nuclear power unit.

IWB-2420 SUCCESSIVE INSPECTIONS

(a) The order of examinations of components, parts, or areas (Table IWB-2600) in each examination category will depend on the requirements established by IWB-2500.

(b) Where the extent of inspections requires the examination of all the components during the first inspection interval, the same components inspected by the expiration of one-third of the first interval shall be inspected by the expiration of one-third of successive inspection intervals (second ten years, etc.). This rotational basis shall be used throughout the successive inspection intervals, insofar as practical.

(c) Where less than all the components are required to be inspected in the first inspection interval, a similar percentage of components not previously inspected (other than the preservice examinations) shall be required in each successive inspection interval.

(d) When inspections are conducted only during disassembly of components, the same inspection requirements that apply during the first inspection interval shall apply during successive inspection intervals.

(e) Where the extent of inspections requires examination of a percentage of the areas of the component during each inspection interval, the areas selected for successive examination shall include (1) those whose preservice examination revealed allowable flaw indications (see IWB-3112) and (2) those whose inservice examination reveals additional allowable flaw indications (see IWB-3122), to the extent necessary to meet the percentage requirement.

IWB-2430 ADDITIONAL EXAMINATIONS

Examinations performed during any one inspection that reveal indications exceeding the allowable standards of Table IWB-2500, in a component of an examination category shall be extended to include an additional number (or areas) of components within the same category, approximately equal to the number (or areas) initially examined during the inspection.

In the event further indications in excess of the allowable standards are revealed, all of the remaining number (or areas) of the components shall be examined to the extent specified in Table IWB-2500 for the inspection interval.

IWB-2500 EXTENT OF EXAMINATION

Components shall be examined to the extent specified in Table IWB-2500.

IWB-2600 EXAMINATION METHOD REQUIREMENTS

The method of examination for the components and parts of the pressure-retaining boundaries shall comply with those tabulated in Table IWB-2600 except where alternate examination methods are used that meet the requirements of IWA-2240.

TABLE IWB-2500
EXAMINATION CATEGORIES

AREAS SUBJECT TO EXAMINATIONS	EXTENT AND FREQUENCY OF EXAMINATIONS
B-A	
PRESSURE RETAINING WELDS IN REACTOR VESSEL BELTLINE REGION	
The areas shall include the shell longitudinal and circumferential welds in the reactor vessel wall opposite the length of the reactor vessel thermal shield, where used, or opposite the effective length of reactor fuel where thermal shield is not used. The volume to be examined is shown in Figures IWB-3510.1 and IWB-3510.2.	Examination of the shell longitudinal and circumferential welds may be performed at or near the end of each inspection interval, and shall cover at least 10% of the length of each longitudinal weld, and 5% of the length of each circumferential weld, with the minimum length of weld examined equal to one wall thickness.
Material that has been repaired by welding shall be examined when the repair depth exceeds 10% of the nominal wall thickness. If the location of the repair is not positively and accurately known, then the individual shell plate, forging, or shell course positively known to contain the repair shall be examined.	The length of weld to be examined shall be increased to at least 50% of the length when the longitudinal and circumferential weld have received an exposure to neutron fluence in excess of 10^{19} nvt (E_n of 1 MeV or above).
	The extent of the examination of repaired areas shall be at least 50% of the repaired areas when the repaired areas have received an exposure to neutron flux in excess of 10^{19} nvt (E_n of 1 MeV or above), but in any case, no later than at the end of the second inspection interval. Examination shall be continued in the succeeding intervals in accordance with IWB-2420.
B-B	
PRESSURE RETAINING WELDS IN VESSELS	
The areas shall include the longitudinal and circumferential welds in the vessel shell and meridional and circumferential welds in vessel heads. This includes weld metal and base metal for one plate thickness beyond the edge of weld.	The examinations performed during each inspection interval shall cover at least 10% of the length of each longitudinal shell weld and meridional head weld and 5% of the length of each circumferential shell weld and head weld.
	For welds on the reactor vessel, examinations may be performed at or near the end of each inspection interval.
B-C	
PRESSURE RETAINING WELDS, VESSEL-TO-FLANGE, AND HEAD-TO-FLANGE	
The areas shall include the vessel-to-flange and head-to-flange welds.	The examinations performed during each inspection interval shall cumulatively cover 100% of each circumferential weld.
B-D	
FULL PENETRATION WELDS OF NOZZLES IN VESSELS	
The areas shall include the nozzle-to-vessel weld and adjacent areas as shown in Figure IWB-2500D.	The extent of examination of each nozzle shall cover 100% of the volume to be inspected as shown in Figure IWB-2500D. All nozzles shall be examined during each inspection interval.
B-E	
PRESSURE-RETAINING PARTIAL PENETRATION WELDS IN VESSELS	
The area surrounding each penetration shall be examined for evidence of leakage during pressure test (IWA-5000).	The examinations performed during each inspection interval shall cumulatively cover at least 25% of each group of penetrations of comparable size and function.

TABLE IWB-2500 (CONT'D) EXAMINATION CATEGORIES

AREAS SUBJECT TO EXAMINATIONS	EXTENT AND FREQUENCY OF EXAMINATIONS

B-F
PRESSURE-RETAINING DISSIMILAR METAL WELDS

The areas shall include dissimilar metal welds (e.g., safe-end welds) between combinations of carbon, low allow, or high tensile steels and stainless steels, nickel-chromium-iron alloys, nickel-copper alloys. This shall include the base material for, at least, one wall thickness beyond the edge of weld.

The examinations performed during each inspection interval shall cover the circumference of 100% of the welds.

B-G-1
PRESSURE RETAINING BOLTING, 2 INCHES AND LARGER IN DIAMETER

The areas shall include bolts, studs, nuts, bushings, washers, and threads in base material and flange ligaments between threaded stud holes.

The examinations performed during each inspection interval shall cover 100% of the bolts, studs, nuts, bushings, and threads in base material and flange ligaments between threaded stud holes.

Bushings, threads, and ligaments in base material of flanges are required to be examined only when the connection is disassembled.

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

B-G-2
PRESSURE-RETAINING BOLTING, SMALLER THAN 2 IN. IN DIAMETER

The areas shall include bolts, studs, and nuts.

The examinations performed during each inspection interval shall cover 100% of the bolts, studs, and nuts,

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

B-H
VESSEL SUPPORTS

The areas shall include the integrally-welded support attachment (e.g., support skirts). This includes the welds to the vessel and the base metal beneath the weld zone and along the support attachment member for a distance of two support thicknesses.

Integral support pads on nozzles are excluded.

In the case of vessel support skirts, the examination performed during each inspection interval shall cover, at least, 10% of the circumference of the weld to the vessel. In the case of support lug attachments, 100% of the welding to the vessel shall be examined.

B-I-1
INTERIOR CLAD SURFACES OF REACTOR VESSELS

The areas shall include at least six patches (each 36 sq. in.) evenly distributed, in the closure head, and six patches (each 36 sq. in.), evenly distributed in accessible sections of vessel shell.

The examinations performed during each inspection interval shall cover 100% of the patch areas.

B-I-2
INTERIOR CLAD SURFACES OF VESSELS OTHER THAN REACTOR VESSELS

The areas shall include at least one patch (36 sq. in.) near each manway in the primary side of the vessel.

The examinations performed during each inspection interval shall cover 100% of the patch areas.

The examination of the patches may be performed at or near the end of the inspection interval.

TABLE IWB-2500 (CONT'D)
EXAMINATION CATEGORIES

AREAS SUBJECT TO EXAMINATIONS	EXTENT AND FREQUENCY OF EXAMINATIONS
B-J	
PRESSURE-RETAINING WELDS IN PIPING	
The areas shall include longitudinal and circumferential welds and the base metal for one wall thickness beyond the edge of the weld. Longitudinal welds shall be examined for at least 1 ft from the intersection with the edge of the circumferential weld selected for examination. In the case of pipe branch connections, the areas shall include the weld metal, the base metal for one pipe wall thickness beyond the edge of the weld on the main pipe run, and at least 2 in. of the base metal along the branch run.	The examinations performed during each inspection interval shall cover all of the area of 25% of the circumferential joints including the adjoining 1 ft sections of longitudinal joints and 25% of the pipe branch connection joints.
B-K-1	
SUPPORT MEMBERS FOR PIPING, VALVES AND PUMPS	
The areas shall include the integrally-welded external support attachments. This includes the welds to the pressure-retaining boundary and the base metal beneath the weld zone and along the support attachment member for a distance of two support thicknesses.	The examinations performed during each inspection interval shall cover 25% of the integrally-welded supports.
B-K-2	
SUPPORT COMPONENTS FOR PIPING, VALVES AND PUMPS	
The areas shall include the support components that extend from the piping, valve, and pump attachment to and including the attachment to the supporting structure.	The examination performed during each inspection interval shall cover all support components. The support settings of constant and variable spring type hangers, snubbers, and shock absorbers shall be verified.
B-L-1	
PRESSURE-RETAINING WELDS IN PUMP CASING	
The areas shall include the weld metal and the base metal for one wall thickness beyond the edge of the weld.	The examinations performed during each inspection interval shall include 100% of the pressure-retaining welds in at least one pump in each group of pumps performing similar functions in system (e.g., recirculating coolant pumps). The examinations may be performed at or near the end of the inspection interval.
B-L-2	
PUMP CASINGS	
The areas shall include the internal pressure boundary surfaces.	One pump in each of the group of pumps performing similar functions in the system shall be examined during each inspection interval. This examination may be performed on the same pump selected for the Category B-L-1 examinations. The examinations may be performed at or near the end of the inspection interval.

TABLE IWB-2500 (CONT'D)
EXAMINATION CATEGORIES

AREAS SUBJECT TO EXAMINATIONS	EXTENT AND FREQUENCY OF EXAMINATIONS
B-M-1 **PRESSURE-RETAINING WELDS IN VALVE BODIES**	
The areas shall include the weld metal and the base metal for one wall thickness beyond the edge of the weld.	The examinations performed during each inspection interval shall include 100% of the pressure-retaining welds in at least one valve within each group of valves that are of the same constructional design, (e.g., globe, gate, or check valve), manufacturing method and manufacturer and that are performing similar functions in the system (e.g., containment isolation, system overpressure protection, etc.). The examinations may be performed at or near the end of the inspection interval.
B-M-2 **VALVE BODIES**	
The areas shall include the internal pressure boundary surfaces, on valves exceeding 4 in. nominal pipe size.	One valve in each group of valves of the same constructional design, e.g., globe, gate, or check valve manufacturing method and manufacturer that performs similar functions in the system shall be examined during each inspection interval. This examination may be performed on the same valve selected for the Category B-M-1 examination. The examinations may be performed at or near the end of the inspection interval.
B-N-1 **INTERIOR OF REACTOR VESSELS**	
The areas shall include the space above and below the reactor core that is made accessible for examination by the removal of components during normal refueling outages.	The examinations shall be performed at the first refueling outage and subsequent refueling outages at approximately three-year intervals.
B-N-2 **INTEGRALLY-WELDED CORE-SUPPORT STRUCTURES AND INTERIOR ATTACHMENTS TO REACTOR VESSELS**	
The areas shall include attachments and core-support structures welded to the vessel wall of the direct cycle boiling water type.	The examinations during each inspection interval shall include 100% of the attachment and visually accessible surfaces of the core-support structure. This examination may be performed at or near the end of the inspection interval.
B-N-3 **REMOVABLE CORE-SUPPORT STRUCTURES**	
The areas shall include removable structures of the pressurized water reactor vessel.	The examinations during the inspection interval shall include 100% of the visually accessible surfaces and may be performed at or near the end of the inspection interval. The structure shall be removed from the reactor vessel for this examination.

TABLE IWB-2500 (CONT'D)
EXAMINATION CATEGORIES

AREAS SUBJECT TO EXAMINATIONS	EXTENT AND FREQUENCY OF EXAMINATIONS
B-O	
PRESSURE-RETAINING WELDS IN CONTROL ROD DRIVE HOUSINGS	
The area shall include the weld metal and base metal for one wall thickness beyond the edge of the weld.	The examinations performed during each inspection interval shall include 100% of the welds in 10% of the peripheral control rod drive housings. The examinations may be performed at or near the end of the inspection interval.
B-P	
COMPONENTS EXEMPTED FROM EXAMINATION BY IWB-1220	
The components shall include those exempted from volumetric and surface examination by IWB-1220.	All components shall be examined in accordance with IWA-5000 during the system hydrostatic pressure tests required by IWB-5000.

TABLE IWB-2600
COMPONENTS, PARTS, AND METHODS OF EXAMINATION

Item No.	Examination Category Table IWB-2500	Components and Parts to be Examined	Method
		Reactor Vessel	
B1.1	B-A	Longitudinal and circumferential shell welds in core region	Volumetric
B1.2	B-B	Longitudinal and circumferential welds in shell (other than those of Category B-A and B-C) and meridional and circumferential seam welds in bottom head and closure head (other than those of Category B-C)	Volumetric
B1.3	B-C	Vessel-to-flange and head-to-flange circumferential welds	Volumetric
B1.4	B-D	Primary nozzle-to-vessel welds and nozzle inside radiused section	Volumetric
B1.5	B-E	Vessel penetrations, including control rod drive and instrumentation penetrations	Visual (IWA-5000)
B1.6	B-F	Nozzle-to-safe end welds	Volumetric and Surface
B1.7	B-G-1	Closure studs, in place	Volumetric
B1.8	B-G-1	Closure studs and nuts, when removed	Volumetric and Surface
B1.9	B-G-1	Ligaments between threaded stud holes	Volumetric
B1.10	B-G-1	Closure washers, bushings	Visual
B1.11	B-G-2	Pressure-retaining bolting	Visual
B1.12	B-H	Integrally-welded vessel supports	Volumetric
B1.13	B-I-1	Closure Head Cladding	1) Visual and Surface, or 2) Volumetric
B1.14	B-I-1	Vessel Cladding	Visual
B1.15	B-N-1	Vessel Interior	Visual
B1.16	B-N-2	Interior attachments and core support structures	Visual
B1.17	B-N-3	Core-support structures	Visual
B1.18	B-O	Control rod drive housings	Volumetric
B1.19	B-P	Exempted components	Visual (IWA-5000)
		Pressurizer	
B2.1	B-B	Longitudinal and circumferential welds	Volumetric
B2.2	B-D	Nozzle-to-vessel welds and nozzle-to-vessel radiused section	Volumetric
B2.3	B-E	Heater penetrations	Visual (IWA-5000)
B2.4	B-F	Nozzle-to-safe end welds	Volumetric and Surface
B2.5	B-G-1	Pressure-retaining bolting, in place	Volumetric
B2.6	B-G-1	Pressure-retaining bolting, when removed	Volumetric and Surface
B2.7	B-G-2	Pressure-retaining bolting	Visual
B2.8	B-H	Integrally-welded vessel supports	Volumetric
B2.9	B-I-2	Vessel cladding	Visual
B2.10	B-P	Exempted components	Visual (IWA-5000)
		Heat Exchangers and Steam Generators	
B3.1	B-B	Longitudinal and circumferential welds, including tube sheet-to-head or shell welds on the primary side	Volumetric
B3.2	B-D	Nozzle-to-head welds and nozzle inside radiused section on the primary side	Volumetric
B3.3	B-F	Nozzle-to-safe end welds	Volumetric and Surface
B3.4	B-G-1	Pressure-retaining bolting, in place	Volumetric
B3.5	B-G-2	Pressure-retaining bolting, when removed	Volumetric and Surface
B3.6	B-G-2	Pressure-retaining bolting	Visual
B3.7	B-H	Integrally-welded vessel supports	Volumetric
B3.8	B-I-2	Vessel Cladding	Visual
B3.9	B-P	Exempted components	Visual (IWA-5000)
		Piping Pressure Boundary	
B4.1	B-F	Safe-end to piping welds and safe-end in branch piping welds	Volumetric and Surface
B4.2	B-G-1	Pressure-retaining bolting, in place	Volumetric
B4.3	B-G-1	Pressure-retaining bolting, when removed	Volumetric and Surface
B4.4	B-G-2	Pressure-retaining bolting	Visual
B4.5	B-J	Circumferential and longitudinal pipe welds	Volumetric
B4.6	B-J	Branch pipe connection welds exceeding six in. diameter	Volumetric

TABLE IWB-2600 (Cont'd)
COMPONENTS, PARTS, AND METHODS OF EXAMINATION

Item No.	Examination Category Table IWB-2500	Components and Parts to be Examined	Method
		Piping Pressure Boundary (Cont'd)	
B4.7	B-J	Branch pipe connection welds six in. diameter and smaller	Surface
B4.8	B-J	Socket welds	Surface
B4.9	B-K-1	Integrally welded supports	Volumetric
B4.10	B-K-2	Support components	Visual
B4.11	B-P	Exempted components	Visual (IWA-5000)
		Pump Pressure Boundary	
B5.1	B-G-1	Pressure-retaining bolting, in place	Volumetric
B5.2	B-G-1	Pressure-retaining bolting, when removed	Volumetric and Surface
B5.3	B-G-2	Pressure-retaining bolting	Visual
B5.4	B-K-1	Integrally-welded supports	Volumetric
B5.5	B-K-2	Support components	Visual
B5.6	B-L-1	Pump casing welds	Volumetric
B5.7	B-L-2	Pump casings	Visual
B5.8	B-P	Exempted components	Visual (IWA-5000)
		Valve Pressure Boundary	
B6.1	B-G-1	Pressure-retaining bolting, in place	Volumetric
B6.2	B-G-1	Pressure-retaining bolting, when removed	Volumetric and Surface
B6.3	B-G-2	Pressure-retaining bolting	Visual
B6.4	B-K-1	Integrally welded supports	Volumetric
B6.5	B-K-2	Support components	Visual
B6.6	B-M-1	Valve-body welds	Volumetric
B6.7	B-M-2	Valve bodies	Visual
B6.8	B-P	Exempted components	Visual (IWA-5000)

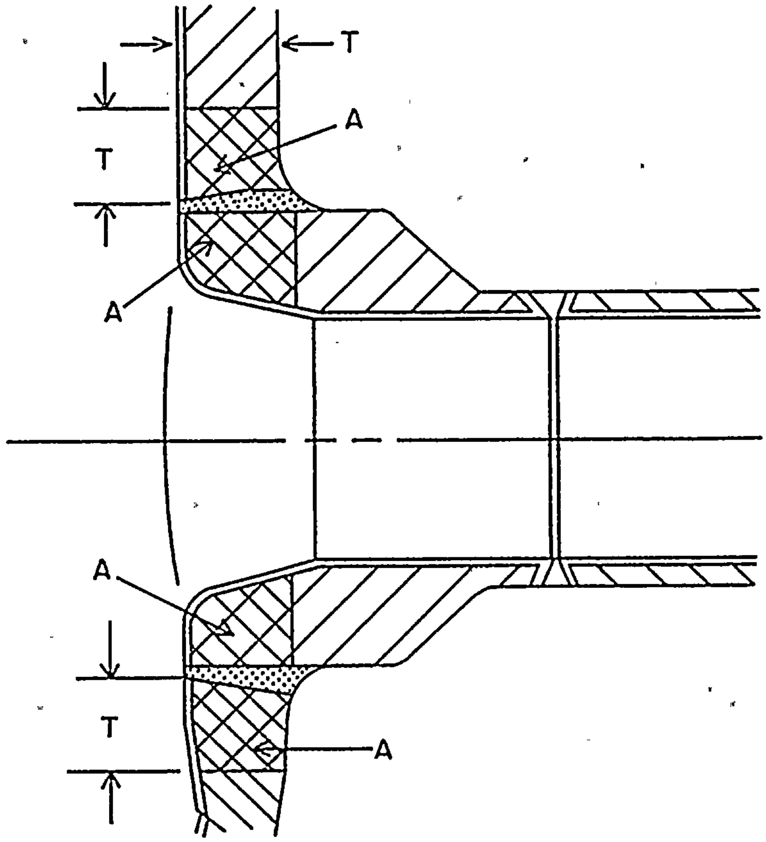


FIG. IWB-2500D AREA TO BE EXAMINED DESIGNATED BY 'A'

ARTICLE IWB-3000
STANDARDS FOR EXAMINATION EVALUATIONS

IWB-3100 EVALUATION OF NONDESTRUCTIVE EXAMINATION RESULTS

IWB-3110 PRESERVICE EXAMINATIONS

IWB-3111 General

The preservice examinations performed to meet the requirements of IWB-2100 and conducted in accordance with the procedures of IWA-2200 shall be evaluated by comparing the examination results with the evaluation standards specified in Table IWB-3410. Acceptance of components for service shall be in accordance with IWB-3112 through IWB-3115.

IWB-3112 Acceptance

Components whose examination either confirms the absence of or reveals flaw indications that are not in excess of the standards listed in Table IWB-3410 shall be acceptable for service, provided the verified flaw indications are recorded in accordance with the requirements of IWA-6220 and I-6300 in terms of location, size, shape, orientation, and distribution within the component.

IWB-3113 Conditional Acceptance

Components whose examination reveals flaw indications that are in excess of the standards listed in Table IWB-3410 shall be unacceptable for service unless such flaws are removed or repaired to the extent necessary to meet the allowable flaw indication standards prior to placement of the component in service.

IWB-3114 Repairs and Re-Examinations

Repairs and re-examinations shall comply with the requirements of IWA-4000 and IWB-4000. Re-examinations shall be conducted in accordance with the requirements of IWA-2200 and the recorded results shall demonstrate that the repair meets the allowable indication standards specified in Table IWB-3410.

IWB-3115 Review by Authorities

(a) The repair program and the reexamination results shall be subject to review by the enforcement authorities having jurisdiction at the plant site.

(b) Evaluation of examination results may be subject to review by the regulatory authority having jurisdiction at the plant site.

IWB-3120 INSERVICE NONDESTRUCTIVE EXAMINATIONS

IWB-3121 General

Inservice nondestructive examinations performed during or at the end of successive inspection intervals to meet the requirements of IWB-2600 and conducted in accordance with the procedures of IWA-2200 shall be evaluated by comparing the examination results with recorded results of the preservice examination (IWB-2100) and prior inservice examinations (IWB-2600). Acceptance of the components for continued service shall be in accordance with IWB-3122 through IWB-3125.

IWB-3122 Acceptance

Components whose examination either reconfirms the absence of flaw indications or reveals flaw indications that are not in excess of allowable flaw indications of the standards listed in Table IWB-3410 shall be acceptable for continued service. Verified changes of indications from prior examinations shall be recorded in accordance with IWA-6220 and I-6300.

IWB-3123 Conditional Acceptance

(a) Components whose examination reveals flaw indications that are in excess of the allowable indication standards listed in Table IWB-3410 shall

be unacceptable for continued service until the additional examination requirements of IWB-2430 are satisfied and the requirements of either IWB-3123.1 or IWB-3123.2 are met.

(b) In the event the flaw indication(s) is determined to exceed the critical law parameters defined by IWB-3600(c), the component shall be repaired or replaced. The extent of examination prior to repair or replacement shall be as specified in Table IWB-2430.

IWB-3123.1 Flaws shall be either removed or repaired to the extent necessary to meet the allowable flaw indication standards listed in Table IWB-3410.

IWB-3123.2 Evaluation of the flaw indication(s) shall be performed by analyses such as described in IWB-3600 in order to confirm the structural adequacy of the component for continued service. In such cases, the area containing this flaw indication(s) shall be re-examined during each scheduled successive inspection conducted in accordance with the program of IWB-2410.

IWB-3124 Repairs and Re-Examinations

Repairs and re-examinations shall comply with the requirements of IWA-4000 and IWB-4000. Re-examinations shall be conducted in accordance with the requirements of IWA-2200 and the recorded results shall demonstrate that the repair meets the allowable indication standards of Table IWB-3410.

IWB-3125 Review by Authorities

(a) The repair program and the reexamination results shall be subject to review by the enforcement authorities having jurisdiction at the plant site.

(b) Evaluation analyses of examination results as required by IWB-3123 shall be submitted to the regulatory authority having jurisdiction at the plant site.

IWB-3130 INSERVICE VISUAL INSPECTIONS

Components whose visual inspection, as specified in Table IWB-2600 reveals surface flaw indications shall be unacceptable for continued service unless, following verification of the visible indications by the supplemental examinations, as required by IWB-3200, the requirements of IWB-3120 are satisfied.

IWB-3200 SUPPLEMENTAL EXAMINATIONS

Examinations that detect indications that require evaluation in accordance with the requirements of IWB-3100 may be supplemented by other examination methods and techniques (IWA-2240) to determine the character of the flaw (i.e., size, shape, and orientation). Visual examinations that detect surface flaws shall be supplemented by either surface or volumetric examinations.

IWB-3300 FLAW INDICATION CHARACTERIZATION

(a) Flaw indications detected by the preservice examinations (IWB-2100) and by the inservice examinations (IWB-2600) shall, for purposes of description and analysis, be circumscribed in elliptical or circular shapes. The major axis of the circumscribing ellipse shall be parallel to the inner (pressure-retaining) surface of the component and the projected planar area of the circumscribed indication shall be considered as oriented normal to the surface of the component.

(b) Flaw indications described in accordance with IWB-3300(a) shall be characterized in accordance with IWB-3310 through IWB-3370, as applicable, for comparison with the standards listed in Table IWB-3410.

(c) The flaw indications shown in the figures in IWB-3300 and IWB-3500 do not constitute the requirements for examination; the requirements for examination are given in Appendix I.

IWB-3310 SURFACE PLANAR FLAWS

(a) A continuous indication shall be considered as a surface planar flaw if the detected area of the indication is oriented primarily in any single plane, other than parallel to the surface of the component, and any portion of the indication penetrates a surface of the component, as shown in Fig. IWB-3310.

(b) A subsurface indication shall be considered as a surface flaw if any portion of the indication is less than the distance, s, from the nearest surface of the component, where s is determined as shown in Figure IWB-3310.

(c) The dimensions a and ℓ of the indication shall be those of the semicircle or semi-ellipse which circumscribes the detected area of the indication.

IWB-3320 SUBSURFACE PLANAR FLAWS

(a) A continuous indication shall be considered as a subsurface planar flaw if the detected area of the indication is oriented primarily in any single plane, other than parallel to the surface of the component,

and any portion of the indication is beyond a distance, s, from the nearest surface of the component, where s is determined as shown in Figure IWB-3320.

(b) The dimensions a and ℓ of the indication shall be those of the circle or ellipse which circumscribes the detected area of the indication as shown in Figure IWB-3320.

IWB-3330 MULTIPLE PLANAR FLAWS

(a) Discontinuous indications shall be considered as single planar flaws if the distance between adjacent indications is less than the dimension s, where s is determined as shown in Fig. IWB-3330.

(b) The rules of IWB-3310 and IWB-3320 shall be applied to characterize multiple planar flaws as surface or subsurface planar flaws, respectively.

(c) The dimensions a and ℓ of such multiple planar flaws shall be those of the circle or ellipse which circumscribes the detected areas of all indications within the proximity limits defined above, and as shown in Fig. IWB-3330.

IWB-3340 NONPLANAR FLAWS

(a) A continuous indication whose detected area is not oriented in a single plane (e.g., two or more intersecting inclined planes, curvilinear geometry, or combinations of nonplanar geometry) shall be considered as a planar flaw.

(b) Discontinuous indications whose detected areas are not oriented in a single plane shall be considered as a planar flaw if the distance between adjacent indications is less than the dimension s, where s is determined as shown in Fig. IWB-3340.

(c) The rules of IWB-3310 and IWB-3320 shall be applied to characterize the nonplanar flaws as surface or subsurface flaws, respectively.

(d) The dimensions a and ℓ of such flaws shall be determined as shown in Fig. IWB-3340.

IWB-3350 PARALLEL PLANAR FLAWS

(a) Discontinuous indications whose areas are oriented primarily in parallel planes, and other than parallel to the surface of the component, shall be considered as single planar flaws if the adjacent planes are within a distance, s, where s is determined as shown in Fig. IWB-3350.

(b) The dimensions a and ℓ of such flaws shall be those of the circle or ellipse which circumscribes the combination of discontinuous indications as shown in Fig. IWB-3350.

IWB-3360 LAMINAR FLAWS

(a) 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 as laminar flaws.

(b) The area of a laminar flaw(s) shall be the area of the circle or ellipse, as applicable, that circumscribes all those indications which either overlap or are within a distance s of one inch of one another, as indicated in Fig. IWB-3360.

IWB-3370 RANDOM, ALIGNED, OR CLUSTERED POROSITY

(a) Flaw indications which are confirmed by radiographic testing techniques to consist of random, aligned, or clustered porosity shall be considered as an equivalent planar surface indication, if the calculated total area of pores shown on the radiograph exceeds the limit prescribed in IWB-3500.

(b) The dimensions of such planar indications shall be assumed as a surface elliptical flaw as indicated in Fig. IWB-3370. The length of the indication shall correspond to the linear distance of weld joint in which the detected porosity exceeds the specified limit.

IWB-3400 FLAW INDICATION STANDARDS

IWB-3410 STANDARDS

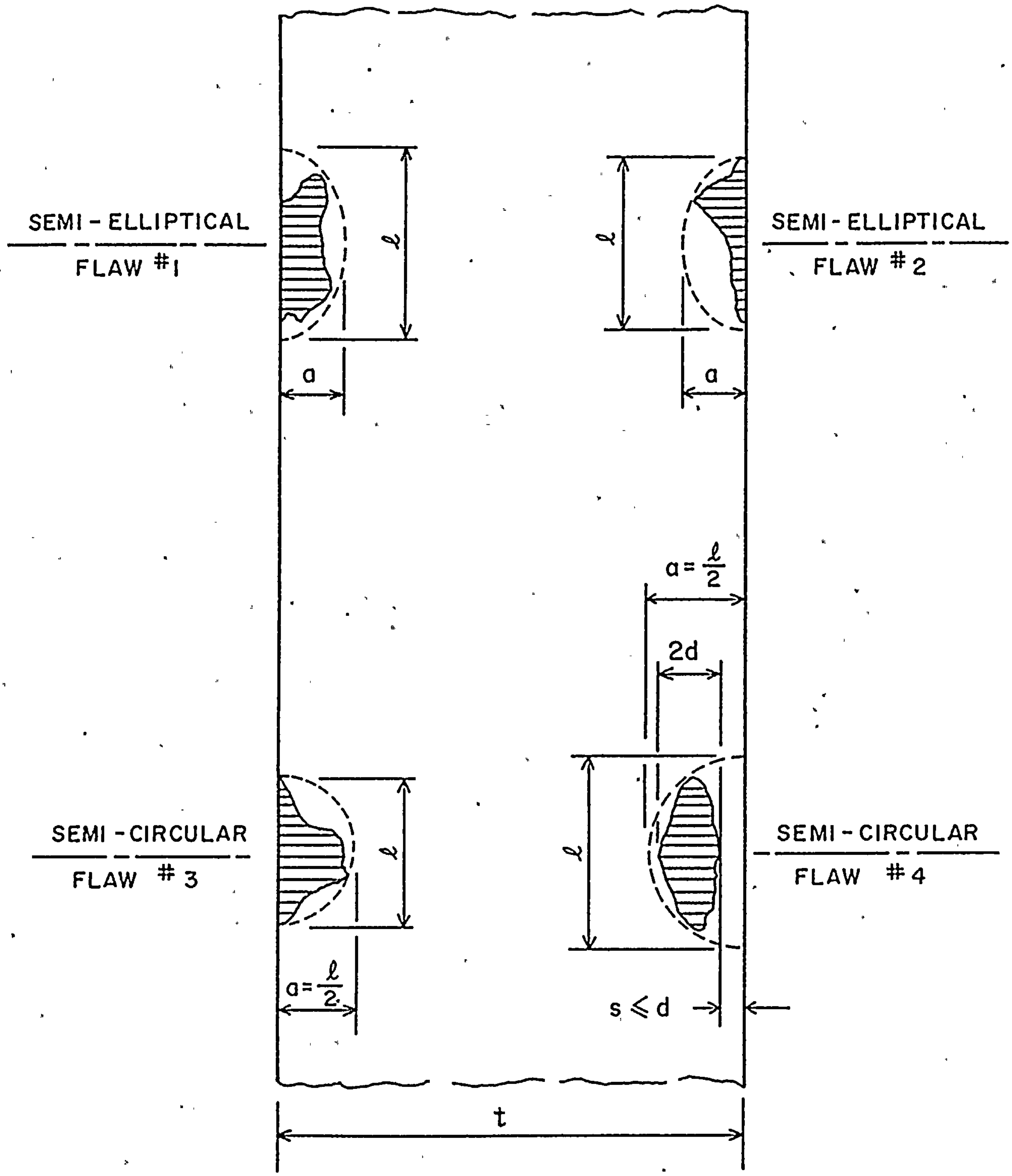
The indication standards of Table IWB-3410 shall be applied to evaluate the acceptability of the component for service following the preservice examination (IWB-2100) and each inservice examination (IWB-2600).

IWB-3420 CHARACTERIZATION

Each detected flaw indication or group of flaw indications shall be characterized by the rules of IWB-3300 in order to establish the dimensions of the indications. These dimensions shall be used in conjunction with the evaluation standards of IWB-3500.

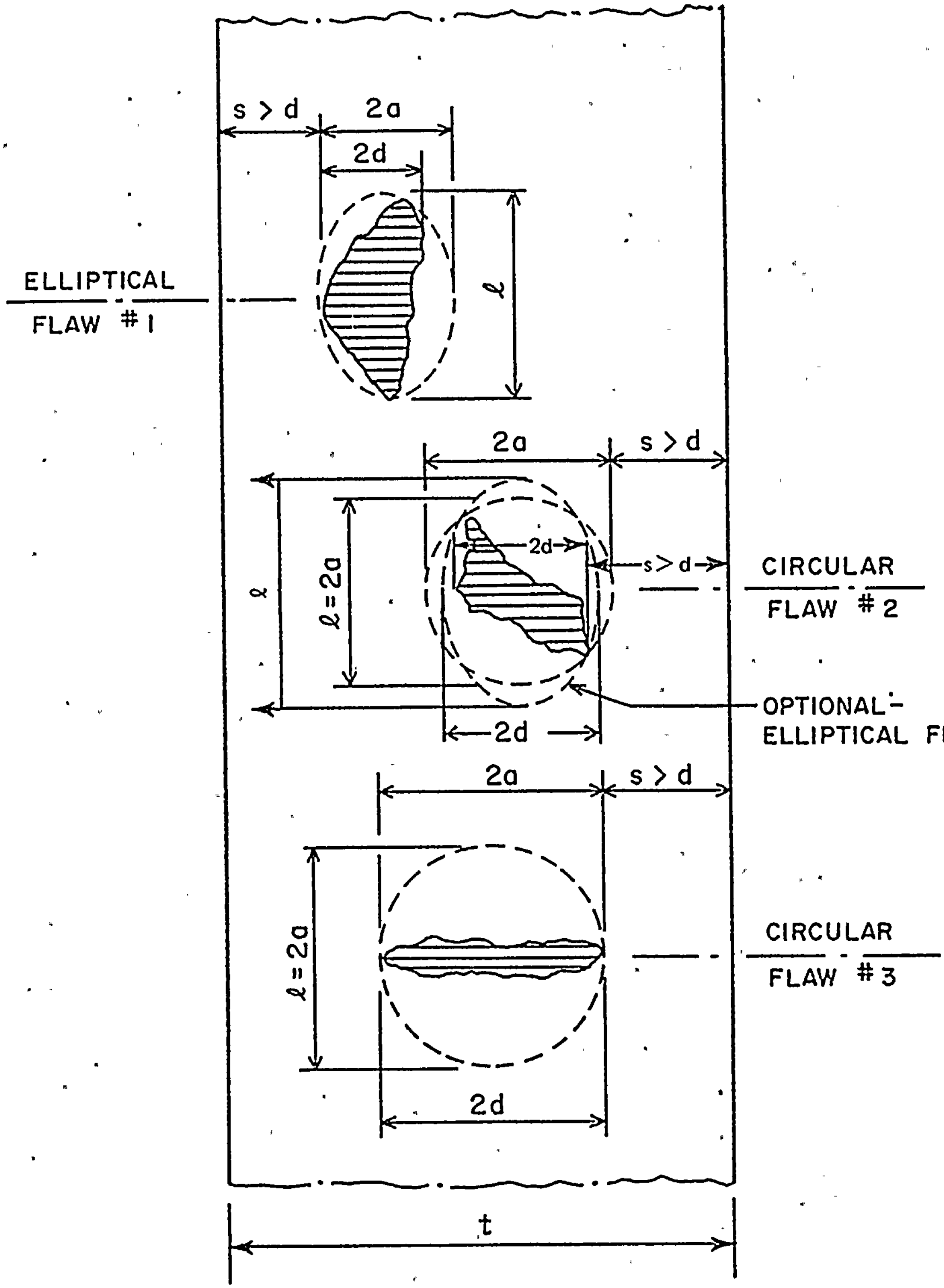
IWB-3430 ACCEPTABILITY

Indications that do not exceed the dimensions of allowable flaw indications as determined by IWB-3500 for the respective examination category shall be considered allowable.



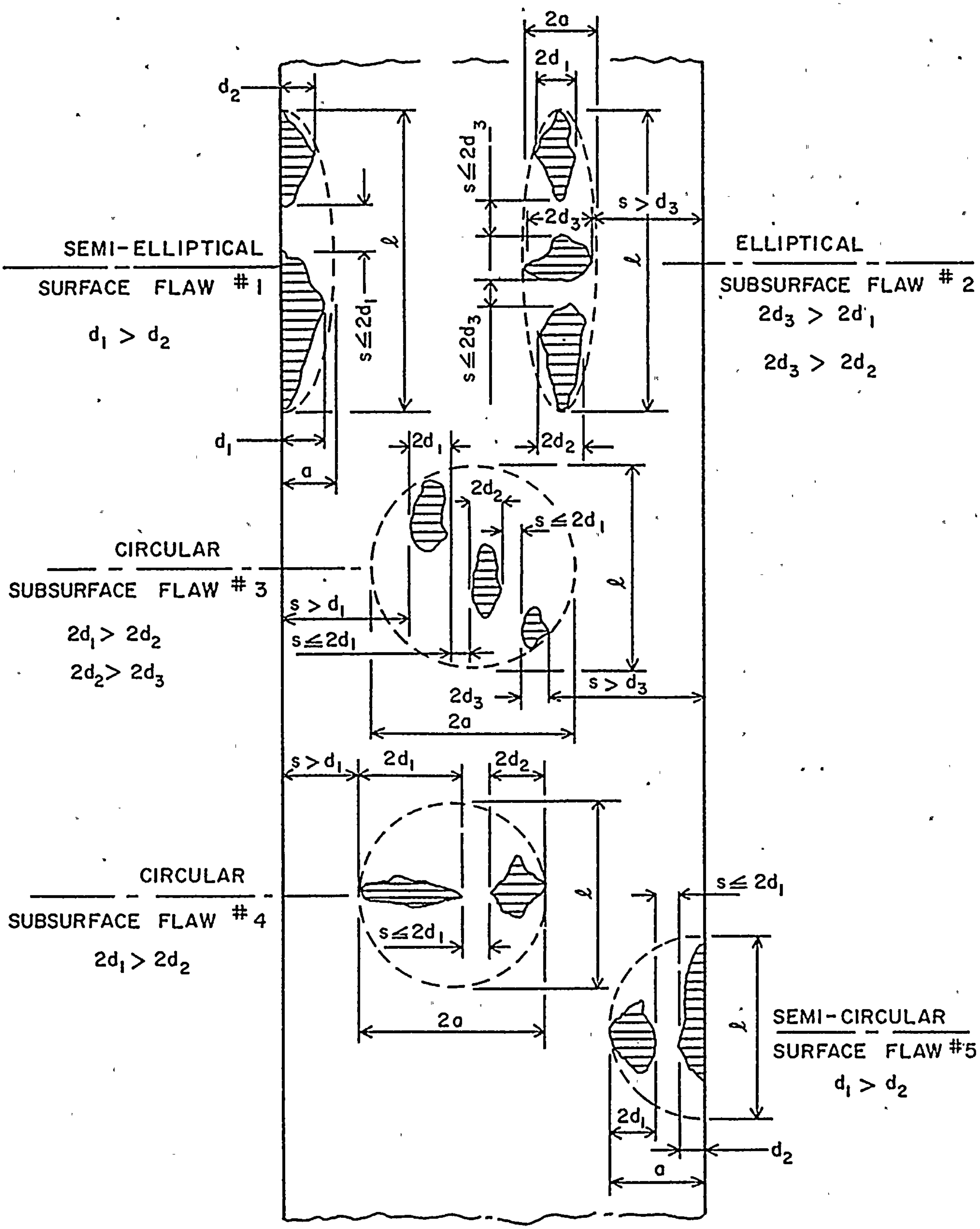
ILLUSTRATIVE FLAW CONFIGURATIONS AND DETERMINATION OF DIMENSIONS "a" AND "ℓ"

FIG. IWB-3310 SURFACE PLANAR FLAWS ORIENTED IN PLANE NORMAL TO MAX. STRESS

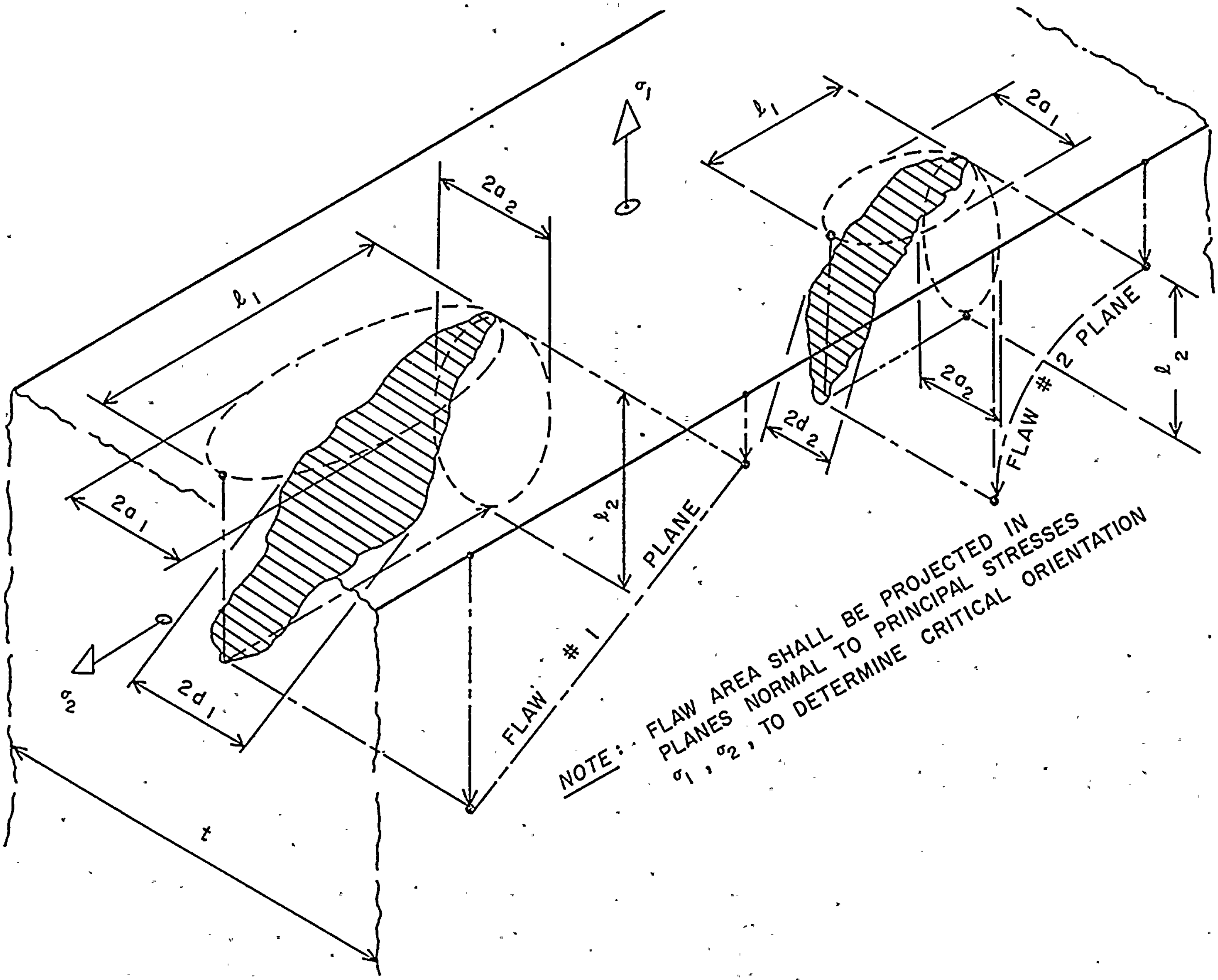


ILLUSTRATIVE FLAW CONFIGURATIONS AND DETERMINATION OF DIMENSIONS "2a" AND "ℓ"

FIG. IWB-3320 SUBSURFACE PLANAR FLAWS ORIENTED IN PLANE NORMAL TO MAX. STRESS

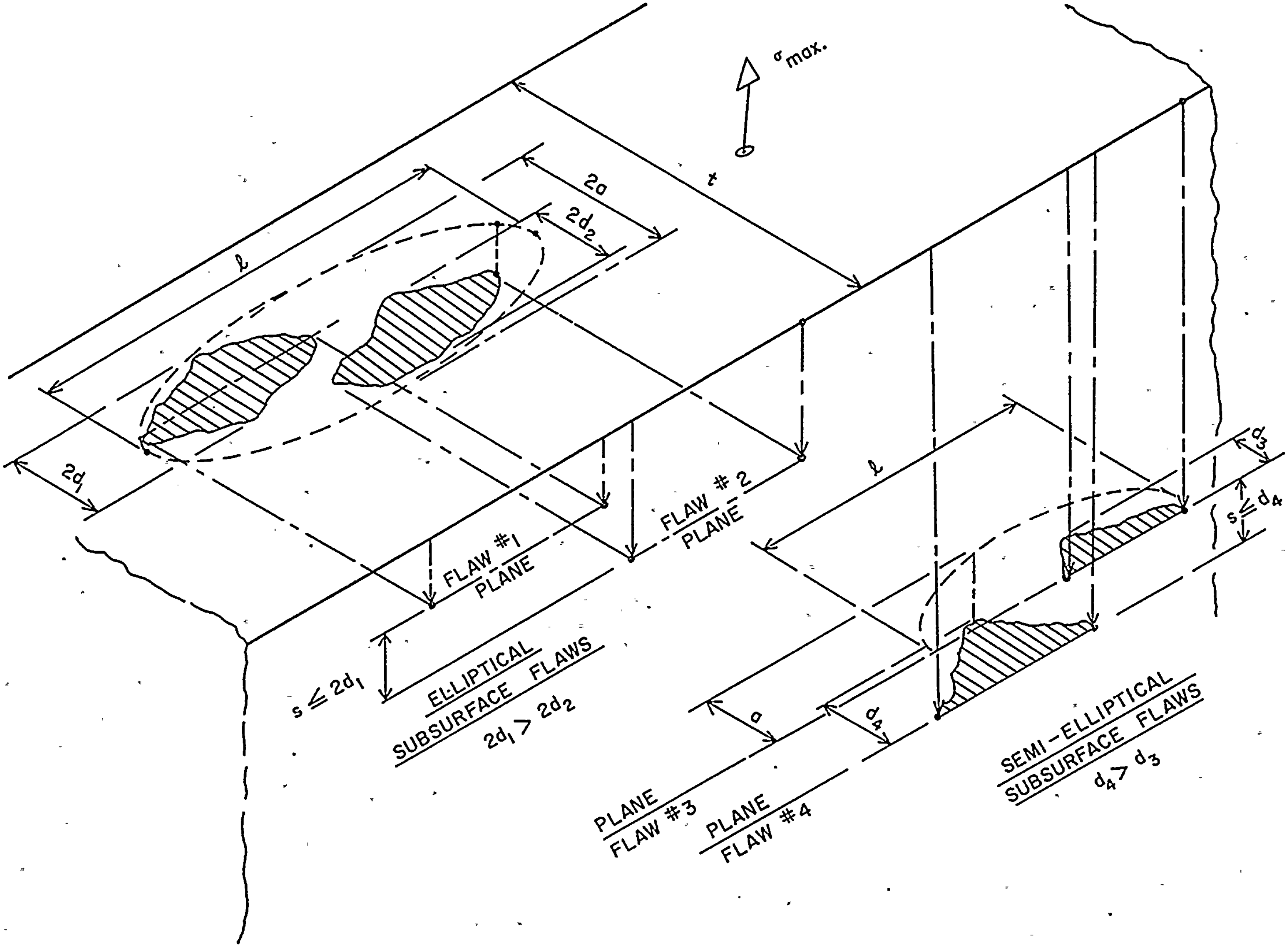


ILLUSTRATIVE FLAW CONFIGURATIONS AND DETERMINATION OF DIMENSIONS "a," "2a," AND "ℓ"
FIG. IWB-3330 MULTIPLE PLANAR FLAWS ORIENTED IN PLANE NORMAL TO MAX STRESS



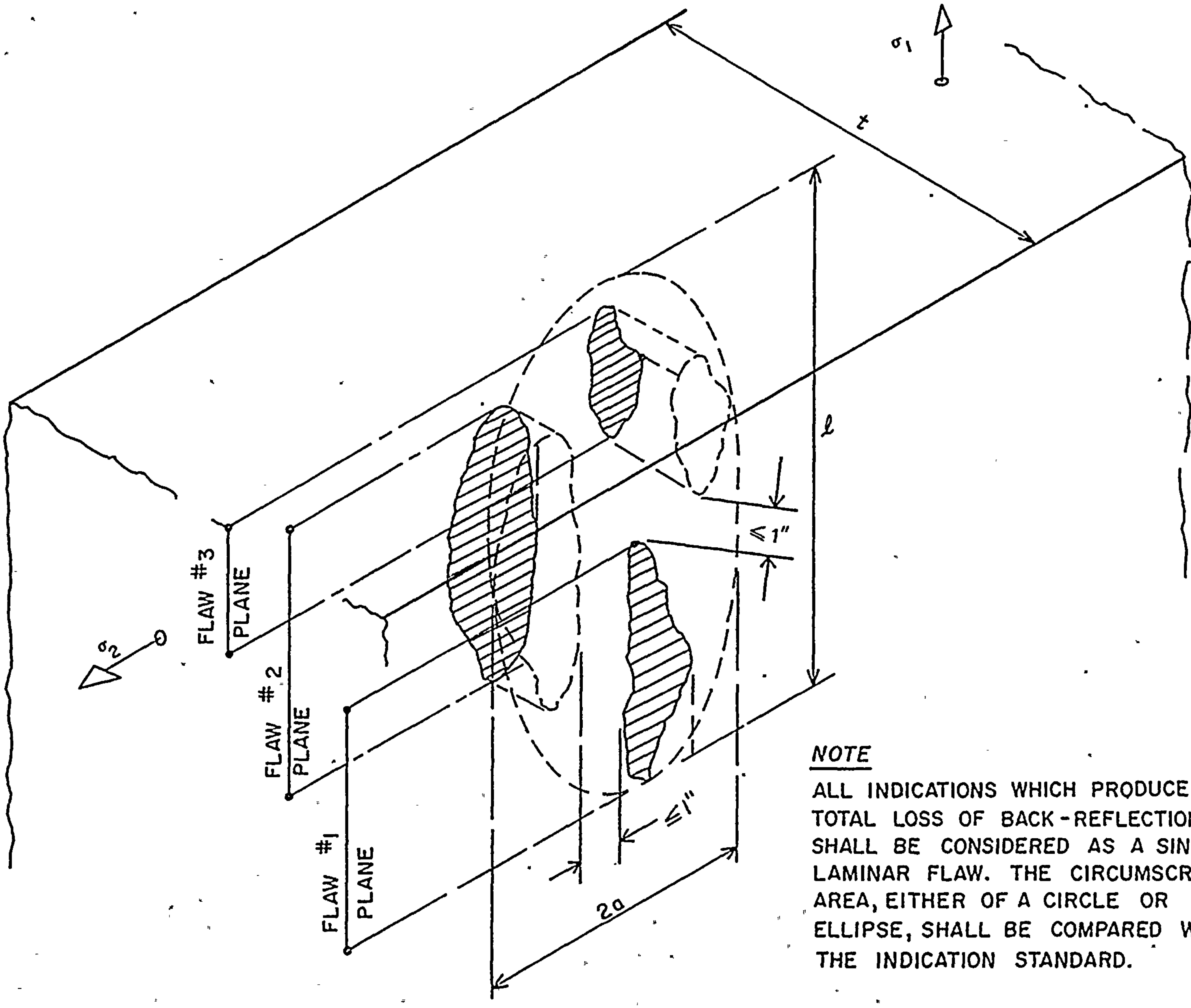
ILLUSTRATIVE FLAW CONFIGURATIONS AND DETERMINATION OF DIMENSIONS "2a" AND "ℓ"

FIG. IWB-3340 NON-PLANAR ELLIPTICAL SUBSURFACE FLAWS



ILLUSTRATIVE FLAW CONFIGURATIONS AND DETERMINATION OF DIMENSIONS "a", "2a", AND "ℓ"

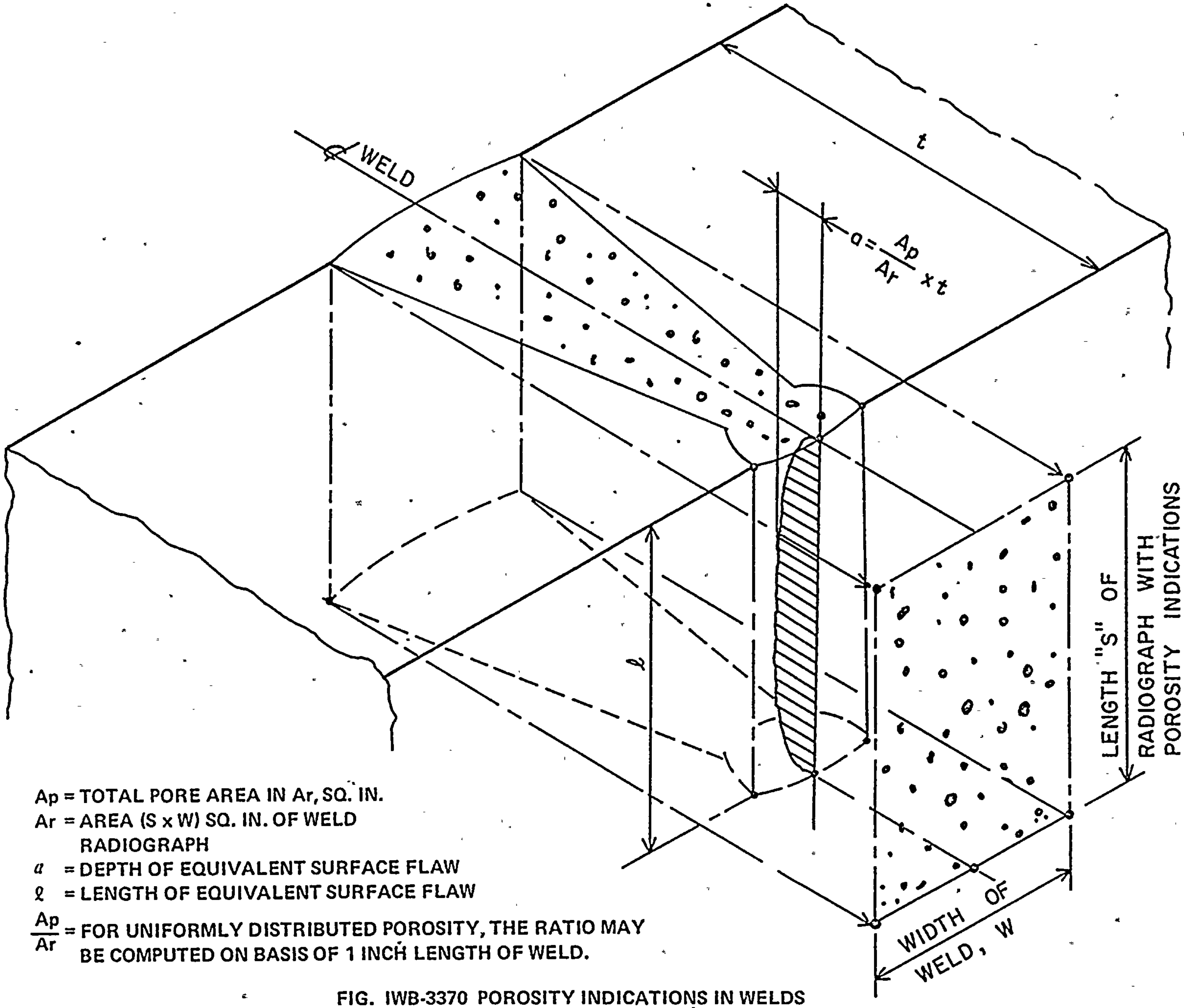
FIG. IWB-3350 PARALLEL PLANAR FLAWS



NOTE

ALL INDICATIONS WHICH PRODUCE A TOTAL LOSS OF BACK-REFLECTION SHALL BE CONSIDERED AS A SINGLE LAMINAR FLAW. THE CIRCUMSCRIBED AREA, EITHER OF A CIRCLE OR ELLIPSE, SHALL BE COMPARED WITH THE INDICATION STANDARD.

FIG. IWB-3360 LAMINAR FLAWS



Ap = TOTAL PORE AREA IN Ar, SQ. IN.
Ar = AREA (S x W) SQ. IN. OF WELD RADIOGRAPH
a = DEPTH OF EQUIVALENT SURFACE FLAW
ℓ = LENGTH OF EQUIVALENT SURFACE FLAW
$\frac{Ap}{Ar}$ = FOR UNIFORMLY DISTRIBUTED POROSITY, THE RATIO MAY BE COMPUTED ON BASIS OF 1 INCH LENGTH OF WELD.

FIG. IWB-3370 POROSITY INDICATIONS IN WELDS

TABLE IWB-3410
EVALUATION STANDARDS

Examination Category	Component and Part Examined	Evaluation Standard
B-A	Welds in Reactor Vessel Belt-line Region	IWB-3510
B-B, B-C	Welds in Vessels, Vessel-to-Flange, Head-to-Flange	IWB-3511
B-D	Vessel Nozzles and Welds	IWB-3512
B-E-1	Welds in Vessel Penetrations	IWB-3513
B-F, B-J-1	Welds in Piping	IWB-3514
B-G-1	Bolting	IWB-3515
B-H, B-K-1	Supports–Components	IWB-3516
B-I-1, B-I-2	Interior Clad Surfaces	IWB-3517
B-L-1, B-M-1	Welds in Pumps and Valves	IWB-3158
B-L-2, B-M-2	Pump Casings and Valve Bodies	IWB-3519
B-N	Interior Surfaces and Internal Components of Reactor Vessels	IWB-3520

TABLE IWB-3510
ALLOWABLE INDICATIONS
FOR MATERIALS SA-533, SA-508

a/ℓ[1]	Surface Indications Percent a/t	Subsurface Indications Percent a/t
0	1.88	2.32
0.05	2.00	2.42
0.10	2.18	2.61
0.15	2.42	2.91
0.20	2.71	3.25
0.25	3.08	3.68
0.30	3.48	4.13
0.35	3.48	4.63
0.40	3.48	5.24
0.45	3.48	5.86
0.50	3.48	6.51

[1] For intermediate ratios, linear interpolation is permitted.

IWB-3500 EVALUATION STANDARDS

IWB-3510 EXAMINATION CATEGORY B-A

IWB-3510.1 Allowable Indications. The size of allowable flaw indications, as related to the applicable indication dimensions shown in Figs. IWB-3510.1 and IWB-3510.2 shall not exceed the limits specified in Table IWB-3510.

IWB-3510.2 Allowable Laminar Indications. The areas of allowable laminar indications shall not exceed the following limits:

Components Thickness in.	Laminar Area sq. in.
6	10
8	20
10	30
12	40

IWB-3510.3 Allowable Porosity Indications. Porosity indications shall be acceptable indications provided the total calculated area of the pores within the area of the radiograph of the weld as shown in Fig. IWB-3370 does not exceed 2%. Porosity which exceeds this limit may be acceptable provided an equivalent planar indication, which is determined in accordance with the requirements of Fig. IWB-3370, meets the standards of Table IWB-3510.

IWB-3511 to IWB-3520 (In Course of Preparation)

IWB-3600 INDICATION EVALUATION ANALYSES

(a) Flaw indications that exceed the standards for allowable indications of IWB-3500 may be evaluated by analytical procedures, such as described in Appendix A, in order to determine the following critical flaw parameters with respect to the location of the detected flaw:

a_f—the maximum size to which the detected flaw is calculated to grow during the remaining service lifetime of the component.

a_c—The minimum critical flaw size of the indication under normal operating conditions.

a_i—The minimum critical flaw size of the indication for initiation of non-arresting growth under postulated design emergency and faulted conditions.

(b) The evaluation procedures and the acceptability criteria for these critical flaw parameters shall be the responsibility of the Owner and shall be subject to approval by the regulatory authority having jurisdiction at the plant site.

(c) The critical flaw parameters defined in IWB-3600(a) shall not exceed the following acceptability criteria:

$$a_f < 0.1 a_c \qquad a_f < 0.5 a_i$$

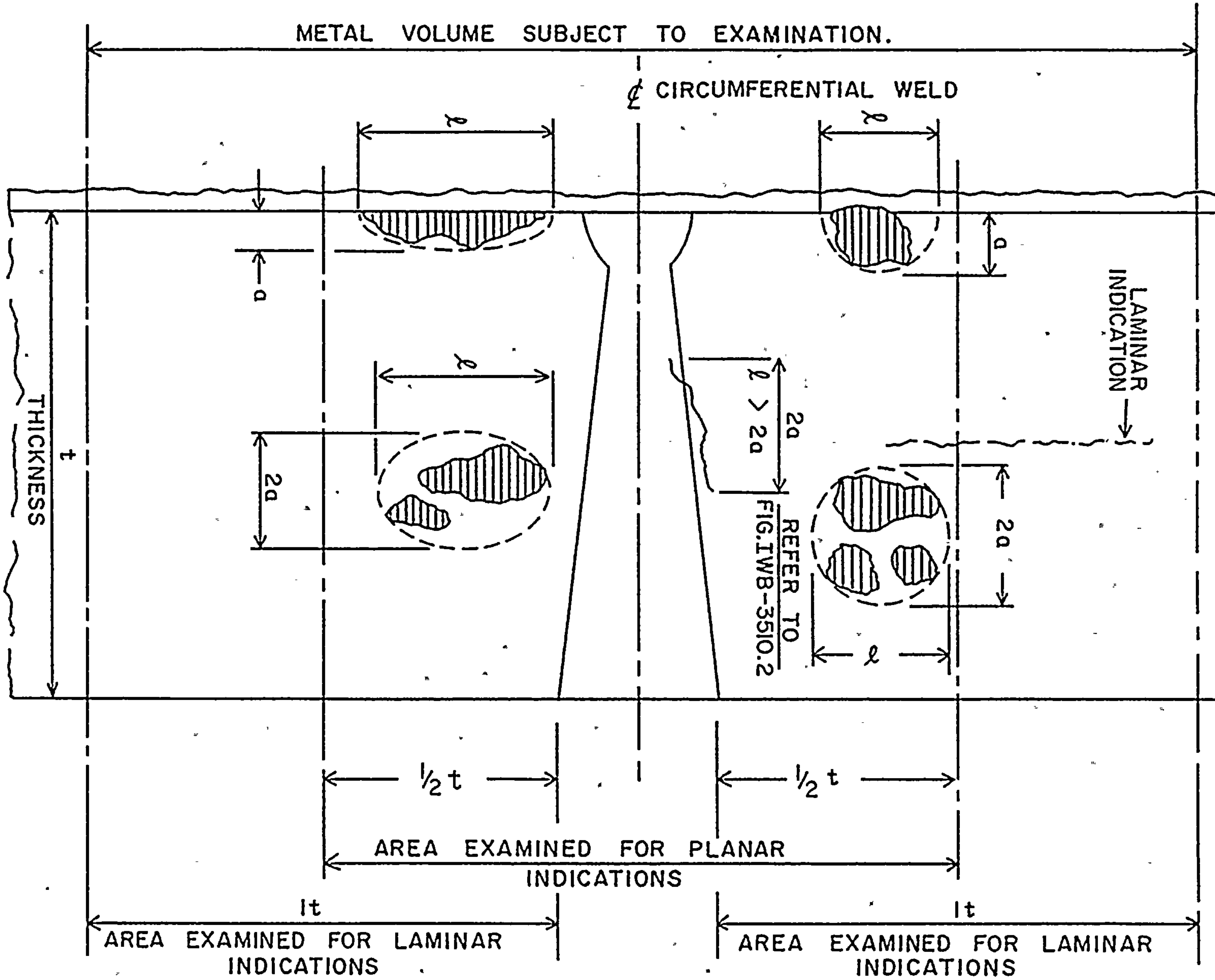


FIG. IWB-3510.1 INDICATIONS NORMAL TO CIRCUMFERENTIAL STRESS

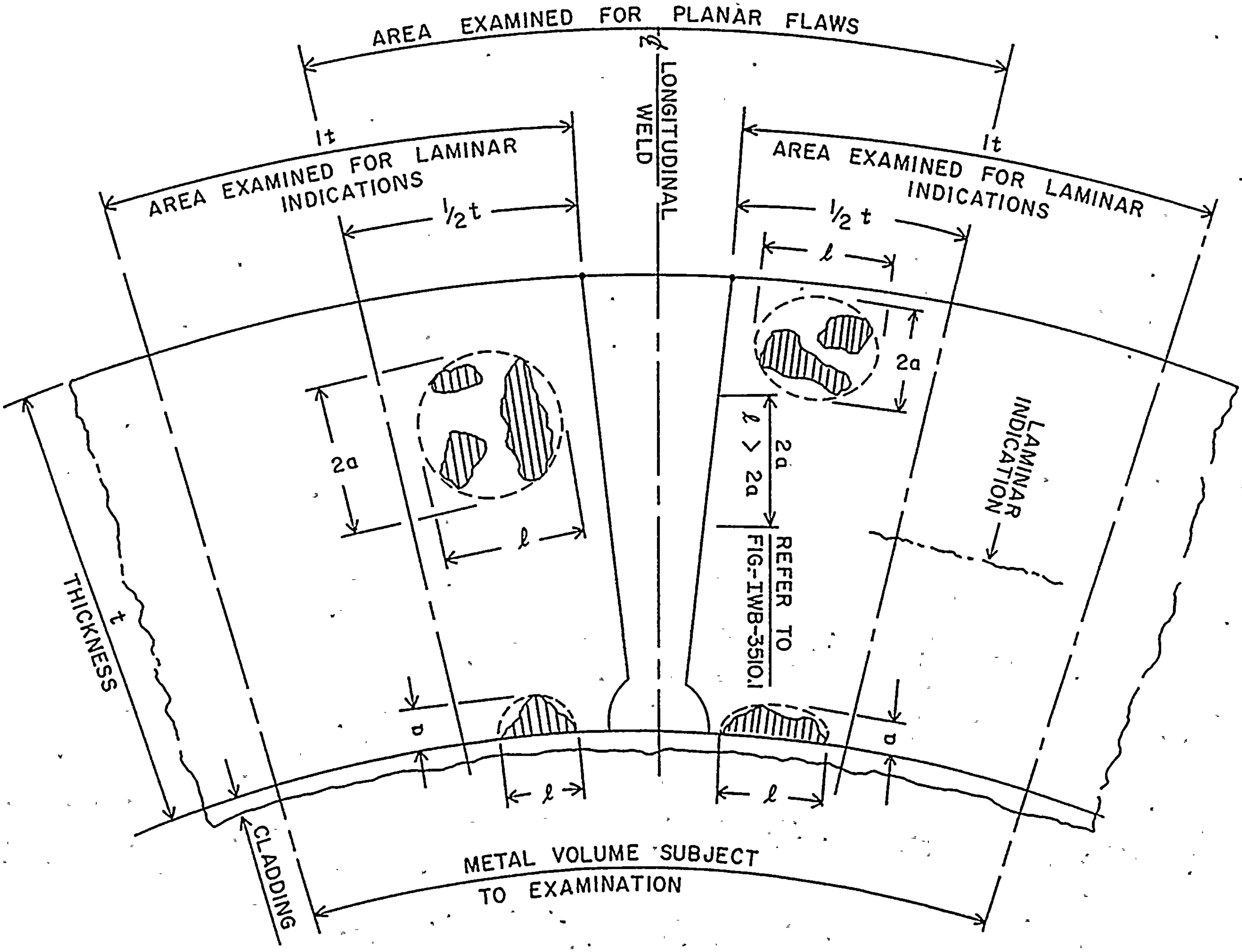


FIG. IWB-3510.2 INDICATIONS NORMAL TO LONGITUDINAL STRESS

ARTICLE IWB-4000
REPAIR PROCEDURES

IWB-4100 SCOPE

These rules apply to clad or unclad components.

IWB-4110 OWNER RESPONSIBILITIES

The owner is responsible for planning, managing, and conducting quality assurance programs for controlling the quality of work performed under this Article and the rules governing the evaluation of such programs shall meet the requirements of NA-4000.

IWB-4120 MATERIALS

The materials used in this Section shall comply with NB-2000.

IWB-4130 WELDING QUALIFICATIONS

All weld repairs shall be performed by welders, welding operators, and welding procedures which have been qualified in accordance with Section IX, NB-4300 and any special requirements of IWB-4400.

IWB-4140 REPAIR PROGRAM

A copy of the repair program shall be made available to the enforcement and regulatory authorities having jurisdiction at the plant site.

IWB-4300 REPAIRS NOT REQUIRING WELDING

IWB-4310 PROCEDURE NUMBER 1 SURFACE DEFECTS

Surface defects may be removed by mechanical means without repair welding provided the rules of NB-2500 or NB-4552 are met.

IWB-4320 PROCEDURE NUMBER 2

IWB-4321 Defect Removal

Procedure Number 2 is applicable to defect removal or reduction in size to the extent necessary to meet allowable flaw indication standards without subsequent weld repair. Use of Procedure Number 2 is restricted to cases where postweld heat treatment would be impossible or impractical if repair by welding were to be utilized.

IWB-4322 Repairs to Materials and Welds

Procedure Number 2 repairs to materials and welds shall be made in accordance with the following requirements:

(a) Removal or reduction to acceptable size of the flaw shall be accomplished by a mechanical method; thermal cutting is not permitted.

(b) The shape of the excavation shall be circular and shall not exceed the diameter or spacing limitations permitted in IWB-4323 for openings not requiring reinforcement and the limits set by IWA-3000.

(c) The depth of the excavation shall not exceed that established by NB-3000.

(d) When the excavation is completed, the surface of the excavated area shall be examined by magnetic particle or liquid penetrant methods in accordance with the examination procedures specified in IWA-2221 or IWA-2222 and shall meet the allowable flaw indications of the standards of IWA-3000.

(e) The remaining material surrounding the volume of the excavation shall also be demonstrated to have met the allowable flaw indications of the standards of IWA-3000.

IWB-4323 Openings Not Requiring Reinforcement

Circular openings need not be provided with reinforcement if all the requirements of the following subparagraphs are satisfied.

(a) The openings have diameters equal to, or less than, $0.2\sqrt{Rt}$, where R is the mean radius of the vessel shell or head and t is the nominal thickness of the head or shell.

(b) When two or more unreinforced openings are placed in a vessel wall, the following limitations shall be observed:

(1) No two unreinforced openings shall have their centers closer than an arc distance of $1.5(d_1 \pm d_2)$, where d_1 and d_2 are the diameters of the unreinforced openings.

(2) All reinforced openings in a group of unreinforced openings shall be totally within a circle of diameter equal to $0.5\sqrt{Rt}$.

(c) The edge on an unreinforced opening or outermost opening in a group of unreinforced openings shall be not closer than $2.5\sqrt{Rt}$ arc distance from any other reinforced or unreinforced opening, or other discontinuity, or area where the primary local membrane stress exceeds $1.1S_m$. Examples of these limitations are shown in Fig. IWB-4323-1. All arc distances are to be measured on the inside of the vessel wall.

IWB-4400 REPAIRS REQUIRING WELDING

IWB-4410 PROCEDURE NUMBER 3 MECHANICAL AND/OR WELDING

Repairs made by welding may be performed in accordance with the applicable portions of the following:

(a) NB-4130, Elimination and Repair of Defects

(b) NB-4453, Requirements for Making Repairs of Welds

(c) NB-4640, Heat Treatment after Repair by Welding

IWB-4420 PROCEDURE NUMBER 4 WELDING LOW ALLOY STEELS

Weld repairs to P-1, P-3, P-12A, P-12B, and P-12C materials and welds may be made after the final postweld heat treatment when an evaluation in accordance with IWA-3000 indicates the need for repair and when it is impractical to perform a postweld heat treatment provided the following requirements are met.

IWB-4421 Materials

(a) General Requirements for Materials

(b) Scope of Principal Terms Employed. The term *materials* as used in this Section applies to those items produced to the requirements of an SA, SB, or SFA Specification of Section II or of any other material specification permitted by this Section. The term *Materials Manufacturer* is defined as the manufacturer who produces the materials to the requirements of the material specification including welding material.

(c) Welding Materials Identification. Welding materials shall be clearly identified by legible marking on the package or container to ensure positive identification of the material. The marking shall include: the heat or lot number as applicable, a control marking code which identifies the materials with the Certified Materials Test Report, and other information such as specification grade and classification number, supplier's name and trade designation. Welding materials shall be controlled during the repair of materials and welds so that they are identifiable as acceptable material until the material is actually consumed in the process.

(d) Welding Materials. All welding filler materials used in the repair of components and materials shall conform to the requirements stated in this Subarticle and to the rules covering identification in IWB-4421(c).

(e) Required Tests for Welding Materials. The required tests for welding materials in IWB-4423 shall be conducted for each lot of covered electrodes to be used in the repair. These tests shall be made on materials taken from the weld qualification test assembly as described in IWB-4423(a). The required tests are stated in IWB-4423 (a). A lot of covered electrodes is defined as the quantity of electrodes produced from the same combination of heat of metal and dry batch or blend of coating ingredients.

(f) Quality Assurance Programs for Manufacturers of Filler Metal. Materials Manufacturers shall document and maintain Quality Assurance Programs (see NA-4000). As a minimum, the programs shall provide for the following, as applicable:

(1) Calibration and periodic check for accuracy of all mechanical testing and nondestructive examination equipment.

(2) Qualified procedures for all nondestructive examination methods.

(3) Qualification of personnel performing and/or interpreting nondestructive examinations in accordance with NB-5500.

(4) Qualified procedures for all welding in accordance with Section IX.

(5) Qualification of welder and operator performance in accordance with Section IX.

(6) Procedure controls for all material test coupon heat treatments in accordance with NB-2400.

(g) Each program shall be subject to review by the Owner, installer, and the manufacturers of components, parts, and appurtenances in accordance with NA-4000.

IWB-4422 Welding Qualifications, Records and Identifying Stamps

(a) Required Qualifications

(1) The Owner is responsible for the welding done by his organization, and shall establish the procedure and conduct the tests required by this Article and by Section IX in order to qualify both the welding procedures and the performance of welders who apply these procedures.

(2) Welding personnel and procedures used in joining permanent or temporary attachments to pressure parts and to make permanent or temporary tack welds used in such welding shall meet the qualification requirements of this Article.

(3) When making procedure test plates for butt welds, it is recommended that consideration be given to the effect of angular, lateral, and end restraint on the weldment. This applies particularly to material and weld metal of 80,000 psi tensile strength or higher and heavy sections of both low and high tensile strength material. The addition of restraint during welding may result in cracking difficulties that otherwise might not occur.

(b) Maintenance and Certification of Records. The Owner shall maintain a record of his qualified welding procedures and of the welders qualified and employed by him, showing the date and results of tests and the identification mark assigned to each welder. These records shall be reviewed, verified, and signed by an individual assigned by the Owner.

(c) Identification of Joints by Welder. The welder shall apply the identification mark assigned to him by the Owner on or adjacent to all permanent welded joints made by him, at 3 ft intervals or less, or, as an alternative, the Owner shall keep a record of permanent welded joints in a component and of the welders used in making each of the joints.

IWB-4423 Repairs

Each repair operation shall be performed in accordance with a procedure delineating all of the requirements of the complete repair cycle.

(1) Dimensional measurements shall be established, if needed, for reference points during and after the repair.

(2) Removal of flaw

(a) Metal removal shall be accomplished by machining, grinding, or chipping; thermal cutting is not permitted.

(b) In preparation for welding, the cavity shall be ground smooth and clean with beveled sides and edges rounded to provide suitable accessibility for welding.

(c) The cavity to be repaired shall be examined by magnetic particle inspection in accordance with the requirements of IWA-2221 prior to repair welding.

(d) Actual dimensions and location shall be documented.

(3) Repair welding

(a) The welding procedure and the welders shall be qualified in accordance with Section IX and the additional following requirements but no welding shall be undertaken until after the welding procedures which are to be used have been qualified:

(1) The test assembly material for the welding procedure qualification test shall be of the same specification type, grade, and class including a similar postweld heat treatment as the material to be repaired. If the repair involves two different types of material the test assembly shall duplicate the combination.

The base metal thickness shall be at least five times the depth of repair or 5 in. minimum, but need not exceed the thickness of the material to be repaired. In order to simulate the restraint that the weld metal will experience in the repaired section of the vessel, the test assembly shall be sufficiently large so that the base material dimension surrounding the cavity shall be the smaller of the thickness to be required or 6 in. but large enough to permit removal of the required test specimens. The cavity length for the test assembly shall be 18 in. or the length of the cavity to be repaired, whichever is smaller, provided the required test specimens can be removed. The depth of the cavity in the test assembly shall be either equal to the depth of the cavity to be repaired or 1 in., whichever is greater. The root width and the included angle of the cavity in the test assembly shall be, respectively, the minimum to be used in the repair. Test specimens required by Section IX and this paragraph shall be removed from the deepest section of the cavity and shall meet the acceptance requirements of Section IX and this paragraph.

(2) Side-bend, Charpy V-notch, and tensile specimens from the test weld shall be required. The

dimensions of specimens made from them shall conform to the requirements of Section III and Section IX and the removal of the impact test coupons, when required, shall be in accordance with NB-2400.

(3) Impact test specimens, side-bend specimens, and all weld metal tensile specimens made from coupons taken from the test weld, at the maximum depth of repair, shall conform to the applicable requirements of NB-2400 and Section IX.

(4) Impact tests of the welding deposit shall be required for welding procedure qualification for classification A-No. 1, 2, and 3 weld analysis or any other ferritic weld metal analysis (Section IX, Table Q-11.2 including notes).

(5) Charpy V-notch impact tests of the weld heat-affected zone of the base metal shall be required for material of P-Nos, 1, 3, 12A, 12B, and 12C classification. If the test assembly consists of two of the above types of material, then impact tests of each are required. The Heat-Affected-Zone impact specimens for material greater than ½ in. thickness shall be made from coupons removed from the test weld, at the maximum depth of repair, transverse to the weld. They shall be etched to define the heat-affected zone. The notch of the impact specimens shall be cut approximately normal to the material surface in such a manner as to include as much heat-affected zone as possible in the resulting fracture. Where the material thickness permits, the axis of a specimen may be inclined to allow the root of the notch to align parallel to the fusion line.

(6) Impact testing of procedure qualification test weld deposit and heat-affected zone shall be performed at or below a temperature selected in accordance with the requirements of NB-2300.

(7) The minimum requirement for weld and heat affected zone impact tests shall be in accordance with NB-2300 for vessels. The value of impact energy to be attributed to the vessel shall be determined as follows:

Let X ft lb = HAZ impact energy of the test weld made to simulate the repair, determined by Charpy V-notch test.

Y ft lb = impact energy of base material used to simulate the repair, determined by Charpy V-notch test.

X' ft lb = the HAZ impact energy of the base metal at the weld repair in the vessel.

Y' ft lb = impact energy of vessel material based on records.

If X is less than Y,
then $Y - X = R$ ft lb; reduction in impact energy caused by the weld repair.
& $Y' - R$ in ft lb = X', HAZ impact energy of the vessel in the area of the repair.

If X is greater than Y, then the original fracture toughness criteria shall apply.

(b) The welders shall be qualified in accordance with Section IX. If the repair weld is to be performed under physical obstructions, the welder shall also demonstrate his ability to deposit sound weld metal in the positions required using the same parameters and simulated physical obstructions as are involved in the repair. In the latter case, the weld requires nondestructive examination only. The two tests may be combined if so desired provided Section IX requirements are met.

(1) The performance qualification tests for welders conducted by one owner shall not qualify welders to weld for any other owner.

(c) The weld metal shall be deposited by the manual shielded metal arc process using low hydrogen type electrodes. The maximum bead width shall be four times the electrode core diameter.

(d) Care of welding filler metal (covered electrodes) shall conform to the following requirements:

(1) All covered electrodes shall be baked before use at temperature of 800 F ± 25 F for 30 minutes to 1 hour. The temperature of the oven shall not exceed 300 F when the electrodes are placed in the oven for baking during the baking cycle. The temperature shall not be raised more than 300 F per hour when oven temperatures are above 500 F, and the total time above 500 F, including the holding time, shall not exceed 5 hours. After baking and before the electrodes are allowed to cool below 150 F, they shall be transferred to holding ovens operating in temperature ranges of 225 F to 300 F.

(2) During the repair, the electrodes shall be kept in portable heated ovens which shall be at the work station. These ovens shall be at 225 F to 300 F. Electrodes shall not be out of an oven more than 20 minutes. Electrodes not used within 20 minutes after removal from the oven shall be returned to the holding oven and held at 225 F to 300 F for at least 8 hours before reissue. Electrodes may not be rebaked more than once unless tests establish that the

electrodes, after multiple rebaking, meet all specification requirements.

(e) In electrode selection, preference shall be given to those with tensile strength close to the minimum specified tensile strength of the base material. If the repair area is to be subjected to a significant fast neutron fluence (greater than 10^{19} $E_n > 1$ MeV) electrodes shall be limited to a Cu content of 0.10%, maximum, and a P content of 0.015%, maximum (as deposited) to minimize the effects of neutron irradiation on the reference nil-ductility temperature.

(f) The repair area and a band around the repair area of a minimum width of $3T$ shall be preheated (T = thickness of repair). The minimum preheat temperature shall be 350 F and shall be maintained until completion of the 450 F to 550 F heat treatment described in IWB-4423(3)(j). The maximum interpass temperature shall be 500 F.

(g) Thermocouples and recording instruments shall be used to monitor the preheat and interpass requirements, and the 450 F to 550 F heat treatment. Thermocouples may be attached by welding, where practical.

(h) The cavity shall be buttered using 3/32 in. maximum diameter electrode as shown in Step 1, Fig. IWB-4423(a). Approximately one-half the thickness of this buttering layer shall be removed by grinding before depositing the second layer. See Step 2, Fig. IWB-4423(a). The second layer shall be deposited with a 1/8 in. maximum diameter electrode and subsequent layers shall be deposited with either 1/8 in. or 5/32 in. diameter electrodes. Bead deposition shall be performed in a manner to temper the prior beads and their heat-affected zones as shown in Step 3, Fig. IWB-4423(a). The completed weld shall have at least one layer of weld reinforcement deposited and then this reinforcement shall be removed making the finished surface of the repair substantially flush with the surface of the vessel surrounding the repair.

(i) Controlled peening may be performed to minimize distortion and residual stresses providing it is used on the welds made to qualify the repair procedure. Peening shall not be used on the initial layer of the weld metal nor on the final layer. If peening is used, each weld bead should be cleaned and then given a light peen using a peening tool with a blunt nose about 1/2 in. radius in a medium size air-operated tool capable of delivering a 9 ft lb blow at 90 psi line pressure. The temparture of the weld bead during peening shall be approximately the same as the interpass temperature (350 F to 500 F).

(j) At the completion of welding, the $3T$ area as defined in IWB-4423(3)(f) shall be maintained at 450 F—550 F for a minimum period of two hours.

(4) Examination

(a) During the weld repair, a magnetic particle examination shall be performed on each layer.

(b) The repair area and the $3T$ band as defined in IWB-4423(3)(g) shall be nondestructively examined after the completed weld has been at ambient temperature for a period of 48 hours, minimum. The nondestructive examination of the repair welded region shall include radiography, if practical, in accordance with IWA-2231, ultrasonic examination in accordance with IWA-2232, and magnetic particle examination in accordance with IWA-2221. Areas representing location of attached thermocouples shall be examined by the magnetic particle method in accordance with IWA-2221.

(5) After the weld repair and nondestructive examination is completed, an evaluation shall be made in accordance with the procedure described in IWA-3000 for evaluation of flaws. Size of flaw indications not completely removed shall be part of the evaluation.

(6) Appropriate records including sketches showing flaw size and location, photographs, results of metallurgical investigation, stress analysis, and dimensions shall be documented and maintained on file by the owner.

IWB-4430 PROCEDURE NUMBER 5

IWB-4431 Welding High Nickel Alloys, Low and High Alloy Steels

Nonpostweld heat treated weld repairs (or replacement) of P-8 or P-43 cladding and structural material that are attached to components fabricated from ferrous materials of P-1, P-3, P-12A, P-12B, and P-12C classifications may be made after the final postweld heat treatment provided the following requirements are met:

(a) Materials shall conform to the requirements of IWA-4421.

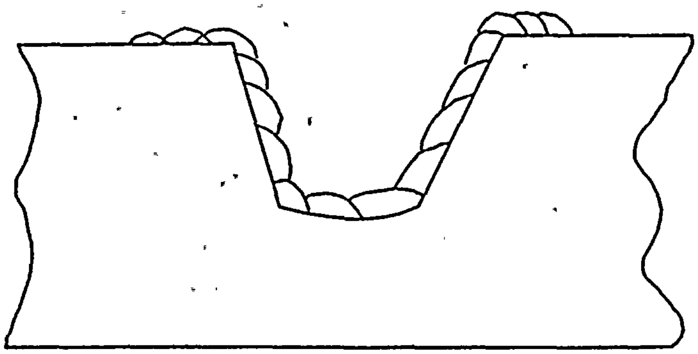
(b) Welding Qualifications, Records, and Identifying Stamps. The rules of IWB-4422 shall apply.

(c) Repairs

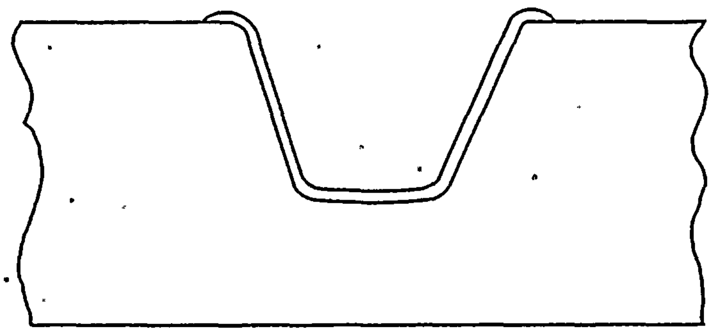
(1) Depths and areas to be repaired shall be in accordance with IWA-3000.

(2) Each repair operation shall be performed in accordance with a procedure delineating all of the requirements of the complete repair cycle.

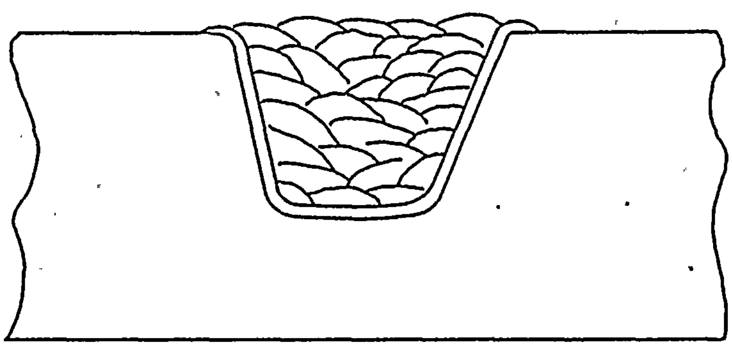
(3) Dimensional measurements shall be es-



Step – 1 Butter cavity with one layer of weld metal using 3/32 in. diameter coated electrode.



Step 2 – Remove half of the first layer by grinding.



Step 3 – Complete the joint using 1/8 in. and 5/32 in. diameter coated electrodes. The final layer overlaps but shall not extend beyond the buttering deposited by Step 1 and shall extend to a level above the surface. It shall then be removed substantially flush with the surface as required by Paragraph IWA-4423(3) (h).

FIG. IWB-4423(a) HALF BEAD WELD REPAIR AND WELD TEMPER BEAD REINFORCEMENT

tablished, if needed, for reference points during and after the repair.

(4) Metal removal shall be accomplished by machining, grinding, or chipping; thermal cutting is not permitted.

(5) In preparation for welding, the cavity shall be ground smooth and clean with beveled sides and edges rounded when applicable to provide suitable accessibility for welding.

(6) The cavity to be repaired shall be examined in accordance with IWA-2200 prior to welding.

(7) Actual dimensions and location of the areas being welded shall be documented.

(d) Repair Welding

(1) The welding procedure shall be qualified in accordance with Section IX and the additional following requirements, but no welding shall be undertaken until after the welding procedures which are to be used have been qualified:

(a) Two test assemblies shall be required to qualify this welding procedure and shall be in accordance with the requirements of Section IX for groove welds and cladding respectively; in cases of conflict, the rules of this article shall apply.

(1) The test assembly material for the welding procedure qualification tests shall be of the same specification type, grade, and class including a similar postweld heat treatment as the material to be repaired. If the repair involves two different types of material, the test assembly shall duplicate each type.

(2) Test Assembly A—for cladding. The base material thickness shall be 5 in. minimum with a clad surface area of 18 in. by 18 in. In addition to the bend tests required by Section IX, two guided side bend specimens that are 45° to the direction of welding shall be removed and tested. The specimens to be removed parallel to the welding directions shall be taken from bead overlap areas. Chemical analysis shall be performed in accordance with Section IX and shall meet the requirements of the electrode material specification. The guided bend test acceptance standards described in Section IX for cladding shall also be applicable to the HAZ of the base material.

(3) Test Assembly B—This test assembly shall meet the requirements described for the Qualification Test in IWB-4420.

(2) The welders shall be qualified in accordance with the requirements described under Procedure Number 4, IWB-4420 except that impact tests of the weld deposit are not required.

(3) The weld metal shall be deposited by the manual shielded metal arc process using Type A-7 weld metal (see Table QW-422 of Section IX) for P-8 cladding or structural material or P-43 weld metal (see Table QW-422 of Section IX) for either P-8 or P-43 cladding or structural material. The maximum bead width shall be three times the electrode core diameter.

(4) Care of welding filler metal (covered electrodes) shall conform to the requirements of IWB-4420.

(5) The repair area and a band around the repair area of minimum width of 3*T* shall be preheated (*T* = Thickness of Repair). The minimum preheat temperature shall be 350 F and shall be maintained until completion of the 450 F to 550 F heat treatment described in IWB-4423(3)(f). The maximum interpass temperature shall be 400 F.

(6) All areas of the base material on which weld metal is to be deposited shall be covered with a single layer of weld deposit using 3/32 in. diameter electrodes. Approximately one-half the thickness of this layer shall be removed by grinding before depositing the second layer. The second and subsequent layers shall be deposited with 1/8 in. diameter electrodes. The technique described in this paragraph shall be duplicated in the procedure qualification. (See Fig. IWB-4423(a).)

(7) At the completion of welding, the 3*T* area as defined in IWB-4431(d)(5) shall be maintained at 450 F to 550 F for a minimum period of two hours.

(e) The repair area and the 3% band as defined in IWB-4431(d)(5) shall be nondestructively examined after the completed weld has been at ambient temperature for a period of 48 hours, minimum. The nondestructive examination of the repair welded region shall include volumetric examination in accordance with IWA-2230 and liquid penetrant examination in accordance with IWA-2222.

(f) After the weld repair and nondestructive examination is completed and if the flaw was located in P-8 or P-43 structural material, an evaluation shall be made in accordance with the procedure described in IWA-3000 for evaluation of flaws. Size of flaw indications not completely removed shall be part of the evaluation. The analysis shall consider all forms of loading.

(g) Appropriate records and actual dimensions of weld repairs shall be documented and maintained on file by the Owner.

ARTICLE IWB-5000
SYSTEM LEAKAGE AND HYDROSTATIC PRESSURE TESTS

IWB-5200 SYSTEM TEST REQUIREMENTS

IWB-5210 TEST

The components shall be subjected to (a) a system leakage test prior to startup following each reactor refueling outage and (b) a system hydrostatic pressure test at or near the end of each inspection interval. The reactor coolant water shall be used as the pressurizing medium.

IWB-5220 PRESSURE

IWB-5221 System Leakage Test Pressure

The system leakage test shall be performed at a test pressure that, for the component located at the highest elevation in the system, is not less than the system nominal operating pressure at 100% rated reactor power. The system pressure shall be increased to the level of the test pressure and test temperature at a rate in accordance with the limitations specified for the system.

IWB-5222 System Hydrostatic Test Pressure

(a) The system hydrostatic test shall be performed at a test pressure that, for the component located at the highest elevation in the system, is not less than 1.10 times the system nominal operating pressure (P_o) which corresponds with 100% rated reactor power, and at a test temperature not less than 100 F except as may be required to meet the test temperature requirements of IWA-5230.

(b) The test pressure may be reduced in accordance with the following table when system hydrostatic testing is required to be conducted at temperatures above 100 F in order to meet the fracture toughness criteria applicable to ferritic materials of which the system components are constructed:

Test Temperature	Test Pressure
100 F	1.10 P_o
200 F	1.08 P_o
300 F	1.06 P_o
400 F	1.04 P_o
500 F	1.02 P_o

SUBSECTION IWC

REQUIREMENTS FOR CLASS 2 COMPONENTS OF LIGHT-WATER COOLED POWER PLANTS

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ARTICLE IWC-1000
SCOPE AND RESPONSIBILITY

IWC-1100 SCOPE

This Subsection defines rules and requirements for inservice inspection of Class 2 pressure-retaining components (and their supports) in light water cooled power plants.

IWC-1200 COMPONENTS SUBJECT TO INSPECTION

IWC-1210 EXAMINATION REQUIREMENTS

The examination requirements of IWC shall apply to Class 2 pressure-retaining components (and their supports).

IWC-1220 EXEMPTED COMPONENTS

The following components may be exempted from the examination requirements of IWC-2520:

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

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

(c) Components which perform an emergency core cooling function, provided the control of the chemistry[1] of the contained fluid is verified by periodic sampling and test.

(d) Component connections, piping, and associated valves, and vessels (and their supports), that are 4 in. nominal pipe size and smaller.

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[1]The control of fluid chemistry is intended to minimize corrosive effects, particularly stress corrosion.

ARTICLE IWC-2000
EXAMINATION AND INSPECTION

IWC-2010 INSPECTION

Examinations shall be witnessed or otherwise verified by an Inspector except for examinations performed during normal system operation.

IWC-2100 PRESERVICE INSPECTION

(a) All detailed examinations listed in Tables IWC-2520 and IWC-2600 shall be performed completely, once, as a preservice examination requirement prior to initial plant startup.

(b) Shop and field examinations may serve in lieu of the on-site preservice examinations, provided:

(1) in the case of vessels only, the hydrostatic test required by Section III has been completed,

(2) such examinations are conducted under conditions and with equipment and techniques equivalent to those which are expected to be employed for subsequent inservice examinations, and

(3) the shop and field examination records are or can be documented and identified in a form consistent with those required in IWA-6000.

IWC-2400 INSPECTION SCHEDULE

IWC-2410 INSPECTION PROGRAM

IWC-2411 Nondestructive Examination

(a) Inservice examinations may be performed during normal system operation or during plant outages.

(b) The examinations required by IWC-2520 shall be divided among the number of components of the same size and geometry in each of the multiple streams of a system which perform the same (or redundant) functions, such that the total examinations completed over the system's service lifetime will be equivalent to having performed 100% of the required examinations in one of the multiple streams of the system. Systems or portions of systems with a single stream shall be examined such that 100% of the required examinations of the components will be completed over the system's service lifetime.

(c) The required examinations for systems with multiple streams shall be distributed among the total number of components and streams by the application of the following procedure:

(1) Determine the number of areas subject to examination (Table IWC-2520) for all components (of the same size and geometry) in one of the multiple streams of the system. (Where the multiple streams have an unequal number of areas subject to examination, use the average.)

(2) Assign an approximately equal number of the required examination areas among the respective components in each of the multiple streams of the system.

(3) Select different components (or areas of components) to be examined in each of the multiple streams of the system.

(d) If the number of areas subject to examination in a specific category is less than the number of streams, at least one such area shall be examined.

(e) The required examinations assigned to the components in each stream of the system shall be completed by the end of the service lifetime, but divided among the number of inspection intervals (e.g., four intervals for 40-year design service lifetime) in accordance with the following rules:

(1) Distribute, to the extent practicable, the required number of examinations uniformly among the number of inspection intervals.

(2) Perform at least part of the required examinations by the expiration of one-third, two-thirds and the end of each inspection interval, where the number of required examinations are distributed in accordance with IWC-2410(e)(1).

(3) Perform at least one examination in each stream of a system during each inspection interval. Select a different component among the multiple streams during each inspection interval.

(4) To the extent practicable, select periods for

the required examination such that the intervals between examinations for a specific examination category will not exceed the inspection interval (i.e., 10 years).

IWC-2412 Pressure Test and Visual Examination

(a) The examinations and tests required by IWC-2510 for the components inspected in accordance with the provisions of IWC-1220 shall be distributed as follows:

(1) Between 25 and 33⅓% of the required examinations shall be completed by the expiration of one-third of each inspection interval.

(2) Between 50 and 66⅔% of the required examinations shall be completed by the expiration of two-thirds of each inspection interval.

(3) The remaining required examinations shall be completed by the end of each inspection interval.

(b) The examinations and tests required by IWC-2510 for all other components shall be performed at least once toward the end of each inspection interval.

IWC-2430 ADDITIONAL EXAMINATIONS

Examinations that reveal unacceptable structural defects in a category and in one multiple stream of the system shall be extended to include an additional number (or areas) of components in the same category approximately equal to that number initially examined. In the event further unacceptable structural defects are revealed, all of the same component(s) in the other multiple streams of the system shall be examined.

IWC-2500 EXAMINATION REQUIREMENTS

IWC-2510 EXEMPT AND NONEXEMPT COMPONENTS

Components shall be examined in accordance with IWA-5000 and IWC-5000.

IWC-2520 NONEXEMPT COMPONENTS

Components shall be examined in accordance with the requirements specified in Table IWC-2520.

IWC-2600 EXAMINATION METHOD REQUIREMENTS

The method of examination for the components and parts of the pressure-retaining boundaries shall comply with those tabulated in Table IWC-2600 except where alternate examination methods are used that meet the requirements of IWA-2240.

TABLE IWC-2520
EXAMINATION CATEGORIES

AREAS SUBJECT TO EXAMINATION	EXTENT OF EXAMINATIONS
C-A PRESSURE-RETAINING WELDS IN PRESSURE VESSELS	
The areas shall include shell and head circumferential welds which are gross structural discontinuities.[1] This includes weld metal and base metal for one plate thickness beyond the edge of the weld joint.	The examinations shall cover at least 20% of each circumferential weld, uniformly distributed among three areas around the vessel circumference.
C-B PRESSURE-RETAINING NOZZLE WELDS IN VESSELS	
The areas shall include the nozzle-to-vessel attachment welds.	The examination shall cover 100% of the nozzle-to-vessel attachment weld.
C-C INTEGRALLY WELDED SUPPORT ATTACHMENTS TO VESSELS	
The areas shall include the welds of external support attachment, brackets, lugs, etc.	The examinations shall cover 100% of the weld.
C-D PRESSURE-RETAINING BOLTING EXCEEDING 1-INCH IN DIAMETER	
The areas shall include bolts, studs, nuts, bushings, washers, and threads in base material and flange ligaments between threaded stud holes.	Visual examinations performed during each inspection interval shall cover 100% of the bolts, studs, nuts, bushings, and threads in base material and flange ligaments between threaded stud holes. Nondestructive examinations shall be performed on 10% of the bolting in each joint, but not less than two bolts or studs per joint. Bushings, threads, and ligaments in base material of flanges are required to be examined only when the connection is disassembled. Bolting may be examined either in place under tension, when the connection is disassembled, or when the bolting is removed.
C-E-1 SUPPORT MEMBERS FOR PIPING, VALVES AND PUMPS	
The areas shall include the external support attachments. This includes the welds to the pressure-retaining boundary and the base metal beneath the weld zone and along the support attachment member for a distance of two support thicknesses.	The examinations performed during each inspection interval shall cover 100% of the major load bearing elements of the support structure and hanger.
C-E-2 SUPPORT COMPONENTS FOR PIPING, VALVES AND PUMPS	
The areas shall include the support components which extend from the piping, valve, and pump attachment, and including the attachment to the supporting structure.	The examination performed during each inspection interval shall cover all support components. The support settings of constant and variable spring type hangers, snubbers, and shock absorbers shall be verified.

[1] Gross structural discontinuity is defined in NB-3213.2.

TABLE IWC-2520 (CONT'D) EXAMINATION CATEGORIES

AREAS SUBJECT TO EXAMINATION	EXTENT OF EXAMINATIONS
C-F	
PRESSURE-RETAINING WELDS IN PIPING, PUMPS, AND VALVES IN SYSTEMS WHICH CIRCULATE REACTOR COOLANT	
The areas shall include: a. circumferential butt welds at structural discontinuities.[1] b. circumferential butt welds in piping within 3 pipe diameters of the centerline of rigid pipe anchors, or anchors at the penetration of the primary reactor containment, or at rigidly anchored components. c. longitudinal weld joints in pipe fittings (i.e., in tees, elbows, reducers). d. branch connection weld joints. e. pump casing and valve body weld joints. This includes the weld metal and base metal for one-wall thickness beyond the edge of weld.	The examinations shall cover 100% of the weld.
C-G	
PRESSURE-RETAINING WELDS IN PIPING, PUMPS, AND VALVES IN SYSTEMS WHICH CIRCULATE OTHER THAN REACTOR COOLANT	
The areas shall include 50% of the total number of the following welds: a. circumferential butt welds at structural discontinuities.[1] b. circumferential butt welds in piping within 3 pipe diameters of the centerline of rigid pipe anchors, or anchors at the penetration of the primary reactor containment, or at rigidly anchored components. c. longitudinal weld joints in pipe fittings (i.e., in tees, elbows, reducers). d. branch connection weld joints. e. pump casing and valve body weld joints. This includes the weld metal and base metal for one wall thickness beyond the edge of weld. The welds selected shall provide a representative sampling among the total number of welds covered by (a) to (e) above.	The examination shall cover 100% of the weld.

[1] Structural discontinuities include weld joints at pipe-to-vessel nozzle, pipe-to-valve body, pipe-to-pump casing, pipe-to-fittings (i.e., elbows, tees, reducers, flanges), and pipe-to-pipe of different schedule wall thickness.

TABLE IWC-2600
COMPONENTS, PARTS, AND METHOD OF EXAMINATION

Item No.	Examination Category Table IWC-2520	Components and Parts to be Examined	Method
		PRESSURE VESSELS	
C1.1	C-A	Circumferential butt welds	Volumetric
C1.2	C-B	Nozzle-to-vessel welds	Volumetric
C1.3	C-C	Integrally-welded supports	Surface
C1.4	C-D	Pressure-retaining bolting	Visual and either surface or volumetric
		PIPING	
C2.1	C-F, C-G	Circumferential butt welds	Volumetric
C2.2	C-F, C-G	Longitudinal weld joints in fittings	Volumetric
C2.3	C-F, C-G	Branch pipe-to-pipe weld joints	Volumetric
C2.4	C-D	Pressure-retaining bolting	Visual and either surface or volumetric
C2.5	C-E-1	Integrally-welded supports	Surface
C2.6	C-E-2	Support components	Visual
		PUMPS	
C3.1	C-F, C-G	Pump casing welds	Volumetric
C3.2	C-D	Pressure-retaining bolting	Visual and either surface or volumetric
C3.3	C-E-1	Integrally-welded supports	Surface
C3.4	C-E-2	Support components	Visual
		VALVES	
C4.1	C-F, C-G	Valve body welds	Volumetric
C4.2	C-D	Pressure-retaining bolting	Visual and either surface or volumetric
C4.3	C-E-1	Integrally-welded supports	Surface
C4.4	C-E-2	Support components	Visual

ARTICLE IWC-3000
EVALUATION OF EXAMINATION RESULTS

(In Course of Preparation)

ARTICLE IWC-4000
REPAIR PROCEDURES

IWC-4200 GENERAL REQUIREMENTS

The repair rules of IWB-4000 shall apply.

ARTICLE IWC-5000
SYSTEM PRESSURE TESTS

IWC-5200 SYSTEM TEST REQUIREMENTS

IWC-5220 PRESSURE

(a) The system hydrostatic test pressure shall be at least 1.25 times the system design pressure (P_D) and conducted at a test temperature not less than 100 F except as may be required to meet the test temperature requirements of IWA-5230.

(b) The test pressure may be reduced in accordance with the following table when system hydrostatic testing is required to be conducted at temperatures above 100 F in order to meet the fracture toughness criteria applicable to ferritic materials of which the system components are constructed.

Test Temperature	Test Pressure
100 F	1.25 P_D
200 F	1.20 P_D
300 F	1.15 P_D
400 F	1.10 P_D
500 F	1.05 P_D

(c) For components that are not required to function during reactor operation, the system test pressure shall not be less than 100% of the pressure developed during the conduct of a periodic system inservice test.[1] In the case of storage tanks, the nominal hydrostatic pressure developed with the tank filled to its design capacity shall be acceptable as the system test pressure.

(d) Open-ended portions of a nonclosed system (e.g., suction line from a storage tank, or discharge line of a containment spray header) extending to the first shutoff valve may be exempted from the test requirements of IWC-2510.

[1]System inservice tests include pressurization of systems to conduct functional tests (i.e., valves and pumps), or a system pressure test.

SUBSECTION IWD

REQUIREMENTS FOR CLASS 3 COMPONENTS OF LIGHT-WATER COOLED POWER PLANTS

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ARTICLE IWD-1000
SCOPE AND RESPONSIBILITY

IWD-1100 SCOPE

This Subsection defines rules and requirements for inservice inspection of Class 3 pressure-retaining components (and their supports) in light water cooled power plants.

IWD-1200 EXAMINATION REQUIREMENTS

The examination requirements of IWD shall apply to Class 3 pressure-retaining components (and their supports).

ARTICLE IWD-2000
INSPECTION REQUIREMENTS

IWD-2100 PRESERVICE INSPECTION

All examinations required by this Article shall be performed completely, once, as a preservice examination requirement prior to initial plant startup.

IWD-2400 INSPECTION SCHEDULE

IWD-2410 INSPECTION PROGRAM

(a) Inservice examinations may be performed during system operation plant outages.

(b) 100% of the components shall have been tested and examined in accordance with IWA-5000, IWD-5000, and IWD-2600 by the expiration of each inspection interval.

(c) In addition, 100% of the components shall have been examined in accordance with IWA-5240 and IWD-2600 while in operation or during system inservice testing, by the expiration of every one-third of each inspection interval.

IWD-2600 EXAMINATION REQUIREMENTS

Components in systems[1] or portions of systems shall be subjected to the following examination:

(a) Visual examination shall be conducted for evidence of component leakages (other than controlled or collected leakages), structural distress, or corrosion when the system is undergoing either a system inservice test, component functional test (i.e., valves and pumps) or a system pressure test.

(b) In the case of buried components (e.g., underground piping), valves shall be provided to permit isolation of the buried portions of piping for the purpose of conducting a system pressure test in lieu of the visual examination. A loss of system pressure during the test shall constitute evidence of component leakage.

(c) Supports (restraints) and hangers for components exceeding four-inch nominal pipe size whose structural integrity is relied upon to withstand design loads when the system function is required shall be visually examined to detect any loss of support capability, and evidence of inadequate restraint.

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[1]Among the systems included in this group, the following are typical examples:

(a) Component cooling water systems for residual heat removal from the reactor.

(b) Component cooling water systems for emergency core cooling, post-accident containment heat removal and atmosphere cleanup.

(c) Portions of service water systems required to accomplish the functions associated with systems (1) and (2) above.

ARTICLE IWD-3000
EVALUATION OF EXAMINATION RESULTS

(In Course of Preparation)

ARTICLE IWD-4000
REPAIR PROCEDURES

IWD-4200 GENERAL REQUIREMENTS

The repair rules of IWB-4000 shall apply.

ARTICLE IWD-5000
SYSTEM PRESSURE TESTS

IWD-5200 SYSTEM TEST REQUIREMENTS

(a) The system test pressure shall be at least 1.10 times the system design pressure.

(b) In the case of storage tanks, the nominal hydrostatic pressure developed with the tank filled to its design capacity shall be acceptable as the system test pressure.

(c) Open-ended portions of a system (e.g., suction line from a storage tank) extending to the first shutoff valve may be exempted from the test requirements of IWD-5200.

SUBSECTION IWP

INSERVICE TESTING OF PUMPS IN NUCLEAR POWER PLANTS

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ARTICLE IWP-1000
INTRODUCTION

IWP-1100 SCOPE

This subsection defines the rules and requirements for inservice testing of Class 1, 2, and 3 pumps which are installed in water-cooled nuclear power plants and which are provided with an emergency power source. The results of these tests are to be used in assessing operational readiness of the pumps during their service life.

IWP-1200 EXCLUSION

Drivers are excluded except when the pump and driver form an integral unit and the pump bearings are in the driver.

IWP-1300 OWNER RESPONSIBILITY

In addition to the requirements of IWA-1400, the Owner shall have included as part of the pump and plant design all necessary valves, instrumentation, and such other provisions as may be required to comply with this subsection.

IWP-1400 BY-PASS LOOPS

In cases where a pump cannot practically be tested in its regular circuit, a by-pass loop may be used.

IWP-1500 DETECTION OF CHANGE

The hydraulic and mechanical condition of a pump relative to a previous condition can be determined by attempting to duplicate by test a set of basic reference parameters. Deviations detected are symptoms of changes and, depending upon the degree of deviation, indicate need for further tests or corrective action.

IWP-1600 DETECTION OF HYDRAULIC CHANGE

Rotative speed, flowrate, and differential pressure are basic parameters which, when a pump is operating with adequate suction conditions describe the hydraulic characteristics of a pump. These parameters are related by the functional equation

$$\Delta P = F(N^m, Q^\ell)$$

During test when the values of any two of these parameters are adjusted to reference values the value of the third parameter is established. If the test data indicates that a deviation from a previous reference value has occurred and all test data is correct, a change has taken place in the hydraulic components of the pump which may warrant corrective action. Thus, there is the requirement to measure these basic parameters.

IWP-1700 DETECTION OF MECHANICAL CHANGE

Vibration and bearing temperature are two basic parameters which describe the mechanical characteristics of a pump. Values determined under a specific dynamic load, i.e. speed, differential pressure, and flow rate, should be duplicated in future tests under similar load conditions. Deviations from reference values may indicate changes in the mechanical components which may warrant corrective action. Thus there is the requirement to measure these basic parameters.

ARTICLE IWP-2000
DEFINITIONS

IWP-2100 DEFINITIONS

IWP-2110 PUMPS

The term pumps as used herein, refers only to those of the centrifugal and displacement type.

IWP-2111 Inservice Test

Inservice test is a special test procedure for obtaining through measurement or observation, information to determine the operational readiness of a pump. These tests are not designed to establish complete pump performance.

IWP-2112 Normal Plant Operation

The term "normal plant operation" as used herein, refers to the respective conditions of start-up, hot standby, operation, or cool-down of the nuclear power plant.

IWP-2113 Operational Readiness

Operational readiness is the capability of a pump to fulfill its function.

IWP-2114 Inservice Life

Inservice life is that period in the life of a pump from the time it is installed and accepted for service until it is retired from service.

IWP-2115 Routine Servicing

Routine servicing is the performing of planned, preventive maintenance, such as changing oil, flushing cooling system, adjusting packing, or adding a packing ring, mechanical seal maintenance, which does not require disassembly of the pump or replacement of pump parts.

IWP-2116 System Resistance

System resistance is the hydraulic resistance to flow in a system.

IWP-2117 Variable Resistance Systems

A variable resistance system is one wherein the hydraulic resistance is varied to duplicate a reference flow rate or differential pressure.

IWP-2118 Fixed Resistance Systems

A fixed resistance system is one wherein the hydraulic resistance remains unchanged from test to test.

TABLE IWP-1100.1
SYMBOLS, QUANTITIES, AND UNITS

Symbols	Quantities	Units	Unit Abbreviations
m, 1,	Exponents		
N	Rotative speed	Revolutions per minute	rpm
ΔP	Differential pressure across pump	Pounds per square inch	psi
Pi	Inlet pressure	Pounds per square inch gage	psig
Q	Flow rate	Gallons per minute	gpm
r	Subscript denotes reference quantity		
T_b	Bearing temperature	Degrees Fahrenheit	F
V	Vibration amplitude (Peak-to-Peak)	Thousandths of an inch	mil

ARTICLE IWP-3000
INSERVICE TEST PROCEDURES

IWP-3100 INSERVICE TEST PROCEDURE

An inservice test shall be conducted with the pump operating at nominal motor nameplate speed for constant speed drives and at a speed adjusted to the reference speed for variable speed drives. In variable resistance systems the resistance of the system shall be varied until either the measured differential pressure or the measured flowrate, but not both, shall equal the corresponding reference value. In variable or fixed resistance systems the Test quantities shown in Table IWP-3100-1 shall then be measured or observed as directed in this Subsection. Each measured test quantity shall then be compared to the reference value of the same quantity. Any deviations determined shall be compared to the limits given in Table IWP-3100-2 and the specified corrective action taken.

IWP-3110 REFERENCE VALUES

Reference values are defined as one or more fixed sets of values of the quantities shown in Table IWP-3100-1 as measured or observed when the equipment is known to be operating acceptably. All subsequent test results shall be compared to these reference values or to new reference values established in accordance with paragraphs IWP-3111 and IWP-3112. Reference values shall be determined from the results of an inservice test which may be run during preoperational testing or from the results of the first inservice test run during power operation. Reference values shall be at points of operation readily duplicated during subsequent inservice testing.

TABLE IWP-3100-1
INSERVICE TEST QUANTITIES

Quantity	Measure	Observe
Speed, N (if variable speed)	√	
Inlet pressure P_i	√[2]	
Differential Pressure, ΔP	√[1]	
Flow rate, Q	√[1]	
Vibration Amplitude, V	√	
Proper lubricant level or pressure		√
Bearing Temperature T_b	√	

[1] In a fixed resistance system it is required to measure ΔP or Q, not both. In a variable resistance system both shall be measured.

[2] Measure before pump startup and during test.

IWP-3111 Effect of Pump Replacement, Repair, and Routine Servicing on Reference Values

After a pump has been replaced, a new set or sets of reference values shall be determined from the results of the first inservice test run after the pump is put into service. When a reference value or set of values may have been affected by repair or routine servicing of the pump, a new reference value or set of values shall be determined or the previous value reconfirmed by an inservice test run prior to or within 96 hours after return of the pump to normal service. Deviations between the previous and new set of reference values shall be identified and verification that the new values represent acceptable pump operation shall be placed in the pump record.

IWP-3112 To Establish an Additional Set of Reference Values

Should it be necessary or desirable for some reason other than stated in paragraph IWP-3111 to establish an additional set of reference values, an inservice test shall first be run at the conditions of an existing set of reference values and the results analyzed. If operation is satisfactory, a second test run at the new reference conditions shall follow as soon as practical. The results of this test shall establish the additional set of reference values. Whenever an additional set of reference values is established, the reasons for so doing shall be justified and documented in the pump record.

TABLE IWP-3100-2
ALLOWABLE RANGES OF TEST QUANTITIES

Test Quantity		Acceptable Range	Alert Range[3]		Required Action Range[3]	
			Low Values	High Values	Low Values	High Values
Pi		[1]	[1]	[1]	[1]	[1]
ΔP		.93 to 1.02 ΔPr	.90 to .93ΔPr	1.02 to 1.03ΔPr	< .90ΔPr	> 1.03ΔPr
Q		.94 to 1.02 Qr	.90 to .94 Qr	1.02 to 1.03 Qr	< .90 Qr	> 1.03 Qr
V	When 0 < Vr < 0.5 mil	V—0 to 1 mil	None	V—1 to 1.5 mil	None	V > 1.5 mil
V	When 0.5 mil < Vr < 2.0 mil	V—0 to 2Vr mil	None	V—2Vr mil to 3Vr mil	None	V > 3Vr mil
V	When 2.0 mil < Vr < 5.0 mil	V—0 to (2 + Vr) mil	None	V—2 (2 + Vr) mil to (4 + Vr) mil	None	V > (4 + Vr) mil
V	When Vr > 5.0 mil	V—0 to 1.4Vr mil	None	V—1.4Vr mil to 1.8Vr mil	None	V > 1.8Vr mil
T_b		[2]	[2]	[2]	[2]	[2]

[1] Pi shall be within the limits specified by the Owner in the pump record.
[2] T_b shall be within the limits specified by the Owner in the pump record.
[3] See IWP-3230

IWP-3200 ANALYSIS OF RESULTS

IWP-3210 ALLOWABLE RANGES OF INSERVICE TEST QUANTITIES

The allowable ranges of inservice test quantities in relation to the reference values, are tabulated in Table IWP-3100-2. In the event these ranges can not be met, the Owner shall specify in the pump record the reduced range limits to allow the pump to fulfill its function, and those limits shall be used in lieu of the ranges given in Table IWP-3100-2.

IWP-3220 TIME ALLOWED FOR ANALYSIS OF TESTS

All test data shall be analyzed within 96 hours after completion of a test.

IWP-3230 CORRECTIVE ACTION

(a) If deviations fall within the "Alert Range" of Table IWP-3100-2, the frequency of testing shall be doubled until the cause of the deviation is determined and corrected and either the existing reference values reverified or a new set established per IWP-3111.

(b) When subsequent tests show deviations greater than allowed (see Table IWP-3100-2), the instruments involved may be recalibrated and the test rerun.

(c) If the deviations fall within the "Required Action Range" of Table IWP-3100-2, the pump shall be declared inoperative, and not returned to service until the condition has been corrected. The corrective action shall be considered completed when a satisfactory inservice test has been conducted in accordance with IWP-3111.

IWP-3300 SCOPE OF TESTS

Each inservice test shall include the measurement and observation of all quantities in Table IWP-3100-1 except bearing temperatures which shall be measured during at least one inservice test each year.

IWP-3400 FREQUENCY OF INSERVICE TESTS

(a) An inservice test shall be run on each pump, nominally each month during normal plant operation. It is recommended that this test frequency be maintained during shutdown periods where this can reasonably be accomplished, although this is not mandatory. If it is not tested during plant shutdown, the pump shall be tested within one week after plant is returned to normal operation.

(b) Pumps that are operated more frequently than every month need not be run or stopped for a special test, provided the plant log shows each such pump was operated at least once every month at the reference conditions and the quantities specified were measured, observed, recorded, and analyzed.

IWP-3500 DURATION OF TESTS

(a) When measurement of bearing temperature is not required, each pump shall be run for at least five minutes under conditions as stable as the system

permits. At the end of this time at least one measurement or observation of each of the quantities specified shall be made and recorded.

(b) When measurement of bearing temperature is required, each pump shall be run until the bearing temperatures (IWP-4310) stabilize, and then the quantities specified shall be measured or observed and recorded. A bearing temperature shall be considered stable when three successive readings taken at ten minute intervals do not vary by more than 3%.

ARTICLE IWP-4000
METHODS OF MEASUREMENT

IWP-4100 INSTRUMENTS

IWP-4110 QUALITY

All instruments shall have nominal errors within limits shown in Table IWP-4110-1. Station instruments meeting these requirements shall be acceptable.

IWP-4111 Range

The full scale range of each instrument shall be not greater than four times the reference value.

IWP-4112 Instrument Location, Transmitters, Computers

Instruments shall be located at their input source and read directly or via video transmission, or transmitters may be used. Instrument outputs may be fed directly into a computer for processing and indication, or digital printout.

IWP-4113 Calibration

All instruments, together with their transmitters where used, shall be calibrated prior to the establishment of reference quantities. All new or repaired instruments shall be calibrated prior to test use. A system of calibration records shall be used to identify each instrument and its date of calibration, or alternatively each instrument may contain an attached tag or sticker that records the date of last calibration. Except as required above, all instruments used for these tests shall be verified for calibration validity on a regular basis as established by the Owner.

TABLE IWP-4110-1
NOMINAL MAXIMUM INSTRUMENT ERRORS

Pressure	± 2% of full scale
Differential pressure	± 2% of full scale
Flowrate	± 2% of full scale
Speed	± 2% of full scale
Temperature	± 5% of full scale
Vibration amplitude	± 5% of full scale

IWP-4114 Fluctuations

Symmetrical damping devices or averaging techniques may be used to reduce instrument fluctuations to within ± 2% of the observed reading. Hydraulic readings may be damped by using gage snubbers or by throttling small valves in instrument lines. If throttling of small valves is used the operator shall alternately open and close the valve several times to verify unobstructed pressure communication, while observing the instrument reading.

IWP-4115 Position Sensitive Instruments

Instruments whose readings are position sensitive shall be either permanently mounted or provision shall be made to duplicate position for each test.

IWP-4200 PRESSURE MEASUREMENT

IWP-4210 GAGE LINES

If a gage line is such that the presence or absence of liquid could produce a difference of more than ¼% in the indicated value of the measured pressure, means shall be provided to assure or determine the presence or absence of liquid as required for the static correction used.

IWP-4211 Pressure Tap Construction

Pressure taps shall be flush with and normal to the wall of the liquid passage.

IWP-4212 Pressure Tap Location

Pressure taps shall be located in a section of the flow path that is expected to have reasonably stable flow as close as practical to the pump. Any line valves between inlet and discharge pressure taps shall be in an open position during the inservice test.

IWP-4213 Differential Pressure

The differential pressure across a pump shall be determined by use of either a differential pressure gage or differential pressure transmitter that provide direct measurement of pressure difference, or by taking the difference between the pressure at a point in the inlet pipe, and the pressure at a point in the discharge pipe.

IWP-4300 TEMPERATURE MEASUREMENT

IWP-4310 BEARINGS

The temperature of all centrifugal pump bearings and main shaft bearing of reciprocating pumps shall be measured at points selected to be responsive to changes in the temperature of the bearing. Oil temperature, prior to the oil entering a cooler, shall be considered the bearing temperature.

IWP-4400 ROTATIVE SPEEDS

For all pumps directly coupled to motor drivers of either synchronous or induction type, the rotative shaft speed need not be measured. When any other type of driver or a variable speed coupling is used, the rpm of the pump shaft shall be determined by measurement.

IWP-4500 VIBRATION

IWP-4510 VIBRATION AMPLITUDE

At least one displacement vibration amplitude (peak-to-peak composite) shall be read during each inservice test. The direction of displacement shall be measured in a plane approximately perpendicular to the rotating shaft, and in the horizontal or vertical direction that has the largest deflection for the particular pump installation. The location shall generally be on a bearing housing, or its structural support, provided it is not separated from the pump by any resilient mounting. On a pump coupled to the driver, the measurement shall be taken on the bearing housing near the coupling; on close-coupled pumps, the measurement point shall be as close as possible to the inboard bearing. On reciprocating pumps, the location shall be on the bearing housing of the main pump drive shaft, approximately perpendicular to both the shaft and the line of plunger travel.

IWP-4520 INSTRUMENTS TO MEASURE AMPLITUDE

One of the following types of instruments shall be used:

(a) Seismic transducer with transmission to a remote readout location.

(b) A portable-type vibration indicator. The probe or measurement reference point shall be clearly identified to permit subsequent duplication in both location and plane.

(c) An appropriately calibrated proximity measuring instrument that is designed for detecting the radial deflection of the rotating shaft or coupling.

The frequency response range of readout system shall be from half minimum speed to at least maximum pump shaft rotational speed.

ARTICLE IWP-6000
RECORDS AND ANALYSIS OF INSERVICE TESTS

IWP-6200 REQUIREMENTS

IWP-6210 SUMMARY LISTING

A summary listing all pumps covered by this Subsection shall be maintained in a format that shall portray the current status of the test program. When all quantities measured during a test are within the acceptable range of Table IWP-3100-2, only the date of each successful test shall be listed.

IWP-6220 PUMP RECORDS

The Owner shall maintain a record for each pump covered by this subsection which shall include the following:

(a) The name of the manufacturer, the manufacturer's model and serial or other identification number.

(b) A copy of the manufacturer's acceptance test report, if any, or a summary thereof.

IWP-6230 INSERVICE TEST PLANS

The test plans shall include the following:

(a) The hydraulic circuit to be used.

(b) The location and type of measurement for each of the required test quantities.

(c) The reference values (Table IWP-3100-1), limits of P_i and T_b (Table IWP-3100-2) and any other values required by this Subsection.

IWP-6240 RECORD OF TESTS

The record shall include the following:

(a) Date of test.

(b) Measured and observed quantities.

(c) Identification of instruments used.

(d) Comparisons with allowable ranges of test values and analysis of deviations.

(e) Requirement for corrective action.

(f) Signature of the person or persons responsible for conducting and analyzing the test.

IWP-6250 RECORD OF CORRECTIVE ACTION

The record shall include a summary of the corrections made and the subsequent inservice test and confirmation of operational adequacy, IWP-3111, and the signature of the individual responsible for corrective action and verification of results.

IWP-6260 RECORD ACCESS

The inservice test plans and records shall be maintained at the plant and shall be accessible for audit.

SUBSECTION IWV

INSERVICE TESTING OF VALVES IN NUCLEAR POWER PLANTS

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ARTICLE IWV-1000
INTRODUCTION

IWV-1100 SCOPE

This Subsection defines the rules and requirements for inservice testing of Code Classes 1, 2, and 3 valves subject to the exclusions of IWV-1300, which are installed in commercial water-cooled nuclear power plants and which fall in the categories defined in IWV-2101. Test results are intended to verify valve operational readiness on a continuing basis.

IWV-1300 EXCLUSIONS

Valves that are not covered by this Subsection include valves used for operating convenience only such as manual vent, drain, instrument and test valves, and valves used for maintenance only.

IWV-1400 OWNER RESPONSIBILITY

In addition to the requirements in IWA-1400, each specific valve to be tested by the rules of this Subsection shall be identified by the Owner and listed in the plant records (IWV-6000).

ARTICLE IWV-2000
DEFINITIONS

IWV-2100 VALVE

"Valve" is any type of valve within the scope of this Subsection with any type of actuation such as manual, power, or self-actuated, and includes the actuating and position indicating system. External control and protection systems responsible for sensing plant conditions and providing signals for valve operation are not included.

IWV-2110 CATEGORIES OF VALVES

Categories[1] of valves subject to the rules of this Subsection are defined as:

(a) Category A—valves for which seat leakage is limited to a specific maximum amount in the closed position for fulfillment of their function.

(b) Category B—valves for which seat leakage in the closed position is inconsequential for fulfillment of their function.

(c) Category C—valves which are self-actuating in response to some system characteristic, such as pressure (relief valves) or flow direction (check valves).

(d) Category D—valves which are actuated by an energy source capable of only one operation, such as rupture disks or explosive actuated valves.

(e) Category E—valves which are normally locked (or sealed) open or locked (or sealed) closed to fulfill their function.

IWV-2120 OPERATIONAL READINESS

Operational readiness is the capability of a valve to fulfill its function.

IWV-2130 INSERVICE TEST

Inservice test is a special test procedure for obtaining through measurement or observation, information to determine the operational readiness of a valve.

IWV-2140 EXERCISING

Exercising is the demonstration based on direct or indirect visual or other positive indication that the moving parts of a valve function satisfactorily.

IWV-2150 MAINTENANCE

Maintenance is routine valve servicing or work on a valve undertaken to correct or prevent an abnormal or unsatisfactory condition.

IWV-2180 INSERVICE LIFE

Inservice life is that period in the life of a valve from the time it is installed and accepted for service until it is retired from service.

[1]Combination of categories, such as categories AC are to be used when more than one distinguishing category characteristic is applicable. In such cases, all requirements of each of the individual categories are applicable, although duplication or repetition of common testing requirements is not necessary.

ARTICLE IWV-3000
TEST PROCEDURES

IWV-3100 PRESERVICE TESTS

Each valve, after installation, and prior to service, shall be given the inservice tests required by this Subsection for its specific category. These tests shall be conducted under conditions similar to those to be experienced during subsequent inservice tests.

IWV-3200 VALVE REPLACEMENT, REPAIR AND MAINTENANCE

After a valve or its control system has either been replaced, repaired, or has undergone maintenance that could affect its performance, and prior to the time it is returned to service, it shall be tested as necessary to demonstrate that the performance parameters which could be affected by the replacement, repair, or maintenance are within acceptable limits. Adjustment of stem packing; removal of the bonnet, stem assembly, or actuator; or disconnection of hydraulic or electrical lines are examples of maintenance that could affect valve performance parameters.

IWV-3300 CHECK OF VALVE-POSITION INDICATOR

All valves with remote position indicators, which during plant operation are inaccessible for direct observation, shall be visually observed at the same (or greater) frequency as scheduled refueling outages but not less than one observation every 2 years, to confirm that remote valve indications accurately reflect valve operation.

IWV-3400 INSERVICE TESTS, CATEGORY A, CATEGORY B VALVES

IWV-3410 VALVE EXERCISING TEST

(a) Test Frequency. Category A and B valves shall be exercised at least once every 3 months, with the exception as defined in IWV-3410(b) (1), (e), and (f).

(b) Exercising Procedure

(1) Valves shall be exercised to the position required to fulfill their function unless such operation is not practical during plant operation. If only limited operation is practical during plant operation the valve shall be part-stroke exercised during plant operation and full-stroked during each cold shutdown; in case of frequent cold shutdowns these valves need not be exercised more often than once every 3 months. Normally closed valves that cannot be operated during normal plant operation shall be specifically identified by the Owner and shall be full-stroke exercised during each cold shutdown; in case of frequent cold shutdowns these valves need not be exercised more often than once every 3 months.

(2) The necessary valve stem or disk movement shall be established by exercising the valve while observing either an appropriate indicator which signals the required change of valve stem or disk position, or indirect evidence, such as changes in system pressure, flow rate or temperature which reflect stem or disk position.

(c) Power Operated Valves

(1) The limiting value of full stroke time of each power operated valve shall be specified by the owner.

(2) The stroke time of all power-operated valves shall be measured to the nearest second or 10% of the maximum allowable stroke time, whichever is less, whenever such a valve is full-stroke tested.

(3) If an increase in stroke time of 25% or more from the previous test for valves with stroke times greater than ten seconds or 50% or more for valves with stroke times less than or equal to ten seconds is observed, test frequency shall be increased to once each month until corrective action is taken, at which time the original test frequency shall be resumed. In any case, any abnormality or erratic action shall be reported.

(d) Valves in Regular Use. Valves which operate in the course of plant operation at a frequency which would satisfy the exercising requirements of this

subsection need not be additionally exercised, provided that the observations otherwise required for testing are made and analyzed during such operation and recorded in the plant record at intervals no greater than specified in IWV-3410(a).

(e) Fail-Safe Valves. Where practical valves with fail-safe actuators shall be tested by observing the operation of the valves upon loss of actuator power. When these valves cannot be tested once every 3 months they shall be tested during each cold shutdown; in case of frequent cold shutdowns, these valves need not be tested more often than once every 3 months.

(f) Valves In Systems Out of Service. If valves are in a system that is out of service, exercising is not required for such valves except immediately prior to the return of the system to service.

(g) Corrective Action. If a valve fails to exhibit the required change of valve stem or disk position by this testing, corrective action shall be initiated immediately. If the condition is not, or can not be corrected within 24 hours, the valve shall be declared inoperative. When corrective action is required as a result of tests made during cold shutdown, the condition shall be corrected before startup. A retest showing acceptable operation shall be run following any required corrective action before the valve is returned to service.

IWV-3420 VALVE LEAK RATE TEST

(a) Scope. Category A valves shall be leak-tested.

(b) Frequency. Tests shall be conducted at the same (or greater) frequency as scheduled refueling outages, but not less than once every two years.

(c) Differential Test Pressure. Valve seat leakage tests shall be made with the pressure differential in the same direction as will be applied when the valve is performing its function with the following exceptions:

(1) Any globe type valve may be tested with pressure under seat.

(2) Butterfly valves may be tested in either direction, provided their seat construction is designed for sealing against pressure on either side.

(3) Gate valves with two-piece disks may be tested by pressurizing them between the seats.

(4) All valves (except check valves) may be tested in either direction if the function differential pressure is 15 psi or less.

(5) The use of leakage tests involving pressure differentials lower than function pressure differentials are permitted in those types of valves in which service pressure will tend to diminish the overall leakage channel opening, as by pressing the disk into or onto the seat with greater force. Gate valves, check valves, and globe type valves having function pressure differential applied over the seat, are examples of valve applications satisfying this requirement. When leakage tests are made in such cases using pressures lower than function maximum pressure differential, the observed leakage shall be adjusted to function maximum pressure differential value by calculation appropriate to the test media and the ratio between test and function pressure differential assuming leakage to be directly proportional to the pressure differential to the one-half power.

(6) Any valves not qualifying for reduced pressure testing as defined in 3420(c)(5) shall be leak-tested at full maximum function pressure differential, with adjustment by calculation if needed to compensate for a difference between service and test media.

(d) Seat Leakage Measurement. Valve seat leakage may be determined by:

(1) draining the line, closing the valve, bringing one side to test pressure, and measuring leakage through a downstream telltale connection, or,

(2) by measuring feed rate required to maintain pressure between two valves, or between two seats of a gate valve, provided the total apparent leak rate is charged to the valve or gate valve seat being tested, and that the conditions required by IWV-3420(c) are satisfied.

(e) Test Medium. The test medium shall be specified by the Owner.

(f) Analysis of Leakage Rates. Leakage-rate measurements shall be compared with previous measurements and with the permissible leakage rates specified by the plant Owner for a specific valve. The values in Table IWV-3420-1 are permissible leakage rates and shall be used in evaluating inservice test results when leakage rates are not specified by the plant owner.

TABLE IWV-3420-1
CATEGORY A VALVES
PERMISSIBLE LEAKAGE RATES
THESE RATES APPLICABLE PER IWV-3420(f)

Test Medium	Leakage Rate at Function Pressure Differential	
Water	30	D[1] Milliliters per hour
Air	7.5	D[1] Standard cubic feet per day

[1] D = Nominal valve size in inches

(g) Corrective Action

(1) Valves with leakage rates exceeding either the values specified by the plant owner, or those rates shown in Table IWV-3420-1 as directed by IWV-3420(f), shall be replaced or repaired and retested to demonstrate satisfactory operation before being returned to service.

(2) For valve's 6 in. and larger, if a leakage rate exceeds the rate determined by the previous test by an amount that reduces the margin between measured leakage rate and the maximum permissible rate by 50% or more, the test frequency shall be doubled and tests scheduled to coincide with a cold shutdown until corrective action is taken, at which time, the original test frequency shall be resumed. When tests show a leakage rate increasing with time, and a projection based on three or more tests indicates that the leakage rate of the next scheduled test will exceed the maximum permissible leakage rate by more than 10%, the valve shall be replaced or repaired and retested to demonstrate satisfactory operation before being returned to service.

IWV-3500 INSERVICE TESTS, CATEGORY C VALVES

IWV-3510 SAFETY VALVE AND RELIEF VALVE TESTS

(a) Test Frequency. Valves shall be tested at the end of each time period as defined in Table IWV-3510-1.

(b) Test Procedure. Safety valves and relief valves set points shall be tested in accordance with ASME PTC 25.2-1966. Bench testing with suitable hydraulic or pneumatic equipment or testing in place with hydraulic or pneumatic assist equipment may be used as acceptable method permitted under PTC 25.2-1966.

(c) Additional Tests. If any valve in a system fails to function properly during a regular test, additional valves in the system shall be tested as determined by an arbitrary assumption that a twelve month operating period has passed to another refueling, and the additional valves shall be tested to make the cumulative total tested at least 60 x total valves in this category, where N now includes the additional 12 months. (See Table IWV-3510-1 for definition of N.) If any of these additional valves fail to function properly on test, then all valves in the system in this category shall be tested.

(d) Corrective Action. A valve failing to function properly during test shall be repaired or replaced and shall successfully pass a retest before being returned to service.

TABLE IWV-3510-1
CATEGORY C: SAFETY AND RELIEF VALVES
Testing Schedule

Time Period	Number of Valves to be Tested
Startup through first refueling	Minimum of $\frac{N_1{}^{1}}{60}$ X total valves in this category.
First refueling through second refueling	Additional valves to make cumulative tested at least $\frac{N_2{}^{1}}{60}$ X total valves in this category
Second refueling through third refueling	Additional valves to make cumulative tested at least $\frac{N_3{}^{1}}{60}$ X total valves in this category
etc.	etc.

[1] N_1, N_2, N_3, etc., equal number of months from startup to first refueling, second refueling, third refueling, etc. When N is a number larger than 60, all valves which have not been tested during the preceding five year period shall be tested. The following period shall then be considered to be the same as "startup to first refueling" for purposes of determining test frequency, with the added requirement that at each refueling all valves which have not been tested during the preceding five year period shall be tested. Subsequent period will be considered the same as first refueling to second refueling, etc., with N determined by counting months from the new starting point.

IWV-3520 CHECK VALVE TESTS

(a) Test Frequency. Check valves shall be exercised at least once every 3 months, with the exceptions as defined in paragraph IWV-3520(b).

(b) Exercising Procedure. Check valves shall be exercised to the position required to fulfill their function unless such operation is not practical during plant operation. If only limited operation is practical during plant operation the check valve shall be part-stroke exercised during plant operation and full-stroked during each cold shutdown. In case of frequent cold shutdowns these check valves need not be exercised more often than once every 9 months. Normally closed check valves that cannot be operated during normal plant operation shall be specifically identified by the Owner and shall be full-stroke exercised during each cold shutdown. In case of frequent cold shutdowns these check valves need not be exercised more often than once every 9 months.

(1) Normally Open Valves. Valves normally open during plant operation whose function is to prevent reversed flow, shall be tested in a manner that proves that the disk travels to the seat promptly on cessation

or reversal of flow. Confirmation that the disk is on its seat shall be by visual observation, by an electrical signal initiated by a position indicating device, by observation of appropriate pressure indications in the system, or by other positive means.

(2) Normally Closed Valves. Valves normally closed during plant operation, whose function is to open on reversal of pressure differential, shall be tested by proving that the disk moves promptly away from the seat when the closing pressure differential is removed and flow through the valve is initiated, or a mechanical opening force is applied to the disk. Confirmation that the disk moves away from the seat shall be by visual observation, by electrical signal initiated by a position indicating device, by observation of substantially free flow through the valve as indicated by appropriate pressure indications in the system, or by other positive means. This test may be made with or without flow through the valve. If it is made without flow through the valve, a mechanical exerciser shall be used to move the disk. The force or torque delivered to the disk by the exerciser must be limited to no more than 10% of the equivalent force or torque represented by the minimum emergency condition pressure differential acting on the disk, or 200% the actual observed force or torque required to perform the exercise on the valve when new and in good operating condition, whichever is less. The disk movement shall be sufficient to prove that the disk moves freely off the seat. For swing or tilting disk type valves, if the test is made by use of fluid flow through the valve, the pressure differential for equivalent flow shall be no greater than that observed during the preoperational test. For other types of check valves, it shall be shown that disk movement is sufficient to provide a flow area of no less than 50% of the area of the seat port, or to permit flow adequate for the function of the valve.

(c) Corrective Action. If a check valve fails to exhibit the required change of disk position by this testing, corrective action shall be initiated immediately. If the condition is not, or can not be corrected within 24 hours, the check valve shall be declared inoperative. When corrective action is required as a result of tests made during cold shutdown, the condition shall be corrected before startup. A retest showing acceptable performance shall be run following any required corrective action before the valve is returned to service.

IWV-3600 INSERVICE TESTS, CATEGORY D VALVES

IWV-3610 EXPLOSIVELY ACTUATED VALVE TESTS

At least 20% of the charges in explosively actuated valves shall be removed, fired, and replaced every 2 years with charges from a fresh batch. A sample charge from the fresh batch shall have been tested satisfactorily. In no case shall the charges in such valves be older than 10 years. If a charge fails to fire during the annual check, all charges with the same batch number shall be removed, destroyed, and replaced with charges from a fresh batch, from which a sample charge shall have been tested satisfactorily.

IWV-3620 RUPTURE DISK TESTS

No testing requirements are prescribed by this Subsection except that designs featuring testability shall be tested in accordance with manufacturer's instructions. The frequency of such tests shall be specified by the Owner.

IWV-3700 INSERVICE TESTS, CATEGORY E VALVES

No regular testing requirements are prescribed by this Subsection for Category E valves. Operational checks, with appropriate record entries, shall record the position of these valves before operations are performed and after operations are completed, and shall verify that each valve is locked or sealed.

ARTICLE IWV-6000
RECORDS

IWV-6100 REQUIREMENTS

IWV-6200 OWNERS RESPONSIBILITIES

The Owners shall develop and maintain at the plant a system of documentation defining all test and examination procedures required by this Subsection including schedules and the limiting values of observed parameters, records of the results of such tests and examinations, and of all corrective action taken, during the life of the plant.

IWV-6210 SUMMARY LISTING

A summary listing all valves covered by this Subsection shall be maintained in a format that shall portray the current status of the test and examination program.

IWV-6220 PREOPERATIONAL TESTS AND EXAMINATIONS

Preoperational test and examination results and manufacturer's functional test results shall be included in the documentation.

IWV-6230 TEST AND EXAMINATION RESULTS

The record of results of tests and examinations shall include the dated signature of the person responsible for the action.

IWV-6240 RECORD ACCESS

Documentation shall be made readily accessible to all persons responsible for supervising or making such tests or examinations, or for examination by authority having jurisdiction at the plant site.

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APPENDIX I

ULTRASONIC EXAMINATION

ARTICLE I–1000 INTRODUCTION

I-1100 SCOPE

This Appendix describes methods to be used when ultrasonic examination of welds is performed to satisfy the volumetric examination requirements of this Division. The methods described here are used to detect and locate imperfections within the weld and adjacent base material.

I-1200 LIMITATIONS ON SCOPE

The methods are limited to Class 1 and 2 ferritic vessels, 2½ in. and over in wall thickness. Clad vessels are included.

I-1300 PROCEDURE REQUIREMENTS

Ultrasonic examination shall be performed in accordance with a written procedure. The procedure shall be reviewed by or demonstrated to the satisfaction of the Inspector in accordance with the requirement of IWA-2120. Each procedure shall include at least the following information:

(a) Weld types and configurations to be examined, including thickness dimensions.

(b) The surface or surfaces from which the examination shall be performed.

(c) Surface condition.

(d) Couplant.

(e) Technique (contact or immersed).

(f) Angles and mode of wave propagation in the material.

(g) Type, frequency, and size of transducer.

(h) Special search units, wedges, shoes, or saddles, if used.

(i) Ultrasonic instrument.

(j) Description of calibration.

(k) Scanning directions.

(l) Method of recording the data.

(m) Automatic alarm and recording equipment, or both, if used.

(n) Rotating, revolving, or scanning mechanisms, if used.

ARTICLE I-2000
EXAMINATION STANDARDIZATION

I-2100 APPARATUS

I-2110 INSTRUMENT TYPE

An ultrasonic, pulse-echo type of instrument shall be used for this examination.

I-2120 SCREEN HEIGHT LINEARITY

The ultrasonic instrument shall provide linear vertical presentation (within $\pm 5\%$ of full screen) for at least 80% of the screen height (sweep line to top screen).

I-2130 AMPLITUDE CONTROL LINEARITY

The ultrasonic instrument shall utilize an amplitude control (accurate over its useful range to $\pm 20\%$ of the nominal amplitude ratio) to allow measurement of indications beyond the linear range of the vertical display on the screen.

I-2200 EXAMINATION

I-2210 COMPLETENESS OF COVERAGE

To assure complete coverage of the material, each pass of the search unit shall overlap a minimum of 10% of the transducer piezoelectric element dimension perpendicular to the direction of scan.

I-2220 RATE OF SEARCH UNIT MOVEMENT

The rate of search unit movement shall not exceed 6 in./sec unless calibration is verified at scanning speed.

I-2300 APPLICATION

I-2310 GENERAL SCANNING REQUIREMENTS

The welds and heat-affected zones[1] shall be examined from both sides of the weld by a straight beam and two angle beams where practical. Base material for one-half the weld thickness on each side of the weld on the same surface shall be examined from one of the base material surfaces by two angle beams. The nominal beam angles for evaluating reflectors and obtaining characterization data shall be 0°, 45°, and 60° with respect to perpendicular to the examination surface. Other beam angles are permitted provided the difference between the angles is at least 15°.

I-2320 EXCEPTIONS TO GENERAL SCANNING REQUIREMENTS

Other angles may be used for examination of

(a) vessel and closure head flange welds,

(b) nozzles and nozzle welds when the examination is conducted from the nozzle bore, and

(c) welds in vessel heads.

Where the ultrasonic beams are directed essentially normal to the plane of the weld parallel to the surface of the material, beam angles sufficient to provide complete coverage of the weld from one direction shall be acceptable.

I-2330 EXTENT OF STRAIGHT BEAM SCANNING

The volume of base material and weld through which the beam will travel in angle beam examination shall be examined with a straight beam search unit.

I-2400 SURFACE PREPARATION

The surfaces shall be free from weld spatter and any roughness that would interfere with free movement of the search unit. The surfaces shall be free of dirt, loose scale, machining or grinding particles, or other loose foreign matter. Smooth, tightly adhering paint is an acceptable surface.

[1]The weld heat-affected zone may be considered to extend ¼ in. beyond the weld fusion line.

ARTICLE I-3000
PREPARATION FOR CALIBRATION

I-3100 CALIBRATION BLOCKS

I-3110 GENERAL

Drilled holes shall serve as calibration reflectors to establish a primary reference response of the equipment and to construct a distance-amplitude correction curve. These holes shall be located either in the component material or in a calibration block.

I-3120 BLOCK MATERIAL

I-3121 Block Selection

Material from which the block is fabricated shall be from the component, from either a nozzle dropout or a prolongation.

I-3122 Cladding

Where the component material is clad, the block shall be clad to a thickness of $\frac{1}{4}$ in. $\pm$ $\frac{1}{8}$ in. Deposition of clad shall be by the automatic method used on the inside of the component. Where the automatic method is impractical, deposition of clad shall be by the manual method used to cover the circumferential welds of the component.

I-3123 Heat Treatment

The calibration block shall receive at least the minimum tempering treatment required by the material specification for the type and grade, and a post weld heat treatment of at least 2 hours.

I-3124 Surface Finish

The finish on the surfaces of the block representing the interior and exterior surfaces of the component shall be representative of the surface finishes of the component.

I-3125 Block Quality

The calibration block material shall be completely examined with a straight beam search unit. Areas that contain indications exceeding the remaining back reflection shall be excluded from the beam paths required to reach the various calibration holes.

I-3130 BASIC CALIBRATION BLOCK

I-3131 Block Thickness

Figure I-3131 shows block configuration with hole size and location. Each weld thickness on the component must be represented by a block having a thickness relative to the component weld as shown in Fig. I-3131. Where the block thickness ± 1 in. spans two of the ranges shown in Fig. I-3131 the block shall be acceptable in those portions of each range covered by ± 1 in. The holes shall be in accordance with the thickness of the block. Where two or more thicknesses are involved, the calibration block thickness is determined from the average thickness of the weld.

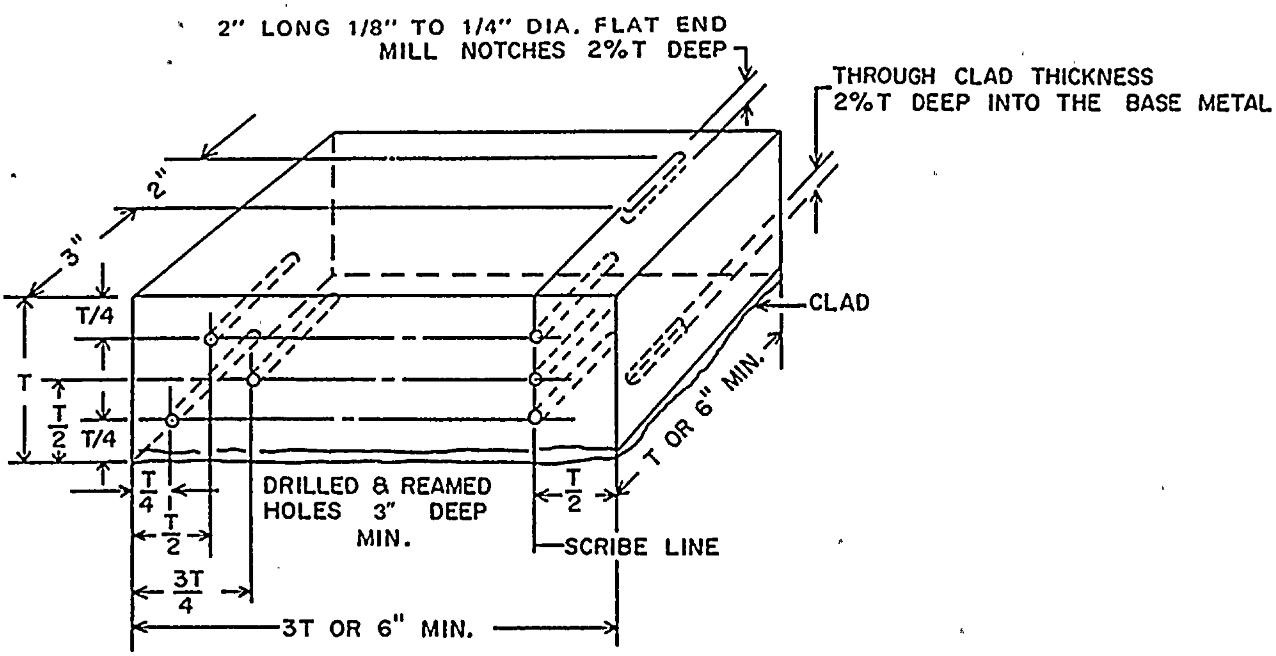
I-3140 CURVED CALIBRATION BLOCKS

I-3141 Weld with Surface Curvature Greater than 20-in. Diameter

For examination of welds with surface curvatures greater than 20 in. diameter, a block of essentially the same curvature, or, alternatively, a flat basic calibration block, shall be used.

I-3142 Welds with Surface Curvature 20-in. Diameter and Less

The basic calibration block shall be curved for surface curvatures less than 20-inch diameter. A single curved basic calibration block may be used to calibrate the examination on surfaces in the range of curvature from 0.9 to 1.5 times the basic calibration block diameter. For example, an 8 in. diameter curved block may be used to calibrate the examination on surfaces in the range of curvature from 7.2 to 12-in. diameter. The curvature range from 0.94 in. to 20 in. diameter requires 6 block curvatures as indicated in



Weld Thickness (t)	Basic Calibration Block Thickness (T)	Hole Diameter
Over 2 in. thru 4 in.	3 in. or t.	3/16 in.
Over 4 in. thru 6 in.	5 in. or t.	1/4 in.
Over 6 in. thru 8 in.	7 in. or t.	5/16 in.
Over 8 in. thru 10 in.	9 in. or t.	3/8 in.
Over 10 in.	*	*

*For each increase in thickness of 2 in. or fraction thereof the hole diameter shall increase 1/16 in.

FIG. I-3131 BASIC CALIBRATION BLOCK

Section III for any thickness range as indicated in Fig. I-3131.

I-3150 RETENTION

All basic calibration blocks for the components of a nuclear power plant shall be retained on site for use in subsequent inservice examinations.

I-3200 CALIBRATION REFLECTORS

I-3210 BASIC CALIBRATION REFLECTORS

The side of a hole drilled with its axis parallel to the examination surface and perpendicular to the edge of the material is the basic calibration reflector. A square notch shall also be used. See Fig. I-3131.

I-3220 SCRIBE LINE

A scribe line as shown in Fig. I-3131 shall be made in the thickness direction through the in-line hole centerlines and continued across the two examination surfaces of the block.

I-3230 ADDITIONAL REFLECTORS

Additional reflectors may be installed at the discretion of the owner. However, these shall not interfere with primary reference.

I-3240 CALIBRATION REFLECTORS FOR CURVED CALIBRATION BLOCKS

When a curved basic calibration block is required (I-3142), it shall meet the hole and notch sizes of Fig.

I-3131 and the geometric requirements of Fig. I-3240. The holes and notches to be used in the calibration of the straight beam and the circumferentially directed angle beam will be machined with their length parallel to the axis of the cylindrical surface. Calibration of the axially-directed angle beam will be performed on holes drilled parallel to the tangent of the circumference of the cylindrical surface from the center scribe line, and on the notches machined with their length in the circumferential direction.

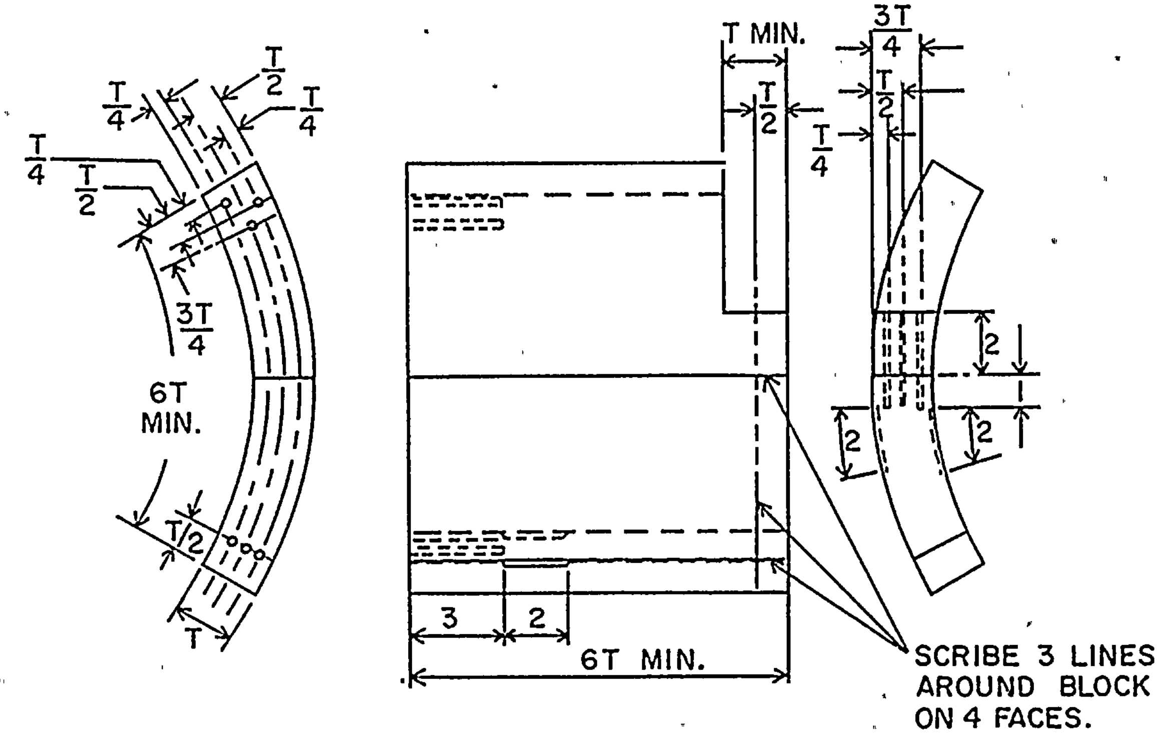


FIG. I-3240 CURVED BASIC CALIBRATION BLOCK

ARTICLE I-4000
CALIBRATION

I-4100 INSTRUMENT CALIBRATION

I-4110 AMPLITUDE LINEARITY

To verify the ability of the ultrasonic instrument to meet the linearity requirement of I-2120, position an angle beam search unit as shown in Fig. I-4110 so that indications can be observed from both the ½ and ¾ T holes in the basic calibration block. Adjust the search unit position to give a 2 to 1 ratio of amplitudes between the two indications, with the larger set at 80% of full screen height. Without moving the search unit, adjust sensitivity (gain) to successively set the larger indication from 100% to 20% of full screen height, in 10% increments (or $2dB$ steps if a fine control is not available), and read the smaller indication at each setting. The reading must be 50% of the larger amplitude, within 5% of full screen height. The settings and readings must be estimated to the nearest 1% of full screen.

I-4120 AMPLITUDE CONTROL LINEARITY

To verify the accuracy of the amplitude control of the ultrasonic instrument, as required in I-2130, position an angle beam search unit as shown in Fig. I-4110 so that the indication from the ½ T hole is peaked on the screen. With the increases and decreases in attenuation shown in the following table, the indication must fall within the specified limits.

Indication set at % of full screen	dB Control Change	Indication limits, % of full screen
80%	− 6dB [1]	32 to 48%
80%	−12dB	16 to 24%
40%	+ 6dB	64 to 96%
20%	+12dB	64 to 96%

[1] Minus denotes decrease in amplitude; plus denotes increase.

The settings and readings must be estimated to the nearest 1% of full screen.

I-4130 INSTRUMENT CALIBRATION RECORD

Include the instrument calibration in the ultrasonic examination record.

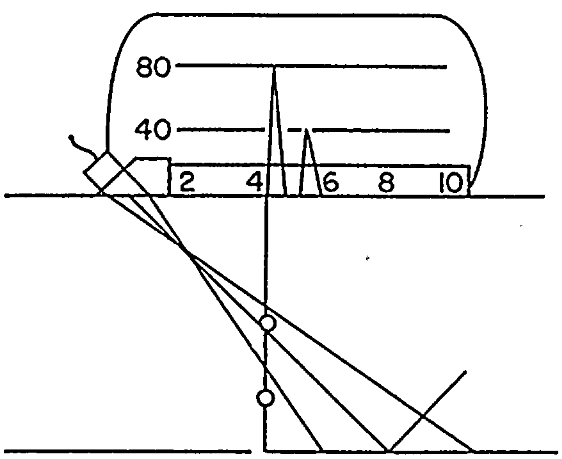


FIG. I-4110 LINEARITY

I-4200 EXAMINATION SYSTEM CALIBRATION

I-4210 GENERAL REQUIREMENTS

Calibration shall include the complete ultrasonic examination system. Any change in search units, shoes, couplants, cables, ultrasonic instruments, or any other parts of the examination system shall be cause for recalibration. The original calibration must be performed on the basic calibration block. Calibration checks may be performed on a basic calibration block simulator.

I-4220 TEMPERATURE

The temperature of the basic calibration block shall be within 25 F of the component temperature.

I-4230 FREQUENCY OF CALIBRATION

Instrument calibration (I-4110 and I-4120) shall be verified at the beginning of each day of examinations. Complete ultrasonic examination system calibration (I-4210, I-4400, I-4500) shall be performed prior to use of the system in each inservice inspection. System calibration shall be checked by verifying the distance-amplitude correction curve (I-4420 or I-4520) and the sweep range calibration (I-4410 or I-4510) at the start and finish of each examination, with any change in examination personnel, and at least every 4 hours during an examination. If any point on the distance-amplitude correction (DAC) curve has changed by more than 20% (2*dB*) of its amplitude, all data sheets since the calibration shall be marked void. A new calibration shall be made and recorded and the voided examination areas shall be reexamined. If any point on the DAC curve has moved on the sweep line more than 5% of the sweep division reading, correct the sweep range calibration and note the correction in the examination record. If recordable reflectors (I-6000) are noted on the data sheets, those data sheets shall be voided, a new calibration shall be recorded, and the voided examinations shall be repeated.

I-4240 RECORDS

Include ultrasonic examination system calibrations in the ultrasonic examination record.

I-4300 GENERAL METHOD

Each calibration shall be performed from the surface (clad or unclad) corresponding to the surface of the component from which the examination will be performed. The general method of calibration used in this Appendix provides the following listed measurements. Figure I-4300 illustrates the calibration parameters.

(*a*) Sweep range calibration over the examination range.

(*b*) Sensitivity calibration of the examination system.

(*c*) Distance amplitude correction.

(*d*) Position calibration with respect to the front of the search unit and the examination surface.

(*e*) Calibration correction for planar reflectors perpendicular to the examination surface at or near the surface.

(*f*) Beam angle and beam spread.

Descriptions and figures for the general method relate position and depth of the reflector to eighths of

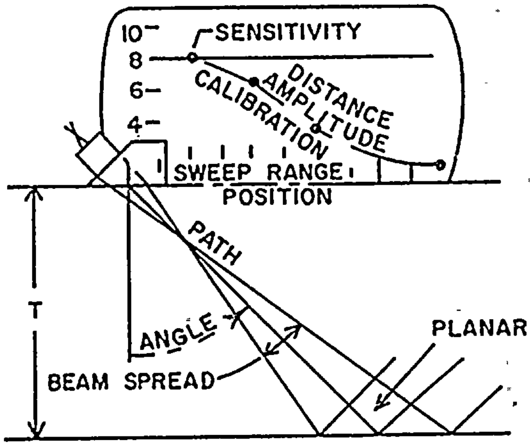


FIG. I-4300 CALIBRATION PARAMETERS

the vee-path. However, for sweep range calibration, metal path calibration along the beam line, position calibration on the examination surface, and distance from the surface to the reflector are equally accepted methods. The particular method may be selected according to the preference of the examiner.

I-4400 ANGLE BEAM CALIBRATION

I-4410 SWEEP RANGE CALIBRATION[1] (SEE FIGURE I-4410.)

(*a*) Position the search unit for the maximum first indication from the $\frac{1}{4}$ *T* side drilled hole. Adjust the left edge of this indication to line 2 on the screen with the delay control.

(*b*) Position the search unit for the maximum indication from the $\frac{3}{4}$ *T* hole. Adjust the left edge of this indication to line 6 on the screen with the range control.

(*c*) Repeat delay and range control adjustments until the $\frac{1}{4}$ *T* and $\frac{3}{4}$ *T* hole reflections start at sweep lines 2 and 6.

(*d*) Position the search unit for maximum response from the square notch on the opposite surface. The indication will appear near sweep line 8.

(*e*) Two divisions on the sweep equals $\frac{1}{4}$ *T*.

I-4420 DISTANCE-AMPLITUDE CORRECTION (SEE FIG. I-4420.)

(*a*) Position the search unit for maximum response from the hole which gives the highest amplitude.

(*b*) Adjust the sensitivity control to provide an 80%

[1]Calibration by beam path measurement may be used. Reflections from concentric cylindrical surfaces such as provided by some IIW blocks and the AWS distance calibration block may be used to adjust delay zero and sweep range.

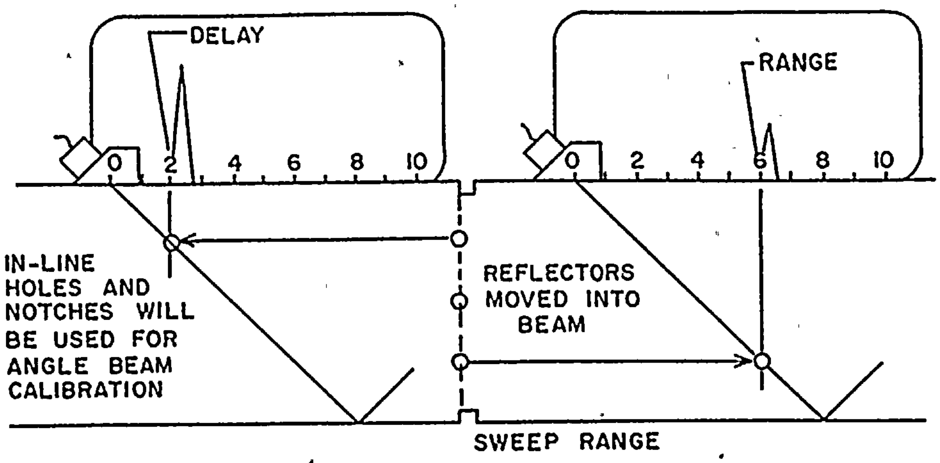


FIG. I-4410 SWEEP RANGE

of full screen indication from the hole. Mark the peak of the indication on the screen with a grease pencil or other suitable marker.

(c) Position the search unit for maximum response from another hole indication.

(d) Mark the peak of the indication on the screen.

(e) Position the search unit for maximum amplitude from the third hole indication and mark the peak on the screen.

(f) Connect the screen marks for the side drilled holes to provide the distance amplitude curve.

(g) For calibration correction for perpendicular planar reflectors at or near either surface, refer to I-4450.

I-4430 ELECTRONIC DISTANCE-AMPLITUDE CORRECTION

When an electronic distance-amplitude correction device is used, the primary reference response shall be equalized on the basic calibration block at a nominal 50% of full screen height over the distance range to be employed in the examination.

I-4440 POSITION CALIBRATION (SEE FIG. I-4440.)

The following measurements may be made with a ruler, scale, or marked on an indexing strip.[1]

(a) Position the search unit for maximum response from the 1/4 T hole. Place one end of the indexing strip against the front of the search unit, the other end extending in the direction of the beam. Mark the number 2 on the indexing strip at the scribe line which is directly above the hole. (If the search unit covers the scribe line, the marks may be made on the side of the search unit.)

(b) Position the search unit for maximum in-

[1]The balance of the calibrations in this Appendix are written based upon the use of the indexing strip. However, the procedures may be transformed for other methods of measurement at the discretion of the examiner.

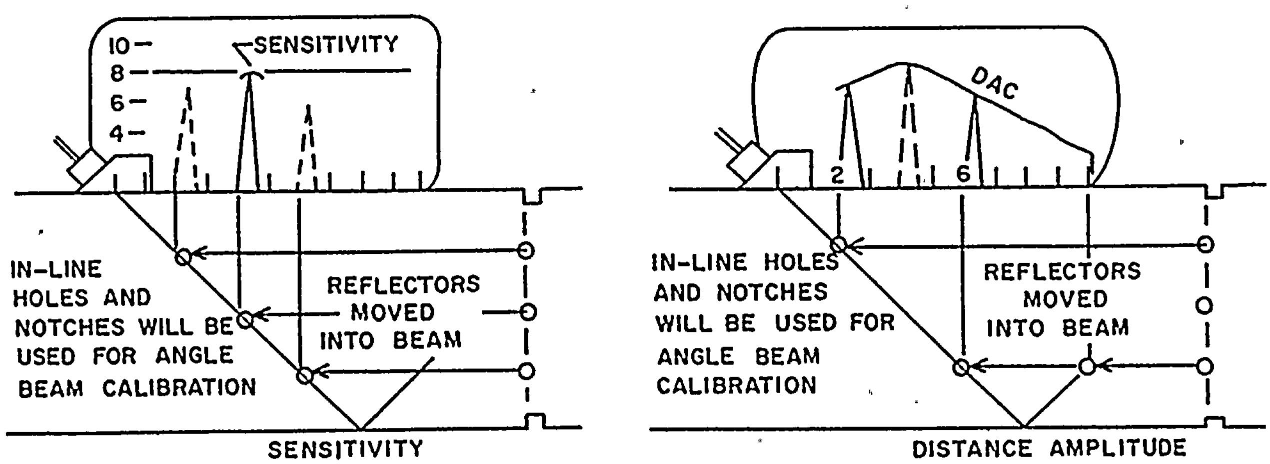


FIG. I-4420 SENSITIVITY

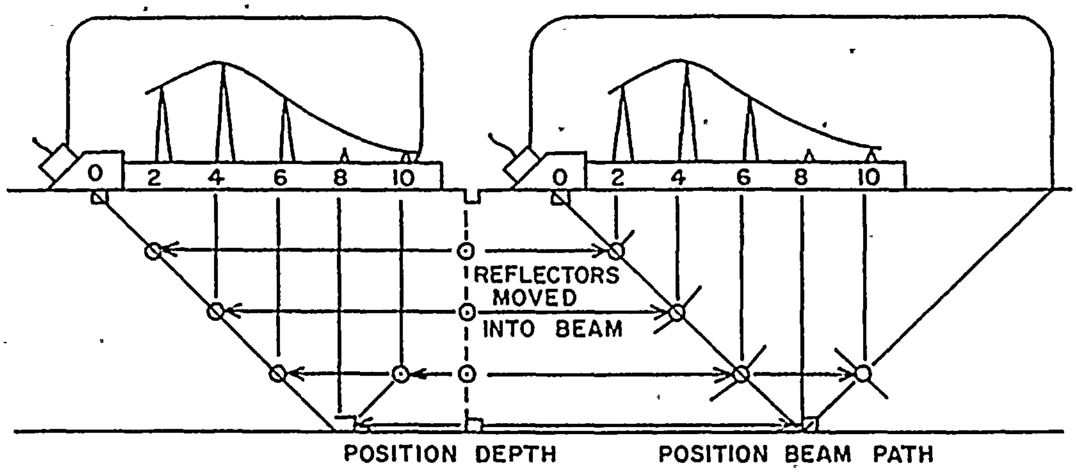


FIG. I-4440 POSITION DEPTH

dications from the ½ and ¾ *T* holes. Keep the same end of the indexing strip against the front of the search unit. Mark numbers 4 and 6 on the indexing strip at the scribe line.

(c) If possible, position the search unit so that the beam bounces from the opposite surface to the ¾ *T* hole. Mark the number 10 on the indexing strip at the scribe line.

(d) Position the search unit for the maximum opposite surface notch indication. Mark the number 8 on the indexing strip at the scribe line.

(e) Couple the search unit to the examination surface on the notch, positioning for the maximum indication. Mark the position of the notch on the side of the search unit.

(f) The calibration numbers on the indexing strip indicate the position directly over the reflector in sixteenths of the Vee-path.

(g) The depth from the examination surface to the reflector is *T* at 8, ¾ *T* at 6 and 10, ½ *T* at 4, ¼ *T* at 2, and 0 at 0. Interpolation is possible for smaller increments of depth. This measurement may be corrected by the radius of the hole if the radius is considered significant to the accuracy of reflector's location.

I-4450 CALIBRATION CORRECTION (SEE FIGURE I-4450.)

The 45° angle beam shear wave reflects well from a corner reflector. However, mode conversion and redirection of reflection occurs to part of beam when a 60° angle beam shear wave hits the same reflector. This problem also exists to a lesser degree throughout the 50° to 70° angle beam shear wave range. This correction is required in order to be equally critical of such an imperfection regardless of the examination beam angle.

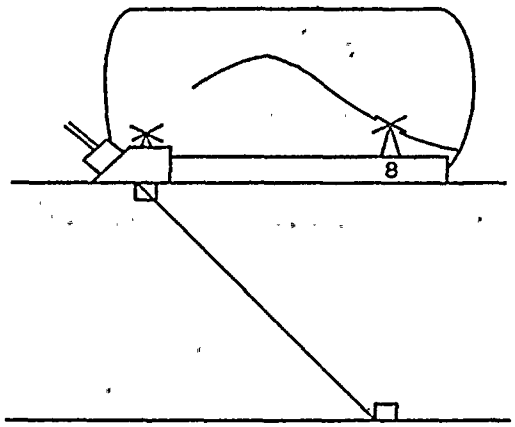


FIG. I-4450 PLANAR REFLECTORS

(a) Position the search unit for maximum amplitude from the square notch on the opposite surface. "X" mark the peak of the indication on the screen near sweep line 8.

(b) Couple the search unit to the square notch in the examination surface. Position for maximum amplitude from the square notch. "X" mark the peak of the indication on the screen near sweep line 0.

(c) The opposite surface square notch may give an indication 2 to 1 above DAC at 45° and ½ DAC at 60°. The square notch in the examination surface will give a low amplitude if detected. Therefore, the indication from the square notch must be considered when evaluating reflectors at the top or bottom surface.

I-4460 BEAM SPREAD, VERTICAL PLANE (SEE FIG. I-4460.)

Measurements of beam spread in the vertical plane shall be made on the side drilled hole. The 50% DAC amplitude limit of the primary lobe of the beam shall be plotted by calibrating the beam centerline in accordance with paragraph I-4410 through I-4440 above and proceeding with the following.

(a) Increase the amplitude of the indications two times (6dB change) so the curve marked on the screen represents the 50% DAC line.

(b) Position for maximum indication from the ¼ *T* hole. Move search unit toward the hole until indication equals the 50% DAC line. Mark a small number 2 on the indexing strip at the scribe line.

(c) Move search unit away from the hole until indication equals the 50% DAC line. Mark a small number 2 on the indexing strip at the scribe line.

(d) Repeat these measurements on the ½ and ¾ *T* holes marking the positions on the indexing strip with small numbers 4 and 6.

(e) Plot these points on a full scale drawing of the projected beam path. Positions are plotted with respect to the vertical projection of the front of the search unit; and depths are plotted at ¼, ½, and ¾ of the thickness equivalent to the ⅛, ⅜, and ⅜ of the vee path.

(f) Draw a straight line through the center line points and extend the line to the search unit. This indicates the beam center line point on the search unit. The beam angle may be read with a protractor as the angle between the beam center line and a perpendicular line to the examination surface such as the search unit front line projection. Alternately the beam angle may be computed by using the ¼ *T* to ¾ *T* hole position distance from the indexing strip position depth calibration where refracted beam angle,

$$\theta_2 = \arctan \frac{\frac{1}{4}T \text{ to } \frac{3}{4}T \text{ hole position distance}}{\frac{1}{2}T}$$

(g) Connect small number points 2, 4, and 6 at the lower edge of the beam and the similar points at the upper edge of the beam. These two lines represent the 50% DAC amplitude limits of the beam measured on the side drilled hole. Project the lines to cross and measure the angle between the lines. This is the beam spread angle of the full beam measured at the 50% DAC amplitude level on the side drilled hole. (Note: If laminar reflectors are present in the basic calibration block, the ¾ *T* hole positions may be affected; if this is the case, beam angle and beam spread measurements must be based on the ¼ and ½ *T* hole positions.)

I-4470 BEAM SPREAD, HORIZONTAL PLANE

(In course of preparation)

I-4500 STRAIGHT BEAM CALIBRATION

I-4510 SWEEP RANGE CALIBRATION[1] (SEE FIG. I-4510.)

(a) Position the search unit for the maximum first indication from the ¼ *T* side drilled hole. Adjust the left edge of this indication to line 2 on the screen with the delay control.

[1]Calibration by beam path measurement may be used by range control positioning of the block back reflection to the sweep division number (or multiple) equal to the measured thickness. The ¼ *T* hole indication must be delay control positioned to ¼ of the sweep division number.

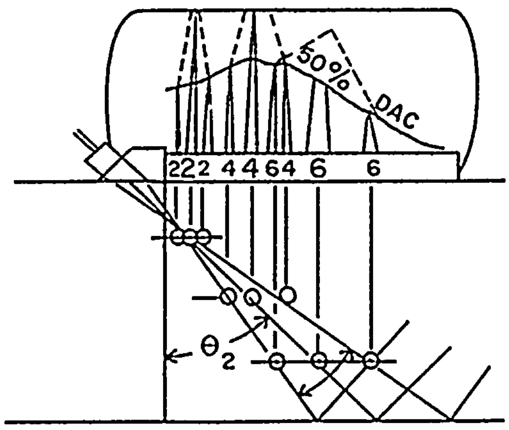


FIG. I-4460 BEAM SPREAD

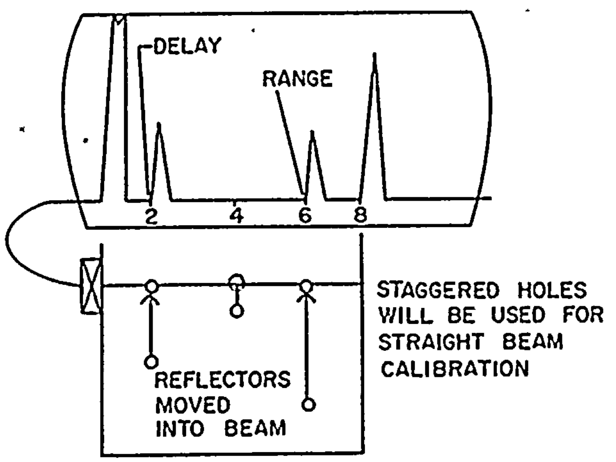


FIG. I-4510 SWEEP RANGE

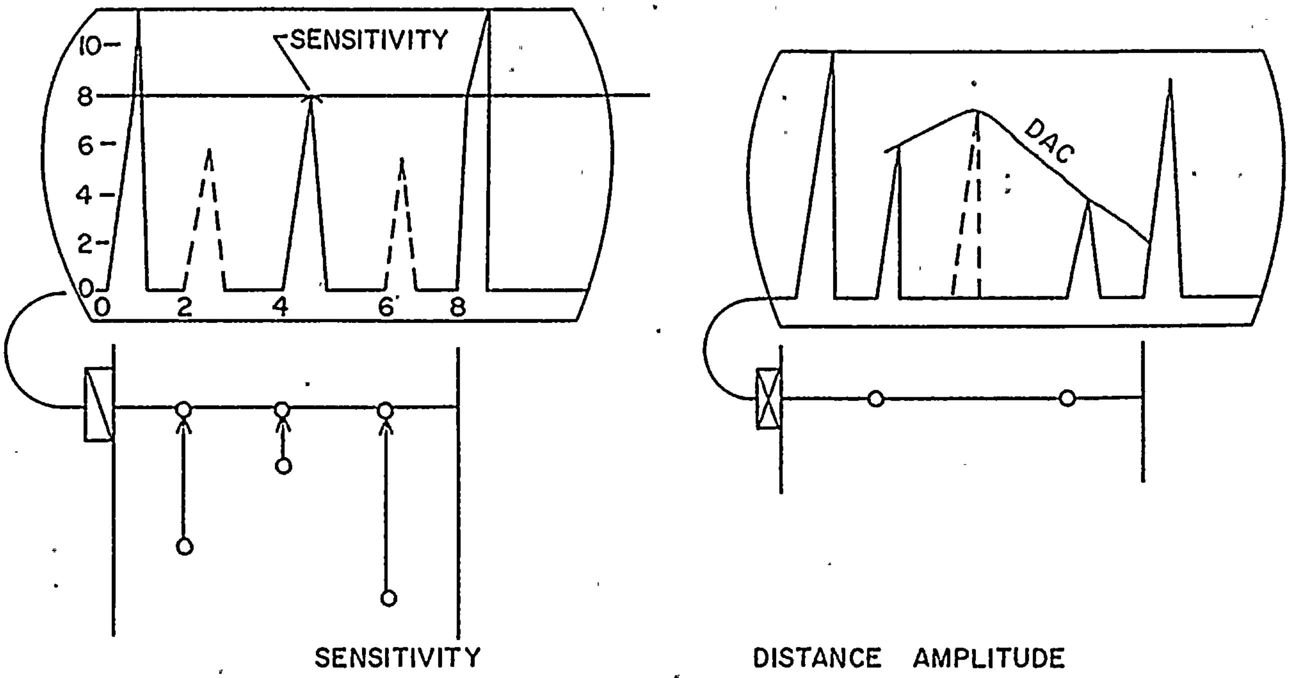


FIG. I-4520 SENSITIVITY

(b) Position the search unit for the maximum indication from ¾ *T* hole. Adjust the left edge of this indication to line 6 on the screen with the range control.

(c) Repeat delay and range control adjustments until the ¼ *T* and ¾ *T* hole relfections start at sweep lines 2 and 6.

I-4520 DISTANCE-AMPLITUDE CORRECTION

(a) Position for maximum response from the hole which gives the highest amplitude.

(b) Adjust the sensitivity control to provide an 80% of full screen indication from the hole. Mark the peak of the indication on the screen with a grease pencil or other suitable marker.

(c) Position the search unit for maximum response from another hole indication.

(d) Mark the peak of the indication on the screen.

(e) Position the search unit for maximum amplitude from the third hole indication and mark the peak on the screen.

(f) Connect the screen marks and extend through the thickness to provide the distance amplitude curve for the side drilled holes.

I-4530 ELECTRONIC DISTANCE-AMPLITUDE CORRECTION

When an electronic distance-amplitude correction device is used, the primary reference response shall be equalized at a nominal 50% of full screen height over the distance-range to be employed in the examination.

I-4600 TRANSFER METHOD

Transfer methods are not permitted for either straight beam or angle beam calibration.

ARTICLE I-5000
EXAMINATION

I-5100 ANGLE BEAM SCANNING

I-5110 EXAMINATION SENSITIVITY LEVEL

I-5111 Primary Reference Response

The distance-amplitude correction curve is the primary reference response (reference level) for monitoring and measuring indications.

I-5112 Scanning Level

Scanning shall be performed at a gain setting of 2 times the reference level (6dB increase in amplitude).

I-5120 EXTENT OF SCANNING

See I-2310 and I-2320.

I-5130 DETECTION OF REFLECTORS ORIENTED PARALLEL TO THE WELD

The angle beam shall be aimed about 90° to the weld, with the search unit manipulated laterally and longitudinally so that the ultrasonic beam(s) passes through all of the weld metal and ½ *T* on both sides of the weld. Where possible, scanning shall be done in two directions 180° to each other.

I-5140 DETECTION OF REFLECTORS ORIENTED TRANSVERSE TO THE WELD

I-5141 Longitudinal and Circumferential Welds

The angle beam shall be aimed parallel to the centerline of longitudinal and circumferential welds from and adjacent to the weld surface. The search unit shall be moved along the weld so that the ultrasonic beam(s) passes through all of the weld metal and ½ *T* on both sides of the weld. Scanning shall be done in two directions 180° to each other.

I-5142 Nozzle Welds

The angle beam shall be aimed along a tangent to a nozzle weld. The search unit shall be manipulated so that the ultrasonic beam passes through all of the weld metal and heat-affected zones in two directions.

I-5200 STRAIGHT BEAM—SCANNING WELD AND HEAT-AFFECTED ZONE

I-5210 SCANNING SENSITIVITY LEVEL

Scanning shall be performed at a gain setting of 2 times the reference level (6dB increase in amplitude). Recording of indications shall be carried out with the gain control set at the reference level.

I-5220 VERIFICATION OF PENETRATION

Penetration shall be verified by obtaining a reflection from an opposite surface of the material being examined.

I-5300 STRAIGHT BEAM—SCANNING FOR LAMINAR REFLECTORS

I-5310 SCANNING SENSITIVITY LEVEL

Scanning shall be performed at a gain setting which maintains an observable back reflection. When the examination is performed from the tapered surface at a transition in thickness of the component, angle beam longitudinal waves travelling perpendicular to the back surface shall be used.

I-5320 EXTENT OF SCANNING

See I-2330.

ARTICLE I-6000
EXAMINATION RECORD

I-6100 BASIC RECORDS

For each ultrasonic examination the following information shall be identified and recorded:

(a) procedure,
(b) ultrasonic examination system (equipment),
(c) examination personnel,
(d) calibration sheet identity,
(e) weld identification and location,
(f) surface from which examination is conducted.

I-6200 UNIFORM METHOD FOR IDENTIFICATION OF EXAMINATION AREAS

I-6210 WELD LOCATIONS

Weld identification and location shall be shown on a "Weld Identification Plan."

I-6220 MARKING

Low Stress stamps or vibratooling may be used to permanently identify each weld. The identification shall not be any deeper than 1/64 in.

I-6230 VESSEL REFERENCE POINTS

The layout of the weld shall consist of placing reference points on the centerline of the weld. The standard spacing of the reference points shall be identified with their number; 0, 1, 2, 3, 4, etc. The number of points, distance apart, and starting point shall be recorded on the reporting form. The weld center line shall be the divider for the two examination surfaces.

(a) Circumferential (Girth) Welds: The standard starting point shall be 0° on the vessel circumference. The reference points shall be numbered clockwise (top view). The examination surfaces shall be identified as above or below the weld.

(b) Longitudinal (Vertical) Welds: Longitudinal welds shall be laid out from the center line of circumferential welds at the top end of the weld. The examination surface shall be identified as clockwise or counter-clockwise (looking down at the top on vessel).

(c) Nozzle-to-Vessel Welds: The external reference circle shall have a sufficient whole number of inches radius so that the circle falls on vessel external surface beyond the weld fillet. The internal reference circle shall have a sufficient whole number of inches radius so that the circle falls within ½ in. of the weld centerline. The 0° point on the weld will be the top of the nozzle. The 0° point for welds of nozzles centered in heads shall be located at the 0° axis of the vessel. Angular layout of the weld shall be made clockwise on the external surface, counterclockwise on the internal surface. The 0°, 90°, 180°, and 270° lines will be marked on all nozzle welds examined. The 30° increment lines will be marked on nozzle welds greater than 4 in. radius. The 15° increment lines will be marked on nozzle welds greater than 12 in. radius. The 5° increment lines will be marked on nozzle welds greater than 24 in. radius.

I-6300 RECORDING OF REFLECTORS—STRAIGHT BEAM AND ANGLE BEAM EXAMINATIONS OF WELD AND HEAT-AFFECTED ZONE

I-6310 SCOPE OF RECORDING

(a) Record all reflectors that produce a response greater than 50% of the distance-amplitude correction (DAC). Also record planar surface reflectors that produce a response exceeding the calibration amplitude established in I-4450.

(b) It is recognized that not all ultrasonic reflectors indicate flaws, since certain metallurgical discontinuities and geometric conditions may produce indications that are not relevant. Such indications must be recorded. Included in this category are plate

segregates in the heat-affected zone, which may become reflective after fabrication. Under straight beam examination these may appear as spot or short line indications.

I-6320 DATA REQUIRED

(a) The following data shall be recorded:

(1) Maximum percent of DAC, distance from surface to indication, search unit position, and indication location.

(2) Minimum distance from surface and position for half maximum when approaching weld from maximum.

(3) Maximum distance from surface and position for half maximum when moving from maximum away from weld.

(4) Calibration sheet number.

(b) Data shall be obtained at increments no greater than $9/10$ of the transducer dimension measured parallel to the scan increment change (10% overlap). Scans shall be made along the length of a reflector, to the end points as determined by the smaller of the 50% DAC or half maximum indication. Emphasis should be placed on accurate measurement of the parameters determining the length, percent of thickness, and distance from surface of the reflector, since these dimensions are the factors most critical in determining ultimate evaluation and disposition of the flaw.

I-6330 ILLUSTRATIVE EXAMPLE

When scanning perpendicular to the weld, a reflector is found which exceeds 50% DAC. Position the search unit to give the maximum amplitude from the reflector. Fig. I-6330 is an illustration of the maximum amplitude scan and tabulation of that data with additional scan data that might be taken on a reflector in a longitudinal weld.

(a) Read and record the *maximum* amplitude in *% DAC.*

(b) Read and record the distance from surface to reflector (at the left side of the indication on the sweep).

(c) Read and record the *position* of the search unit on the indexing strip at the reference line.

(d) Read and record the *location* of the indication at the beam centerline intersection with reference line from the weld layout reference points in inches (for longitudinal or circumferential welds) or in azimuth degrees (for nozzle welds).

Move the search unit toward the reflector until the amplitude falls to half the maximum.

Read and record the

(e) minimum distance from surface and

(f) minimum position.

Move the search unit away from the reflector past the maximum amplitude position until the amplitude falls to half of the maximum amplitude. Read and record the

(g) maximum distance from surface and

(h) maximum position.

Subtract the minimum distance from surface from the maximum and divide by the through thickness reading on the sweep. Record as

(i) depth in % of *T.*

Subtract the maximum distance from surface from the through thickness reading (or use the minimum depth, whichever gives the smaller number), and divide the number by the through thickness reading on the sweep. Record as

(j) distance from surface in % of *T.*

Successively read, record, and compute data along scan paths at increments no greater than $9/10$ of the transducer dimension (measured parallel to the scan increment change). Continue scans until the maximum amplitude found at the end points of the reflector is the smaller of 50% DAC or half of the maximum amplitude that was measured at the maximum amplitude location and position. The length of the reflector is the distance between the end points.

I-6400 RECORDING OF REFLECTORS—STRAIGHT BEAM EXAMINATION FOR LAMINATIONS

I-6410 SCOPE OF RECORDING

Record all areas giving indications equal to or greater than the remaining back reflection.

I-6420 DATA REQUIRED

The following data shall be recorded.

(a) Distance from surface, distance from reference line, and distance parallel the reference line for each search unit position giving a recordable indication, as the laminar area is scanned on parallel scan paths.

(b) Calibration sheet number.

Data shall be obtained at increments no greater than $9/10$ of the transducer dimension measured parallel to scan increment change (10% overlap).

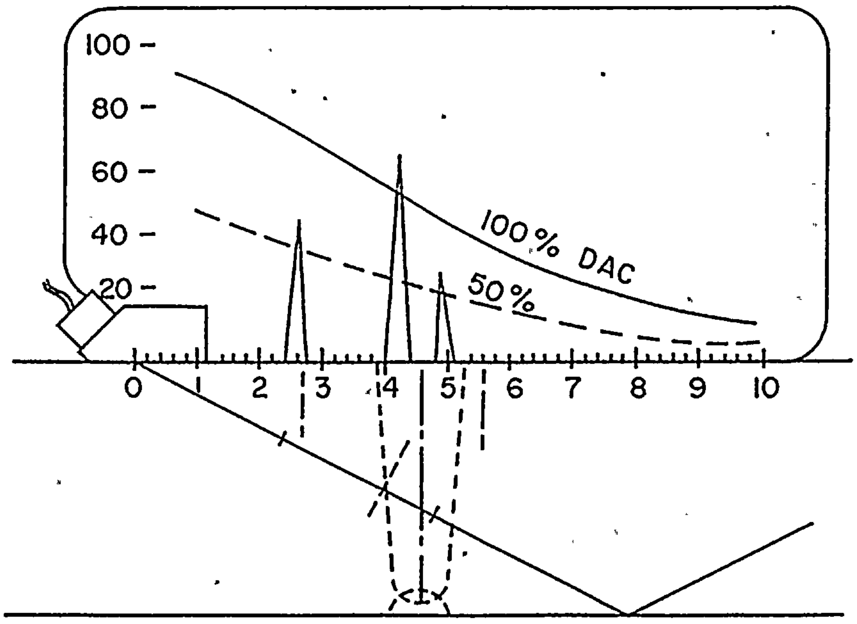


FIG. I-6330 REFLECTOR READING

DATA TABULATION FOR FIGURE 1-6330

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	
				half maximum amplitude				% of T		
				minimum		maximum				
Max. % DAC	distance from surface in.	position in.	inches location	distance from surface in.	position in.	distance from surface in.	position in.	distance from depth surface % of T	% of T	computation or remarks
120	4.0	4.6	23	2.4	2.7	4.8	5.6	30	30	(4.8−2.4)/8.0
80	4.0	4.6	22-1/4	2.6	2.9	4.8	5.6	27.5	32.5	(4.8−2.6)/8.0
50	4.0	4.6	21-3/4	3.4	3.8	4.2	4.8	10	42.5	(4.2−3.4)/8.0
90	4.1	4.7	23-3/4	2.7	3.1	4.5	5.2	22.5	34	(4.5−2.7)/8.0
70	4.1	4.7	24-1/2	3.1	3.4	4.4	5.0	16	39	(4.4−3.1)/8.0
50	4.2	4.8	25	3.6	4.0	4.4	5.0	15	45	(4.4−3.6)/8.0 25-21-3/4
										depth (2a) height: 30% of T
										length: 3-1/4 inches

ARTICLE I-7000
REPORT OF EXAMINATION

The Owner or his agent shall prepare a report of the examinations performed during each inservice inspection.[1] The report shall be prepared, filed, and maintained in accordance with IWA-6000.

All procedures and equipment shall be identified sufficiently to permit duplication of the examination(s) at a later date; this shall include initial calibration data for each complete ultrasonic examination system, and any significant changes in subsequent rechecks.

The report shall include a record indicating the weld(s) examined (this may be marked up drawings or sketches), the location of each recorded indication, and the identification of the operator who carried out each examination or part thereof.

---

[1]The intent is that a report be prepared for all those ultrasonic examinations performed preservice or during each plant shutdown in which inservice inspections are performed. It is not intended that a separate report be prepared for each individual examination or that a report accumulate the results of examinations performed over a 10 year inspection interval.

APPENDIX II

OWNER'S DATA REPORT FOR INSERVICE INSPECTIONS

FORM NIS

FORM NIS-1 OWNERS' DATA REPORT FOR INSERVICE INSPECTIONS

As required by the Provisions of the ASME Code Rules

1. Owner ______________________________
(Name and Address of Owner)

2. Plant ______________________________
(Name and Address of Plant)

3. Plant Unit ______________ 4. Owner Certificate of Authorization (if required) ______________

5. Commercial Service Date ______________ 6. National Board Number for Unit ______________

7. Components Inspected

Component or Appurtenance	Manufacturer or Installer	Manufacturer or Installer Serial No.	State or Province No.	National Board No.

Note: Supplemental sheets in form of lists, sketches, or drawings may be used provided (1) size is 8½ in. x 11 in., (2) information in items 1 through 6 on this data report is included on each sheet, and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-1 (back)

8. Examination Dates ____________ to ____________ 9. Inspection Interval from __________ to __________

10. Abstract of Examinations. Include a list of examinations and a statement concerning status of work required for current interval.

11. Abstract of Conditions Noted.

12. Abstract of Corrective Measures Recommended and Taken.

We certify that the statements made in this report are correct and the examinations and corrective measures taken conform to the rules of the ASME Code, Section XI.

Date ____________________ 19 _____ Signed ______________________ By ______________________
Owner

Certificate of Authorization No. (if applicable) ________________ Expiration Date ________________

CERTIFICATE OF INSERVICE INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of ______________ and employed by ____________________ of ______________ have inspected the components described in this Owners' Data Report during the period ______________ to ______________, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owners' Data Report in accordance with the requirements of the ASME Code, Section XI.

By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the examinations and corrective measures described in this Owners' Data Report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date ____________________ 19 _____

______________________________ Commissions ______________________________
Inspector's Signature National Board, State, Province and No.

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APPENDIX A

EVALUATION OF FLAW INDICATIONS

ARTICLE A-1000 INTRODUCTION

A-1100 SCOPE

This appendix presents a procedure for evaluating the acceptability of flaws that have been detected during in-service inspection that exceed the allowable flaw indication standards of IWB-3500. The procedure is based upon the principles of linear elastic fracture mechanics. The details of this procedure are intended to apply to thick section (4 in. and greater) ferritic materials with specified minimum yield strengths of 50,000 psi or less and simple geometries and stress distributions. The basic concepts of the procedure may be extended to other ferritic materials (including clad ferritic materials) and more complex geometries; however, they are not intended to apply to austenitic or high nickel alloys. For purposes of evaluation, all indications that exceed the standards of IWB-3500 should be considered as cracks or flaws. The following is a summary of the evaluation procedure:

(a) Determine the actual flaw configuration from the measured indication in accordance with the rules of IWA-2000.

(b) Using the rules of A-2000, resolve the actual flaw into a simple shape that can be analyzed.

(c) Determine the stresses at the location of the observed flaw for all normal emergency and faulted conditions.

(d) Calculate stress intensity factors for each condition using the methods outlined in A-3000.

(e) Using the methods outlined in A-4000, determine the necessary material properties including the effects of irradiation if applicable.

(f) Using the analytical procedures described in A-5000, determine the following critical flaw parameters:

a_f —The maximum size to which the observed flaw can grow during the remaining service lifetime of the component.

a_c —The minimum critical size of the observed flaw under normal conditions.

a_i —The minimum critical size for initiation of non-arresting growth of the observed flaw under emergency and faulted conditions.

(g) Using these critical flaw parameters, apply the flaw evaluation criteria of IWB-3600 to determine whether the observed flaw indication is acceptable for continued operation.

ARTICLE A-2000
DEFINITION OF FLAW MODEL FOR ANALYSIS

A-2100 SCOPE

In this article, definitions are given covering flaw shape, proximity to closest flaw, flaw orientation and flaw location to permit their application into the analytical model for linear elastic fracture mechanics.

A-2200 FLAW SHAPE

The actual flaw indication should be completely circumscribed by an elliptical or circular planar area according to the methods outlined in IWB-3300.

A-2300 MULTIPLE INDICATIONS

In the case of multiple neighboring indications, if the shortest distance between the boundaries of any two neighboring flaw indications is within the proximity limits described in IWB-3330 and IWB-3350, the neighboring flaw indications should be circumscribed by a single ellipse as described in IWB-3330 and IWB-3350.

A-2400 FLAW ORIENTATION

Flaws that do not lie in a plane perpendicular to the maximum principal stress direction should be projected into that plane following the rules described in IWB-3340.

A-2500 FLAW LOCATION

For purposes of evaluation, the flaw is to be considered in its actual location. The stresses due to system loading should be computed at this location. Surface flaw or subsurface flaw expressions should be used depending upon the type of indication. If the indication is a subsurface flaw, but it is within the proximity limit described in IWB-3340 of the surface of the component, then the indication should be considered to be a surface flaw and should be circumscribed by a semi-ellipse, with its major axis on the surface. For clad components the inside surface of the component should be assumed to be the cladding-base metal interface.

ARTICLE A-3000
METHOD FOR K_I DETERMINATION

A-3100 SCOPE

In this article, method is described by which the K_I (stress intensity factor) can becalculated utilizing the membrane stress and the bending stress as determined by stress analysis.

A-3200 APPLIED STRESSES

The applied stresses at the flaw location can be resolved into membrane and bending stresses with respect to the wall thickness. All forms of loading are to be considered, including pressure stresses, thermal stresses, discontinuity stresses, and residual stresses. In the case of a nonlinear stress distribution through the reactor vessel wall, the actual stress distribution can be conservatively approximated using the linearization technique illustrated in Fig. A-3200-1. The linearized stress distribution can then be characterized by the membrane stress σ_m and the bending stress σ_b as shown in Fig. A-3200-1.

A-3300 STRESS INTENSITY EQUATION

(a) Stress Intensity factors for the flaw model can be calculated from the membrane and bending stresses at the flaw location using the following equation:

$$K_I = \sigma_m M_m \sqrt{\pi}\sqrt{a/Q} + \sigma_b M_b \sqrt{\pi}\sqrt{a/Q}$$

Where:

σ_m, σ_b = Membrane and bending stresses as defined in the previous paragraph

a = Minor half-diameter of embedded flaw; flaw depth for surface flaw.

Q = Flaw shape parameter to be determined from Fig. A-3300-1 using σ_m and the flaw geometry.

M_m = Correction factor for membrane stresses (see Figure A-3300-2 for subsurface flaws; Figure A-3300-3 for surface flaws).

M_b = Correction factor for bending stresses (see Figure A-3300-4 for subsurface flaws; Figure A-3300-5 for surface flaws).

(b) Where variations in K_I around the periphery of the crack occur, the maximum value is to be used as representative.

(c) Note that Equation (1) is only a recommended procedure for determination of K_I. More sophisticated techniques may be used providing, the methods and analyses are documented. In many cases, involving complex geometries and stress distributions, the methods outlined above may be inadequate, and more sophisticated techniques should be used.

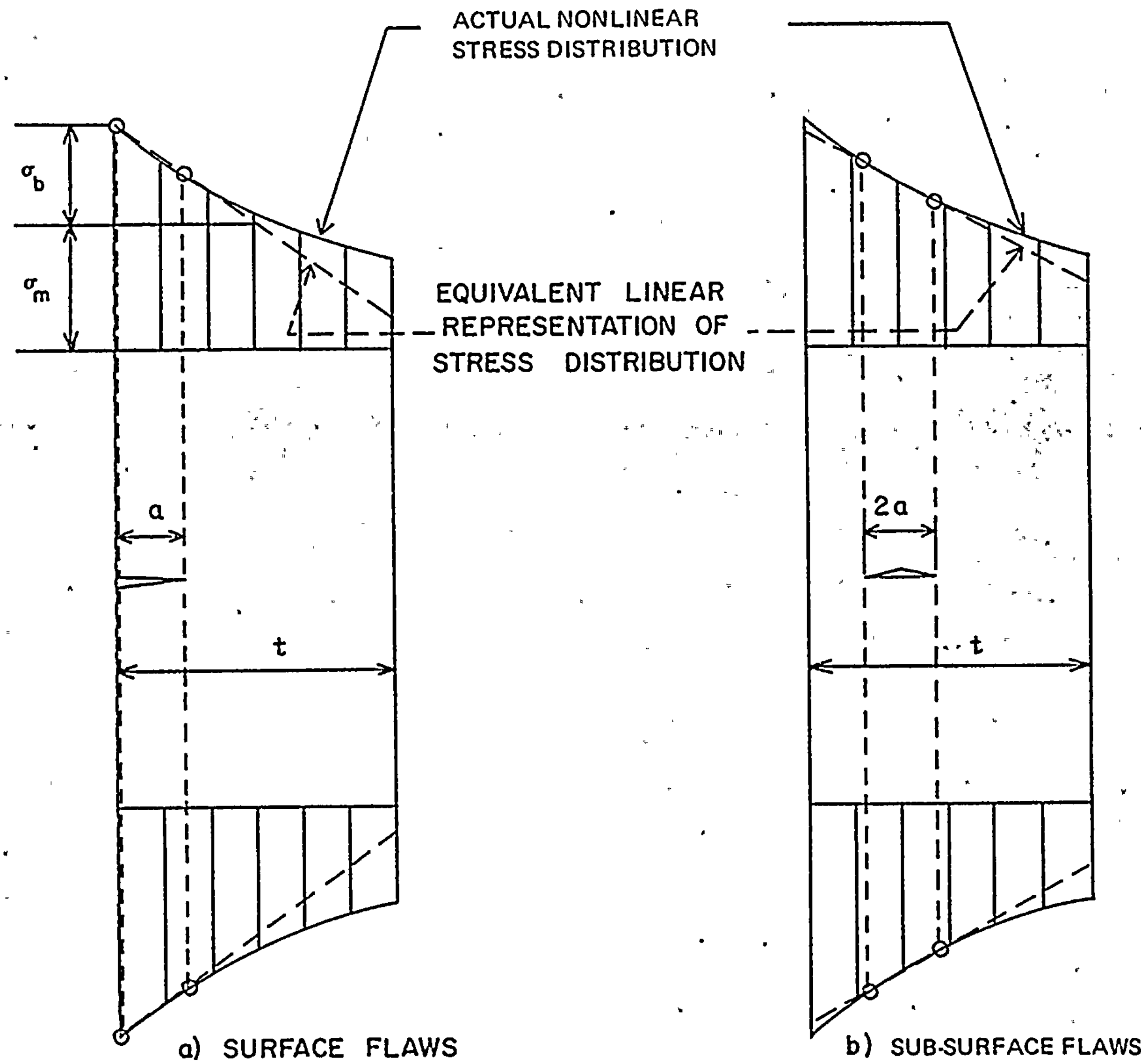
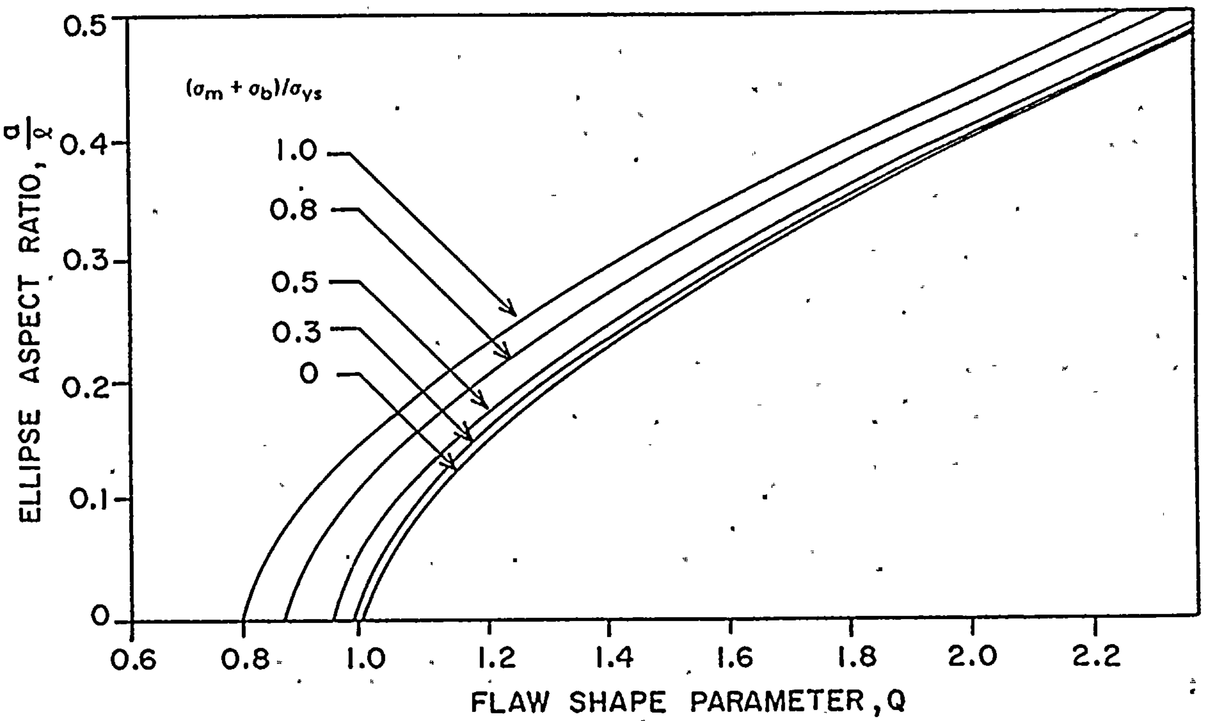


FIG. A-3200-1 LINEARIZED REPRESENTATION OF STRESSES



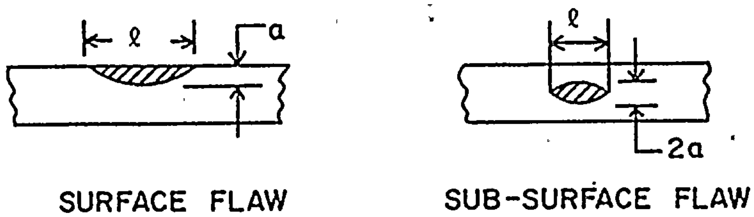


FIG. A-3300-1 SHAPE FACTORS FOR FLAW MODEL

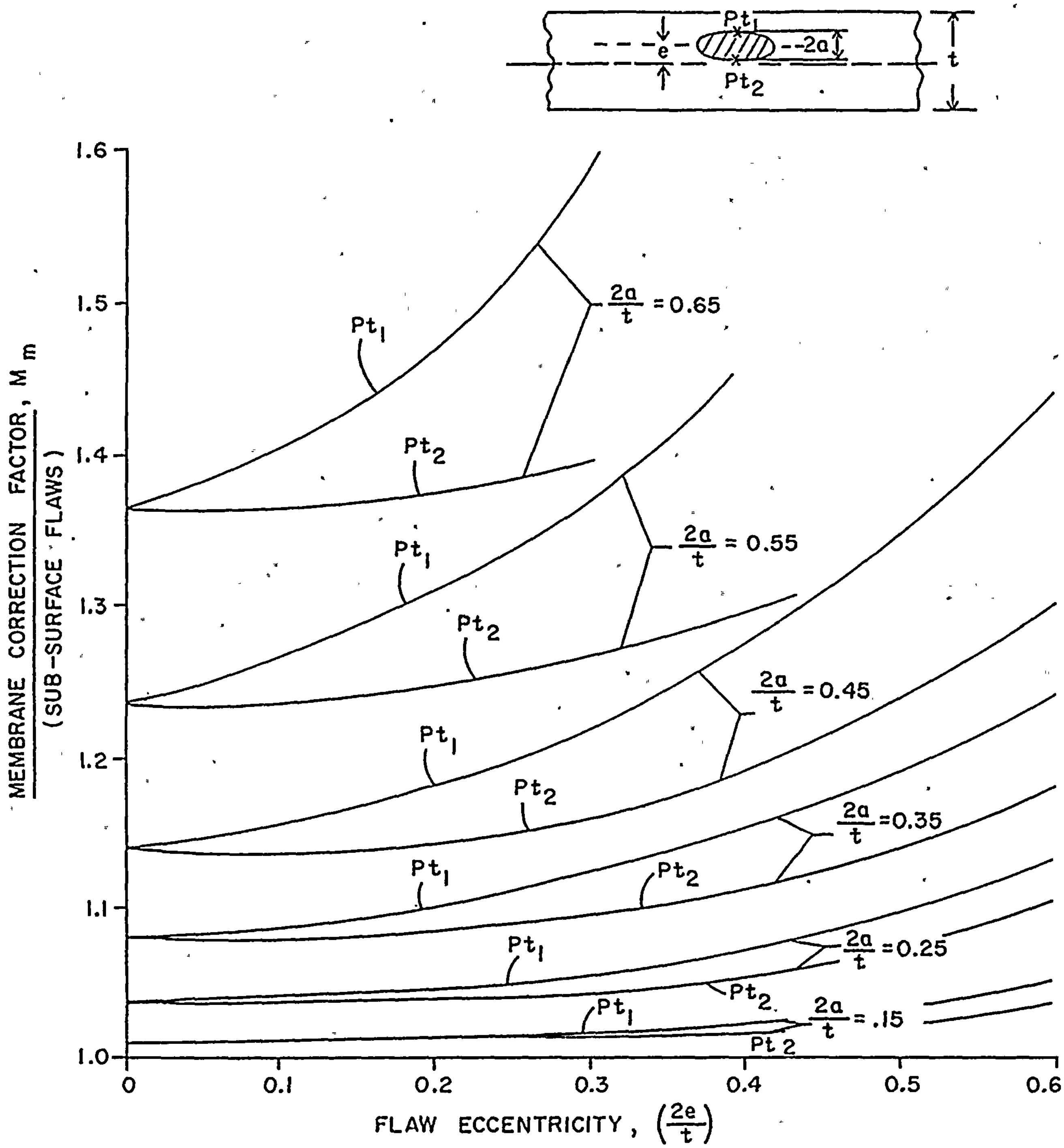


FIG. A-3300-2 MEMBRANE CORRECTION FACTOR FOR SUB-SURFACE FLAWS

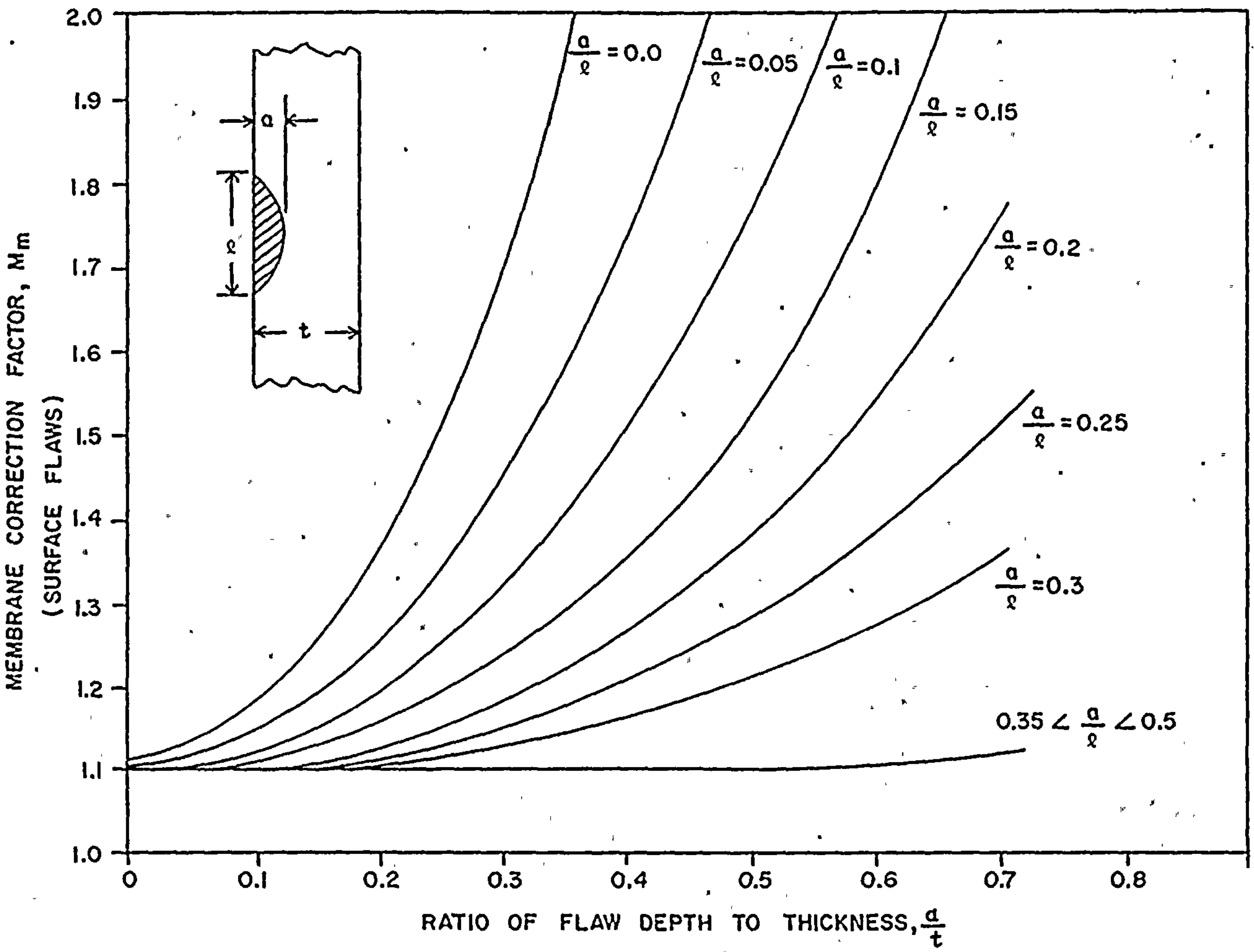
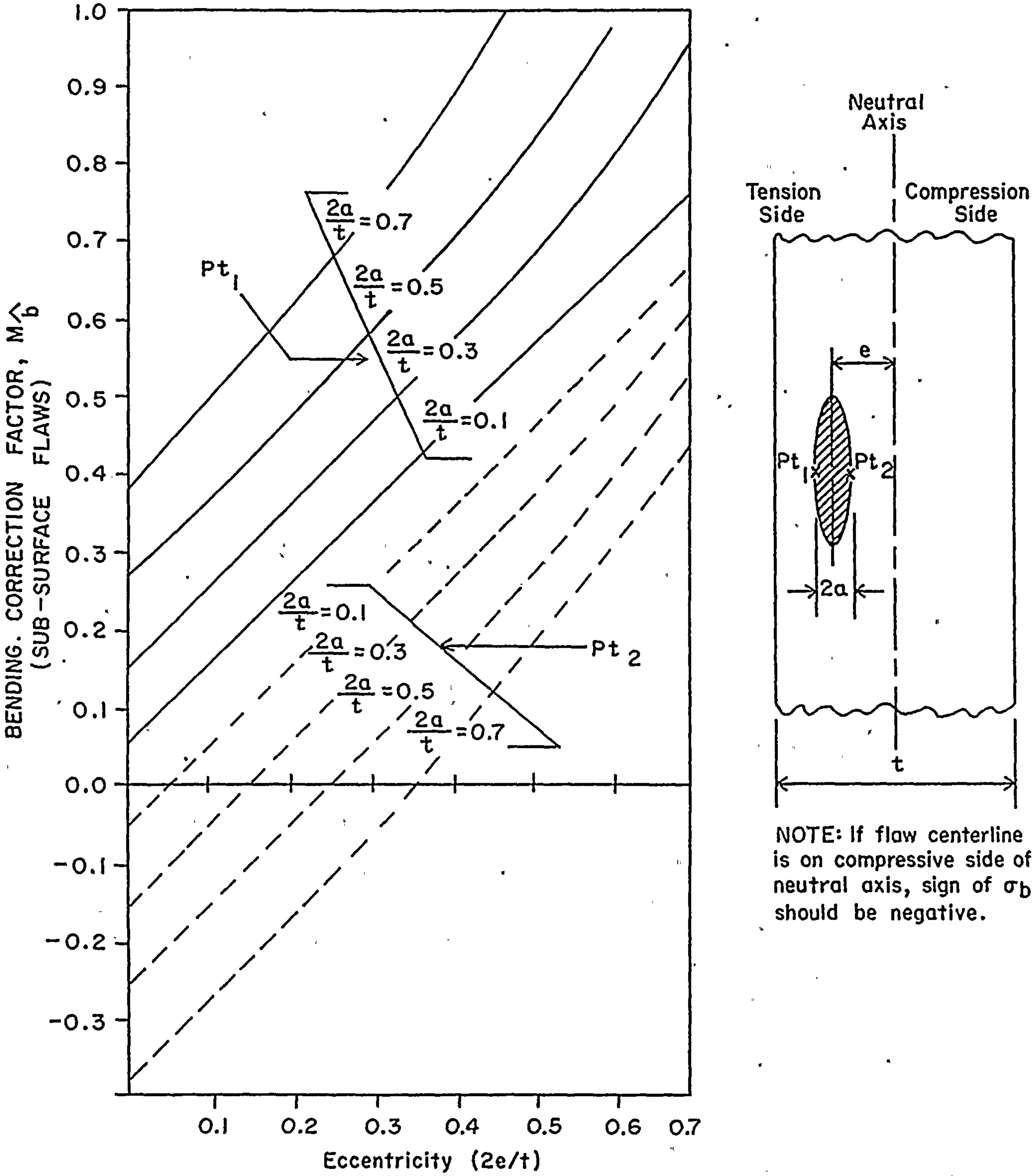


FIG. A-3300-3 MEMBRANE CORRECTION FACTOR FOR SURFACE FLAWS



NOTE: If flaw centerline is on compressive side of neutral axis, sign of σ_b should be negative.

FIG. A-3300-4 BENDING CORRECTION FACTOR FOR SUB-SURFACE FLAWS

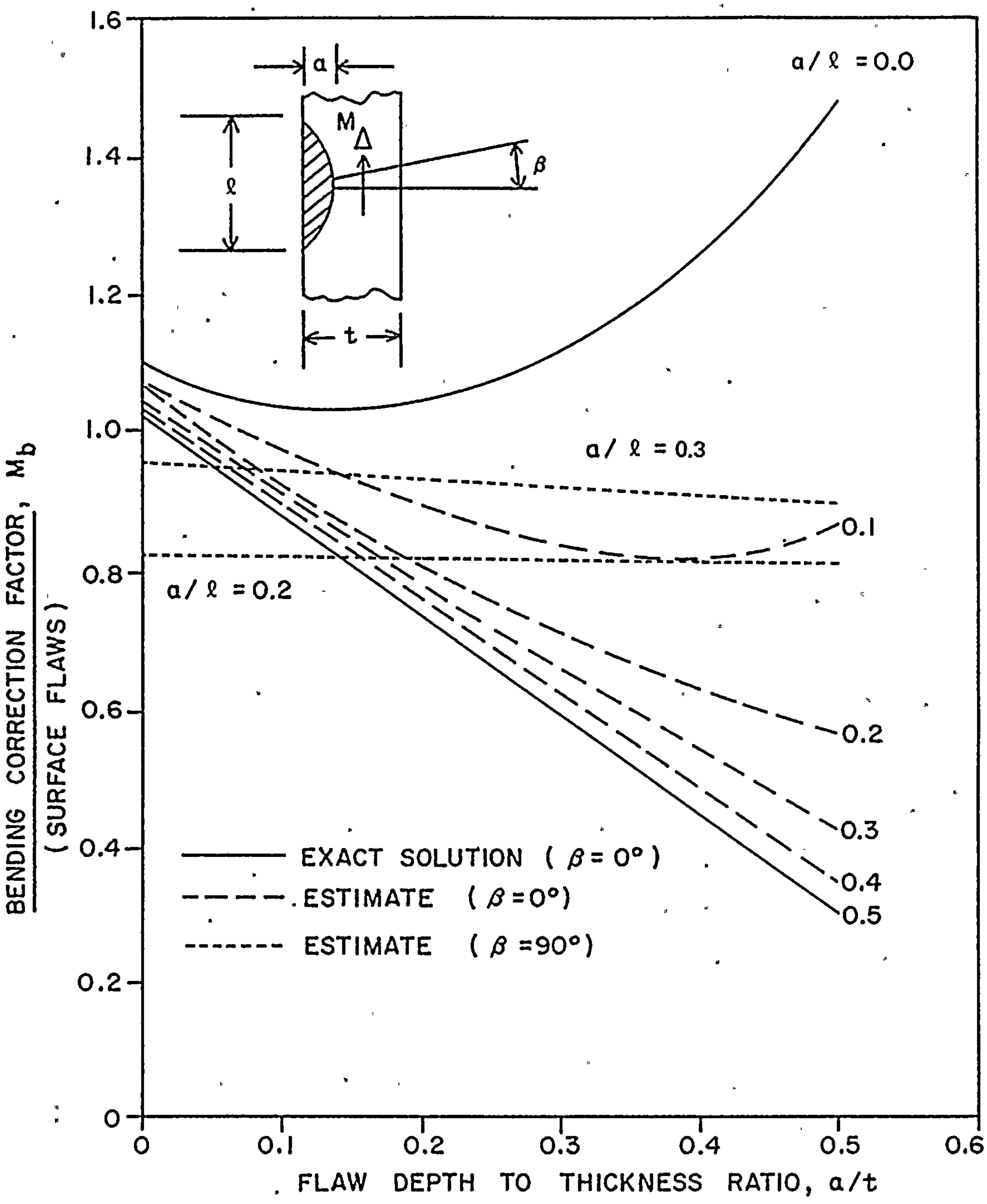


FIG. A-3300-5 BENDING CORRECTION FACTOR FOR SURFACE FLAWS

ARTICLE A-4000
DEFINITION OF MATERIAL PROPERTIES

A-4100 SCOPE

In this article the material properties that are utilized in the linear elastic fracture mechanics analysis are defined and formulas for calculating these properties are presented.

A-4200 FRACTURE TOUGHNESS

(a) The fracture toughness of the material can be defined by two properties, K_{Ia} and K_{Ic}, which represent critical values of the stress intensity factor K_I. K_{Ia} is based on the lower bound of crack-arrest critical K_I values measured as a function of temperature. K_{Ic} is based on the lower bound of static initiation critical K_I values measured as a function of temperature. The K_{Ia} and K_{Ic} values used in the analysis should represent conservative values obtained preferably from the specific material and product form involved. The values so used should be justified on the basis of current technology, and should take into account material variability, testing techniques, and any other variables which might lower these toughness values.

(b) Lower bound K_{Ia} and K_{Ic} versus temperature curves from tests of SA-533B-1, SA-508-2, and SA-508-3 steel are provided in Fig. A-4200-1 for use if data from the actual product form are not available. The temperature scale of this data should be related to the reference nil-ductility temperature, RT_{NDT} as determined for the material prior to irradiation according to the rules of NB-2331. The curves in Figure A-4200-1 are intended to be very conservative since the recommended procedure is to determine the material fracture toughness from specimens of the actual material and product form in question.

A-4300 FATIGUE CRACK GROWTH RATE

(a) the fatigue crack growth rate (da/dN) of the material can be characterized in terms of the range of applied stress intensity factor (ΔK_I). This characterization is generally of the form:

$$\frac{da}{dN} \doteq C_o \, (\Delta K_I)^n$$

where n is the slope of the log (da/dN) versus log (ΔK_I), and C_o is a scaling constant. These data should preferably be obtained from specimens of the actual material and product form involved, taking into account material variability, environment, test frequency, and any other variables that may affect the data.

(b) An upper bound curve for fatigue crack growth data measured on SA-533B-1 and SA-508 steels, including the effects of temperature, frequency, and pressurized water environment, is given in Fig. A-4300-1 for use if data from the actual product form are not available. This curve is intended to be very conservative since the recommended procedure is to obtain the data from specimens of the actual material and product form in question.

A-4400 IRRADIATION EFFECTS

For materials that are subjected to fast neutron fluence, the degradation of the material fracture toughness due to irradiation must be accounted for. The degree of degradation depends upon the neutron fluence, the irradiation temperature, and the relative sensitivity of the particular steel. Radiation-induced changes in fracture toughness should be determined from surveillance specimens of the actual material and product form, irradiated according to the surveillance techniques of ASTM-E184, "Standard Recommended Practice for Effects of High-Energy Irradiation on the Mechanical Properties of Metallic Materials."

Where no surveillance data are available, the effects of neutron irradiation can be accommodated for both K_{Ia} and K_{Ic} by shifting the reference nil-

ductility temperature (RT_{NDT}) as a function of irradiation using the trend curves of Fig. A-4400-1 for reactor vessel steels irradiated at 550 F. Note that copper content of the weld and base metal has a strong influence on the data in Fig. A-4400-1. Where the actual copper content data is not known, the highest copper content curve of Fig. A-4400-1 should be used. These curves are intended to be very conservative since the recommended procedure is to determine the irradiation effects from surveillance specimens of the actual material and product form in question.

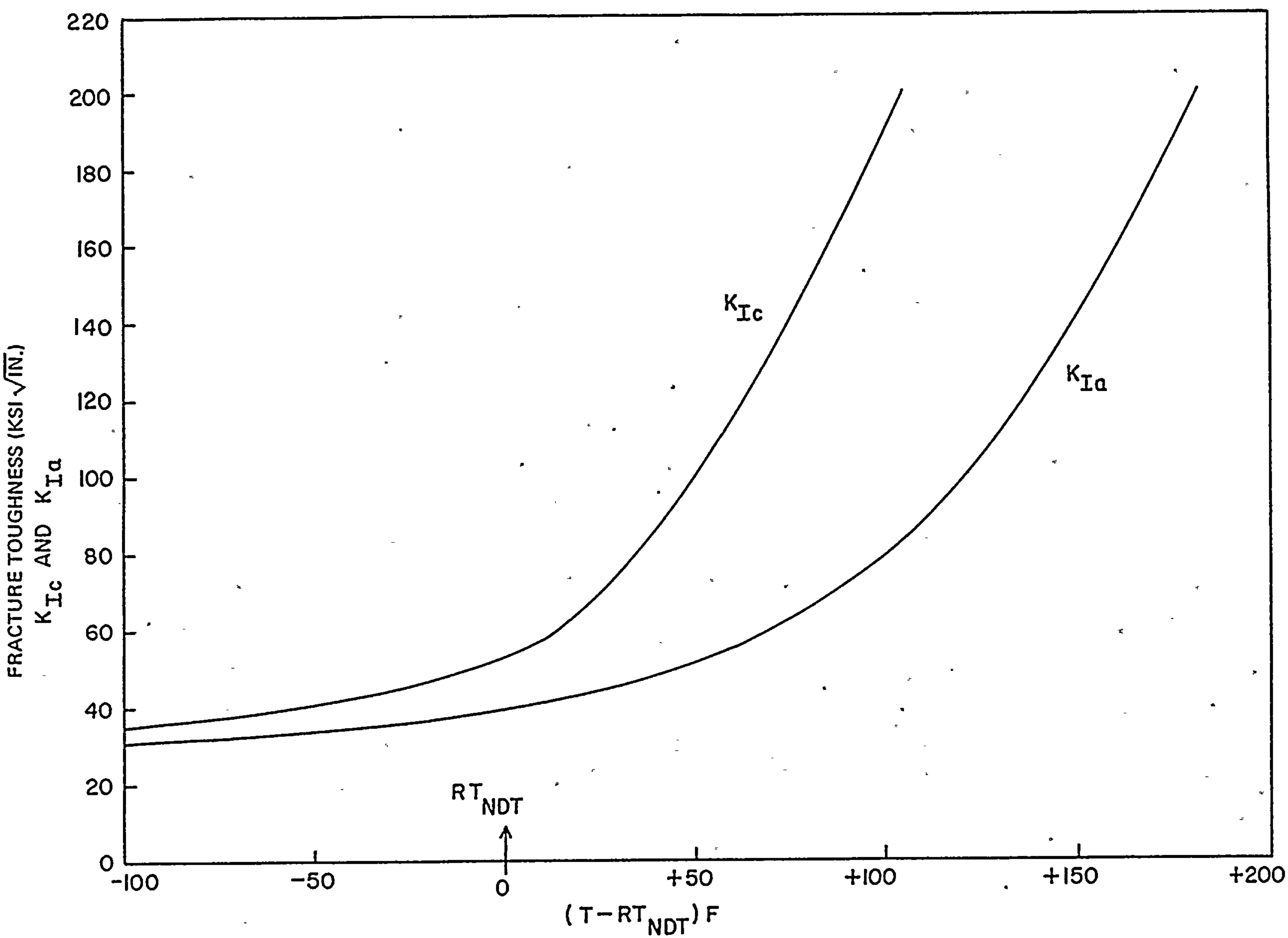

220
200
180
160
140
120
100
80
60
40
20
0
FRACTURE TOUGHNESS (KSI $\sqrt{IN.}$)
K_{Ic} AND K_{Ia}
K_{Ic}
K_{Ia}
RT_{NDT}
−100
−50
0
+50
+100
+150
+200
$(T-RT_{NDT})$ F

FIG. A-4200-1

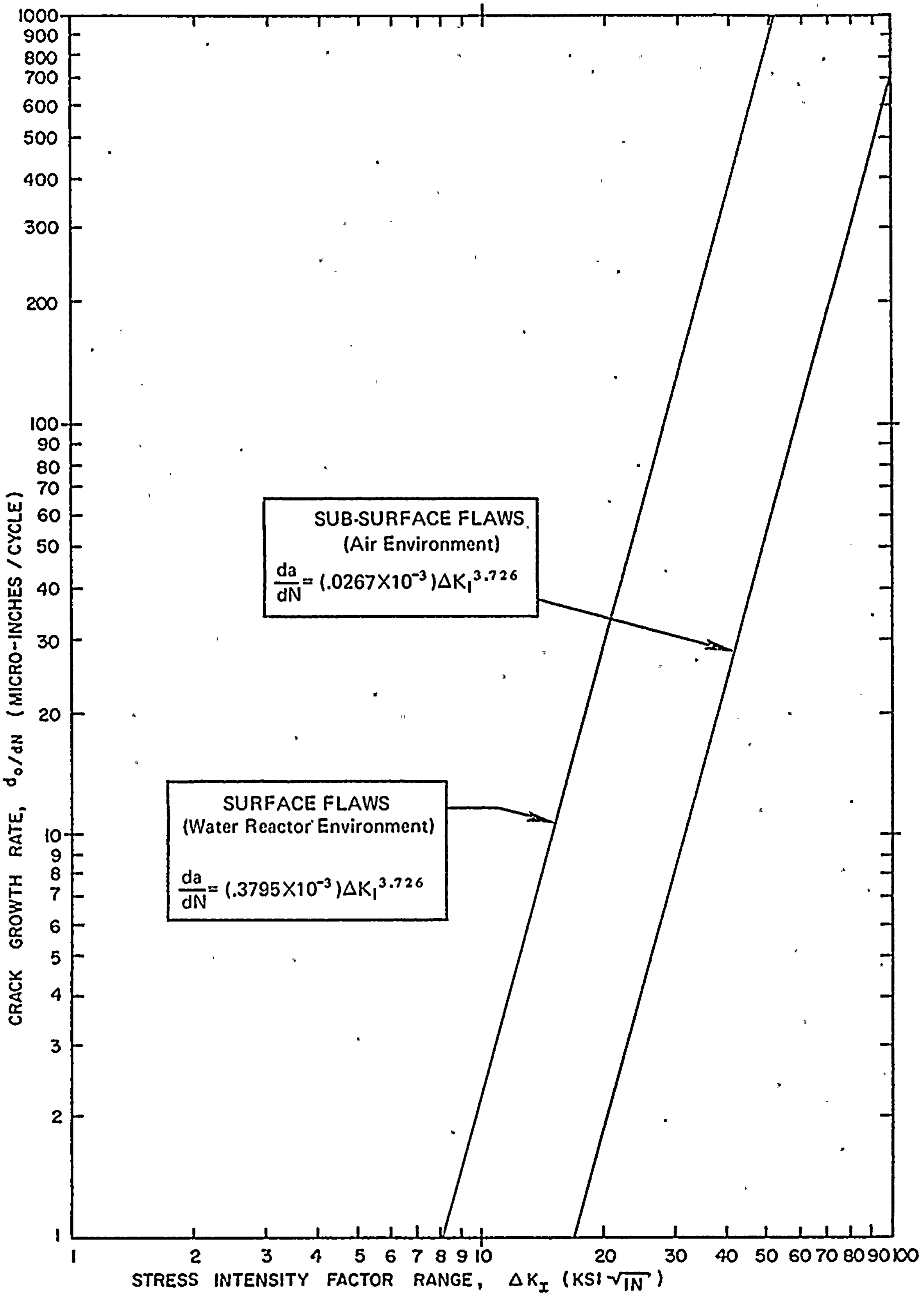


FIG. A-4300-1 UPPER BOUND FATIGUE CRACK GROWTH DATA FOR REACTOR VESSEL STEELS

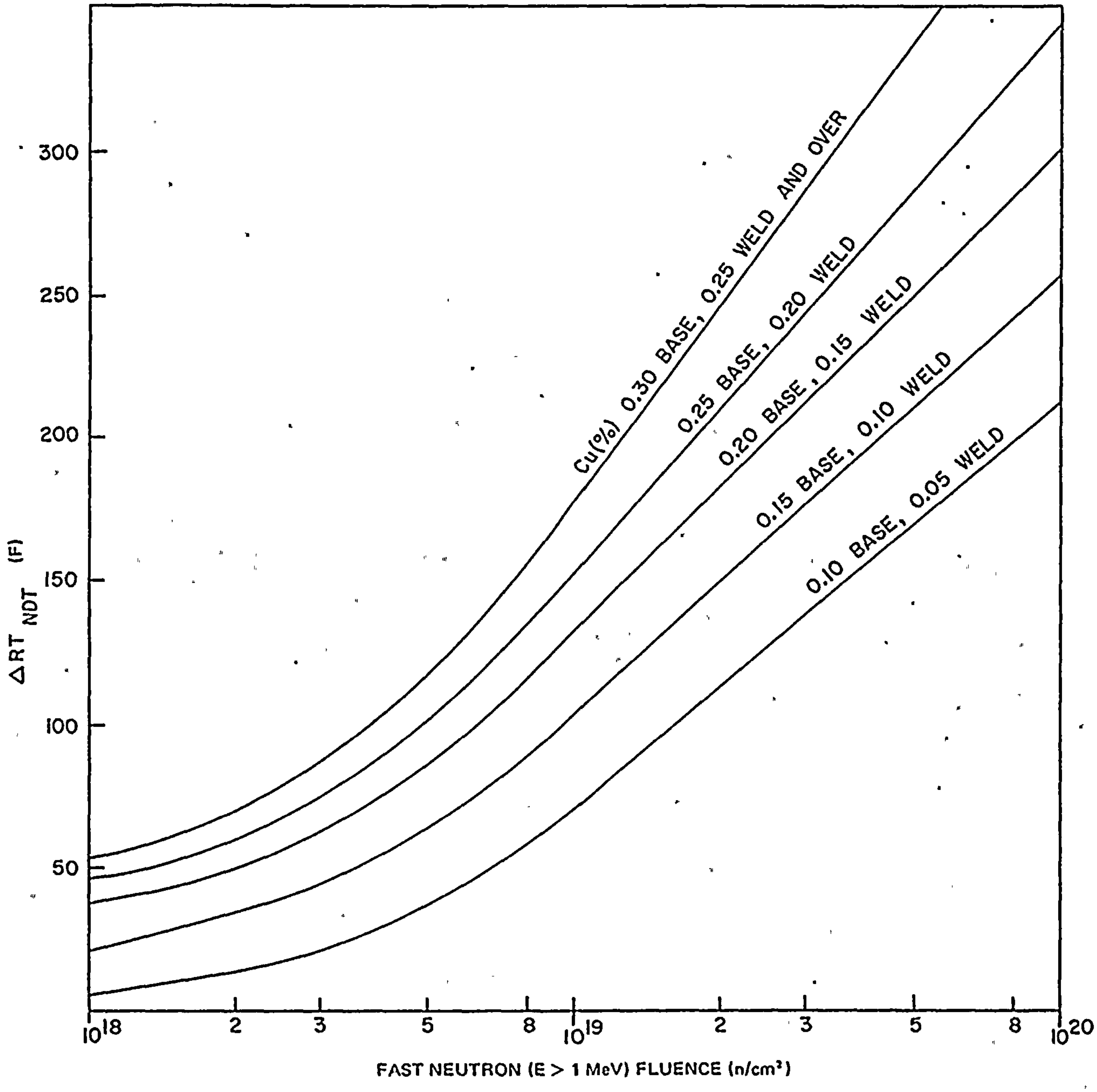


FIG. A-4400-1 EFFECT OF FAST NEUTRON FLUENCE AND COPPER CONTENT ON SHIFT OF RT_{NDT} FOR REACTOR VESSEL IRRADIATION AT 550 F

ARTICLE A-5000
ANALYSIS

A-5100 SCOPE

In this article the method to be used in applying the linear elastic fracture mechanics analysis to the normal, emergency, and faulted conditions is described.

A-5200 NORMAL CONDITIONS

Normal conditions include all transients expected to occur during the course of system testing and operation as well as upset conditions anticipated to occur frequently enough that the system should be designed to accommodate them.

In order to determine the maximum potential for fatigue crack growth of the observed flaw indication during normal operation, a cumulative fatigue crack growth study of the component should be performed. All of the design transients prescribed in the system design specification that apply to the remainder of the service life of the component should be included. Stress intensity factors should be determined for each transient using the bounding elliptical or semi-elliptical flaw model described in A-2000 and using the methods for K_I determination outlined in A-3000. Each transient should be considered in approximate chronological order in the following manner:

(1) Determine the maximum range of K_I fluctuation associated with the transient (ΔK_I).

(2) Find the incremental flaw growth (Δa) corresponding to ΔK_I from the fatigue crack growth rate data.

(3) Update the flaw size by assuming the flaw grows to a geometrically similar, larger flaw with a minor half diameter of $(a + \Delta a)$.

(4) Proceed to the next transient.

The above procedure, after all transients have been considered, yields the expected end-of-life flaw size (a_f).

Next the minimum critical flaw size for normal operation should be established. The procedure for determining critical flaw size for each transient is as follows:

(1) Determine the maximum end-of-life irradiation level at the flaw location.

(2) Using irradiated fracture toughness data, determine the crack-arrest fracture toughness (K_{Ia}) as a function of temperature.

(3) Calculate stress intensity factors (using the methods outlined in A-3000 or some other documented procedure) for various penetration depths of an assumed flaw that is geometrically similar to the ellipse or semi-ellipse that bounds the observed flaw.

(4) Compare the calculated stress intensity factors to the material fracture toughness (K_{Ia}) for the appropriate temperature to determine the critical flaw size (a_c) for the transient.

(5) Proceed to the next transient.

The smallest value of a_c determined by the above procedure, after all transients have been considered, represents the minimum critical flaw size for normal operation at the location of the observed flaw.

A-5300 EMERGENCY AND FAULTED CONDITIONS

Emergency and faulted conditions refer to very low probability postulated incidents whose consequences are such that subsequent plant operation is not required and safe system shutdown is the only consideration. Cumulative fatigue analysis of components need not include faulted conditions.

The minimum critical flaw size for emergency and faulted conditions should be established using K_{Ic} data for crack initiation considerations and K_{Ia} data for crack arrest considerations. Each postulated incident should be considered for critical flaw size as follows:

(1) Determine the maximum end-of-life irradiation profile through the thickness of the component at the observed flaw location.

(2) Determine temperature and stress profiles through the thickness of the component at the observed flaw location as a function of time following the postulated incident.

(3) Using the irradiated fracture toughness data, determine the crack arrest (K_{Ia}) and crack initiation (K_{Ic}) fracture toughness profiles through the thickness of the component as a function of time following the postulated incident.

(4) Calculate stress intensity factors (using the methods outlined in A-3000 or some other documented procedure) for various penetration depths of an assumed flaw that is geometrically similar to the ellipse or semi-ellipse that bounds the observed flaw.

(5) The crack penetration at which the calculated stress intensity factor exceeds the K_{Ic} profile corresponds to the critical crack size for initiation (a_i) and the penetration at which the stress intensity factor goes below the K_{Ia} curve corresponds to the critical crack size for arrest (a_a). This comparison is illustrated in Figure A-5300-1 for both an arrest and a nonarrest situation.

(6) Curves such as Fig. A-5300-1 should be prepared for a number of selected times following each postulated accident to establish the critical time.

The smallest value of a_i determined by the above procedure, and for which the crack arrest penetration (p) is greater than 0.75, after all postulated accidents have been considered, represents the minimum critical initiation flaw size for emergency and faulted conditions at the location of the observed flaw.

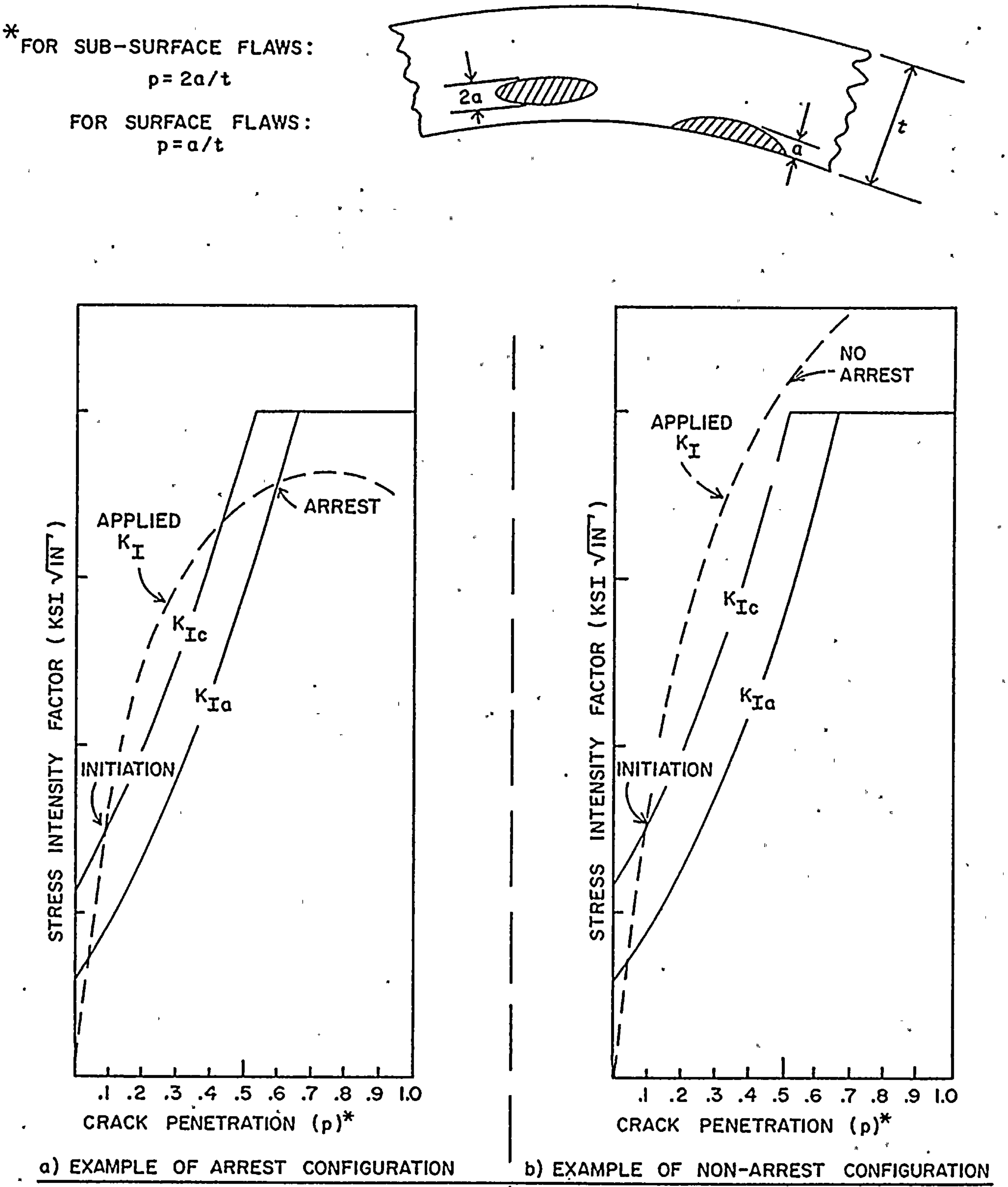


FIG. A-5300-1 DETERMINATION OF CRITICAL FLAW SIZES FOR POSTULATED CONDITIONS

Summer 1974 Addenda

Date of Issue: June 30, 1974

ASME BOILER AND PRESSURE VESSEL CODE
An American National Standard

SECTION XI
Rules for Inservice Inspection of Nuclear Power Plant Components

1974 Edition

This is the first Addenda to be published to the 1974 Edition of Section XI.

IWB-3300(a) *Revise to read:*

(a) Flaw indications detected by the preservice examinations (IWB-2100) and by the inservice examinations (IWB-2600) shall be circumscribed in elliptical or circular shape for the purpose of description and analysis. The dimensions of an elliptical or semicircular flaw indication shall be determined by the size of a rectangle that fully contains the area of the indication. The width and length of the rectangle shall correspond with the depth and length of the indication, respectively. The length of the rectangle shall be drawn parallel to the inner, pressure-retaining surface of the component. The width and length of the rectangle shall be considered as the dimensions of the minor and major axes of an ellipse (or semi-ellipse) that circumscribes the subsurface (or surface) indication. The dimensions of a circular flaw indication shall be determined by the size of a square that fully contains the area of the indication. One-half the depth dimension of the square, a, and length, ℓ, shall determine the aspect ratio, a/ℓ, of the flaw indications. The projected planar area of the circumscribed indication shall be considered as oriented normal to the surface of the component.

S75 Errata

Fig. IWB-3310 *Revise as shown on p. 3 of this Addenda.*

IWB-3310(c) *Revise to read:*

(c) The dimensions, a and ℓ, of the indication shall be those of the rectangle that contains the detected area of the indication as shown in Fig. IWB-3310.

Fig. IWB-3320 *Revise as shown on p. 4 of this Addenda.*

IWB-3320(b) *Revise to read:*

(b) The dimensions, a and ℓ, of the indication shall be those of the square or rectangle that contains the detected area of the indication as shown in Fig. IWB-3320.

Fig. IWB-3330 *Revise as shown on p. 5 of this Addenda.*

IWB-3330(c) *Revise to read:*

(c) The dimensions, a and ℓ, of such multiple planar flaws shall be those of the square or rectangle that contains the detected area of all indications within the proximity limits defined in IWB-3330(a) and shown in Fig. IWB-3330.

Fig. IWB-3340 *Revise as shown on p. 6 of this Addenda.*

IWB-3340(d) *Revise to read:*

(d) The dimensions, a and ℓ, of such flaws shall be those of a rectangle that contains the projected detected area of the indication as shown in Fig. IWB-3340.

Fig. IWB-3350 *Revise as shown on p. 7 of this Addenda.*

IWB-3350(b) *Revise to read:*

(b) The dimensions, a and ℓ, of such flaws shall be those of the square or rectangle that contains the detected area of all indications within the flaw-plane adjacency limits of (a) above as shown in Fig. IWB-3350.

Fig. IWB-3360 *Revise as shown on p. 8 of this Addenda.*

IWB-3360(b) *Revise to read:*

(b) The area of a laminar flaw shall be the area of the square or rectangle that contains the detected area of those indications that either overlap or are within a distance s of 1 in. of one another as shown in Fig. IWB-3360.

IWB-3370 *Delete entirely.*

Fig. IWB-3370 *Delete entirely.*

IWB-3510 *Adopt* Fig. 3510.1 *and* Fig. 3510.2 *as shown on pp. 9 and 10 of this Addenda.*

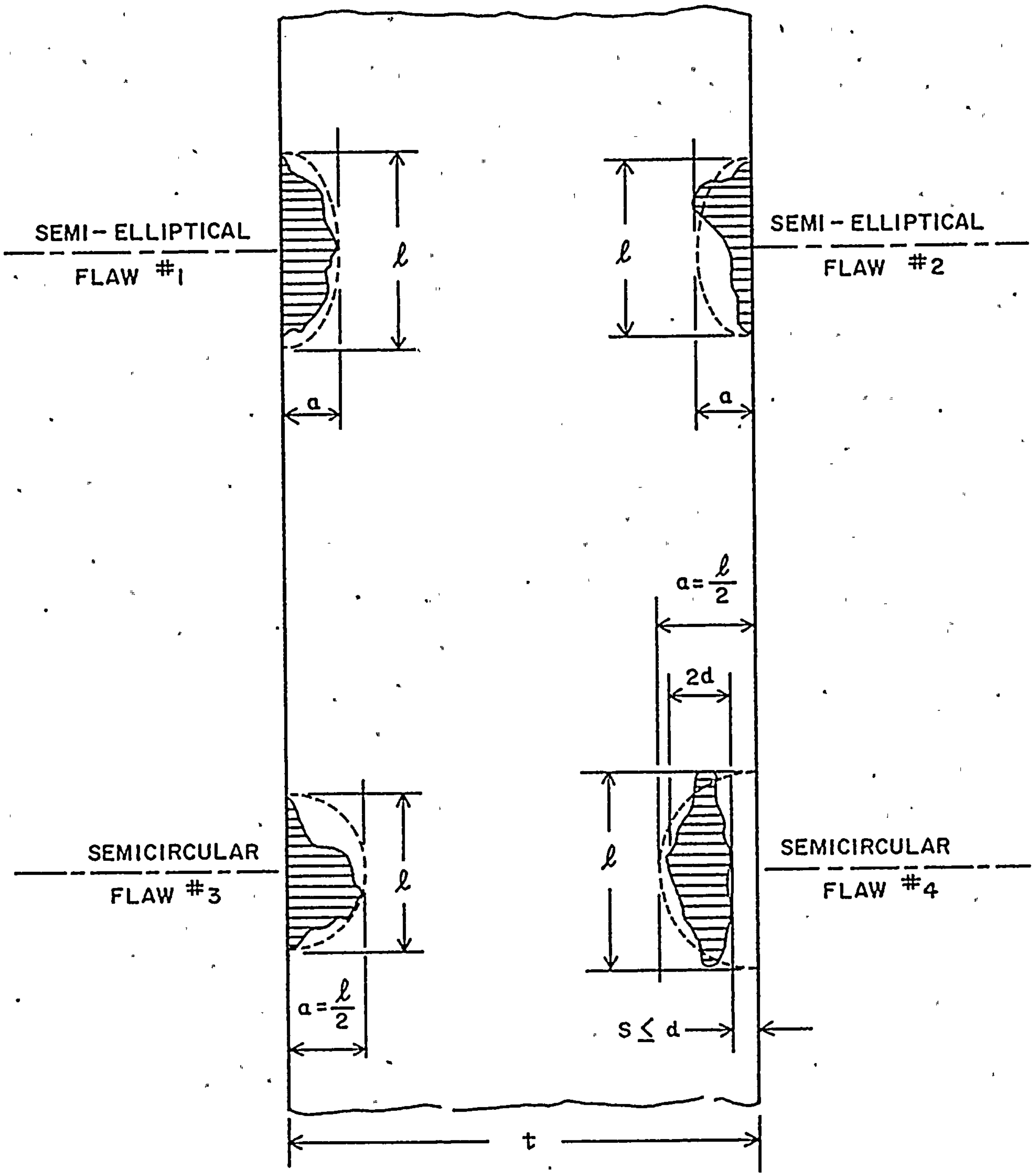
IWB-3511 *Adopt as shown on pp. 11-18 of this Addenda.*

IWB-3512 *Adopt as shown on pp. 19-21 of this Addenda.*

IWB-3514 *Adopt as shown on pp. 22-23 of this Addenda.*

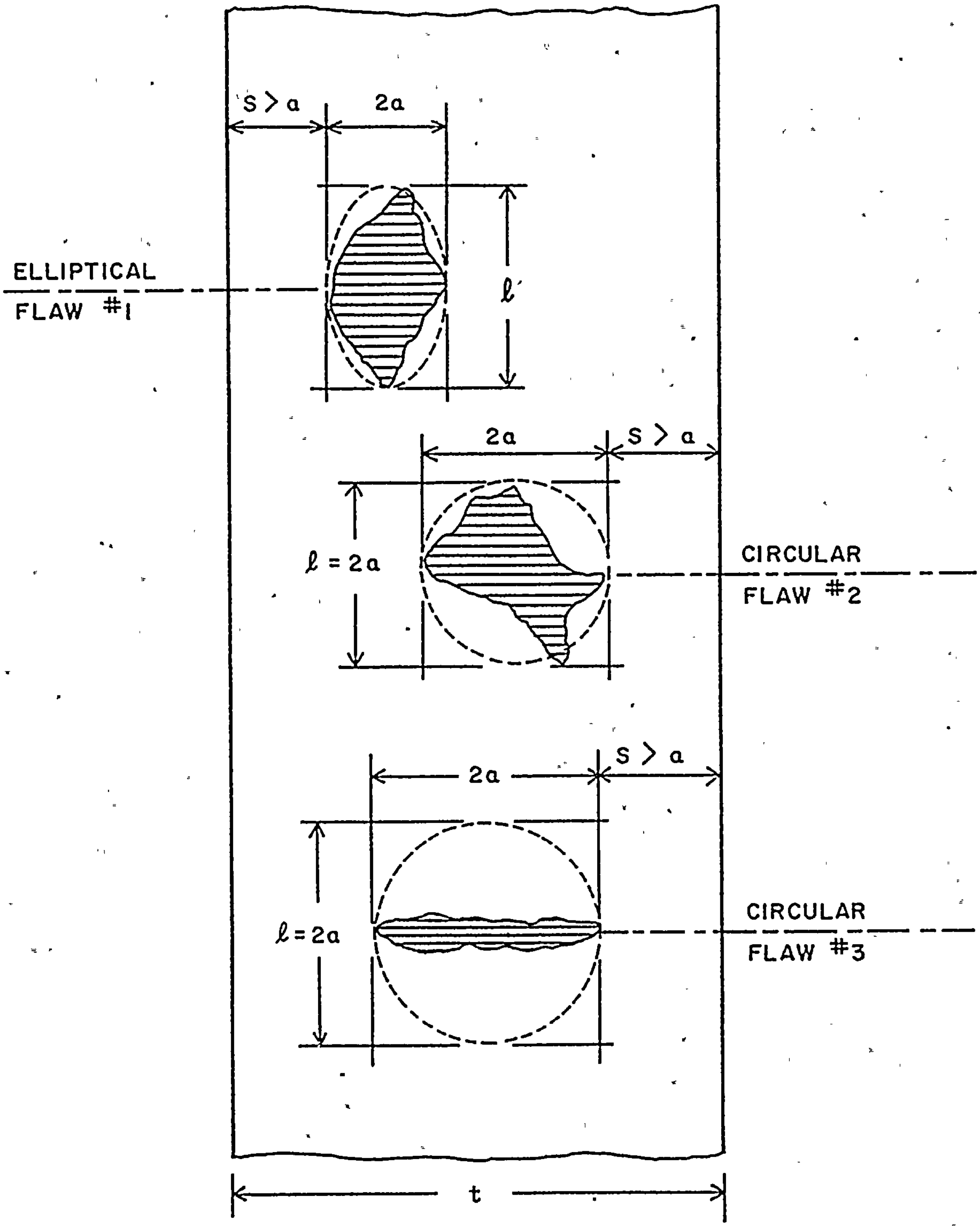
IWB-3515 *Adopt as shown on pp. 24-26 of this Addenda.*

IWB-3517 *Adopt as shown on p. 27 of this Addenda.*



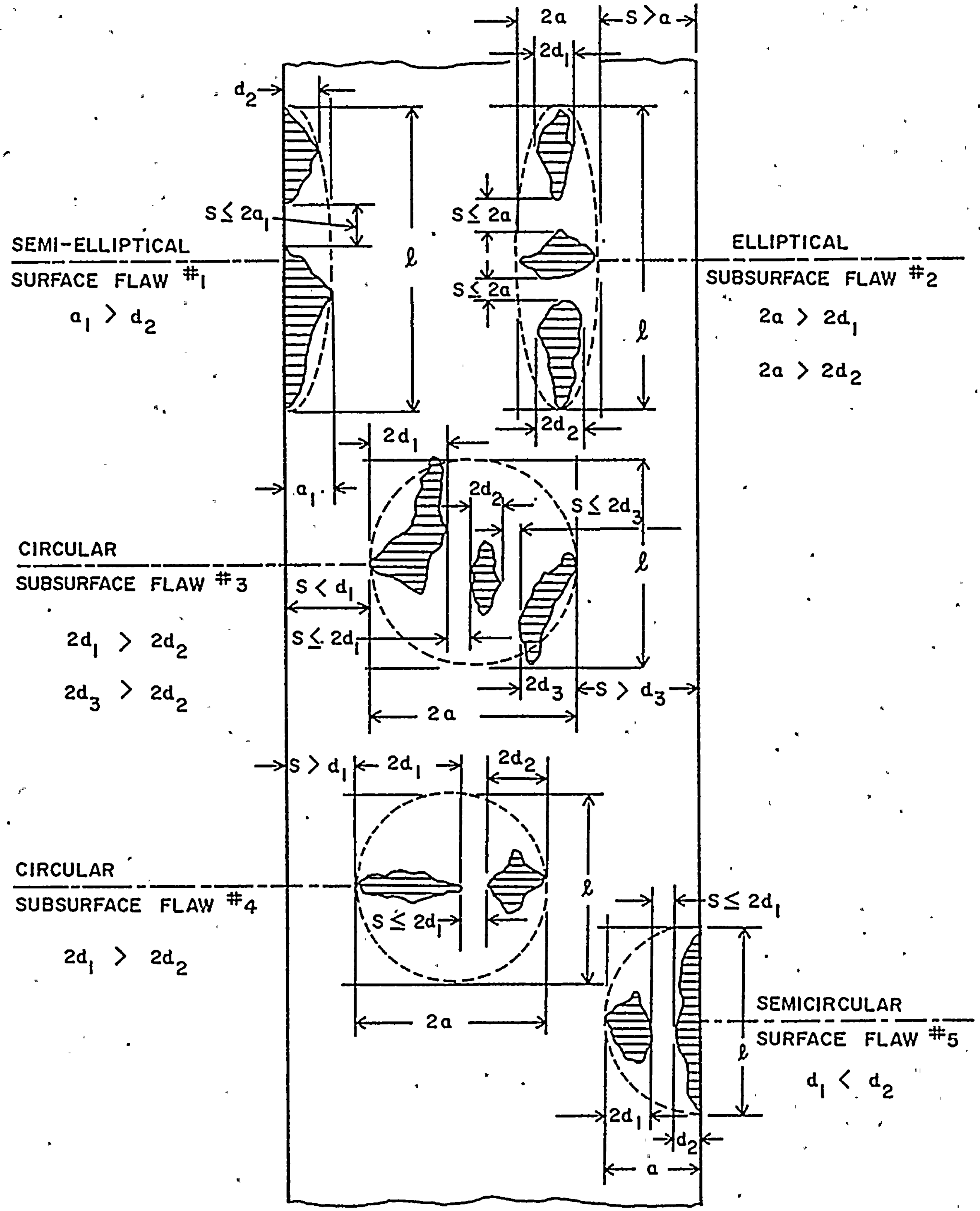
ILLUSTRATIVE FLAW CONFIGURATIONS AND DETERMINATION OF DIMENSIONS a AND ℓ

FIG. IWB-3310 SURFACE PLANAR FLAWS ORIENTED IN PLANE
NORMAL TO MAXIMUM STRESS



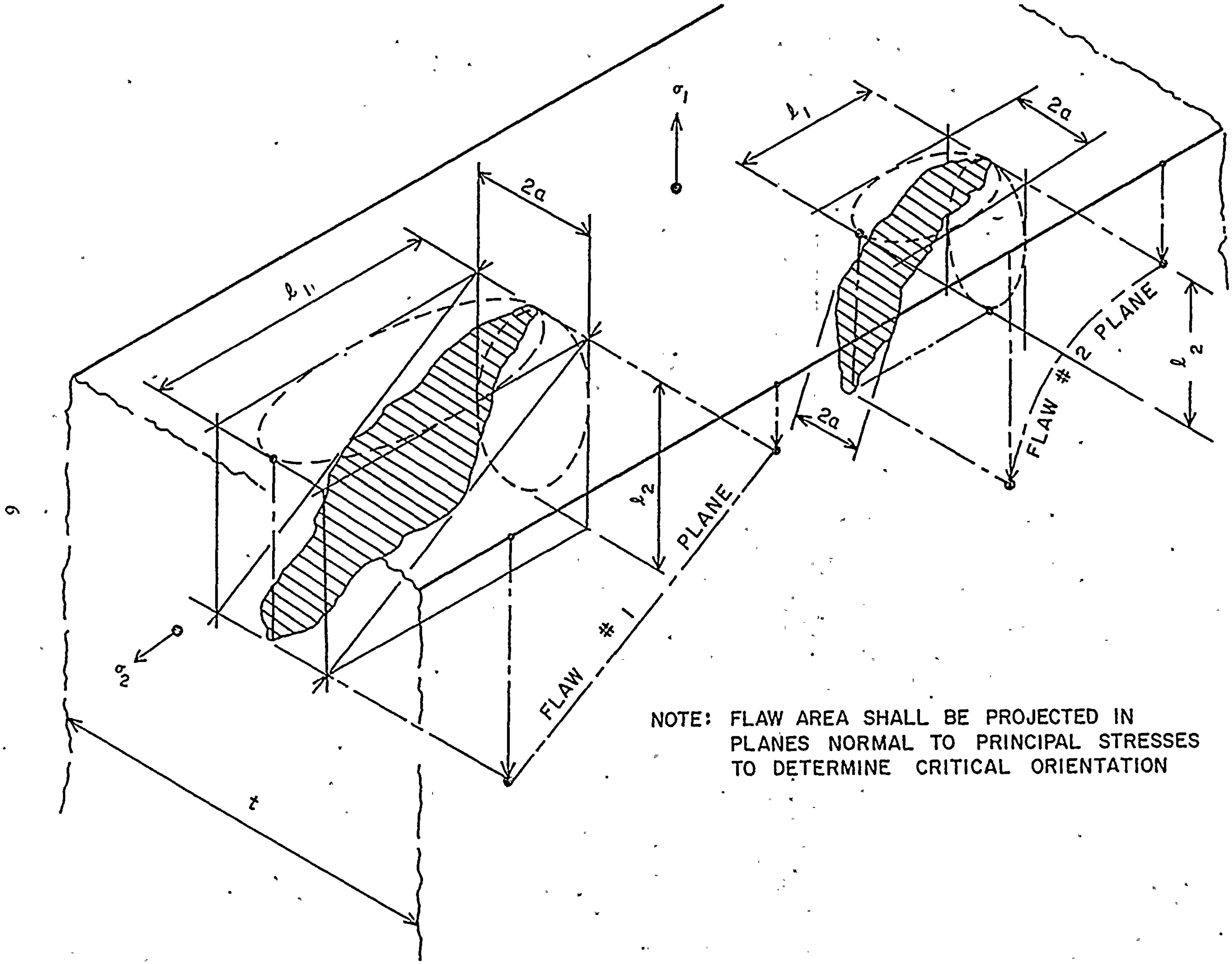
ILLUSTRATIVE FLAW CONFIGURATIONS AND DETERMINATION OF DIMENSIONS 2a AND ℓ

FIG. IWB-3320 SUBSURFACE PLANAR FLAWS ORIENTED IN PLANE NORMAL TO MAXIMUM STRESS



ILLUSTRATIVE FLAW CONFIGURATIONS AND DETERMINATION OF DIMENSIONS *a*, *2a*, AND *ℓ*

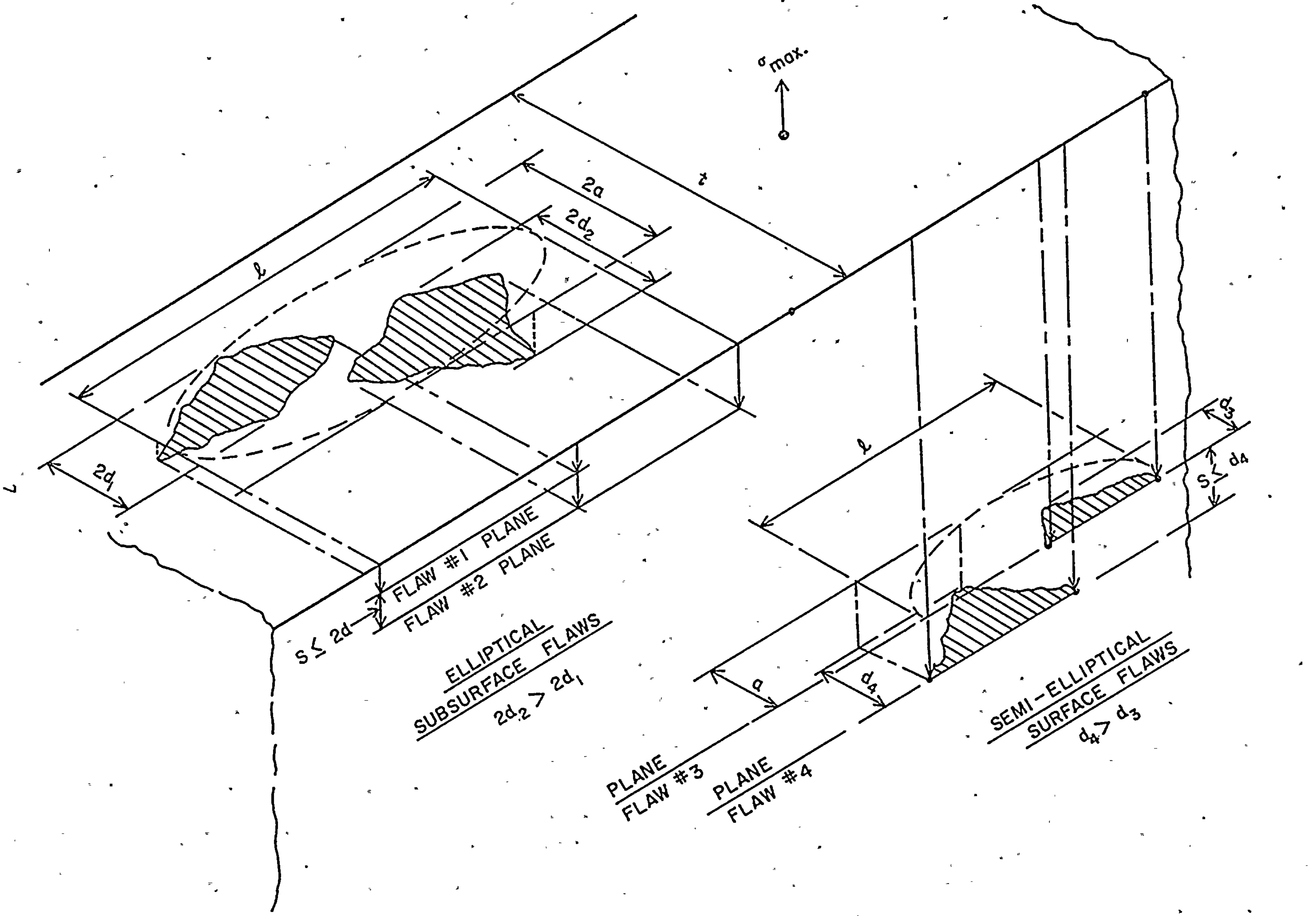
FIG. IWB-3330 MULTIPLE PLANAR FLAWS ORIENTED IN PLANE NORMAL TO MAXIMUM STRESS



NOTE: FLAW AREA SHALL BE PROJECTED IN PLANES NORMAL TO PRINCIPAL STRESSES TO DETERMINE CRITICAL ORIENTATION

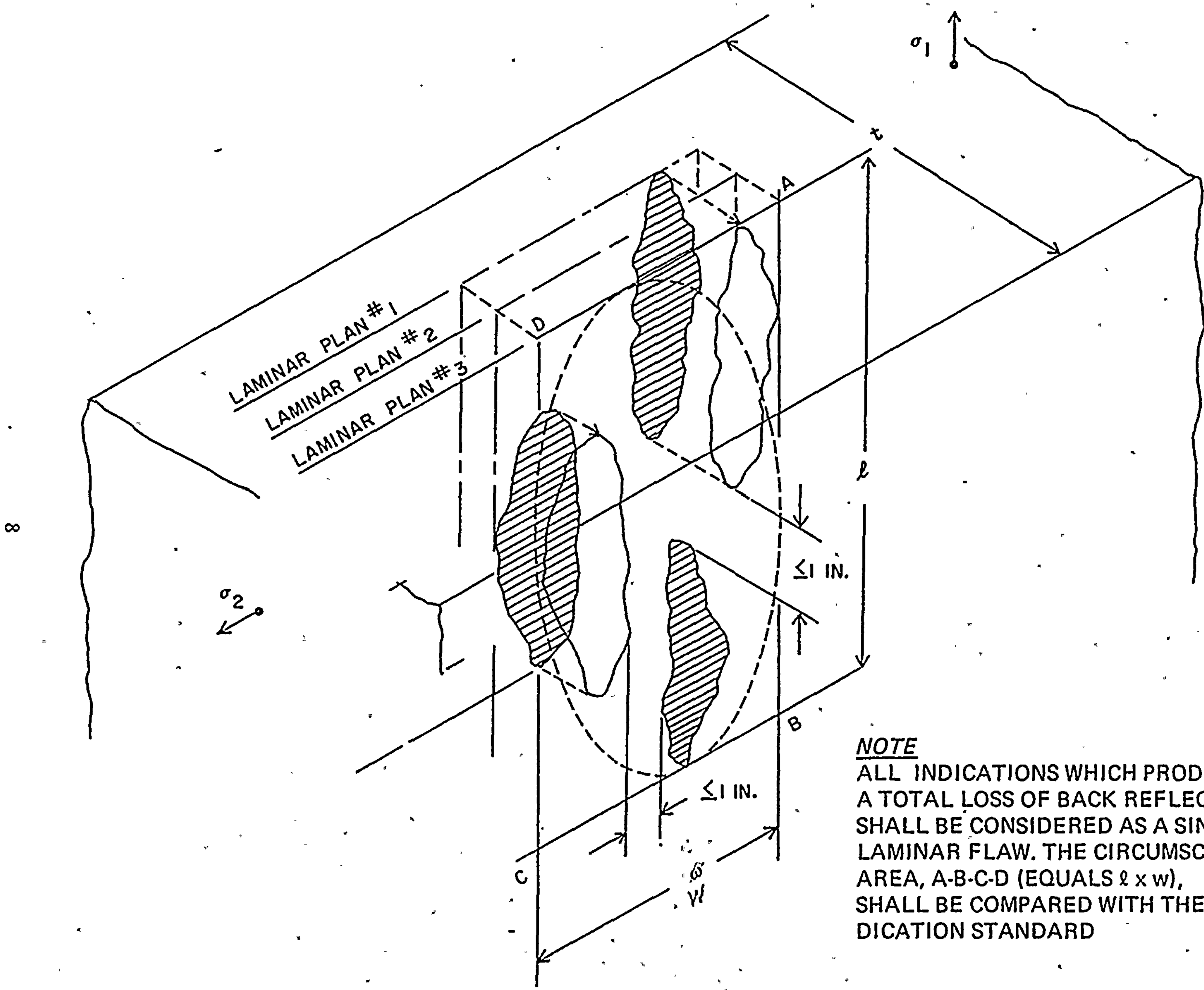
ILLUSTRATIVE FLAW CONFIGURATIONS AND DETERMINATION OF DIMENSIONS 2*a* AND ℓ

FIG. IWB-3340 NONPLANAR ELLIPTICAL SUBSURFACE FLAWS



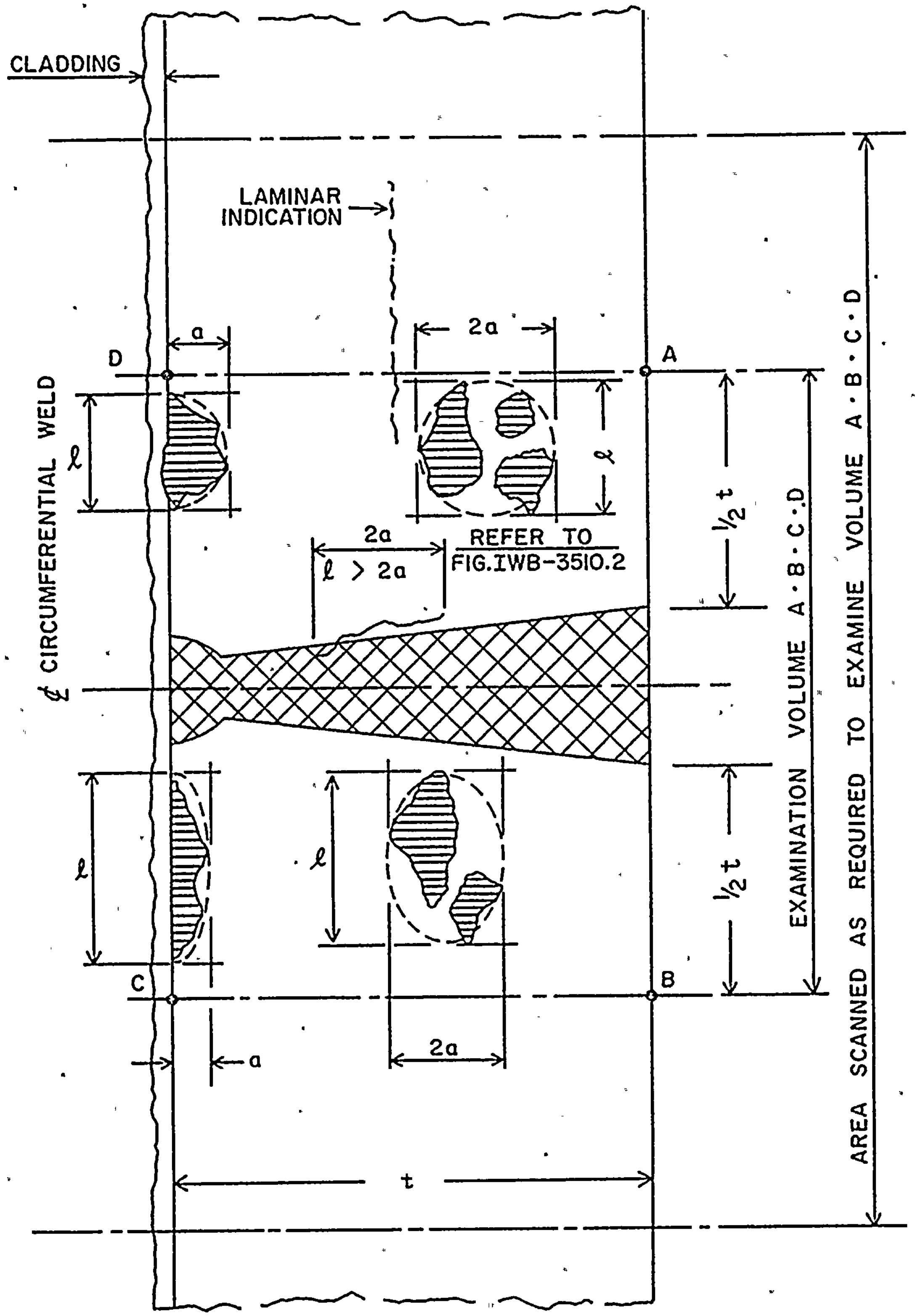
ILLUSTRATIVE FLAW CONFIGURATIONS AND DETERMINATION OF DIMENSIONS *a*, *2a*, AND ℓ

FIG. IWB-3350 PARALLEL PLANAR FLAWS



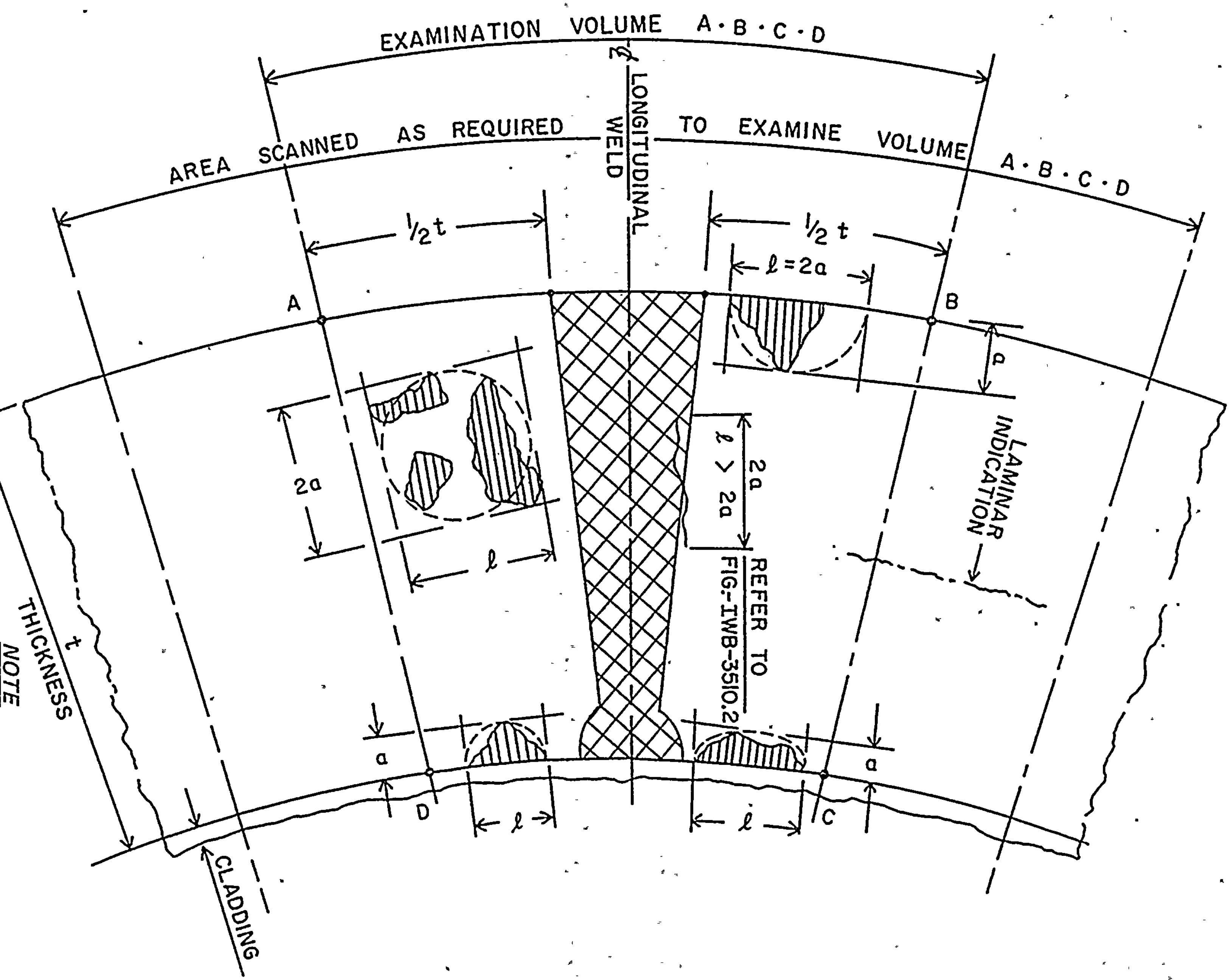
NOTE
ALL INDICATIONS WHICH PRODUCE A TOTAL LOSS OF BACK REFLECTION SHALL BE CONSIDERED AS A SINGLE LAMINAR FLAW. THE CIRCUMSCRIBED AREA, A-B-C-D (EQUALS ℓ x w), SHALL BE COMPARED WITH THE INDICATION STANDARD

FIG. IWB-3360 LAMINAR FLAWS



NOTE: ALL FLAWS ARE EXAGGERATED IN SIZE AND SCALE

FIG. IWB-3510.1 INDICATIONS NORMAL TO CIRCUMFERENTIAL STRESS



NOTE
ALL FLAWS ARE EXAGGERATED
IN SIZE AND SCALE

FIG. IWB-3510.2 INDICATIONS NORMAL TO LONGITUDINAL STRESS

IWB-3511 Standards for Examination Categories B–B, Pressure-Retaining Welds in Vessels, and B–C, Pressure-Retaining Welds, Vessel-to-Flange, and Head-to-Flange

IWB-3511.1 Allowable Planar Indications

(a) The size of allowable planar indications within the boundary of the examination volumes specified in Figs. IWB-3511.1(a) through (f) shall not exceed the limits specified in Table IWB-3511.1.

(b) Where a flaw indication extends or lies beyond the examination volumes as detected by the procedures used to examine the specified volumes, the overall size of the indication shall be compared with the limits specified in Table IWB-3511.1 [for examples, see Figs. IWB-3511.1(a) and IWB-3511.1(b)].

(c) Any two or more flaw indications that fall within two parallel planes ½ in. apart and combine to reduce the net section thickness[1] are acceptable provided the depths of individual indications do not exceed the allowable limits of Table IWB-3511.1 and the combined flaw-indication depths do not exceed the following limits.

(1) Two surface indications, one inside and one outside: The combined depths shall not exceed the average of the sum of the allowable surface indications of Table IWB-3511.1 for the corresponding flaw-aspect ratios.

(2) Two or more subsurface indications: The combined depths shall not exceed the sum of the allowable subsurface indications of Table IWB-3511.1 for the corresponding flaw-aspect ratios divided by the number of indications.

(3) Two or more surface and subsurface indications: The combined depths shall not exceed the average of the sum of the allowable combined depths of surface and subsurface indications, respectively, as permitted by IWB-3511.1(c)(1) and IWB-3511.1(c)(2).

(d) Surface indications within cladding shall be governed by the standards of IWB-3517.1. 576

(e)

IWB-3511.2 Allowable Laminar Indications. The areas of allowable laminar indications within the boundary of the examination zone delineated in the applicable figures specified in IWB-3511.1 shall not exceed the limits specified in Table IWB-3511.3. 576

IWB-3511.3 Conditionally Allowable Laminar Indications

(a) Laminar indications that exceed the standards specified in IWB-3511.~~3~~2 shall be considered as conditionally allowable laminar indications. In such cases, the area of the component containing the laminar indication shall be included as an additional area subject to examination under the applicable Examination Categories of Table IWB-2500. 575 Errata

(b) Indications that reveal a laminar indication joining a planar indication [Fig. IWB-3511.1(e)] shall be governed by the standards of IWB-3511.1(~~e~~f). 575 Errata

[1]Net section thickness is measured normal to the pressure-retaining surface of the component.

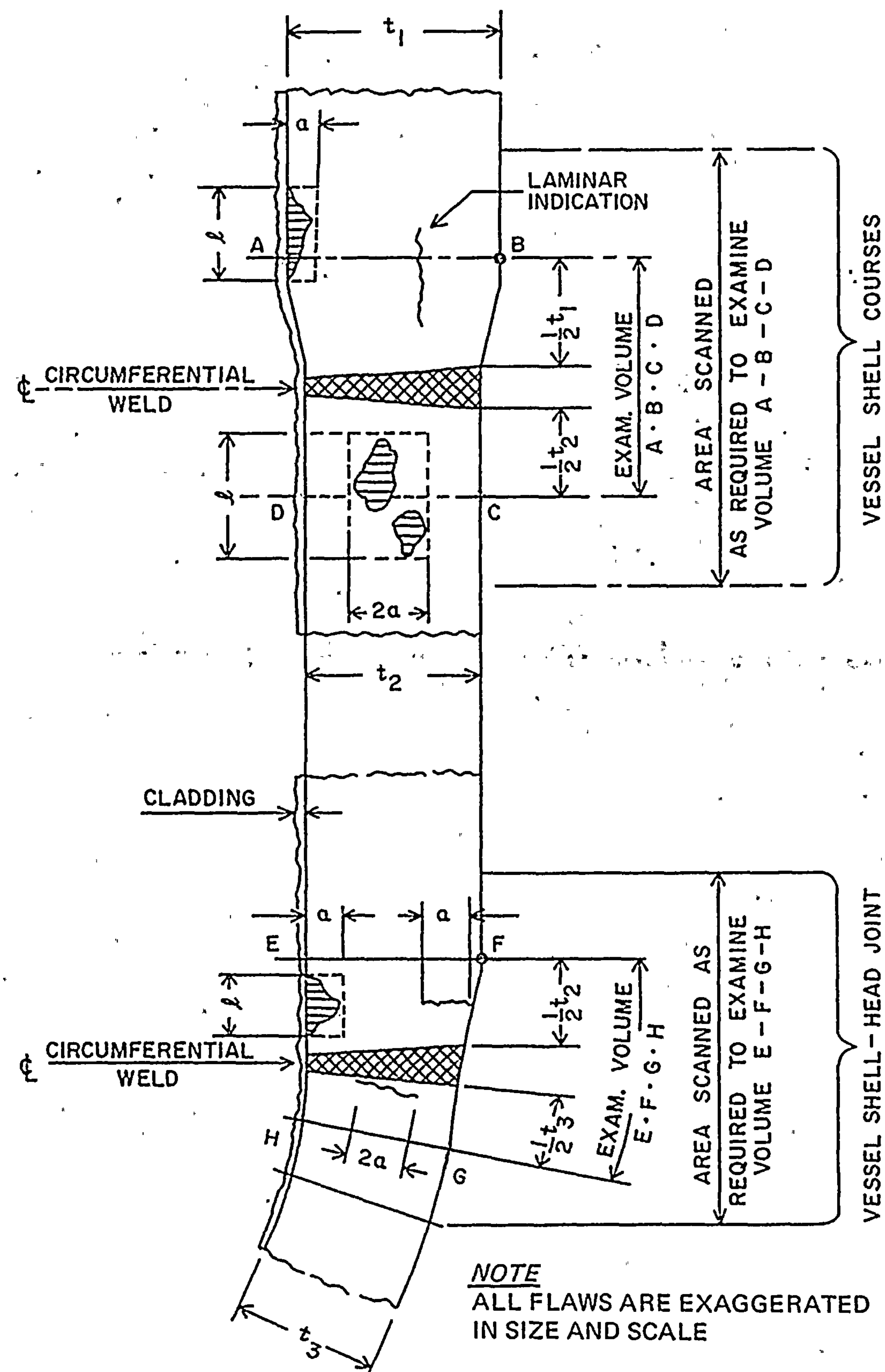


FIG. IWB-3511.1(a) VESSEL SHELL CIRCUMFERENTIAL WELD JOINTS

S75 [illegible]

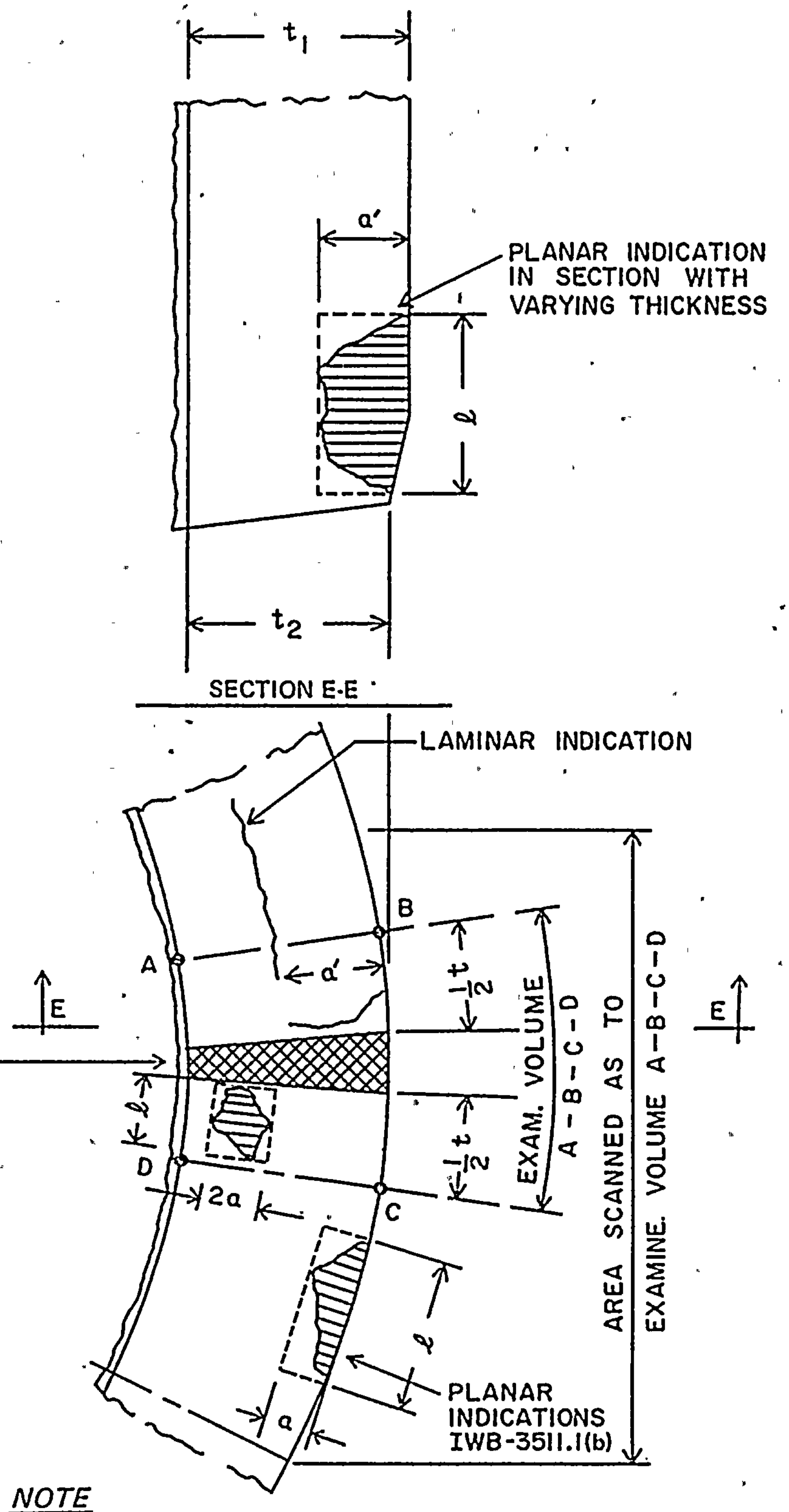
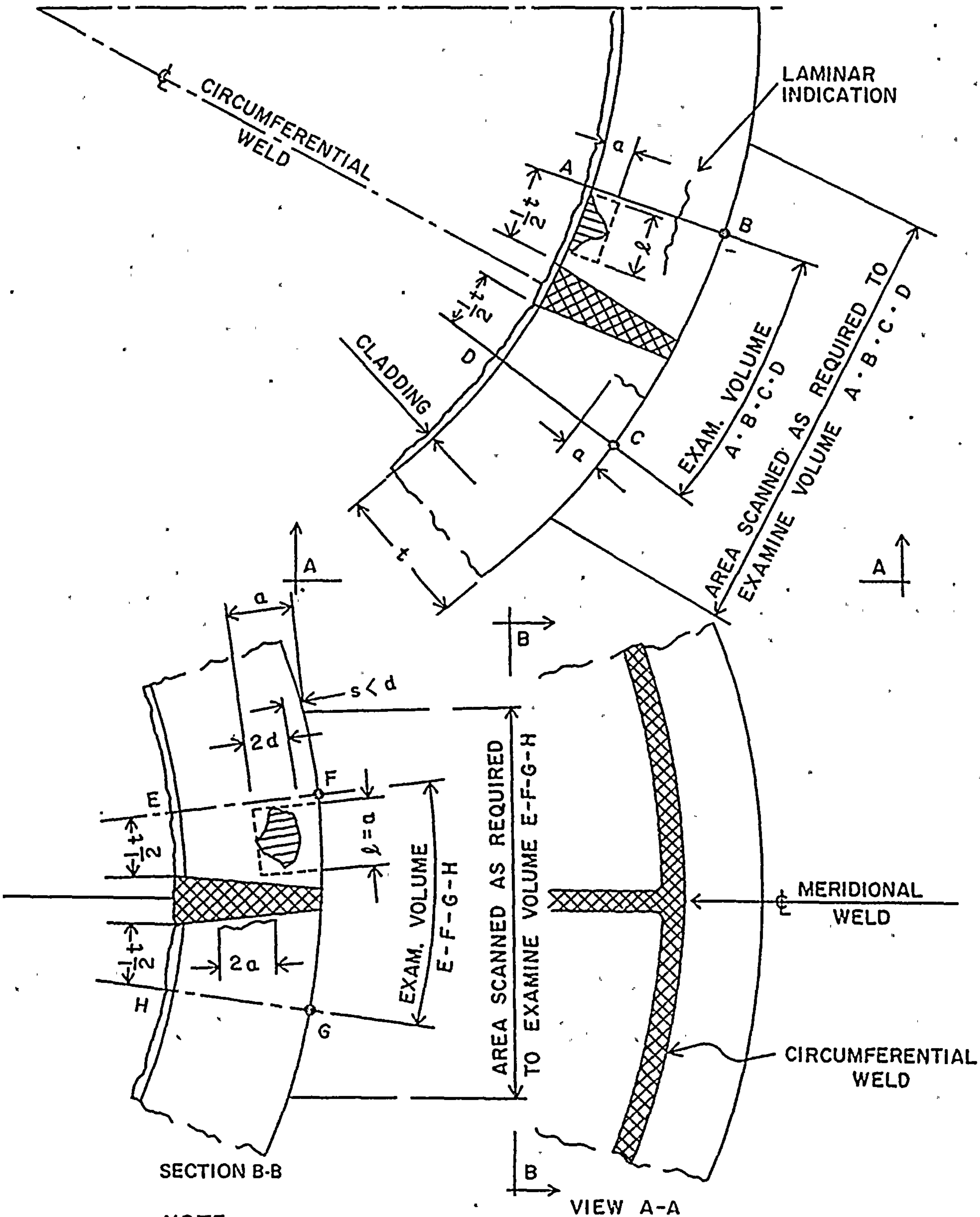


FIG. IWB-3511.1(b) VESSEL SHELL LONGITUDINAL WELD JOINTS

575

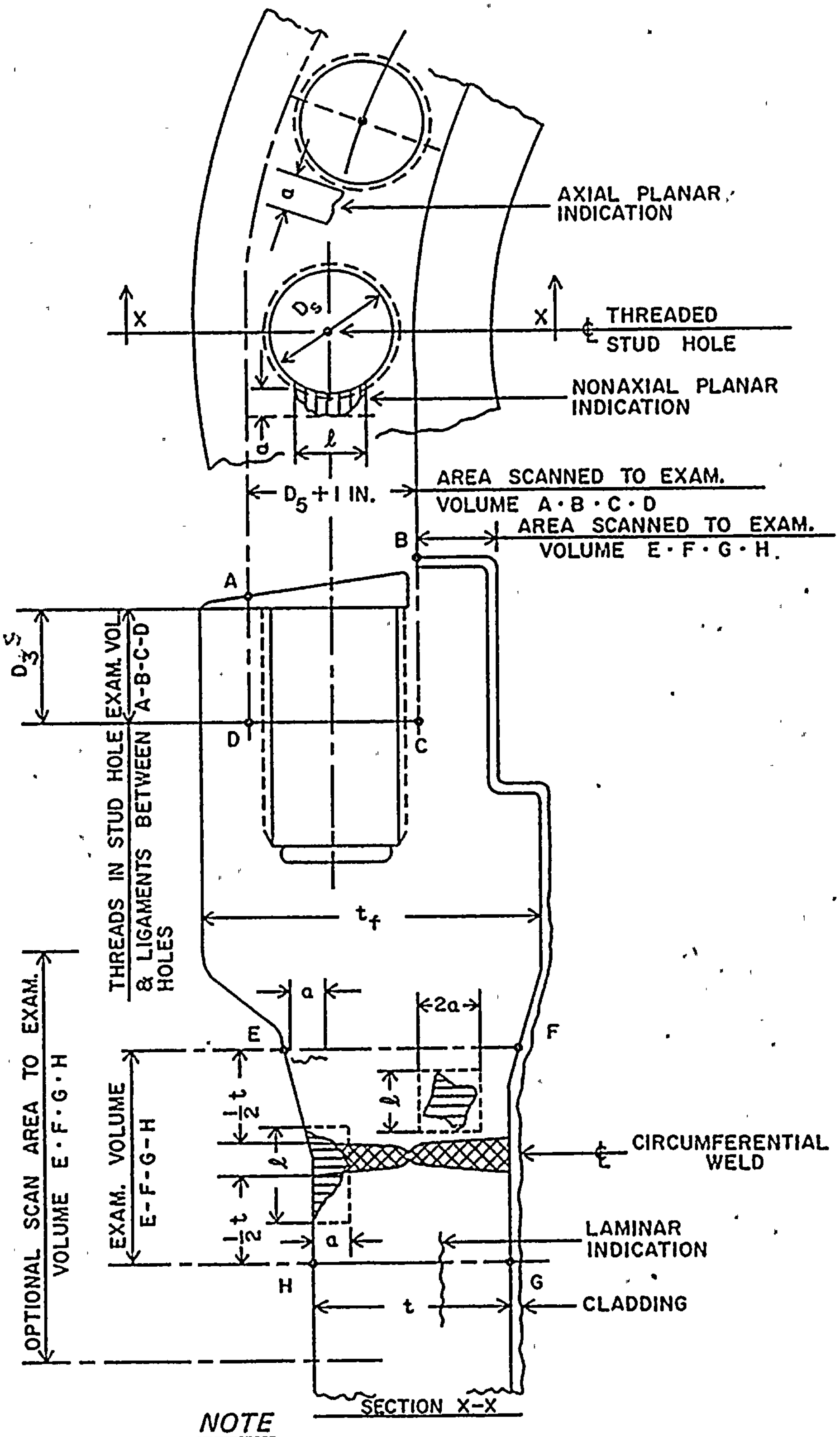
Errata p19



NOTE
ALL FLAWS ARE EXAGGERATED
IN SIZE AND SCALE

FIG. IWB-3511.1(c) SPHERICAL VESSEL HEAD — CIRCUMFERENTIAL AND MERIDIONAL WELD JOINTS

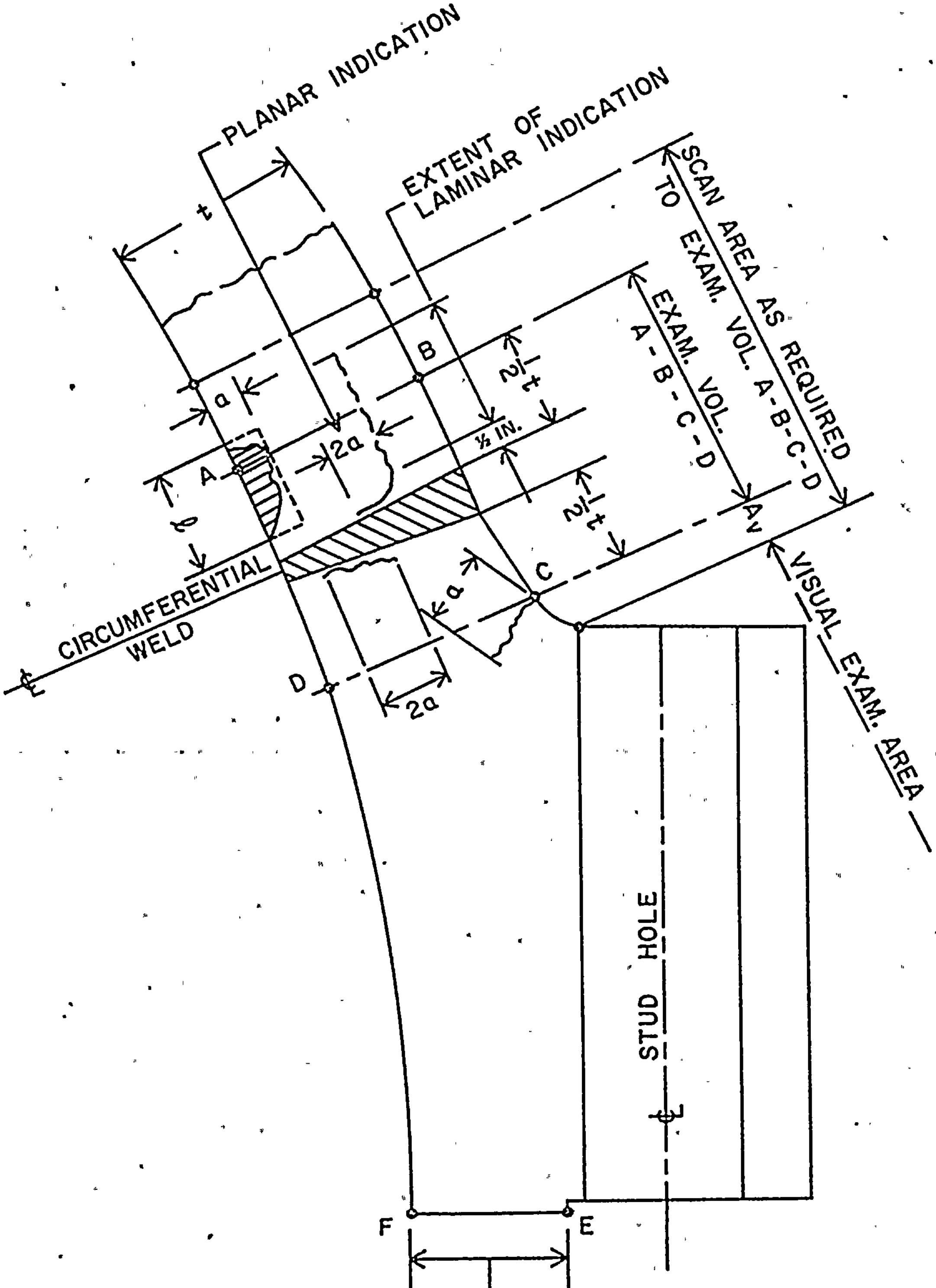
S75 Errata p20



NOTE
ALL FLAWS ARE EXAGGERATED
IN SIZE AND SCALE

FIG. IWB-3511.1(d) SHELL-TO-FLANGE WELD JOINT

S75 Errata p 21



NOTE
ALL FLAWS ARE EXAGGERATED
IN SIZE AND SCALE

FIG. IWB-3511.1(e) HEAD-TO-FLANGE WELD JOINT

S75 Errata
S76

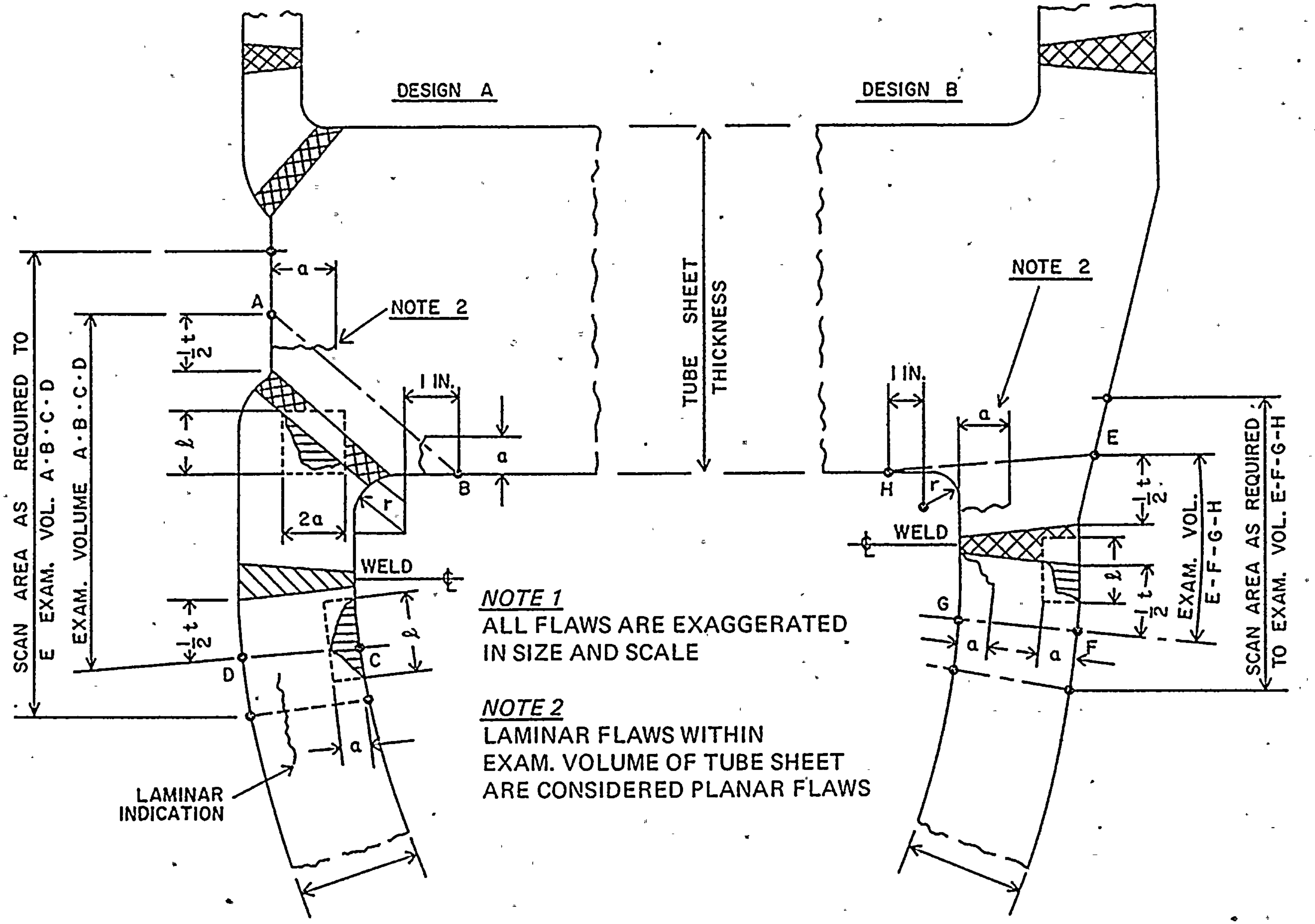


FIG. IWB-3511.1(f) TYPICAL TUBE SHEET-TO-HEAD WELD JOINTS

575 Errata

TABLE IWB-3511.1
ALLOWABLE PLANAR INDICATIONS

Material: Ferritic steels that meet the requirements of NB-2331 and have specified minimum yield strength of 50 ksi or less at room temperature
Thickness Range: 4 in. and greater

Aspect Ratio, a/ℓ [1]	Surface Indications, a/t,% [2]	Subsurface Indications, a/t,% [2,3]
0.	2.0	2.6
0.05	2.1	2.8
0.10	2.3	2.9
0.15	2.6	3.2
0.20	2.9	3.6
0.25	3.2	4.1
0.30	3.7	4.6
0.35	3.7	5.2
0.40	3.7	5.8
0.45	3.7	6.5
0.50	3.7	7.2

NOTES:
(1) Dimensions a and ℓ are defined in the figures referenced in IWB-3511.1. For intermediate flaw-aspect ratios, a/ℓ, linear interpolation is permissible.
(2) Component thickness t is measured normal to the pressure-retaining surface of the component. Where the section thickness varies, the average thickness over the length of the planar indication is the component thickness.
(3) The total depth of an allowable subsurface indication is twice the listed value.

TABLE IWB-3511.3
ALLOWABLE LAMINAR INDICATIONS

Component Thickness, t in. [1,2]	Laminar Area, [3] sq in.
4	12
6	18
8	24
10	30
12	36
14	42
16	48

NOTES:
(1) Component thickness t is measured normal to the pressure-retaining surface of the component. Where the section thickness varies, the average thickness over the area of the laminar indication is the component thickness.
(2) For intermediate thicknesses, linear interpolation of area is permissible.
(3) The area of a laminar flaw is defined in IWB-3360.

Full

IWB-3512 Standards for Examination Category B-D, Pressure-Retaining Nozzles in Vessels S75 Errata

IWB-3512.1 Allowable Planar Indications

(a) The size of allowable planar indications within the boundary of the examination volumes specified in Fig. IWB-3512.1(a) shall not exceed the limits specified in Table IWB-3512.1. S76

(b) The standards of IWB-3511.1 shall apply to flaw indications detected in the vessel shell or head material within the boundary of the examination volumes specified in Fig. IWB-3512.1(a).

(c) Any two or more flaw indications that fall within two parallel planes ½ in. apart and combine to reduce the net section thickness[1] are acceptable provided the depths of individual indications do not exceed the allowable limits of Table IWB-3511.1 and the combined flaw indication depths do not exceed the following limits

(1) Two surface indications, one inside and one outside: The combined depths shall not exceed the average of the sum of the allowable surface indications of Table IWB-3511.1 for the corresponding flaw-aspect ratios.

(2) Two or more subsurface indications: The combined depths shall not exceed the sum of the allowable subsurface indications of Table IWB-3511.1 for the corresponding flaw-aspect ratios divided by the number of indications.

(3) Two or more surface and subsurface indications: The combined depths shall not exceed the average of the sum of the allowable combined depths of surface and subsurface indications respectively as permitted by (1) and (2) above.

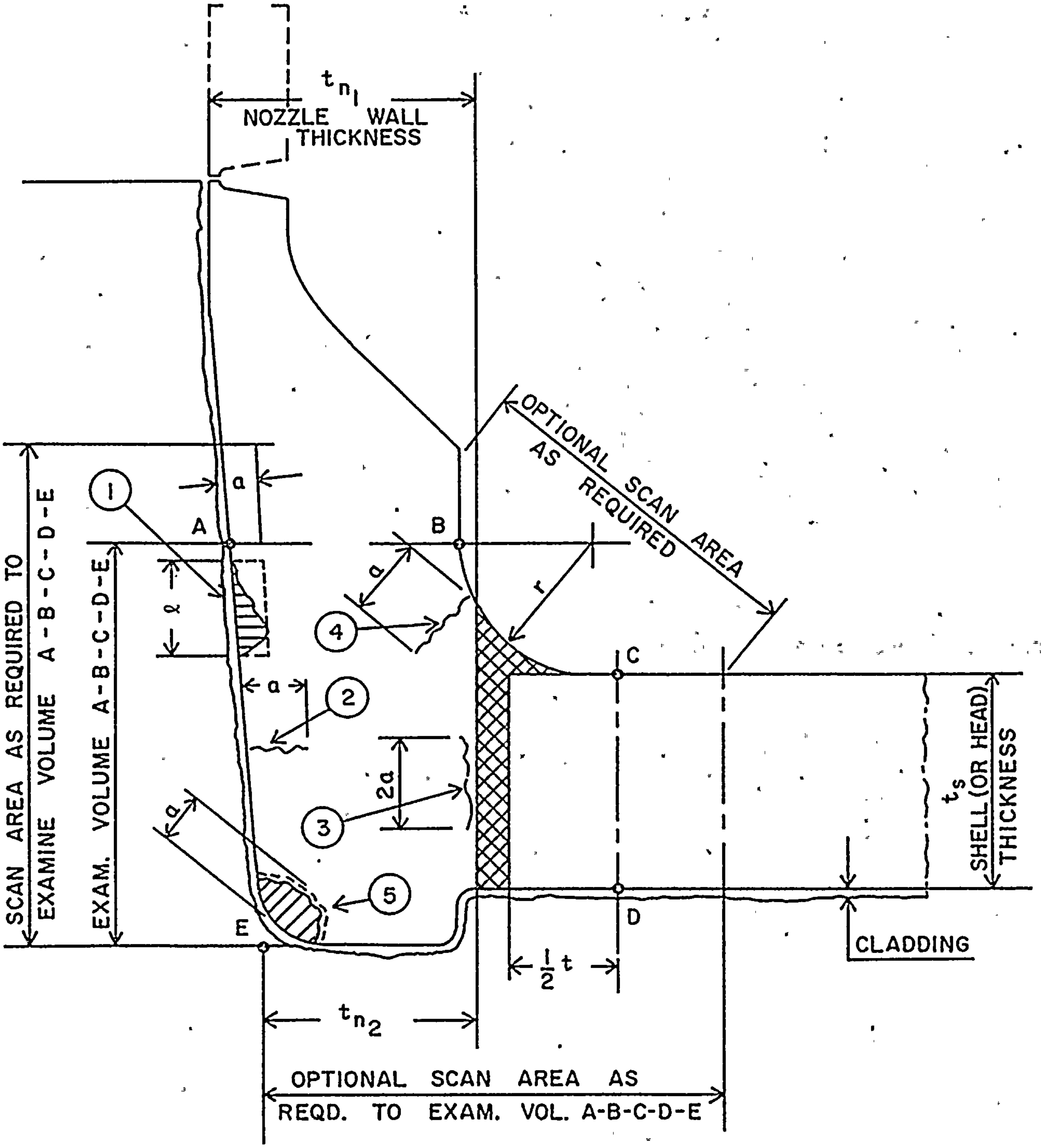
S76 (d) Surface indications within cladding shall be governed by the standards of IWB-3511.2. S75
(e) 7

IWB-3512.2 ~~Allowable~~ Laminar Indications S75 Errata

(a) Laminar indications in vessel shell or head material within the boundary of the examination volumes specified in Fig. IWB-3512(a) shall be governed by the standards of IWB-3511.2. S75

(b) Laminar flaws in the nozzle wall shall be considered as planar indications and the standards of IWB-3512.1 shall apply.

[1]Net section thickness is measured normal to the pressure-retaining surface of the component.



NOTE
ALL FLAWS ARE EXAGGERATED
IN SIZE AND SCALE

FIG. IWB-3512.1(a) NOZZLE-TO-SHELL OR HEAD WELD JOINTS
(Applies to Nozzles With or Without Internal Reinforcement)

1/75
Errata

TABLE IWB-3512.1
ALLOWABLE PLANAR INDICATIONS[1]

Material: SA-508 Class 2 and 3 Forgings that meet the requirements of NB-2331 and have specified minimum yield strengths of 50 ksi or less

Thickness Range, t: 3 in. and greater

Aspect Ratio, a/ℓ[3]	Surface Indications, a/t,%[2]	Subsurface Indications, a/t,%[2,3]
0.	1.9	2.3
0.05	2.0	2.4
0.10	2.2	2.6
0.15	2.4	2.9
0.20	2.7	3.3
0.25	3.1	3.7
0.30	3.5	4.1
0.35	3.5	4.6
0.40	3.5	5.2
0.45	3.5	5.9
0.50	3.5	6.5
Inside Corner Radius	2.5	NApplicable

S75 Errata

NOTES:

(1) Dimensions a and ℓ are defined in Fig. IWB-3512.1(a). For intermediate flaw-aspect ratios, a/ℓ, linear interpolation is permissible.

(2) The component thickness, t, is determined as follows for the applicable typical flaws shown in Fig. IWB-3512.1(a):

Flaw #1 and #2	$t = (t_{n_1} + t_{n_2})/2$
Flaw #3	$t = t_s$
Flaw #4	$t = t_{n_1}$
Flaw #5	t = lesser of t_{n_2} or t_s for any aspect ratios applicable to this flaw geometry

(3) The total depth of an allowable subsurface indication is twice the listed value.

IWB-3514 Standards for Examination Category B-F Pressure-Retaining Dissimilar Metal Welds

175

IWB-3514.1 Allowable Planar Indications

(a) The size of allowable planar indications within the boundary of the examination volumes shown in Fig. IWB-3514.1 shall not exceed the following limits:

(1) Ferritic-Steel Nozzle, and Ferritic-Steel Safe End and Weld. The allowable indication standards of IWB-3511.1 shall apply, and t shall be considered as t_1 shown in Fig. IWB-3514.1.

575 Errata

(2) Austenitic Steel Safe End and Weld. The size of an allowable indication for an individual surface or subsurface indication, or the combinations thereof, that fall within two parallel planes ½ in. apart shall not exceed 5% of thickness t_2 shown in Fig. IWB-3514.1.

(b) Where a flaw indication extends or lies beyond the examination volumes specified in Fig. IWB-3514.1, the overall flaw size shall be compared with the standards of IWB-3514.1(a). W75

(c) Surface indications within cladding shall be governed by the standards of IWB-3517.1.

IWB-3514.2 Allowable Laminar Indications. The area of allowable laminar indications within the boundary of the examination zones shown in Fig. IWB-3514.1 shall not exceed 8 sq in. for all thicknesses less than 3 in. For greater thicknesses, the standards of Table IWB-3511.3 shall apply.

1576

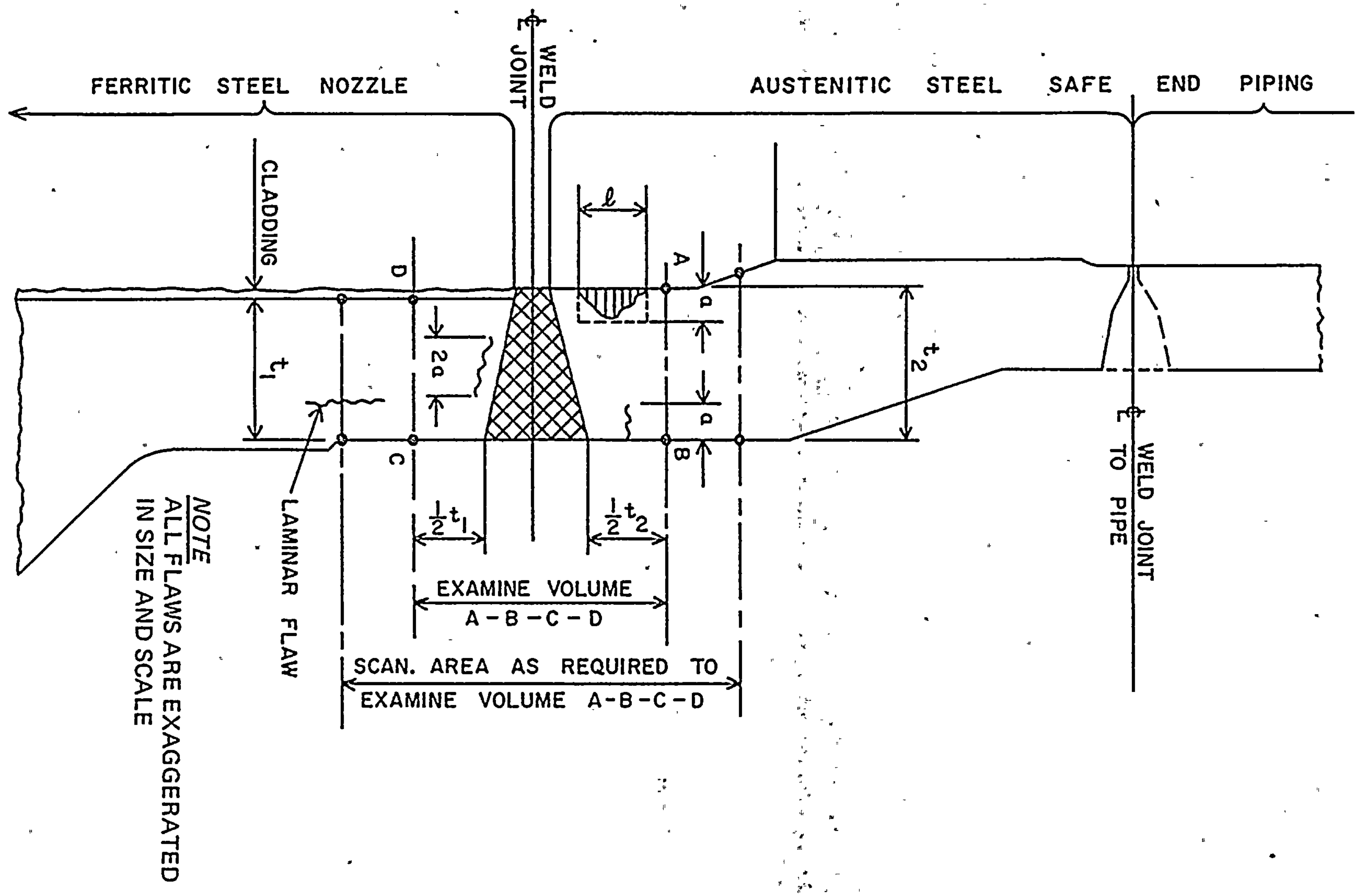


FIG. IWB-3514.1 SAFE END WELD JOINT

IWB-3515 Standards for Examination Category B-G-1, Pressure-Retaining Bolting 2 in. and Larger in Diameter

IWB-3515.1 Allowable Indications for Surface Examinations. Allowable surface indications in vessel-closure studs and pressure-retaining bolting shall not exceed the following limits:

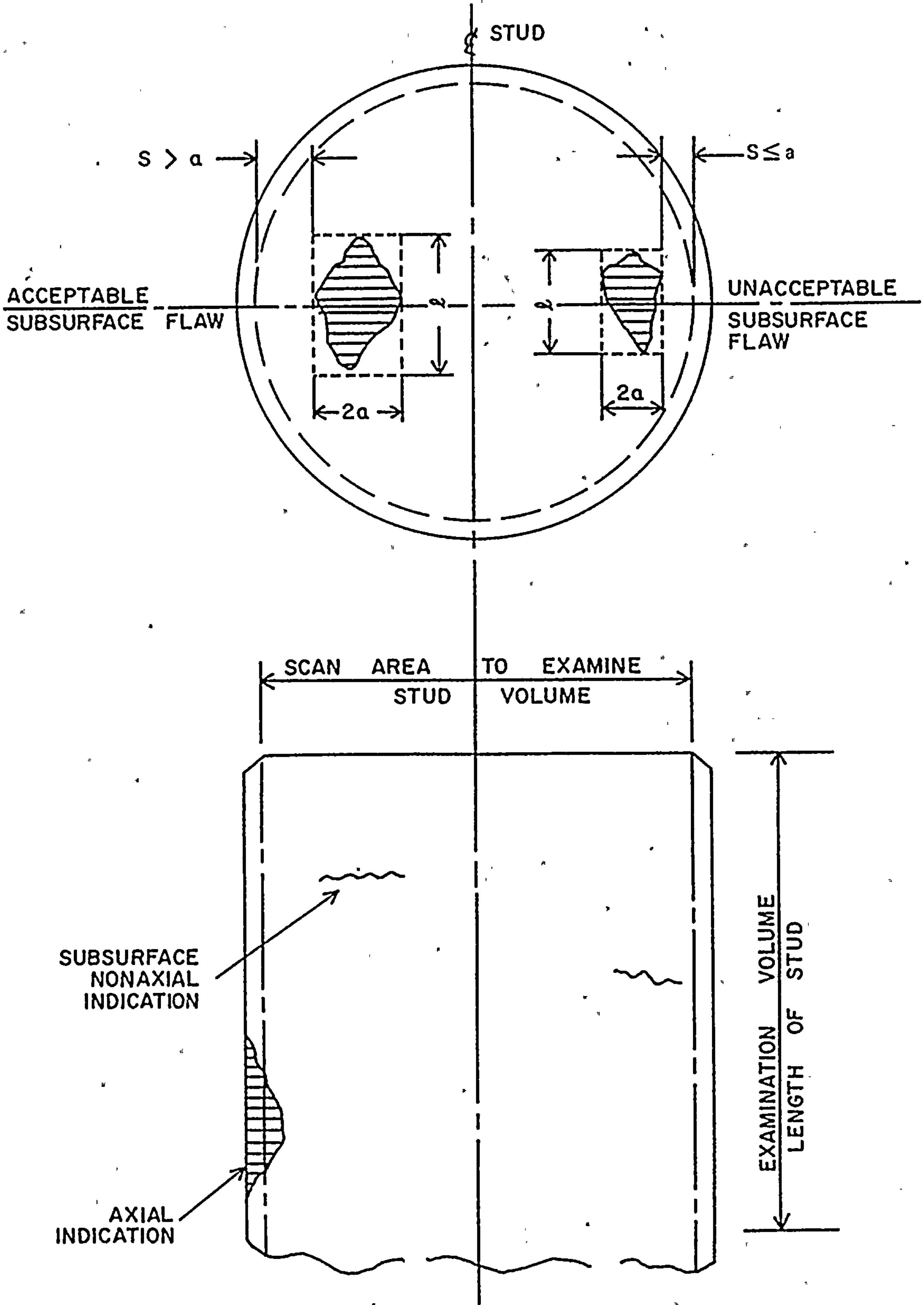
(a) nonaxial indications, ¼ in. in length
(b) axial indications, 1 in. in length 575

IWB-3515.2 Allowable Indications for Volumetric Examination

(a) The size of allowable nonaxial indications in vessel closure studs and pressure-retaining bolting as shown in Fig. IWB-3515.1 shall not exceed the limits specified in Table IWB-3515.1.

(b) Any two or more subsurface indications, at any diameter of the stud, which combine to reduce the net diameter are acceptable provided the combined flaw depths do not exceed the sum of the allowable limits specified in Table IWB-3515.1 for the corresponding flaw-aspect ratios, divided by the number of indications.

(c) Any axial indication detected by the volumetric examination shall be confirmed by a surface examination, and the standards of IWB-3515.1 shall apply.



NOTE
ALL FLAWS ARE EXAGGERATED
IN SIZE AND SCALE

S75 Errata

FIG. IWB-3515.1 INDICATIONS IN CLOSURE STUD

TABLE IWB-3515.1
ALLOWABLE PLANAR INDICATIONS

Materials: SA-193 Grade B7, SA-320 Grade L43, SA-540 Class 3 Grade B23, B24 that meet the requirements of NB-2333

Diameter Range: Nominal Sizes Greater than 4 in.

Aspect Ratio, a/ℓ[1]	Subsurface[2] Indications, a, in.
0.0	0.10
0.10	0.10
0.20	0.15
0.30	0.15
0.40	0.20
0.50	0.25

Diameter Range: Nominal Sizes 2 in. and Greater, But Not Over 4 in.

Aspect Ratio, a/ℓ[1]	Subsurface[2] Indications, a, in.
0.0	0.075
0.10	0.075
0.20	0.10
0.30	0.10
0.40	0.15
0.50	0.18

NOTES:

(1) Dimensions a and ℓ are defined in Fig. IWB-3515.1. For intermediate flaw aspect ratios, a/ℓ, linear interpolation is permissible.

(2) The total depth of an allowable subsurface indication is twice the listed value.

IWB-3517 Standards for Examination Categories B-I-1 & B-I-2, Interior Clad Surfaces of Vessels

IWB-3517.1 Allowable Indications for Surface Examination. Surface indications in the examination patches of clad surfaces shall be allowable provided the following limits on flaw depth[1] are not exceeded in more than two patches:

(a) preservice examination, 3/32 in.
(b) inservice examinations, 1/8 in.

IWB-3517.2 Conditional Indications

(a) Indications that exceed the allowable indications of IWB-3517.1 and extend into the base metal to a depth not in excess of the standards of IWB-3511.1 shall be considered as conditional indications, and the requirements of IWB-3123.2 shall apply.

(b) The conditions of the examination patches shall be considered as representative of the entire cladding of a component if conditional indications are detected in 50% of the number of examination patches in the component.

---

[1]Grinding or polishing of the cladding is an acceptable method for determining the depth of a surface indication.

RECORD OF REVISIONS (Cont. Next Page)

Rev. No.	Date	Description	Reason	Prepared by	Approved by
1	3-9-77	Appendix G, p1, QA Plan (NES 81A0402), page 2	To comply with new NES ISI Program QA Manual(NES 80A9021)	[illegible]	[illegible]
		Cal Block Drwgs. 80C0527, 80B0827, 80B0830, 80B0828	To reflect "as built" dimensions and conditions.		
		NIP-541 Fig. 5, 7, 8	To reflect as-built conditions		
2	10-5-77	Appendix C: Year 2, pages 1, 1A (add), 2, 7A (add), 8, 12	To reflect changes made during outage-year 2 and reflect actual conditions	AU	[illegible]
		Year 3, pages 1-3, 6 7A (add), 8-10, 12-14, 15A, B, C (add), 23A (add)			
		Year 4, pages 9, 11 16A (add)	to reflect actual conditions		
		Year 5, pages 10, 18A (add)			
		Year 6, pages 2, 7, 8			
		Year 7, pages 4, 10, 11			
		Year 8, pages 10, 11, 15, 5			
		Appendix E, para. (4) add "a Visual Examination... invalid."	to comply with actual conditions		
		Appendix H, procedure NIP 533	to reflect field changes and "as-built" conditions		
		procedure NIP 541	for clarification		
		procedure NIP 544	for clarification		
		procedure NIP 562	to reflect field changes		

RECORD OF REVISIONS (cont.)

Rev. No.	Date	Description	Reason	Prepared by	Approved by
2 (cont.)	10-5-77	Appendix D, Fig. 8-5 change location of 9" examination area for weld HX-38-11IN-w	To reflect changes made during outage-year 2	AU	PJB
		Appendix A, Table A-2, System No. 38, change "NU02" to "NG02"	Typographical error		
		Appendix I, Dwg. No. 80C0530	To reflect "as-built" conditions		

p. 8	Delete	P-32-71-w
	↓	RV-4-565A-w
		P-32-LUG/PS/A-s
P. 12	Delete	P-32-H3/A-s
	↓	P-32-LUG/PS/A-s
		P-32-SB1/PS/A-s
		V-NG08/A-b
		PM-32-H1/A-s
		PM-32-SS1/A-s
		PM-32-PSF/A-s
		PM-32-SS3/A-s

Add the attached Program Plan and Schedule sheets to the second outage-year ISI requirements.

Very truly yours,

NUCLEAR ENERGY SERVICES, INC.
NES Division

A. H. Yoli

Alfred H. Yoli
Engineering Vice President

AHY/jam

NUCLEAR ENERGY SERVICES, INC.
NES DIVISION
SHELTER ROCK ROAD
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(203) 748-3581

March 14, 1977
Reference No. 5530-22

Mr. Thomas Perkins
NIAGARA MOHAWK POWER CORPORATION
Nine Mile Point Nuclear Station Unit 1
P.O. Box 32
Lycoming, New York

Subject: Changes in ISI Requirements for Second Outage-Year

Dear Tom:

Following our conversation with Mike Jones on March 11, 1977 on the availability of Recirculation Loop B for this outage, we concur that examination requirements for Loop B scheduled for the third outage-year of Fall 1978 can be substituted for this outage, while postponing Loop A requirements originally scheduled for this outage to Fall 1978. These changes and all others that might be encountered during this outage will be consolidated into the Program Plan at the conclusion of the examinations as part of the second year ISI Report. Meanwhile, this letter is to serve as notification to F. Carr, NES Task Engineer, to modify the second-outage year Program Plan and Schedule in Appendix C as follows:

p. 1	Delete	P-32-71-w
	↓	RV-4-565A-w
		P-32-03-w
		P-32-03-wU1
		P-32-03-wU2
		P-32-01-w
		P-32-01-wU
p. 2	Delete	V-NG01A-b
	↓	V-NG02A-b
		P-NG03A-b

continued ...

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- 2.2 NRC Regulations 3
- 2.3 Definition of NMPC Intent 6
- 2.4 Methods of Examination 6
- 2.5 Overall Schedule 7

3. INSERVICE INSPECTION PROGRAM BOOK DESCRIPTION 10

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- 3.2 Zone Designations 10
- 3.3 Program Plan and Schedule 10
- 3.4 System Isometrics and Diagrams 11
- 3.5 Technical Specifications Deviations 11
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- 3.10 Records and Reports 12
- 3.11 Evaluation Criteria 12
- 3.12 Personnel Qualification Requirements 13
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- 3.14 NRC Regulatory Guide 1.26 13

4. APPENDICES ....

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- Appendix B Zone Designations ....
- Appendix C Program Plan and Schedule ....
- Appendix D System Isometrics and Diagrams ....
- Appendix E Technical Specifications Deviations ....

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1. INTRODUCTION

Ten-Year Inservice Inspection Program

This Program Book has been prepared to fulfill the Inservice Inspection requirements for the first ten-year inspection interval for Niagara Mohawk Power Corporations Nine Mile Point Nuclear Station Unit 1.

The scope of inspection for each component complies with the Nine Mile Point Unit 1 Technical Specifications, and the procedures and acceptance criteria meet the requirements outlined in Section XI of the ASME Boiler and Pressure Vessel Code, 1974 Edition (including the Summer 1974 Addenda): Rules for Inservice Inspection of Nuclear Power Plant Components, depending on the quality group classification of the component to be inspected. The classification is provided by Section 50.55a of 10 CFR 50 for Quality Group A and by NRC Regulatory Guide 1.26 (Revision 2, June 1975) for Group B, C and D. The Inservice Inspection requirements for each Quality Group Classification are evoked by 10 CFR 50 and NRC Regulatory Guide 1.51 "Inservice Inspection of ASME Code Class 2 and 3 Nuclear Power Plant Components". Section 50.55a of 10 CFR 50 requires that Quality Group A Components be inspected in accordance with the requirements specified in the ASME Code, Section XI "Rules for Inservice Inspection of Nuclear Reactor Systems for Class 1 Components". NRC Regulatory Guide 1.51 requires that Quality Group B and C Components be inspected in accordance with the requirements specified in the ASME Code, Section XI.

It should be noted that Nine Mile Point Unit 1 was designed and constructed prior to the adoption of the ASME Code. As a result, certain examinations stipulated by the Code can not be performed completely since the plant design does not permit direct access to portions of some examination areas.

In addition, components which are in high radiation areas or which are covered by non-replaceable insulation or coatings have been considered inaccessible, as indicated in the Nine Mile Point Unit 1 Technical Specifications, Article 4.2.6. All items of non-compliance established by the Technical Specifications have been summarized in the Technical Specifications Deviations section of the Program Book.

In developing the ten-year interval inspection program sufficient flexibility has been incorporated into the plan so that effective utilization of unscheduled plant outages can be made.

This Program Book is self-contained. Included are inservice examination schedules for eight outages during the interval between 1975 and 1986, isometric drawings which show weld locations in the various piping systems, and nozzle and weld locations in the principal components (i.e. reactor vessel, closure head, heat exchangers). Appropriate examination procedures (ultrasonic, liquid penetrant, and visual) and associated data sheets are provided for use by qualified examiners. Also included in the program book are plant zones which have been established to define examination boundaries, system classification information, Technical Specifications Deviations, pre-examination requirements, calibration block details, evaluation criteria, quality control/quality assurance documents, examination procedure philosophy, copies of Section XI of the ASME Boiler and Pressure Code including the Summer 1974 Addenda and NRC Regulatory Guide 1.26, record retention and report submittal, and personnel qualification requirements.

2. BASES FOR INSERVICE INSPECTION PROGRAM

2.1 Objective

The program contained herein provides the details necessary for performing the first ten-year interval inservice inspection of the welds and other examination areas within Niagara Mohawk Power Corporations Nine Mile Point Nuclear Station Unit 1 water and steam containing systems that are classified Group A, B or C. This program conforms to the requirements and exclusions of Nine Mile Point 1 Technical Specification, Section 4.2.6, which deals with inservice inspection. The examination procedures, calibration blocks and acceptance criteria are in accordance with the ASME Code, Section XI: Rules for Inservice Inspection of Nuclear Power Plant components, 1974 Edition (including the Summer 1974 Addenda) to the extent practicable.

The scope of the inservice inspection program includes the full range of activities which fulfill the inservice inspection requirements of Nine Mile Point Unit 1 for the first inspection interval between the years 1975 and 1986. The examination requirements defined for the Fall 1975 outage were initially reported in NES Document 81A0403 (dated September 15, 1975) and are incorporated as an integral part into this ten-year program plan, with only minor changes to reflect actual plant conditions encountered during the implementation of the 1975 outage inspection plan.

2.2 NRC Regulations

The Quality Group Classification System for radioactive water and steam containing components important to the safety of water-cooled nuclear power plants is established by NRC Regulatory Guide 1.26 in conjunction with Section 50.55a of 10 CFR 50.

Regulatory Guide 1.26, "Quality Group Classification and Standards," establishes the Quality Group Classification System consisting of four Quality Groups, A through D. The definition of Quality Group A is provided by Section 50.55a, 10 CFR 50. The definition of Groups B, C, and D is provided by Regulatory Guide 1.26.

The quality standards for each Group are evoked by 10 CFR 50 for Group A and Regulatory Guide 1.26 for Groups B, C and D. The quality standards which apply are ASME Code Section III Class 1, 2 and 3 for Quality Groups A, B and C, respectively, and ASME Section VIII, Division 1 and ANSI B31.1.0 for Group D.

The Inservice Inspection requirements for each Quality Group Classification are evoked by 10 CFR 50 and NRC Regulatory Guide 1.51, "Inservice Inspection of ASME Code Class 2 and 3 Nuclear Power Plant Components." Section 50.55a of 10 CFR 50 mandates that Quality Group A components must be inspected in accordance with the requirements specified in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Reactor Systems for Class 1 Components." NRC Regulatory Guide 1.51 mandates that Quality Group B and C components be inspected in accordance with the requirements specified in the ASME Code, Section XI.

The relationship of these governing documents is summarized in Table 2.1.

TABLE 2.1

NRC REGULATIONS/GUIDES - INSPECTION CODE INTER-RELATIONSHIP

Quality Group Regulatory Guide 1.26	Definition of Quality Group	Quality Standards Applicable to Quality Group (reference standard)	Inspection Requirements (reference standard)
A	Section 50.55a of 10 CFR 50	ASME Sect. III Class 1 (Section 50.55a)	ASME Sect. XI, Class 1 (Section 50.55a)
B	Regulatory Guide 1.26	ASME Sect. III, Class 2 (Regulatory Guide 1.26)	ASME Sect. XI, Class 2 (Regulatory Guide 1.51)
C	Regulatory Guide 1.26	ASME Sect. III, Class 3 (Regulatory Guide 1.26)	ASME Sect. XI, Class 3 (Regulatory Guide 1.51)
D	Regulatory Guide 1.26	ASME Sect. VIII, Div. 1 (Regulatory Guide 1.26)	Not covered

2.3 Definition of NMPC Intent

The Nine Mile Point Unit 1 has been designed and fabricated to ensure freedom from gross defects throughout the plant's lifetime. Furthermore, a five year surveillance program was developed to determine the status of the reactor pressure boundary systems and to monitor high stress concentration areas as well as randomly selected portions of the system components in order to assess their overall condition.

The proposed ten-year inservice inspection program has been developed in response to a NRC letter (September 28, 1973) from D.L. Ziemann to P.D. Raymond and reflects this concern to ensure component integrity and leak tightness of systems important to safety. This program is intended to be implemented over the lifetime of the facility and will be applied to those areas of Quality Group A, B or C systems whose physical location and low radiation levels allow access. The inspection examination requirements are based on Nine Mile Point Unit 1 Technical Specifications, Section 4.2.6.

2.4 Methods of Examination

Methods, techniques and procedures for the inservice inspections are titled visual, surface, and volumetric. Each term describes a general method permitting a selection of different techniques and procedures restricted to that method to accommodate varying degrees of accessibility and radiation levels, and the automation of equipment to perform the examinations.

A visual examination is employed to provide a report of the general condition of the part, component, or surface to be examined, including such conditions as scratches, wear, cracks, corrosion or erosion on the surfaces; misalignment or movement of the part or component; or evidence of leaking. Visual examinations are applicable to welds, support members, valves, pumps, fasteners, cladding, etc. NES's visual examination procedure is based on the recommendations in Article 9 of Section V (ASME Code).

A liquid penetrant examination is specified as the surface examination method to delineate or verify the presence of cracks or discontinuities open to the examination surface. NES's liquid penetrant examination procedure is based on the recommendations of Article 6 of Section V (ASME Code).

The ultrasonic pulse echo examination is selected as the volumetric examination method to indicate the presence of subsurface discontinuities by examining the entire volume of metal contained beneath the surface to be examined. NES's ultrasonic examination is based on the recommendations of Appendix I of Section XI (ASME Code). Where Appendix I is not applicable, the provisions of Article 5 of Section V have been used.

2.5 Overall Schedule

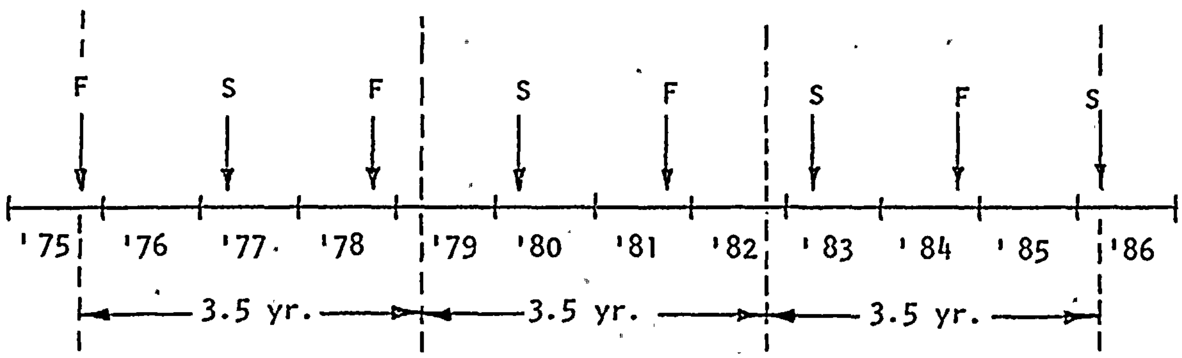
As allowed by Subarticle IWA-2400 of Section XI, the examinations and pressure tests required by Subsections IWA, IWB and IWC have been scheduled to be completed during a ten and one half calender-year interval to be concurrent with plant outages. The inspection interval commences with the Fall 1975 outage and is terminated by the Spring 1986 outage.

Based on an anticipated interval of eighteen months between two successive scheduled refueling shutdowns, the ten and one half calender-year inspection interval encompasses eight refueling outages. Table 2.2 defines the inspection schedule in terms of the "Outage-year" as related to calender-years.

The inservice examinations shall be performed in accordance with the option specified in Paragraph IWB-2411 of Section XI. The eight outage-years have been grouped into thirds of the interval as shown in Table 2.2. Outage-years 1 through 3 form the first third of the ten and one half year interval, 4 and 5 the second third, and 6 through 8 the final third.

TABLE 2.2 - INSPECTION SCHEDULE

Outage-Year	Calender-Year
1	Fall 1975
2	Spring 1977
3	Fall 1978
4	Spring 1980
5	Fall 1981
6	Spring 1983
7	Fall 1984
8	Spring 1986



3. INSERVICE INSPECTION PROGRAM BOOK DESCRIPTION

This Program Book is completely self-contained. The following sections constitute the Nine Mile Point Ten-Year Inservice Inspection Program Book and are discussed in detail in their corresponding Appendix.

3.1 System Classification

The Nine Mile Point Piping and Instrumentation Drawings have been reviewed, and Quality Group A, B and C boundaries established in accordance with NRC Regulatory Guide 1.26 (Revision 2, June 1975) in conjunction with Section 50.55a of 10 CFR 50 as stipulated by Subarticle IWA-1400(a) of Section XI. Appendix A identifies appropriate code classes for each plant system, supplies detailed boundary diagrams where practicable, and lists systems that are exempted from the examination requirements per the provisions of Subarticles IWB-1220 and IWC-1220.

3.2 Zone Designations

The plant has been subdivided into smaller areas of interest called zones, usually delineated by floors. Appendix B includes the zone designations and plan view diagrams with major components shown and identified.

3.3 Program Plan and Schedule

The examination requirements for the eight scheduled outages, including the 1975 Fall shutdown, are defined in the Program Plan and Schedule shown in Appendix C. Each weld or other examination area is designated by a unique identification number. A table in Appendix C describes the letter and number identification code.

3.4 System Isometrics and Diagrams

The piping isometric drawings show the piping for plant systems, delineating the identification of components subject to examination. These drawings constitute Appendix D along with the diagrams that define various other plant areas (i.e. closure head and vessel welds, penetration identifications, etc.).

3.5 Technical Specifications Deviations

Appendix E discusses in detail those areas that can not be examined either in part or fully because of insufficient access due to plant design, high radiation levels, and/or non-replaceable insulation as established by Nine Mile Point Unit 1 Technical Specifications.

3.6 Pre-Examination Requirements

In addition to the requirements for clearance and access specified by Subarticle IWA-1500 of Section XI, Appendix F also lists those other tasks which must be accomplished prior to conducting the examinations.

3.7 Quality Assurance

The NES Quality Assurance Plan, which governs the design review and implementation of the inservice inspection program plan, is in accordance with the requirements of the NES Quality Assurance Manual which is in compliance with Appendix B of 10 CFR 50. The plan includes the detailed quality assurance requirements that are common to all activities of the program including organization, management, liaison, examination implementations, control of inspection records,

qualifications of personnel, materials and procedures, etc. Appendix G presents the Quality Assurance Plan, the work plan and the five task plans that are applicable to the ten-year interval.

3.8 Examination Procedures

The examination procedures (visual, surface and ultrasonic) that are used in the implementation of the inservice inspection program plan are contained in Appendix H. Appendix H also contains a discussion of the philosophy used in preparing the examination procedures.

3.9 UT Calibration Blocks

Appendix I includes a list of all the UT Calibration blocks and the accompanying drawings. A discussion of the design philosophy behind the calibration blocks that were designed and fabricated for the Nine Mile Point Unit 1 inservice inspection is also presented.

3.10 Records and Reports

General guidelines for the retention of calibrations and qualification information, recording of data, evaluation and final report requirements are presented in Appendix J.

3.11 Evaluation Criteria

The evaluation criteria contained and described in Appendix K will be used to evaluate all relevant indications found during the inservice inspection examinations in accordance with the recommendations of Article IWB-3000 of Section XI.

3.12 Personnel Qualification Requirements

Personnel performing nondestructive examination operations during the Nine Mile Point Unit 1 inservice inspection program implementation shall have been qualified with procedure(s) prepared in accordance with SNT-TC-1A as recommended in Subarticle IWA-2300 of Section XI. CONAM procedures for certifying inspection personnel are discussed and presented in Appendix L.

3.13 ASME Code, Section XI (1974)

Appendix M contains a copy of Section XI (1974 Edition) of the ASME Boiler and Pressure Vessel Code with the applicable Addenda (Summer 1974), Rules for Inservice Inspection of Nuclear Power Plant Components.

3.14 NRC Regulatory Guide 1.26

Appendix N contains a copy of NRC Regulatory Guide 1.26, Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-waste-Containing Components of Nuclear Power Plants, Revision 2, June 1975.

APPENDIX A

SYSTEM CLASSIFICATION

APPENDIX A

System Classification

NES has reviewed the basic system Piping and Instrumentation Diagrams (P & ID) and established Quality Group A, B and C boundaries in accordance with the requirements of Section 50.55a of 10 CFR 50 and NRC Regulatory Guide 1.26, Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants, Revision 2, June 1975.

Quality Group A components within the Reactor Coolant Pressure Boundary as defined by Section 50.55a of 10 CFR 50 are shown in Figure A-1. Portions of the systems shown in Figure A-1 are exempted from volumetric and surface examinations per Subarticle IWB-1220 of Section XI. Details of Group A piping system boundaries, the reference Niagara Mohawk P & ID number and portions of the piping systems that are exempted,if any, are listed in Table A-1 of this Appendix.

The Reactor Coolant Pressure Boundary incorporates components that are part of the reactor coolant system inside the drywell up to and including the outermost containment isolation valves, and the reactor coolant system safety and relief valves. The applicable isolation valves have been tabulated in Section 3.2.7 of the Nine Mile Point Unit 1 Technical Specifications.

Quality Group B components that are subject to the examination requirements of the Nine Mile Point Technical Specifications and Subsection IWC of Section XI are shown in Figures A-2 through A-7 (with the exception of the extensive Feedwater System).

Table A-2 of this Appendix lists all the Group B Systems (exempt and non-exempt), reference P & ID numbers and the Section XI paragraphs that allow the exemptions.

Group B classifications have been determined in accordance with the requirements of NRC Regulatory Guide 1.26 (Revision 2, June 1975). Nine Mile Point Systems that are plant safety-oriented (emergency core cooling, post-accident containment heat removal, reactor shutdown, residual heat removal, etc.) and portions of the main steam lines to the turbine stop and by-pass valves have been categorized as Group B.

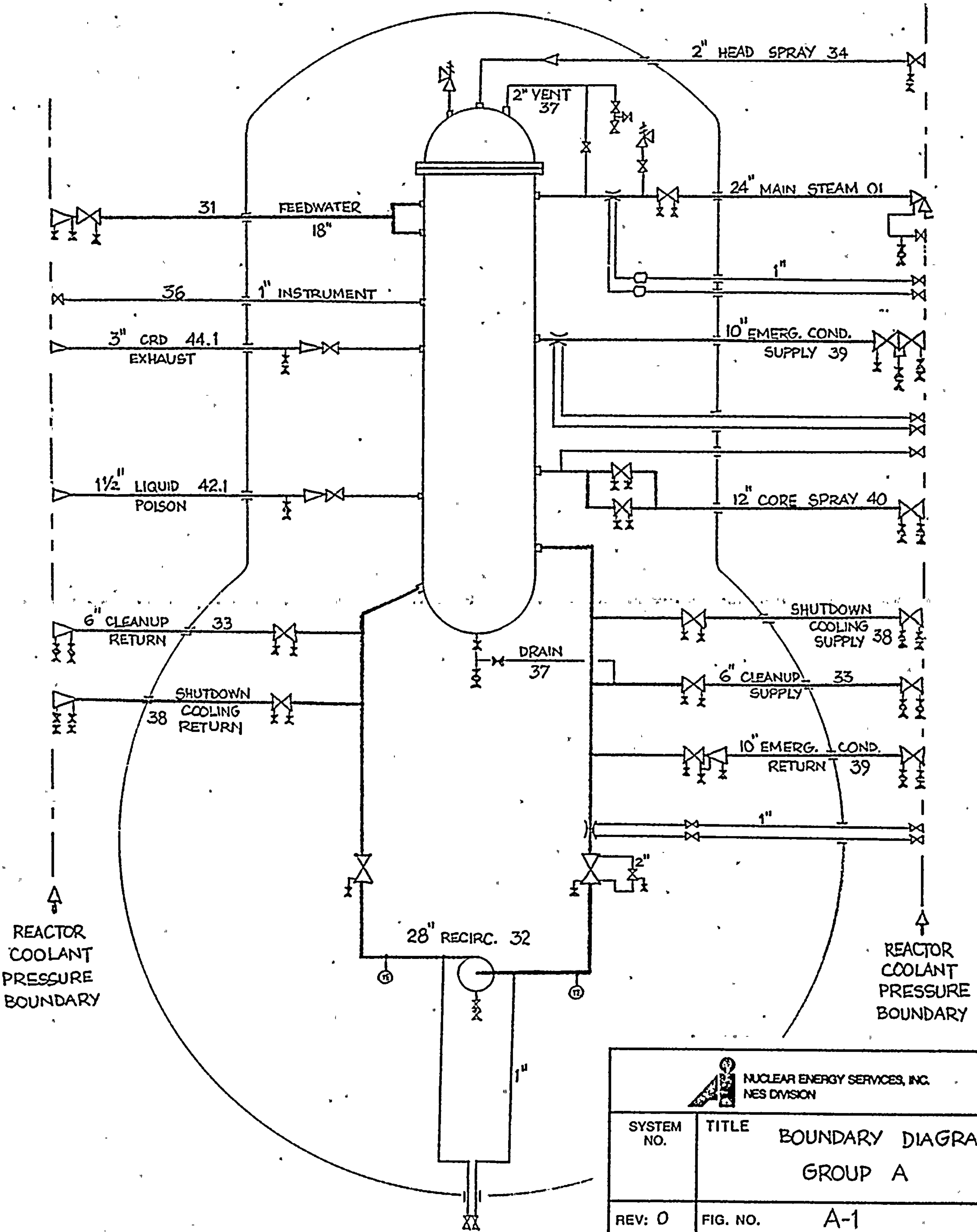
Group C components that are to be examined according to the requirements of the Technical Specifications and Subsection IWD of Section XI have been listed in Table A-3 of this Appendix, along with their reference P & ID numbers. These systems include cooling water and auxiliary feedwater systems for plant safety-oriented Group B components (including reactor coolant pumps, emergency diesels and control room cooling), spent fuel pool cooling and the reactor cleanup system in conformance with the guidelines of NRC Regulatory Guide 1.26.

The radioactive waste treatment and the off-gas systems have been classified as Group D as Niagara Mohawk calculations have shown that potential offsite doses meet the limits stipulated by NRC Regulatory Guide 1.26.

Systems not covered by NRC Regulatory Guide 1.26, such as instrument air service air, diesel engine and its generators and auxiliary support systems, diesel fuel, emergency and normal ventilation, and all other non-water, non-steam, and non-radioactive material containing systems have not been assigned

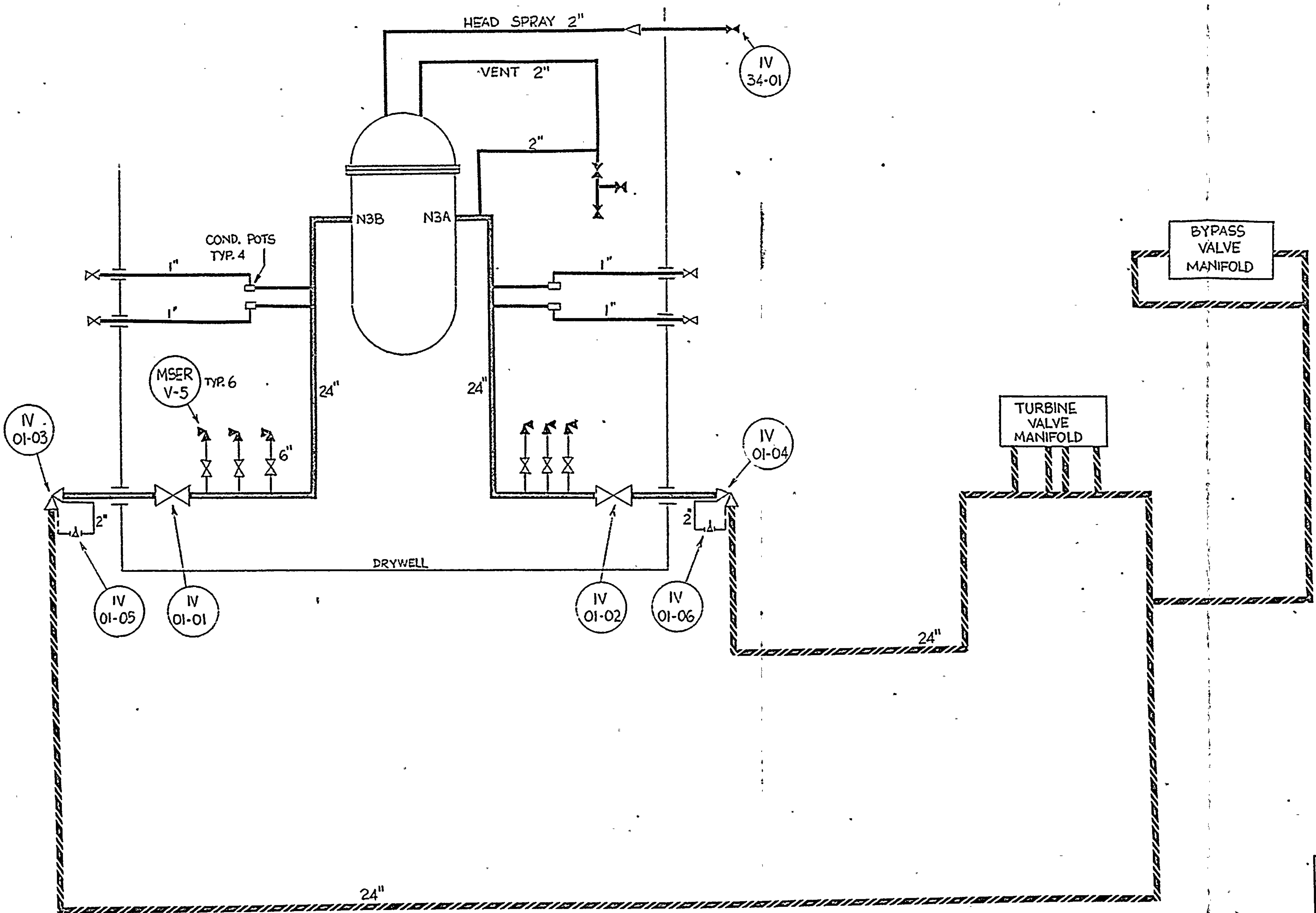
quality group classifications within the scope of the ten-year inservice inspection program.

All Group A and B exempted components will be examined according to the requirements of Articles IWB-5000 and IWC-5000 of Section XI, respectively, in addition to the general requirements of IWA-5000.



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

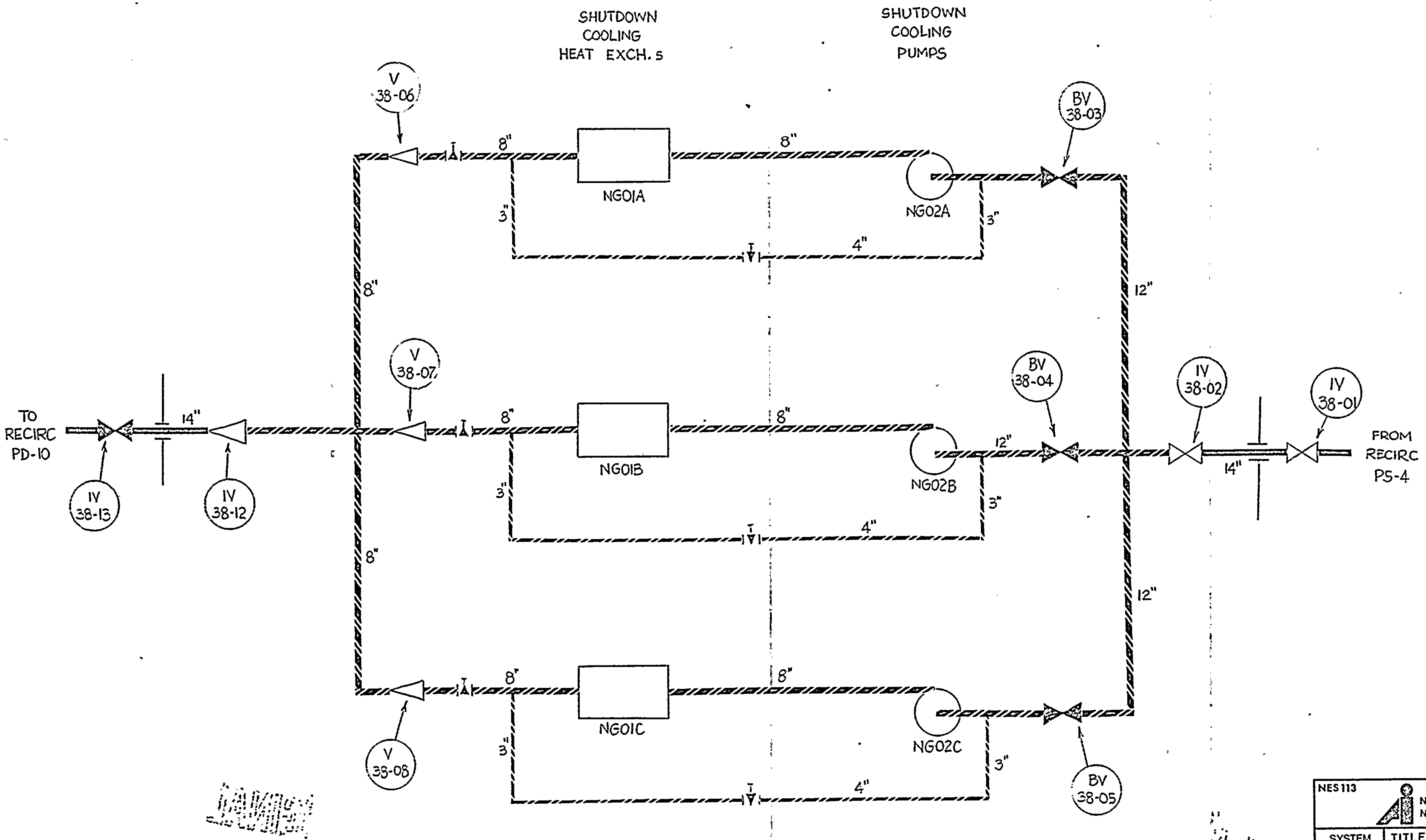
SYSTEM NO.	TITLE	BOUNDARY DIAGRAM GROUP A	
REV: 0	FIG. NO.	A-1	
BY: A.U.	DATE: 10-8-75		
APP: [signature]	DATE: 11-11-75		
PROJECT:	5530 - 9MP		
NES 112	NOT TO SCALE		



POOR ORIGINAL

POOR ORIGINAL

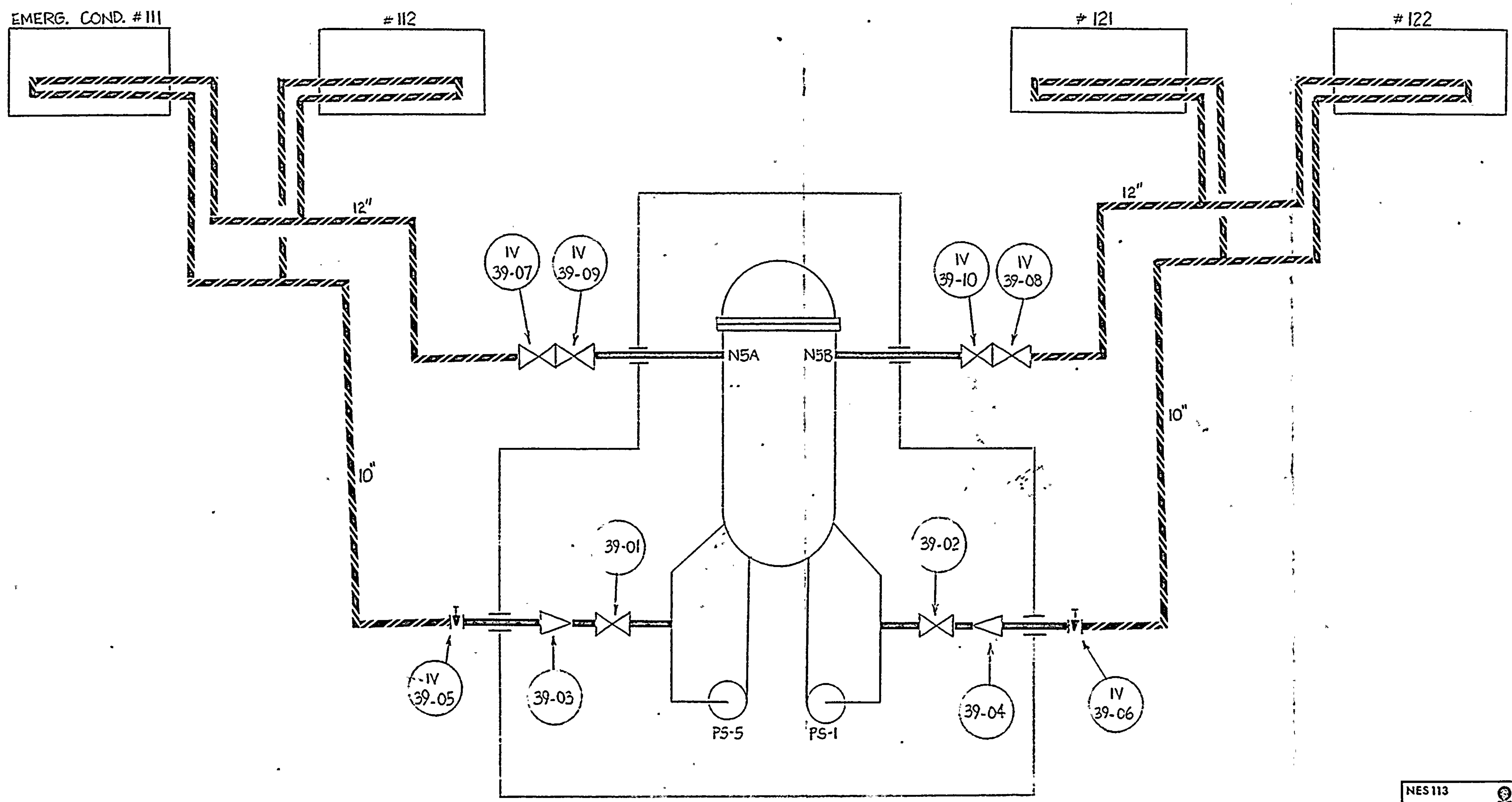
NES 113	NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO. 01,02,03 34.37	TITLE BOUNDARY DIAGRAM MAIN STEAM HEAD SPRAY AND VENT	
REV: 0	FIG. NO. A-2	
BY: AU	DATE: 10-9-75	GROUP A
APP: 99	DATE: 10-27-75	GROUP B
REF. P&I NO:	C-18002-C	
PROJECT:	5530-9MP	



NES 113

NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

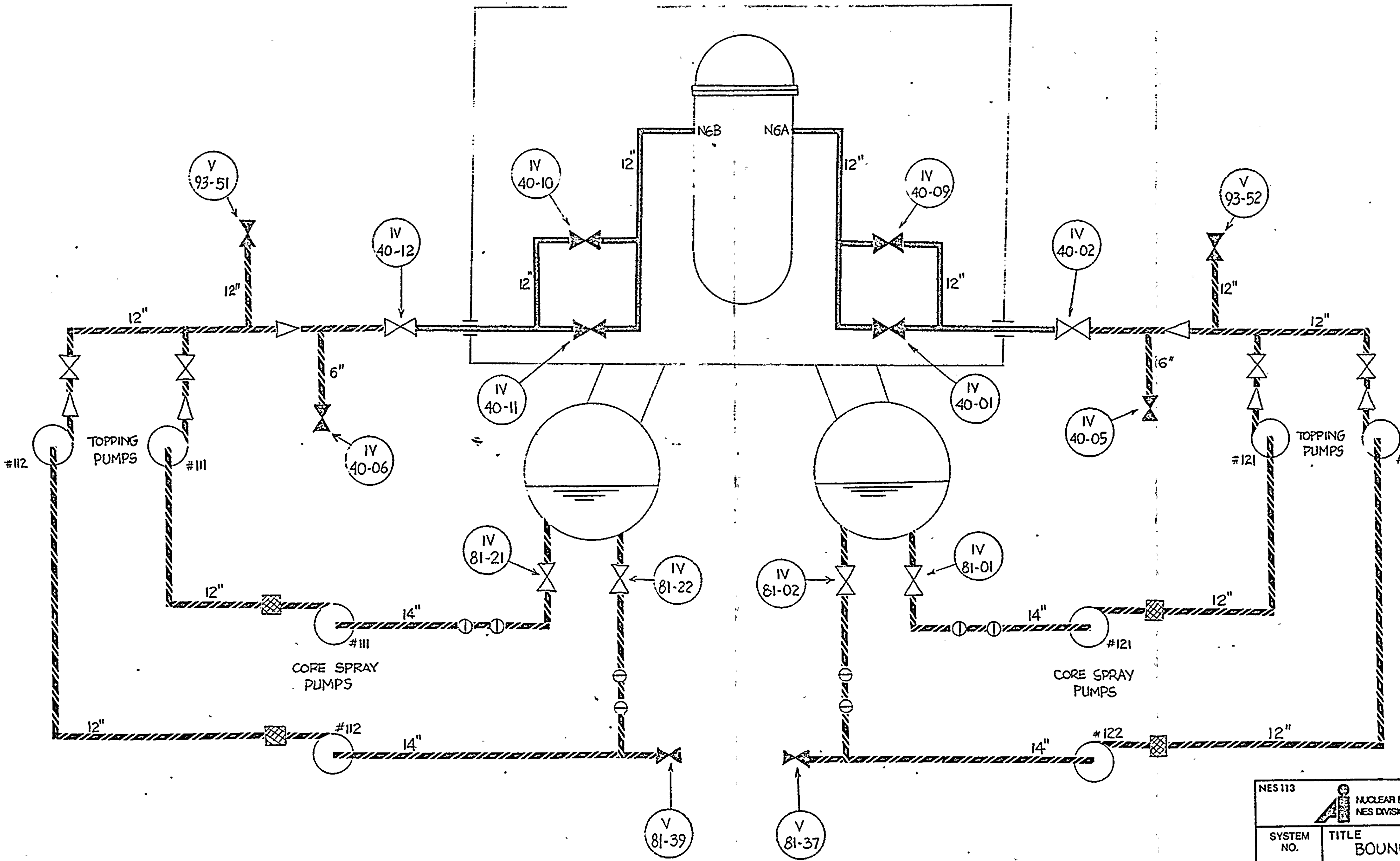
SYSTEM NO. 38	TITLE BOUNDARY DIAGRAM SHUTDOWN COOLING	
REV: 0	FIG. NO. A-3	
BY: A.U.	DATE: 10-8-75	GROUP A
APP: QQ	DATE: 10-27-75	GROUP B
REF. P&I NO:	C-18018-C	
PROJECT:	5530-9MP	



POOR ORIGINAL

POOR ORIGINAL

NES 113	NUCLEAR ENERGY SERVICES, INC. NES DIVISION
SYSTEM NO. 39	TITLE BOUNDARY DIAGRAM EMERGENCY CONDENSER
REV: 0	FIG. NO. A-4
BY: AU DATE: 10-8-75	GROUP A
APP: 9B DATE: 10-27-75	GROUP B
REF. P&I NO: C-18017-C	
PROJECT: 5530-9MP	

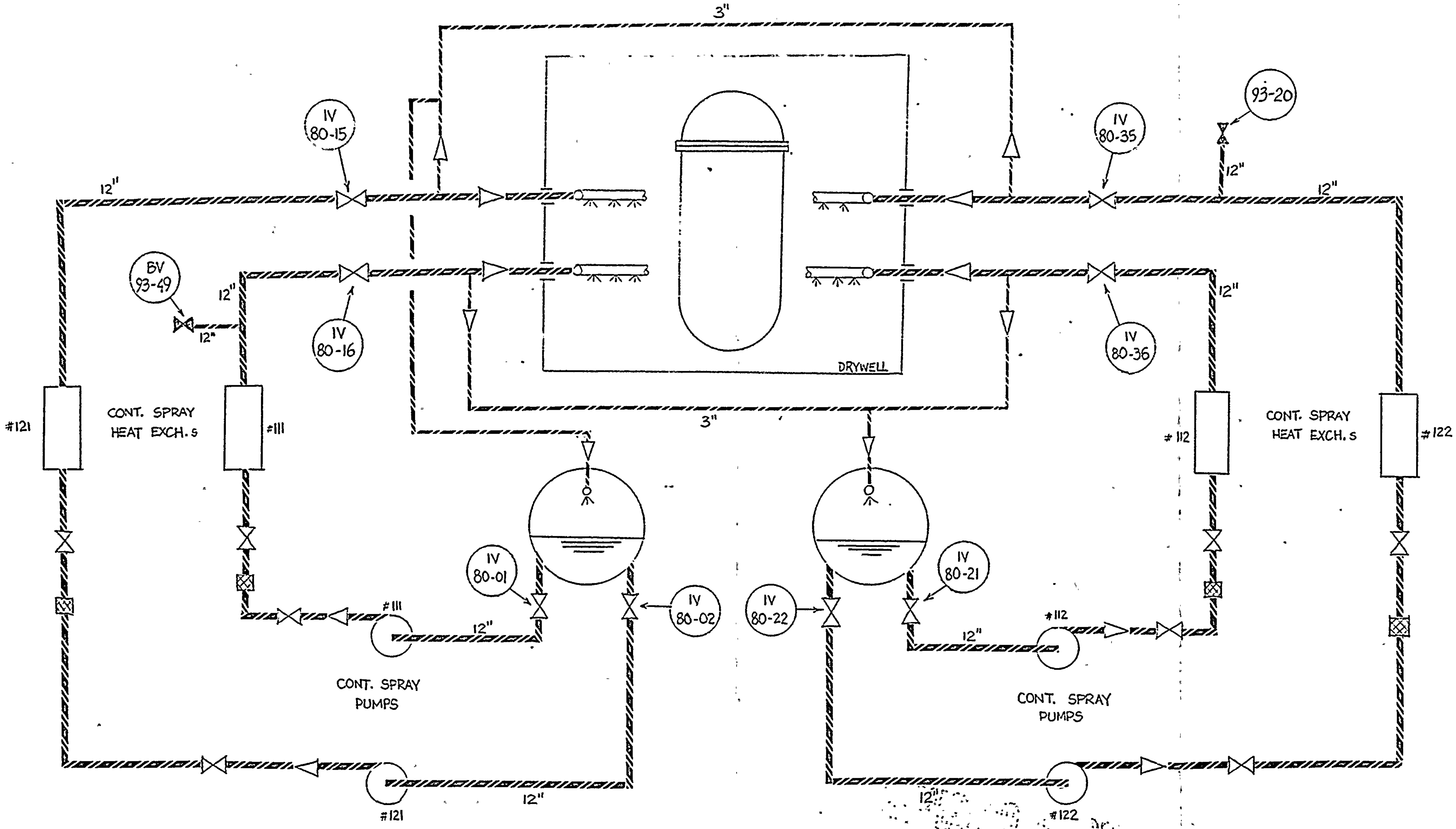


POOR ORIGINAL

NES 113

NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

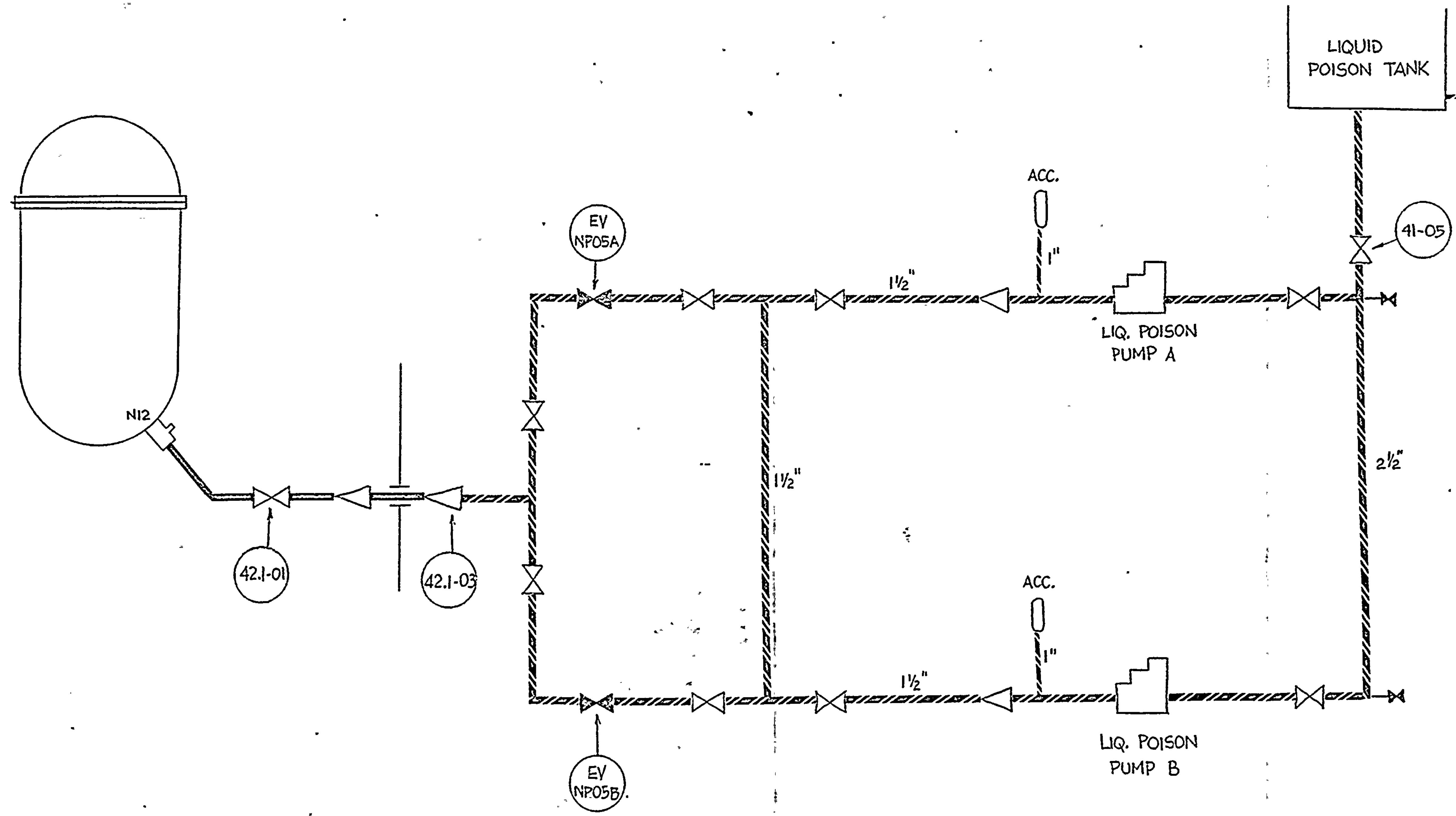
SYSTEM NO. 40,81	TITLE BOUNDARY DIAGRAM CORE SPRAY
REV: 0	FIG. NO. A-5
BY: AU DATE: 10-8-75	GROUP A
APP: [illegible] DATE: 10-27-75	GROUP B
REF. P&I NO: C-18007-C	
PROJECT: 5530-9MP	



POOR ORIGINAL

POOR ORIGINAL

NES 113	NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO. 80, 80.1	TITLE BOUNDARY DIAGRAM CONTAINMENT SPRAY	
REV: 0	FIG. NO. A-6	
BY: AU	DATE: 10-8-75	GROUP A
APP: gg	DATE: 10-27-75	GROUP B
REF. P&I NO: C-18012-C		
PROJECT: 5530 - 9MP		



NES 113	NUCLEAR ENERGY SERVICES, INC. NES DIVISION
SYSTEM NO. 41, 42	TITLE BOUNDARY DIAGRAM LIQUID POISON
REV: 0	FIG. NO. A-7
BY: AU DATE: 10-8-75	GROUP A
APP: [illegible] DATE: 10-27-75	GROUP B
REF. P&I NO: C-18019-C	
PROJECT: 5530-9MP	

TABLE A1 - GROUP A COMPONENTS

Quality Group	System Number	System Title	System Description	P & I Diagram	Exempt (E)	Basis for Exemption
A	01	Main Steam	Main Steam lines from Reactor up to and including relief valves and outer isolation valves 01-03 and 01-04	C-18002-C	—	—
			1"-Instrument lines from Main Steam up to and including outer root valves, drain lines on Main Steam inner and outer isolation valves.		E	One-inch nominal size and smaller, Section XI.IWB-1220 (b) (3)
	31	Feedwater	Feedwater lines from and including outer isolation valves 31-01 and 31-02 to Reactor	C-18005-C	—	—
			Drain Lines on isolation valves 31-01, 31-02, 31-03, 31-04		E	One-inch nominal size and smaller, Section XI, IWB-1220 (b) (3)
	32	Recirculation	Reactor Recirculation lines, including blocking valve NG08	C-18020	—	—
			Drain lines on valve, NG02, NG03, and NG08, one-inch flow elements.		E	One-inch nominal size and smaller Section XI, IWB-1220 (b) (3)
			Instrument lines on pump discharge side, and dP line from recirc.pump up to and including outer root valves, thermowell lines, drain lines on recirc.pump.		—	—

TABLE A1 - GROUP A COMPONENTS (CONT'D)

Quality Group	System Number	System Title	System Description	P & I Diagram	Exempt (E)	Basis for Exemption
A	33	Cleanup	Cleanup supply and return lines from Reactor up to and including outer isolation valves 33-03,33-04	C-18009-C	—	—
			Drain Lines on valve, 33-01, 33-02, 33-03, 33-04		E	One-inch nominal size and smaller Section XI, IWB-1220(b) (3)
	34	Head Spray	Head Spray Line from and including outer isolation valve 34-01 to Reactor Head	C-18002-C	—	—
			Drain line on valve 34-01		E	One-inch nominal size and smaller Section XI, IWB-1220 (b) (3)
	36	Reactor Instrument	Instrument lines from Reactor up to and including outer root valve	C-18015-C	E	One-inch nominal size and smaller Section XI, IWB-1220 (b) (3)
	37	Reactor Vent	Reactor Vent line from Reactor to and including blocking valves 37-02, 37-06 and to junction with System 01 (Main Steam)	C-18002-C	—	—
		Reactor Drain	Reactor Drain line from Reactor to and including blocking valve 37-05 and to junction with System 33 (Cleanup)	C-18009-C	—	—

TABLE A1 - GROUP A COMPONENTS (CONT'D)

Quality Group	System Number	System Title	System Description	P & I Diagram	Exempt (E)	Basis for Exemption
A	38	Shutdown Cooling	Shutdown Cooling supply and return lines from Reactor up to and including outer isolation valve, 38-02, 38-12	C-18018-C	—	—
			Drain lines on valves 38-01, 38-13 38-02, 38-12		E	One-inch nominal size and smaller, Section XI, IWB-1220(b) (3)
	39	Emergency Condensing	Emergency Condenser Supply and return lines from Reactor up to and including outer isolation valves, 39-05, 39-06, 37-07, 39-08	C-18017-C	—	—
			Drain lines on valves 39-01 through 39-10, pressure instrumentation lines from Emergency Condensing supply line up to and including outer root valves.		E	One-inch nominal size and smaller, Section XI, IWB-1220 (b) (3)
	40	Core Spray	Core Spray lines from and including outer isolation valves 40-02,40-12 to Reactor.	C-18007-C	—	—
			Drain lines on valves 40-01, 40-02, 40-09, 40-10, 40-11, 40-12. Instrument line from Core Spray line up to and including outer root valves.		E	One-inch nominal size and smaller Section XI, IWB-1220 (b) (3)

TABLE A1 - GROUP A COMPONENTS (CONT'D)

Quality Group	System Number	System Title	System Description	P & I Diagram	Exempt (E)	Basis for Exemption
A	42.1	Liquid Poison	Liquid Poison line from and including outer isolation valve 42.1-03 to Reactor	C-18019-C	—	—
			Drain line on liquid Poison Line		E	One-inch nominal size and smaller Section XI, IWB-1220 (b) (3)
	44.1	CRD Return	CRD Return line from and including outer isolation valve 301-112 to Reactor	C-18016-C	—	—
			Drain line on CRD Return line		E	One-inch nominal size and smaller, Section XI, IWB-1220 (b) (3)

TABLE A2 - GROUP B COMPONENTS

Quality Group	System Number	System Title	System Description	P & I Diagram	Exempt (E)	Basis for Exemption
B	02	Main Steam	Main Steam lines from outer isolation valves, 01-03,04 up to but not including turbine stop valves.	C-18002-C	—	—
	03	Main Steam	Turbine by-pass line from System 02 up to but not including turbine by-pass valves.	C-18002-C	—	—
	49	Feedwater	Condensate from Condenser to Condensate pump inlet.	C-18003-C	E	Design pressure and temperature less than 275 psig and 200°F respectively, Section XI, IWC-1220(a)
	50	Feedwater	From and including condensate pumps to Feedwater booster pumps inlet including the inter-condenser and recombiner-condenser.	C-18003-C	E	Design pressure and temperature less than 275 psig and 200°F respectively, Section XI, IWC-1220(a)
	51	Feedwater	From and including booster pumps to Reactor Feedwater pump inlet	C-18004-C	—	—
	29	Feedwater	Feedwater lines from and including Feedwater pump to 5th Feedwater Heater Stop Valves	C-18005-C	—	—
	30	Feedwater	Feedwater lines from 5th Feedwater Heater Stop Valve to external isolation valves, 31-01, 31-02	C-18005-C	—	—

TABLE A2 - GROUP B COMPONENTS (CONT'D)

Quality Group	System Number	System Title	System Description	P & I Diagram	Exempt (E)	Basis for Exemption
B	38	Shutdown Cooling	From outer isolation valves, 38-02 to pumps NG02 to heat exchangers NG01 to isolation valve 38-12	C-18018-C	–	–
			3" by-pass line around pump and heat exchanger		E	Four-inch nominal size and smaller Section XI, IWC-1220 (d)
	39	Emergency Condensing	Steam Supply from outer isolation valves 39-07, 39-08 to condensers to outer isolation valves 39-05, 39-06	C-18017-C	–	–
	41	Liquid Poison	Liquid Poison lines from Tanks to pumps NP02 inlet	C-18019-C	E	Four-inch nominal size and smaller Section XI, IWC-1220(d) (also exempted from test requirements of Section XI, IWC-2510 per IWC-5220 (d) : open-ended suction line from storage tank)
	42	Liquid Poison	Liquid Poison from and including pumps NP02 to outer isolation valve 42.1-03	C-18019-C	E	Four-inch nominal size and smaller Section XI IWC-1220 (d)
	80	Containment Spray	Containment Spray from Torus outlet to shutoff valves 80-17, 80-18, 80-37, 80-38 outside Drywell	C-18012-C	E	Design pressure and temperature less than 275 psig and 200°F respectively, Section XI, IWC-1220(a)

TABLE A2 - GROUP B COMPONENTS (CONT'D)

Quality Group	System Number	System Title	System Description	P & I Diagram	Exempt (E)	Basis for Exemption
B	80.1	Containment Spray	Containment Spray inside Drywell	C-18012-C	E	Design pressure and temperature less than 275 psig and 200°F respectively, Section XI, IWC-1220 (a) (also exempted from test requirements of Section XI, IWC-2510 per IWC-5220 (d): open-ended discharge line to first shutoff valve)
	81,81.1	Core Spray	Core Spray from Torus outlet to topping pumps to outer isolation valves 40-02, 40-03 (up to and including valves, 93-51, 93-52, 40-05, 40-06)	C-18007-C	—	—

TABLE A3 - GROUP C COMPONENTS

Quality Group	System Number	System Title	System Description	P & I Diagram	Exempt (E)	Basis for Exemption
C	33,35	Cleanup	Reactor Cleanup system beyond outer isolation valves 33-03, 33-04 including non-regenerative and regenerative heat exchangers, filters, demineralizers and surge tank.	C-18009-C	—	—
	44	CRD Insert/withdraw lines	Control Rod Drive insert/withdraw lines from CRD housing flanges to CRD Hydraulic Control Units.	C-18016-C	—	—
	54	Fuel Pool Cooling	Fuel Pool Cooling System from surge tank outlet to pool inlet including pumps, filters, heat exchangers	C-18008-C	—	—
	60	Emergency Condenser Makeup Water	Emergency Condenser Makeup Water System from Makeup tanks to emergency condensers and cross-connect.	C-18017-C	—	—
	70	Closed Loop Cooling Water (CLCW)	Closed Loop Cooling Water Pumps and Heat Exchangers	C-18022-C	—	—
	70-32	↓	CLCW to System 32 (Reactor Recirc. Pumps)	C-18020-C C-18022-C	—	—
	70-33	↓	CLCW to System 33 (Cleanup Non-Reg. Heat Exchangers, etc.)	C-18009-C C-18022-C	—	—

TABLE A3 - GROUP C COMPONENTS (CONT'D)

Quality Group	System Number	System Title	System Description	P & I Diagram	Exempt (E)	Basis for Exemption
C	70-38	Closed Loop Cooling Water (CLCW)	Close Loop Cooling Water to System 38 (Shutdown Cooling Heat Exchangers)	C-18018-C C-18022-C	—	—
	70-54	↓	CLCW to System 54(Fuel Pool Cooling Heat Exchangers)	C-18008-C C-18022-C	—	—
	70-94	↓	CLCW to System 94(Instrument Air Compressor/aftercooler)	C-18011-C C-18022-C	—	—
	70-105	↓	CLCW to System 105(Drywell Equipment Drain Sump Coolers)	C-18014-C C-18022-C	—	—
	70-201	↓	CLCW to System 201(Drywell Air Coolers)	C-18014-C C-18022-C	—	—
	70-210	↓	CLCW to System 210(Control Room Air Conditioners)	C-18047-C C-18022-C	—	—
	72	Emergency Service Water	Emergency Service Water System to CLCW Heat Exchangers and up to and including valves 72-21, 72-22	C-18022-C	—	—
	79	Diesel Generator Cooling	Diesel Generator Cooling Water from pumps 72-62, 72-63 to diesel generaters	C-18026-W	—	—
	93	Containment Spray Raw Water	Containment Spray raw water pumps to Containment spray heat exchangers and cross-connect to Core Spray #81	C-18012-C	—	—

APPENDIX B

ZONE DESIGNATIONS

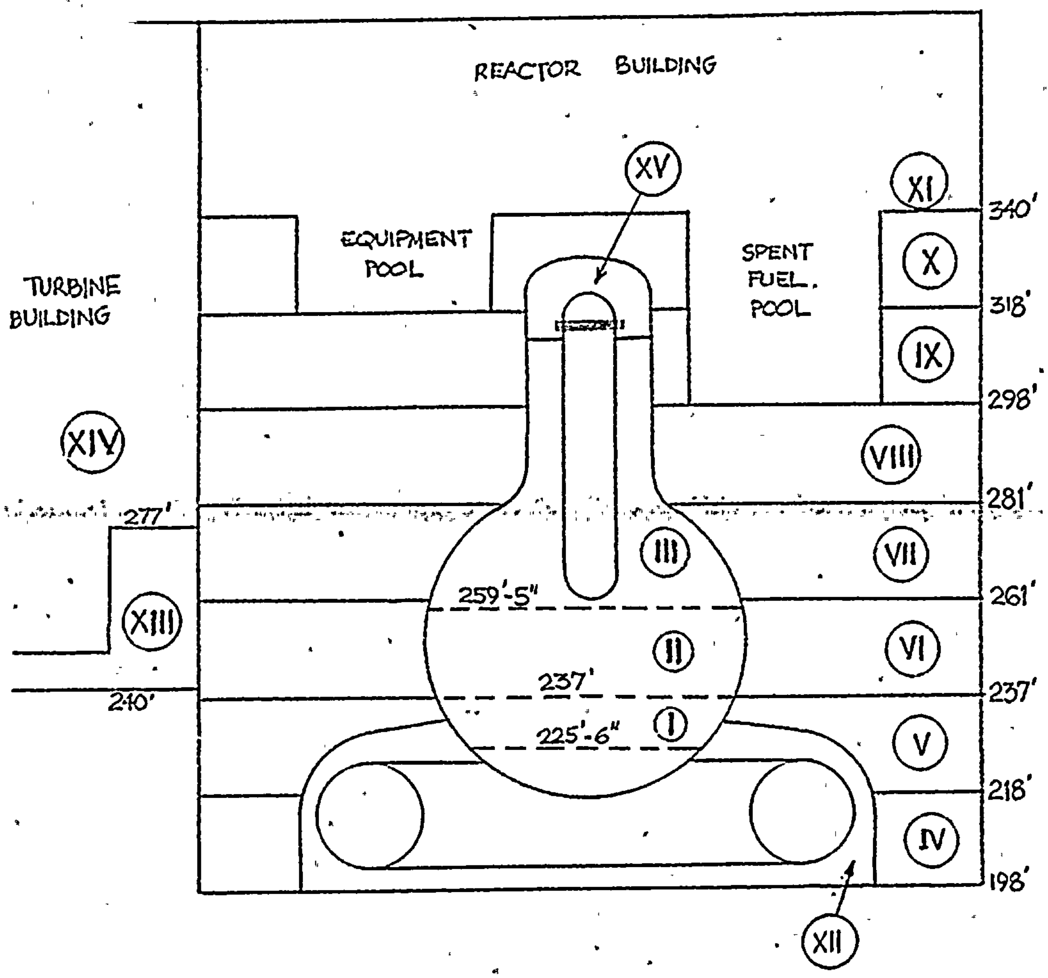
APPENDIX B

Zone Designations

The Nine Mile Point Unit 1 reactor and turbine building drawings (plan and elevation drawings) have been reviewed to develop suitable zone designations. Zones are designated so that similar examinations can be performed on components that are within close physical proximity at one time to prevent unnecessary movement from one part of the plant to another.

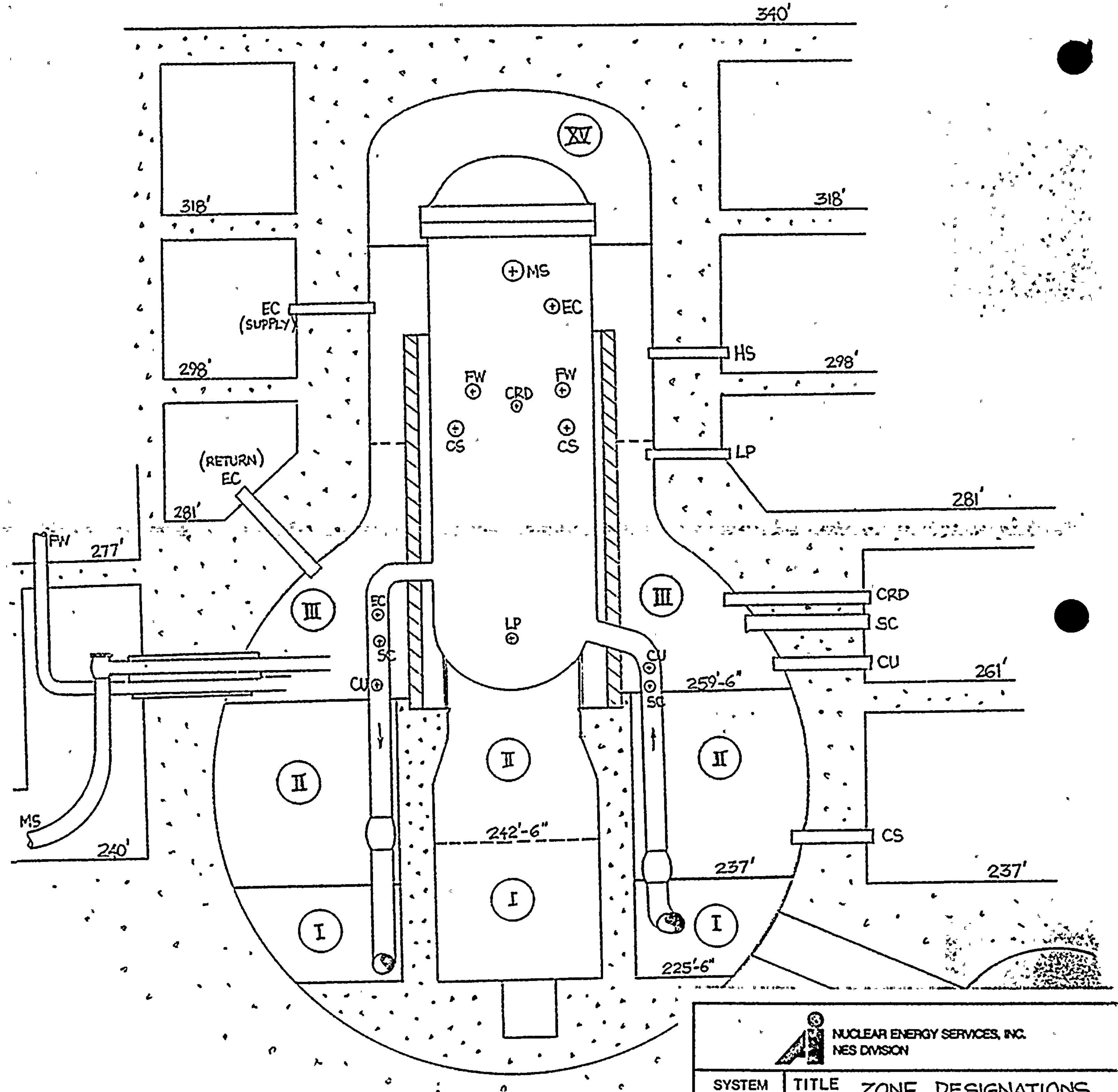
The zone designations are illustrated in Figure B-1 and B-2. Zones I, II, and III define work areas inside the drywell. Zones IV through XI define work areas outside the drywell in the reactor building with each zone delineated by floors. Zone XII is the suppression chamber area, Zone XIII is the main steam/feedwater piping tunnel. Zone XIV is the turbine building and the reactor vessel cavity is Zone XV.

As shown in Figure B-3, Zones I through XII have been subdivided into East and West halves for prompt identification of work examination areas. To further facilitate orientation within the reactor buildings, floor plans of Zones IV through XI with major system components have been provided in Figure B-4 through B-11 respectively.



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE ZONE DESIGNATIONS SCHEMATIC REACTOR BUILDING
REV: 0	FIG. NO. B-1
BY: A.U. DATE: 8-18-75	
APP: g.g DATE: 9-5-75	
PROJECT: 5530 - 9MP	
NES 112	NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
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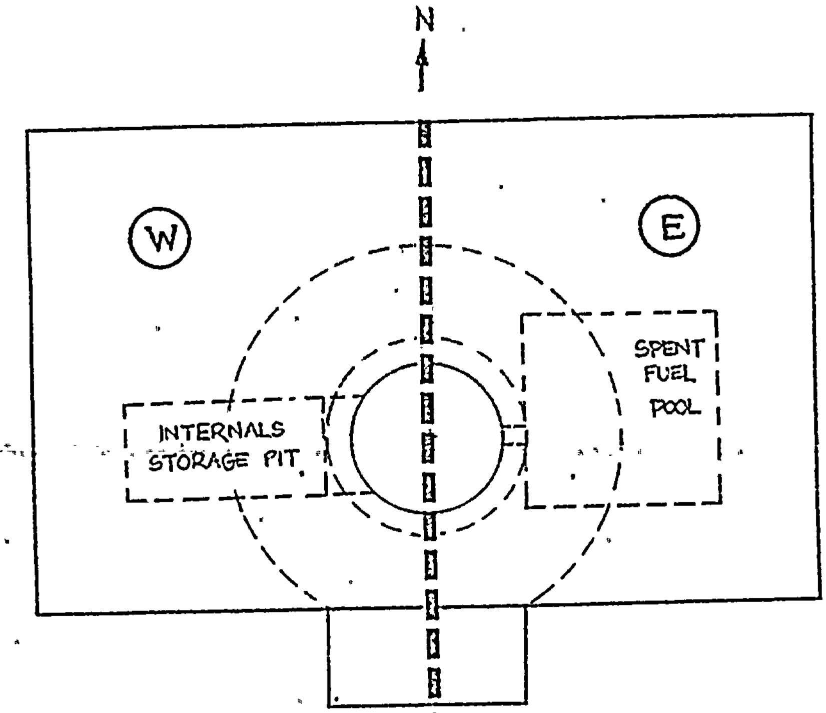
SYSTEM NO.	TITLE ZONE DESIGNATIONS SCHEMATIC DRYWELL		
REV: 0	FIG. NO. B-2		
BY: A.U.	DATE: 8-18-75		
APP: QQ	DATE: 9-5-75		
PROJECT:	5530 - 9MP		
NES 112	NOT TO SCALE		



NUCLEAR ENERGY SERVICES, INC.
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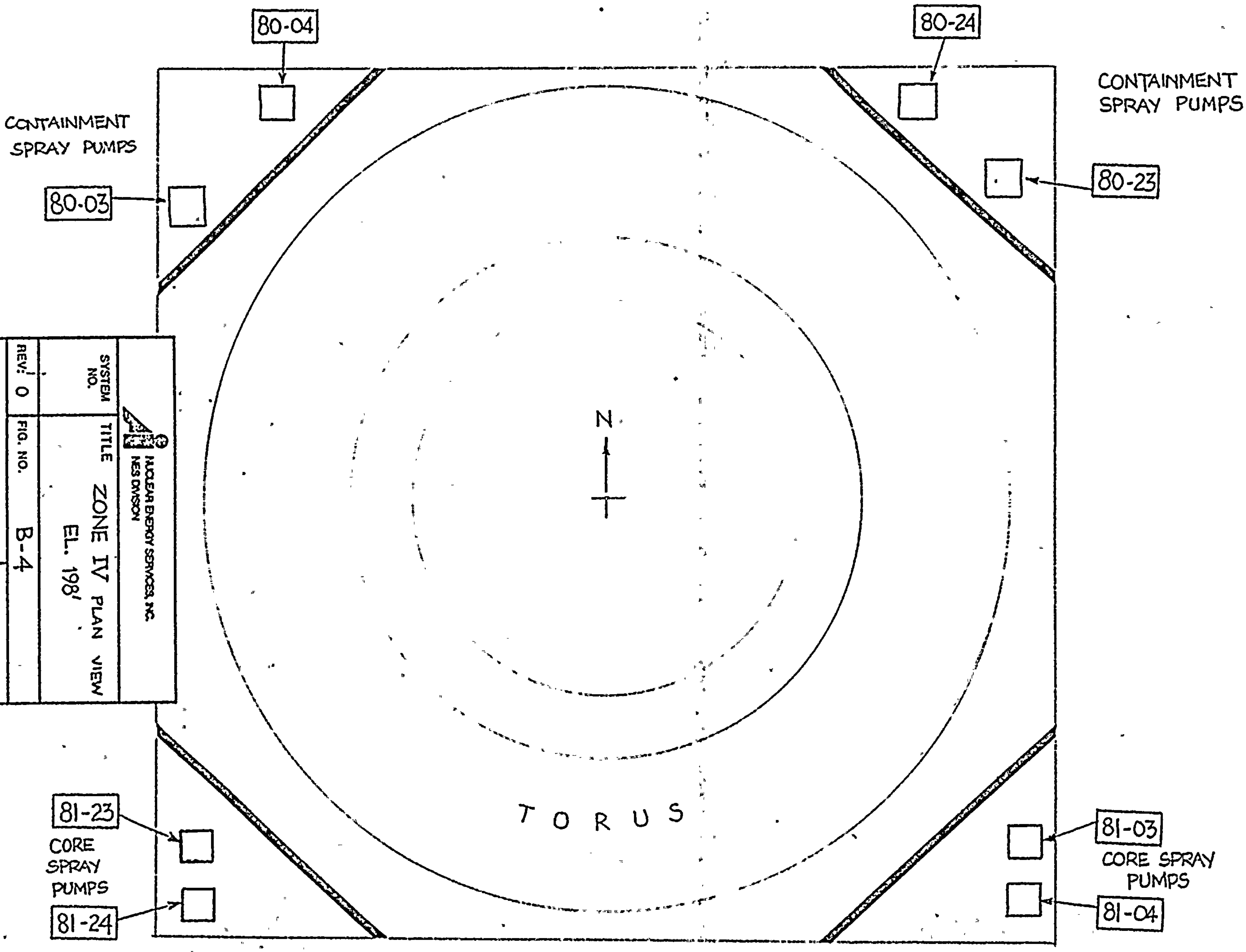
SYSTEM NO.	TITLE ZONES I THRU XII EAST AND WEST DESIGNATIONS
REV: 0	FIG. NO.: B-3
BY: A.U. DATE: 8-27-75	N
APP: gg DATE: 9-5-75	
PROJECT:	5530-9MP
NES 112	NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
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SYSTEM NO.

TITLE ZONE IV PLAN VIEW
EL. 198'

REV: 0

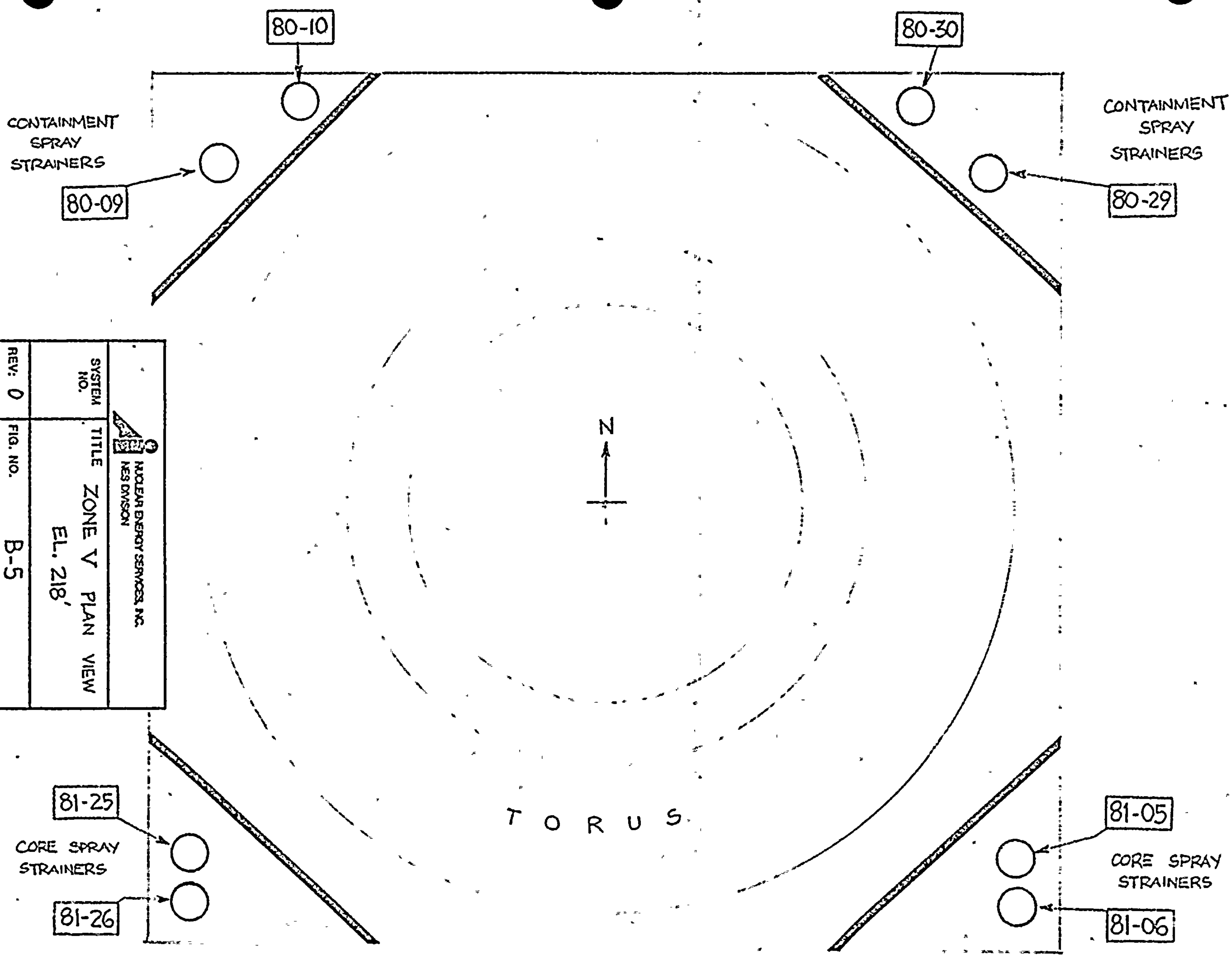
FIG. NO. B-4

BY: A.U. DATE: 8-27-75

APP: gg DATE: 4-5-75

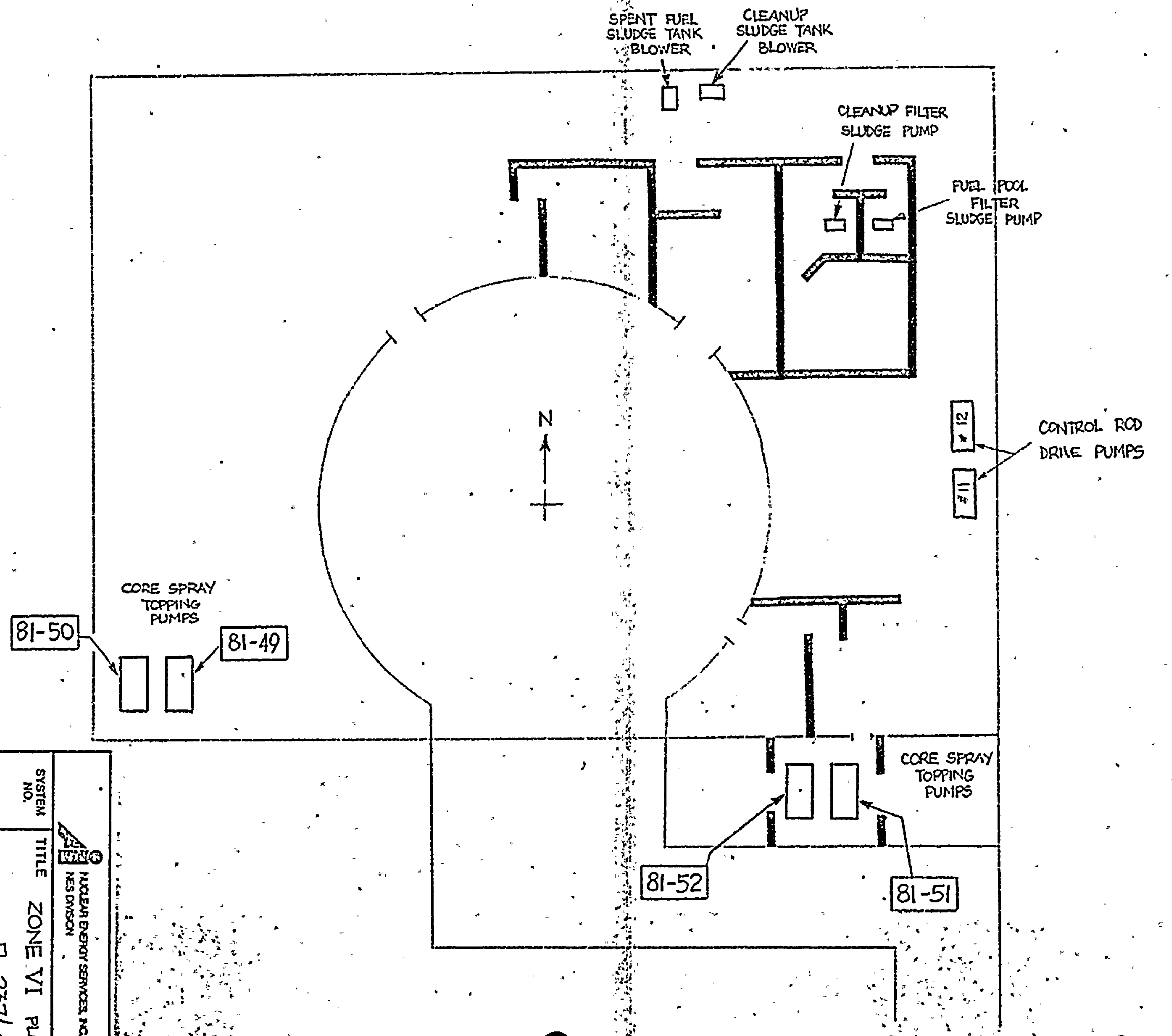
PROJECT: 5530 - 9MP

NES 112 NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE ZONE V PLAN VIEW EL. 218'
REV: 0	FIG. NO. B-5
BY: A.U. DATE: 8-27-75	
APP: GB DATE: 9-5-75	
PROJECT: 5530 - 9MP	
NES 112	NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
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SYSTEM NO.

TITLE ZONE VI PLAN VIEW
EL. 237'

REV: 0 | FIG. NO. B-6

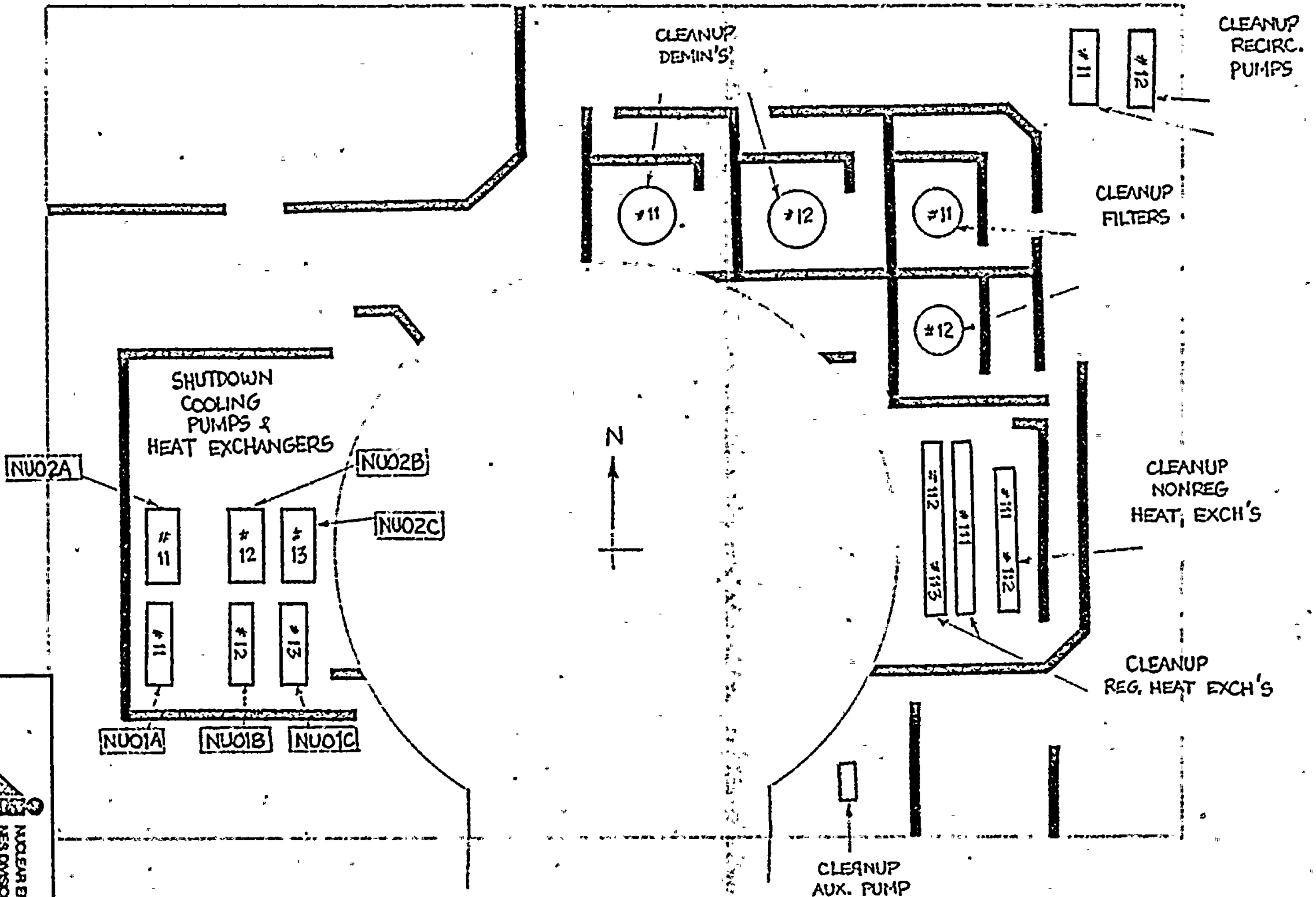
BY: A.U. DATE: 8-27-75

APP: DB DATE: 9-5-75

PROJECT: 5530-9MP

NES 112

NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
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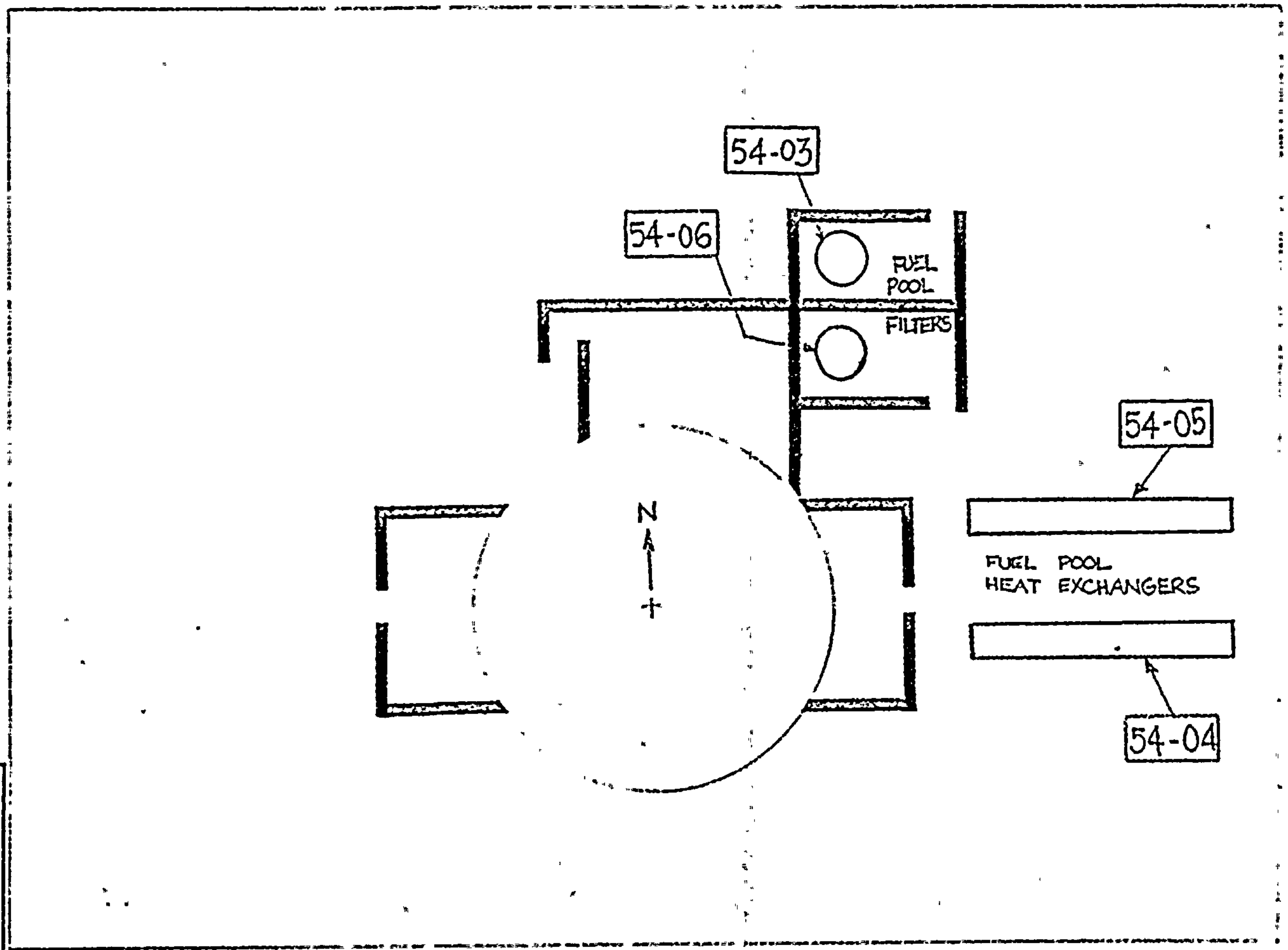
SYSTEM NO.	TITLE ZONE VII PLAN VIEW EL. 261'
REV: 0	FIG. NO. B-7
BY: A.U.	DATE: 8-27-75
APP:	DATE: 9-5-75
PROJECT: 5530-9MP	
NES 112	NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
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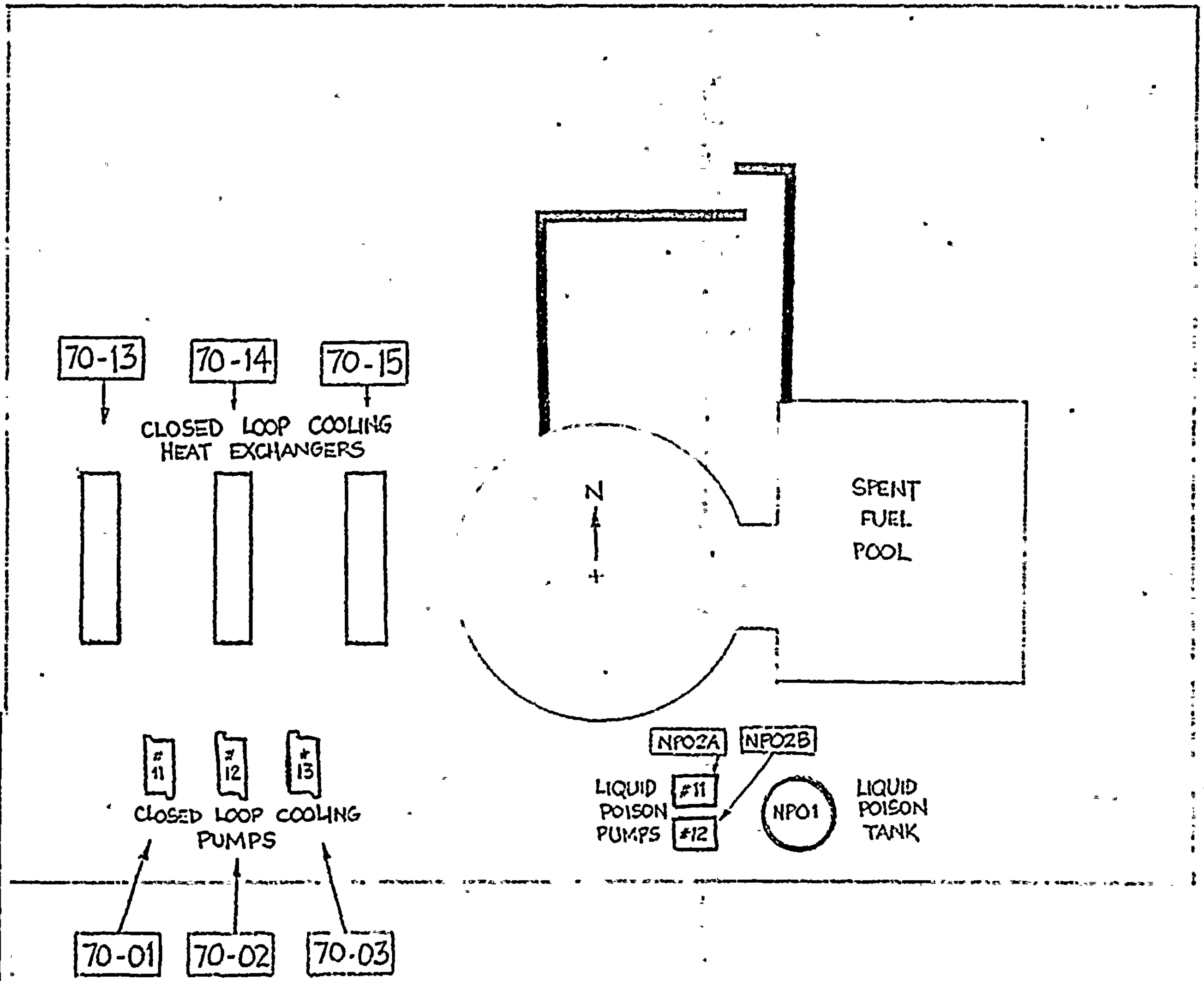
SYSTEM NO.	TITLE ZONE VIII PLAN VIEW EL. 281'
REV: 0	FIG. NO. B-8
BY: A.U. DATE: 8-27-75	APP: GG DATE: 9-5-75
PROJECT: 5530-9MP	

NES 112

NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
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SYSTEM NO.

TITLE ZONE IX PLAN VIEW
EL. 298'

REV: 0 | FIG. NO. B-9

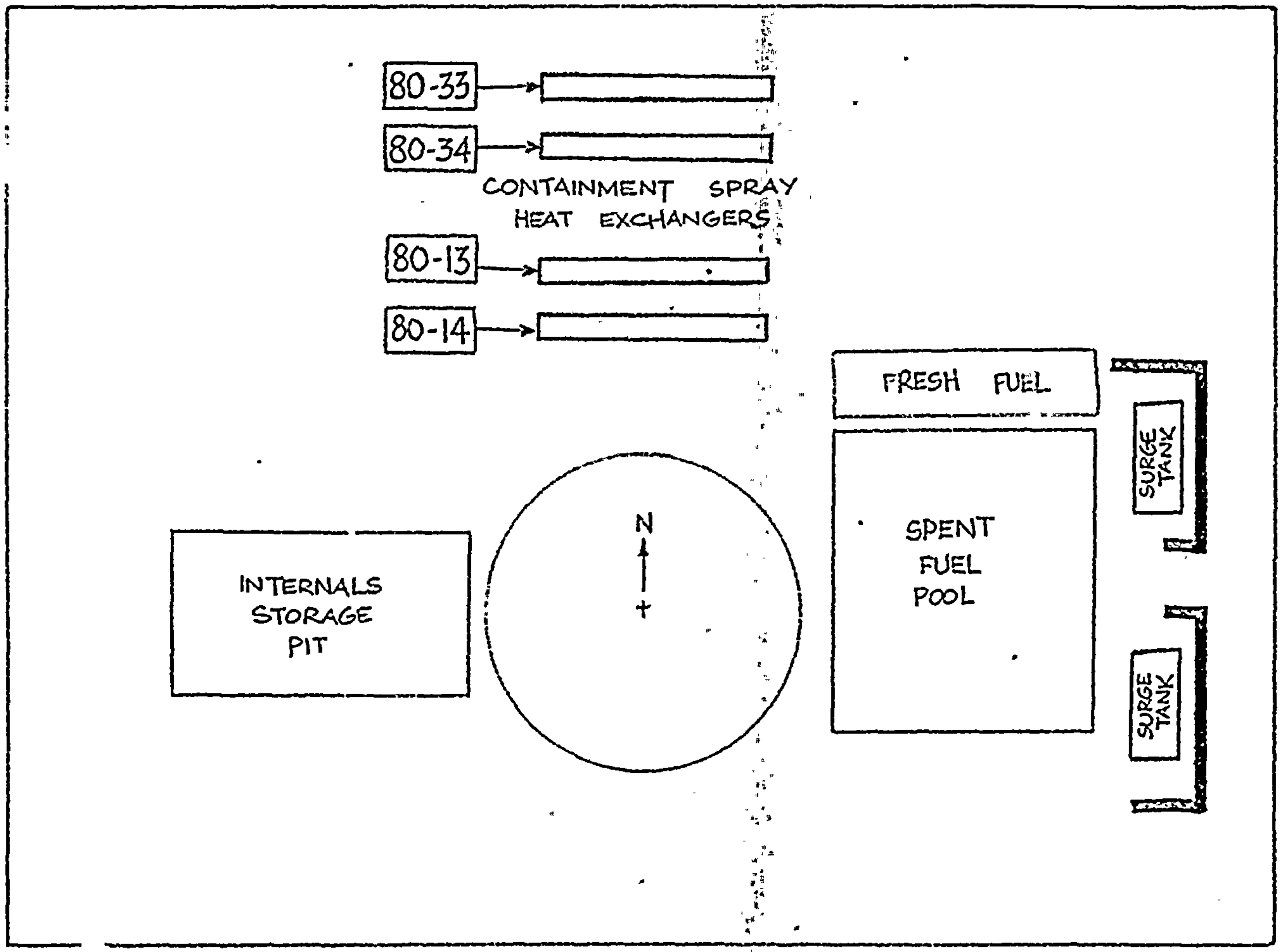
BY: A.U. DATE: 8-27-75

APP: [illegible] DATE: 9-5-75

PROJECT: 5530-9MP

NES 112

NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
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SYSTEM NO.

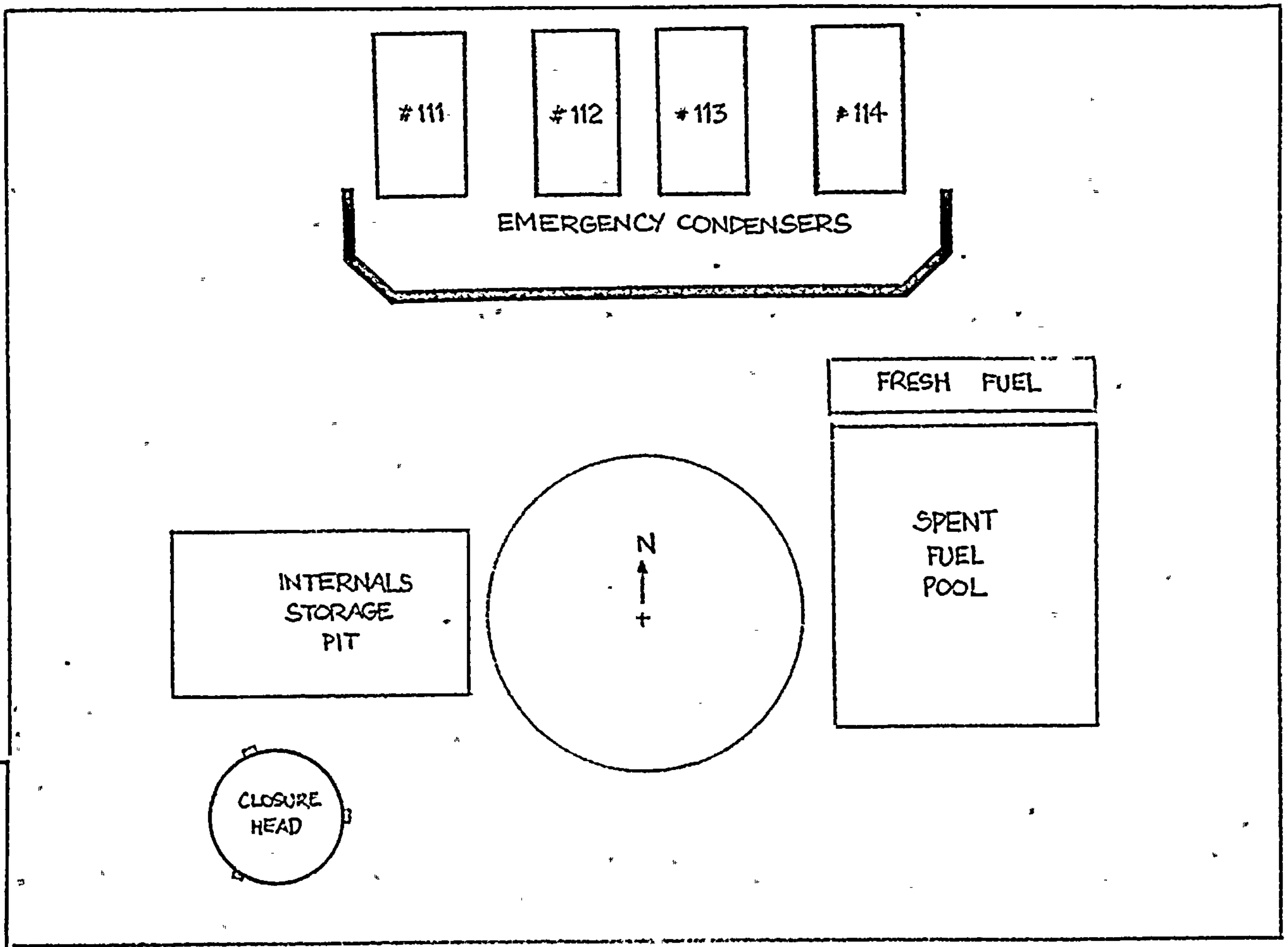
TITLE ZONE X PLAN VIEW
EL. 318'

REV: 0 FIG. NO. B-10

BY: A.U. DATE: 8-27-75
APP: [illegible] DATE: 9-5-75

PROJECT: 5530-9NP

NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
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SYSTEM NO.

TITLE: ZONE XI PLAN VIEW
EL. 340'

REV: 0 FIG. NO. B-11

BY: A.U. DATE: 8-27-75

APP: DATE: 9-5-75

PROJECT: 5530-9MP

NES 112

NOT TO SCALE

APPENDIX C

PROGRAM PLAN AND SCHEDULE

APPENDIX C

Program Plan and Schedule

The examination requirements for the Nine Mile Point Unit 1 ten-year in-service inspection program covering the years 1975 through 1986 are defined by the Program Plan and Schedule.

The Program Plan and Schedule consists of detailed examination requirement information for each of the eight outage-years defined in Section 2.5 of the Program Book.

The plan includes the examination area designation number, and description, the zone where the examination area is located (Appendix B), a reference drawing/isometric (Appendix D), ASME Code examination category, code examination method (visual, surface or ultrasonic), examination procedure number (Appendix H), and where applicable, a calibration block number (Appendix I). A brief summary of the extent of the examination requirements is also provided.

In the Program Plan, each weld or other examination area has been given a unique designation number. The designation consists of four parts: (1) a letter code which identifies a specific component or piping, (2) a system number which identifies the plant system, wherever applicable, (3) a sequence number which identifies examination areas individually and (4) a letter code which identifies the examination area (weld, bolt, hanger, etc.). Table C-1 describes the letter and number identification code in detail. The system and sequence numbers are consistent with NMPC designations. Wherever the numbering system deviates from the basic Niagara Mohawk System, the code letters NES have been added.

TABLE C-1.- EXAMINATION AREA IDENTIFICATION CODE

The area is referenced by the following general designation; (some portions may be deleted if not applicable).

C-XX-SQ-a

C (Component):	RV	Reactor Vessel
	CH	Closure Head
	P	Piping
	PM	Pump
	V	Valve
	HX	Heat Exchanger
	S	Strainer/Filter
	BJ	Ball Joint
	HYD	Hydrostatic Test System
XX (System Number) :	01, 02, 03	Main Steam
	29, 30, 31, 49, 50, 51	Feedwater
	32	Recirculation
	33	Cleanup
	34, 37	Reactor Vent, Drain
	36	Reactor Instrumentation
	38	Shutdown Cooling
	39	Emergency Cooling
	40, 81	Core Spray
	42.1	Liquid Poison
	44.1	CRD Return
	54	Fuel Pool Cooling
	60	Emergency Condenser Makeup Water
	70	Closed Loop Cooling Water
	72	Emergency Service Water
	79	Diesel Generator Cooling Water
	80, 80.1	Containment Spray
	93	Containment Spray Cooling Raw Water
SQ (Sequence):	Sequence numbers starting at 01.	
a (area) :	w	weld
	wU	longitudinal weld Upstream
	wD	longitudinal weld Downstream
	s	support/hanger/snubber
	b	bolts/studs
	n	nuts
	p	area patch
	i	internals
	t	thread/bushing/washers
	l	stud hole ligaments
	r	nozzle inner radii

To satisfy the requirements of category B-M-2 (Valve Bodies), all internal pressure boundary surfaces of <u>one</u> valve in <u>each</u> of the seven groups of valves in Table C-2 will be visually examined. The examination will be performed when one of the valves in each group is made accessible due to routine maintenance or repair, during the 10-year interval. The valves are grouped according to similar constructional design, manufacturer and function.

TABLE C-2 VALVES FOR EXAMINATION CATEGORY B-M-2

GROUP	SYSTEM	VALVE #	DESCRIPTION
1	Main Steam	01-01 thru 01-04	24" isolation valves
2	Main Steam	01-07 thru 01-12	6" Gate, w/position ind.
3	Main Steam	MSER V-1 thru MSER V-6	6" Relief Valves
4	Feedwater	31-01, 31-02	18" Check Valves
	Cleanup	33-03	6" Check Valves
	Shutdown Cooling	38-12	14" Check Valves
	Emergency Cond.	39-03, 39-04	10" Check Valves
5	Feedwater	31-03, 31-04	18" Isolation Valves
6	Cleanup	33-01, 02, 04	6" Isolation Valves
	Shutdown Cooling	38-01, 02, 04	14" Isolation Valves
	Emergency Cond.	39-07, thru 39-10	10" Isolation Valves
		39-01,02	10" Gate w/position ind.
	Core Spray	40-01, 09, 10, 11	12" Blocking Valves
		40-02, 12	12" Isolation Valves
7	Emergency Cond.	39-05, 06	10" Globe Valves

NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

PROGRAM PLAN AND SCHEDULE

PROJECT 5530-9MP

BY: gg DATE: 9-4-75
APP: AU DATE: 9-5-75
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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
1	III	NIP 554	P-01-08-w	Pipe to Valve 01-01, 24"	1-1	B-J	UT	100% of circ.weld	P1F-1.5-1
			P-01-03-w	Pipe to Ell, 24"					
			P-01-02-w	Pipe to Pipe, 24"					
			P-31-04-w	Red.Tee to Pipe, 10"	4-1				P1R-.75-2
			P-31-27C-w	Red.Tee to 18"x10" Red. 10"					
			P-31-27A-w	Pipe to Ell, 10"					
			P-33-70 -w	Pipe to Pipe,6"	6-1				P8R-.75-3
			P-33-67 -w	Pipe to Valve 33-01,6"					
			P-32- 57 -w	Pipe to Ell, 28"	5-1, 5-6				P8F-1.5-1
			P-32- 57.-wU1	Ell Long.Weld (Shortside)				12" of Long.Weld	
			P-32- 57 -wU2	" " " (Longside)					
			P-32-57-wD	Straight Pipe Long.Weld					

NUCLEAR ENERGY SERVICES, INC.
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PROGRAM PLAN AND SCHEDULE

PROJECT 5530-9MP

BY: gg DATE: 9-4-75
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REV 0 PAGE 2 OF 22

OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
1	III	NIP 554	P-32-14-w	Pipe to Red.Tee, 28"	5-1, 5-5	B-J	UT	100% of Circ.Weld	P8F-1.5-1
			P-32-14-wD	Straight Pipe Long.Weld				12" of Long.Weld	
			P-32-14-wU2	Tee Long.Weld (Longside)					
			P-32-54-w	Pipe to Ell, 28"				100% of Circ.Weld	
			P-32-54-wD1	Ell Long.Weld (Shortside)				12" of Long.Weld	
			P-32-54-wD2	" " " (Longside)					
			P-32-54-wU	Straight Pipe Long.Weld					

NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

PROGRAM PLAN AND SCHEDULE

PROJECT 5530-9MP

BY: gg DATE: 9-4-75
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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
1	III	NIP 554	P-38-2A-w	Pipe to Ell, 14"	8-1	B-J	UT	100% of Circ.Weld	P8R-.75-2
			P-38-2A-wD2	Ell Long. Weld (Longside)				12" of Long.Weld	
			P-38-2A-wU	Straight Pipe Long.Weld					
			P-38-02-w	Pipe to Valve 38-01,14"				100% of Circ.Weld	
			P-38-02-wU	Straight Pipe Long.Weld				12" of Long.Weld	
			P-39-36A-w	Valve 39-01 to 12"x10" Red., 10"	9-2			100% of Circ.Weld	
			P-39-36A-wD	Straight Pipe Long.Weld				12" of Long. Weld	
			P-39-35A-w	Pipe to Ell, 10"				100% of Circ.Weld	
			P-39-35A-wD	Straight Pipe Long.Weld				12" of Long. Weld	

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NES DIVISION

PROGRAM PLAN AND SCHEDULE

PROJECT 5530-9MP

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
1	III	NIP554	P-40-50A-w	Pipe to Ell, 12"	10-1	B-J	UT	100% of Circ.Weld	P8R-75-2
↓	↓	↓	P-40-50A-wU	Straight Pipe Long.Weld	↓	↓	↓	12" of Long. Weld	↓
			P-40-50A-wD1	Ell Long.Weld (Shortside)				↓	
			P-40-50A-wD2	" " " (Longside)					
			P-40-50C-w	Ell to Pipe, 12"				100% of Circ.Weld	
			P-40-50C-wU	Straight Pipe Long.Weld				12" of Long.Weld	
			P-40-50C-wD2	Ell Long.Weld (Longside)				↓	
			P-40-11-w	Pipe to Ell, 12"				100% of weld	
			P-40-11-wU2	Ell Long.Weld (Longside)				12" of Long.Weld	
			P-40-11-wD	Straight Pipe Long.Weld				↓	

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PROJECT 5530-9MP

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
1	III	NIP 554	P-44.1-14A-w	Pipe to Ell, 3"	12-1	B-J	UT	100% of Circ.Weld	P8R-.3-1
↓	XIII	↓	P-02-12-w	Pipe to Pipe, 24"	2-1	C-F	↓	100% of Circ.Weld	P1F-1.5-1
↓	↓	↓	P-02-6Z-w	Pipe to Pipe, 24"	↓	↓	↓	↓	↓
↓	VII	↓	P-38-14-w	Pipe to Ell, 12"	8-2	↓	↓	↓	P8R-.75-2
↓	↓	↓	P-38-114-w	Pipe to Ell, 12"	↓	↓	↓	↓	↓
↓	IV	↓	P-81-89-w	Pipe to Tee, 12"	10-2	C-G	↓	↓	P1R-.75-2
↓	VI	↓	P-81-77A-w	Pipe to Ell, 12"	↓	↓	↓	↓	↓
↓	IV	↓	P-81-20A-w	Pipe to Ell, 14"	10-3	↓	↓	↓	↓

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PROJECT 5530-9MP

BY: [signature] DATE: 10-8-75
APP: AU DATE: 10-8-75
REV 0 PAGE 6 OF 22

OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
1	XI	NIP 562	CH-2-576J-w	Nozzle to Safe-end Weld	13-2	B-F	UT	100% of Circ. Weld	P8R-1.5-2
			CH-2-576K-w	Nozzle to Safe-end Weld					
			CH-2-576L-w	Nozzle to Safe-end Weld					
			CH-2-576M-w	Nozzle to Safe-end Weld					
			CH-4-576E-w	Nozzle to Safe-end Weld					
			CH-4-576F-w	Nozzle to Safe-end Weld					

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PROGRAM PLAN AND SCHEDULE

PROJECT 5530-9MP

BY: [signature] DATE: 10-8-75
APP: [signature] DATE: 10-8-75
REV 0 PAGE 7 OF 22

OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
1	III	NIP 528	P-32-24-w	Cleanup Supply Branch Weld, 6"	5-1, 5-2	B-J	SURF	100% of Circ. weld, 2" along main pipe, 2" along branch	N/A
			P-01-2A-w	Branch Weld, 6"	1-1				
			P-NES-42.1-4-w	Socket Weld, 1½"	11-1			100% of Circ. Weld	
	XI		CH-1-P	Closure Head Cladding	13-1	B-I-1		6" X 6" Patch	
			CH-3-P	Closure Head Cladding					
			CH-2-576J-w	Nozzle to Safe-end Weld	13-2	B-F		100% of Circ.Weld	
			CH-2-576K-w	Nozzle to Safe-end Weld					
			CH-2-576L-w	Nozzle to Safe-end Weld					
			CH-2-576M-w	Nozzle to Safe-end Weld					

NUCLEAR ENERGY SERVICES, INC.
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PROGRAM PLAN AND SCHEDULE

PROJECT 5530-9MP

BY: gz DATE: 10-8-75
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REV 0

OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
I	XI	NIP 528	CH-4-576E-w	Nozzle to Safe-end Weld	13-2	B-F	SURF	100% of Circ. Weld	N/A
↓	↓	↓	CH-4-576F-w	Nozzle to Safe-end Weld	↓	↓	↓	↓	↓

NUCLEAR ENERGY SERVICES, INC.
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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATON METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
1	II	NIP 529	V-32-H5/E-s	NG02 Valve/E Support	5-1, 5-7	B-K-2	VIS	All Support Components	N/A
↓	↓	↓	PM-32-SS2/E-s	Pump/E Motor Support (2 Shock Suppressors)	↓	↓	↓	↓	↓
			V-32-H6/E-s	Bypass Valve/E Support					
			V-32-H2/E-s	NG03 Valve/E Support					
			V-32-H5/D-s	NG02 Valve/D Support					
			PM-32-SS2/D-s	Pump/D Motor Support (2 Shock Suppressors)					
			V-32-H6/D-s	Bypass Valve/D Support					
			V-32-H2/D-s	NG03 Valve/D Support					
			V-32-H5/C-s	NG02 Valve/C Support					
			PM-32-SS2/C-s	Pump/C Motor Support (2 Shock Suppressors)					

NUCLEAR ENERGY SERVICES, INC.
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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
I	II	NIP 529	V-32-H6/C-s	Bypass Valve/C Support	5-1, 5-7	B-K-2	VIS	All Support Components	N/A
			V-32-H2/C-s	NG03 Valve/C Support					
	III		P-33-H36-s	Pipe Support (2 units)	6-2				
			P-33-H35-s	Pipe Support					
			P-33-H3-s	Pipe Support					
			P-39-H10-s	Pipe Support	9-4				
			V-39-03-b	Valve 39-03 Bolting		B-G-2		100% of Bolting Less Than 2" Dia.	
			V-39-01-b	Valve 39-01 Bolting					
			P-39-H11-s	Pipe Support		B-K-2		All Support Components	
			V-301-113-b	Valve 301-113 Bolting	12-1	B-G-2		100% of Bolting Less Than 2" Dia.	

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I	III	NIP 529	P-38-H1-s	Pipe Support	8-3	B-K-2	VIS	All Support Components	N/A
↓	↓	↓	P-38-SC18-s	Pipe Support	↓	↓	↓	↓	↓
			V-38-01-b	Valve 38-01 Bolting	↓	B-G-2		100% of Bolting Less Than 2" Dia.	
			P-31-H6-s	Pipe Support	4-2	B-K-2		All Support Components	
			P-NES-40-1-s	Pipe Support	10-4	↓		↓	
			V-40-10-b	Valve 40-10 Bolting	↓	B-G-2		100% of Bolting Less Than 2" Dia.	
			P-31-SC2-s	Pipe Support	4-2	B-K-2		All Support Components	
			V-01-08-b	Valve 01-01 Bolting	1-2	B-G-2		100% of Bolting Less Than 2" Dia.	
↓	↓	↓	V-01-MSER-V2-b	Valve 01-MSER-V2 Bolting	↓	↓	↓	↓	↓

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I	III	NIP 529	P-01-H28-s	Pipe Support (2 units)	1-2	B-K-2	VIS	All Support Components	N/A
			P-01-H30-s	Pipe Support					
			P-40-SC46-s	Pipe Support	10-4				
			P-40-H18-s	Pipe Support (2 units)					
			P-01-H20-s	Pipe Support	1-2				
			P-NES-42.1-X-s	Pipe Support	11-2				
			P-NES-42.1-R4-s	Pipe Support					

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
1	XI	NIP 529	CH-1-p	C. H. Cladding	13-1	B-I-1	VIS	6" X 6" Patch	N/A
↓	↓	↓	CH-3-p	C. H. Cladding	↓	↓	↓	↓	↓
↓	XI	↓	RV-01-i	Steam Dryer	14-1	B-N-1	↓	All Accessible Areas	↓
↓	↓	↓	RV-02-i	Steam Separator	↓	↓	↓	↓	↓
↓	XV	↓	RV-05-i	Feedwater Spargers	↓	↓	↓	↓	↓
↓	↓	↓	RV-06-i	Core Spray Spargers	↓	↓	↓	↓	↓
↓	↓	↓	RV-07-i	Core Spray Lines	↓	↓	↓	↓	↓
↓	↓	↓	RV-13-i	Upper Core Grid	↓	↓	↓	↓	↓
↓	↓	↓	RV-14-i	Core Shroud	↓	↓	↓	↓	↓
↓	↓	↓	RV-15-i	Core Shroud Support Ring	↓	↓	↓	↓	↓

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1	X	NIP 529	P-39-SC10-s	Pipe Support	9-4	C-E-2	VIS	All Major Load Bearing Elements	N/A
	VII		P-38-SC15-s	Pipe Support	8-4				
	V		S-81-25-b	Strainer 81-25 Bolting	10-5	C-D		100% of Bolting Greater Than 1" Dia.	
	IV		BJ-81-1-b	Ball Joint 81-1 Bolting					
			V-81-21-b	Valve 81-21 Bolting					
			PM-81-24-b	Pump 81-24 Bolting					
			P-81-H1A-s	Pipe Support		C-E-2		All Major Load Bearing Elements	
	XIV		03-SC1-s	Pipe Support	3-2				
	XIII		P-02-H1-s	Pipe Support	2-2				

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
1	III	NIP 529	HYD-36-11	Instrumentation Lines Inside Drywell	15-1, 15-3 15-1A	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	↓	↓	HYD-36-2	↓	,15-2	↓	↓	↓	↓
↓	↓	↓	HYD-36-10	↓	,15-5	↓	↓	↓	↓
↓	↓	↓	HYD-36-4	↓	,15-6	↓	↓	↓	↓
↓	↓	↓	HYD-36-7	↓	,15-7	↓	↓	↓	↓
↓	↓	↓	HYD-36-8	↓	,15-7	↓	↓	↓	↓
↓	↓	↓	HYD-36-3	↓	,15-2	↓	↓	↓	↓
↓	↓	↓	HYD-36-12	↓	,15-3	↓	↓	↓	↓
↓	↓	↓	HYD-36-9	↓	,15-5	↓	↓	↓	↓
↓	↓	↓	HYD-36-5	↓	,15-6	↓	↓	↓	↓

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
1	III	NIP 529	HYD-36-6	Instrumentation Lines Inside Drywell	15-1, 1A, 4	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	↓	↓	HYD-36-1	↓	↓	↓	↓	↓	↓
↓	↓	↓	HYD-01-1	1" Instr. lines from Main Steam (East & West)	15-8, 15-9 15-10	↓	↓	↓	↓
↓	↓	↓	HYD-01-2	Drains from Valves 01-01, 01-02	↓ , 1-1	↓	↓	↓	↓
↓	↓	↓	HYD-39-1	1" Pressure line on Emergency Cond. Supply (East and West)	↓ , 15-17 15-18	↓	↓	↓	↓
↓	↓	↓	HYD-39-4	Drains from Valves 39-01, 39-02, 39-03, 39-04	↓ , 9-2	↓	↓	↓	↓
↓	↓	↓	HYD-33-1	Drains from Valve 33-01	↓ , 6-1	↓	↓	↓	↓
↓	↓	↓	HYD-33-3	Drains from Valve 33-02	↓ , 6-1	↓	↓	↓	↓
↓	↓	↓	HYD-38-1	Drains from Valve 38-01	↓ , 8-1	↓	↓	↓	↓

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1	III	NIP 529	HYD-38-3	Drains from Valve 38-13	15-8, 8-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-40-1	Drains from Valves 40-01, 40-09, 40,10, 40-11	,10-1				
			HYD-40-3	1" Instrument Line from Core Spray (Typ. of 2)	,15-19				
			HYD-44.1-1	Drain Line on CRD Return	,12-1				
			HYD-42.1-1	Drain Line on Liquid Poison	,11-1				
	II		HYD-32-1	Drain Line on Suction Valve BV-NG02-(A, B, C, D, E)	-				
			HYD-32-6	1" F. E. Instrument Line on Discharge Side (A, B, C, D, E)	,15-15,16				
			HYD-32-8	Drain Line on Discharge Valve BV-NG03-(A,B,C,D, E)	-				

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
1	II	NIP 529	HYD-32-9	Drain Line on 2" Bypass Valve from Valve BV-NG03-(A,B,C,D,E)	15-8	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	↓	↓	HYD-32-2	1" T.E. Thermowell on Suction Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-32-3	1" dP Line Around Recirculation Pumps (A,B,C,D,E)	15-11,12,13 14	↓	↓	↓	↓
↓	↓	↓	HYD-32-4	Drain Line From Recirculation Pump NG01 (A,B,C,D,E,)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-32-5	T.E. Thermowell on Discharge Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
1	IX	NIP 529	HYD-34-1	Drain Line on Valve IV-34-01 on Head Spray	15-8, 7-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-39-2	Drain Lines from Valves 39-07, 39-08, 39-09, 39-10	, 9-1				
	VIII		HYD-36-13	Instrumentation Line Outside Drywell	15-1				
			HYD-36-14						
			HYD-36-15						
			HYD-36-16						
			HYD-36-19						
			HYD-36-20						
			HYD-36-21						

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1	VIII	NIP 529	HYD-36-22	Instrumentation Line Outside Drywell	15-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-23						
			HYD-36-24						
			HYD-39-3	1" Pressure Line and Valve on Emerg. Cond. (Typ. of 2)	15-8				
			HYD-39-5	Drain Lines on Valves 39-05, and 39-06 on Emerg. Cond Return	, 9-2				
			HYD-40-4	Instrument Line and Valve on Core Spray (Typ of 2)					
	VII		HYD-33-2	Drain Lines on Valve IV-33-03	, 6-1				
			HYD-33-4	Drain Lines on Valve IV-33-04	, 6-1				

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1	VII	NIP 529	HYD-38-2	Drain Lines on Valve IV-38-02	15-8, 8-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-38-4	Drain Lines on Valve IV-38-12	, 8-1				
	VI	NIP 529	HYD-01-4	Instrument Lines and Valves from Main Steam Lines					
			HYD-40-2	Drain Lines on Valves IV-40-02, IV-40-12	, 10-1				
			HYD-32-7	F. E. Instrument Lines and Valves (A,B,C,D,E)					
			HYD-32-10	1" dP Lines and Valves around recirc. pump (A,B,C,D,E)					
	XIII	NIP 529	HYD-01-03	Drain Line on Warm-up by-pass lines around valves IV-01-03 and IV-01-04 on Main Steam Lines	, 1-1				

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1	XIII	NIP-529	HYD-31-1	Drain Lines on Valves IV-31-01, IV-31-02, IV-31-03, IV-31-04	15-8, 4-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
	-		HYD-54	Fuel Pool Cooling	15-29A,B,C	Group C			
	-		HYD-70-54	Closed Loop Cooling Water to Fuel Pool Cooling Heat Exch's.	15-21				
	-		HYD-70-94	CLCW to Instr. Air Compressors.	15-26				
	-		HYD-70-210	CLCW to Air Conditioners	15-27				
	-		HYD-70-38	CLCW to Shutdown Cooling Heat Exch's	15-22				

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2	IIIE	NIP-544	RV-1-565B-w	Vesselto Nozzle Weld	14-2B	B-D	UT	100% of Nozzle Weld	PIF-1.5C
		NIP-544	RV-2-565B-w	Nozzle to Safe-end, 28"		B-F		100% of Circ Weld	PIF-1.5C P8F-1.5-1
		NIP-554	P-32-77-w	Pipe to Safe-end Weld, 28"	5-1, 5-3				P8F-1.5-1
			P-32-72-w	Pipe to Safe-end Weld, 28"					
		NIP-563	RV-4-565B-w	Nozzle to Safe-end Weld, 28"	14-2B				
	IIE	NIP-554	P-32-28-w	Valve NG02B to Pipe Weld, 28"	5-1, 5-3	B-J			
			P-32-28-wD	Straight Pipe Long. Weld, 28"				12" of Long. Weld	

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2	IE	NIP-554	P-32-39	Pipe to ELL Weld, 28"	5-1, 5-3	B-J	UT	100% of Circ. Weld	P8F-1.5-1
↓	↓	↓	P-32-39-WU1	ELL Long. Weld, Short Side	↓	↓	↓	12" of Long. Weld	↓
↓	↓	↓	P-32-39-WU2	ELL Long. Weld, Long Side	↓	↓	↓	↓	↓
↓	↓	↓	P-32-39-WD	Straight Pipe Long. Weld	↓	↓	↓	↓	↓
↓	IIIW	↓	P-39-1A-WD	Straight Pipe Long. Weld	9-1	↓	↓	12" of Long Weld	P8R-.75-2
↓	IIW	↓	P-40-15-W	Pipe to ELL 12"	10-1	↓	↓	100% of Circ Weld	↓
↓	↓	↓	P-40-15-WD	Straight Pipe Long. Weld	↓	↓	↓	12" of Long. Weld	↓

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2	II W	NIP 554	P-40-15-wU1	ELL Long Weld (Short Side)	10-1	B-J	UT	12" of Long Weld	P8R-.75-2
↓	↓	↓	P-40-15-wU2	ELL Long Weld (Long Side)	↓	↓	↓	↓	↓
↓	II E	NIP 541	PM-NG01B-b	Pump NG01B Bolting * (16 Bolts)	5-1,5-2	B-G-1	↓	100% of Bolting ≥ 2" Dia.	P1S-2.5
↓	↓	↓	V-NG02B-b	Valve NG02B Bolting* 24 Studs, 48 Nuts	↓	↓	↓	↓	P1S-2.0 P1N-2.0
↓	↓	↓	V-NG03B-b	Valve NG03B Bolting* 20 Studs, 40 Nuts	↓	↓	↓	↓	P1S-2.0 P1N-2.0
↓	XV	NIP 533	RV-3-563/1-w	Vessel Flange Weld, 96" CW From 0°	14-6	B-C	↓	100% of Weld	P1-LF-1
↓	↓	NIP 534	RV-1-1	Flange Ligament Area, Stud Hole 1	14-4	B-G-1	↓	100% of Ligament	↓
↓	↓	↓	RV-2-1	Flange Ligament Area, Stud Hole 2	↓	↓	↓	↓	↓
			RV-3-1	Flange Ligament Area, Stud Hole 3	↓	↓			

NES III 7/75 *-If bolting is removed, a liquid penetrant examination shall be performed also (NIP 528)
-Individual bolting designations shall be determined and marked in field per figure 14-7.

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2	III E	NIP 536	RV-3-565 A-r	Nozzle inner radius	14-2B	B-D	UT	100% of nozzle radius	Later
			RV-4-566 A-r	Nozzle inner radius	14-2A				
			RV-2-566 A-r	Nozzle inner radius					
			RV-6-566 A-r	Nozzle inner radius					
		NIP 554	P-31-14-w	Transition to Pipe Weld, 10"	4-1	B-J		100% of circ. weld	P1 R-.75-2
		NIP 563	RV-1-566 A-w	Nozzle to Safe-end Weld 10"	14-2A	B-F			P8R-1.5-1
		NIP 554	P-39-25-w	Safe-end to Pipe Weld 10"	9-1				P8R-.75-2
	III W		P-39-1A-w	Pipe to ELL, 10"		B-J			
			P-39-1A-wU1	ELL Long Weld (Short Side)				12" of long weld	
			P-39-1A-wU2	ELL Long Weld (Long Side)					

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2	XV	NIP 534	RV-4-1	Flange Ligament Area, Stud Hole 4	14-4	B-G-1	UT	100% of Ligament	P1-LF-1
			RV-5-1	Flange Ligament Area, Stud Hole 5					
			RV-6-1	Flange Ligament Area, Stud Hole 6					
			RV-7-1	Flange Ligament Area, Stud Hole 7					
			RV-8-1	Flange Ligament Area, Stud Hole 8					
			RV-9-1	Flange Ligament Area, Stud Hole 9					
		NIP 541	CH-1-b	C.H. Stud No.1				100% of Studs	P1S-6.25
			CH-2-b	C.H. Stud No.2					
			CH-3-b	C.H. Stud No.3					
			CH-4-b	C.H. Stud No.4					
			CH-5-b	C.H. Stud No.5					

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2	XV	NIP 541	CH-6-b	C.H. Stud No.6	14-4	B-G-1	UT	100% of Studs	PIS-6.25
			CH-7-b	C.H. Stud No.7					
			CH-8-b	C.H. Stud No.8					
			CH-9-b	C.H. Stud No.9					
			CH-1-n	C.H. Nut No.1				100% of Nuts	PIN-6.25
			CH-2-n	C.H. Nut No.2					
			CH-3-n	C.H. Nut No.3					
			CH-4-n	C.H. Nut No.4					
			CH-5-n	C.H. Nut No.5					
			CH-6-n	C.H. Nut No.6					
			CH-7-n	C.H. Nut No.7					
			CH-8-n	C.H. Nut No.8					
			CH-9-n	C.H. Nut No.9					

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2	XI E	NIP 554	P-39-15 A-w	Pipe to ELL., 10"	9-2	C-F	UT	100% of Circ. Weld	P8R-.75-2
		NIP 564	HX-39-121SH-w	Emergency Cond. Heat Exchanger Dome Weld 5" Length	9-5	C-A			P8F-1.5-1
			HX-39-121RN-w	Emergency Cond. Heat Exchanger to Nozzle Weld, 12" Length		C-B			
	XI W	NIP 538	CH-1-574AB-w	C.H. Flange Weld	13-3	B-C		100% of Weld	P1F-4.31C
			CH-3-574 A-w	C.H. Meridional Weld, 9"		B-B		10% of Weld	
		NIP 539	CH-5-576-w	C.H to Vent Nozzle Weld	13-2	B-D		100% of Nozzle Weld	
			CH-3-576A-w	C.H. to Instrument Nozzle Weld					
			CH-1-576A-w	C.H. to Safety Vent Nozzle Weld					
		NIP 536	CH-5-576-r	Nozzle inner radius				100% of Nozzle radius	Later
			CH-3-576A-r	Nozzle inner radius					
			CH-1-576A-r	Nozzle inner radius					

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2	X W	NIP 554	P-39-22A-w	Pipe to Pipe, 10"	9-2	C-F	UT	100% of Circ. Weld	P8R-.75-2
	VII W		P-38-97-w	Pipe to ELL., 12"	8-2			100% of Long Weld	
			P-38-97-wU1	ELL Long Weld, Short Side					
			P-38-97-wU2	ELL Long Weld, Long Side					
	V W		P-81-35C-w	Pipe to Reducer, 12"	10-2	C-G		100% of Circ. Weld	P1R-.75-2
			P-81-35B-w	Pipe to ELL., 12"					
	XIV W		P-03-8D-w	Pipe to ELL., 16"	3-1	C-F			P1R-1.5-1
			P-03-8F-w	Pipe to ELL., 16"					
	XIII	NIP 541	V-01-03-b	Valve 01-03 Bolting*	1-1	B-G-1		100% of Bolting ≥ 2" Dia.	P1S-2.0 P1N-2.0

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*- If bolting is removed, a liquid penetrant examination shall be performed also (NIP 528)
- Individual bolting designations shall be determined and marked in field per figure 14-7.

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2	III E	NIP 528	~~P-32-71-w~~	~~Safe-end to Pipe Weld, 28"~~	~~5-1,5-2~~	~~B-F~~	~~SURF~~	~~100% of Circ Weld~~	~~N/A~~
			~~RV-4-565A-w~~	~~Nozzle-to-Safe-end Weld, 28"~~	~~14-2B~~				
			P-39-25-w	Safe-end to Pipe Weld, 10"	9-1				
			RV-1-566 A-w	Nozzle to Safe-end Weld, 10"	14-2A				
			P-NES-37-4-w	Pipe to Valve 37-01 Socket Weld, 2"	7-1	B-J			
			P-NES-37-5-w	Pipe to ELL., Socket Weld, 2"					
	II E		~~P-32-LUG/PS/A-s~~	~~Pipe Support (4 Lugs) Welds~~	~~5-1,5-7~~	~~B-K-1~~		~~Weld + 2 Support~~ t	
	XI W		CH-1-n	C.H. Nut No.1	14-4	B-G-1		100% of Nuts	
			CH-2-n	C.H. Nut No.2					
			CH-3-n	C.H. Nut No.3					

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2	IIIE	NIP-538	RV-2-565B-w	Nozzle to Safe-end Weld, 28"	14-2B	B-F	SURF	100% of Circ. Weld	N/A
↓	↓	↓	P-32-77-w	Pipe to Safe-end Weld, 28"	5-1, 5-3	↓	↓	↓	↓
			P-32-27-w	Cleanup Return Branch Weld, 6"	↓	B-J			
			RV-4-565B-w	Nozzle to Safe-end Weld, 28"	14-2B	B-F			
	↓		P-32-72-w	Pipe to Safe-end Weld, 28"	5-1, 5-3	↓		↓	
↓	IIE	↓	P-32-LUG/PS/B-S	Pipe Support, 4 Lugs	5-7	B-K-1	↓	Weld + 2 Support:t	↓

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2	III E	NIP 528	P-39-25-w	Safe-end to Pipe Weld, 10"	9-1	B-F	SURF	100% of Circ.Weld	N/A
↓	↓	↓	RV-1-566 A-w	Nozzle to Safe-end Weld, 10"	14-2A	↓	↓	↓	↓
↓	↓	↓	P-NES-37-4-w	Pipe to Valve 37-01 Socket Weld, 2"	7-1	B-J	↓	↓	↓
↓	↓	↓	P-NES-37-5-w	Pipe to ELL., Socket Weld, 2"	↓	↓	↓	↓	↓
↓	XI W	↓	CH-1-n	C.H. Nut No.1	14-4	B-G-1	↓	100% of Nuts	↓
↓	↓	↓	CH-2-n	C.H. Nut No.2	↓	↓	↓	↓	↓
↓	↓	↓	CH-3-n	C.H. Nut No.3	↓	↓	↓	↓	↓

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2	XI W	NIP 528	CH-4-n	C.H. Nut No.4	14-4	B-G-1	SURF	100% of Nuts	N/A
			CH-5-n	C.H. Nut No.5					
			CH-6-n	C.H. Nut No.6					
			CH-7-n	C.H. Nut No.7					
			CH-8-n	C.H. Nut No.8					
			CH-9-n	C.H. Nut No.9					
	XI E		P-34-13-w	Pipe to ELL., Socket Weld, 2"	7-1	B-J		100% of Circ. Weld	
			P-39-H37-s	Pipe Support (1 LUG) Weld	9-3	C-E-1		Weld + 2 Support t	
	VII W		V-38-03-b	Valve 38-03 Bolting*	8-2	C-D		10% of Bolting > 1" Dia	
			HX-38-11IN-w	Shutdown Cooling Heat Exchanger to Nozzle Weld, 9"	8-4, 8-5	C-B		100% of the Weld	
	V E		P-81-H35A-s	Pipe Support (Stanchion) Weld	10-6	C-E-1		Weld + 2 Support t	

* 2 bolts to be selected and designated in field if > 1" (only if removed).

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2	XV W	NIP 529	RV-A1-p	R.V. Shell Cladding	14-5	B-I-1	VIS	6" x 6" patch	N/A
	XV E		RV-1-t	R.V. Bushing, Threads, and Washers	14-4	B-G-1		100% of visible components	
			RV-2-t						
			RV-3-t						
			RV-4-t						
			RV-5-t						
			RV-6-t						
			RV-7-t						
			RV-8-t						
			RV-9-t						
	XI		P-34-R5-s	Pipe Support	7-3	B-K-2		All Support Components	
			P-NES-37-R5-s	Pipe Support					

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2	XI	NIP 529	P-NES-37-R6-s	Pipe Support	7-3	B-K-2	VIS	All Support Components	N/A
↓	↓	↓	CH-576-12B-b	Nozzle 576-12B Flange Bolting	13-2	B-G-2	↓	100% of Bolting < 2" Dia.	↓
↓	↓	↓	CH-576-12C-b	Nozzle 576-12C Flange Bolting	↓	↓	↓	↓	↓
↓	↓	↓	P-39-H37-s	Pipe Support	9-3	C-E-2	↓	All Support Components	↓
↓	XIII	↓	V-31-03-b	Valve 31-03 Bolting	4-1	B-G-2	↓	100% of Bolting < 2" Dia.	↓
↓	↓	↓	V-01-05-b	Warm-up Valve 01-05 Bolting	1-1	↓	↓	↓	↓
↓	VII W	↓	V-38-03-b	Valve 38-03 Bolting	8-2	C-D	↓	100% of Bolting > 1" Dia	↓
↓	V E	↓	P-81-H35A-s	Pipe Support (Stanchion)	10-6	C-E-2	↓	All Support Components	↓

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2	II E	NIP 529	~~P-32-H3/A-s~~	~~Loop A Pipe Support (2 Units)~~	~~5-1, 5-7~~	~~B-K-2~~	~~VIS~~	~~All Support Components~~	N/A
			~~P-32-LUG/PS/A-s~~	~~Loop A Pipe Support (4 LUGS)~~					
			~~P-32-SB1/PS/A-s~~	~~Loop A Pipe Support (2 Units)~~					
			~~V-NG08/A-b~~	~~Loop A Valve NG08 Bolting~~	~~5-1, 5-2~~	~~B-G-2~~		~~100% Bolting <2" Dia.~~	
			V-37-RD-1-b	Valve 37-RD-1 Bolting	7-4				
	I E		~~PM-32-H1/A-s~~	~~Pump A Support (4 Units)~~	~~5-1, 5-7~~	~~B-K-2~~		~~All Support Components~~	
			~~PM-32-SS1/A-s~~	~~Pump A Support (2 Units)~~					
			~~PM-32-PSF/A-s~~	~~Pump A Support Frame~~					
			~~PM-32-SS3/A-s~~	~~Pump A Support~~					

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2	II E	NIP 529	P-32-H3/B-s	Loop B Pipe Support (2 Units)	5-1,5-7	B-K-2	VIS	All Support Components	N/A
↓	↓	↓	P-32-LUG/PS/B-s	Loop B Pipe Support (4 LUGS)	↓	↓	↓	↓	↓
↓	↓	↓	P-32-SB1/PS/B-s	Loop B Pipe Support (2 Units)	↓	↓	↓	↓	↓
↓	↓	↓	V-NG08/B-b	Loop B Valve NG08 Bolting	5-1,5-2	B-G-2	↓	100% Bolting <2" Dia.	↓
↓	↓	↓	V-37-RD-1-b	Valve 37-RD-1 Bolting	7-4	↓	↓	↓	↓
↓	I E	↓	PM-32-H1/B-s	Pump B Support (4 Units)	5-1, 5-7	B-K-2	↓	All Support Components	↓
↓	↓	↓	PM-32-SS1/B-s	Pump B Support (2 Units)	↓	↓	↓	↓	↓
↓	↓	↓	PM-32-PSF/B-s	Pump B Support Frame	↓	↓	↓	↓	↓
↓	↓	↓	PM-32-SS3/B-s	Pump B Support	↓	↓	↓	↓	↓

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2	III E	NIP 529	P-39-H24-s	Pipe Support (Stanchion)	9-3	B-K-2	VIS	All Support Components	N/A
			P-39-H23-s	Pipe Support (Stanchion)					
			V-34-02-b	Valve 34-02 Bolting	7-1	B-G-2		100% of Bolting <2" Dia.	
			V-MS-9-b	Valve MS-9 Bolting					
			V-37-01-b	Valve 37-01 Bolting					
			V-37-06-b	Valve 37-06 Bolting					
	III W		P-40-SC47-s	Pipe Support (2 LUGS)	10-4	B-K-2		All Support Components	
			P-40-H21-s	Pipe Support					
			P-40-SC51-s	Pipe Support					

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2	III W	NIP 529	HYD-N17B	2" Protection System Reference Penetration	15-1A	B-E	HYD VIS	Area Surrounding Penetration @ 100% Operating Pressure	N/A
	II		HYD-CRD-T1	Control Rod Drive Penetration	14-3				
			HYD-CRD-Q1						
			HYD-CRD-T2						
			HYD-CRD-U3						
			HYD-CRD-R4						
			HYD-CRD-S3						
			HYD-CRD-R5						
			HYD-CRD-U6						
			HYD-CRD-T7						
			HYD-CRD-Q4						
			HYD-CRD-T8						

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2	11	NIP 529	HYD-FM-1	Flux Monitor Penetration	14-3	B-E	HYD VIS	Area Surrounding Penetration @ 100% Operating Pressure	N/A
↓	↓	↓	HYD-FM-4	↓	↓	↓	↓	↓	↓
↓	↓	↓	HYD-FM-7	↓	↓	↓	↓	↓	↓
↓	↓	↓	HYD-FM-10	↓	↓	↓	↓	↓	↓
↓	↓	↓	HYD-FM-13	↓	↓	↓	↓	↓	↓

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2	III	NIP 529	HYD-36-11	Instrumentation Lines Inside Drywell	15-1, 15-3 15-1A	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-2		,15-2				
			HYD-36-10		,15-5				
			HYD-36-4		,15-6				
			HYD-36-7		,15-7				
			HYD-36-8		,15-7				
			HYD-36-3		,15-2				
			HYD-36-12		,15-3				
			HYD-36-9		,15-5				
			HYD-36-5		,15-6				

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2	III	NIP 529	HYD-36-6	Instrumentation Lines Inside Drywell	15-1, 1A,4	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	↓	↓	HYD-36-1	↓	↓	↓	↓	↓	↓
			HYD-01-1	1" Instr. lines from Main Steam (East & West)	15-8, 15-9 15-10				
			HYD-01-2	Drains from Valves 01-01, 01-02	, 1-1				
			HYD-39-1	1" Pressure line on Emergency Cond. Supply (East and West)	, 15-17 15-18				
			HYD-39-4	Drains from Valves 39-01, 39-02, 39-03, 39-04	, 9-2				
			HYD-33-1	Drains from Valve 33-01	, 6-1				
			HYD-33-3	Drains from Valve 33-02	, 6-1				
↓	↓	↓	HYD-38-1	Drains from Valve 38-01	↓ , 8-1	↓	↓	↓	↓

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2	III	NIP 529	HYD-38-3	Drains from Valve 38-13	15-8, 8-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	↓	↓	HYD-40-1	Drains from Valves 40-01, 40-09, 40,10, 40-11	,10-1	↓	↓	↓	↓
			HYD-40-3	1" Instrument Line from Core Spray (Typ. of 2)	,15-19				
			HYD-44.1-1	Drain Line on CRD Return	,12-1				
	↓		HYD-42.1-1	Drain Line on Liquid Poison	,11-1				
	II		HYD-32-1	Drain Line on Suction Valve BV-NG02-(A, B, C, D, E)	-				
	↓		HYD-32-6	1" F. E. Instrument Line on Discharge Side (A, B, C, D, E)	,15-15,16				
↓	↓	↓	HYD-32-8	Drain Line on Discharge Valve BV-NG03-(A,B,C,D,E)	-	↓	↓	↓	↓

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2	11	NIP 529	HYD-32-9	Drain Line on 2" Bypass Valve from Valve BV-NG03-(A,B,C,D,E)	15-8	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	1	↓	HYD-32-2	1" T.E. Thermowell on Suction Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-32-3	1" dP Line Around Recirculation Pumps (A,B,C,D,E)	15-11,12,13 14	↓	↓	↓	↓
↓	↓	↓	HYD-32-4	Drain Line From Recirculation Pump NG01 (A,B,C,D,E,)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-32-5	T.E. Thermowell on Discharge Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓

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2	IX	NIP 529	HYD-34-1	Drain Line on Valve IV-34-01 on Head Spray	15-8, 7-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-39-2	Drain Lines from Valves 39-07, 39-08, 39-09, 39-10	; 9-1				
	VIII		HYD-36-13	Instrumentation Line Outside Drywell	15-1				
			HYD-36-14						
			HYD-36-15						
			HYD-36-16						
			HYD-36-19						
			HYD-36-20						
			HYD-36-21						

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2	VIII	NIP 529	HYD-36-22	Instrumentation Line Outside Drywell	15-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-23						
			HYD-36-24						
			HYD-39-3	1" Pressure Line and Valve on Emerg. Cond. (Typ. of 2)	15-8				
			HYD-39-5	Drain Lines on Valves 39-05, and 39-06 on Emerg. Cond Return	, 9-2				
			HYD-40-4	Instrument Line and Valve on Core Spray (Typ of 2)					
	VII		HYD-33-2	Drain Lines on Valve IV-33-03	; 6-1				
			HYD-33-4	Drain Lines on Valve IV-33-04	, 6-1				

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2	VII	NIP 529	HYD-38-2	Drain Lines on Valve IV-38-02	15-8, 8-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-38-4	Drain Lines on Valve IV-38-12	, 8-1				
	VI	NIP 529	HYD-01-4	Instrument Lines and Valves from Main Steam Lines					
			HYD-40-2	Drain Lines on Valves IV-40-02, IV-40-12	, 10-1				
			HYD-32-7	F. E. Instrument Lines and Valves (A,B,C,D,E)					
			HYD-32-10	1" dP Lines and Valves around recirc. pump (A,B,C,D,E)					
	XIII	NIP 529	HYD-01-03	Drain Line on Warm-up by-pass lines around valves IV-01-03 and IV-01-04 on Main Steam Lines	, 1-1				

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2	XIII	NIP-529	HYD-31-1	Drain Lines on Valves IV-31-01, IV-31-02, IV-31-03, IV-31-04	15-8, 4-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
	-		HYD-49	Feedwater	15-35A, B, C, D	Group B Exempt		125% Design Pressure	
	-		HYD-50	Feedwater					
	-		HYD-51	Feedwater	15-36A, B				
	-		HYD-72	Emergency Service Water	15-28A, B	Group C		110% Design Pressure	
	-		HYD-60	Emergency Cond. Make-up	15-30A, B				
	-		HYD-79	Diesel Gen. Cooling	15-33A,B,C,D				
	-		HYD-93	Cont.Spray Raw Water	15-32A, B				
	-		HYD-70	Closed Loop Cooling Water	15-20				

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2	IIIE	NIP-544	RV-1-565B-w	Vesselto Nozzle Weld	14-2B	B-D	UT	100% of Nozzle Weld	PIF-1.5C
		NIP-563	RV-2-565B-w	Nozzle to Safe-end, 28"		B-F		100% of Circ Weld	PIF-1.5C P8F-1.5-1
		NIP-554	P-32-77-w	Pipe to Safe-end Weld, 28"	5-1, 5-3				P8F-1.5-1
			P-32-72-w	Pipe to Safe-end Weld, 28"					
		NIP-563	RV-4-565B-w	Nozzle to Safe-end Weld, 28"	14-2B				
	IIE	NIP-554	P-32-28-w	Valve NG02B to Pipe Weld, 28"	5-1, 5-3	B-J			
			P-32-28-wD	Straight Pipe Long. Weld, 28"				12" of Long. Weld	

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2	IE	NIP-554	P-32-39	Pipe to ELL Weld, 28"	5-1, 5-3	B-J	UT	100% of Circ. Weld	P8F-1.5-1
			P-32-39-WU1	ELL Long. Weld, Short Side				12" of Long. Weld	
			P-32-39-WU2	ELL Long. Weld, Long Side					
			P-32-39-WD	Straight Pipe Long. Weld					
	IIE	NIP-541	V-NG02B-b	Valve NG02B Bolting *, 24 Studs, 48 Nuts	5-1	B-G-1	UT	100% of Bolting ≥ 2" Dia.	P1S-2.0 P1N-2.0
			V-NG03B-b	Valve NG03B Bolting *, 20 Studs, 40 Nuts					P1S-2.0 P1N-2.0
			PM-NG01B-b	Pump NG01B Bolting *, 16 Bolts					P1S-2.5

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* If bolting is removed, a liquid penetrant examination shall be performed also (NIP 528), individual bolting designations shall be determined and marked in field per Fig. 14-7.

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2	IIIE	NIP-528	RV-2-565B-w	Nozzle to Safe-end Weld, 28"	14-2B	B-F	PT	100% of Circ. Weld	N/A
			P-32-77-w	Pipe to Safe-end Weld, 28"	5-1, 5-3				
			P-32-27-w	Cleanup Return Branch Weld, 6"		B-J			
			RV-4-565B-w	Nozzle to Safe-end Weld, 28"	14-2B	B-F			
			P-32-72-w	Pipe to Safe-end Weld, 28"	5-1, 5-3				
	IIE		P-32-LUG/PS/B-S	Pipe Support, 4 Lugs	5-7	B-K-1		Weld + 2 Support t	

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2	IE	NIP-529	PM-32-SS3/B-s	Pump B Support	5-7	B-K-2	VIS	All Support Components	N/A
			PM-32-PSF/B-s	Pump B Support Frame					
			PM-32-SS1/B-s	Pump B Support, 2 Units					
			PM-32-H1/B-s	Pump B Support, 4 Units					
	IIE		V-NG08/B-b	Loop B Valve NG08 Bolting		B-G-2		100% of ≤ 2" Bolting	
			P-32-SB1/PS/B-s	Loop B Pipe Support, 2 Units		B-K-2		All Support Components	
			P-32-LUG/PS/B-s	Loop B Pipe Support, 4 Lugs					
			P-32-H3/B-s	Loop B Pipe Support, 2 Units					

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3	III, E	NIP 536	RV-2-567A-r	Nozzle inner radius	14-2A	B-D	UT	100% of Nozzle radius	Later
			RV-3-565B-r	Nozzle inner radius	14-2B				
		NIP-544	RV-1-565A-w	Vessel to Nozzle Weld				100% of Nozzle Weld	P1F-1.5C
		NIP 554	P-32-76-w	Pipe to Safe-end Weld, 28"	5-1, 5-2	B-F		100% of Circ. weld	P8F-1.5-1
		NIP 544	RV-2-565A-w	Nozzle to Safe-end, 28"	14-2B				P1F-1.5C P8F-1.5-1
		NIP 554	P-32-71-w	Pipe to Safe-end Weld, 28"	5-1, 5-2				P8F-1.5-1
		NIP 563	RV-4-565-A-w	Nozzle to Safe-end, 28"	14-2B				
	II E	NIP 554	P-32-01-w	Valve NG02A to Pipe Weld, 28"	5-1, 5-2	B-J			
	III E	NIP 536	RV-1-565-A-r	Nozzle inner radius	14-2B	B-D		100% of Nozzle radius	Later
			RV-1-565-B-r	Nozzle inner radius					

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3	II E	NIP 554	P-32-01-wU	Straight Pipe Long. Weld, 28"	5-1, 5-2	B-J	UT	12" of Long.weld	P8F-1.5-1
	I E		P-32-03	Pipe to ELL Weld, 28"				100% of Circ. weld	
			P-32-03-wU1	ELL Long. Weld, Short Side				12" of Long.weld	
			P-32-03-wU2	ELL Long. Weld, Long Side					
	III E		P-01-16Z-w	Pipe to ELL Weld, 24"	1-1			100% of Circ. weld	P1F-1.5-1
			P-40-78-w	Transition Weld, 6"	10-1	B-F			P8R-.75-3
			P-40-79-w	Pipe to Safe-end Weld, 6"					
		NIP 563	RV-1-566A-w	Nozzle to Safe-end Weld 10"	14-2A				P8R-1.5-1

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3	III E	NIP 563	RV-1-567A-w	Nozzle to Safe-end, 6"	14-2A	B-F	UT	100% of Circ. weld	P8R-75-3
		NIP 554	P-40-39D	Pipe to Tee, 12"	10-1	B-J			P8R-75-2
			P-40-39D-wU	Tee Long.Weld, Short Sides				12" of Long weld	
			P-40-39D-wD	Straight Pipe Long. Weld, 12"					
	III W	NIP 541	V-01-01-b	Valve 01-01 Bolting*	1-1	B-G-1		100% of Bolting ≥ 2" Dia.	P1S-2.0 P1N-2.0
	II E		V-NG02A-b	Valve NG02A Bolting,* 24 Studs, 48 Nuts	5-1				P1S-2.0 P1N-2.0
			V-NG03A-b	Valve NG03A Bolting,* 20 Studs, 40 Nuts					P1S-2.0 P1N-2.0
			PM-NG01A-b	Pump NG01A Bolting, * 16 Bolts					P1S-2.5
	XV	NIP 533	RV-3-563/2-w	Vessel to Flange Weld, 96" Length CW from 51°	14-6	B-C		100% of Weld	P1-LF-1

NES III 7/75

*- If bolting is removed, a liquid penetrant examination shall be performed also (NIP 528)
- Individual bolting designations shall be determined and marked in field per figure 14-7.

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3	III E	NIP 563	RV-1-567A-w	Nozzle to Safe-end, 6"	14-2A	B-F	UT	100% of Circ. weld	P8R-75-3
		NIP 554	P-40-39D	Pipe to Tee, 12"	10-1	B-J			P8R-75-2
			P-40-39D-wU	Tee Long.Weld, Short Sides				12" of Long weld	
			P-40-39D-wD	Straight Pipe Long. Weld, 12"					
	III W	NIP 541	V-01-01-b	Valve 01-01 Bolting*	1-1	B-G-1		100% of Bolting ≥ 2" Dia.	P1S-2.0 P1N-2.0
	II E		V-NG02B-b	Valve NG02B Bolting,* 24 Studs, 48 Nuts	5-1				P1S-2.0 P1N-2.0
			V-NG03B-b	Valve NG03B Bolting,* 20 Studs, 40 Nuts					P1S-2.0 P1N-2.0
			PM-NG01B-b	Pump NG01B Bolting, * 16 Bolts					P1S-2.5
	XV	NIP 533	RV-3-563/2-w	Vessel to Flange Weld, 96" Length CW from 51°	14-6	B-C		100% of Weld	P1-LF-1

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*- If bolting is removed, a liquid penetrant examination shall be performed also (NIP 528)
- Individual bolting designations shall be determined and marked in field per figure 14-7.

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3	XV	NIP 534	RV-10-1	Flange Ligament Area, Hole 10	14-4	B-G-1	UT	100% of Ligament	P1-LF-1
			RV-11-1	Flange Ligament Area, Hole 11					
			RV-12-1	Flange Ligament Area, Hole 12					
			RV-13-1	Flange Ligament Area, Hole 13					
			RV-14-1	Flange Ligament Area, Hole 14					
			RV-15-1	Flange Ligament Area, Hole 15					
			RV-16-1	Flange Ligament Area, Hole 16					
			RV-17-1	Flange Ligament Area, Hole 17					
			RV-18-1	Flange Ligament Area, Hole 18					

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3	XV	NIP 534	RV-19-1	Flange Ligament Area, Hole 19	14-4	B-G-1	UT	100% of Ligament	P1-LF-1
		NIP 541	CH-10-b	C.H. Stud No. 10				100% of Studs	P1S-6.25
			CH-11-b	C.H. Stud No. 11					
			CH-12-b	C.H. Stud No. 12					
			CH-13-b	C.H. Stud No. 13					
			CH-14-b	C.H. Stud No. 14					
			CH-15-b	C.H. Stud No. 15					
			CH-16-b	C.H. Stud No. 16					
			CH-17-b	C.H. Stud No. 17					
			CH-18-b	C.H. Stud No. 18					
			CH-19-b	C.H. Stud No. 19					

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3	XI W	NIP 538	CH-3-574B-w	C.H. Meridional Weld, 9"	13-3	B-B	UT	10% of Weld	PIF-4.31C
			CH-1-574BC-w	C.H. Flange Weld		B-C		100% of Weld	
		NIP 539	CH-1-576B-w	C.H. to Safety Vent Nozzle Weld	13-2	B-D		100% of Nozzle weld	
			CH-1-576C-w	C.H. to Safety Vent Nozzle Weld					
			CH-3-576B-w	C.H. to Head Spray Nozzle Weld					
	XI	NIP 541	CH-10-n	C.H. Nut No. 10	14-4	B-G-1		100% of Nuts	PIN-6.25
			CH-11-n	C.H. Nut No. 11					
			CH-12-n	C.H. Nut No. 12					
			CH-13-n	C.H. Nut No. 13					
			CH-14-n	C.H. Nut No. 14					
		NIP 536	CH-1-576B-r	Nozzle inner radius	13-2	B-D		100% of Nozzle radius	Later
			CH-1-576C-r	Nozzle inner radius					

NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
3	XI W	NIP 538	CH-3-574H-W	C.H. Meridional Weld, 9"	13-3	B-B	UT	10% of Weld	P1F-4.31C
			CH-3-574B-w	C.H. Meridional Weld, 9"					
			CH-1-574BC-w	C.H. Flange Weld		B-C		100% of Weld	
		NIP 539	CH-1-576B-w	C.H. to Safety Vent Nozzle Weld	13-2	B-D		100% of Nozzle weld	
			CH-1-576C-w	C.H. to Safety Vent Nozzle Weld					
			CH-3-576B-w	C.H. to Head Spray Nozzle Weld					
	XI	NIP 541	CH-10-n	C.H. Nut No. 10	14-4	B-G-1		100% of Nuts	P1N-6.25
			CH-11-n	C.H. Nut No. 11					
			CH-12-n	C.H. Nut No. 12					
			CH-13-n	C.H. Nut No. 13					
			CH-14-n	C.H. Nut No. 14					
		NIP 536	CH-1-576B-r	Nozzle inner radius	13-2	B-D		100% of Nozzle radius	Later
			CH-1-576C-r	Nozzle inner radius					

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATON METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
3	XI	NIP 536	CH-3-576-B-r	Nozzle inner radius	13-2	B-D	UT	100% of Nozzle radius	Later
		NIP 541	CH-15-n	C.H. Nut No. 15	14-4	B-G-1		100% of Nuts	PIN-6.25
			CH-16-n	C.H. Nut No. 16					
			CH-17-n	C.H. Nut No. 17					
			CH-18-n	C.H. Nut No. 18					
			CH-19-n	C.H. Nut No. 19					
	XI E	NIP 554	P-39-6C-wD1	ELL Long. Weld, Short Side	9-1	C-F		100% of Long. Weld	P8R-.75-2
			P-39-6C-wD2	ELL Long. Weld, Long Side					
			P-39-23-wD1	TEE Long. Weld, Short Sides	9-2				
			P-39-23-wD2	TEE Long. Weld, Long Side					
	XIV		P-03-7-w	Pipe to ELL Weld, 16"	3-1			100% of Circ. weld	P1R-1.5-1
			P-03-7F-w	ELL to Pipe Weld,16"					

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3	III E	NIP 528	RV-2-565A-w	Nozzle to Safe-end Weld, 28"	14-2B	B-F	SURF	100% of Circ. weld	N/A
			P-32-76-w	Pipe to Safe-end Weld, 28"	5-1, 5-2				
			RV-1-567A-w	Nozzle to Safe-end Weld, 6"	14-2A				
			P-40-78-w	Transition Weld, 6"	10-1				
			P-40-79-w	Pipe to Safe-end Weld, 6"	10-1				
			RV-2-565B-w	Nozzle to Safe-end Weld, 28"	14-2B				
			P-32-77-w	Pipe to Safe-end Weld, 28"	5-1, 5-3				
			P-32-27-w	Clean-up Return, Branch Weld, 6"	5-1, 5-3	B-J			
			RV-4-565B-w	Nozzle to Safe-end Weld, 28"	14-2B	B-F			

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3	III E	NIP 528	RV-2-565A-w	Nozzle to Safe-end Weld, 28"	14-2B	B-F	SURF	100% of Circ. weld	N/A
			P-32-76-w	Pipe to Safe-end Weld, 28"	5-1, 5-2				
			RV-1-567A-w	Nozzle to Safe-end Weld, 6"	14-2A				
			P-40-78-w	Transition Weld, 6"	10-1				
			P-40-79-w	Pipe to Safe-end Weld, 6"	10-1				
			P-32-71-w	Pipe to Safe-end Weld, 28"	5-1, 5-2				
			RV-4-565B-w	Nozzle to Safe-end Weld, 28"	14-2B	B-F			
	VII W		V-38-03-b	Valve 38-03 bolting *	8-2	C-D		10% of bolting > 1" dia.	

NES III 7/75

* 2 bolts to be selected and designated in field if > 1" (only if removed)

NUCLEAR ENERGY SERVICES, INC.
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3	III E	NIP 528	P-01-16X-w	6" Weldolet	1-1	B-J	SURF	100% of Circ. weld	N/A
			P-NES-37-6-w	Pipe to ELL, Socket Weld, 2"	7-1				
			P-NES-37-7-w	Valve 37-02 to Pipe, Socket Weld, 2"	7-1				
			P-31-H4-s	Pipe Support, Stanchion	4-2	B-K-1		Weld +2 support t	
	II E		P-32-LUG/PS/A-s	Pipe Support, 4 Lugs	5-7				
	V		S-81-25-b	Strainer 81-25 Bolting*	10-5	C-D		10% of Bolting > 1" Dia.	
	IV		BJ-81-1-b	Ball Joint 81-1 Bolting*					
			V-81-21-b	Valve 81-21 Bolting*					
			Pm-81-24-b	Pump 81-24 Bolting*					

NES III 7/75

* 2 Bolts/joint to be selected and designated in the field of > 1" Dia.

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3	XIV W	NIP-528	P-03-H4-S	Pipe Support, 4 Lugs	3-2	C-E-1	SURF	Weld + 2 support t	N/A
	III E		P-40-H55-S	Pipe Support, Stanchion	10-4	B-K-1			
			P-31-H11-S	Pipe Support, Stanchion	4-2				
			P-31-H8-S	Pipe Support, Stanchion					
			P-01-H19-S	Pipe Support, Stanchion	1-2				

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3	III E	NIP 529	V-33-01-b	Valve 33-01 Bolting	6-1	B-G-2	VIS	100% of Bolting < 2" Dia.	N/A
			P-40-H56-s	Pipe Support	10-4	B-K-2		All support components	
			V-40-01-b	Valve 40-01 Bolting	10-4	B-G-2		100% of Bolting < 2" Dia.	
			V-01-09-b	Valve 01-09 Bolting	1-2				
			V-01-MSER-V1-b	Valve MSER-V1 Bolting					
			P-01-H27-s	Pipe Support		B-K-2		All support components	
			V-01-10-b	Valve 01-10 Bolting		B-G-2		100% of Bolting < 2" Dia.	
			V-01-MSER-V4-b	Valve MSER-V4 Bolting					
			P-01-H25-s	Pipe Support		B-K-2		All support components	

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
3	III E	NIP 529	V-37-02-b	Valve 37-02 Bolting	7-3	B-G-2	VIS	100% of Bolting < 2" Dia.	N/A
			V-42.1-01-b	Valve 42.1-01 Bolting	11-1				
	III W		P-31-H4-s	Pipe Support	4-2	B-K-2		All support components	
			P-40-H19-s	Pipe Support	10-4				
	III E		V-CU-27-b	Valve CU-27 Bolting	7-2	B-G-2		100% of Bolting < 2" Dia.	
	I E		PM-32-SS3/B-s	Pump B Support	5-7	B-K-2		All support components	
			PM-32-PSF/B-s	Pump B Support Frame					
			PM-32-SS1/B-s	Pump B Support, 2 Units					
			PM-32-H1/B-s	Pump B Support, 4 Units					
	II E		V-NG08/B-b	Loop B Valve NG08 Bolting		B-G-2		100% of Bolting < 2" Dia.	

OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
3	III E	NIP 529	V-37-02-b	Valve 37-02 Bolting	7-3	B-G-2	VIS	100% of Bolting < 2" Dia.	N/A
↓	↓	↓	V-42.1-01-b	Valve 42.1-01 Bolting	11-1	↓	↓	↓	↓
↓	III W	↓	P-31-H4-s	Pipe Support	4-2	B-K-2	↓	All support components	↓
↓	↓	↓	P-40-H19-s	Pipe Support	10-4.	↓	↓	↓	↓
↓	III E	↓	V-CU-27-b	Valve CU-27 Bolting	7-2	B-G-2	↓	100% of Bolting < 2" Dia.	↓
↓	I E	↓	PM-32-SS3/ A-s	Pump A Support	5-7	B-K-2	↓	All support components	↓
↓	↓	↓	PM-32-PSF/A-s	Pump A Support Frame	↓	↓	↓	↓	↓
↓	↓	↓	PM-32-SS1/ A-s	Pump A Support, 2 Units	↓	↓	↓	↓	↓
↓	↓	↓	PM-32-H1/ A-s	Pump A Support, 4 Units	↓	↓	↓	↓	↓
↓	II E	↓	V-NG08/A-b	Loop A Valve NG08 Bolting	↓	B-G-2	↓	100% of Bolting < 2" Dia.	↓

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
3	II E	NIP 529	P-32-SB1/ PS/A-s	Loop A Pipe Support, 2 Units	5-7	B-K-2	VIS	All support components	N/A
			P-32-LUG/ PS/A-s	Loop A Pipe Support, 4 Lugs					
			P-32-H3/ A-s	Loop A Pipe Support 2 Units					
	XI		CH-576-12L-b	Nozzle 576-12L Flange Bolting	13-2	B-G-2		100% of Bolting <2" Dia.	
			RV-01-i	Steam Dryer	14-1	B-N-1		All accessible areas	
			RV-02-i	Steam Separator					
	XV		RV-05-i	Feedwater Spargers					
			RV-06-i	Core Spray Spargers					
			RV-07-i	Core Spray Lines					

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
3	XV	NIP 529	RV-13-i	Upper Core Grid	14-1	B-N-1	VIS	All accessible areas	N/A
			RV-14-i	Core Shroud					
			RV-15-i	Core Shroud Support Ring					
			RV-B2-p	R.V. Shell Cladding	14-5	B-I-1		6" X 6" Patch	
			RV-10-t	R.V. Bushing, Threads and Washers	14-4	B-G-1		100% of visible components	
			RV-11-t	R.V. Bushing, Threads and Washers					
			RV-12-t	R.V. Bushing, Threads and Washers					
			RV-13-t	R.V. Bushing, Threads and Washers					
			RV-14-t	R.V. Bushing, Threads and Washers					
	VII W		V-38-03-b	Valve 38-03 bolting	8-2	C-D		100% of bolting > 1" Dia.	

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3	XV	NIP 529	RV-15-t	R.V. Bushing, Threads and Washers	14-4	B-G-1	VIS	100% of visible components	N/A
			RV-16-t	R.V. Bushing, Threads and Washers					
			RV-17-t	R.V. Bushing, Threads and Washers					
			RV-18-t	R.V. Bushing, Threads and Washers					
			RV-19-t	R.V. Bushing, Threads and Washers					
	IX E		P-39-HS-13-s	Pipe Support	9-3	C-E-2			
	IX W		P-39-HS-27-s	Pipe Support					

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3	III	NIP 529	HYD-36-6	Instrumentation Lines Inside Drywell	15-1, 1A, 4	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-1						
			HYD-01-1	1" Instr. lines from Main Steam (East & West)	15-8, 15-9 15-10				
			HYD-01-2	Drains from Valves 01-01, 01-02	, 1-1				
			HYD-39-1	1" Pressure line on Emergency Cond. Supply (East and West)	, 15-17 15-18				
			HYD-39-4	Drains from Valves 39-01, 39-02, 39-03, 39-04	, 9-2				
			HYD-33-1	Drains from Valve 33-01	, 6-1				
			HYD-33-3	Drains from Valve 33-02	, 6-1				
			HYD-38-1	Drains from Valve 38-01	, 8-1				

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3	XI	NIP 529	CH-10-n	C.H. Nut No. 10	14-4	B-G-1	VIS	100% of Nuts	N/A
			CH-11-n	C.H. Nut No. 11					
			CH-12-n	C.H. Nut No. 12					
			CH-13-n	C.H. Nut No. 13					
			CH-14-n	C.H. Nut No. 14					
			CH-15-n	C.H. Nut No. 15					
			CH-16-n	C.H. Nut No. 16					
			CH-17-n	C.H. Nut No. 17					
			CH-18-n	C.H. Nut No. 18					
			CH-19-n	C.H. Nut No. 19					

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3	VII	NIP-529	V-31-01-b	Valve 31-01 Bolting	4-1	B-G-1	VIS	100% of Bolting	N/A
	V		S-81-25-b	Strainer 81-25 Bolting	10-5	C-D			
	IV		BJ-81-1-b	Ball Joint 81-1 Bolting					
			V-81-21-b	Valve 81-21 Bolting					
			PM-81-24-b	Pump 81-24 Bolting					
	XI		CH-15-b	C.H. Stud No. 15	14-4	B-G-1		100% of Studs	
			CH-16-b	C.H. Stud No. 16					
			CH-17-b	C.H. Stud No. 17.					
			CH-18-b	C.H. Stud No. 18					

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3	III E	NIP-529	P-40-H55-s	Pipe Support	10-4	B-K-2	VIS	All Support Components	N/A
↓	↓	↓	P-31-H11-s	Pipe Support	4-2	↓	↓	↓	↓
↓	↓	↓	P-31-H8-s	Pipe Support	↓	↓	↓	↓	↓
↓	↓	↓	P-01-H19-s	Pipe Support	1-2	↓	↓	↓	↓

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3	III	NIP 529	HYD-36-11	Instrumentation Lines Inside Drywell	15-1, 15-3 15-1A	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-2		,15-2				
			HYD-36-10		,15-5				
			HYD-36-4		,15-6				
			HYD-36-7		,15-7				
			HYD-36-8		,15-7				
			HYD-36-3		,15-2				
			HYD-36-12		,15-3				
			HYD-36-9		,15-5				
			HYD-36-5		,15-6				

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3	III	NIP 529	HYD-38-3	Drains from Valve 38-13	15-8, 8-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	↓	↓	HYD-40-1	Drains from Valves 40-01, 40-09, 40,10, 40-11	,10-1	↓	↓	↓	↓
			HYD-40-3	1" Instrument Line from Core Spray (Typ. of 2)	,15-19				
			HYD-44.1-1	Drain Line on CRD Return	,12-1				
	↓		HYD-42.1-1	Drain Line on Liquid Poison	,11-1				
	II		HYD-32-1	Drain Line on Suction Valve BV-NG02-(A, B, C, D, E)	-				
	↓		HYD-32-6	1" F. E. Instrument Line on Discharge Side (A, B, C, D, E)	,15-15,16				
↓	↓	↓	HYD-32-8	Drain Line on Discharge Valve BV-NG03-(A,B,C,D, E)	-	↓	↓	↓	↓

NUCLEAR ENERGY SERVICES, INC.
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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
3	11	NIP 529	HYD-32-9	Drain Line on 2" Bypass Valve from Valve BV-NG03-(A,B,C,D,E)	15-8	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	1	↓	HYD-32-2	1" T.E. Thermowell on Suction Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓
	↓		HYD-32-3	1" dP Line Around Recirculation Pumps (A,B,C,D,E)	15-11,12,13 14				
			HYD-32-4	Drain Line From Recirculation Pump NG01 (A,B,C,D,E,)	15-8				
			HYD-32-5	T.E. Thermowell on Discharge Side of Pump (A,B,C,D,E)	15-8				

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
3	IX	NIP 529	HYD-34-1	Drain Line on Valve IV-34-01 on Head Spray	15-8, 7-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-39-2	Drain Lines from Valves 39-07, 39-08, 39-09, 39-10	, 9-1				
	VIII		HYD-36-13	Instrumentation Line Outside Drywell	15-1				
			HYD-36-14						
			HYD-36-15						
			HYD-36-16						
			HYD-36-19						
			HYD-36-20						
			HYD-36-21						

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3	VIII	NIP 529	HYD-36-22	Instrumentation Line Outside Drywell	15-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-23						
			HYD-36-24						
			HYD-39-3	1" Pressure Line and Valve on Emerg. Cond. (Typ. of 2)	15-8				
			HYD-39-5	Drain Lines on Valves 39-05, and 39-06 on Emerg. Cond Return	, 9-2				
			HYD-40-4	Instrument Line and Valve on Core Spray (Typ of 2)					
	VII		HYD-33-2	Drain Lines on Valve IV-33-03	, 6-1				
			HYD-33-4	Drain Lines on Valve IV-33-04.	, 6-1				

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3	VII	NIP 529	HYD-38-2	Drain Lines on Valve IV-38-02	15-8, 8-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-38-4	Drain Lines on Valve IV-38-12	, 8-1				
	VI	NIP 529	HYD-01-4	Instrument Lines and Valves from Main Steam Lines					
			HYD-40-2	Drain Lines on Valves IV-40-02, IV-40-12	, 10-1				
			HYD-32-7	F. E. Instrument Lines and Valves (A,B,C,D,E)					
			HYD-32-10	1" dP Lines and Valves around recirc. pump (A,B,C,D,E)					
	XIII	NIP 529	HYD-01-03	Drain Line on Warm-up by-pass lines around valves IV-01-03 and IV-01-04 on Main Steam Lines	, 1-1				

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3	XIII	NIP 529	HYD-31-1	Drain Lines on Valves IV-31-01, IV-31-02, IV-31-03, IV-31-04	15-8, 4-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
	–		HYD-33	Clean-Up Filters, Demineralizers, etc.	15-34	Group C			
	–		HYD-70-201	Closed Loop Cooling Water to Drywell Air Cooler*	15-25				
	–		HYD-70-105	CLCW to Equipment Drain Sump*	15-25				
	–		HYD-70-32	CLCW to Recirc. Pump Motor*	15-24				
	–		HYD-70-33	CLCW to Clean-up Non-reg. Heat Exchangers, Precoat Cooler, etc.	15-23				
	–		HYD-44	CRD Insert/withdraw Lines from CRD Housing Flanges to CRD Hydraulic Control Units*	15-31				

*Systems inside drywell.

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3	-	NIP 529	HYD-49	Feedwater	15-35A, B, C, D	Group B Exempt	HYD VIS	125% Design Pressure	N/A
	-		HYD-50	Feedwater					
	-		HYD-51	Feedwater	15-36A, B				
	-		HYD-72	Emergency Service Water	15-28A, B	Group C		110% Design Pressure	
	-		HYD-93	Cont. Spray Raw Water	15-32A, B				
	-		HYD-70	Closed Loop Cooling Water	15-20				

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4	III E	NIP 536	RV-4-566B-r	Nozzle inner radius	14-2A	B-D	UT	100% of Nozzle radius	Later
	III W		RV-3-565C-r	Nozzle inner radius	14-2B				
			RV-6-567-r	Nozzle inner radius	14-2A				
		NIP 554	P-32-73-w	Pipe to Safe-end Weld, 28"	5-1, 5-4	B-F		100% of Circ. Weld	P8F-1.5-1
		NIP 563	RV-4-565C-w	Nozzle to Safe-end Weld, 28"	14-2B				
	III E	NIP 554	P-32-35-w	Pipe to ELL Weld, 28"	5-1, 5-2	B-J			
			P-32-35-wU	Straight Pipe Long. Weld, 28"				12" of Long.Weld	
			P-32-35-wD1	ELL Long.Weld, Short Side					
			P-32-35-wD2	ELL Long.Weld, Long Side					
	II E		P-32-30-w	Pipe to Pipe Weld, 28"				100% of Circ.Weld	

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4	II E	NIP 554	P-32-30-wU	Straight Pipe Long. Weld, 28"	5-1, 5-2	B-J	UT	12" of Long.Weld	P8F-1.5-1
			P-32-30-wD	Straight Pipe Long. Weld, 28"					
	III E		P-01-25-w	ELL to Pipe Weld, 24"	1-1			100% of Circ.Weld	P1F-1.5-1
			P-01-24-w	Pipe to Pipe Weld, 24"					
			P-31-32C-w	Pipe to Pipe Weld, 10"	4-1				P1R-.75-2
	III W		P-44.1-18-w	Pipe to Safe-end Weld, 3"	12-1	B-F			P8R-.3-1
		NIP 563	RV-5-567-w	Nozzle to Safe-end Weld, 3"	14-2A				P8R-.75-1
	III E	NIP 554	P-39-1B-w	Pipe to ELL Weld, 10"	9-1	B-J			P8R-.75-2
			P-39-1B-wU	Straight Pipe Long. Weld, 10"				12" of Long.Weld	
			P-39-1B-wD1	ELL Long.Weld, Short Side					
			P-39-1B-wD2	ELL Long.Weld, Long Side					

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4	III W	NIP 554	P-40-47A-w	Pipe to ELL Weld, 12"	10-1	B-J	UT	100% of Circ.Weld	P8R-.75-2
			P-40-47A-wU	Straight Pipe Long. Weld, 12"				12" of Long.Weld	
			P-40-47A-wD1	ELL Long.Weld, Short Side					
			P-40-47A-wD2	ELL Long.Weld, Long Side					
			P-38-27A-w	Pipe to Pipe Weld, 14"	8-1			100% of Circ.Weld	
			P-38-27A-wU	Straight Pipe Long. Weld, 14"				12" of Long.Weld	
			P-38-27A-wD	Straight Pipe Long. Weld, 14"					
	IX W		P-39-10A-w	Pipe to ELL Weld, 12"	9-1	C-F		100% of Circ.Weld	
	XV	NIP 533	RV-3-563/3-w	Vessel to Flange Weld, 96" CW from 102°	14-6	B-C		100% of Weld	P1-LF-1
		NIP 534	RV-20-1	Flange Ligament Area, Hole 20	14-4	B-G-1		100% of Ligament	

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4	XV	NIP 534	RV-21-1	Flange Ligament Area, Hole 21	14-4	B-G-1	UT	100% of Ligament	P1-LF-1
			RV-22-1	Flange Ligament Area, Hole 22					
			RV-23-1	Flange Ligament Area, Hole 23					
			RV-24-1	Flange Ligament Area, Hole 24					
			RV-25-1	Flange Ligament Area, Hole 25					
			RV-26-1	Flange Ligament Area, Hole 26					
			RV-27-1	Flange Ligament Area, Hole 27					
			RV-28-1	Flange Ligament Area, Hole 28					
		NIP 541	CH-20-b	C.H. Stud No.20				100% of Studs	P1S-6.25

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4	XV	NIP 541	CH-21-b	C.H. Stud No.21	14-4	B-G-1	UT	100% of Studs	P1S-6.25
			CH-22-b	C.H. Stud No.22					
			CH-23-b	C.H. Stud No.23					
			CH-24-b	C.H. Stud No.24					
			CH-25-b	C.H. Stud No.25					
			CH-26-b	C.H. Stud No.26					
			CH-27-b	C.H. Stud No.27					
			CH-28-b	C.H. Stud No.28					
	XI	NIP 538	CH-3-574C-w	C.H. Meridional Weld, 9"	13-3	B-B		10% of Weld	P1F-4.31C
			CH-1-574CD-w	C.H. Flange Weld		B-C		100% of Weld	
		NIP 539	CH-1-576D-w	C.H. to Safety Vent Nozzle Weld	13-2	B-D		100% of Nozzle Weld	
			CH-1-576E-w	C.H. to Safety Vent Nozzle Weld					
		NIP 536	CH-1-576D-r	Nozzle inner radius				100% of Nozzle radius	Later
			CH-1-576E-r	Nozzle inner radius					

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4	X1	NIP 536	CH-3-576C-r	Nozzle inner radius	13-2	B-D	UT	100% of radius	Later
		NIP 539	CH-3-576C-w	C.H. to Safety Vent Nozzle Weld				100% of Nozzle Weld	P1F-4.31C
		NIP 562	CH-2-576D-w	Nozzle to Safe-end Weld		B-F		100% of Circ.Weld	P8R-1.5-2
			CH-2-576E-w	Nozzle to Safe-end Weld					
			CH-4-576C-w	Nozzle to Safe-end Weld					
		NIP 541	CH-20-n	C.H. Nut No.20	14-4	B-G-1		100% of Nuts	P1N-6.25
			CH-21-n	C.H. Nut No.21					
			CH-22-n	C.H. Nut No.22					
			CH-23-n	C.H. Nut No.23					
			CH-24-n	C.H. Nut No.24					
			CH-25-n	C.H. Nut No.25					
			CH-26-n	C.H. Nut No.26					
			CH-27-n	C.H. Nut No.27					
			CH-28-n	C.H. Nut No.28					

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4	VII E	NIP 554	P-33-66-w	Pipe to Valve 33-03 Weld, 6"	6-1	B-J	UT	100% of Circ. Weld	P8R-.75-3
	VII W		P-38-80-w	Pipe to ELL Weld, 8"	8-2	C-F			
			P-38-39-w	Pipe to Pipe Weld, 8"					
	VI E		P-81-13-w	Pipe to Flow Element, 12"	10-3	C-G			P1R-.75-2
			P-81-11A-w	Pipe to TEE Weld, 12"					
	XIV		P-02-12X-w	Branch Weld, 18"	2-1	C-F		100% of Branch Weld	P1R-1.5-1
			P-03-6-w	Pipe to ELL Weld, 16"	3-1			100% of Circ. Weld	

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4	III W	NIP 528	P-31-SC6-s	Pipe Support, 4 Lugs	4-2	B-K-1	SURF	Weld + 2 Support t	N/A
			P-31-H7-s	Pipe Support, Brackets					
			RV-5-567-w	Nozzle to Safe-end Weld, 3"	14-2A	B-F		100% of Circ.Weld	
			P-44.1-18-w	Pipe to Safe-end Weld, 3"	12-1				
			P-40-H17-s	Pipe Support,Lug	10-4	B-K-1		Weld + 2 Support t	
			RV-4-565C-w	Nozzle to Safe-end Weld, 28"	14-2B	B-F		100% of Circ.Weld	
			P-32-73-w	Pipe to Safe-end Weld, 28"	5-1, 5-4				
	II E		P-31-H10-s	Pipe Support, 4 Lugs	4-2	B-K-1		Weld + 2 Support t	
			P-31-SC4-s	Pipe Support, 4 Lugs					
			P-32-LUG/PD/A-s	Pipe Support, 4 Lugs	5-1, 5-7				

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4	XI W	NIP 528	P-37-2-w	Pipe to ELL Socket Weld, 2"	7-1	B-J	SURF	100% of Weld	N/A
↓	↓	↓	P-37-3-w	Pipe to Flange Socket Weld, 2"	↓	↓	↓	↓	↓
↓	↓	↓	P-34-09-w	Pipe to Flange Socket Weld, 2"	↓	↓	↓	↓	↓

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4	XI	NIP 528	CH-20-n	C.H. Nut No.20	14-4	B-G-1	SURF	100% of Nuts	N/A
			CH-21-n	C.H. Nut No.21					
			CH-22-n	C.H. Nut No.22					
			CH-23-n	C.H. Nut No.23					
			CH-24-n	C.H. Nut No.24					
			CH-25-n	C.H. Nut No.25					
			CH-26-n	C.H. Nut No.26					
			CH-27-n	C.H. Nut No.27					
			CH-28-n	C.H. Nut No.28					
	XI W.		P-37-2-w	Pipe to ELL Socket Weld, 2"	7-1	B-J		100% of Weld	
			P-37-3-w	Pipe to Flange Socket Weld, 2"					
			P-34-09-w	Pipe to Flange Socket Weld, 2"					

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4	XI W	NIP 528	CH-2-576D-w	Nozzle to Safe-end Weld	13-2	B-F	SURF	100% of Circ.Weld	N/A
			CH-2-576E-w	Nozzle to Safe-end Weld					
			CH-4-576C-w	Nozzle to Safe-end Weld					
	X E		P-39-SC7-s	Pipe Support, 4 Lugs	9-3	C-E-1		Weld + 2 Support t	
	X W		P-39-H22-s	Pipe Support, 4 Lugs					
	VII W		P-38-SC7-s	Pipe Support, 4 Lugs	8-4				
			HX-38-130UT-w	Heat Exchanger Vessel to Nozzle Weld, 9"	8-4, 8-5	C-B		100% of the Weld	
			PM-38-NU02B-b	Pump 38-NU02B Bolting*	8-4	C-D		10% of Bolting > 1" Dia.	
	VI E		P-81-SC23-s	Pipe Support, 4 Lugs	10-6	C-E-1		Weld + 2 Support t	
			V-81-10-b	Valve 81-10 Bolting*		C-D		10% of Bolting > 1" Dia.	

NE[illegible] 7/75

* 2 bolts to be selected and designated [illegible] the field if > 1" Dia. (only if removed).

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4	VI E	NIP 528	V-81-07-b	Valve 81-07 Bolting*	10-6	C-D	SURF	10% of Bolting > 1"Dia.	N/A
↓	↓	↓	PM-81-51-b	Pump 81-51 Bolting*	↓	↓	↓	↓	↓
↓	XIV E	↓	P-02-H15-s	Pipe Support, Lug	2-2	C-E-1	↓	Weld + 2 Support t	↓
↓	XI	↓	CH-2-P	C.H. Cladding	13-1	B-I-1	↓	6"x6" Patch	

NES III 7/75 * 2 bolts to be selected and designated in the field if > 1" Dia. (only if removed).

NUCLEAR ENERGY SERVICES, INC.
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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
4	VI E	NIP 528	V-81-07-b	Valve 81-07 Bolting*	10-6	C-D	SURF	10% of Bolting > 1"Dia.	N/A
			PM-81-51-b	Pump 81-51 Bolting*					
	XIV E		P-02-H15-s	Pipe Support, Lug	2-2	C-E-1		Weld + 2 Support t	

NES III 7/75 * 2 bolts to be selected and designated in the field if > 1" Dia. (only if removed).

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4	II E	NIP 529	V-32-H6/A-s	Valve NG08/A Support	5-1, 5-7	B-K-2	VIS	All Support Components	N/A
			V-32-H2/A-s	Valve NG03/A Support					
			PM-32-SS2/A-s	Pump A Support, 2 Units					
			P-32-LUG/PD/A-s	Pipe Support, 4 Lugs					
			P-32-SB1/PD/A-s	Pipe Support, 2 Units					
			V-32-H5/A-s	Valve NG02/A Support					
			P-32-H4/A-s	Pipe Support, 2 Units					
	III W		P-39-H9-s	Pipe Support	9-4				
			P-39-SC15-s	Pipe Support, 2 Units					
			P-31-SC6-s	Pipe Support, 2 Units	4-2				
			P-31-H7-s	Pipe Support					

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4	III W	NIP 529	P-38-H28-s	Pipe Support, Stanchion	8-3	B-K-2	VIS	All Support Components	N/A
			P-38-HS-2-s	Pipe Support					
			P-40-HS-7-s	Pipe Support	10-4				
			P-40-HS-8-s	Pipe Support					
			P-40-HS-9-s	Pipe Support					
			P-40-H17-s	Pipe Support					
	III E		P-31-SC4-s	Pipe Support	4-2				
			P-31-H10-s	Pipe Support, 2 Units					
			P-01-H21-s	Pipe Support, 2 Units	1-2				
	VI E		PM-81-51-b	Pump 81-51 Bolting	10-6	C-D		100% of Bolting > 1" Dia.	
			V-81-07-b	Valve 81-07 Bolting					
			V-81-10-b	Valve 81-10 Bolting					

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4	VI E	NIP 529	P-81-SC23-s	Pipe Support	10-6	C-E-2	VIS	All Support Components	N/A
	VI W		V-40-12-b	Valve 40-12 Bolting	10-4	B-G-2		100% of Bolting < 2" Dia.	
			V-40-12-s	Valve 40-12 Support		B-K-2		All Support Components	
	VII W		P-38-SC7-s	Pipe Support	8-4	C-E-2			
			PM-38-NU02B-b	Pump 38-NU02B Bolting		C-D		100% of Bolting > 1" Dia.	
	VII E		V-33-04-b	Valve 33-04 Bolting	6-1	B-G-2		100% of Bolting < 2" Dia.	
			V-33-03-b	Valve 33-03 Bolting					
	IX E		V-39-08-b	Valve 39-08 Bolting	9-1	B-G-2		100% of Bolting < 2" Dia.	
			V-39-10-b	Valve 39-10 Bolting					

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
4	XI	NIP 529	CH-576-12D-b	Nozzle 576-12D Flange Bolting	13-2	B-G-2	VIS	100% of Bolting < 2" Dia.	N/A
↓	↓	↓	CH-576-12E-b	Nozzle 576-12E Flange Bolting	↓	↓	↓	↓	↓
↓	↓	↓	CH-576-12F-b	Nozzle 576-12F Flange Bolting	↓	↓	↓	↓	↓
↓	↓	↓	CH-576-07A-b	Nozzle 576-07A Flange Bolting	↓	↓	↓	↓	↓
↓	↓	↓	CH-576-07B-b	Nozzle 576-07B Flange Bolting	↓	↓	↓	↓	↓
↓	XV	↓	RV-C1-P	R.V. Shell Cladding	14-5	B-1-1	↓	6" X 6" Patch	↓
↓	↓	↓	RV-20-t	R.V. Bushing, Threads and Washers	14-4	B-G-1	↓	100% of Visible Components	↓
↓	↓	↓	RV-21-t	R.V. Bushing, Threads and Washers	↓	↓	↓	↓	↓
↓	↓	↓	RV-22-t	R.V. Bushing, Threads and Washers	↓	↓	↓	↓	↓

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4	XV	NIP 529	RV-23-t	R.V. Bushing, Threads and Washers	14-4	B-G-1	VIS	100% of Visible Components	N/A
			RV-24-t	R.V. Bushing, Threads and Washers					
			RV-25-t	R.V. Bushing, Threads and Washers					
			RV-26-t	R.V. Bushing, Threads and Washers					
			RV-27-t	R.V. Bushing, Threads and Washers					
			RV-28-t	R.V. Bushing, Threads and Washers					
	XIV		P-02-H15-s	Pipe Support	2-2	C-E-2		All Support Components	
			P-03-H5-s	Pipe Support	3-2				
	XE		P-39-H5-7-S	Pipe Support	9-4				

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4	XI	NIP 528	CH-20-n	C.H. Nut No. 20	14-4	B-G-1	VIS	100% of Nuts	N/A
			CH-21-n	C.H. Nut No. 21					
			CH-22-n	C.H. Nut No. 22					
			CH-23-n	C.H. Nut No. 23					
			CH-24-n	C.H. Nut No. 24					
			CH-25-n	C.H. Nut No. 25					
			CH-26-n	C.H. Nut No. 26					
			CH-27-n	C.H. Nut No. 27					
			CH-28-n	C.H. Nut No. 28					
			CH-2-P	C.H. Cladding	13-1	B-I-1		6"x6" Patch	

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4	III	NIP 529	HYD-36-11	Instrumentation Lines Inside Drywell	15-1, 15-3 15-1A	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-2		,15-2				
			HYD-36-10		,15-5				
			HYD-36-4		,15-6				
			HYD-36-7		,15-7				
			HYD-36-8		,15-7				
			HYD-36-3		,15-2				
			HYD-36-12		,15-3				
			HYD-36-9		,15-5				
			HYD-36-5		,15-6				

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4	III	NIP 529	HYD-36-6	Instrumentation Lines Inside Drywell	15-1, 1A, 4	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-1						
			HYD-01-1	1" Instr. lines from Main Steam (East & West)	15-8, 15-9 15-10				
			HYD-01-2	Drains from Valves 01-01, 01-02	, 1-1				
			HYD-39-1.	1" Pressure line on Emergency Cond. Supply (East and West)	, 15-17 15-18				
			HYD-39-4	Drains from Valves 39-01, 39-02, 39-03, 39-04	, 9-2				
			HYD-33-1	Drains from Valve 33-01	, 6-1				
			HYD-33-3	Drains from Valve 33-02	, 6-1				
			HYD-38-1	Drains from Valve 38-01	, 8-1				

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4	III	NIP 529	HYD-38-3	Drains from Valve 38-13	15-8, 8-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-40-1	Drains from Valves 40-01, 40-09, 40,10, 40-11	,10-1				
			HYD-40-3	1" Instrument Line from Core Spray (Typ. of 2)	,15-19				
			HYD-44.1-1	Drain Line on CRD Return	,12-1				
			HYD-42.1-1	Drain Line on Liquid Poison	,11-1				
	II		HYD-32-1	Drain Line on Suction Valve BV-NG02-(A, B, C, D, E)	-				
			HYD-32-6	1" F. E. Instrument Line on Discharge Side (A, B, C, D, E)	,15-15,16				
			HYD-32-8	Drain Line on Discharge Valve BV-NG03-(A,B,C,D, E)	-				

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4	11	NIP 529	HYD-32-9	Drain Line on 2" Bypass Valve from Valve BV-NG03-(A,B,C,D,E)	15-8	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	1	↓	HYD-32-2	1" T.E. Thermowell on Suction Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-32-3	1" dP Line Around Recirculation Pumps (A,B,C,D,E)	15-11,12,13 14	↓	↓	↓	↓
↓	↓	↓	HYD-32-4	Drain Line From Recirculation Pump NG01 (A,B,C,D,E,)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-32-5	T.E. Thermowell on Discharge Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓

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4	IX	NIP 529	HYD-34-1	Drain Line on Valve IV-34-01 on Head Spray	15-8, 7-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-39-2	Drain Lines from Valves 39-07, 39-08, 39-09, 39-10	, 9-1				
	VIII		HYD-36-13	Instrumentation Line Outside Drywell	15-1				
			HYD-36-14						
			HYD-36-15						
			HYD-36-16						
			HYD-36-19						
			HYD-36-20						
			HYD-36-21						

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4	VIII	NIP 529	HYD-36-22	Instrumentation Line Outside Drywell	15-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-23						
			HYD-36-24						
			HYD-39-3	1" Pressure Line and Valve on Emerg. Cond. (Typ. of 2)	15-8				
			HYD-39-5	Drain Lines on Valves 39-05, and 39-06 on Emerg. Cond Return	, 9-2				
			HYD-40-4	Instrument Line and Valve on Core Spray (Typ of 2)					
	VII		HYD-33-2	Drain Lines on Valve IV-33-03	, 6-1				
			HYD-33-4	Drain Lines on Valve IV-33-04	, 6-1				

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4	VII	NIP 529	HYD-38-2	Drain Lines on Valve IV-38-02	15-8, 8-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	↓	↓	HYD-38-4	Drain Lines on Valve IV-38-12	, 8-1	↓	↓	↓	↓
↓	VI	NIP 529	HYD-01-4	Instrument Lines and Valves from Main Steam Lines	↓	↓	↓	↓	↓
↓	↓	↓	HYD-40-2	Drain Lines on Valves IV-40-02, IV-40-12	, 10-1	↓	↓	↓	↓
↓	↓	↓	HYD-32-7	F. E. Instrument Lines and Valves (A,B,C,D,E)	↓	↓	↓	↓	↓
↓	↓	↓	HYD-32-10	1" dP Lines and Valves around recirc. pump (A,B,C,D,E)	↓	↓	↓	↓	↓
↓	XIII	NIP 529	HYD-01-03	Drain Line on Warm-up by-pass lines around valves IV-01-03 and IV-01-04 on Main Steam Lines	, 1-1	↓	↓	↓	↓

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4	XIII	NIP-529	HYD-31-1	Drain Lines on Valves IV-31-01, IV-31-02, IV-31-03, IV-31-04	15-8, 4-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	-	↓	HYD-54	Fuel Pool Cooling	15-29A,B,C	Group C	↓	↓	↓
↓	-	↓	HYD-70-54	Closed Loop Cooling Water to Fuel Pool Cooling Heat Exch's.	15-21	↓	↓	↓	↓
↓	-	↓	HYD-70-94	CLCW to Instr. Air Compressors.	15-26	↓	↓	↓	↓
↓	-	↓	HYD-70-210	CLCW to Air Conditioners	15-27	↓	↓	↓	↓
↓	-	↓	HYD-70-38	CLCW to Shutdown Cooling Heat Exch's	15-22	↓	↓	↓	↓

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
4	-	NIP 529	HYD-72	Emergency Service Water	15-28A, B	Group C	HYD VIS	100% Operating Pressure	N/A
	-		HYD-60	Emergency Cond.Make-up	15-30A, B				
	-		HYD-79	Diesel Generator Cooling Water	15-33A, B, C, D				
	-		HYD-93	Containment Spray Raw Water	15-32A, B				
	-		HYD-70	Closed Loop Cooling Water	15-20				
	-		HYD-29	Feedwater	15-37	Group B Exempt		125% Design Pressure	
	-		HYD-30	Feedwater	15-38				

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5	III E	NIP 544	RV-1-565C-w	Vessel to Nozzle Weld	14-2B	B-D	UT	100% of Nozzle Weld	PIF-1.5C
↓	↓	↓	RV-1-565D-w	Vessel to Nozzle Weld	↓	↓	↓	↓	↓
↓	↓	NIP 554	P-33-71-w	Valve 33-02 to Pipe, 6"	6-1	B-J	↓	100% of Circ. Weld	P8R-.75-3
↓	↓	↓	P-39-04-w	Valve 39-04 to Pipe, 10"	9-2	↓	↓	↓	P8R-.75-2
↓	↓	↓	P-39-04-wU	Straight Pipe Long. Weld, 10"	↓	↓	↓	12" of Long. Weld	↓
↓	↓	↓	P-39-25A-w	Reducer to Pipe, 12"	↓	↓	↓	100% of Circ. Weld	↓
↓	↓	↓	P-39-25A-wU1	Reducer Long. Weld*	↓	↓	↓	12" of Long. Weld	↓
↓	↓	↓	P-39-25A-wU2	Reducer Long. Weld*	↓	↓	↓	↓	↓
↓	↓	↓	P-39-25A-wD	Straight Pipe Long. Weld, 12"	↓	↓	↓	↓	↓
↓	↓	↓	P-40-40A-w	Pipe to ELL, Weld 12"	10-1	↓	↓	100% of Circ. Weld	↓
↓	↓	NIP 536	RV-1-565C-r	Nozzle inner radius	14-2B	B-D	↓	100% of Nozzle radius	Later
↓	↓	↓	RV-1-565D-r	Nozzle inner radius	↓	↓	↓	↓	↓

NES III 7/75 * Designations to be determined and marked in the field.

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5	III E	NIP 554	P-40-40A-wU	Straight Pipe Long Weld, 12"	10-1	B-J	UT	12" of Long. Weld	P8R-75-2
			P-40-40A-wD1	ELL Long. Weld, Short Side					
			P-40-40A-wD2	ELL Long. Weld, Long Side					
			P-40-40B-w	Pipe to TEE, 12"				100% of Circ. Weld	
			P-40-40B-wD	Straight Pipe Long. Weld, 12"				12" of Long. Weld	
			P-40-40B-wU1	TEE Long. Weld, Short Side					
			P-40-40B-wU2	TEE Long. Weld, Long Side					
			P-40-25-w	Valve 40-09 to Pipe, 12"				100% of Circ. Weld	
			P-40-25-wU	Straight Pipe Long. Weld, 12"				12" of Long. Weld	

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5	III E	NIP 554	P-01-28A-w	Valve 01-11 to Pipe, 6"	1-1	B-J	UT	100% of Circ. Weld	P1R-.75-1
			P-31-10-w	Pipe to Pipe, 18"	4-1				P1R-1.5-1
		NIP 541	V-01-02-b	Valve 01-02 Bolting*, 8 Studs, 16 Nuts	1-1	B-G-1		100% of Bolting ≥ 2" Dia.	P1S-2.0 P1N-2.0
	III W	NIP 554	P-01-31-w	Pipe to Valve 01-02 Weld, 24"		B-J		100% of Circ. Weld	P1F-1.5-1
			P-44.1-15-w	Pipe to ELL, 3"	12-1				P8R-.3-1
	III E	NIP 554	P-32-78-w	Pipe to Safe-end Weld, 28"	5-1, 5-4	B-F			P8F-1.5-1
		NIP 544	RV-2-565C-w	Nozzle to Safe-end Weld, 28"	14-2B				P1F-1.5C, P8F-1.5-1
	III W	NIP 554	P-32-79-w	Pipe to Safe-end Weld, 28"	5-1, 5-5				P8F-1.5-1
		NIP 544	RV-2-565D-w	Nozzle to Safe-end Weld 28"	14-2B				P1F-1.5C, P8F-1.5-1
	II W	NIP 554	P-32-13-w	Valve NG02/C to Pipe, 28"	5-1, 5-4	B-J		100% of Circ. Weld	P8F-1.5-1

*- If bolting is removed, a liquid penetrant examination shall be performed also (NIP 528)
- Individual bolting designations shall be determined and marked in the field per figure 14-7

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5	11 W	NIP 554	P-32-13-wU	Straight Pipe Long.Weld 28"	5-1, 5-4	B-J	UT	12" of Long.Weld	P8F-1.5-1
	11 E		P-32-46-w	Valve NG03/C to Pipe, 28"				100% of Circ. Weld	
			P-32-46-wD	Straight Pipe Long. Weld, 28"				12" of Long.Weld	
		NIP 541	V-NG03/C-b	Valve NG03/C Bolting*, 20 Studs, 40 Nuts		B-G-1		100% of Bolting ≥ 2" Dia.	P1S-2.0 P1N-2.0
	11 W		V-NG02/C-b	Valve NG02/C Bolting*, 24 Studs, 40 Nuts					P1S-2.0 P1N-2.0
	1 E		PM-NG01/C-b	Pump NG01/C Bolting*, 16 Bolts					P1S-2.5
		NIP 554	P-32-48-w	Pump NG01/C to ELL,28" 28"		B-J		100% of Circ. Weld	P8F-1.5-1
			P-32-48-wD1	ELL Long. Weld, Short Side				12" of Long.Weld	
			P-32-48-wD2	ELL Long. Weld, Long Side					

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*- If bolting is removed, a liquid penetrant procedure shall be performed also (NIP 528)
- Individual bolting designations shall be determined and marked in the field per figure 14-7

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5	XV	NIP 533	RV-3-563/4-w	R.V. to Flange Weld, 96" CW from 153°	14-6	B-C	UT	100% of Weld	P1-LF-1
↓	↓	NIP 534	RV-29-1	Flange Ligament Area, Hole 29	14-4	B-G-1	↓	100% of Ligament	↓
↓	↓	↓	RV-30-1	Flange Ligament Area, Hole 30	↓	↓	↓	↓	↓
↓	↓	↓	RV-31-1	Flange Ligament Area; Hole 31	↓	↓	↓	↓	↓
↓	↓	↓	RV-32-1	Flange Ligament Area, Hole 32	↓	↓	↓	↓	↓
↓	↓	↓	RV-33-1	Flange Ligament Area, Hole 33	↓	↓	↓	↓	↓
↓	↓	↓	RV-34-1	Flange Ligament Area, Hole 34	↓	↓	↓	↓	↓
↓	↓	↓	RV-35-1	Flange Ligament Area, Hole 35	↓	↓	↓	↓	↓
↓	↓	↓	RV-36-1	Flange Ligament Area, Hole 36	↓	↓	↓	↓	↓
↓	↓	↓	RV-37-1	Flange Ligament Area, Hole 37	↓	↓	↓	↓	↓

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5	XV	NIP 541	CH-29-b	C.H. Stud No. 29	14-4	B-G-1	UT	100% of Studs	P1S-6.25
			CH-30-b	C.H. Stud No. 30					
			CH-31-b	C.H. Stud No. 31					
			CH-32-b	C.H. Stud No. 32					
			CH-33-b	C.H. Stud No. 33					
			CH-34-b	C.H. Stud No. 34					
			CH-35-b	C.H. Stud No. 35					
			CH-36-b	C.H. Stud No. 36					
			CH-37-b	C.H. Stud No. 37					
	XI W	NIP 562	CH-2-576F-w	Nozzle to Safe-end Weld	13-2	B-F		100% of Weld	P8R-1.5-2
			CH-4-576D-w	Nozzle to Safe-end Weld					
		NIP 539	CH-3-576D-w	C.H. to Safety Vent Nozzle Weld		B-D			P1F-4.31C
			CH-1-576F-w	C.H. to Safety Vent Nozzle Weld					
		NIP 536	CH-3-576D-r	Nozzle inner radius				100% of radius	Later
			CH-1-576F-r	Nozzle inner radius					

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5	XI W	NIP 538	CH-3-574D-w	C.H. Meridional Weld,9"	13-3	B-B	UT	10% of Weld	PIF-4.31C
			CH-1-574DE-w	C.H. Flange Weld		B-C		100% of Weld	
		NIP 541	CH-29-n	C.H. Nut No. 29	14-4	B-G-1		100% of Nuts	PIN-6.25
			CH-30-n	C.H. Nut No. 30					
			CH-31-n	C.H. Nut No. 31					
			CH-32-n	C.H. Nut No. 32					
			CH-33-n	C.H. Nut No. 33					
			CH-34-n	C.H. Nut No. 34					
			CH-35-n	C.H. Nut No. 35					
			CH-36-n	C.H. Nut No. 36					
			CH-37-n	C.H. Nut No. 37					
		NIP 554	P-39-14A-w	Pipe to ELL, 12"	9-1	C-F		100% of Circ. Weld	P8R-.75-2
			P-39-14B-w	Pipe to ELL, 12"					

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5	XI W	NIP 564	HX-39-112-SN	Emergency Cond.Heat Exchanger to Nozzle Weld, 14" Length	9-1, 9-5	C-B	UT	100% of Circ. Weld	P8F-1.5-1
	XI E		HX-39-122-RH	Emergency Cond. Heat Exchanger Body Weld, 5" Length		C-A		100% of Weld	
	VII W	NIP 554	P-38-84-w	Pipe to Pipe, 8"	8-1	C-F		100% of Circ. Weld	P8R-.75-3
			P-38-77-w	Pipe to TEE, 8"					
			P-38-77-wU	Straight Pipe Long. Weld, 8"				100% of Long. Weld	
	VI W		P-81-70-w	Pipe to Pipe, 12"	10-2	C-G		100% of Circ. Weld	P1R-.75-2
	XIV W		P-03-1-w	Pipe to TEE, 16"	3-1	C-F			P1R-1.5-1

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5	III E	NIP 528	P-39-H17-s	Pipe Support, Stanchion	9-4	B-K-1	SURF	Weld +2 Support t	N/A
			P-33-H2-s	Pipe Support, Stanchion	6-2				
			P-40-H55-s	Pipe Support, Stanchion	10-4				
			P-34-16-w	Pipe to ELL, 2" Socket Weld	7-1	B-J		100% of Weld	
			P-NES-37-9-w	Pipe to ELL, 2" Socket Weld	7-2				
			P-NES-37-10-w	Pipe to ELL, 2" Socket Weld					
			P-NES-37-11-w	Pipe to ELL, 2" Socket Weld					
			P-31-H11-s	Pipe Support, Stanchion	4-2	B-K-1		Weld +2 Support t	
			P-NES-42.1-2-w	Valve 42.1-01 to Pipe, 1½" Socket Weld	11-1	B-J		100% of Weld	
			P-31-H8-S	Pipe Support, Stanchion	4-2	B-K-1		Weld +2 Support t	

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5	III E	NIP 528	P-01-H19-s	Pipe Support, Stanchion	1-2	B-K-1	SURF	Weld +2 Support t	N/A
			RV-2-565C-w	Nozzle to Safe-end, 28"	14-2B	B-F		100% of Weld	
			P-32-78-w	Pipe to Safe-end, 28"	5-1, 5-4				
	III W		RV-2-565D-w	Nozzle to Safe-end, 28"	14-2B				
			P-32-79-w	Pipe to Safe-end, 28"	5-1, 5-5				
	II E		P-32-LUG/PD/C-s	Pipe Support, 4 Lugs	5-1, 5-7	B-K-1		Weld +2 Support t	
			P-32-45-w	Pipe to Valve NG08/C, 2" Socket Weld	5-4	B-J		100% of Circ. Weld	
	II W		P-32LUG/PS/C-s	Pipe Support, 4 Lugs	5-1, 5-7	B-K-1		Weld +2 Support t	
	XI W		CH-29-n	C.H. Nut No. 29	14-4	B-G-1		100% of Nuts	
			CH-30-n	C.H. Nut No. 30					

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5	III E	NIP 528	P-01-H19-s	Pipe Support,Stanchion	1-2	B-K-1	SURF	Weld +2 Support t	N/A
			RV-2-565C-w	Nozzle to Safe-end,28"	14-2B	B-F		100% of Weld	
			P-32-78-w	Pipe to Safe-end, 28"	5-1, 5-4				
	III W		RV-2-565D-w	Nozzle to Safe-end,28"	14-2B				
			P-32-79-w	Pipe to Safe-end, 28"	5-1, 5-5				
	II E		P-32-LUG/PD/ C-s	Pipe Support, 4 Lugs	5-1, 5-7	B-K-1		Weld +2 Support t	
			P-32-45-w	Pipe to Valve NG08/C, 2" Socket Weld	5-4	B-J		100% of Circ. Weld	
	II W		P-32LUG/PS/ C-s	Pipe Support, 4 Lugs	5-1, 5-7	B-K-1		Weld +2 Support t	

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5	XI W	NIP 528	CH-2-576F-w	Nozzle to Safe-end Wled	13-2	B-F	SURF	100% of Circ. Weld	N/A
			CH-4-576D-w	Nozzle to Safe-end Weld					
			CH-4-P	C.H. Cladding	13-1	B-I-1		6"x6" Patch	
	VI		P-81-H10-s	Pipe Support	10-5	C-E-1		Weld +2 Support t	

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5	XI W	NIP 528	CH-31-n	C.H. Nut No. 31	14-4	B-G-1	SURF	100% of Nuts	N/A
			CH-32-n	C.H. Nut No. 32					
			CH-33-n	C.H. Nut No. 33					
			CH-34-n	C.H. Nut No. 34					
			CH-35-n	C.H. Nut No. 35					
			CH-36-n	C.H. Nut No. 36					
			CH-37-n	C.H. Nut No. 37					
			CH-2-576F-w	Nozzle to Safe-end Weld	13-2	B-F		100% of Circ. Weld	
			CH-4-576D-w	Nozzle to Safe-end Weld					
			CH-4-P	C.H. Cladding	13-1	B-I-1		6"X 6" Patch	
	VI		P-81-H10-s	Pipe Support	10-5	C-E-1		Weld +2 Support t	

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5	III E	NIP 529	P-33-HS-4	Pipe Support	6-2	B-K-2	VIS	All Support Components	N/A
			P-33-HS-2-S	Pipe Support					
			P-33-HS-3-S	Pipe Support					
			P-33-H2-s	Pipe Support, Stanchion					
			P-33-HS-1-S	Pipe Support					
			V-33-02-b	Valve 33-02 Bolting		B-G-2		100% of Bolting <2" Dia.	
			P-33-H1-s	Pipe Support, Stanchion		B-K-2		All Support Components	
			V-37-03-b	Valve 37-03 Bolting	7-2	B-G-2		100% of Bolting <2" Dia.	
			P-39-H18-s	Pipe Support, Stanchion	9-4	B-K-2		All Support Components	
			V-39-02-b	Valve 39-02 Bolting		B-G-2		100% of Bolting <2" Dia.	
			V-39-04-b	Valve 39-04 Bolting					
			P-39-H17-s	Pipe Support, Stanchion		B-K-2		All Support Components	
			P-34-R1-s	Pipe Support	7-3				

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5	III E	NIP 529	P-34-R2-s	Pipe Support	7-3	B-K-2	VIS	All Support Components	N/A
			P-34-R3-s	Pipe Support					
	III W		P-44.1-H2-s	Pipe Support	12-2				
			P-44.1-H1-s	Pipe Support					
	III E		P-01-H19-s	Pipe Support, Stanchion	1-2	B-K-2		All Support Components	
			P-31-H8-s	Pipe Support, Stanchion	4-2				
			P-31-H11-s	Pipe Support, Stanchion					
			P-01-H23-s	Pipe Support, Stanchion					
			P-01-H29-s	Pipe Support	1-2				

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5	III E	NIP 529	V-01-11-b	Valve 01-11- Bolting	1-2	B-G-2	VIS	100% of Bolting <2" Dia.	N/A
			V-MSER-V6-b	Valve MSER-V6 Bolting					
			P-NES-42.1-Y-s	Pipe Support	11-2	B-K-2		All Support Components	
			P-NES-42.1-R1-s	Pipe Support					
			V-42.1-02-b	Valve 42.1-02 Bolting		B-G-2		100% of Bolting <2" Dia.	
			P-40-H54-s	Pipe Support,Stanchion	10-4	B-K-2		All Support Components	
			P-40-H55-s	Pipe Support,Stanchion					
			V-40-09-b	Valve 40-09 Bolting		B-G-2		100% of Bolting <2" Dia.	

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5	III E	NIP 529	P-NES-37-R12-s	Pipe Support	7-3	B-K-2	VIS	All Support Components	N/A
			P-NES-37-R2-s	Pipe Support					
			P-NES-37-R11-s	Pipe Support					
			P-NES-37-R1-s	Pipe Support					
	II E		P-32-H4/C-s	Pipe Support, 2 Units	5-1, 5-7	B-K-2		All Support Components	
	II W		P-32-H3/C-s	Pipe Support, 2 Units					
	II E		P-32-SB1/PD/C-s	Pipe Support, 2 Units					
			V-32-NG08/C-b	Valve NG08/C Bolting		B-G-2		100% of Bolting <2" Dia.	

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5	II W	NIP 529	P-32-SB1/PS/C-s	Pipe Support, 2 Units	5-1, 5-7	B-K-2	VIS	All Support Components	N/A
			P-32-LUG/PS/C-s	Pipe Support, 4 Lugs					
			P-32-LUG/PD/C-s	Pipe Support, 4 Lugs					
	I		PM-32-SS3/C-s	Pump Support					
			PM-32-PSF/C-s	Pump Support Frame					
			PM-32-SS1/C-s	Pump Support, 2 Units					
			PM-32-H1/C-s	Pump Support, 4 Units					
	XV W		RV-29-t	R.V. Bushings,Threads and Washers	14-4	B-G-1		100% of All Visible Components	N/A
			RV-30-t	R.V. Bushings, Threads and Washers					

NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

PROGRAM PLAN AND SCHEDULE

PROJECT 5530-9MP

BY: GG DATE: 11-3-75
APP: AU DATE: 11-11-75
REV 0

OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
5	XV W	NIP 529	RV-31-t	R.V. Bushings, Threads and Washers	14-4	B-G-1	VIS	100% of All Visible Components	N/A
			RV-32-t	R.V. Bushings, Threads and Washers					
			RV-33-t	R.V. Bushings, Threads and Washers					
			RV-34-t	R.V. Bushings, Threads and Washers					
			RV-35-t	R.V. Bushings, Threads and Washers					
			RV-36-t	R.V. Bushings, Threads and Washers					
			RV-37-t	R.V. Bushings, Threads and Washers					
	XV		RV-A2-p	R.V. Shell Cladding	14-5	B-I-1		6" X 6" Patch	
			RV-05-i	Feedwater Spargers	14-1	B-N-1		All Accessible Areas	

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
5	XV	NIP 529	RV-06-i	Core Spray Spargers	14-1	B-N-1	VIS	All Accessible Areas	N/A
			RV-07-i	Core Spray Lines					
			RV-13-i	Upper Core Grid					
			RV-14-i	Core Shroud					
			RV-15-i	Core Shroud Support Ring					
			P-NES-37-R6-s	Pipe Support	7-3	B-K-2		All Support Components	
	XI		RV-01-i	Steam Dryer	14-1	B-N-1		All Accessible Areas	
			RV-02-i	Steam Separator					
	XI W		P-39-H25-s	Pipe Support	9-3	C-E-2		All Support Components	
	VII W		P-38-H21-s	Pipe Support	8-3				
	VI W		P-81-H10-s	Pipe Support	10-5				

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
5	XI W	NIP 529	CH-29-n	C.H. Nut No. 29	14-4	B-G-1	VIS	100% of Nuts	N/A
↓	↓	↓	CH-30-n	C.H. Nut No. 30	↓	↓	↓	↓	↓
			CH-31-n	C.H. Nut No. 31					
			CH-32-n	C.H. Nut No. 32					
			CH-33-n	C.H. Nut No. 33					
			CH-34-n	C.H. Nut No. 34					
			CH-35-n	C.H. Nut No. 35					
			CH-36-n	C.H. Nut No. 36					
	↓		CH-37-n	C.H. Nut No. 37	↓	↓		↓	
	IX		V-34-01-b	Valve 34-01 Bolting	7-1	B-G-2		100% of Bolting 2" dia	
↓	XI	↓	CH-4-p	C.H. Cladding	13-1	B-I-1	↓	6"x6" Patch	↓

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5	III E	NIP 529	HYD-N13A	Instrument Line Penetration	15-1A	B-E	HYD VIS	Area Surrounding Penetration @ 100% Operating Pressure	N/A
	III		HYD-CRD-U1	CRD Penetration	14-3				
			HYD-CRD-R2	CRD Penetration					
			HYD-CRD-S2	CRD Penetration					
			HYD-CRD-R3	CRD Penetration					
			HYD-CRD-U4	CRD Penetration					
			HYD-CRD-T5	CRD Penetration					
			HYD-CRD-Q3	CRD Penetration					
			HYD-CRD-T6	CRD Penetration					
			HYD-CRD-U7	CRD Penetration					
			HYD-CRD-R8	CRD Penetration					
			HYD-CRD-S1	CRD Penetration					

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5	III	NIP 529	HYD-FM-2	Flux Monitor Penetration	14-3	B-E	HYD	Area Surrounding Penetration @ 100% Operating Pressure	N/A
			HYD-FM-5	Flux Monitor Penetration					
			HYD-FM-8	Flux Monitor Penetration					
			HYD-FM-11	Flux Monitor Penetration					
			HYD-FM-14	Flux Monitor Penetration					
			HYD-FM-16	Flux Monitor Penetration					

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5	III	NIP 529	HYD-36-11	Instrumentation Lines Inside Drywell	15-1, 15-3 15-1A	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-2		,15-2				
			HYD-36-10		,15-5				
			HYD-36-4		,15-6				
			HYD-36-7		,15-7				
			HYD-36-8		,15-7				
			HYD-36-3		,15-2				
			HYD-36-12		,15-3				
			HYD-36-9		,15-5				
			HYD-36-5		,15-6				

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5	III	NIP 529	HYD-36-6	Instrumentation Lines Inside Drywell	15-1, 1A, 4	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-1						
			HYD-01-1	1" Instr. lines from Main Steam (East & West)	15-8, 15-9 15-10				
			HYD-01-2	Drains from Valves 01-01, 01-02	, 1-1				
			HYD-39-1	1" Pressure line on Emergency Cond. Supply (East and West)	, 15-17 15-18				
			HYD-39-4	Drains from Valves 39-01, 39-02, 39-03, 39-04	, 9-2				
			HYD-33-1	Drains from Valve 33-01	, 6-1				
			HYD-33-3	Drains from Valve 33-02	, 6-1				
			HYD-38-1	Drains from Valve 38-01	, 8-1				

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
5	III	NIP 529	HYD-38-3	Drains from Valve 38-13	15-8, 8-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-40-1	Drains from Valves 40-01, 40-09, 40,10, 40-11	,10-1				
			HYD-40-3	1" Instrument Line from Core Spray (Typ. of 2)	,15-19				
			HYD-44.1-1	Drain Line on CRD Return	,12-1				
			HYD-42.1-1	Drain Line on Liquid Poison	,11-1				
	II		HYD-32-1	Drain Line on Suction Valve BV-NG02-(A, B, C, D, E)	-				
			HYD-32-6	1" F. E. Instrument Line on Discharge Side (A, B, C, D, E)	,15-15,16				
			HYD-32-8	Drain Line on Discharge Valve BV-NG03-(A,B,C,D, E)	-				

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5	11	NIP 529	HYD-32-9	Drain Line on 2" Bypass Valve from Valve BV-NG03-(A,B,C,D,E)	15-8	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	↓	↓	HYD-32-2	1" T.E. Thermowell on Suction Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-32-3	1" dP Line Around Recirculation Pumps (A,B,C,D,E)	15-11,12,13 14	↓	↓	↓	↓
↓	↓	↓	HYD-32-4	Drain Line From Recirculation Pump NG01 (A,B,C,D,E,)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-32-5	T.E. Thermowell on Discharge Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓

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5	IX	NIP 529	HYD-34-1	Drain Line on Valve IV-34-01 on Head Spray	15-8, 7-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-39-2	Drain Lines from Valves 39-07, 39-08, 39-09, 39-10	, 9-1				
	VIII		HYD-36-13	Instrumentation Line Outside Drywell	15-1				
			HYD-36-14						
			HYD-36-15						
			HYD-36-16						
			HYD-36-19						
			HYD-36-20						
			HYD-36-21						

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5	VIII	NIP 529	HYD-36-22	Instrumentation Line Outside Drywell	15-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-23						
			HYD-36-24						
			HYD-39-3	1" Pressure Line and Valve on Emerg. Cond. (Typ. of 2)	15-8				
			HYD-39-5	Drain Lines on Valves 39-05, and 39-06 on Emerg. Cond Return	, 9-2				
			HYD-40-4	Instrument Line and Valve on Core Spray (Typ of 2)					
	VII		HYD-33-2	Drain Lines on Valve IV-33-03	, 6-1				
			HYD-33-4	Drain Lines on Valve IV-33-04	, 6-1				

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5	VII	NIP 529	HYD-38-2	Drain Lines on Valve IV-38-02	15-8, 8-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-38-4	Drain Lines on Valve IV-38-12	, 8-1				
	VI	NIP 529	HYD-01-4	Instrument Lines and Valves from Main Steam Lines					
			HYD-40-2	Drain Lines on Valves IV-40-02, IV-40-12	, 10-1				
			HYD-32-7	F. E. Instrument Lines and Valves (A,B,C,D,E)					
			HYD-32-10	1" dP Lines and Valves around recirc. pump (A,B,C,D,E)					
	XIII	NIP 529	HYD-01-03	Drain Line on Warm-up by-pass lines around valves IV-01-03 and IV-01-04 on Main Steam Lines	, 1-1				

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5	XIII	NIP 529	HYD-31-1	Drain Lines on Valves IV-31-01, IV-31-02, IV-31-03, IV-31-04	15-8, 4-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
	–		HYD-33	Clean-Up Filters, Demineralizers, etc.	15-34	Group C		110% Design Pressure	
	–		HYD-70-201	Closed Loop Cooling Water to Drywell Air Cooler*	15-25				
	–		HYD-70-105	CLCW to Equipment Drain Sump*	15-25				
	–		HYD-70-32	CLCW to Recirc. Pump Motor*	15-24				
	–		HYD-70-33	CLCW to Clean-up Non-reg. Heat Exchangers, Precoat Cooler, etc.	15-23				
	–		HYD-44	CRD Insert/Withdraw Lines from CRD Housing Flanges to CRD Hydraulic Control Units*	15-31				

*Systems inside drywell.

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5	—	NIP 529	HYD-80	Containment Spray	15-40A, B	Group B Exempt	HYD VIS	All Components @ 100% System Test Pressure	N/A

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6	III W	NIP 536	RV-2-566B-r	Nozzle inner radius	14-2A	B-D	UT	100% of Nozzle radius	Later
			RV-6-566B-r	Nozzle inner radius					
			RV-3-565D-r	Nozzle inner radius	14-2B				
		NIP 554	P-39-24H-w	Pipe to Pipe, 10"	9-2	B-J		100% of Circ. Weld	P8R-75-2
			P-39-24H-wU	Straight Pipe Long. Weld				12" of Long.Weld	
			P-39-24H-wD	Straight Pipe Long. Weld					
			P-39-35J-w	Pipe to ELL, 10"				100% of Circ. Weld	
			P-39-35J-wD	Straight Pipe Long. Weld				12" of Long. Weld	
			P-39-35J-wU1	ELL Long. Weld, Short Side					
			P-39-35J-wU2	ELL.Long. Weld, Long Side					

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6	III W	NIP 554	P-39-26-w	Safe-end to ELL Weld, 10"	9-1	B-F	UT	100% of Circ. Weld	P8R-75-2
		NIP 563	RV-1-566B-w	Nozzle to Safe-end, 10"	14-2A				
		NIP 554	P-01-01-w	ELL to Transition Weld 24"	1-1	B-J			P1F-1.5-1
		NIP 563	RV-4-565D-w	Nozzle to Safe-end, 28"	14-2B	B-F			
		NIP 554	P-32-74-w	ELL to Safe-end Weld, 28"	5-1, 5-5				P8F-1.5-1
			P-32-09-w	Pipe to ELL Weld 28"	5-1, 5-4	B-J			
			P-32-09-wU1	ELL Long.Weld, Short Side				12" of Long.Weld	
			P-32-09-wU2	ELL Long.Weld, Long Side					
			P-32-09-wD	Straight Pipe Long.Weld					
	II E		P-32-04-w	Pipe to Pipe Weld, 28"	5-1, 5-3			100% of Circ.Weld	
			P-32-04-wU	Straight Pipe Long.Weld				12" of Long.Weld	
			P-32-04-wD	Straight Pipe Long.Weld					

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6	III W	NIP 554	P-39-26-w	Safe-end to ELL Weld, 10"	9-1	B-F	UT	100% of Circ. Weld	P8R-.75-2
		NIP 563	RV-1-566B-w	Nozzle to Safe-end, 10"	14-2A				P8R-1.5-1
		NIP 554	P-01-01-w	ELL to Transition Weld 24"	1-1	B-J			P1F-1.5-1
		NIP 563	RV-4-565D-w	Nozzle to Safe-end, 28"	14-2B	B-F			
		NIP 554	P-32-74-w	ELL to Safe-end Weld, 28"	5-1, 5-5				P8F-1.5-1
			P-32-09-w	Pipe to ELL Weld 28"	5-1, 5-4	B-J			
			P-32-09-wU1	ELL Long.Weld, Short Side				12" of Long.Weld	
			P-32-09-wU2	ELL Long.Weld, Long Side					
			P-32-09-wD	Straight Pipe Long.Weld					
	II E		P-32-04-w	Pipe to Pipe Weld, 28"	5-1, 5-3			100% of Circ.Weld	
			P-32-04-wU	Straight Pipe Long.Weld				12" of Long.Weld	
			P-32-04-wD	Straight Pipe Long.Weld					

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6	XV W	NIP 533	RV-3-563/5-w	R.V. to Flange Weld, 96" CW from 204°	14-6	B-C	UT	100% of Weld	P1-LF-1
		NIP 534	RV-38-1	Flange Ligament Area, Hole 38	14-4	B-G-1		100% of Ligament.	
			RV-39-1	Flange Ligament Area, Hole 39					
			RV-40-1	Flange Ligament Area, Hole 40					
			RV-41-1	Flange Ligament Area, Hole 41					
			RV-42-1	Flange Ligament Area, Hole 42					
			RV-43-1	Flange Ligament Area, Hole 43					
			RV-44-1	Flange Ligament Area, Hole 44					
			RV-45-1	Flange Ligament Area, Hole 45					
			RV-46-1	Flange Ligament Area, Hole 46					

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6	XV W	NIP 541	CH-38-b	C.H. Stud No. 38	14-4	B-G-1	UT	100% of Studs	PIS-6.25
			CH-39-b	C.H. Stud No. 39					
			CH-40-b	C.H. Stud No. 40					
			CH-41-b	C.H. Stud No. 41					
			CH-42-b	C.H. Stud No. 42					
			CH-43-b	C.H. Stud No. 43					
			CH-44-b	C.H. Stud No. 44					
			CH-45-b	C.H. Stud No. 45					
			CH-46-b	C.H. Stud No. 46					
	XI W	NIP 538	CH-1-574EF-w	C.H. Flange Weld	13-3	B-C		100% of Weld	PIF-431C
			CH-3-574E-w	C.H. Meridional Weld, 9"		B-B		10% of Weld	
		NIP 539	CH-1-576G-w	C.H. to Safety Vent Nozzle Weld	13-2	B-D		100% of weld	
			CH-1-576H-w	C.H. to Safety Vent Nozzle Weld					
		NIP 536	CH-1-576G-r	Nozzle inner radiu				100% of radius	La
			CH-1-576H-r	Nozzle inner radius					

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6	XI W	NIP 562	CH-2-576H-w	Nozzle to Flange Weld	13-2	B-F	UT	10% of Weld	P8R-1.5-2
			CH-2-576G-w	Nozzle to Flange Weld					
		NIP 541	CH-38-n	C.H. Nut No. 38	14-4	B-G-1		100% of Nuts	P1N-6.25
			CH-39-n	C.H. Nut No. 39					
			CH-40-n	C.H. Nut No. 40					
			CH-41-n	C.H. Nut No. 41					
			CH-42-n	C.H. Nut No. 42					
			CH-43-n	C.H. Nut No. 43					
			CH-44-n	C.H. Nut No. 44					
			CH-45-n	C.H. Nut No. 45					
			CH-46-n	C.H. Nut No. 46					
	XI E	NIP 554	P-39-40B-w	ELL to Pipe , 12"	9-1	C-F		100% of Weld	P8R-.75-2
	VII W		P-44.1-9-w	Pipe to Valve 301-112, 3"	12-1	B-J		100% of Circ.Weld	P8R-.3-1

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6	VII W	NIP 554	P-38-06-w	Pipe to Valve 38-02,14"	8-1	B-J	UT	100% of Circ.Weld	P8R-.75-2
			P-38-06-wD	Straight Pipe Long.Weld				12" of Long.Weld	
	XIV W		P-03-7A-w	Pipe to TEE, 16"	3-1	C-F		100% of Circ.Weld	P1R-1.5-1
	XIII W		P-31-26-w	Pipe to Valve 31-01,18"	4-1	B-J			
	XIII E		P-01-33-w	Pipe to Valve 01-01,24"	1-1				
		NIP 541	V-01-04-b	Valve 01-04 Bolting*		B-G-1		100% of Bolting ≥ 2" Dia.	P1S-2.0 P1N-2.0

N[illegible] 7/75

* -If bolting is removed, a liquid penetrant examination shall be performed also (NIP 528)
-Individual bolting designations shall be determined and marked in the field per figure 14-7

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6	III W	NIP 528	RV-1-566B-w	Nozzle to Safe-end Weld	14-2A	B-F	SURF	100% of Weld	N/A
			P-39-26-w	Safe-end to Pipe, 10"	9-1				
			RV-4-565D-w	Nozzle to Safe-end Weld	14-2B				
			P-32-74-w	Safe-end to Pipe, 24"	5-1, 5-5				
	II E		P-32-LUG/PD/B-s	Pipe Support, 4 Lugs	5-1, 5-7	B-K-1			
	XI W		CH-2-576G-w	C.H. Nozzle to Flange	13-2	B-F			
			CH-2-576H-w	C.H. Nozzle to Flange					
			CH-5-P	C.H. Cladding	13-1	B-I-1		6" X 6" Patch	
	VII W		HX-38-NU01C-b	Shutdown Cooling Heat Exchanger Bolting*	8-2	C-D		10% of Bolting > 1" Dia.	
			P-38-H12-s	Pipe Support, Stanchion	8-4	C-E-1		Weld +2 Support t	
	XIV W		P-03-H1-s	Pipe Support, Bracket	3-2				

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* 2 Bolts to be selected and designated in field if > 1" (only if removed)

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6	XI W	NIP 529	CH-38-n	C.H. Nut No. 38	14-4	B-G-1	VIS	100% of Nuts	N/A
			CH-39-n	C.H. Nut No. 39					
			CH-40-n	C.H. Nut No. 40					
			CH-41-n	C.H. Nut No. 41					
			CH-42-n	C.H. Nut No. 42					
			CH-43-n	C.H. Nut No. 43					
			CH-44-n	C.H. Nut No. 44					
			CH-45-n	C.H. Nut No. 45					
			CH-46-n	C.H. Nut No. 46					
	VII		V-31-02-b	Valve 31-02 Bolting	4-1			100% of Bolting	

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6	III E	NIP 529	P-39-H16-s	Pipe Support	9-4	B-K-2	VIS	All Support Components	N/A
			P-39-SC16-s	Pipe Support, 2 Units					
			P-40-SC48-s	Pipe Support	10-4				
			P-40-H57-s	Pipe Support, 2 Units					
			P-40-SC45-s	Pipe Support					
	II E		P-32-H4/B-s	Pipe Support, 2 Units	5-1, 5-7				
			P-32-LUG/PD/B-s	Pipe Support, 4 Lugs					
			V-32-H5/B-s	Valve NG02/B Support					
			P-32-SB1/PD/B-s	Pipe Support, 2 Units					
			PM-32-SS2/B-s	Pump Support, 2 Units					

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6	II E	NIP 529	V-32-H6/B-s	Valve NG08/B Support	5-1, 5-7	B-K-2	VIS	All Support Components	N/A
			V-32-H2/B-s	Valve NG03/B Support					
	XV W		RV-38-t	R.V. Bushing, Threads and Washers	14-4	B-G-1		100% of All Visible Components	
			RV-39-t	R.V. Bushing, Threads and Washers					
			RV-40-t	R.V. Bushing, Threads and Washers					
			RV-41-t	R.V. Bushing, Threads and Washers					
			RV-42-t	R.V. Bushing, Threads and Washers					
			RV-43-t	R.V. Bushing, Threads and Washers					
			RV-44-t	R.V. Bushing, Threads and Washers					

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6	XV W	NIP 529	RV-45-t	R.V. Bushing, Threads and Washers	14-4	B-G-1	VIS	100% of All Visible Components	N/A
			RV-46-t	R.V. Bushing, Threads and Washers					
	XI W		CH-576-12G-b	Nozzle 576-12G Flange Bolting	13-2	B-G-2		100% of Bolting < 2" Dia.	
			CH-576-12H-b	Nozzle 576-12H Flange Bolting					
			CH-576-07C-b	Nozzle 576-07C Flange Bolting					
			CH-5-p	C.H. Cladding	13-1	B-I-1			
	IX W		V-39-07-b	Valve 39-07 Bolting	9-1	B-G-2		100% of Bolting < 2" Dia.	
			V-39-09-b	Valve 39-09 Bolting					

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6	VII W	NIP 529	V-301-112-b	Valve 301-112 Bolting	12-1	B-G-2	VIS	100% of Bolting < 2" Dia.	N/A
			V-38-12-b	Valve 38-12 Bolting	8-1				
			V-38-02-b	Valve 38-02 Bolting					
			HX-38-NU01C-b	Shutdown Cooling Heat Exchanger Bolting	8-4	C-D		100% of Bolting ≥ 1" Dia.	
			P-38-H12-s	Pipe Support		C-E-2		All Support Components.	
	XIII E		V-31-04-b	Valve 31-04 Bolting	4-1	B-G-2		100% of Bolting	
			V-01-06-b	Valve 01-06 Bolting	1-1				

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6	III	NIP 529	HYD-36-11	Instrumentation Lines Inside Drywell	15-1, 15-3 15-1A	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-2		,15-2				
			HYD-36-10		,15-5				
			HYD-36-4		,15-6				
			HYD-36-7		,15-7				
			HYD-36-8		,15-7				
			HYD-36-3		,15-2				
			HYD-36-12		,15-3				
			HYD-36-9		,15-5				
			HYD-36-5		,15-6				

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6	111	NIP 529	HYD-36-6	Instrumentation Lines Inside Drywell	15-1, 1A, 4	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-1						
			HYD-01-1	1" Instr. lines from Main Steam (East & West)	15-8, 15-9 15-10				
			HYD-01-2	Drains from Valves 01-01, 01-02	, 1-1				
			HYD-39-1	1" Pressure line on Emergency Cond. Supply (East and West)	, 15-17 , 15-18				
			HYD-39-4	Drains from Valves 39-01, 39-02, 39-03, 39-04.	, 9-2				
			HYD-33-1	Drains from Valve 33-01	, 6-1				
			HYD-33-3	Drains from Valve 33-02	, 6-1				
			HYD-38-1	Drains from Valve 38-01	, 8-1				

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6	III	NIP 529	HYD-38-3	Drains from Valve 38-13	15-8, 8-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-40-1	Drains from Valves 40-01, 40-09, 40,10, 40-11	,10-1				
			HYD-40-3	1" Instrument Line from Core Spray (Typ. of 2)	,15-19				
			HYD-44.1-1	Drain Line on CRD Return	,12-1				
			HYD-42.1-1	Drain Line on Liquid Poison	,11-1				
	II		HYD-32-1	Drain Line on Suction Valve BV-NG02-(A, B, C, D, E)	-				
			HYD-32-6	1" F. E. Instrument Line on Discharge Side (A, B, C, D, E)	,15-15,16				
			HYD-32-8	Drain Line on Discharge Valve BV-NG03-(A,B,C,D, E)	-				

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6	11	NIP 529	HYD-32-9	Drain Line on 2" Bypass Valve from Valve BV-NG03-(A,B,C,D,E)	15-8	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	1	↓	HYD-32-2	1" T.E. Thermowell on Suction Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-32-3	1" dP Line Around Re-circulation Pumps (A,B,C,D,E)	15-11,12,13 14	↓	↓	↓	↓
↓	↓	↓	HYD-32-4	Drain Line From Recir-culation Pump NG01 (A,B,C,D,E,)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-32-5	T.E. Thermowell on Dis-charge Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓

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6	IX	NIP 529	HYD-34-1	Drain Line on Valve IV-34-01 on Head Spray	15-8, 7-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-39-2	Drain Lines from Valves 39-07, 39-08, 39-09, 39-10	, 9-1				
	VIII		HYD-36-13	Instrumentation Line Outside Drywell	15-1				
			HYD-36-14						
			HYD-36-15						
			HYD-36-16						
			HYD-36-19						
			HYD-36-20						
			HYD-36-21						

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6	VIII	NIP 529	HYD-36-22	Instrumentation Line Outside Drywell	15-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-23						
			HYD-36-24						
			HYD-39-3	1" Pressure Line and Valve on Emerg. Cond. (Typ. of 2)	15-8				
			HYD-39-5	Drain Lines on Valves 39-05, and 39-06 on Emerg. Cond Return	9-2				
			HYD-40-4	Instrument Line and Valve on Core Spray (Typ of 2)					
	VII		HYD-33-2	Drain Lines on Valve IV-33-03	6-1				
			HYD-33-4	Drain Lines on Valve IV-33-04	6-1				

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6	VII	NIP 529	HYD-38-2	Drain Lines on Valve IV-38-02	15-8, 8-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-38-4	Drain Lines on Valve IV-38-12	, 8-1				
	VI	NIP 529	HYD-01-4	Instrument Lines and Valves from Main Steam Lines					
			HYD-40-2	Drain Lines on Valves IV-40-02, IV-40-12	, 10-1				
			HYD-32-7	F. E. Instrument Lines and Valves (A,B,C,D,E)					
			HYD-32-10	1" dP Lines and Valves around recirc. pump (A,B,C,D,E)					
	XIII	NIP 529	HYD-01-03	Drain Line on Warm-up by-pass lines around valves IV-01-03 and IV-01-04 on Main Steam Lines	, 1-1				

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6	XIII	NIP-529	HYD-31-1	Drain Lines on Valves IV-31-01, IV-31-02, IV-31-03, IV-31-04	15-8, 4-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	-	↓	HYD-54	Fuel Pool Cooling	15-29A,B,C	Group C	↓	All Components @ 110% Design Pressure	↓
↓	-	↓	HYD-70-54	Closed Loop Cooling Water to Fuel Pool Cooling Heat Exch's.	15-21	↓	↓	↓	↓
↓	-	↓	HYD-70-94	CLCW to Instr. Air Compressors.	15-26	↓	↓	↓	↓
↓	-	↓	HYD-70-210	CLCW to Air Conditioners	15-27	↓	↓	↓	↓
↓	-	↓	HYD-70-38	CLCW to Shutdown Cooling Heat Exch's	15-22	↓	↓	↓	↓
	-		HYD-42.1	Liquid Poison	15-39	Group B Exempt		All Components @ 100% System Test Pressure	

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7	III W	NIP 536	RV-2-567B-r	Nozzle inner radius	14-2A	B-D	UT	100% of Nozzle radius	Later
			RV-1-565E-r	Nozzle inner radius					
			RV-4-566C-r	Nozzle inner radius					
		NIP 544	RV-1-565E-w	Vessel to Nozzle Weld	14-2B			100% of nozzle weld	P1F-1.5C
		NIP 554	P-44.1-13-w	Pipe to Valve 301-114, 3"	12-1	B-J		100% of Circ. Weld	P8R-.3-1
			P-01-06-w	Weldolet to Valve 01-12, 6"	1-1				P1R-.75-1
			P-39-35G-w	Pipe to ELL, 10"	9-2				P8R-.75-2
			P-39-35G-wU1	ELL Long.Weld, Short Side				12" of Long. Weld	
			P-39-35G-wU2	ELL Long.Weld, Long Side					
			P-39-35G-wD	Straight Pipe Long.Weld					
			P-39-8A-w	Pipe to ELL, 10"	9-1			100% of Circ. Weld	

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7	III W	NIP 554	P-39-8A-wU	Straight Pipe Long. Weld	9-1	B-J	UT	12" of Long. Weld	P8R-75-2
			P-39-8A-wD1	ELL Long.Weld, Short Side					
			P-39-8A-wD2	ELL Long.Weld, Long Side					
			P-38-20-w	Pipe to Valve 38-13, 14"	8-1			100% of Circ. Weld	
			P-38-20-wD	Straight Pipe Long. Weld				12" of Long. Weld	
			P-40-07-w	ELL to Valve 40-11,12"	10-1			100% of Circ. Weld	
			P-40-07-wD1	ELL Long.Weld, Short Side				12" of Long. Weld	
			P-40-07-wD2	ELL Long.Weld, Long Side					
			P-40-02-w	Pipe to Reducer, 12"				100% of Circ. Weld	

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
7	III W	NIP 554	P-40-02-wU	Straight Pipe Long. Weld	10-1	B-J	UT	12" of Long. Weld	P8R-.75-2
			P-40-02-wD1	Reducer Long. Weld*					
			P-40-02-wD2	Reducer Long. Weld*					
			P-40-76-w	Pipe to Safe-end, 6"		B-F		100% of Circ. Weld	P8R-.75-3
			P-40-77-w	Transition Weld, 6"					
		NIP 563	RV-1-567B-w	Nozzle to Safe-end, 6"	14-2A				
		NIP 554	P-31-6-w	Pipe to Transition, 10"	4-1	B-J			P1R-.75-2
	III E		P-31-33B-w	Pipe to ELL, 10"					
	III W	NIP 544	RV-2-565E-w	Nozzle to Safe-end, 28"	14-2B	B-F			P1F-1.5C P8F-1.5-1
		NIP 554	P-32-80-w	Pipe Safe-end, 28"	5-1, 5-6				P8F-1.5-1
	I W		P-32-49-w	Pipe to ELL, 28"	5-1, 5-5	B-J			
			P-32-49-wU1	ELL Long. Weld, Short Side				12" of Long. Weld	

* Designations to be determined and marked in the field.

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
7	I W	NIP 554	P-32-49-wU2	ELL Long Weld, Long Side	5-1, 5-5	B-J	UT	12" of Long. Weld	P8F-1.5-1
			P-32-49-wD	Straight Pipe Long. Weld					
		NIP 541	PM-NG01/D-b	Pump NG01-D Bolting,* 16 Bolts		B-G-1		100% of Bolting ≥ 2" Dia.	P1S-2.5
	II E	NIP 554	RV-CRD-R1-w	CRD Housing to Flange, 6"	14-3	B-D		100% of Circ. Weld	P8R-75-3
			RV-CRD-U2-w	CRD Housing to Flange, 6"					
			RV-CRD-T3-w	CRD Housing to Flange 6"					
	II W	NIP 541	V-NG03D-b	Valve NG03D Bolting*, 20 Studs, 40 Nuts	5-1, 5-7	B-G-1		100% of Bolting ≥ 2" Dia.	P1S-2.0 P1N-2.0
			V-NG0 2D-b	Valve NG02/D Bolting*, 24 Studs, 48 Nuts.					
	XV W	NIP 533	RV-3-563/6-w	R.V. to Flange Weld, 96" CW from 255°	14-6	B-C		100% of Weld	P1-LF-1

* -If bolting is removed, a liquid penet[illegible] examination shall be performed also (NIP 528).
-Individual bolting designations to be [illegible]etermined and marked in the field per figure 14-7

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
7	I W	NIP 554	P-32-49-wU2	ELL Long Weld, Long Side	5-1, 5-5	B-J	UT	12" of Long. Weld	P8F-1.5-1
↓	↓	↓	P-32-49-wD	Straight Pipe Long. Weld	↓	↓	↓	↓	↓
↓	↓	NIP 541	PM-NG01/D-b	Pump NG01-D Bolting,* 16 Bolts	↓	B-G-1	↓	100% of Bolting ≥ 2" Dia.	P1S-2.5
↓	II E	NIP 554	RV-CRD-R1-w	CRD Housing to Flange, 6"	14-3	B-O	↓	100% of Circ. Weld	P8R-.75-3
↓	↓	↓	RV-CRD-U2-w	CRD Housing to Flange, 6"	↓	↓	↓	↓	↓
↓	↓	↓	RV-CRD-T3-w	CRD Housing to Flange, 6"	↓	↓	↓	↓	↓
↓	II W	NIP 541	V-NG03D-b	Valve NG03D Bolting*, 20 Studs, 40 Nuts	5-1, 5-7	B-G-1	↓	100% of Bolting ≥ 2" Dia.	P1S-2.0 P1N-2.0
↓	↓	↓	V-NG0 2D-b	Valve NG02/D Bolting*, 24 Studs, 48 Nuts.	↓	↓	↓	↓	↓
↓	XV W	NIP 533	RV-3-563/6-w	R.V. to Flange Weld, 96" CW from 255°	14-6	B-C	↓	100% of Weld	P1-LF-1
↓	II E	NIP 554	RV-CRD-S1-w	CRD Housing to Flange, 6"	14-3	B-O	↓	100% of Circ. Weld	P8R-.75-3

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* -If bolting is removed, a liquid penetrant examination shall be performed also (NIP 528)
-Individual bolting designations to be determined and marked in the field per figure 14-7

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
7	XV W	NIP 534	RV-47-1	Flange Ligament Area, Hole 47	14-4.	B-G-1	UT	100% of Ligament	P1-LF-1
			RV-48-1	Flange Ligament Area, Hole 48					
			RV-49-1	Flange Ligament Area, Hole 49					
			RV-50-1	Flange Ligament Area, Hole 50					
			RV-51-1	Flange Ligament Area, Hole 51					
			RV-52-1	Flange Ligament Area, Hole 52					
			RV-53-1	Flange Ligament Area, Hole 53					
			RV-54-1	Flange Ligament Area, Hole 54					
			RV-55-1	Flange Ligament Area, Hole 55					

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7	XV W	NIP 541	CH-47-b	C.H. Stud No. 47	14-4	B-G-1	UT	100% of Studs	P1S-6.25
↓	↓	↓	CH-48-b	C.H. Stud No. 48	↓	↓	↓	↓	↓
			CH-49-b	C.H. Stud No. 49					
			CH-50-b	C.H. Stud No. 50					
			CH-51-b	C.H. Stud No. 51					
			CH-52-b	C.H. Stud No. 52					
			CH-53-b	C.H. Stud No. 53					
			CH-54-b	C.H. Stud No. 54					
	↓	↓	CH-55-b	C.H. Stud No. 55	↓	↓		↓	↓
	XI W	NIP 538	CH-1-574FG-w	C.H. Flange Weld	13-3	B-C		100% of Weld	P1F-431C
	↓	↓	CH-3-574F-w	C.H. Meridional Weld, 9"	↓	B-B		10% of Weld	↓
		NIP 539	CH-1-576K-w	C.H. to Safety Vent Nozzle Weld	13-2	B-D		100% of Weld	
↓	↓	↓	CH-1-576J-w	C.H. to Safety Vent Nozzle Weld	↓	↓		↓	↓
		NIP 536	CH-1-576K-r	Nozzle inner radi	↓	↓	↓	100% of radius	L r
		↓	CH-1-576J-r	Nozzle inner radius				↓	↓

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7	XI W	NIP 536 NIP 539	CH-3-576E-r CH-3-576E-w	Nozzle inner radius C.H. to Safety Vent Nozzle Weld	13-2	B-D	UT	100% of radius 100% of Weld	Later P1F-431C
		NIP 562	CH-4-576A-w	Nozzle to Flange Weld		B-F			P8R-1.5-2
			CH-2-576A-w	Nozzle to Flange Weld					
			CH-6-576-w	Nozzle to Flange Weld					P8R-1.5-3
		NIP 541	CH-47-n	C.H. Nut No. 47	14-4	B-G-1		100% of Nuts	P1N-6.25
			CH-48-n	C.H. Nut No. 48					
			CH-49-n	C.H. Nut No. 49					
			CH-50-n	C.H. Nut No. 50					
			CH-51-n	C.H. Nut No. 51					
			CH-52-n	C.H. Nut No. 52					
			CH-53-n	C.H. Nut No. 53					
			CH-54-n	C.H. Nut No. 54					
			CH-55-n	C.H. Nut No. 55					

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7	VII W	NIP 554	P-38-54-w	Pipe to Pump NU02C Weld 8"	8-2	C-F	UT	100% of Circ. Weld	P8R-.75-3
↓	↓	↓	P-38-130-w	Pipe to Reducer, 12"	↓	↓	↓	↓	P8R-.75-2
↓	IV E	↓	P-81-27C-w	Pipe to ELL, 12"	10-3	C-G	↓	↓	P1R-.75-2
↓	↓	↓	P-81-41-w	ELL to Ball Joint, 12"	↓	↓	↓	↓	↓
↓	↓	↓	PM-81-03-w	Pump 81-03 Body Weld	10-3, 10-7	↓	↓	↓	↓
↓	XIII E	↓	P-02-37-w	Pipe to Pipe Weld,24"	2-1	C-F	↓	100% of Circ. Weld	P1F-1.5-1
↓	↓	↓	P-02-17-w	Pipe to Pipe Weld,24"	↓	↓	↓	↓	↓

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7	III E	NIP 528	P-NES-01-2-w	Pipe Branch Weld, 2"	1-1	B-J	SURF	100% of Weld	N/A
			P-NES-37-8-w	Pipe to ELL, 2" Socket	7-1				
	III W		P-38-H2-s	Pipe Support,Stanchion	8-3	B-K-1		Weld +2 Support t	
			P-32-80-w	Pipe to Safe-end Weld	5-1, 5-6	B-F		100% of Weld	
			RV-2-565E-w	Nozzle to Safe-end Weld	14-2B				
			P-40-76-w	Pipe to Safe-end Weld	10-1				
			P-40-77-w	Transition Weld					
			RV-1-567B-w	Nozzle to Safe-end Weld	14-2A				
			P-31-H3-s	Pipe Support,Stanchion	4-2	B-K-1		Weld +2 Support t	
	III E		P-31-H12-s	Pipe Support, 4 Lugs					
			P-31-SC5-s	Pipe Support, 4 Lugs					

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
7	II W	NIP 528	P-32-LUG/PD/D-s	Pipe Support, 4 Lugs	5-1, 5-7	B-K-1	SURF	Weld +2 Support t	N/A
			P-32-LUG/PS/D-s	Pipe Support, 4 Lugs					
			P-32-70-w	Pipe Branch Weld, 2"	5-1, 5-5	B-J		100% of Weld	
	XV E		P-34-11-w	Pipe to ELL, 2" Socket Weld	7-1				
			P-34-11A-w	Pipe to coupling, 2" Socket					
	XI W		CH-2-576A-w	C.H. Nozzle to Flange	13-2	B-F			
			CH-4-576A-w	C.H. Nozzle to Flange					
			CH-6-576-w	C.H. Nozzle to Flange					
			CH-47-n	C.H. Nut No. 47	14-4	B-G-1		100% of Nuts	
			CH-48-n	C.H. Nut No. 48					
			CH-49-n	C.H. Nut No. 49					
			CH-50-n	C.H. Nut No. 50					
			CH-51-n	C.H. Nut No. 51					

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
7	II W	NIP 528	P-32-LUG/PD/D-s	Pipe Support, 4 Lugs	5-1, 5-7	B-K-1	SURF	Weld +2 Support t	N/A
			P-32-LUG/PS/D-s	Pipe Support, 4 Lugs					
			P-32-70-w	Pipe Branch Weld, 2"	5-1, 5-5	B-J		100% of Weld	
	XV E		P-34-11-w	Pipe to ELL, 2" Socket Weld	7-1				
			P-34-11A-w	Pipe to coupling, 2" Socket					
	XI W		CH-2-576A-w	C.H. Nozzle to Flange	13-2	B-F			
			CH-4-576A-w	C.H. Nozzle to Flange					
			CH-6-576-w	C.H. Nozzle to Flange					
	IX E		P-39-H15-s	Pipe Support, Lug	9-4	C-E-1		Weld +2 Support t	
	VII W		HX-38-12-IN-w	Shutdown Cooling Heat Exchanger to Nozzle Weld, 9"	8-4, 8-5	C-B		100% of the Weld	
	IV E		P-81-H30-s	Pipe Support, Stanchion	10-6	C-E-1		Weld +2 Support t	
	XIV W		P-03-H9-s	Pipe Support, Stanchion	3-2				

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7	XI W	NIP 529	CH-47-n	C.H. Nut No. 47	14-4	B-G-1	VIS	100% of Nuts	N/A
↓	↓	↓	CH-48-n	C.H. Nut No. 48	↓	↓	↓	↓	↓
↓	↓	↓	CH-49-n	C.H. Nut No. 49	↓	↓	↓	↓	↓
↓	↓	↓	CH-50-n	C.H. Nut No. 50	↓	↓	↓	↓	↓
↓	↓	↓	CH-51-n	C.H. Nut No. 51	↓	↓	↓	↓	↓
↓	↓	↓	CH-52-n	C.H. Nut No. 52	↓	↓	↓	↓	↓
↓	↓	↓	CH-53-n	C.H. Nut No. 53	↓	↓	↓	↓	↓
↓	↓	↓	CH-54-n	C.H. Nut No. 54	↓	↓	↓	↓	↓
			CH-55-n	C.H. Nut No. 55	↓	↓	↓	↓	↓

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
7	XI W	NIP 528	CH-52-n	C.H. Nut No. 52	14-4	B-G-1	SURF	100% of Nuts	N/A
			CH-53-n	C.H. Nut No. 53					
			CH-54-n	C.H. Nut No. 54					
			CH-55-n	C.H. Nut No. 55					
	IX E		P-39-H15-s	Pipe Support, Lug	9-4	C-E-1		Weld +2 Support t	
	VII W		HX-38-12-IN-W	Shutdown Cooling Heat Exchanger to Nozzle Weld, 9"	8-4, 8-5	C-B		100% of the Weld	
	IV E		P-81-H30-s	Pipe Support, Stanchion	10-6	C-E-1		Weld +2 Support t	
	XIV W		P-03-H9-s	Pipe Support, Stanchion	3-2				

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
7	III E	NIP 529	P-NES-37-R31-s	Pipe Support	7-3	B-K-2	VIS	All Support Components	N/A
↓	↓	↓	P-NES-37-R32-s	Pipe Support	↓	↓	↓	↓	↓
↓	↓	↓	P-NES-37-R33-s	Pipe Support	↓	↓	↓	↓	↓
↓	↓	↓	P-NES-37-R34-s	Pipe Support	↓	↓	↓	↓	↓
↓	↓	↓	P-NES-37-R35-s	Pipe Support	↓	↓	↓	↓	↓
↓	↓	↓	P-31-SC5-s	Pipe Support	4-2	↓	↓	↓	↓
↓	↓	↓	P-31-H12-s	Pipe Support	↓	↓	↓	↓	↓
↓	↓	↓	P-34-R4-s	Pipe Support	7-3	↓	↓	↓	↓
↓	III W	↓	P-39-31-s	Pipe Support	9-3	↓	↓	↓	↓
↓	↓	↓	P-39-32-s	Pipe Support	↓	↓	↓	↓	↓
↓	↓	↓	V-301-114-b	Valve 301-114 Bolting	12-1	B-G-2	↓	100% of Bolting < 2" Dia.	↓

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
7	III W	NIP 529	P-44.1-H3-s	Pipe Support	12-2	B-K-2	VIS	All Support Components	N/A
			V-38-13-b	Valve 38-13 Bolting	8-1	B-G-2		100% of Bolting < 2" Dia.	
			P-38-HS-1-s	Pipe Support	8-3	B-K-2		All Support Components	
			P-38-H2-s	Pipe Support					
			P-40-HS-10-s	Pipe Support	10-4				
			P-40-H20-s	Pipe Support					
			V-40-11-b	Valve 40-11 Bolting		B-G-2		100% of Bolting < 2" Dia.	
			V-01-07-b	Valve 01-07-Bolting	1-2				
			V-01-MSER-V3-b	Valve MSER-V3 Bolting					
			P-01-H26-s	Pipe Support		B-K-2		All Support Components	

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7	III W	NIP 529	V-01-12-b	Valve 01-12 Bolting	1-2	B-G-2	VIS	100% of Bolting < 2" Dia.	N/A
			V-01-MSER-V5-b	Valve MSER-V5 Bolting					
			P-01-H24-s	Pipe Support		B-K-2		All Support Components	
			P-31-H3-s	Pipe Support	4-2				
	II W		P-32-H4/D-s	Pipe Support, 2 Units	5-1, 5-7				
			P-32-LUG/PD/D-s	Pipe Support, 4 Lugs					
			P-32-SB1/PD/D-s	Pipe Support, 2 Units					
			P-32-H3/D-s	Pipe Support, 2 Units					
		NIP 529	P-32-SB1/PS/D-s	Pipe Support, 2 Units					
			P-32-LUG/PS/D-s	Pipe Support, 4 Lugs					

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7	I W	NIP 529	PM-32-SS3/D-s	Pump NG01/D Support	5-1, 5-7	B-K-2	VIS	All Support Components	N/A
			PM-32-PSF/D-s	Pump NG01/D Support Frame					
			PM-32-SS1/D-s	Pump NG01/D Support, 2 Units					
			PM-32-H1/D-s	Pump NG01/D Support, 4 Units					
			V-32-NG08/D-b	Valve NG08/D Bolting		B-G-2		100% of Bolting <2" Dia.	
	XV W		RV-47-t	R.V. Bushing, Threads and Washers	14-4	B-G-1		100% of All Visible Components	
			RV-48-t	R.V. Bushing, Threads and Washers					
			RV-49-t	R.V. Bushing, Threads and Washers					
			RV-50-t	R.V. Bushing, Threads and Washers					

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7	I W	NIP 529	PM-32-SS3/D-s	Pump NG01/D Support	5-1, 5-7	B-K-2	VIS	All Support Components	N/A
			PM-32-PSF/D-s	Pump NG01/D Support Frame					
			PM-32-SS1/D-s	Pump NG01/D Support, 2 Units					
			PM-32-H1/D-s	Pump NG01/D Support, 4 Units					
			PM-NG01/D-b	Pump NG01/D Bolting		B-G-2		100% of Bolting < 2" Dia.	
	XV W		RV-47-t	R.V. Bushing, Threads and Washers	14-4	B-G-1		100% of All Visible Components	
			RV-48-t	R.V. Bushing, Threads and Washers					
			RV-49-t	R.V. Bushing, Threads and Washers					
			RV-50-t	R.V. Bushing, Threads and Washers					

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7	XV W	NIP 529	RV-51-t	R.V. Bushing, Threads and Washers	14-4	B-G-1	VIS	100% of All Visible Components	N/A
			RV-52-t	R.V. Bushing, Threads and Washers					
			RV-53-t	R.V. Bushing, Threads and Washers					
			RV-54-t	R.V. Bushing, Threads and Washers					
			RV-55-t	R.V. Bushing, Threads and Washers					
	XV		RV-B1-p	R.V. Cladding	14-5	B-I-1		6" X 6" Patch	
			RV-08-i	Dryer Support Brackets (4)	14-1B	B-N-2		All Accessible Areas	
			RV-09-i	Feedwater Sparger Brackets (8)					
			RV-10-i	Guide Rod Support Brackets (2)					

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7	XV	NIP 529	RV-11-i	Surveillance Specimen Holder Brackets, Upper (3)	14-1B	B-N-2	VIS	All Accessible Areas	N/A
			RV-12-i	Surveillance Specimen Holder Brackets, Lower (3)					
			RV-05-i	Feedwater Spargers	14-1	B-N-1			
			RV-06-i	Core Spray Spargers					
			RV-07-i	Core Spray Lines					
			RV-13-i	Upper Core Grid					
			RV-14-i	Core Shroud					
			RV-15-i	Core Shroud Support Ring					
	XI		RV-01-i	Steam Dryer					
			RV-02-i	Steam Separator					
	XI W		CH-576-12J-b	Nozzle 576-12J Flange Bolting	13-2	B-G-2		100% of Bolting <2" Dia.	

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7	XI W	NIP 529	CH-576-12K-b	Nozzle 576-12K Flange Bolting	13-2	B-G-2	VIS	100% of Bolting < 2" Dia.	N/A
↓	↓	↓	CH-576-07D-b	Nozzle 576-07D Flange Bolting	↓	↓	↓	↓	↓
↓	IX E	↓	P-39-H15-s	Pipe Support, 2 Units	9-4	C-E-2	↓	All Support Components	↓
↓	IV E	↓	P-81-H30-s	Pipe Support, 2 Units	10-6	↓	↓	↓	↓
↓	XIV W	↓	P-03-H9-s	Pipe Support, 2 Units	3-2	↓	↓	↓	↓
↓	XIII	↓	P-02-H10-s	Pipe Support, 2 Units	2-2				

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7	III E	NIP 529	HYD-N14A	Instrument Line Penetration	15-1, 1A	B-E	HYD VIS	Area Surrounding Penetration @ 100% Operating Pressure	N/A
	III		HYD-CRD-R1	CRD Penetration	14-3				
			HYD-CRD-U2	CRD Penetration					
			HYD-CRD-T3	CRD Penetration					
			HYD-CRD-Q2	CRD Penetration					
			HYD-CRD-T4	CRD Penetration					
			HYD-CRD-U5	CRD Penetration					
			HYD-CRD-R6	CRD Penetration					
			HYD-CRD-S4	CRD Penetration					
			HYD-CRD-R7	CRD Penetration					
			HYD-CRD-U8	CRD Penetration					

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7	III	NIP 529	HYD-FM-3	Flux Monitor Penetration	14-3	B-E	HYD VIS	Area Surrounding Penetration @ 100% Operating Pressure	N/A
↓	↓	↓	HYD-FM-6	Flux Monitor Penetration	↓	↓	↓	↓	↓
↓	↓	↓	HYD-FM-9	Flux Monitor Penetration	↓	↓	↓	↓	↓
↓	↓	↓	HYD-FM-12	Flux Monitor Penetration	↓	↓	↓	↓	↓
↓	↓	↓	HYD-FM-15	Flux Monitor Penetration					

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7	III	NIP 529	HYD-36-11	Instrumentation Lines Inside Drywell	15-1, 15-3 15-1A	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-2		,15-2				
			HYD-36-10		,15-5				
			HYD-36-4		,15-6				
			HYD-36-7		,15-7				
			HYD-36-8		,15-7				
			HYD-36-3		,15-2				
			HYD-36-12		,15-3				
			HYD-36-9		,15-5				
			HYD-36-5		,15-6				

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7	III	NIP 529	HYD-36-6	Instrumentation Lines Inside Drywell	15-1, 1A, 4	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-36-1						
			HYD-01-1	1" Instr. lines from Main Steam (East & West)	15-8, 15-9 15-10				
			HYD-01-2	Drains from Valves 01-01, 01-02	, 1-1				
			HYD-39-1	1" Pressure line on Emergency Cond. Supply (East and West)	, 15-17 15-18				
			HYD-39-4	Drains from Valves 39-01, 39-02, 39-03, 39-04.	, 9-2				
			HYD-33-1	Drains from Valve 33-01	, 6-1				
			HYD-33-3	Drains from Valve 33-02	, 6-1				
			HYD-38-1	Drains from Valve 38-01	, 8-1				

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7	III	NIP 529	HYD-38-3	Drains from Valve 38-13	15-8, 8-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	↓	↓	HYD-40-1	Drains from Valves 40-01, 40-09, 40,10, 40-11	,10-1	↓	↓	↓	↓
			HYD-40-3	1" Instrument Line from Core Spray (Typ. of 2)	,15-19				
			HYD-44.1-1	Drain Line on CRD Return	,12-1				
	↓		HYD-42.1-1	Drain Line on Liquid Poison	,11-1				
	II		HYD-32-1	Drain Line on Suction Valve BV-NG02-(A, B, C, D, E)	-				
	↓		HYD-32-6	1" F. E. Instrument Line on Discharge Side (A, B, C, D, E)	,15-15,16				
↓	↓	↓	HYD-32-8	Drain Line on Discharge Valve BV-NG03-(A,B,C,D, E)	-	↓	↓	↓	↓

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7	11	NIP 529	HYD-32-9	Drain Line on 2" Bypass Valve from Valve BV-NG03-(A,B,C,D,E)	15-8	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	↓	↓	HYD-32-2	1" T.E. Thermowell on Suction Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-32-3	1" dP Line Around Recirculation Pumps (A,B,C,D,E)	15-11,12,13 14	↓	↓	↓	↓
↓	↓	↓	HYD-32-4	Drain Line From Recirculation Pump NG01 (A,B,C,D,E,)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-32-5	T.E. Thermowell on Discharge Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓

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7	IX	NIP 529	HYD-34-1	Drain Line on Valve 1V-34-01 on Head Spray	15-8, 7-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-39-2	Drain Lines from Valves 39-07, 39-08, 39-09, 39-10	, 9-1				
	VIII		HYD-36-13	Instrumentation Line Outside Drywell	15-1				
			HYD-36-14						
			HYD-36-15						
			HYD-36-16						
			HYD-36-19						
			HYD-36-20						
			HYD-36-21						

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7	VIII	NIP 529	HYD-36-22	Instrumentation Line Outside Drywell	15-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	↓	↓	HYD-36-23	↓	↓	↓	↓	↓	↓
↓	↓	↓	HYD-36-24	↓	↓	↓	↓	↓	↓
↓	↓	↓	HYD-39-3	1" Pressure Line and Valve on Emerg. Cond. (Typ. of 2)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-39-5	Drain Lines on Valves 39-05, and 39-06 on Emerg. Cond Return	, 9-2	↓	↓	↓	↓
↓	↓	↓	HYD-40-4	Instrument Line and Valve on Core Spray (Typ of 2)	↓	↓	↓	↓	↓
↓	VII	↓	HYD-33-2	Drain Lines on Valve IV-33-03	, 6-1	↓	↓	↓	↓
↓	↓	↓	HYD-33-4	Drain Lines on Valve IV-33-04	, 6-1	↓	↓	↓	↓

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7	VII	NIP 529	HYD-38-2	Drain Lines on Valve IV-38-02	15-8, 8-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
			HYD-38-4	Drain Lines on Valve IV-38-12	, 8-1				
	VI	NIP 529	HYD-01-4	Instrument Lines and Valves from Main Steam Lines					
			HYD-40-2	Drain Lines on Valves IV-40-02, IV-40-12	, 10-1				
			HYD-32-7	F. E. Instrument Lines and Valves (A,B,C,D,E)					
			HYD-32-10	1" dP Lines and Valves around recirc. pump (A,B,C,D,E)					
	XIII	NIP 529	HYD-01-03	Drain Line on Warm-up by-pass lines around valves IV-01-03 and IV-01-04 on Main Steam Lines	, 1-1				

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7	XIII	NIP 529	HYD-31-1	Drain Lines on Valves IV-31-01, IV-31-02, IV-31-03, IV-31-04	15-8, 4-1	B-P	HYD VIS	All Components @ 100% Operating Pressure	N/A
↓	-	↓	HYD-72	Emergency Service Water	15-28A, B	Group C	↓	↓	↓
↓	-	↓	HYD-60	Emergency Cond.Make-up	15-30A, B	↓	↓	↓	↓
↓	-	↓	HYD-79	Diesel Generator Cooling	15-33A, B, C, D	↓	↓	↓	↓
↓	-	↓	HYD-93	Cont.Spray Raw Water	15-32-A, B	↓	↓	↓	↓
↓	-	↓	HYD-70	Closed Loop Cooling Water	15-20	↓	↓	↓	↓

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8	III W	NIP 536	RV-3-565E-r	Nozzle inner radius	14-2B	B-D	UT	100% of Nozzle radius	Later
			RV-4-566D-r	Nozzle inner radius	14-2A				
		NIP 554	P-01-1Z-w	Pipe to Pipe Weld, 24"	1-1	B-J		100% of Circ. Weld	P1F-1.5-1
	III E		P-31-31D-w	Pipe to Red. TEE, 18"	4-1				P1R-1.5-1
			P-40-38B-w	Pipe to ELL, Weld, 12"	10-1				P8R-.75-2
			P-40-38B-wD1	ELL Long.Weld, Short Side				12" of Long. Weld	
			P-40-38B-wD2	ELL Long.Weld, Long Side					
			P-40-38B-wU	Straight Pipe Long Weld					
			P-40-37B-w	Pipe to ELL Weld, 12"				100% of Circ. Weld	
			P-40-37B-wU1	ELL Long.Weld, Short Side				12" of Long.Weld	

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8	III E	NIP 554	P-40-37B-wU2	ELL Long.Weld, Long Side	10-1	B-J	UT	12" of Long.	P8R-75-2
↓	↓	↓	P-40-37B-wD	Straight Pipe Long. Weld	↓	↓	↓	↓	↓
↓	III W	NIP 563	RV-4-565E-w	Nozzle to Safe-end, 28"	14-2B	B-F	↓	100% of Circ. Weld	P8F-1.5-1
↓	↓	NIP 554	P-32-75-w	Safe-end to Pipe, 28"	5-1, 5-6	↓	↓	↓	↓
↓	II W	↓	P-32-62-w	Pipe to Valve NG02/E, 28"	↓	B-J	↓	↓	↓
↓	↓	↓	P-32-62-wU	Straight Pipe Long. Weld	↓	↓	↓	12" of Long. Weld	↓
↓	I W	↓	P-32-65-w	Pipe to ELL Weld, 28"	↓	↓	↓	100% of Circ. Weld	↓
↓	↓	↓	P-32-65-wU	Straight Pipe Long. Weld	↓	↓	↓	12" of Long. Weld	↓
↓	↓	↓	P-32-65-wD1	ELL Long.Weld, Short Side	↓	↓	↓	↓	↓
↓	↓	↓	P-32-65-wD2	ELL Long.Weld, Long Side	↓	↓	↓	↓	↓

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8	I W	NIP 554	P-32-19-w	Pipe to ELL Weld, 28"	5-1, 5-6	B-J	UT	100% of Circ. Weld	P8F-1.5-1
			P-32-19-wU1	ELL Long. Weld, Short Side				12" of Long. Weld	
			P-32-19-wU2	ELL Long.Weld, Long Side					
			P-32-19-wD	Straight Pipe Long. Weld					
		NIP 541	PM-NG01E-b	Pump NG01/E Bolting*, 16 Bolts	5-1, 5-7	B-G-1		100% of Bolting ≥ 2" Dia.	P1S-2.5
	II W		V-NG02E-b	Valve NG02/E Bolting*, 24 Studs, 48 Nuts					P1S-2.0 P1N-2.0
			V-NG03E-b	Valve NG03/E Bolting*, 20 Studs, 40 Nuts					P1S-2.0 P1N-2.0
	XV W	NIP 533	RV-3-563/7-w	R.V. to Flange Weld, 96" CW from 307°	14-6	B-C		100% of Weld	P1-LF-1
		NIP 534	RV-56-1	Flange Ligament Area, Hole No. 56	14-4	B-G-1		100% of Ligament	

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*-If bolting is removed, a liquid penetrant examination shall be performed also (NES 528)
-Individual bolting designations to be determined and marked in the field per figure 14-7

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8	XV W	NIP 534	RV-57-1	Flange Ligament Area, Hole 57	14-4	B-G-1	UT	100% of Ligament	P1-LF-1
			RV-58-1	Flange Ligament Area, Hole 58					
			RV-59-1	Flange Ligament Area, Hole 59					
			RV-60-1	Flange Ligament Area, Hole 60					
			RV-61-1	Flange Ligament Area, Hole 61					
			RV-62-1	Flange Ligament Area, Hole 62					
			RV-63-1	Flange Ligament Area, Hole 63					
			RV-64-1	Flange Ligament Area, Hole 64					
		NIP 541	CH-56-b	C.H. Stud No. 56				100% of Studs	P1S-6.25
			CH-57-b	C.H. Stud No. 57					

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8	XV W	NIP 541	CH-58-b	C.H. Stud No. 58	14-4	B-G-1	UT	100% of Studs	PIS-6.25
↓	↓	↓	CH-59-b	C.H. Stud No. 59	↓	↓	↓	↓	↓
↓	↓	↓	CH-60-b	C.H. Stud No. 60	↓	↓	↓	↓	↓
↓	↓	↓	CH-61-b	C.H. Stud No. 61	↓	↓	↓	↓	↓
↓	↓	↓	CH-62-b	C.H. Stud No. 62	↓	↓	↓	↓	↓
↓	↓	↓	CH-63-b	C.H. Stud No. 63	↓	↓	↓	↓	↓
↓	↓	↓	CH-64-b	C.H. Stud No. 64	↓	↓	↓	↓	↓
↓	XI W	NIP 538	CH-3-574G-w	C.H. Meridional Weld, 9"	13-3	B-B	↓	10% of Weld	PIF-431C
↓	↓	↓	CH-2-574-w	C.H. Circumferential Dome Weld, 18" Length*	↓	↓	↓	5% of Weld	↓
↓	↓	↓	CH-1-574GH-w	C.H. Flange Weld	↓	B-C	↓	100% of Weld	↓
↓	↓	↓	CH-1-574HA-w	C.H. Flange Weld	↓	↓	↓	↓	↓

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*location to be selected in the field.

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
8	XV W	NIP 541	CH-58-b	C.H. Stud No. 58		B-G-1	UT	100% of Studs	P1S-6.25
↓	↓	↓	CH-59-b	C.H. Stud No. 59	↓	↓	↓	↓	↓
			CH-60-b	C.H. Stud No. 60					
			CH-61-b	C.H. Stud No. 61					
			CH-62-b	C.H. Stud No. 62					
			CH-63-b	C.H. Stud No. 63					
	↓	↓	CH-64-b	C.H. Stud No. 64	↓	↓		↓	↓
	XI W	NIP 538	CH-3-574G-w	C.H. Meridional Weld, 9"	13-3	B-B		10% of Weld	P1F-431C
	↓	↓	CH-3-574H-w	C.H. Meridional Weld, 9"	↓	↓		↓	↓
			CH-2-574-w	C.H. Circumferential Dome Weld, 18" Length*		↓		5% of Weld	
			CH-1-574GH-w	C.H. Flange Weld		B-C		100% of Weld	
↓	↓	↓	CH-1-574HA-w	C.H. Flange Weld	↓	↓	↓	↓	↓

*location to be selected in the field.

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8	XI W	NIP 539	CH-1-576L-w	C.H. to Safety Vent Nozzle Weld	13-2	B-D	UT	100% of Weld	P1F-431C
			CH-1-576M-w	C.H. to Safety Vent Nozzle Weld					
			CH-3-576F-w	C.H. to Safety Vent Nozzle Weld					
		NIP 562	CH-2-576B-w	Nozzle to Flange Weld		B-F			P8R-1.5-2
			CH-2-576C-w	Nozzle to Flange Weld					
			CH-4-576B-w	Nozzle to Flange Weld					
		NIP 541	CH-56-n	C.H. Nut No. 56	14-4	B-G-1		100% of Nuts	P1N-6.25
			CH-57-n	C.H. Nut No. 57					
			CH-58-n	C.H. Nut No. 58					
			CH-59-n	C.H. Nut No. 59					
			CH-60-n	C.H. Nut No. 60					
			CH-61-n	C.H. Nut No. 61					
		NIP 536	CH-1-576L-r	Nozzle inner radius	13-2	B-D		100% of radius	Later
			CH-1-576M-r	Nozzle inner radius					
			CH-3-576F-r	Nozzle inner radiu					

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8	XI W	NIP 541	CH-62-n	C.H. Nut No. 62	14-4	B-G-1	UT	100% of Nuts	P1N-6.25
			CH-63-n	C.H. Nut No. 63					
			CH-64-n	C.H. Nut No. 64					
		NIP 564	HX-39-111SH-w	Emergency Cond.Heat Exchanger Dome Weld, 5'' Length	9-1, 9-5	C-A		20% of Weld	P8F-1.5-1
			HX-39-111RN-w	Emergency Cond.Heat Exchanger Nozzle Weld, 12'' Length	9-2, 9-5	C-B		100% of Weld	
		NIP 554	P-39-13C-w	Pipe to ELL Weld, 12''	9-1	C-F		100% of Weld	P8R-.75-2
	X W		P-39-46A-w	Pipe to ELL Weld, 10''	9-2				
	VIII E		P-39-7-w	Pipe to Valve 39-06, 10''		B-J			
			P-39-7-wU	Straight Pipe Long. Weld				12'' of Long.Weld	

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8	VII W	NIP 554	P-38-10-w	Pipe to Valve 38-05,12"	8-2	C-F	UT	100% of Weld	P8R-.75-2
↓	↓	↓	P-38-31-w	Pipe to Pipe Weld, 8"	↓	↓	↓	↓	P8R-.75-3
↓	VI E	↓	P-81-64G-W	Pipe to Pipe Weld, 12"	10-3	C-G	↓	↓	P1R-.75-2

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8	III E	NIP 528	P-31-H9-s	Pipe Support, Stanchion	4-2	B-K-1	SURF	Weld +2 Support t	N/A
			P-NES-37-12-w	Pipe to Valve 37-04, 2" Socket Weld	7-2	B-J		100% of Weld	
			P-NES-42.1-3-w	Valve 42.1-02 to Reducer, Socket Weld	11-1				
	III W		P-32-75-w	Safe-end to Pipe Weld	5-1, 5-6	B-F			
			RV-4-565E-w	Nozzle to Safe-end Weld	14-2B				
	II W		P-32-23-w	Pipe to Valve NG08/E, 2" Socket Weld	5-1, 5-6	B-J			
			P-32LUG/PD/E-s	Pipe Support, 4 Lugs	5-1, 5-7	B-K-1		Weld +2 Support t	
			P-32LUG/PS/E-s	Pipe Support, 4 Lugs					
	XV E		P-NES-37-1-w	Pipe to Reducer, 2" Socket Weld	7-1	B-J		100% of Weld	

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8	XI W	NIP 528	CH-2-576B-w	C.H. Nozzle to Flange	13-2	B-F	SURF	100% of Weld	N/A
			CH-2-576C-w	C.H. Nozzle to Flange					
			CH-4-576B-w	C.H. Nozzle to Flange					
			CH-6-p	C.H. Cladding	13-1	B-I-1		6" X 6" Patch	
			CH-56-n	C.H. Nut No. 56	14-4	B-G-1		100% of Nuts	
			CH-57-n	C.H. Nut No. 57					
			CH-58-n	C.H. Nut No. 58					
			CH-59-n	C.H. Nut No. 59					
			CH-60-n	C.H. Nut No. 60					
			CH-61-n	C.H. Nut No. 61					
			CH-62-n	C.H. Nut No. 62					
			CH-63-n	C.H. Nut No. 63					
			CH-64-n	C.H. Nut No. 64					

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8	XI W	NIP 528	CH-2-576B-w	C.H. Nozzle to Flange	13-2	B-F	SURF	100% of Weld	N/A
			CH-2-576C-w	C.H. Nozzle to Flange					
			CH-4-576B-w	C.H. Nozzle to Flange					
			CH-6-p	C.H. Cladding	13-1	B-I-1		6" X 6" Patch	
	VI E		V-40-03-b	Valve 40-03 Bolts*	10-3	C-D		10% of Bolts/ Joints	
			V-40-05-b	Valve 40-05 Bolts*					
			V-93-52-b	Valve 93-52 Bolts*					
			P-81-SC22-s	Pipe Support, 4 Lugs	10-6	C-E-1		Weld +2 Support t	

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* 2 bolts to be selected and marked in field, if > 1" (only if removed)

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
8	XI W	NIP 529	CH-56-n	C.H. Nut No. 56	14-4	B-G-1	VIS	100% of Nuts	N/A
			CH-57-n	C.H. Nut No. 57					
			CH-58-n	C.H. Nut No. 58					
			CH-59-n	C.H. Nut No. 59					
			CH-60-n	C.H. Nut No. 60					
			CH-61-n	C.H. Nut No. 61					
			CH-62-n	C.H. Nut No. 62					
			CH-63-n	C.H. Nut No. 63					
			CH-64-n	C.H. Nut No. 64					

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
8	VI E	NIP 528	V-40-03-b	Valve 40-03 Bolts*	10-3	C-D	SURF	10% of Bolts/ Joint	N/A
↓	↓	↓	V-40-05-b	Valve 40-05 Bolts*	↓	↓	↓	↓	↓
↓	↓	↓	V-93-52-b	Valve 93-52 Bolts*	↓	↓	↓	↓	↓
			P-81-SC22-s	Pipe Support, 4 Lugs	10-6	C-E-1	↓	Weld +2 Support t	↓

* 2 bolts to be selected and marked in field, if > 1" (only if removed).

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8	III E	NIP 529	P-42.1-R2-s	Pipe Support	11-2	B-K-2	VIS	All Support Components	N/A
			P-42.1-R3-s	Pipe Support					
			P-31-SC1-s	Pipe Support	4-2				
			P-31-H9-s	Pipe Support					
			P-40-H53-s	Pipe Support	10-4				
			P-40-HS-2-s	Pipe Support					
			P-40-HS-1-s	Pipe Support					
			V-37-04-b	Valve 37-04 Bolting	7-2	B-G-2		100% of Bolting < 2" Dia.	
			V-37-05-b	Valve 37-05 Bolting					
	III W		P-01-H22-s	Pipe Support, 2 Units	1-2	B-K-2		All Support Components	

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8	II W	NIP 529	P-32-H4/E-s	Pipe Support, 2 Units	5-1, 5-7	B-K-2	VIS	All Support Components	N/A
			P-32-H3/E-s	Pipe Support, 2 Units					
			P-32-SB1/PS/ E-s	Pipe Support					
			P-32-SB1/PD/ E-s	Pipe Support					
			P-32-LUG/PD/ E-s	Pipe Support, 4 Lugs					
			P-32-LUG/PS/ E-s	Pipe Support, 4 Lugs					
			V-32-NG08/E-b	Valve NG08/E Bolting		B-G-2		100% of Bolting < 2" Dia.	
	I W		PM-32-SS3/E-s	Pump NG01/E Support		B-K-2		All Support Components	
			PM-32-PSF-s	Pump NG01/E Support Frame					

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8	I W	NIP 529	PM-32-SS1/E-s	Pump NG01/E Support, 2 Units	5-1, 5-7	B-K-2	VIS	All Support Components	N/A
			PM-32-H1/E-s	Pump NG01/E Support, 4 Units					
	XV W		RV-56-t	R.V. Bushing, Threads and Washers	14-4	B-G-1		100% of All Visible Components	
			RV-57-t	R.V. Bushing, Threads and Washers					
			RV-58-t	R.V. Bushing, Threads and Washers					
			RV-59-t	R.V. Bushing, Threads and Washers					
			RV-60-t	R.V. Bushing, Threads and Washers					

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8	XV W	NIP 529	RV-61-t	R.V. Bushing, Threads and Washers	14-4	B-G-1	VIS	100% of All Visible Components	N/A
			RV-62-t	R.V. Bushing, Threads and Washers					
			RV-63-t	R.V. Bushing, Threads and Washers					
			RV-64-t	R.V. Bushing, Threads and Washers					
			RV-C2-p	R.V. Cladding	14-5	B-I-1		6" X 6" Patch	
	XI W		CH-6-p	C.H. Cladding	13-1				
			CH-576-12M-b	Nozzle 576-12M Flange Bolting	13-2	B-G-2		100% of Bolting < 2" Dia.	
			CH-576-07E-b	Nozzle 576-07E Flange Bolting					
			CH-576-07 F-b	Nozzle 576-07F Flange Bolting					
			CH-576-12A-b	Nozzle 576-12A Flange Bolting					

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
8	XV W	NIP 529	RV-61-t	R.V. Bushing, Threads and Washers	14-4	B-G-1	VIS	100% of All Visible Components	N/A
			RV-62-t	R.V. Bushing, Threads and Washers					
			RV-63-t	R.V. Bushing, Threads and Washers					
			RV-64-t	R.V. Bushing, Threads and Washers					
			RV-C2-p	R.V. Cladding	14-5	B-I-1		6" X 6" Patch	
	XI W		CH-6-p	C.H. Cladding	13-1				
			CH-576-12M-b	Nozzle 576-12M Flange Bolting	13-2	B-G-2		100% of Bolting < 2" Dia.	
			CH-576-07E-b	Nozzle 576-07E Flange Bolting					
			CH-576-07 F-b	Nozzle 576-07F Flange Bolting					

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8	XI W	NIP 529	P-39-H1-s	Pipe Support, 2 Units	9-4	C-E-2	VIS	All Support Components	N/A
	X W		P-39-SC1-s	Pipe Support	9-3				
	VIII W		V-39-05-b	Valve 39-05 Bolting	9-2	B-G-2		100% of Bolting < 2" Dia.	
			V-39-06-b	Valve 39-06 Bolting					
			V-42.1-03-b	Valve 42.1-03 Bolting	11-1				
	VII W		P-38-SC12-s	Pipe Support	8-4	C-E-2		All Support Components	
	VI W		P-81-H15-s	Pipe Support	10-5				
	VI E		V-40-02-s	Valve 40-02 Support	10-1	B-K-2			
			V-40-02-b	Valve 40-02 Bolting		B-G-2		100% of Bolting < 2" Dia.	

NUCLEAR ENERGY SERVICES, INC.
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PROJECT 5530-9MP

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
8	VI E	NIP 529	V-40-03-b	Valve 40-03 Bolting	10-3	C-D	VIS	100% of Bolting > 1" Dia.	N/A
			V-40-05-b	Valve 40-05 Bolting					
			V-93-52-b	Valve 93-52 Bolting					

NES III 7/75

NUCLEAR ENERGY SERVICES, INC.
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PROJECT 5530-9MP

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
8	III	NIP 529	HYD-36-11	Instrumentation Lines Inside Drywell	15-1, 15-3 15-1A	B-P	HYD VIS	All Components @ 110% Operating Pressure	N/A
↓	↓	↓	HYD-36-2	↓	↓ ,15-2	↓	↓	↓	↓
↓	↓	↓	HYD-36-10	↓	↓ ,15-5	↓	↓	↓	↓
↓	↓	↓	HYD-36-4	↓	↓ ,15-6	↓	↓	↓	↓
↓	↓	↓	HYD-36-7	↓	↓ ,15-7	↓	↓	↓	↓
↓	↓	↓	HYD-36-8	↓	↓ ,15-7	↓	↓	↓	↓
↓	↓	↓	HYD-36-3	↓	↓ ,15-2	↓	↓	↓	↓
↓	↓	↓	HYD-36-12	↓	↓ ,15-3	↓	↓	↓	↓
↓	↓	↓	HYD-36-9	↓	↓ ,15-5	↓	↓	↓	↓
↓	↓	↓	HYD-36-5	↓	↓ ,15-6	↓	↓	↓	↓

NUCLEAR ENERGY SERVICES, INC.
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PROJECT 5530-9MP

BY: gg DATE: 9-4-75
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REV 0

OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
8	III	NIP 529	HYD-36-6	Instrumentation Lines Inside Drywell	15-1, 1A, 4	B-P	HYD VIS	All Components @ 110% Operating Pressure	N/A
			HYD-36-1						
			HYD-01-1	1" Instr. lines from Main Steam (East & West)	15-8, 15-9 15-10				
			HYD-01-2	Drains from Valves 01-01, 01-02	, 1-1				
			HYD-39-1	1" Pressure line on Emergency Cond. Supply (East and West)	, 15-17 15-18				
			HYD-39-4	Drains from Valves 39-01, 39-02, 39-03, 39-04	, 9-2				
			HYD-33-1	Drains from Valve 33-01	, 6-1				
			HYD-33-3	Drains from Valve 33-02	, 6-1				
			HYD-38-1	Drains from Valve 38-01	, 8-1				

NUCLEAR ENERGY SERVICES, INC.
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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
8	III	NIP 529	HYD-38-3	Drains from Valve 38-13	15-8, 8-1	B-P	HYD VIS	All Components @ 110% Operating Pressure	N/A
			HYD-40-1	Drains from Valves 40-01, 40-09, 40,10, 40-11	,10-1				
			HYD-40-3	1" Instrument Line from Core Spray (Typ. of 2)	,15-19				
			HYD-44.1-1	Drain Line on CRD Return	,12-1				
			HYD-42.1-1	Drain Line on Liquid Poison	,11-1				
	II		HYD-32-1	Drain Line on Suction Valve BV-NG02-(A, B, C, D, E)	-				
			HYD-32-6	1" F. E. Instrument Line on Discharge Side (A, B, C, D, E)	,15-15,16				
			HYD-32-8	Drain Line on Discharge Valve BV-NG03-(A,B,C,D, E)	-				

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PROJECT 5530-9MP

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
8	11	NIP 529	HYD-32-9	Drain Line on 2" Bypass Valve from Valve BV-NG03-(A,B,C,D,E)	15-8	B-P	HYD VIS	All Components @ 110% Operating Pressure	N/A
↓	↓	↓	HYD-32-2	1" T.E. Thermowell on Suction Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-32-3	1" dP Line Around Recirculation Pumps (A,B,C,D,E)	15-11,12,13 14	↓	↓	↓	↓
↓	↓	↓	HYD-32-4	Drain Line From Recirculation Pump NG01 (A,B,C,D,E,)	15-8	↓	↓	↓	↓
↓	↓	↓	HYD-32-5	T.E. Thermowell on Discharge Side of Pump (A,B,C,D,E)	15-8	↓	↓	↓	↓

NUCLEAR ENERGY SERVICES, INC.
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PROGRAM PLAN AND SCHEDULE

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
8	IX	NIP 529	HYD-34-1	Drain Line on Valve IV-34-01 on Head Spray	15-8, 7-1	B-P	HYD VIS	All Components @ 110% Operating Pressure	N/A
			HYD-39-2	Drain Lines from Valves 39-07, 39-08, 39-09, 39-10	, 9-1				
	VIII		HYD-36-13	Instrumentation Line Outside Drywell	15-1				
			HYD-36-14						
			HYD-36-15						
			HYD-36-16						
			HYD-36-19						
			HYD-36-20						
			HYD-36-21						

NUCLEAR ENERGY SERVICES, INC.
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BY: gg DATE: 9-4-75
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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
8	VIII	NIP 529	HYD-36-22	Instrumentation Line Outside Drywell	15-1	B-P	HYD VIS	All Components @ 110% Operating Pressure	N/A
			HYD-36-23						
			HYD-36-24						
			HYD-39-3	1" Pressure Line and Valve on Emerg. Cond. (Typ. of 2)	15-8				
			HYD-39-5	Drain Lines on Valves 39-05, and 39-06 on Emerg. Cond Return	, 9-2				
			HYD-40-4	Instrument Line and Valve on Core Spray (Typ of 2)					
	VII		HYD-33-2	Drain Lines on Valve IV-33-03	, 6-1				
			HYD-33-4	Drain Lines on Valve IV-33-04	, 6-1				

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
8	VII	NIP 529	HYD-38-2	Drain Lines on Valve IV-38-02	15-8, 8-1	B-P	HYD VIS	All Components @ 110% Operating Pressure	N/A
			HYD-38-4	Drain Lines on Valve IV-38-12	, 8-1				
	VI	NIP 529	HYD-01-4	Instrument Lines and Valves from Main Steam Lines					
			HYD-40-2	Drain Lines on Valves IV-40-02, IV-40-12	; 10-1				
			HYD-32-7	F. E. Instrument Lines and Valves (A,B,C,D,E)					
			HYD-32-10	1" dP Lines and Valves around recirc. pump (A,B,C,D,E)					
	XIII	NIP 529	HYD-01-03	Drain Line on Warm-up by-pass lines around valves IV-01-03 and IV-01-04 on Main Steam Lines	, 1-1				

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OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
8	XIII	NIP 529	HYD-31-1	Drain Lines on Valves IV-31-01, IV-31-02, IV-31-03, IV-31-04	15-8, 4-1	B-P	HYD VIS	All Components @110% Operating Pressure	N/A
			HYD-02	Main Steam-External Isolation Valve to Turbine Inlet	2-2	Class B Non-Exempt		All Components@ 125% Design Pressure	
			HYD-03	Main Steam-Turbine By-pass to Condenser	3-1				
			HYD-39	Emergency Cond.Steam Supply and Return Lines(Outside Drywell only)	9-1, 9-2, 9-3, 9-4				
			HYD-81	Core Spray (Outside Drywell Only)	10-2, 10-3			All Components at 100% System test pressure	
			HYD-38	Shutdown Cooling (Outside Drywell Only)	8-1, 8-2			All Components @ 125% Design Pressure	
			HYD-38/3	Shutdown Cooling,3" By-pass Line	8-2	Class B Exempt			

NUCLEAR ENERGY SERVICES, INC.
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BY: [illegible] DATE: 11-6-75
APP: AU DATE: 11-11-75
REV 0 PAGE 26 OF 26

OUTAGE-YEAR OF EXAMINATION DURING INTERVAL	ZONE #	PROCEDURE NUMBER	AREA DESIGNATION	AREA DESCRIPTION	REFERENCE DRAWING NUMBER	CODE EXAMINATION CATEGORY	CODE EXAMINATION METHOD	EXTENT OF EXAMINATION REQUIREMENTS PER CODE (SUMMARY)	CALIBRATION BLOCK NUMBER
8	-	NIP 529	HYD-33	Clean-up Heat Exchangers etc. (Not incl. Filters, Demins)	15-34	Group C	HYD VIS	All Components @ 100% Operating Pressure	N/A
	—		HYD-70-201	CLCW to Drywell Air Cooler*	15-25				
	—		HYD-70-205	CLCW to Equipment Drain Sump*					
	-		HYD-70-32	CLCW to Recirc. Pump Motor*	15-24				
	—		HYD-70-33	CLCW to Clean-up. Non-Reg. Heat Exchangers, Precoat Cooler, etc.	15-23				
	-		HYD-44	CRD Ins/withdraw Lines from CRD Housing Flanges to CRD Hydraulic Control Units*	15-31				

NE[illegible] 7/75 * Systems inside Drywell.

APPENDIX D

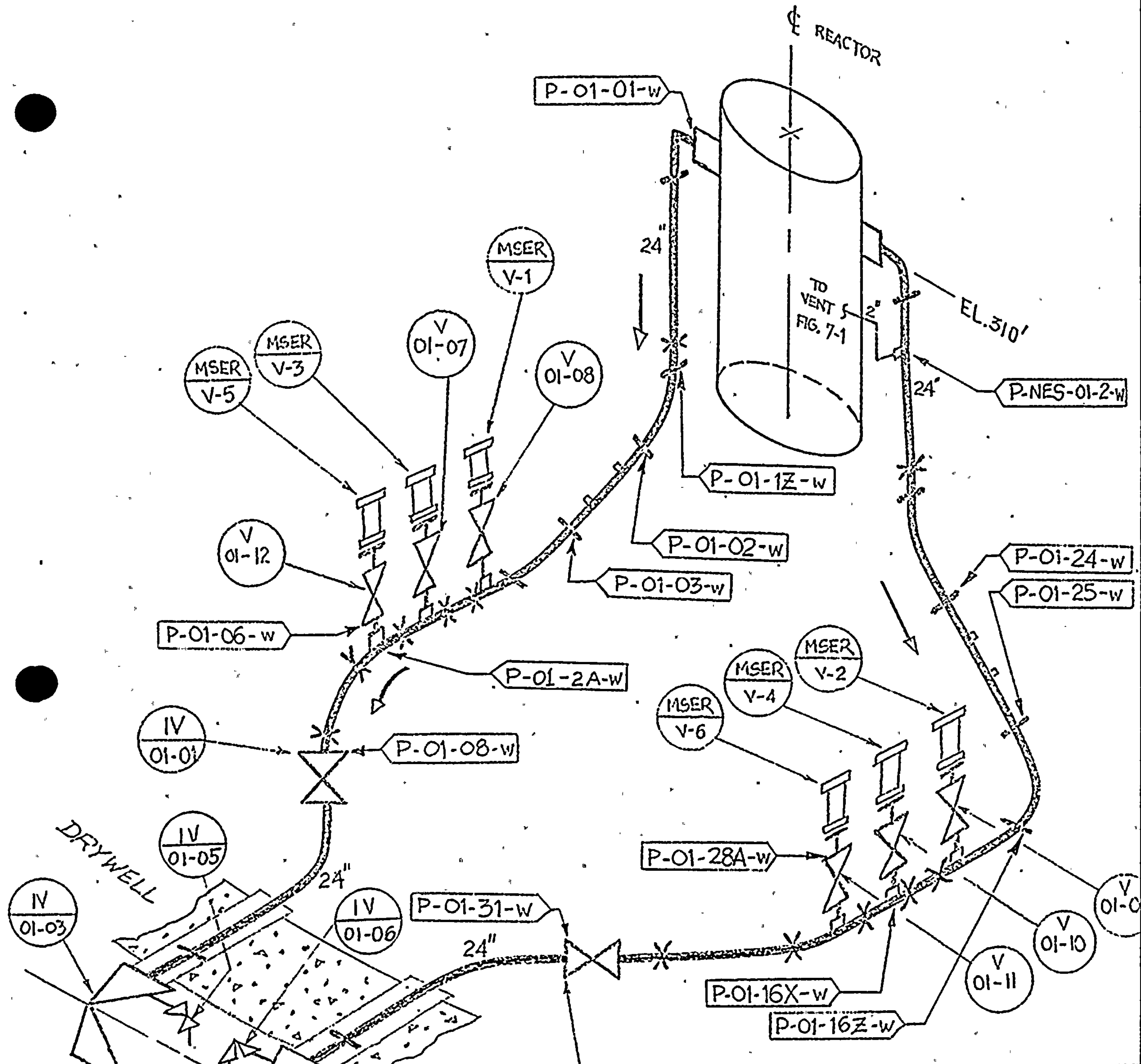
System Isometrics and Diagrams

The system isometrics and plant component diagrams presented in this Appendix show the physical location and identification numbers for all examination areas. Valve, pump and heat exchangers, etc. have also been identified by their Niagara Mohawk numbers along with penetrations and flow directions.

Figures 1-1 through 12-2 are system piping isometrics. Reactor vessel component drawings are Figures 13-1 through 14-6. All hydrostatic test areas for Quality Groups A, B and C are illustrated in Figures 15-1 through 15-40. A detail breakdown of the isometric/diagrams is presented in Table D-1.

TABLE D-1 SYSTEM ISOMETRICS AND DIAGRAMS

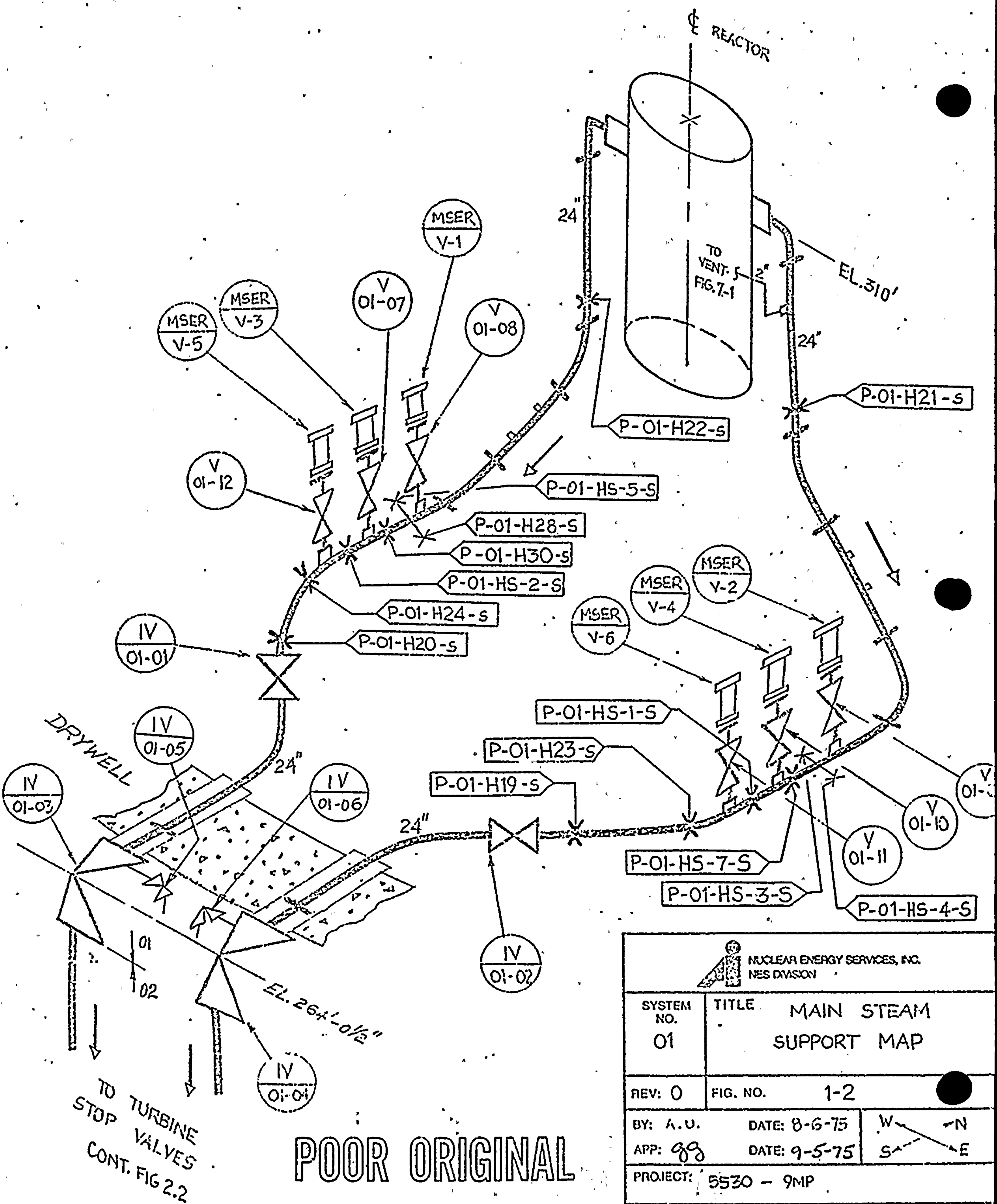
Figure Set Number	Nine Mile Point System Number	System Description
1	01	Main Steam
2	02	Main Steam
3	03	Main Steam
4	31	Feedwater
5	32	Recirculation
6	33	Cleanup
7	34,37	Vent, Drain
8	38	Shutdown Cooling
9	39	Emergency Condenser
10	40	Core Spray
11	42.1	Liquid Poison
12	44.1	CRD Return
13	-	Closure Head
14	-	Reactor Vessel
15	-	Hydrostatic Test



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE		
01	MAIN STEAM WELD MAP		
REV: 0	FIG. NO. 1-1		
BY: A.U.	DATE: 8-6-75	W — N	
APP: gg	DATE: 9-5-75	S — E	
PROJECT: 5530 - 9MP			
NES 112	NOT TO SCALE		

POOR ORIGINAL



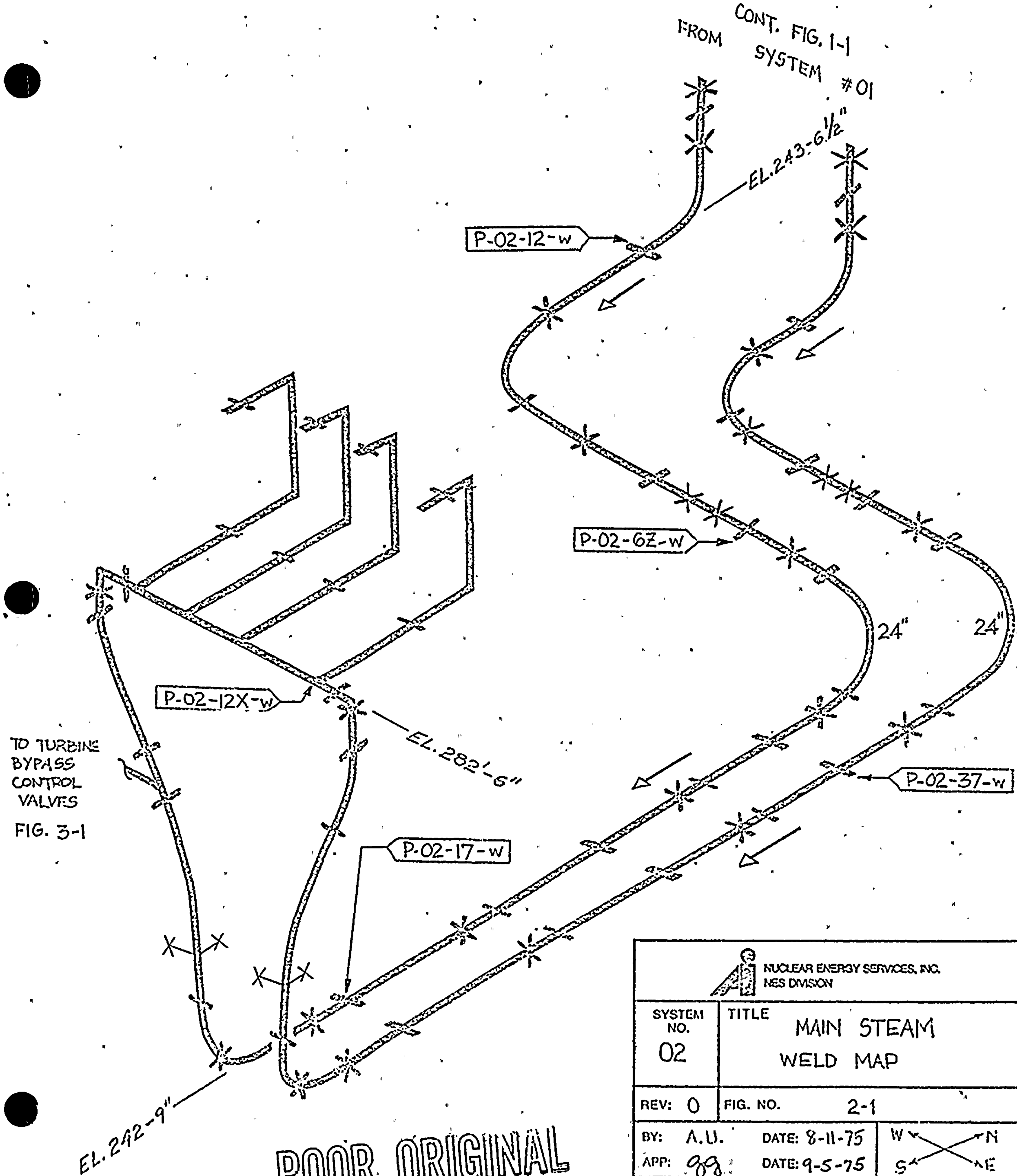
POOR ORIGINAL

NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE	
01	MAIN STEAM SUPPORT MAP	
REV: 0	FIG. NO. 1-2	
BY: A.U.	DATE: 8-6-75	W — N, S — E
APP: [illegible]	DATE: 9-5-75	
PROJECT: 5530 – 9MP		

NOT TO SCALE

NES 112



POOR ORIGINAL

NUCLEAR ENERGY SERVICES, INC.
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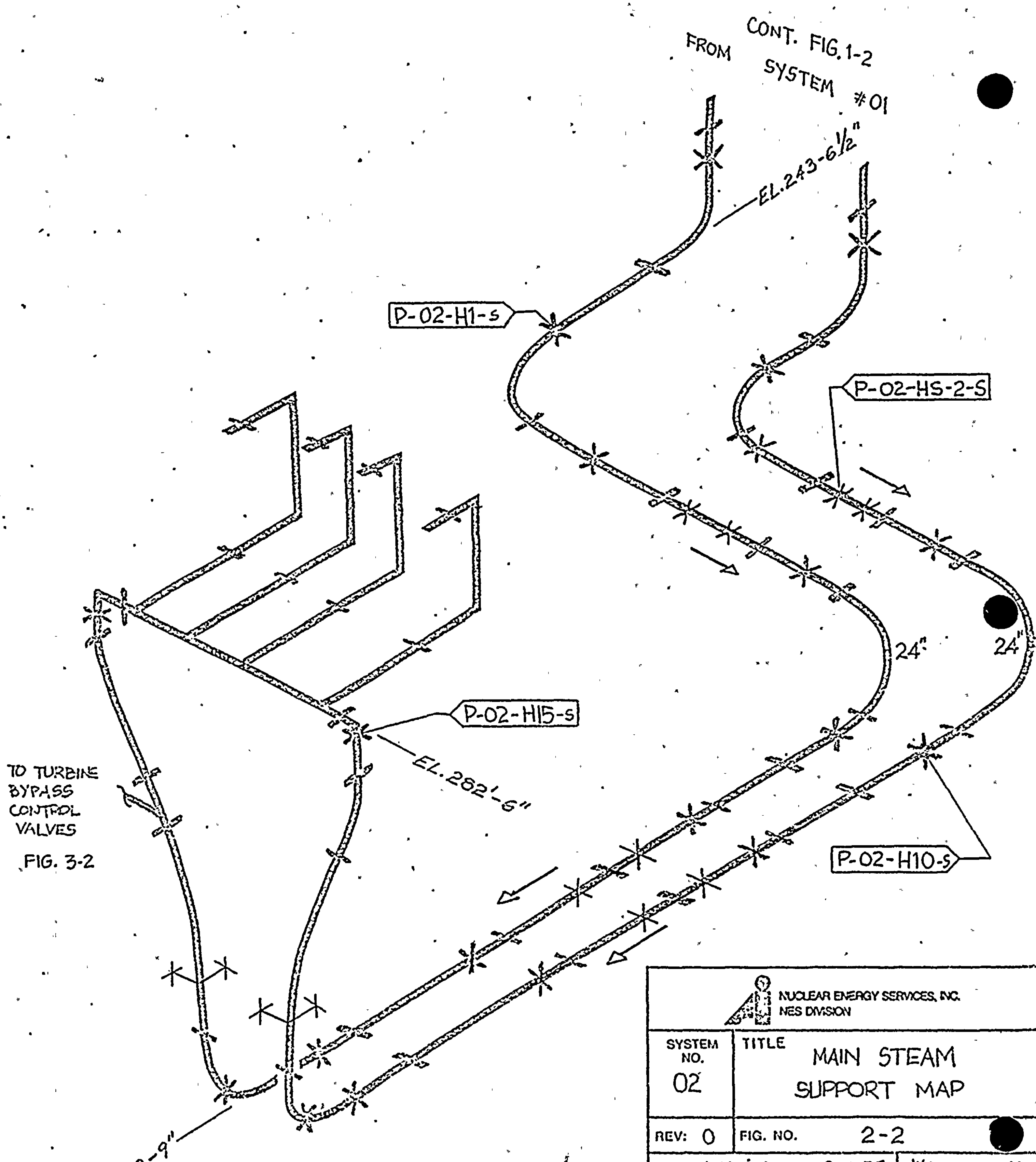
SYSTEM NO. 02	TITLE MAIN STEAM WELD MAP
REV: 0	FIG. NO. 2-1
BY: A.U. DATE: 8-11-75	W N S E
APP: [illegible] DATE: 9-5-75	
PROJECT: 5530 - 9MP	
NOT TO SCALE	

NES 112



POOR ORIGINAL

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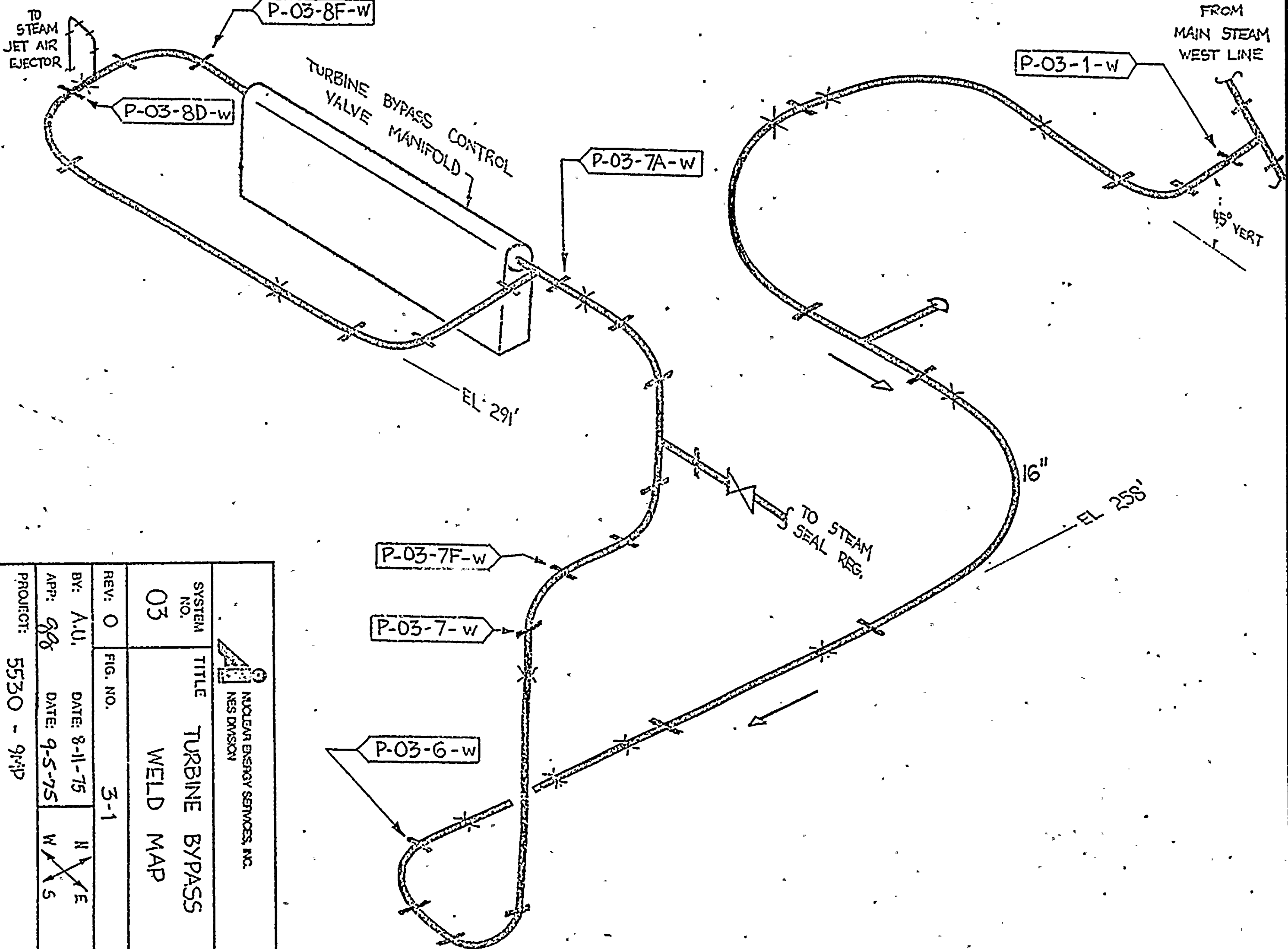
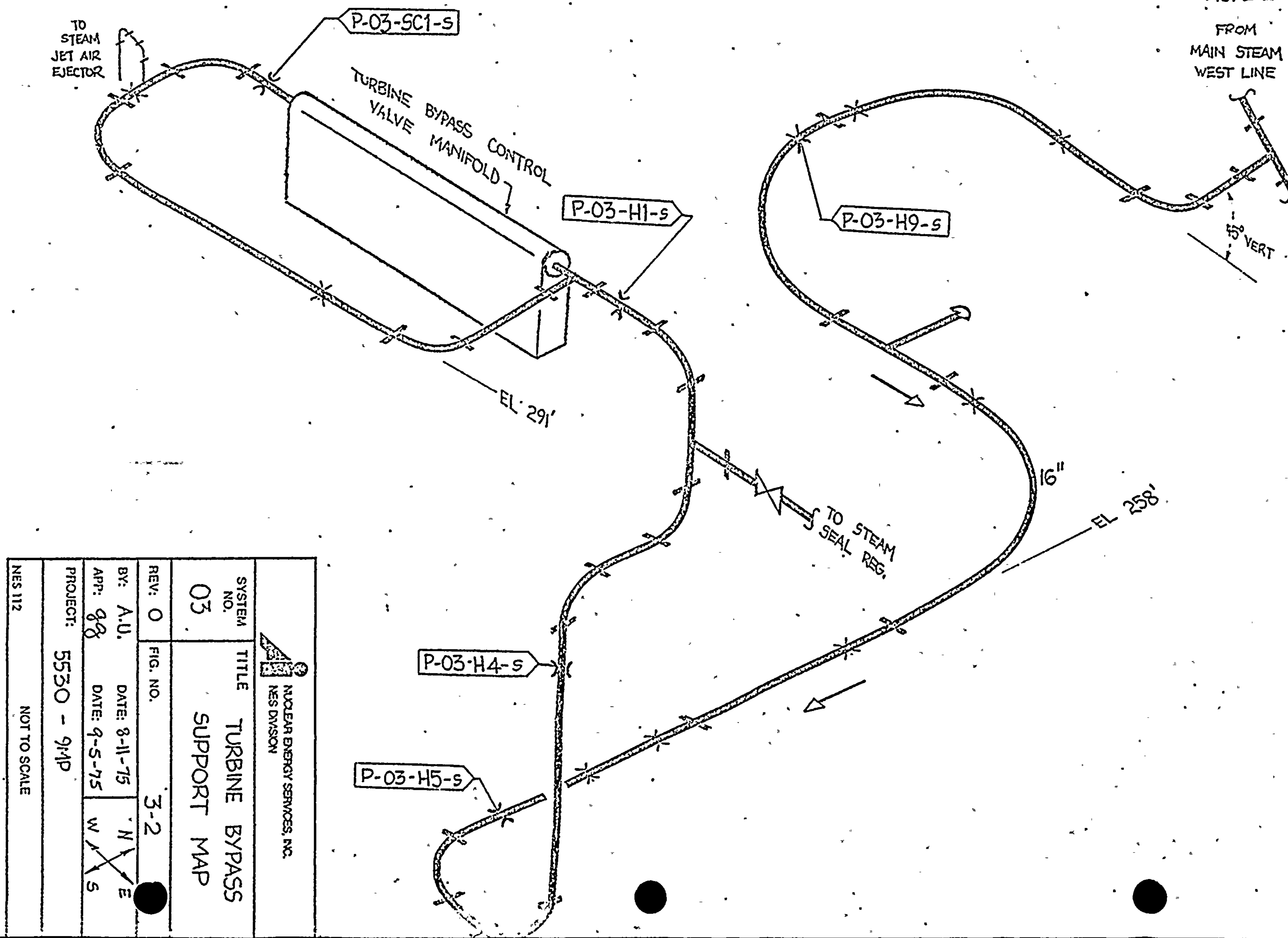
SYSTEM NO. 02	TITLE MAIN STEAM SUPPORT MAP
REV: 0	FIG. NO. 2-2
BY: A.U. DATE: 8-11-75 APP: 88 DATE: 9-5-75	W S N E
PROJECT: 5530 - 9MP	
NES 112	NOT TO SCALE

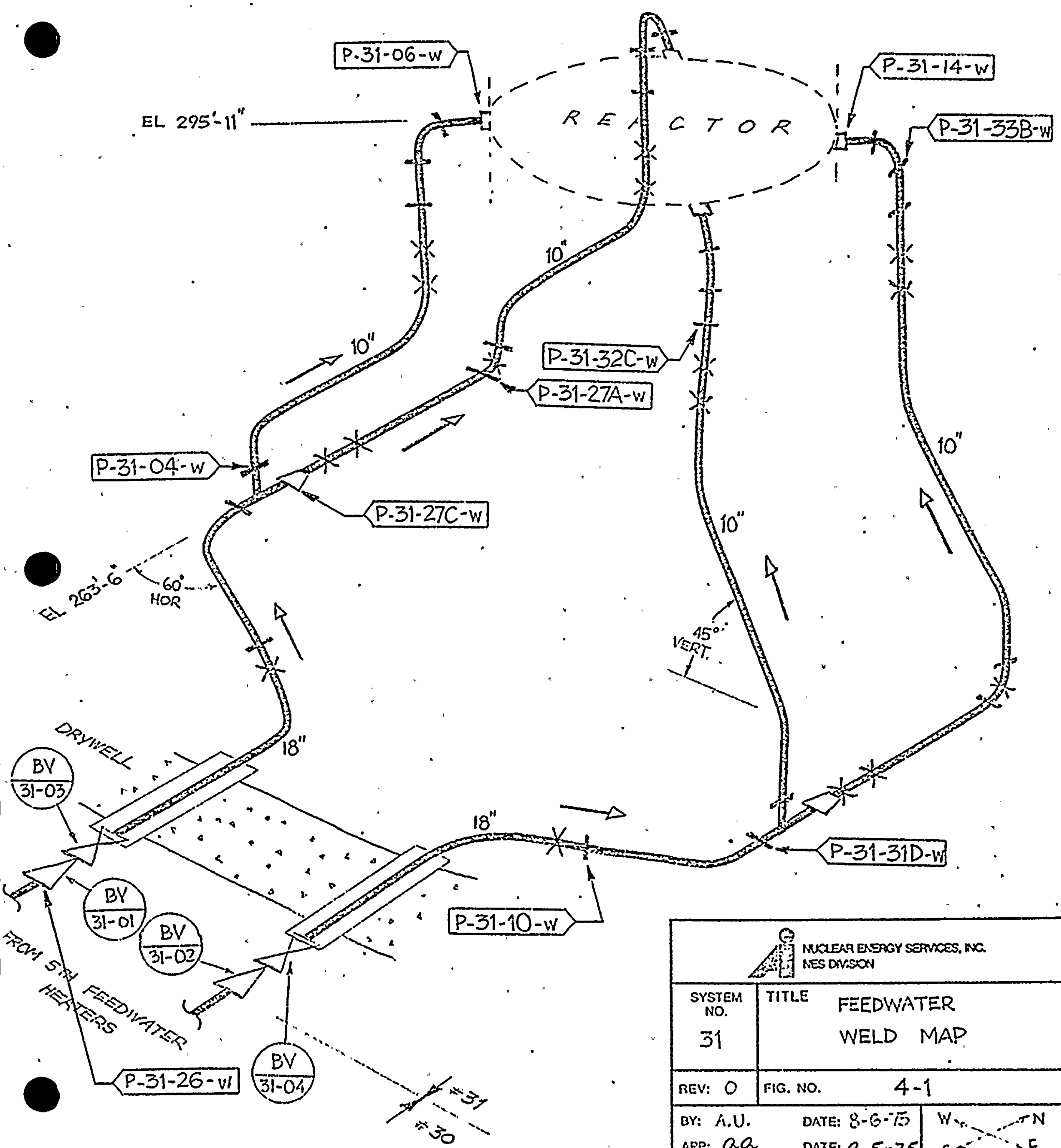
FIG. 2-1



SYSTEM NO. 03	NUCLEAR ENERGY SERVICES, INC. NES DIVISION TITLE TURBINE BYPASS WELD MAP
REV: 0	FIG. NO. 3-1
BY: A.U. DATE: 8-11-75	N E S W
APP: [signature] DATE: 9-5-75	
PROJECT: 5530 - 9MP	
NES 112	NOT TO SCALE

FIG. 2-2


TO STEAM JET AIR EJECTOR
P-03-SC1-s
TURBINE BYPASS CONTROL VALVE MANIFOLD
P-03-H1-s
FROM MAIN STEAM WEST LINE
P-03-H9-s
45° VERT
EL 291'
16"
TO STEAM SEAL REG.
EL 258'
P-03-H4-s
P-03-H5-s
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION
SYSTEM NO.
03
TITLE
TURBINE BYPASS
SUPPORT MAP
REV: 0
FIG. NO.
3-2
BY: A.U.
DATE: 8-11-75
DATE: 9-5-75
PROJECT:
5530 - 9MP
N
E
S
W
NES 112
NOT TO SCALE



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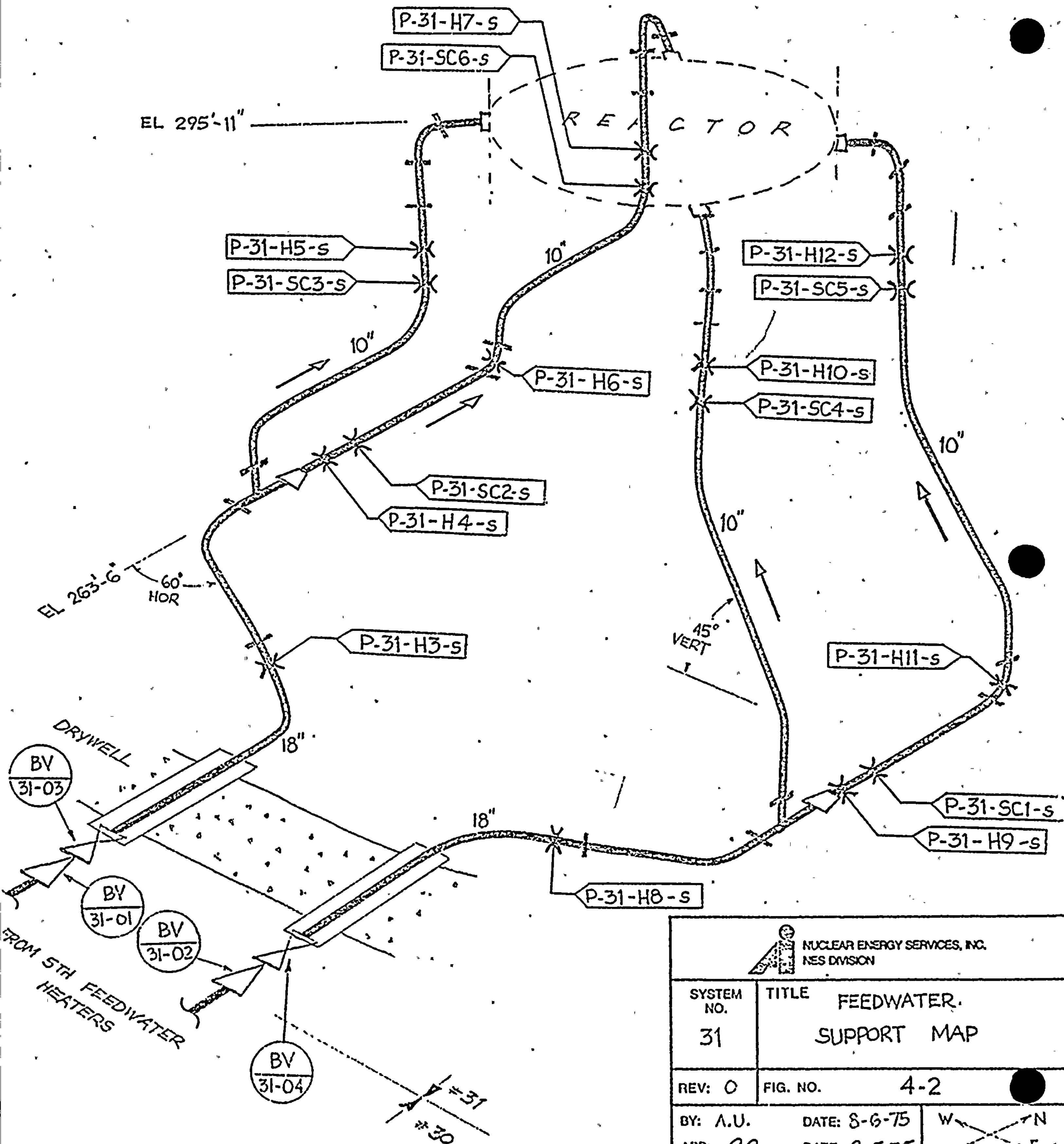
SYSTEM NO. 31	TITLE FEEDWATER WELD MAP
REV: 0	FIG. NO. 4-1
BY: A.U. DATE: 8-6-75	W N S E
APP: [illegible] DATE: 9-5-75	
PROJECT: 5530 - 9MP	
NES 112	NOT TO SCALE



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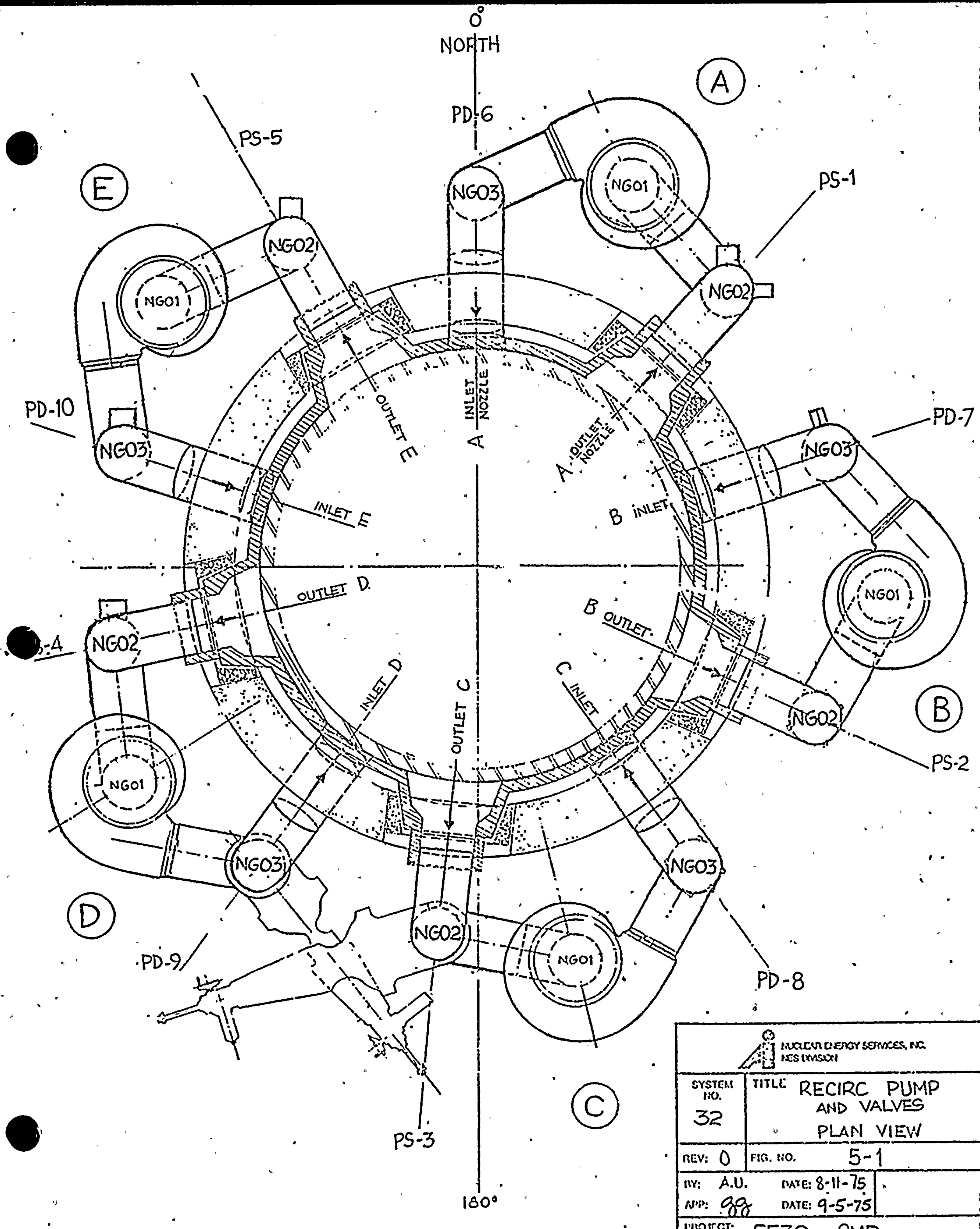
NES DIVISION

SYSTEM NO.	TITLE	
31	FEEDWATER SUPPORT MAP	
REV: 0	FIG. NO. 4-2	
BY: A.U.	DATE: 8-6-75	W N S E
APP: gg	DATE: 9-5-75	
PROJECT: 5530 - 9MP		

NES 112 NOT TO SCALE



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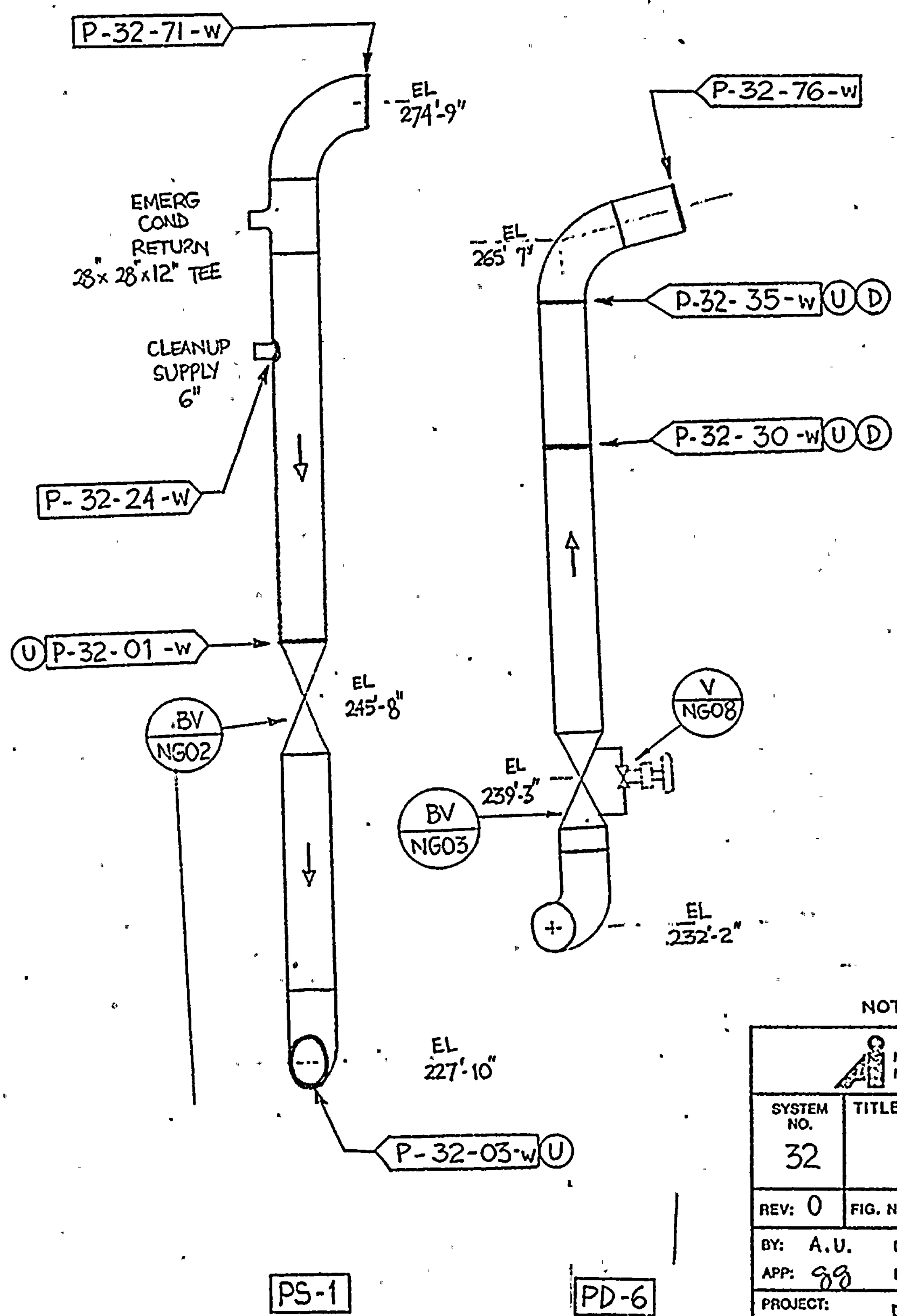
SYSTEM NO. 32	TITLE RECIRC PUMP AND VALVES PLAN VIEW
REV: 0	FIG. NO. 5-1
BY: A.U.	DATE: 8-11-75
APP: gg	DATE: 9-5-75
PROJECT:	5530 - 9MP
NES 112	NOT TO SCALE



NOTE: NES WELD ID #'s

NUCLEAR ENERGY SERVICES, INC.
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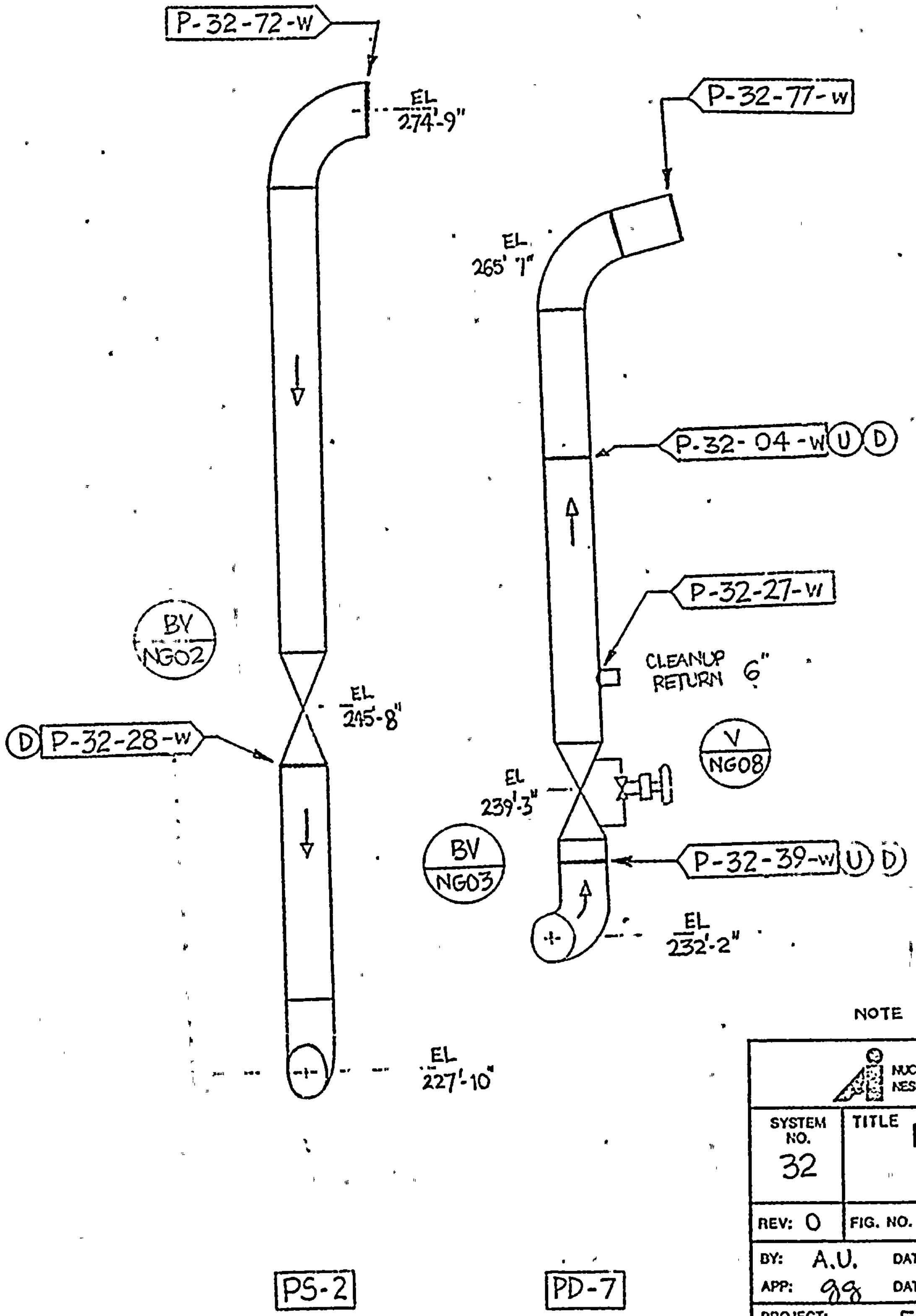
SYSTEM NO.	TITLE
32	RECIRC LOOP A WELD MAP
REV: 0	FIG. NO. 5-2
BY: A.U.	DATE: 9-2-75
APP: gg	DATE: 9-5-75
PROJECT:	5530-9MP

NOT TO SCALE

NES 112



NOTE : NES WELD ID #'S

NUCLEAR ENERGY SERVICES, INC.
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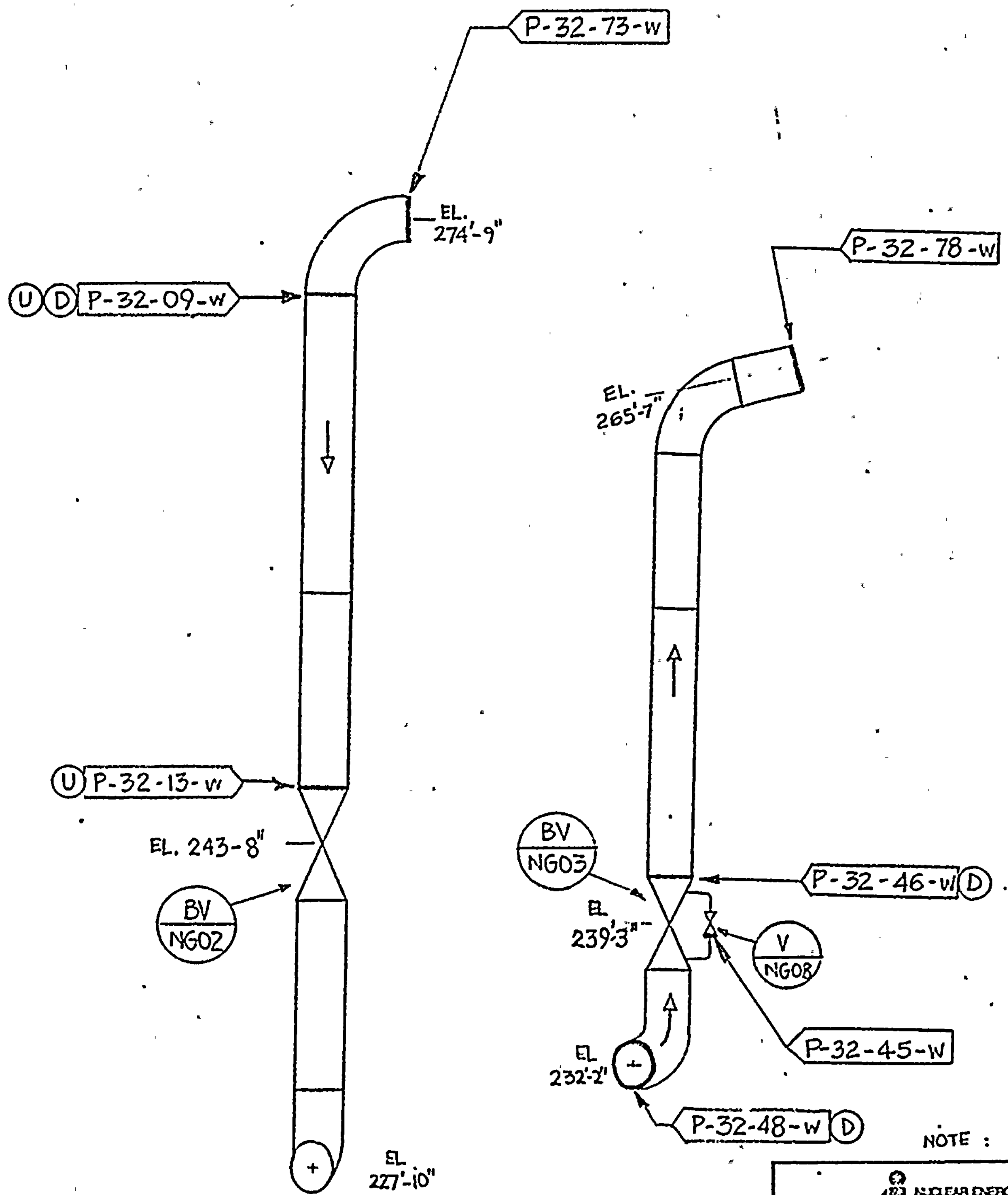
SYSTEM NO. 32	TITLE RECIRC LOOP B WELD MAP
REV: 0	FIG. NO. 5-3
BY: A.U. DATE: 9-2-75	
APP: gg DATE: 9-5-75	
PROJECT:	5530-9MP
NES 112	NOT TO SCALE

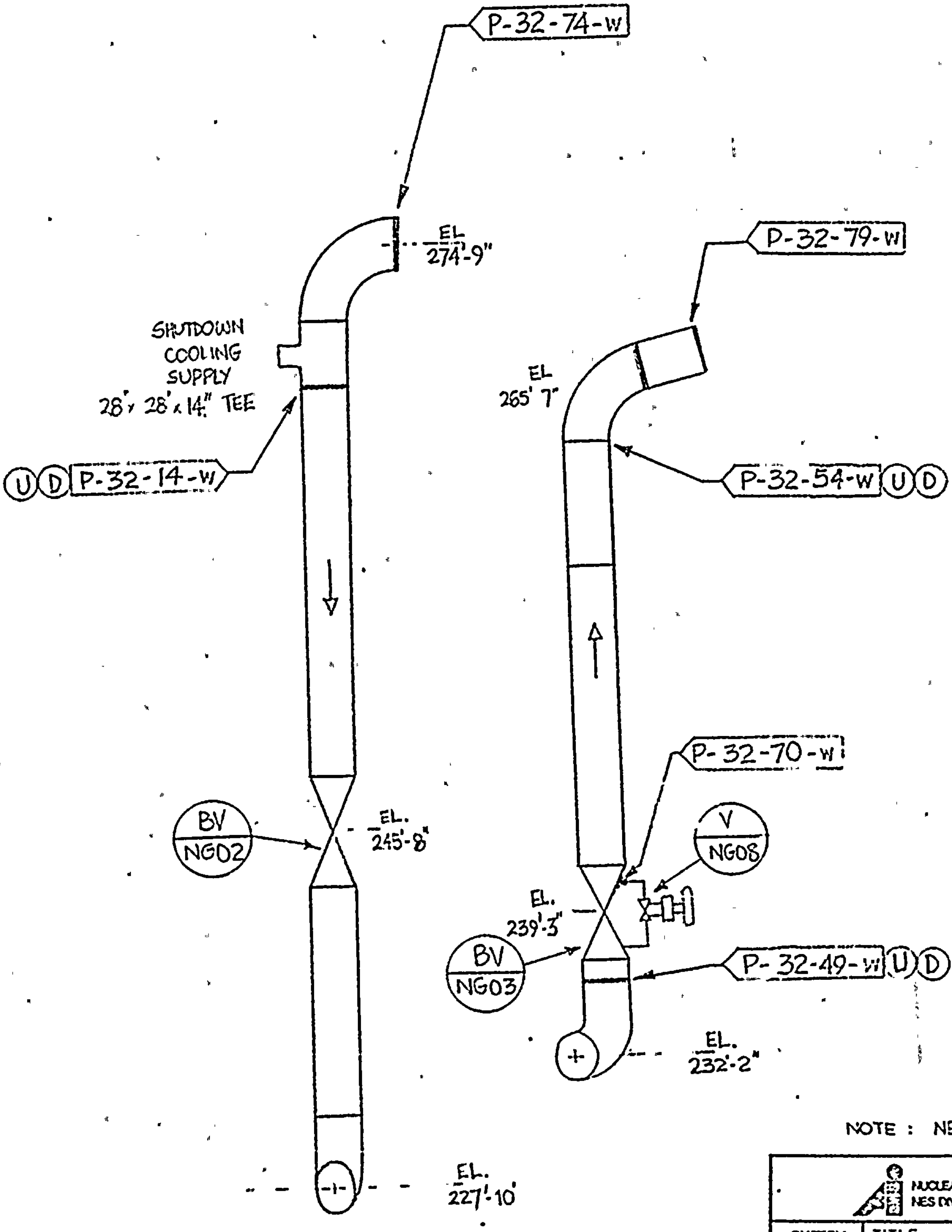


PS-3

PD-8

NOTE : NES WELD ID #

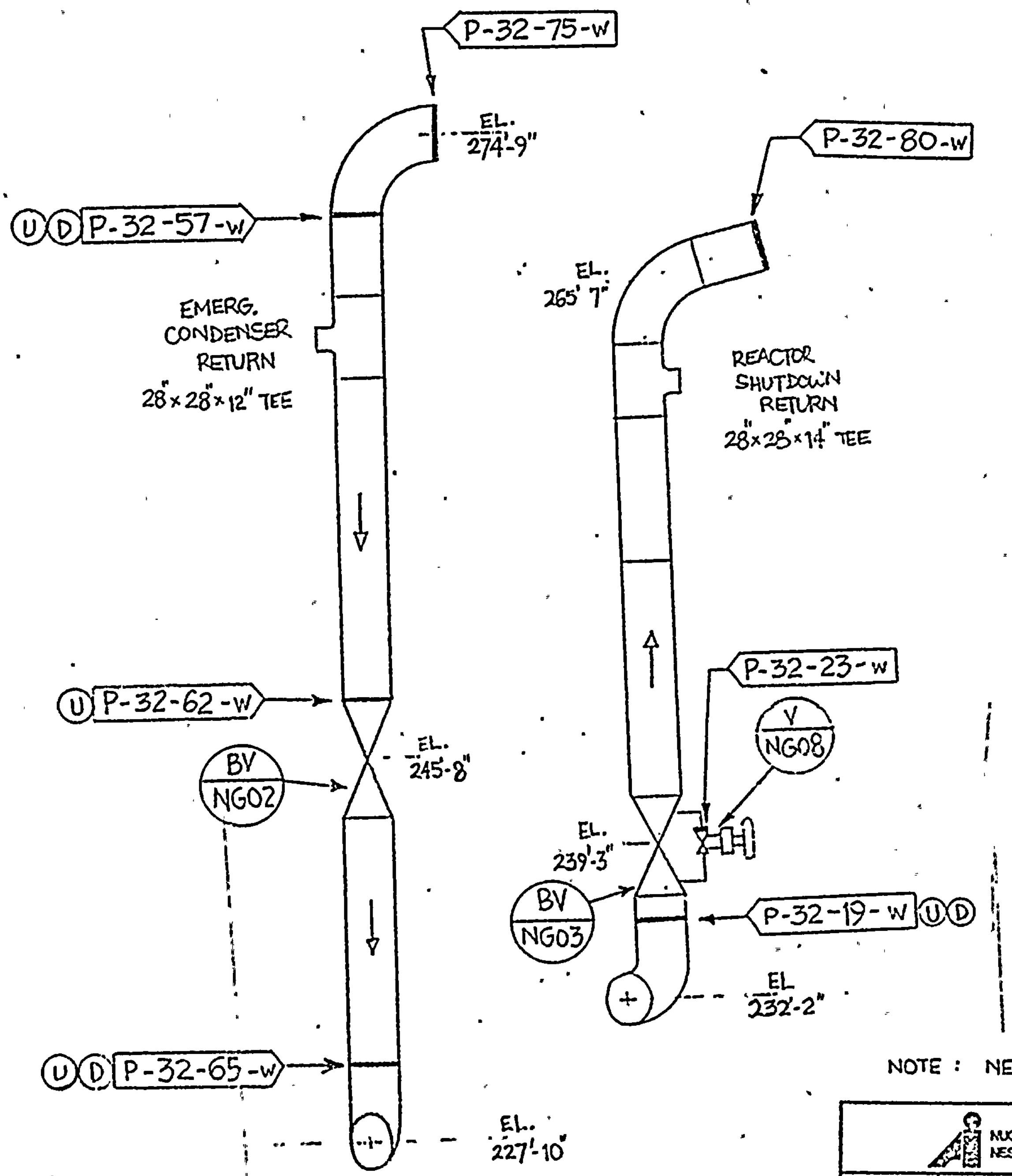
NUCLEAR ENERGY SERVICES, INC. NES DIVISION		
SYSTEM NO. 32	TITLE RECIRC LOOP C WELD MA	
REV: O	FIG. NO. 5-4	
BY: A.U.	DATE: 9-2-75	
APP: gg	DATE: 9-5-75	
PROJECT:	5530 - 9MP	
NES 112	NOT TO SCALE	



NOTE : NES WELD ID #'s

NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO. 32	TITLE RECIRC LOOP D WELD MAP
REV: 0	FIG. NO. 5-5
BY: A.U. DATE: 9-2-75	
APP: gg DATE: 9-5-75	
PROJECT: 5530-9MP	
NES 112	NOT TO SCALE

PS-4 PD-9



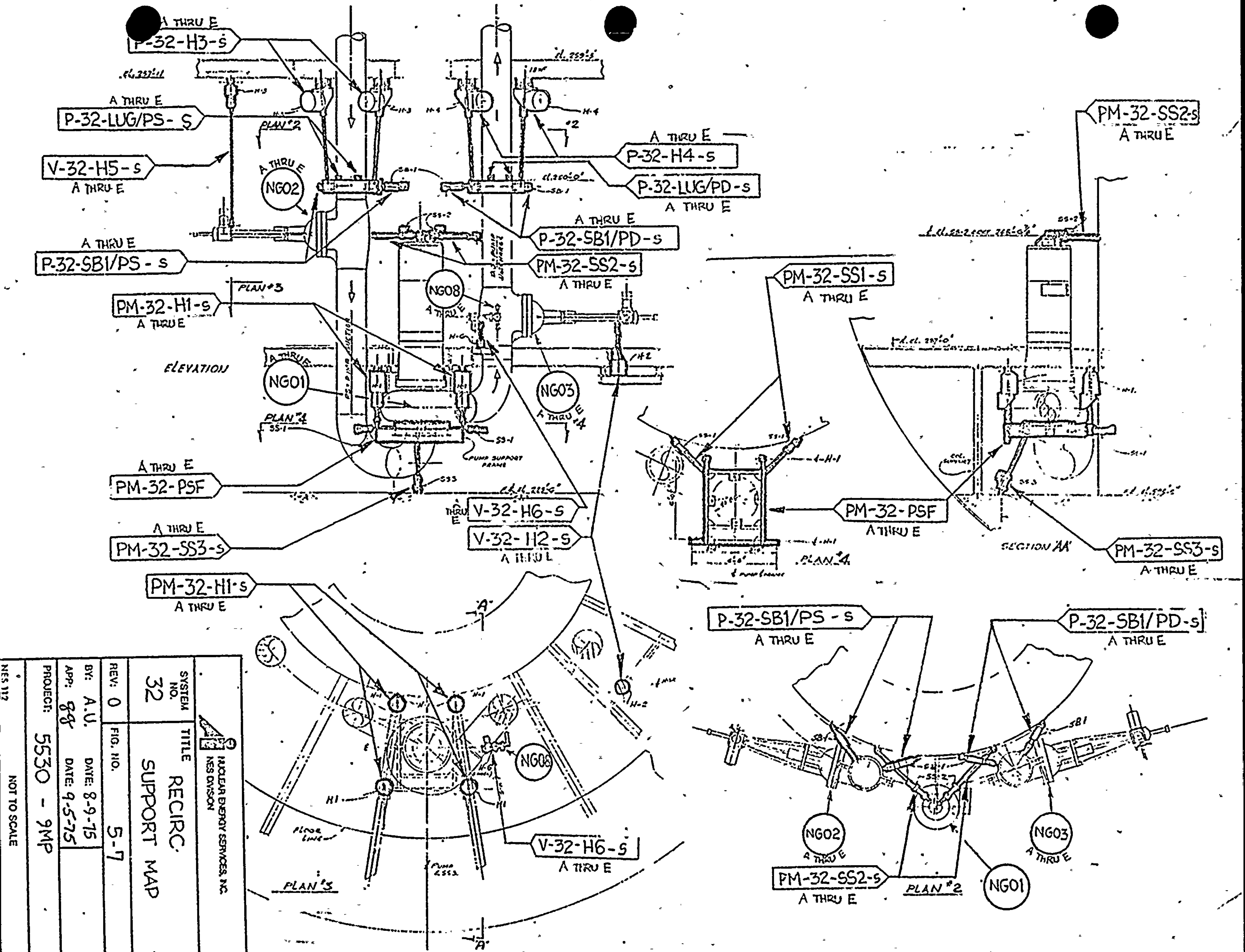
NOTE : NES WELD ID #'s

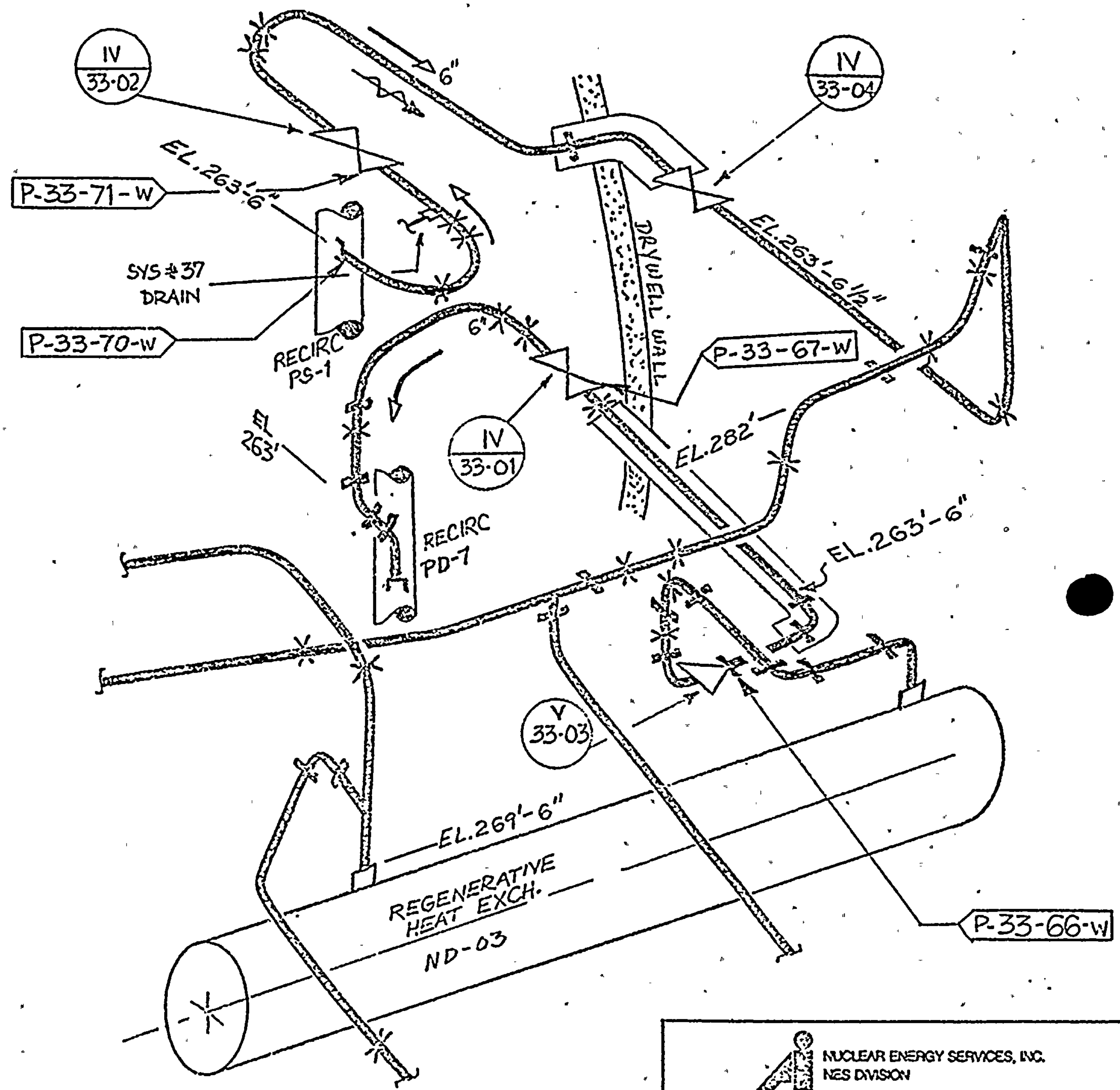
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE
32	RECIRC LOOP E WELD MA
REV: 0	FIG. NO. 5-6
BY: A.U.	DATE: 9-2-75
APP: gg	DATE: 9-5-75
PROJECT:	5530-9MP

NES 112 NOT TO SCALE

PS-5 PD-10


P-32-H3-s
A THRU E
P-32-LUG/PS-S
A THRU E
V-32-H5-s
A THRU E
NG02
A THRU E
P-32-SB1/PS-s
A THRU E
PM-32-H1-s
A THRU E
ELEVATION
NG01
PM-32-PSF
A THRU E
PM-32-SS3-s
A THRU E
P-32-H4-s
A THRU E
P-32-LUG/PD-s
A THRU E
P-32-SB1/PD-s
A THRU E
PM-32-SS2-s
A THRU E
NG08
NG03
V-32-H6-s
V-32-H2-s
PM-32-SS2-s
A THRU E
PM-32-SS1-s
A THRU E
PM-32-PSF
A THRU E
PLAN #4
SECTION 'AA'
PM-32-SS3-s
A THRU E
PM-32-H1-s
A THRU E
NG06
V-32-H6-s
A THRU E
PLAN #3
P-32-SB1/PS-s
A THRU E
P-32-SB1/PD-s
A THRU E
NG02
NG03
NG01
PM-32-SS2-s
A THRU E
PLAN #2
PUMP SUPPORT FRAME
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION
SYSTEM NO. 32
TITLE RECIRC. SUPPORT MAP
REV: 0
FIG. NO. 5-7
BY: A.U.
DATE: 8-9-75
APP:
DATE: 9-5-75
PROJECT: 5530 - 9MP
NES 112
NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

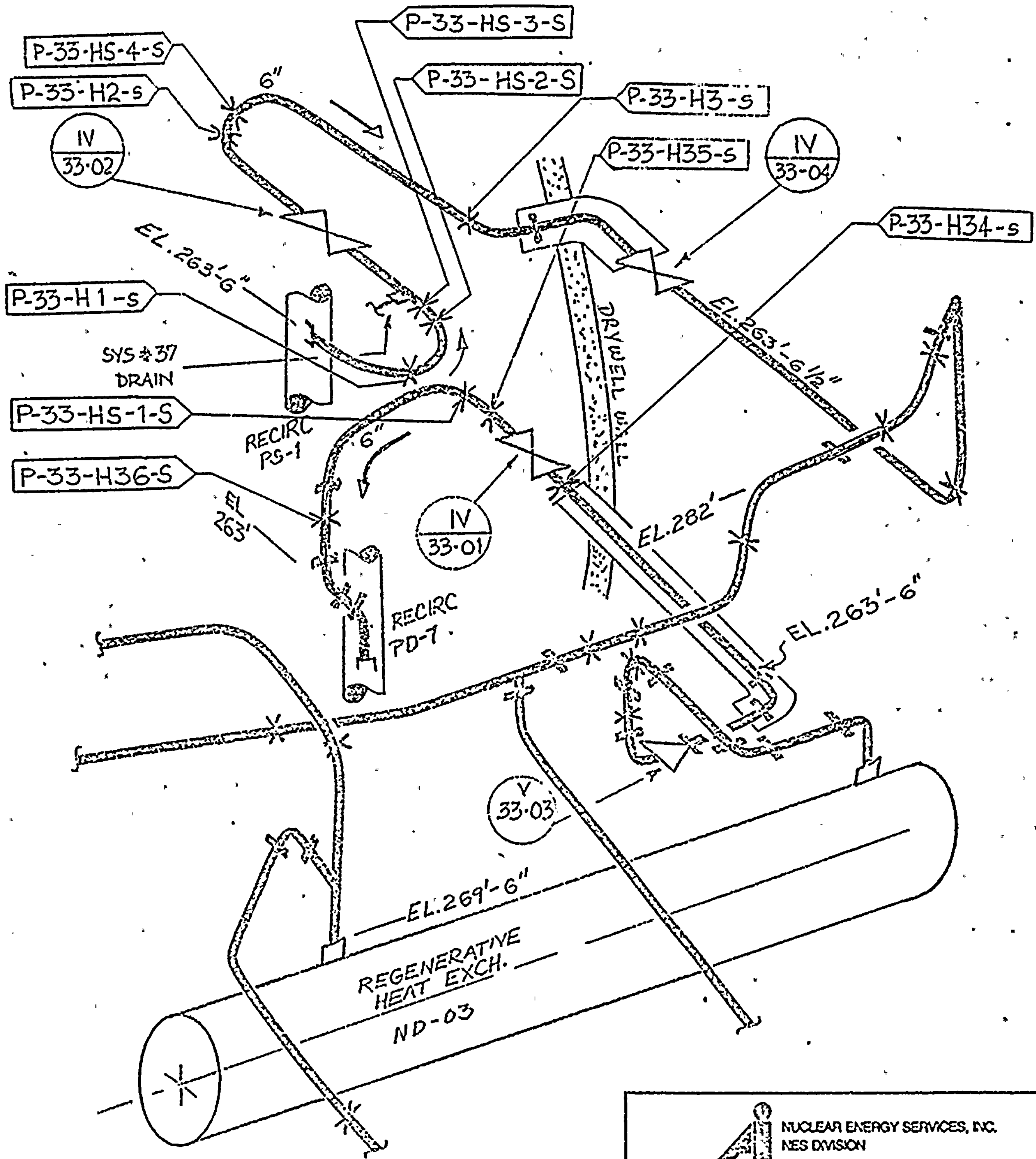
SYSTEM NO.	TITLE
33	CLEAN-UP WELD MAP
REV: 0	FIG. NO. 6-1

BY: A.U. DATE: 08-06-75
APP: gg DATE: 9-5-75
W N S E

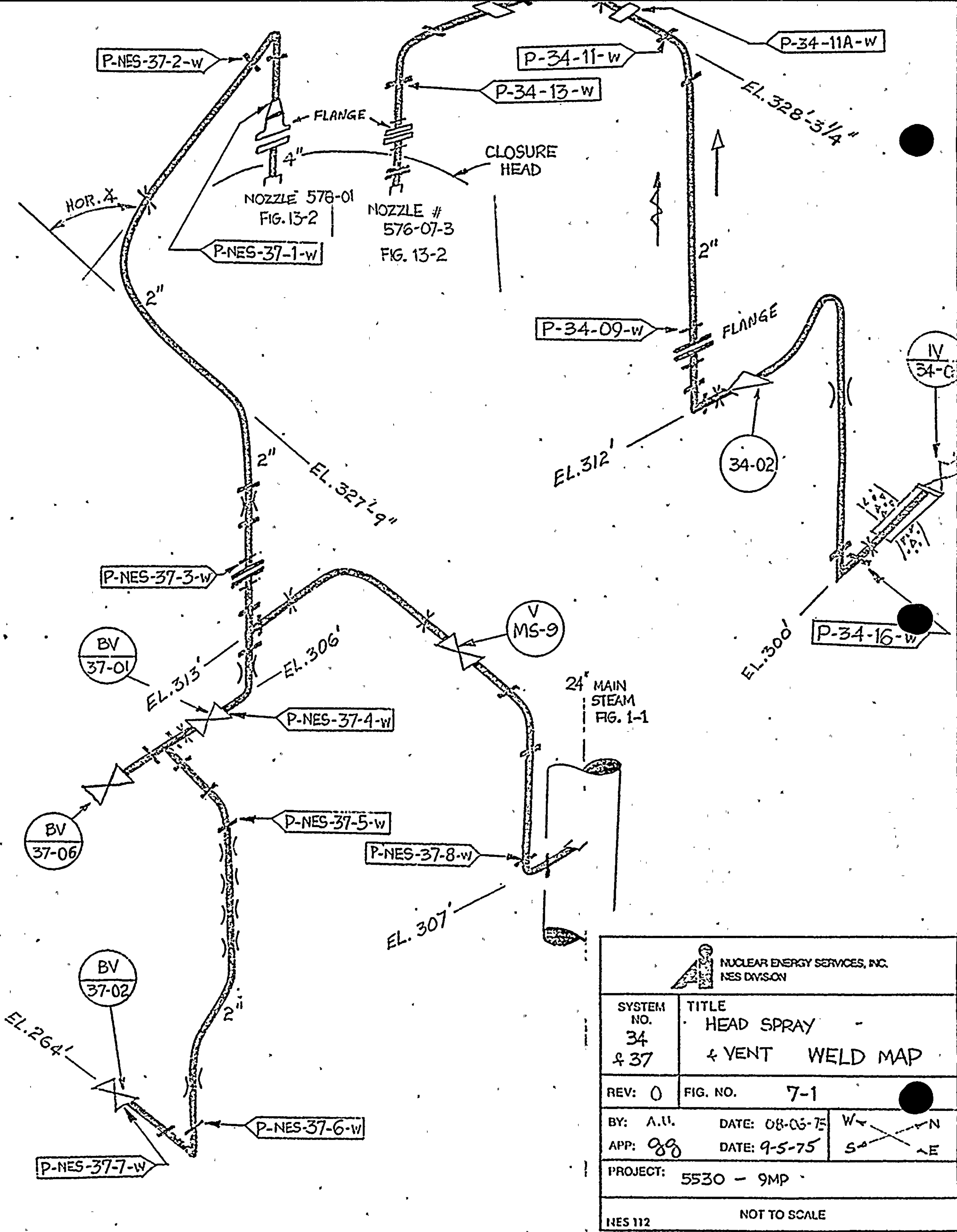
PROJECT: 5530 - 9MP

NOT TO SCALE

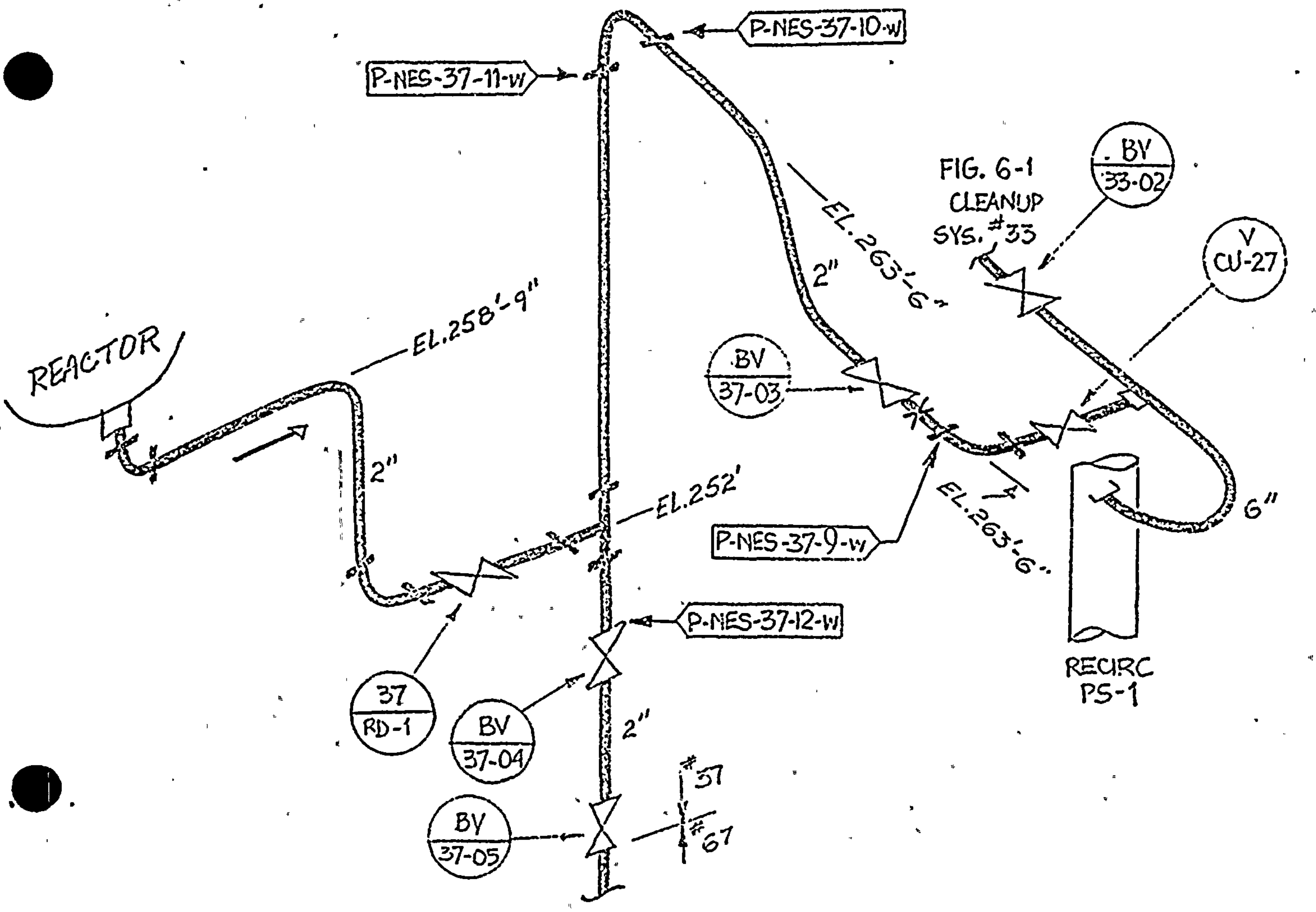
NES 112



NUCLEAR ENERGY SERVICES, INC. NES DIVISION			
SYSTEM NO. 33	TITLE CLEAN-UP SUPPORT MAP		
REV: 0	FIG. NO. 6-2		
BY: A.U.	DATE: 08-06-75	W — N / S — E	
APP: gg	DATE: 9-5-75		
PROJECT: 5530 - 9MP			
NES 112	NOT TO SCALE		

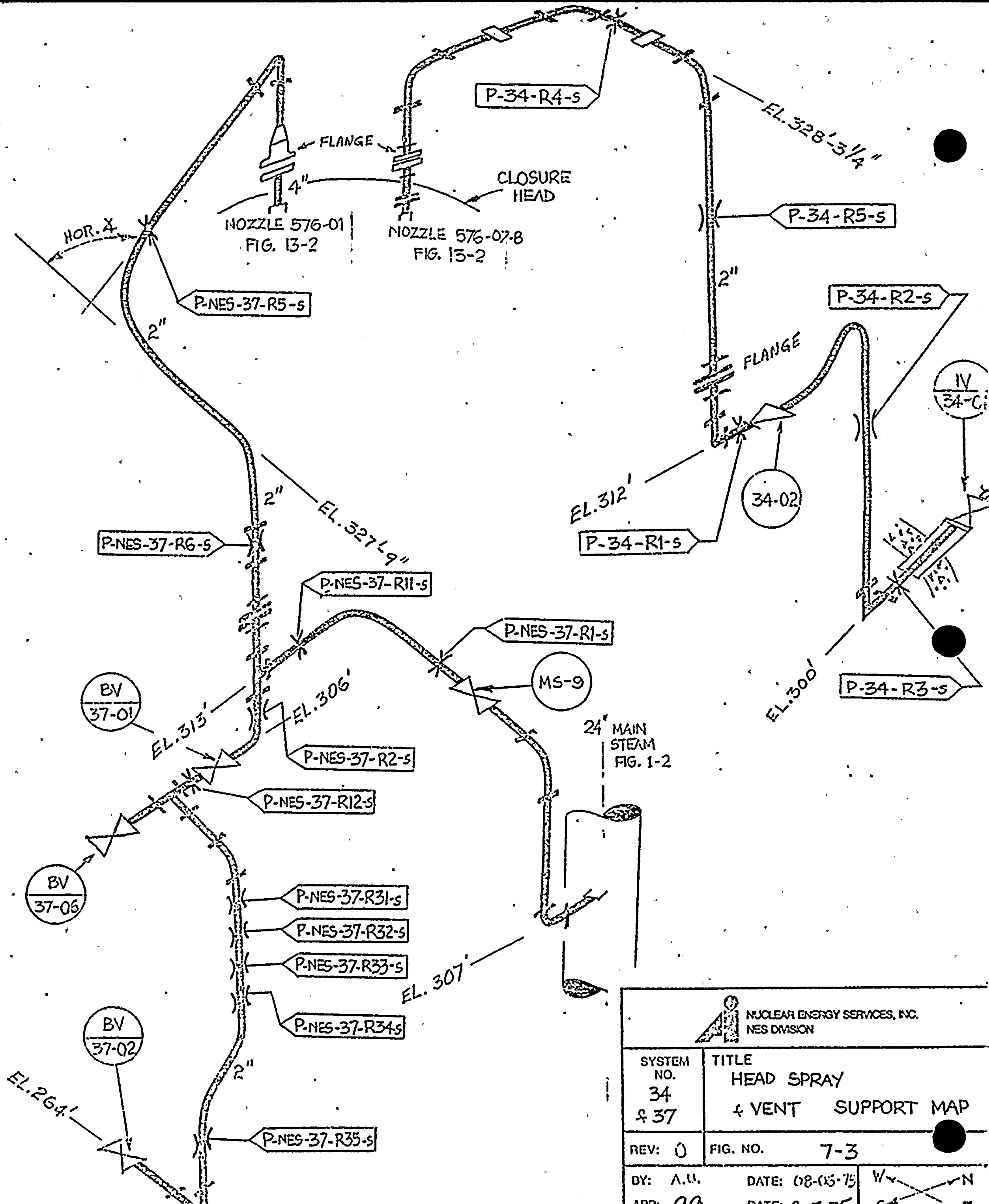


NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO. 34 & 37	TITLE HEAD SPRAY - & VENT WELD MAP
REV: 0	FIG. NO. 7-1
BY: A.U. DATE: 08-06-75 APP: [illegible] DATE: 9-5-75	W N S E
PROJECT: 5530 - 9MP	
NES 112	NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

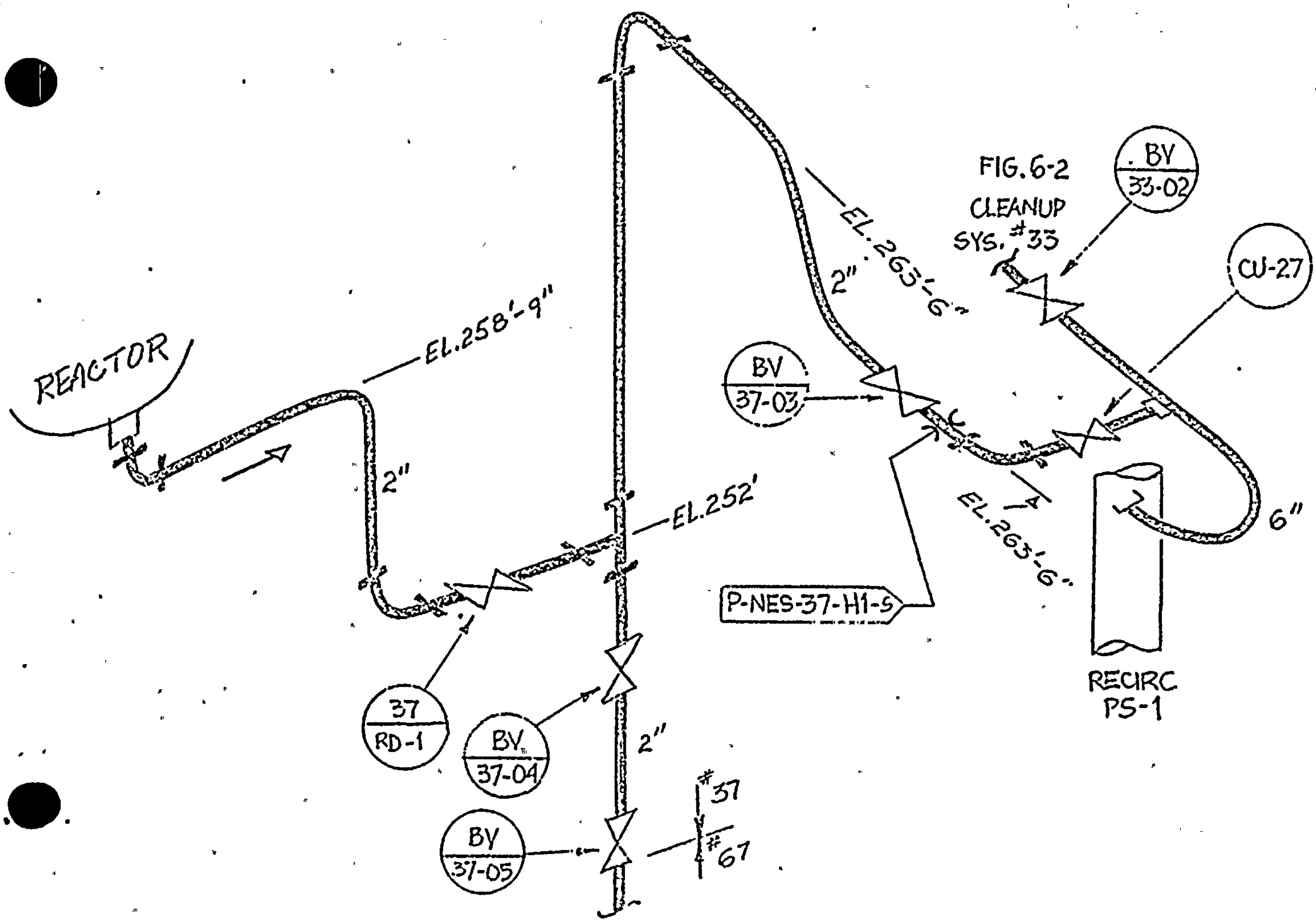
SYSTEM NO. 37	TITLE REACTOR DRAIN WELD MAP
REV: 0	FIG. NO. 7-2
BY: A.U. DATE: 08-06-75	
APP: gg DATE: 9-5-75	
PROJECT: 5530 - 9MP	
NES 112	NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

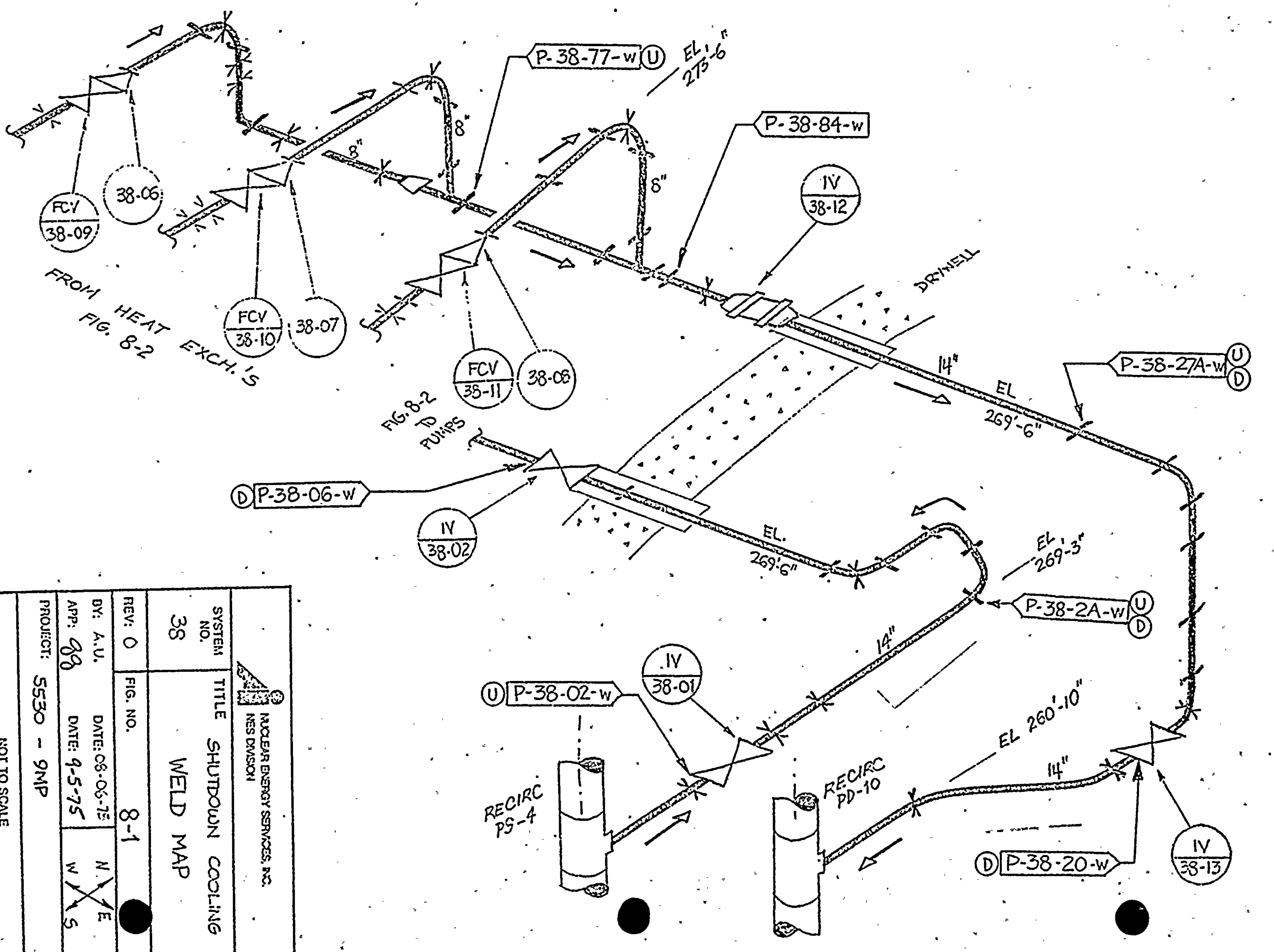
SYSTEM NO. 34 & 37	TITLE HEAD SPRAY & VENT SUPPORT MAP		
REV: 0	FIG. NO. 7-3		
BY: A.U.	DATE: 08-05-75		
APP: gg	DATE: 9-5-75		
PROJECT: 5530 - 9MP			

NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 37	TITLE REACTOR DRAIN SUPPORT MAP		
REV: 0	FIG. NO. 7-4		
BY: A.U.	DATE: 08-06-75	W N S E	
APP: gg	DATE: 9-5-75		
PROJECT: 5530 - 9MP			
NES 112	NOT TO SCALE		

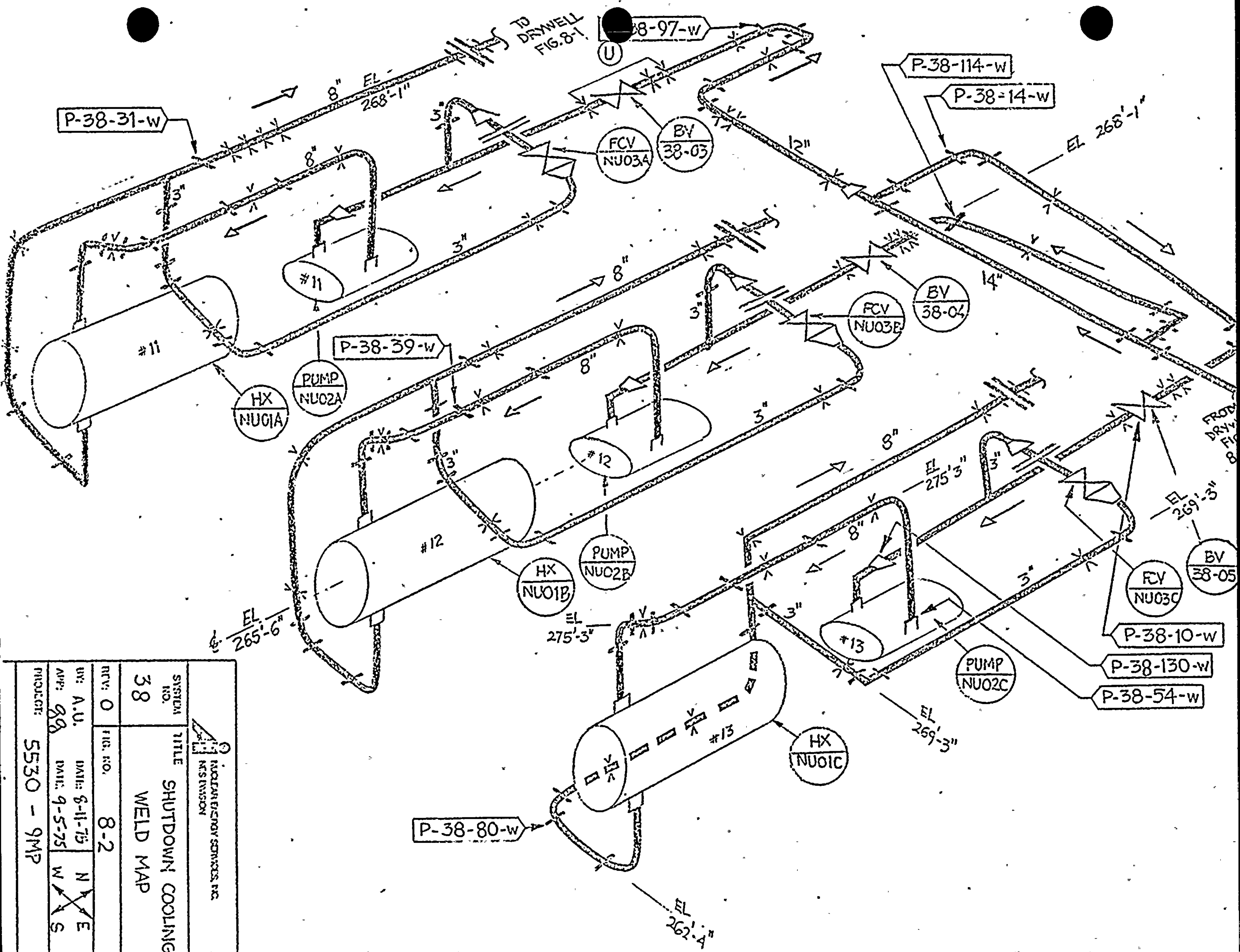


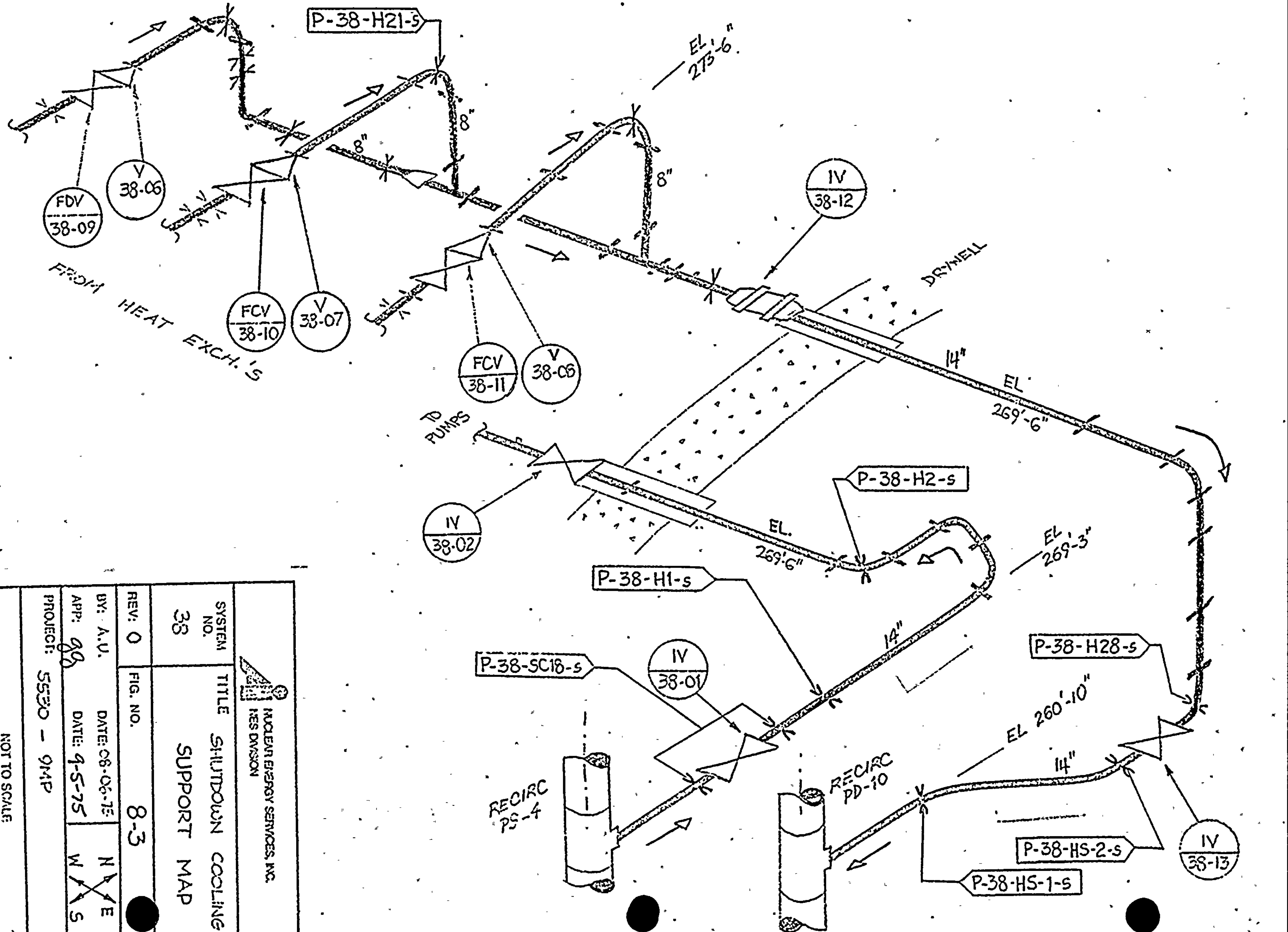
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 38	TITLE SHUTDOWN COOLING WELD MAP
REV: 0	FIG. NO. 8-1
BY: A.U.	DATE: 08-06-75
APP: GB	DATE: 9-5-75
PROJECT: 5530 - 9MP	N E S W

NES 112

NOT TO SCALE


TO DRYWELL FIG. 8-1
P-38-97-W
U
P-38-114-W
P-38-14-W
EL 268'-1"
P-38-31-W
8"
EL 268'-1"
3"
8"
FCV NU03A
BV 38-03
12"
3"
#11
#11
HX NU01A
PUMP NU02A
P-38-39-W
8"
3"
FCV NU03B
BV 38-04
14"
8"
3"
#12
#12
HX NU01B
PUMP NU02B
EL 265'-6"
EL 275'-3"
8"
EL 275'3"
3"
8"
3"
3"
#13
#13
HX NU01C
PUMP NU02C
FCV NU03C
BV 38-05
EL 269'-3"
FROM DRYWELL FIG. 8
P-38-10-W
P-38-130-W
P-38-54-W
EL 269'-3"
P-38-80-W
EL 262'-4"
NUCLEAR ENERGY SERVICES, INC NES DIVISION
SYSTEM NO. 38
TITLE SHUTDOWN COOLING WELD MAP
REV: 0
FIG. NO. 8-2
BY: A.U. DATE: 8-11-75
APP: DATE: 9-5-75
PROJECT: 5530 - 9MP
N E S W

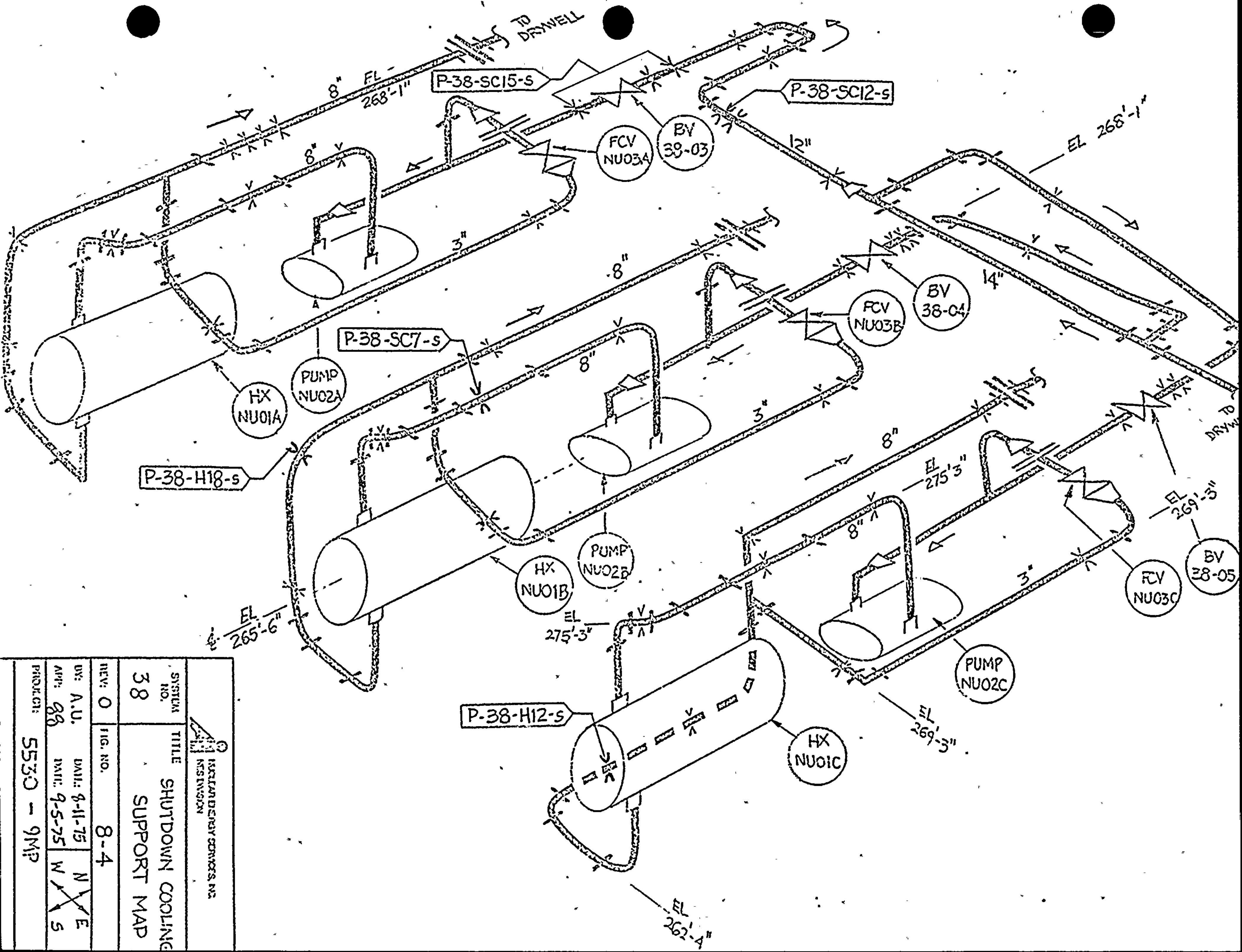


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

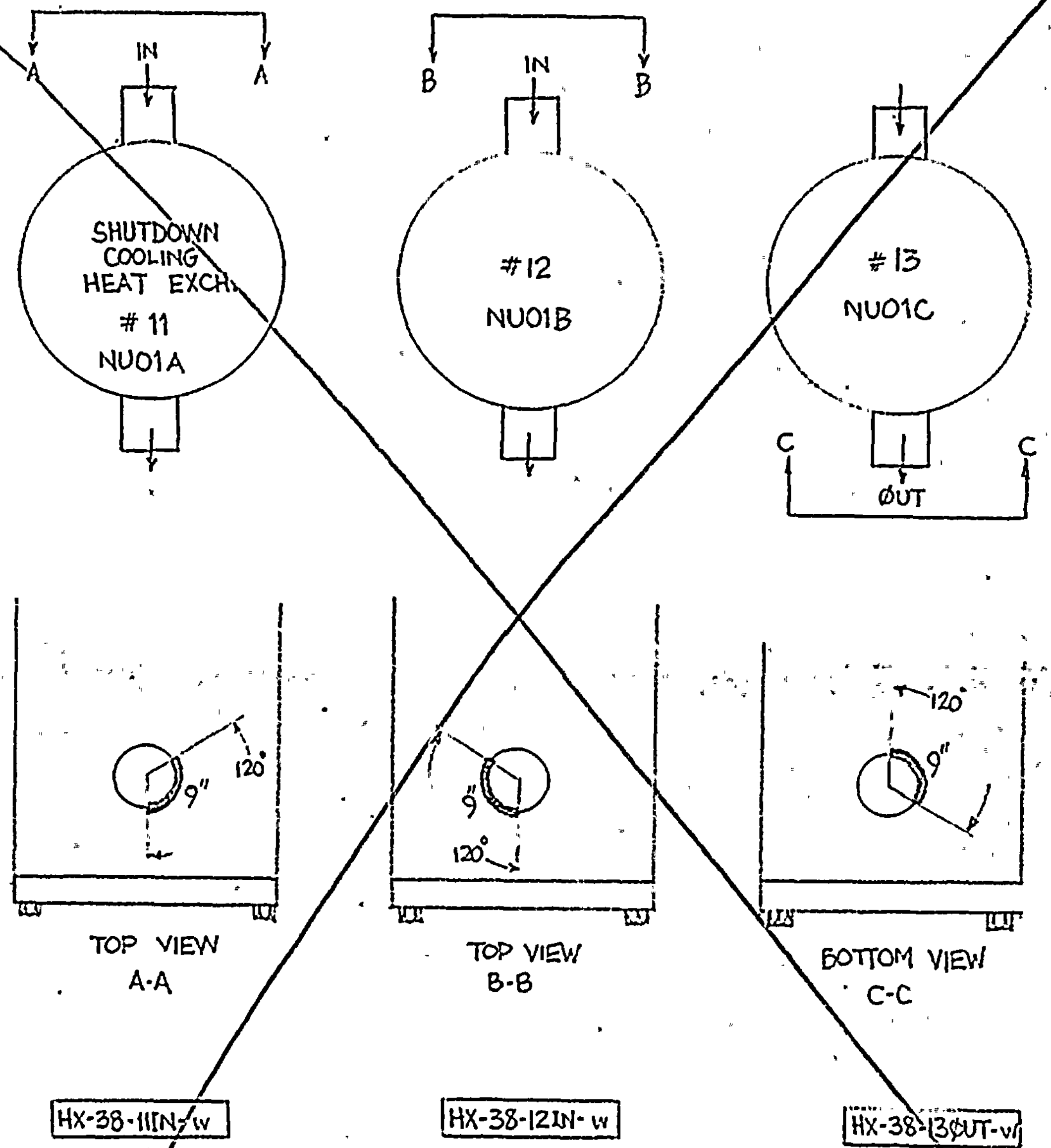
SYSTEM NO. 38	TITLE SHUTDOWN COOLING SUPPORT MAP
REV: 0	FIG. NO. 8-3
BY: A.U. DATE: 08-06-75	N E W S
APP: [signature] DATE: 9-5-75	
PROJECT: 5530 - 9MP	

NOT TO SCALE

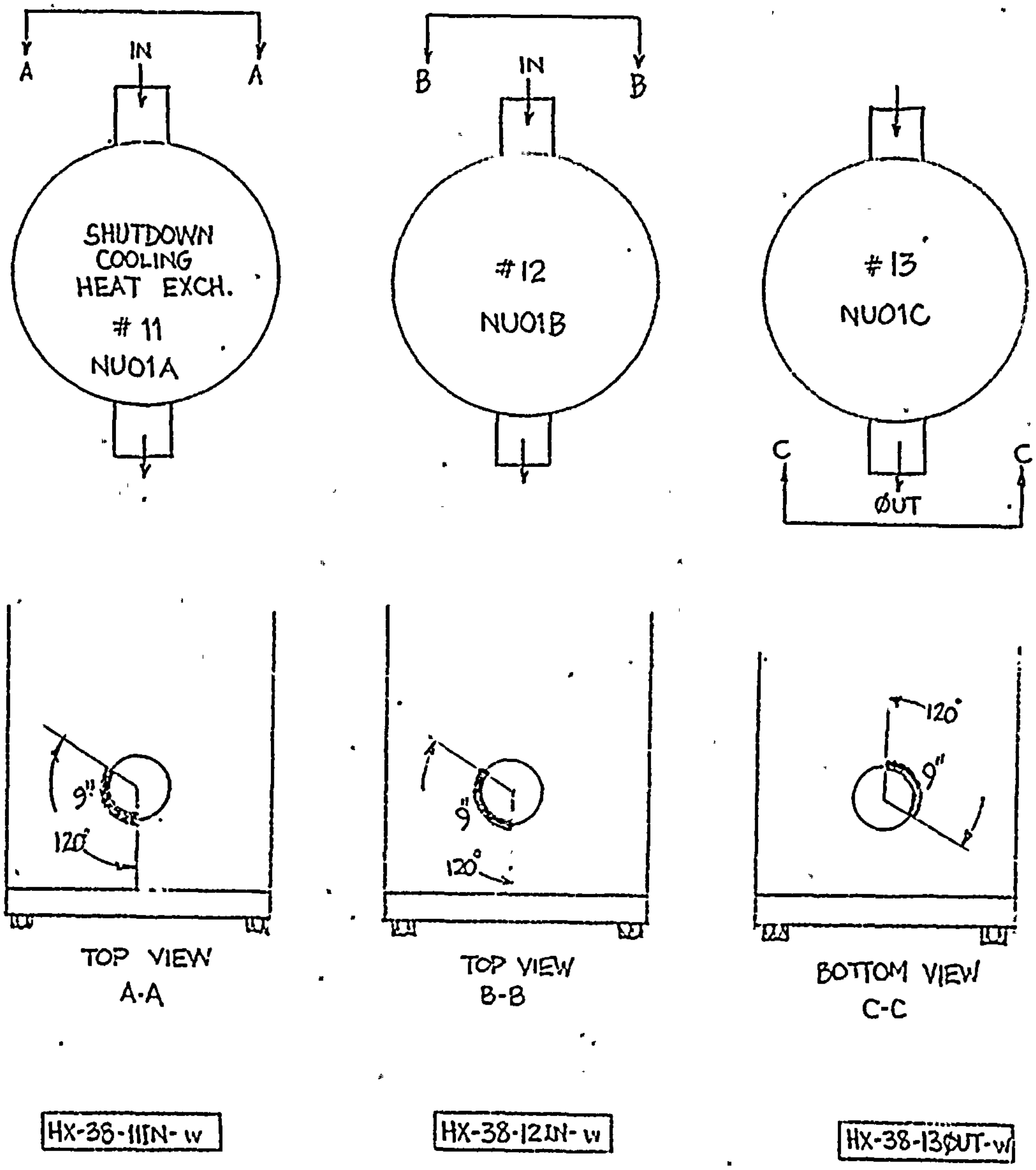
NES 112



TO DRYWELL
8"
EL 268'-1"
P-38-SC15-S
P-38-SC12-S
EL 268'-1"
12"
FCV NU03A
BV 38-03
8"
3"
8"
14"
BV 38-04
FCV NU03B
P-38-SC7-S
8"
3"
HX NU01A
PUMP NU02A
P-38-H18-S
HX NU01B
PUMP NU02B
EL 265'-6"
TO DRYWELL
8"
EL 275'-3"
EL 269'-3"
8"
3"
BV 38-05
FCV NU03C
EL 275'-3"
PUMP NU02C
P-38-H12-S
HX NU01C
EL 269'-3"
EL 262'-4"
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION
SYSTEM NO. 38
TITLE SHUTDOWN COOLING SUPPORT MAP
REV. 0
FIG. NO. 8-4
BY: A.U. DATE: 8-11-75
APP: DATE: 9-5-75
PROJECT: 5530 - 9MP
N E W S



NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO. 38	TITLE SHUTDOWN COOLING HEAT EXCH. WELD MAP
REV: 0	FIG. NO. 8-5
BY: A.U.. DATE: 8-22-75	
APP: [illegible] DATE: 9-5-75	
PROJECT: 5530-9MP	
NES 112	NOT TO SCALE

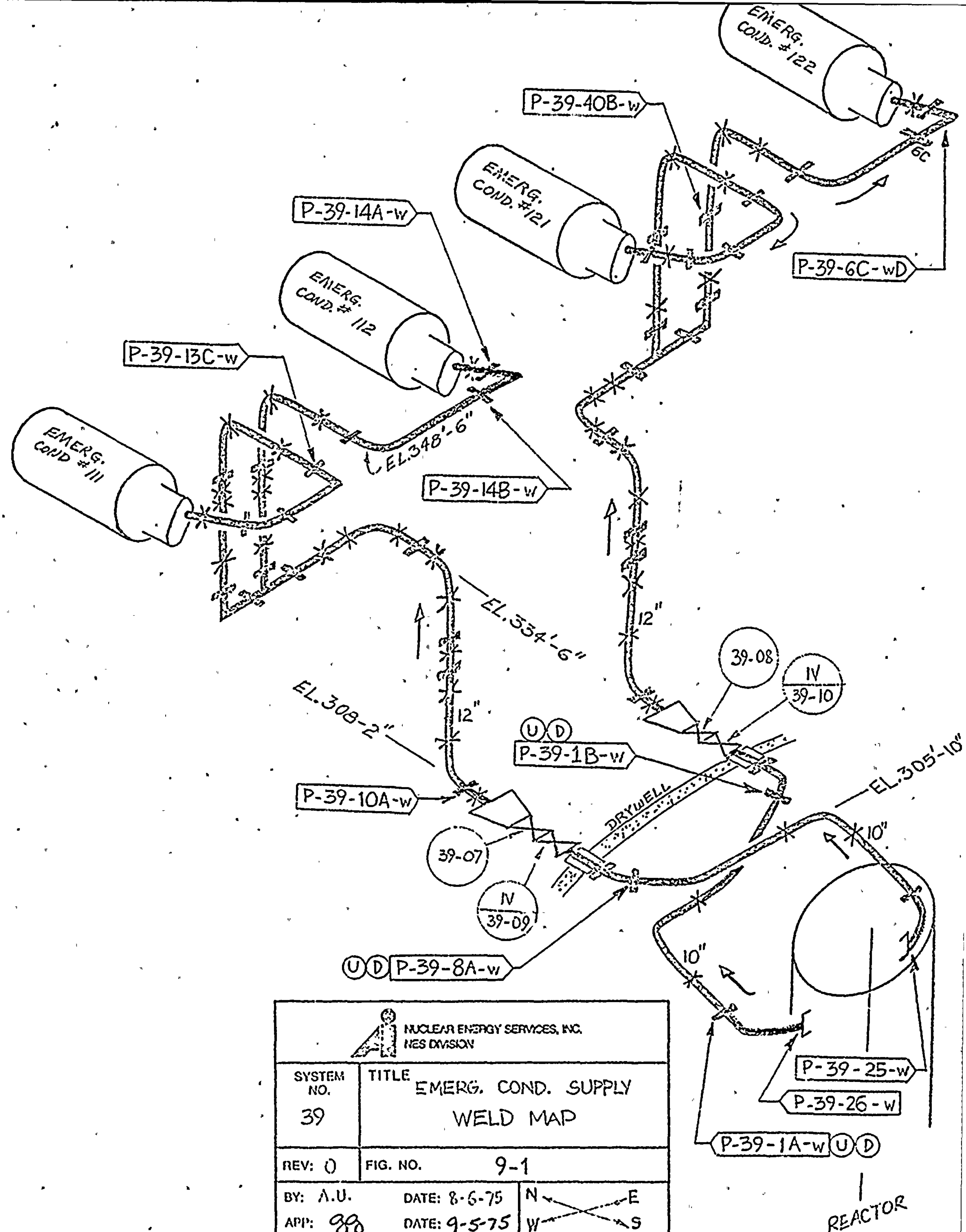


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 38	TITLE SHUTDOWN COOLING HEAT EXCH. WELD MAP
REV: 1	FIG. NO. 8-5
BY: A.U.	DATE: 8-22-75
APP: gg	DATE: 9-5-75
PROJECT:	5530-9MP

NES 112

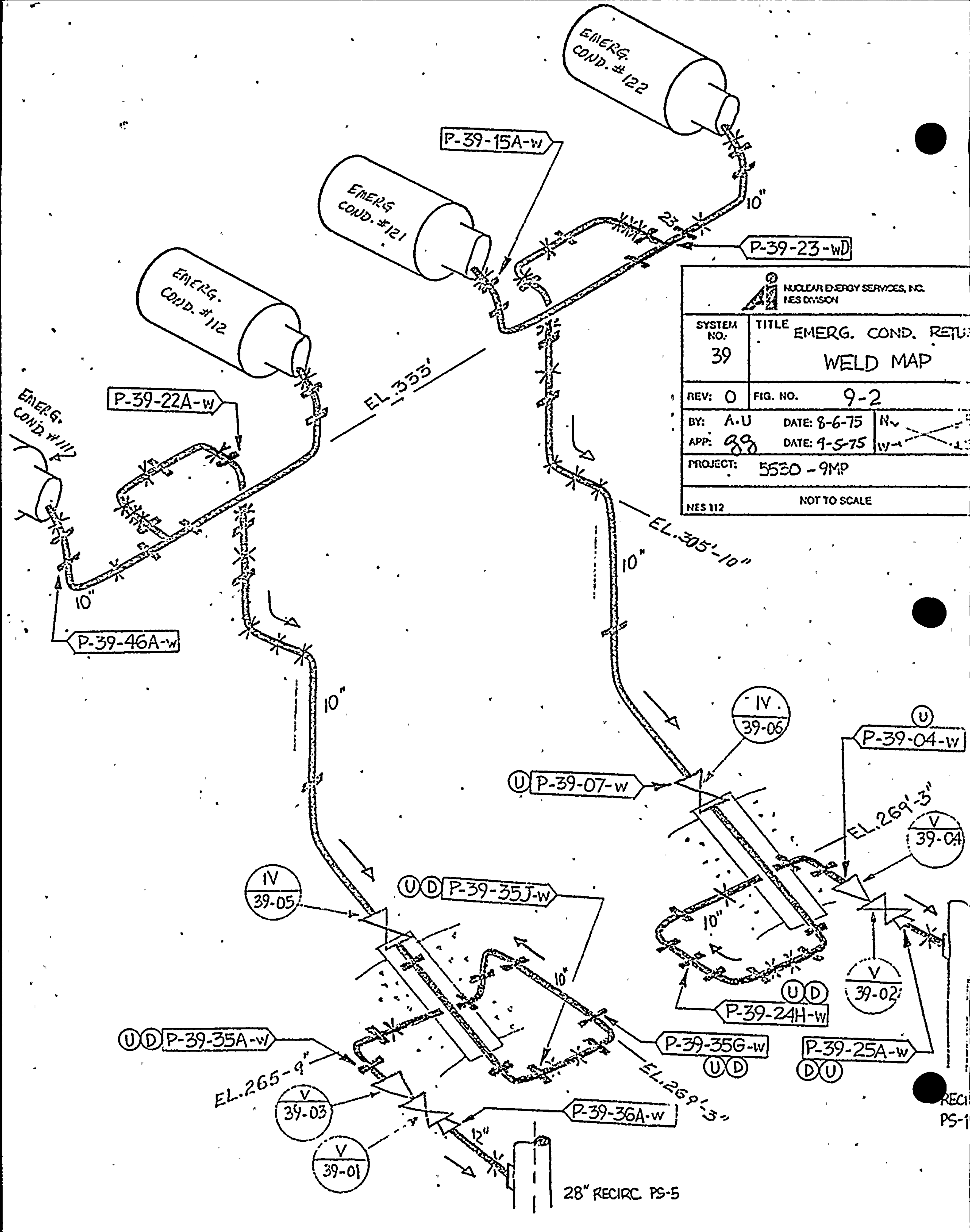
NOT TO SCALE



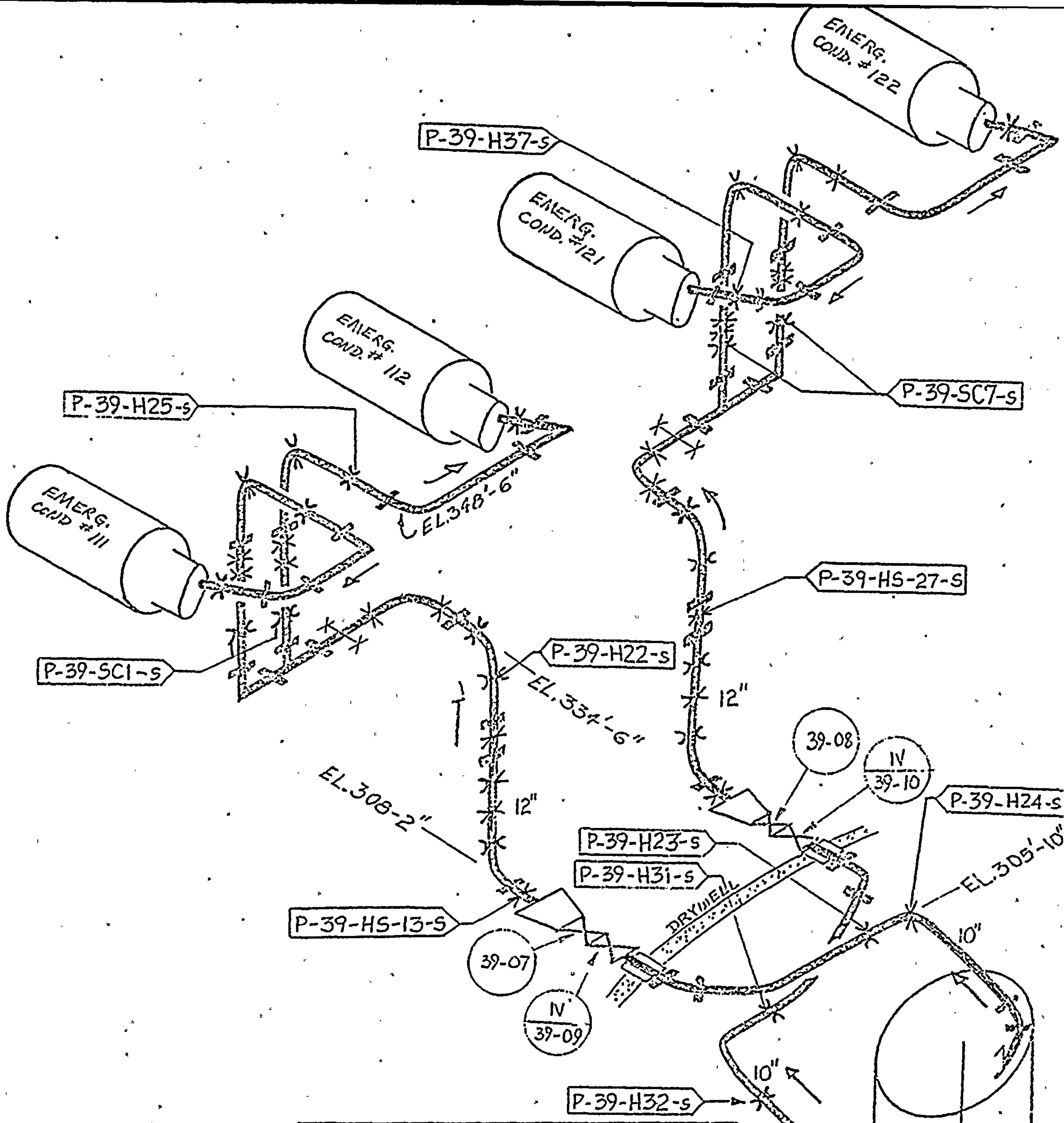
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 39	TITLE EMERG. COND. SUPPLY WELD MAP	
REV: 0	FIG. NO. 9-1	
BY: A.U. DATE: 8-6-75	APP: [illegible] DATE: 9-5-75	N E W S
PROJECT: 5530 - 9MP		
NOT TO SCALE		

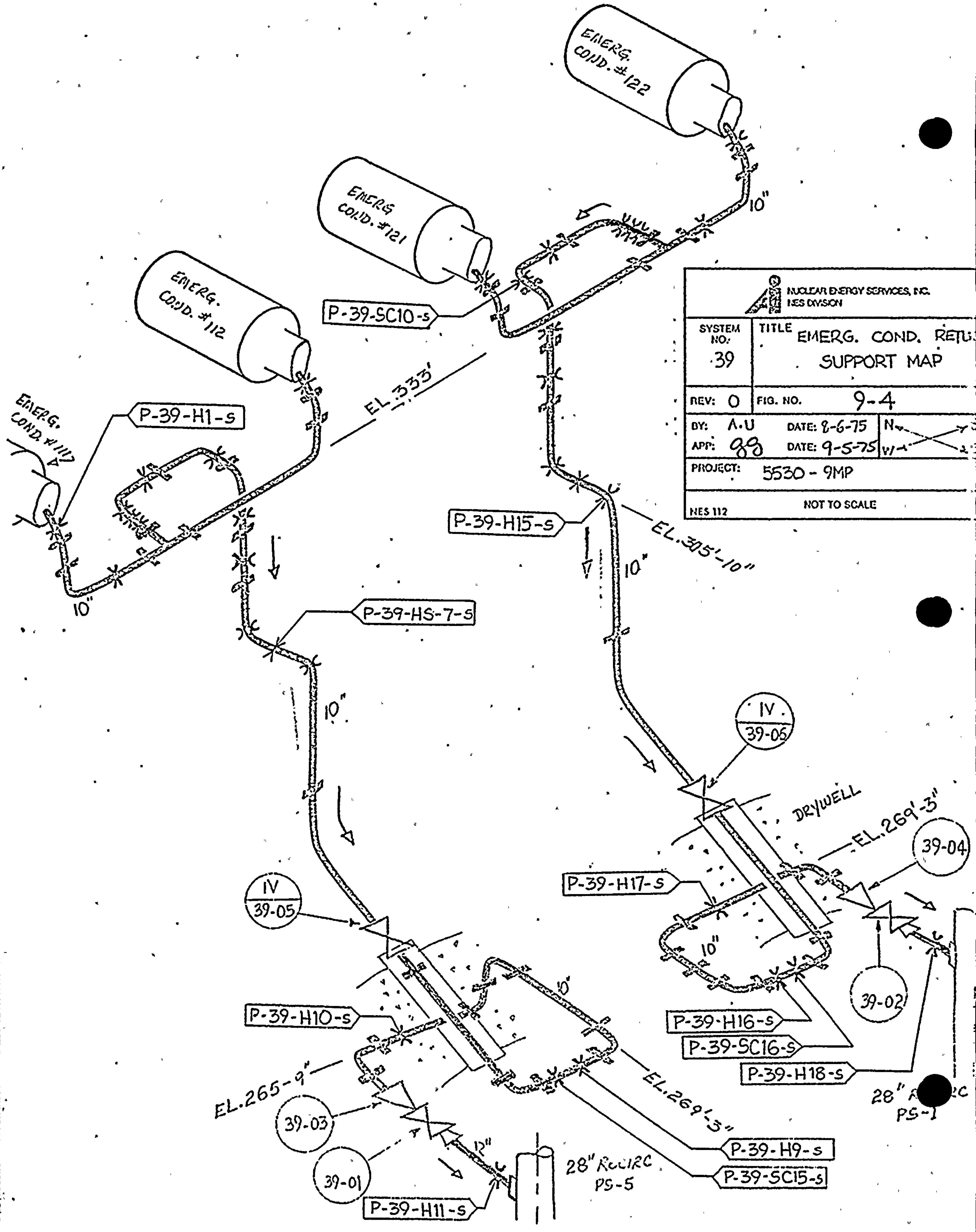
NES 112



NUCLEAR ENERGY SERVICES, INC. NES DIVISION		
SYSTEM NO. 39	TITLE EMERG. COND. RETU WELD MAP	
REV: 0	FIG. NO. 9-2	
BY: A.U	DATE: 8-6-75	
APP: [illegible]	DATE: 9-5-75	
PROJECT: 5530-9MP		
NES 112	NOT TO SCALE	

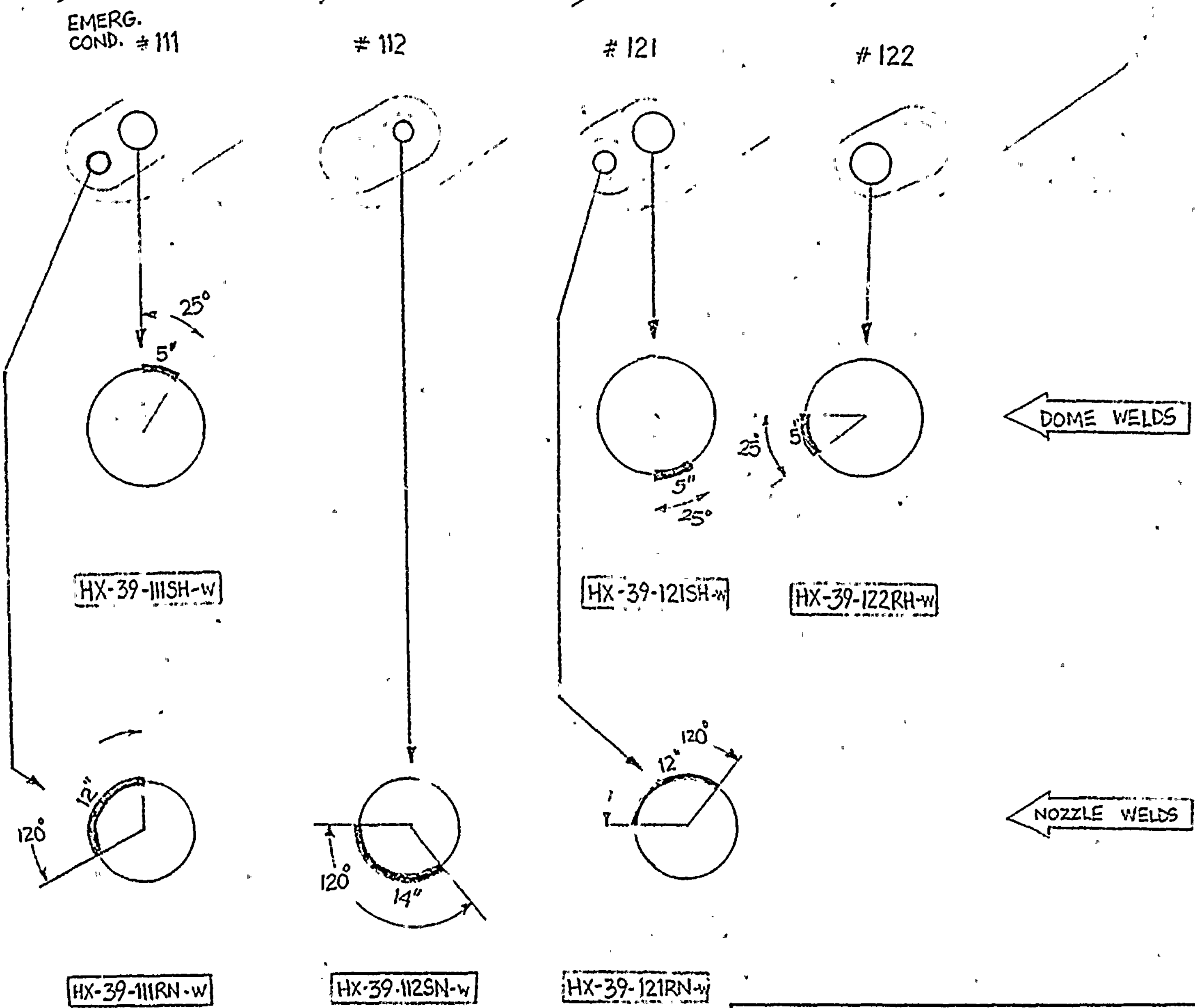


NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO. 39	TITLE EMERG. COND. SUPPLY SUPPORT MAP
REV: 0	FIG. NO. 9-3
BY: A.U. DATE: 8-6-75	N E W S
APP: gg DATE: 9-5-75	
PROJECT: 5530 - 9MP	
NES 112	NOT TO SCALE



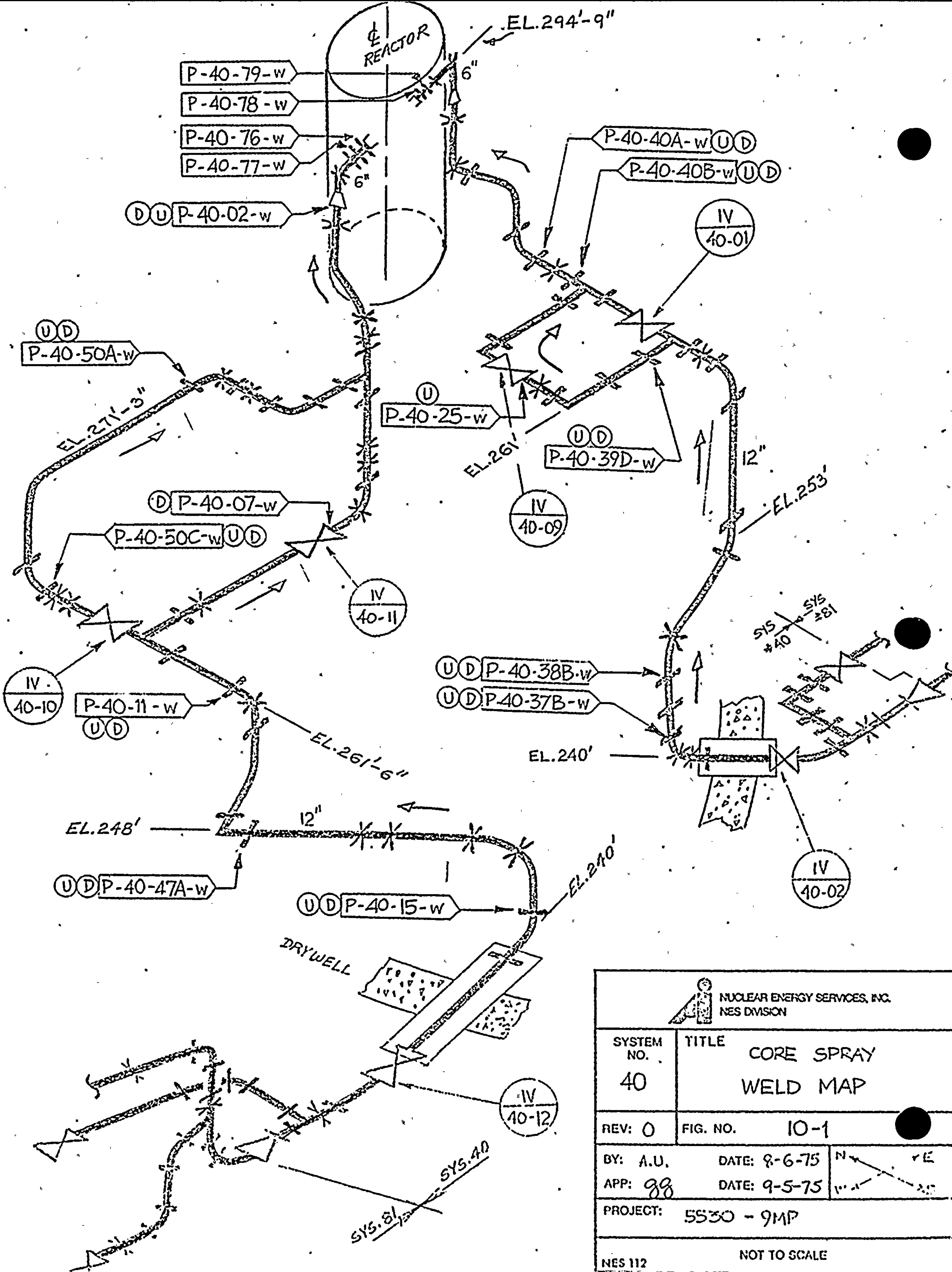
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO: 39	TITLE: EMERG. COND. RETU[RN] SUPPORT MAP		
REV: 0	FIG. NO. 9-4		
BY: A.U	DATE: 8-6-75		
APP: gg	DATE: 9-5-75		
PROJECT:	5530 - 9MP		
NES 112	NOT TO SCALE		



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

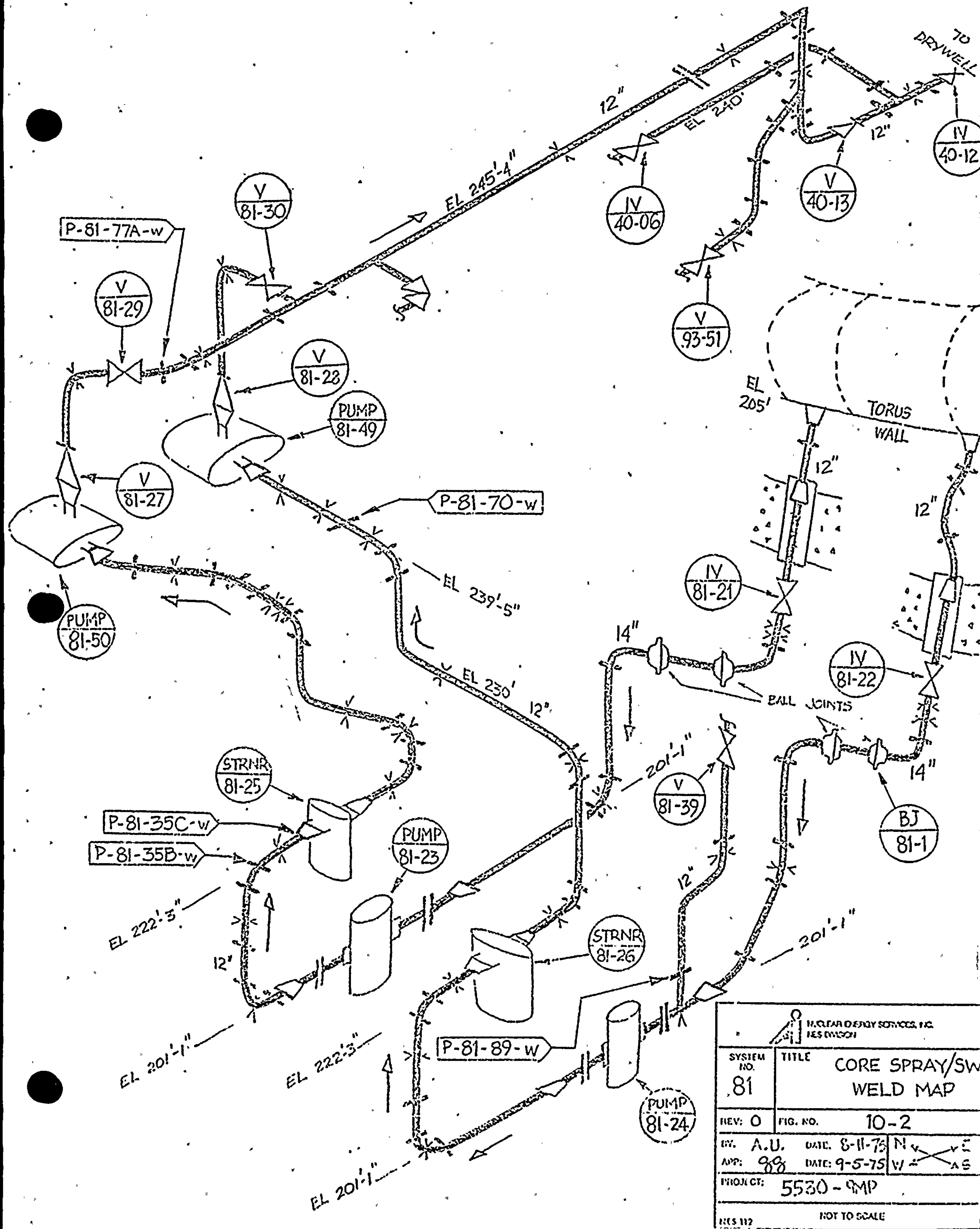
SYSTEM NO. 39	TITLE EMERG. CONDENSER WELD MAP	
REV: 0	FIG. NO. 9-5	
BY: A.U.	DATE: 8-22-75	N
APP: gg	DATE: 9-5-75	
PROJECT:	5530 - 9MP	
NES 112	NOT TO SCALE	



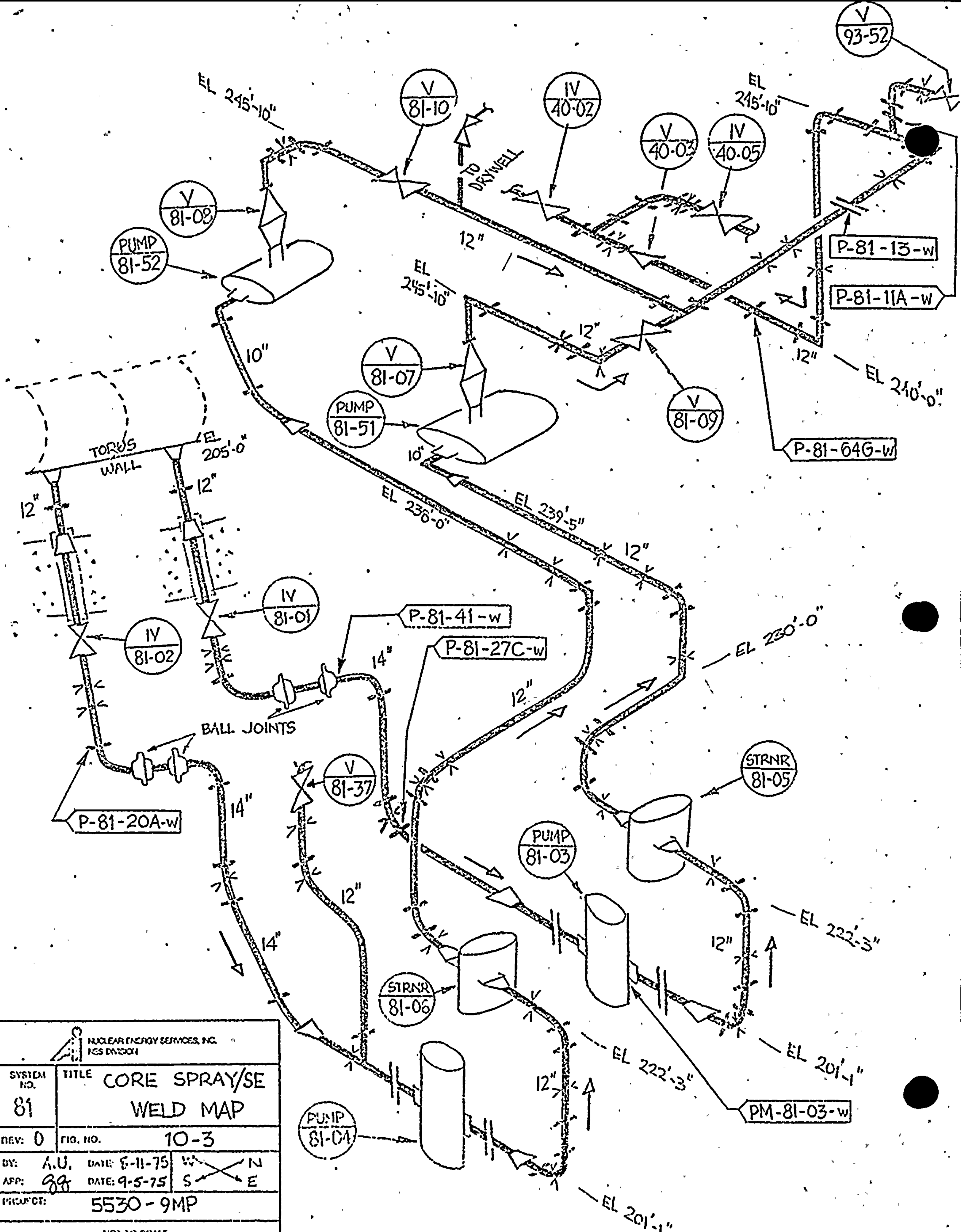
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE	
40	CORE SPRAY WELD MAP	
REV: 0	FIG. NO. 10-1	
BY: A.U.	DATE: 8-6-75	N E
APP: 98	DATE: 9-5-75	
PROJECT:	5530 - 9MP	

NES 112 NOT TO SCALE



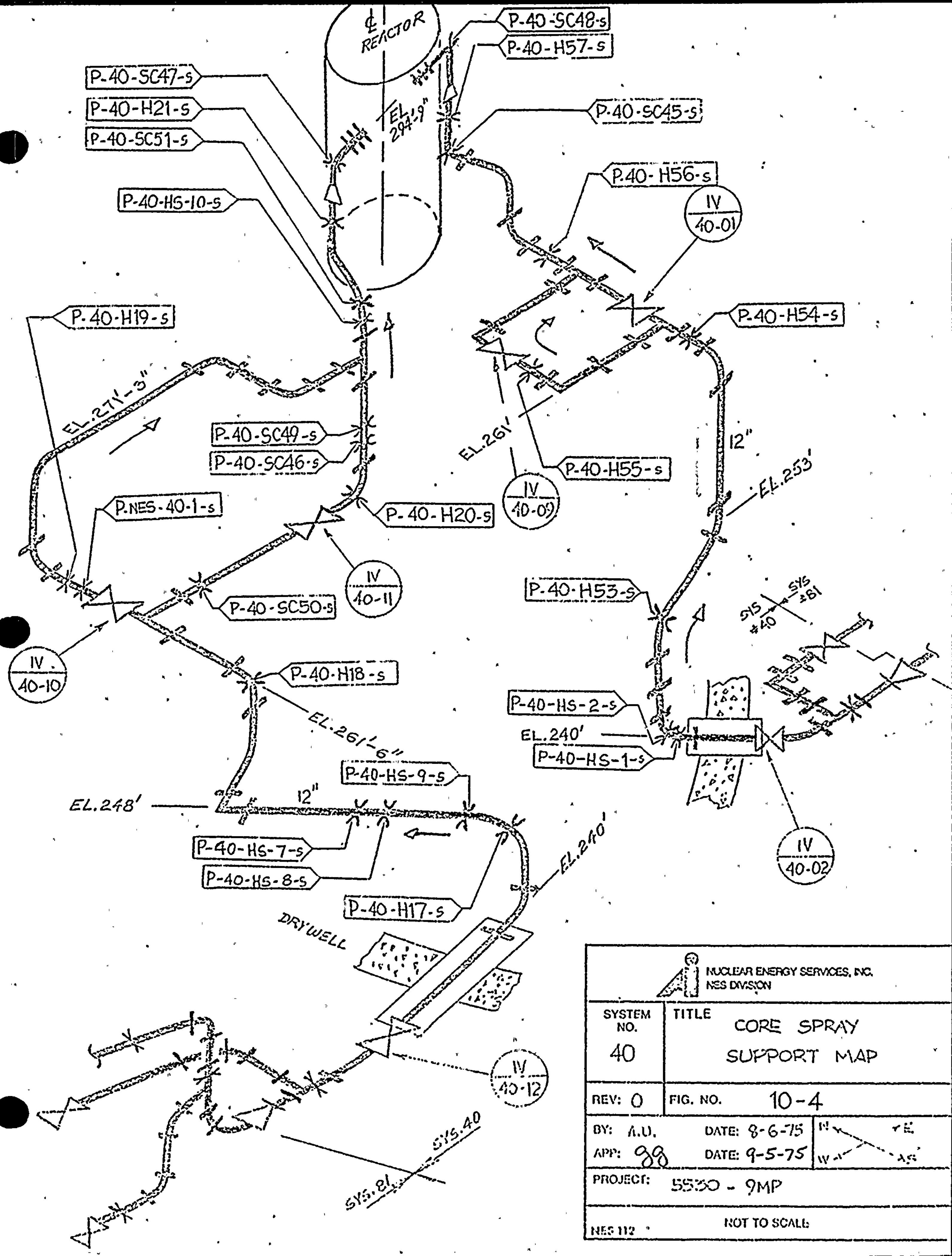
NUCLEAR ENERGY SERVICES, INC. NES DIVISION			
SYSTEM NO. 81	TITLE CORE SPRAY/SW WELD MAP		
REV: 0	FIG. NO. 10-2		
BY: A.U.	DATE: 8-11-75	N E W S	
APP: 98	DATE: 9-5-75		
PROJECT: 5530-9MP			
NES 112	NOT TO SCALE		



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

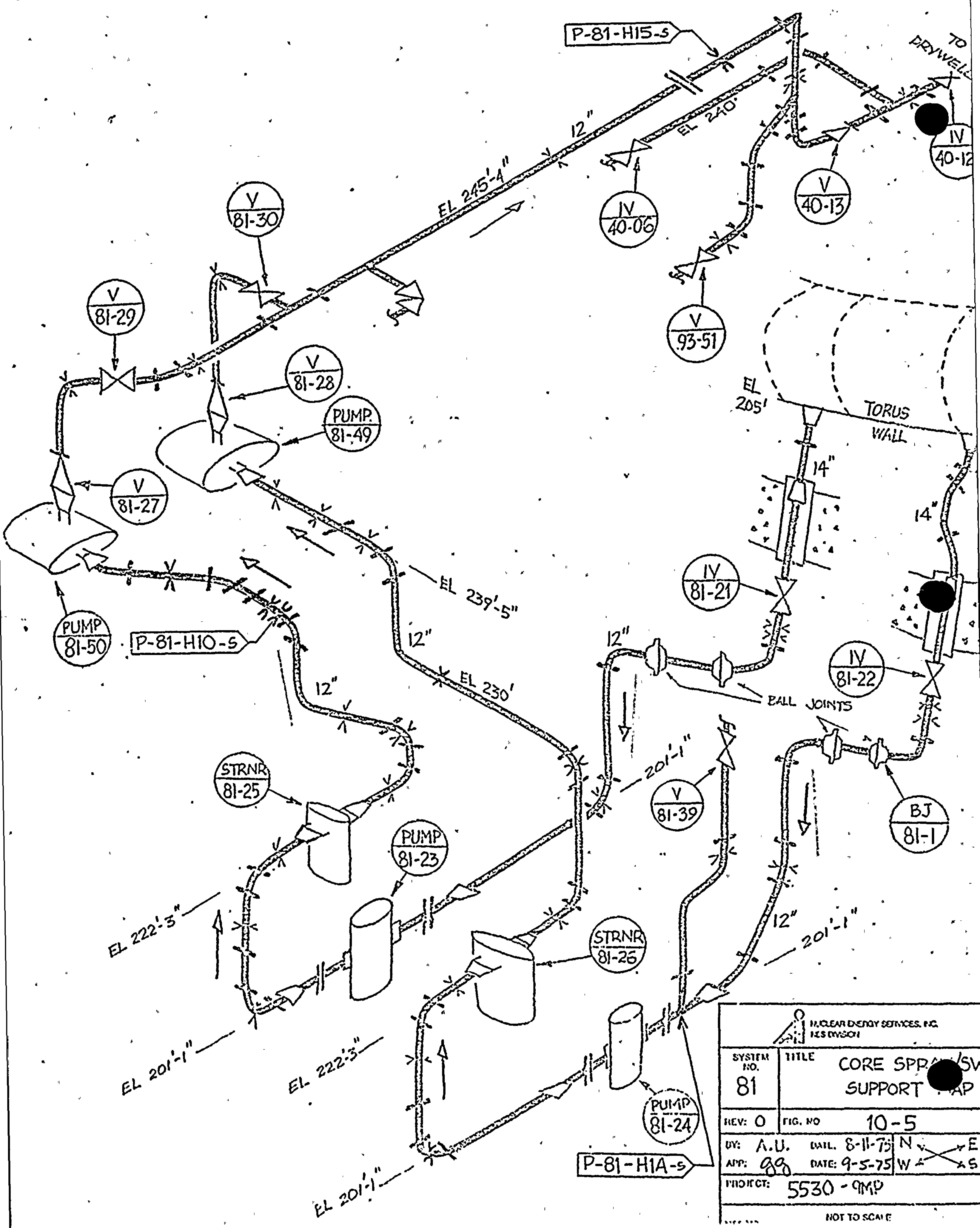
SYSTEM NO. 81	TITLE CORE SPRAY/SE WELD MAP
REV: 0	FIG. NO. 10-3
BY: A.U. DATE: 5-11-75	W N
APP: gg DATE: 9-5-75	S E
PROJECT:	5530-9MP

NOT TO SCALE

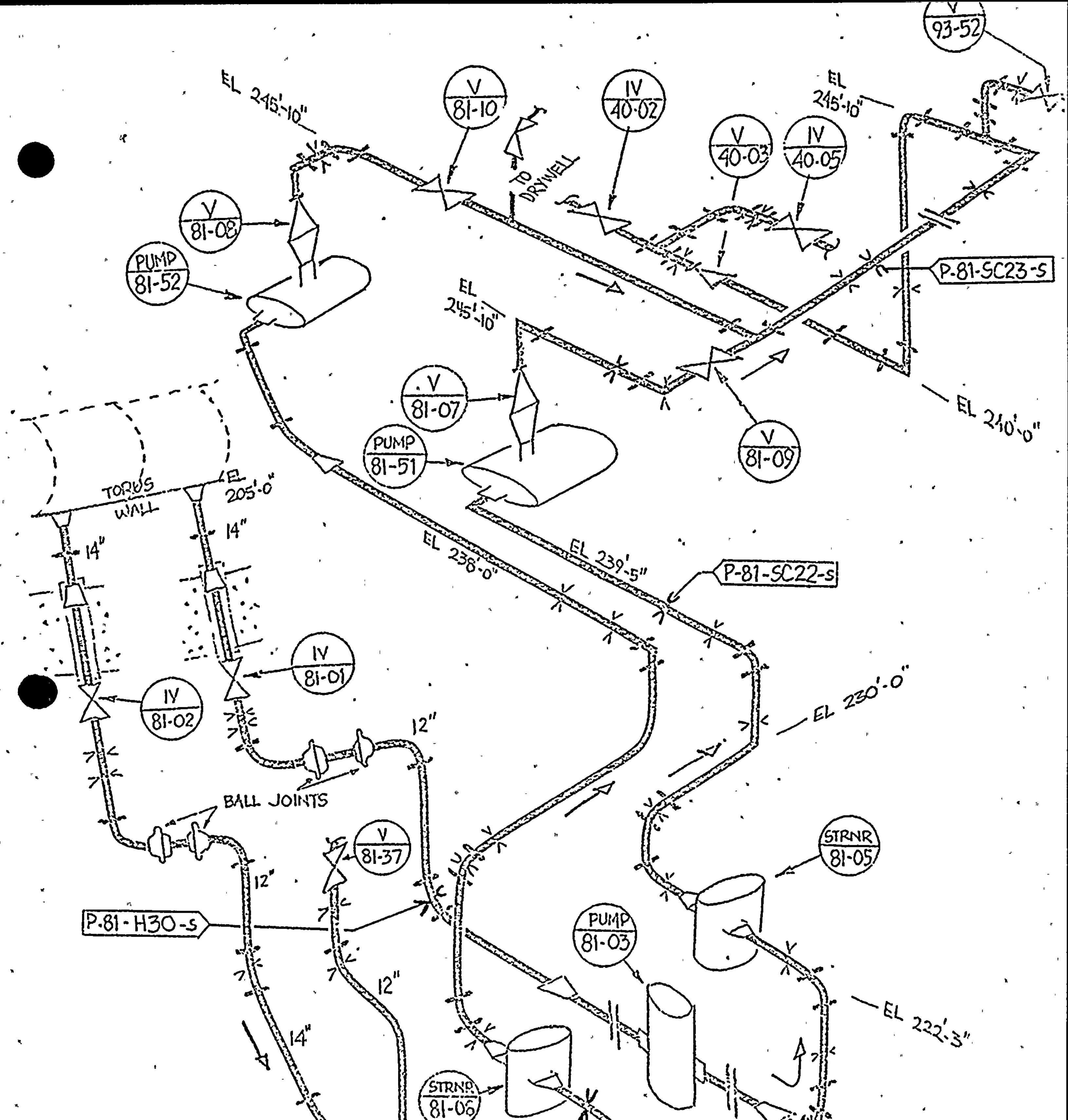


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE		
40	CORE SPRAY SUPPORT MAP		
REV: 0	FIG. NO. 10-4		
BY: A.U.	DATE: 8-6-75	N	E
APP: gg	DATE: 9-5-75	W	S
PROJECT:	5530 - 9MP		
NES 112	NOT TO SCALE		



P-81-H15-S
TO DRYWELL
12"
EL 240'
EL 245'-4"
IV 40-12
V 40-13
IV 40-06
V 81-30
V 81-29
V 93-51
V 81-28
PUMP 81-49
EL 205'
TORUS WALL
14"
14"
V 81-27
PUMP 81-50
P-81-H10-S
EL 239'-5"
12"
IV 81-21
12"
IV 81-22
12"
EL 230'
BALL JOINTS
201'-1"
STRNR 81-25
V 81-39
BJ 81-1
PUMP 81-23
12"
EL 222'-3"
201'-1"
STRNR 81-26
EL 201'-1"
EL 222'-3"
PUMP 81-24
P-81-H1A-S
EL 201'-1"
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION
SYSTEM NO. 81
TITLE CORE SPRA /SV
SUPPORT AP
REV: 0
FIG. NO 10-5
BY: A.U.
DATE: 8-11-75
APP: gg
DATE: 9-5-75
N E W S
PROJECT: 5530-9MP
NOT TO SCALE

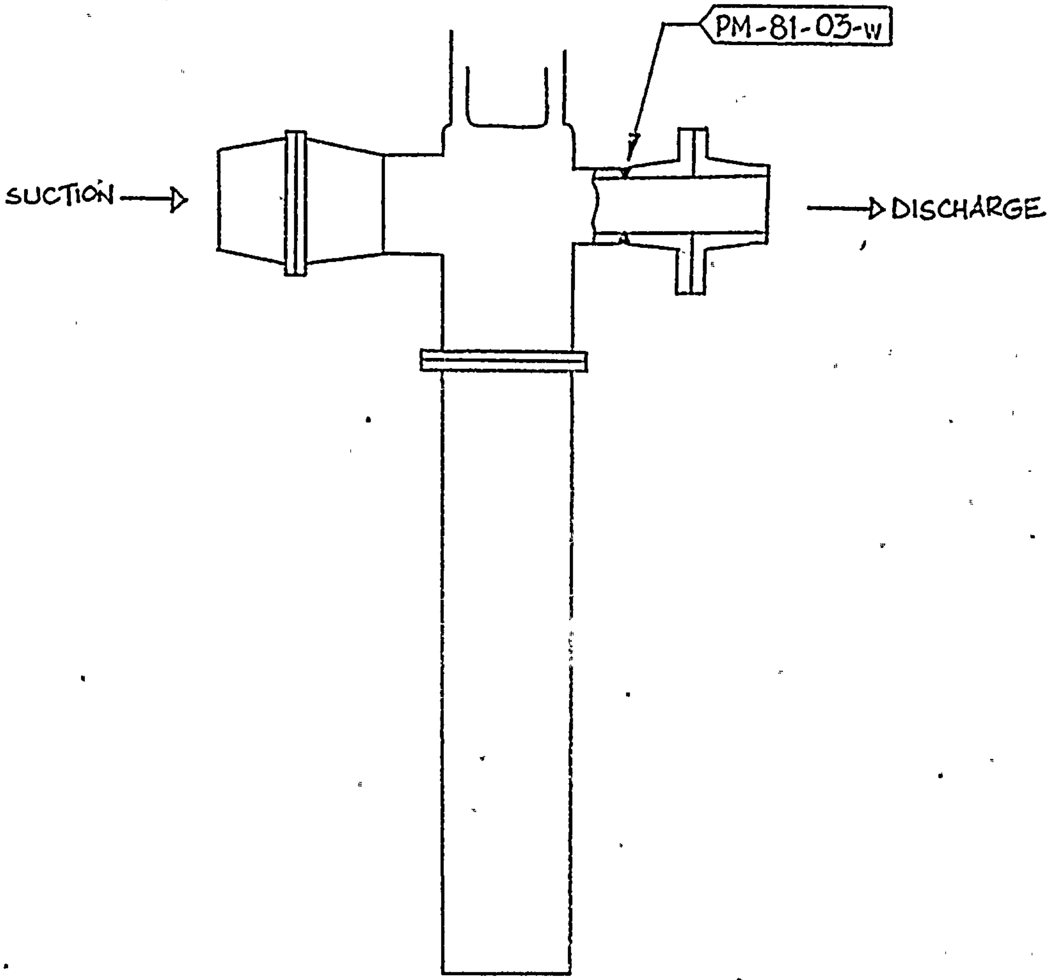


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE CORE SPRAY/SE SUPPORT MAP	
REV: 0	FIG. NO. 10-6	
BY: A.J. DATE: 5-11-75		W N
APP. 99 DATE: 9-5-75		S E
PROJECT: 5530-9MP		

NOT TO SCALE

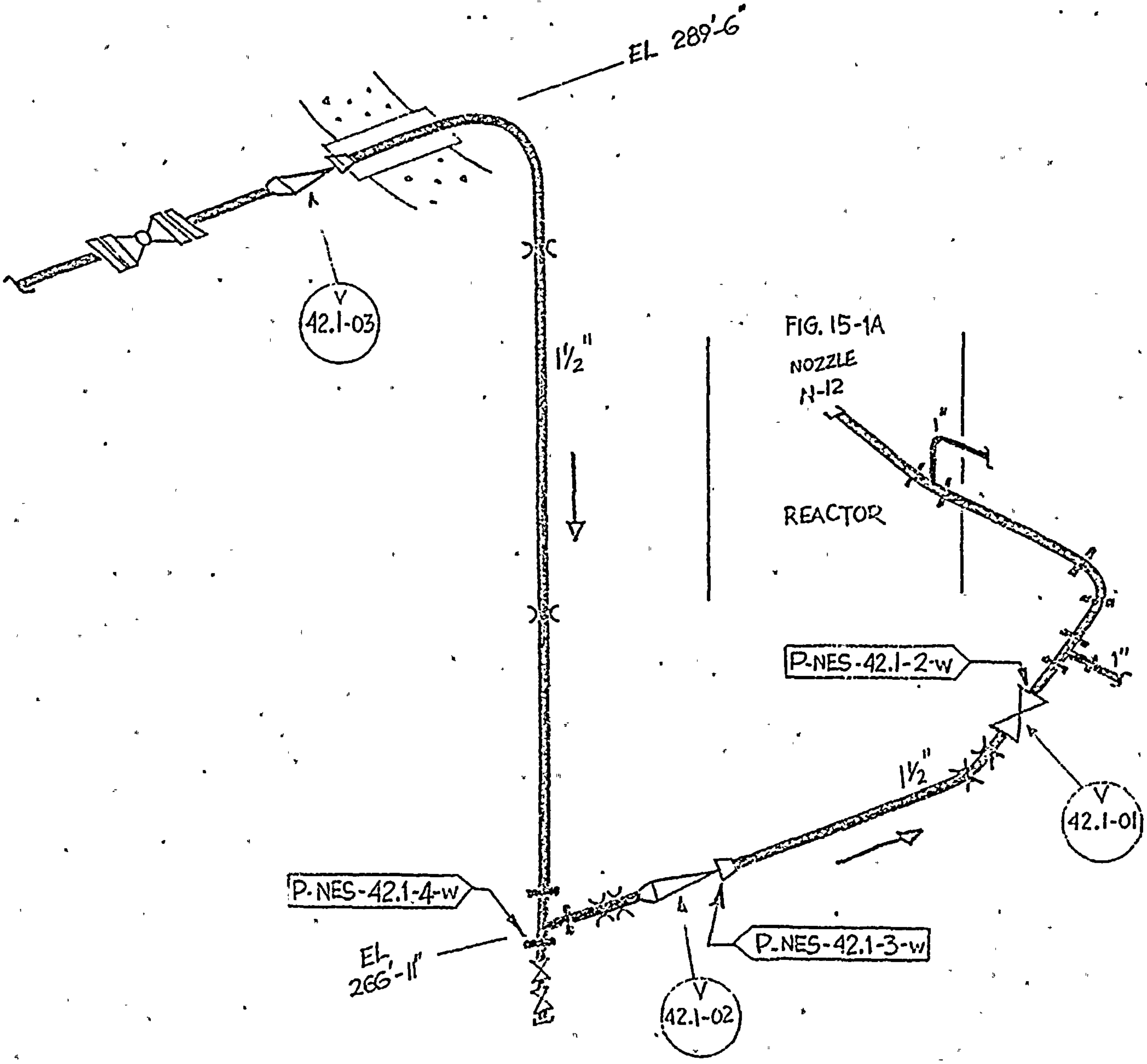
NES 319



CORE SPRAY
PUMP
81-03

NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE		
81	CORE SPRAY PUMP BODY WELD		
REV:	FIG. NO. 10-7		
BY: A.U	DATE: 8-11-75		
APP: [illegible]	DATE: 8-18-75		
PROJECT:	5530-9MP		
NES 112	NOT TO SCALE		

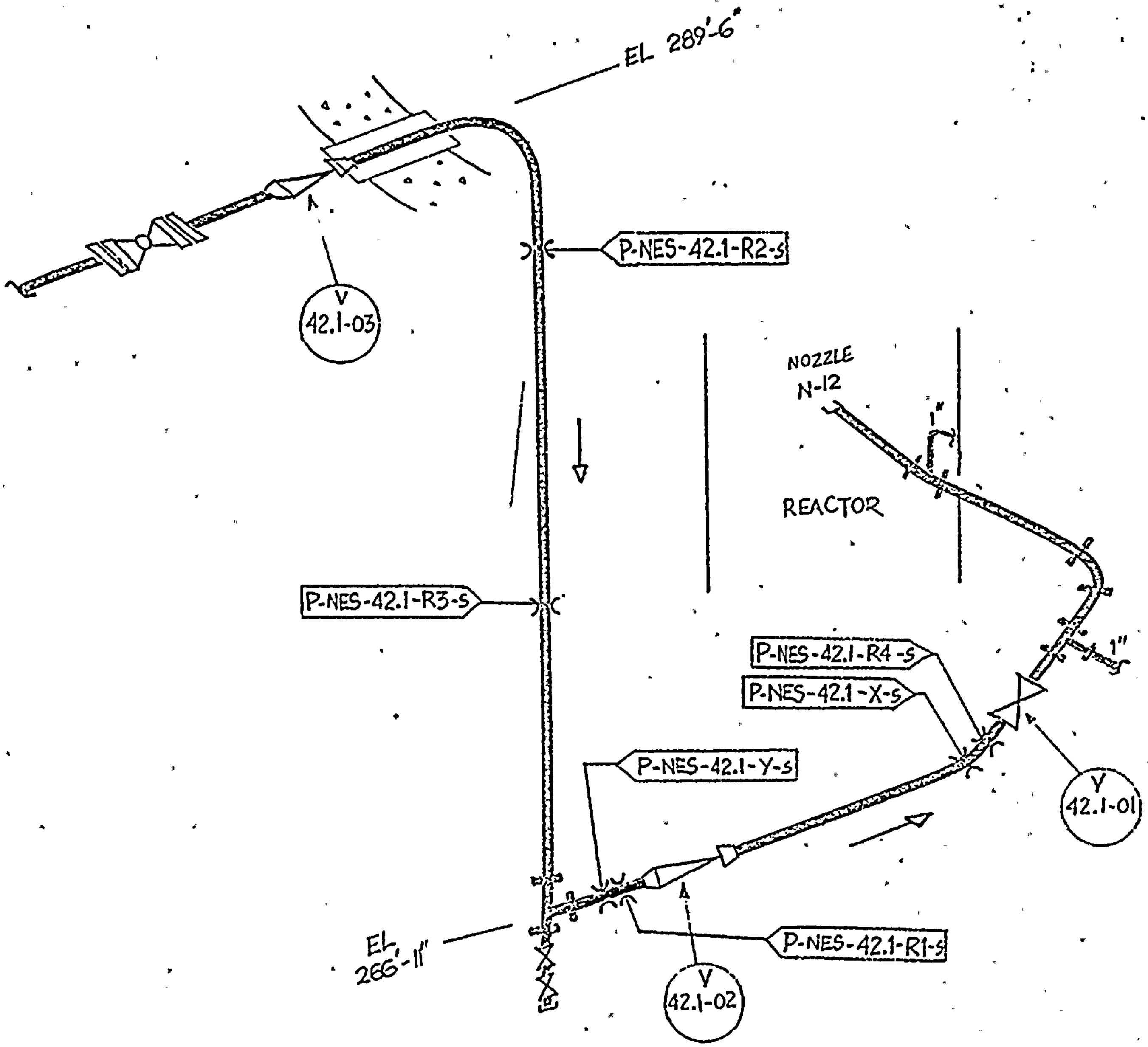


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE	
42.1	LIQUID POISON WELD MAP	
REV: 0	FIG. NO. 11-1	
BY: A.U.	DATE: 8-6-75	
APP: [illegible]	DATE: 9-5-75	
PROJECT:	5530 - 9MP	

NOT TO SCALE

NES 112

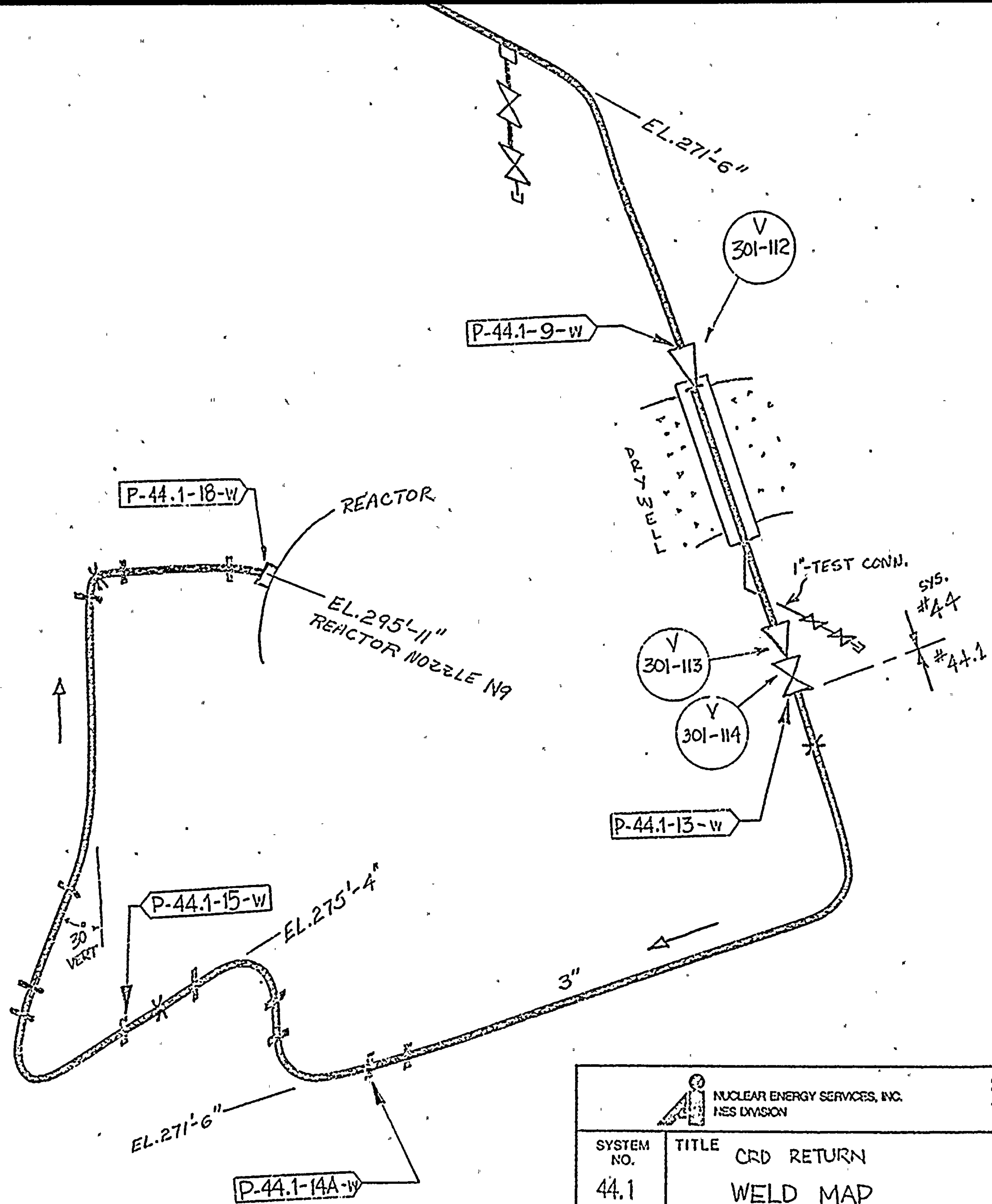


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE
42.1	LIQUID . POISON SUPPORT MAP
REV: 0	FIG. NO. 11-2
BY: A.U. DATE: 8-6-75	W N S E
APP: gg DATE: 9-5-75	
PROJECT: 5530 - 9MP	

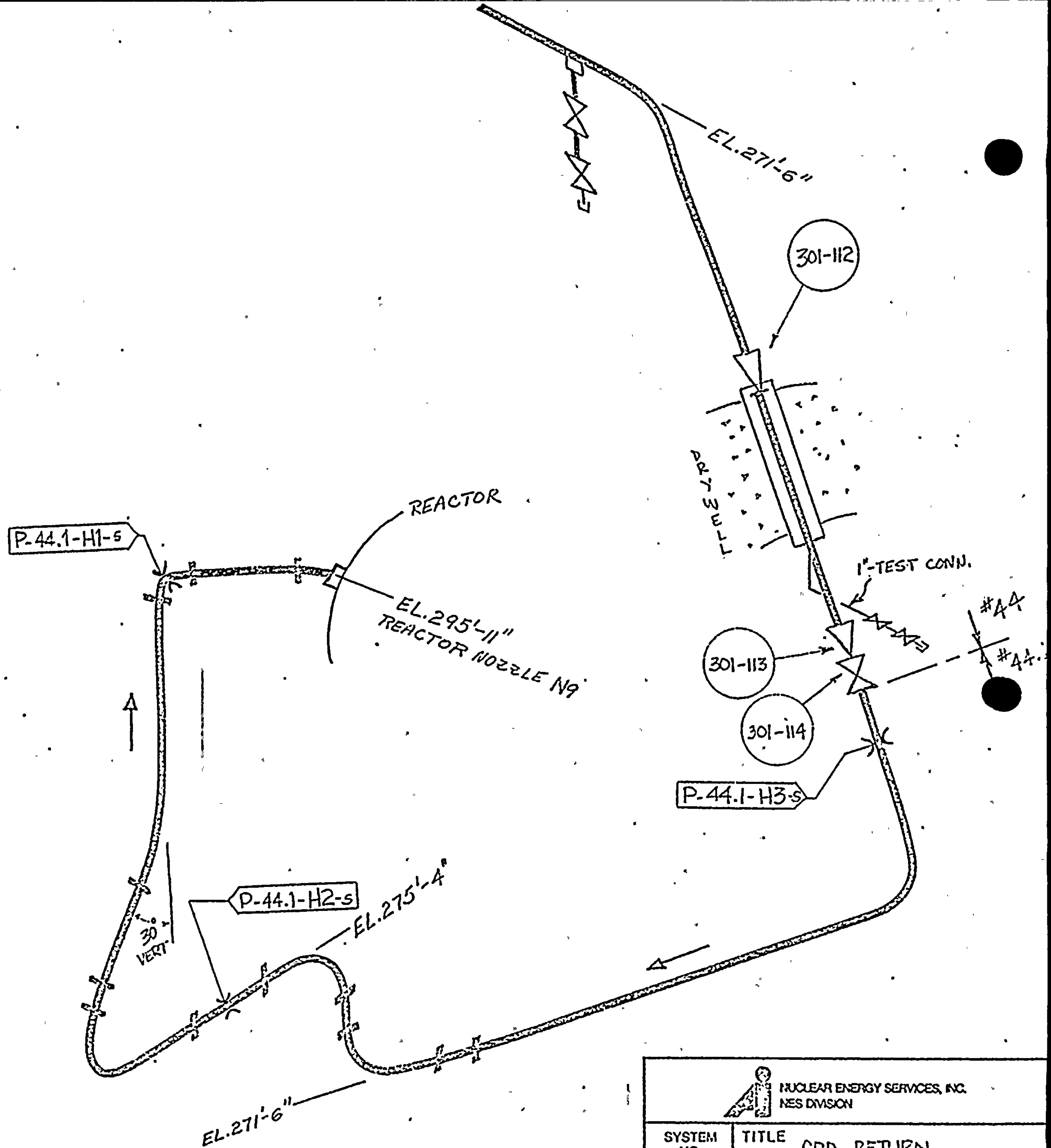
NOT TO SCALE

NES 112



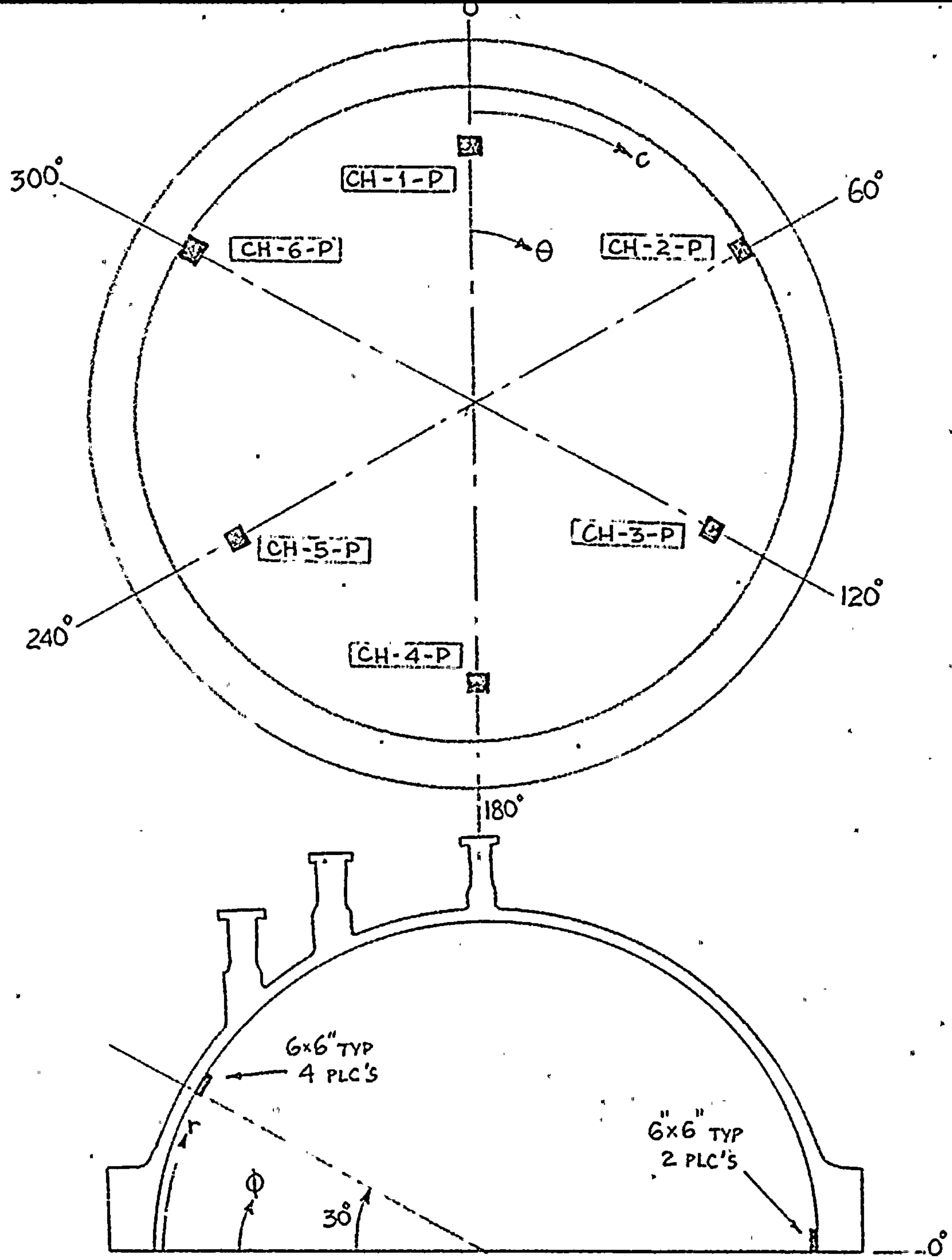
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 44.1	TITLE CRD RETURN WELD MAP	
REV: 0	FIG. NO. 12-1	
BY: A.U. DATE: 8-6-75		W N S E
APP: [illegible] DATE: 9-5-75		
PROJECT: 5530 - 9MP.		
NFS 112	NOT TO SCALE	



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

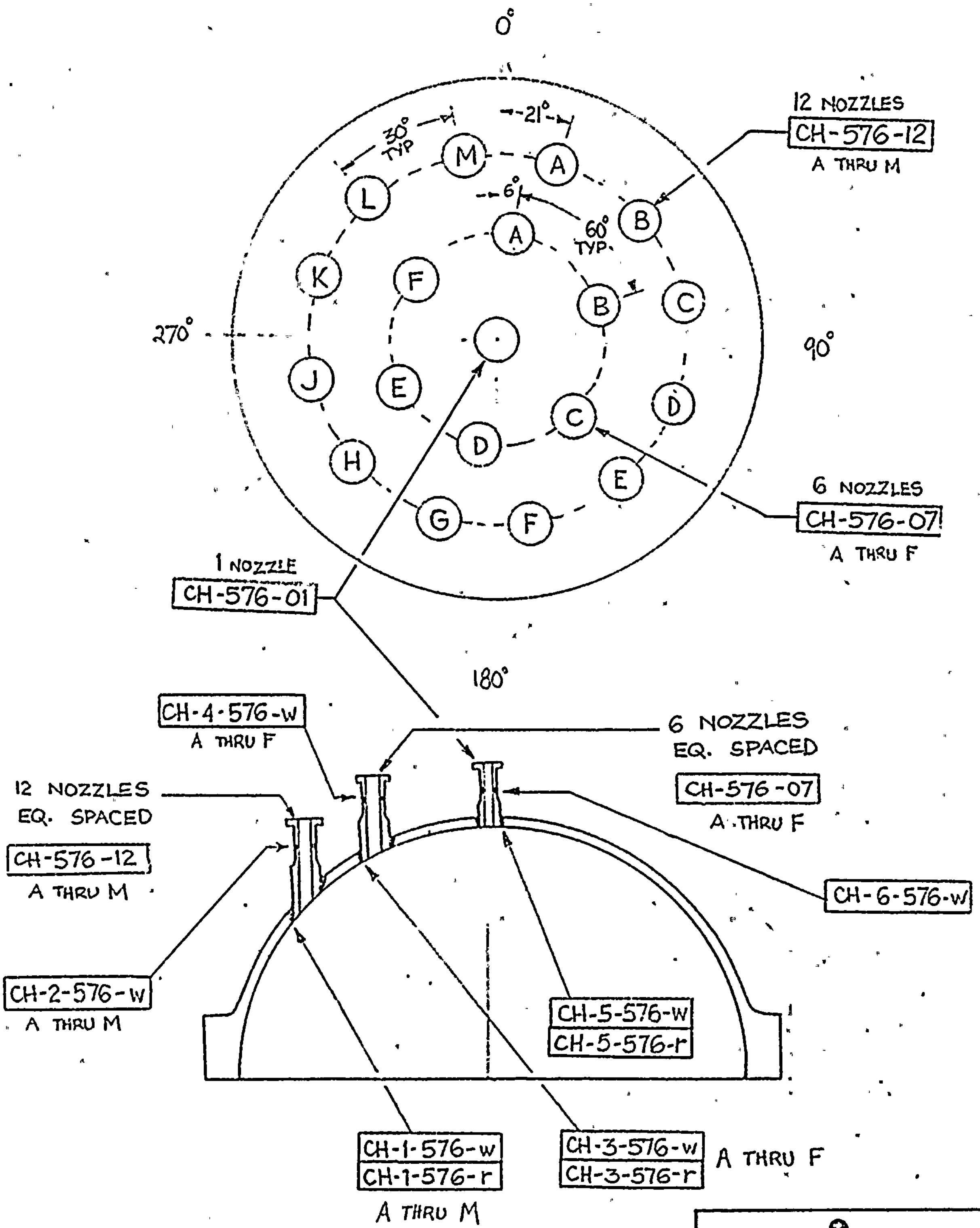
SYSTEM NO. 44.1	TITLE CRD RETURN SUPPORT MAP
REV: 0	FIG. NO. 12-2
BY: A.U. DATE: 5-6-75	W N
APP: 88 DATE: 9-5-75	S E
PROJECT: 5530 - 9MP	
NES 112	NOT TO SCALE



PATCH #	Θ	c	Φ	r
CH-1-P	0°	0.0"	30°	55.8"
CH-2-P	60°	111.8"	0°	0.0"
CH-3-P	120°	223.6"	30°	55.8"
CH-4-P	180°	335.4"	30°	55.8"
CH-5-P	240°	447.2"	30°	55.8"
CH-6-P	300°	558.0"	0°	0.0"

NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

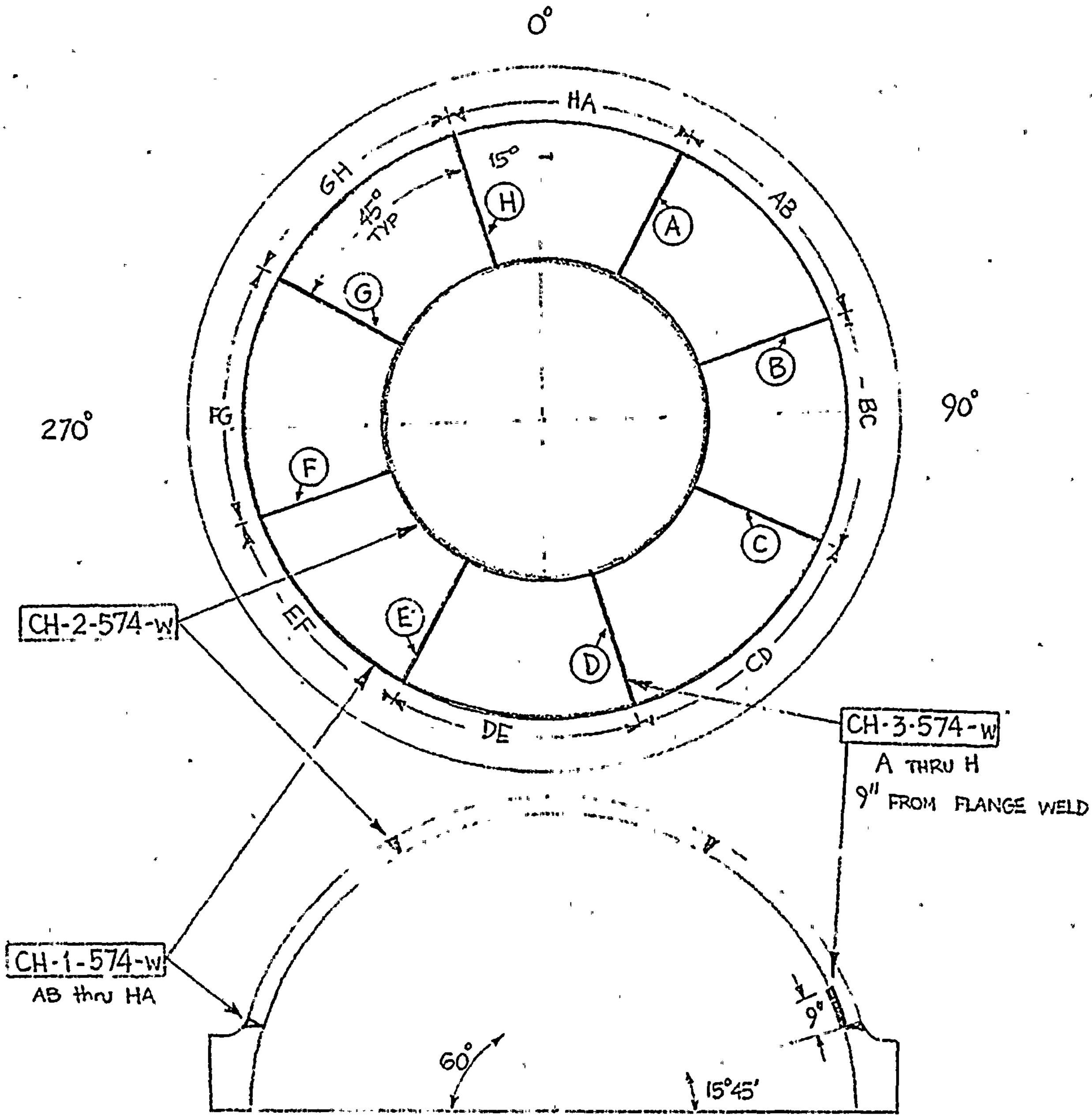
SYSTEM NO.	TITLE CLOSURE HEAD CLAD PATCHES
REV: 0	FIG. NO. 13-1
BY: A.U.	DATE: 8-18-75
APP: gg	DATE: 9-5-75
PROJECT: 5530 . 9MP	
NES 112	NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

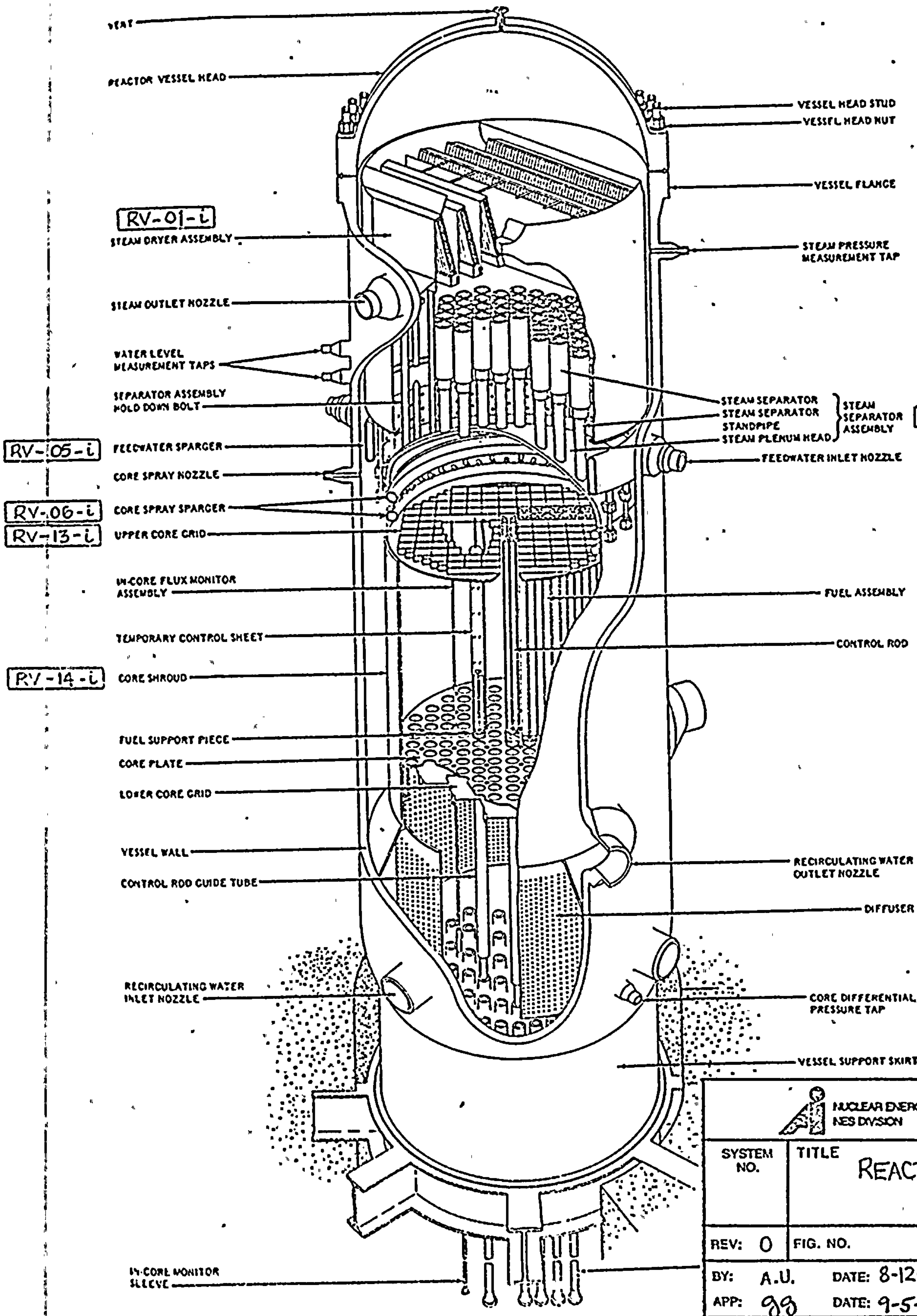
SYSTEM NO.	TITLE CLOSURE HEAD NOZZLES AND WELD MAP
REV: 0	FIG. NO. 13-2
BY: A.U. DATE: 8-18-75	
APP: gg DATE: 9-5-75	
PROJECT: 5530 , 9MP	

NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO.	TITLE CLOSURE HEAD WELD MAP CIRC., MERID. AND FLANGE
REV: 0	FIG. NO. 13-3
BY: A.U. DATE: 8-20-75 APP: GG DATE: 9-5-75	
PROJECT: 5530 - 9MP	
NES 112	NOT TO SCALE

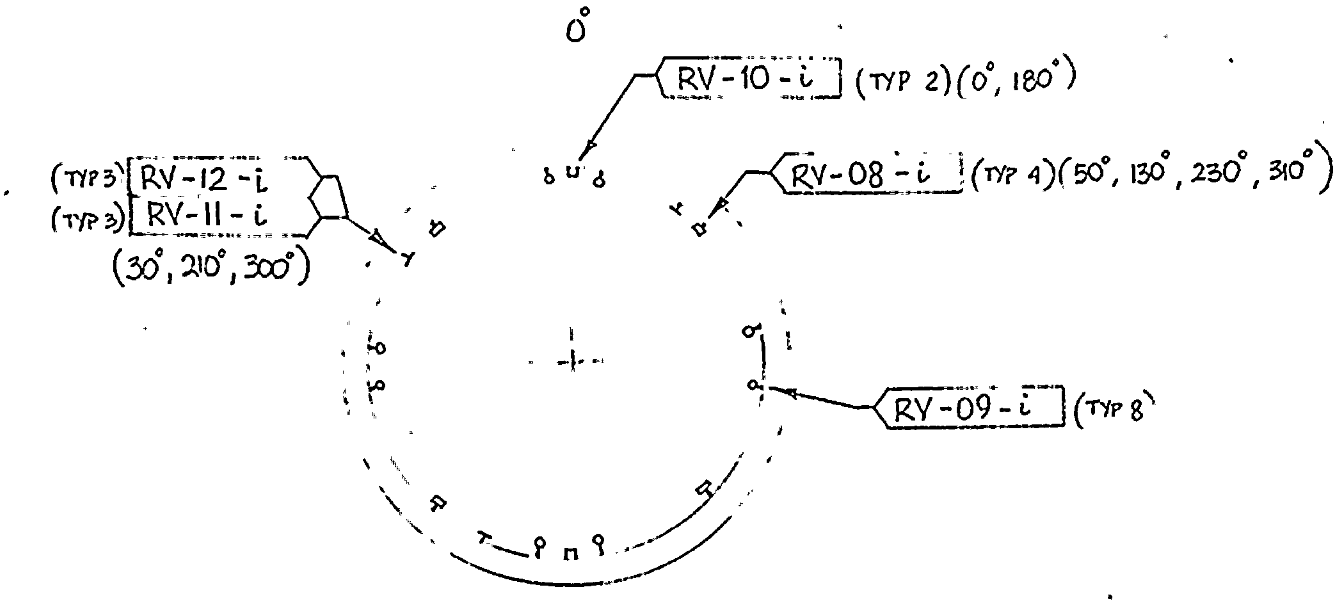
REACTOR VESSEL ISOMETRIC

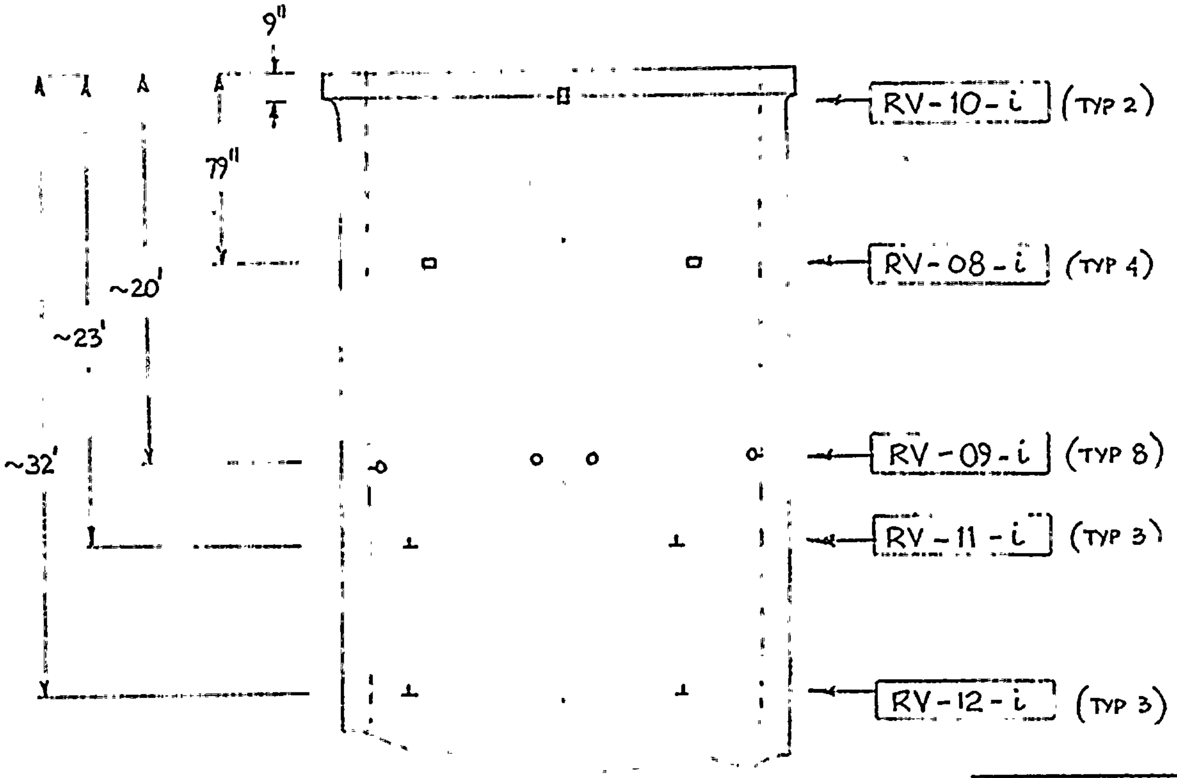


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE REACTOR INTERNALS		
REV: 0	FIG. NO. 14-1		
BY: A.U.	DATE: 8-12-75		
APP: gg	DATE: 9-5-75		
PROJECT:	5530 , 9MP		

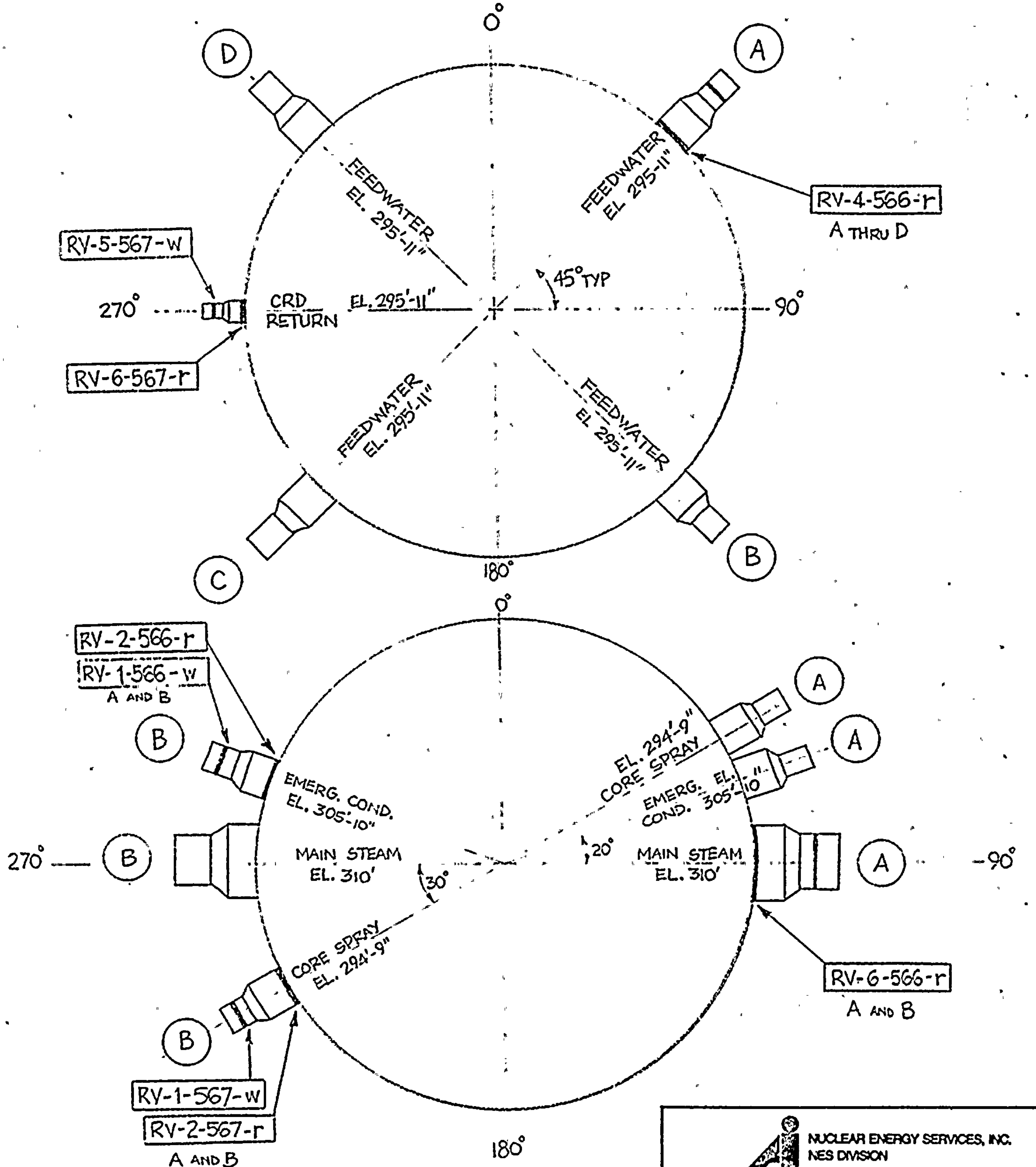
NOT TO SCALE





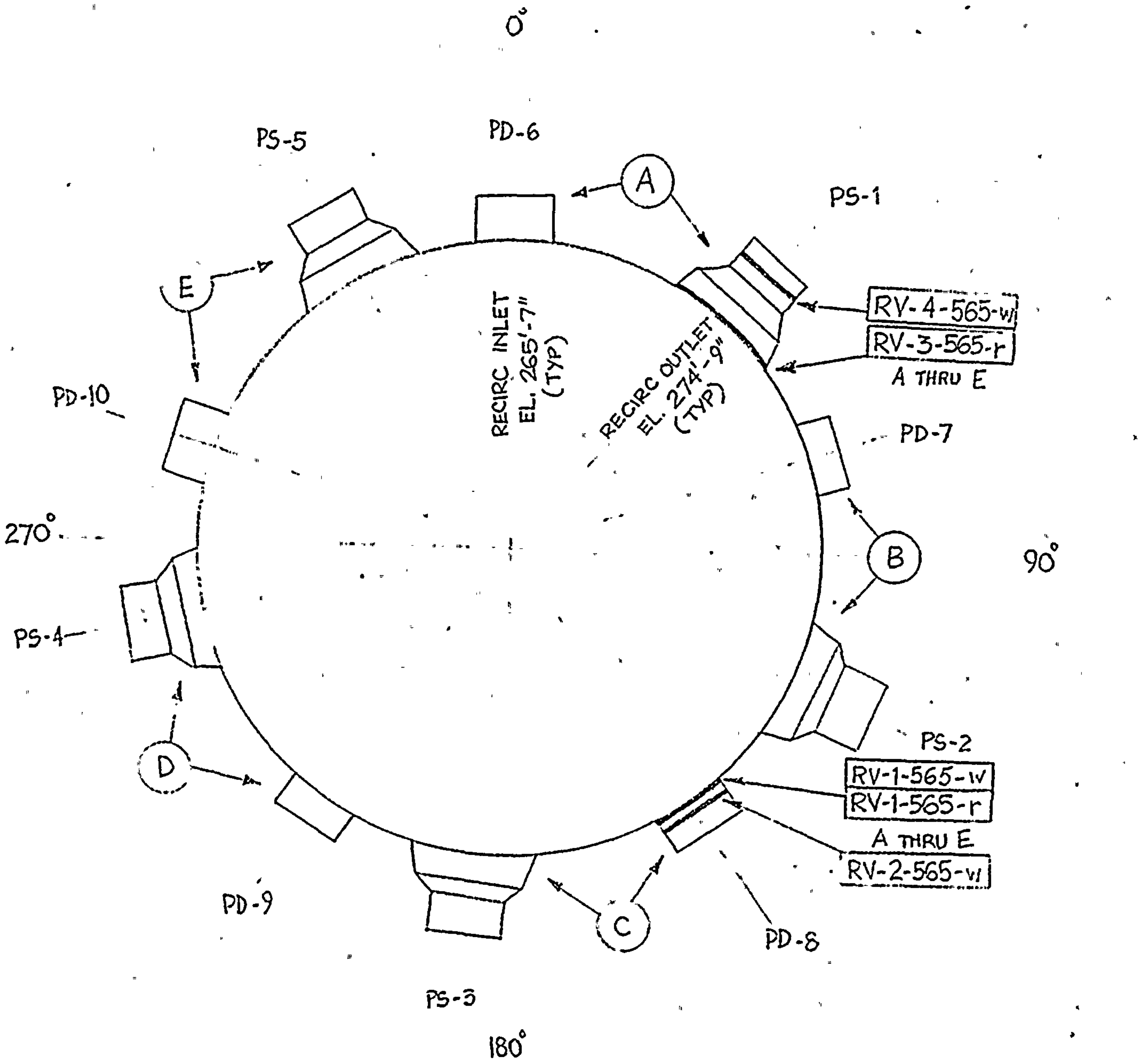
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE INTEGRALLY WELDED INTERIOR ATTACHMENTS
REV: 0	FIG. NO. 14-1B
BY: A.U DATE: 8-11-75	
APP: gg DATE: 8-18-75	
PROJECT: 5530-9MP	
NES 112	NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

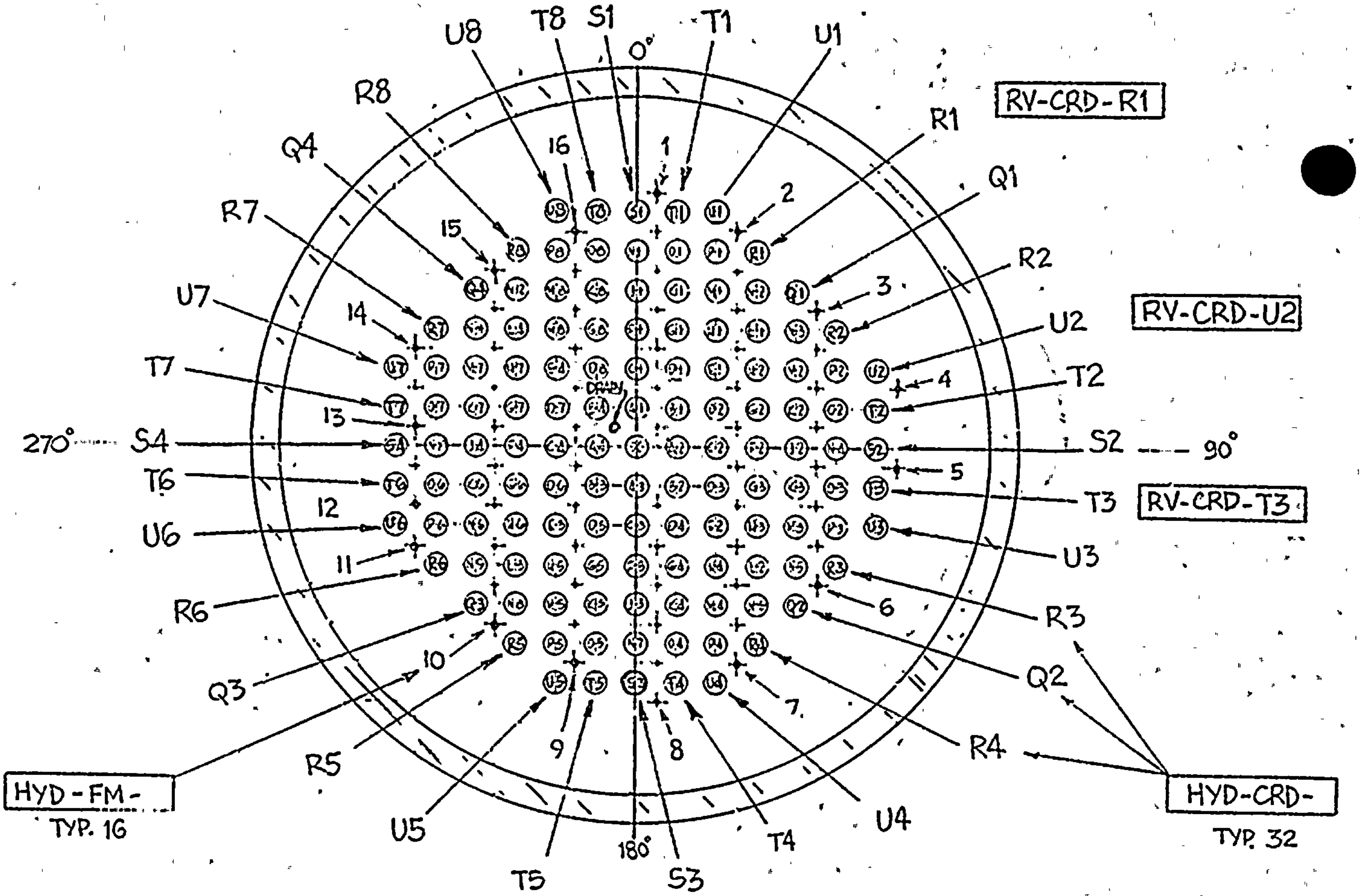
SYSTEM NO.	TITLE REACTOR VESSEL NOZZLE WELD MAP
REV: 0	FIG. NO. 14-2A
BY: A.U. DATE: 8-21-75 APP: gg DATE: 9-5-75	N
PROJECT:	5530 - 9MP
NES 112	NOT TO SCALE

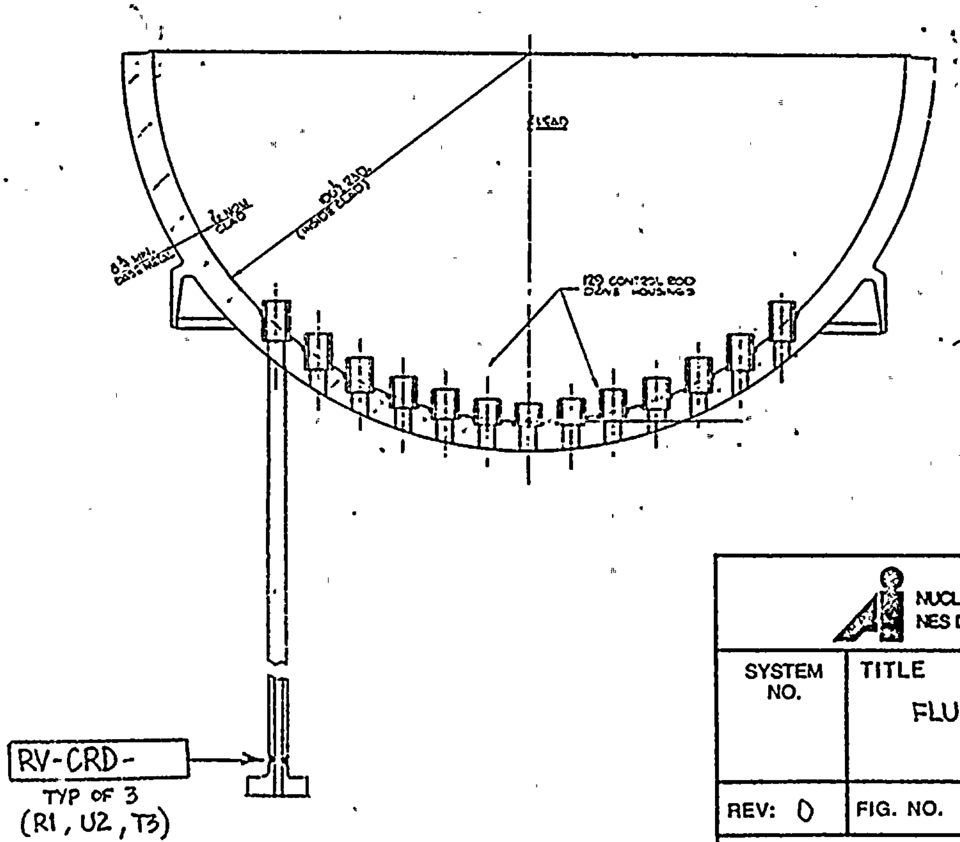


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

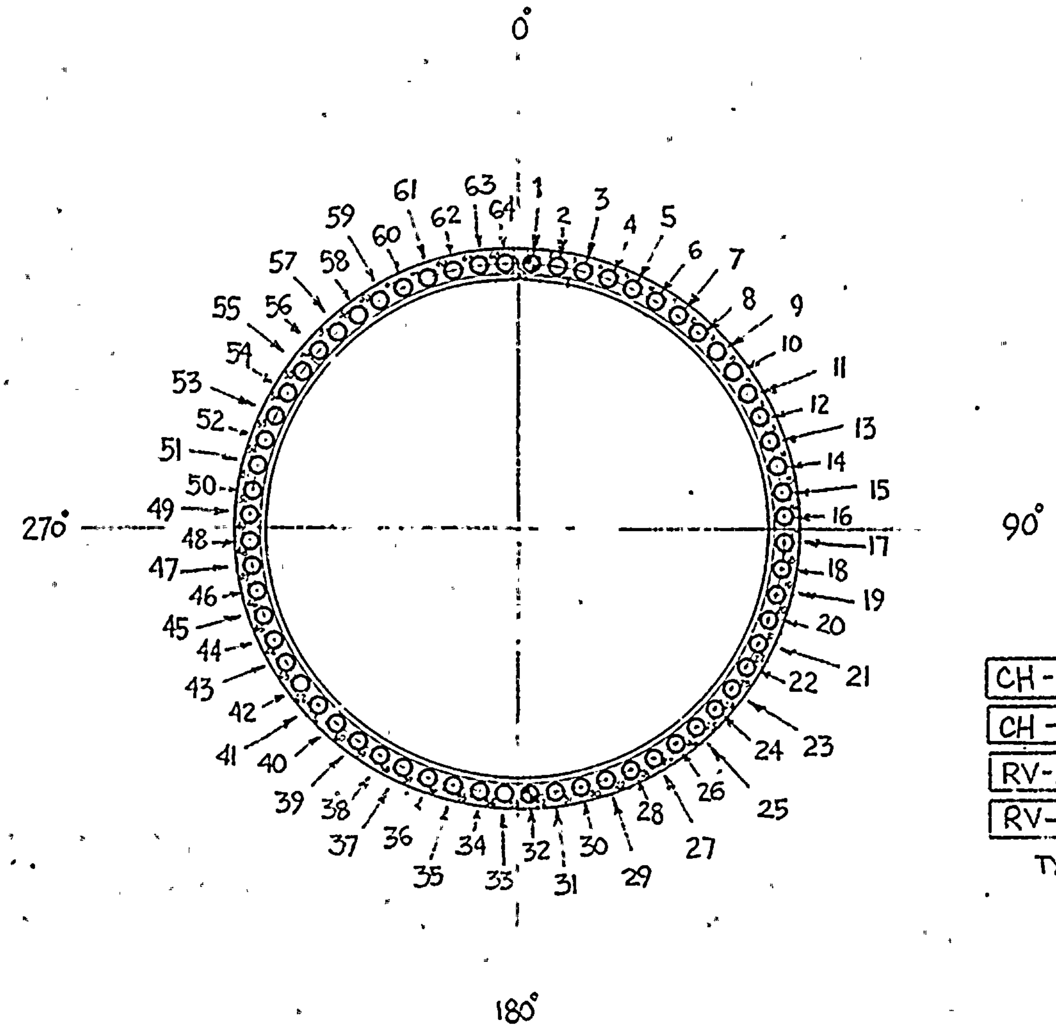
SYSTEM NO.	TITLE REACTOR VESSEL NOZZLE WELD MAP
REV: O	FIG. NO. 14-2B
BY: A.U. DATE: 8-21-75 APP: 88 DATE: 9-5-75	N
PROJECT: 5530 - 9MP	

NES 112 NOT TO SCALE





NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO.	TITLE CONTROL ROD DRIVE & FLUX MONITOR PEN.'s
REV: 0	FIG. NO. 14-3
BY: A.U.	DATE: 8-21-75
APP: 98	DATE: 9-5-75
PROJECT:	5530 - 9MP
NES 112	NOT TO SCALE



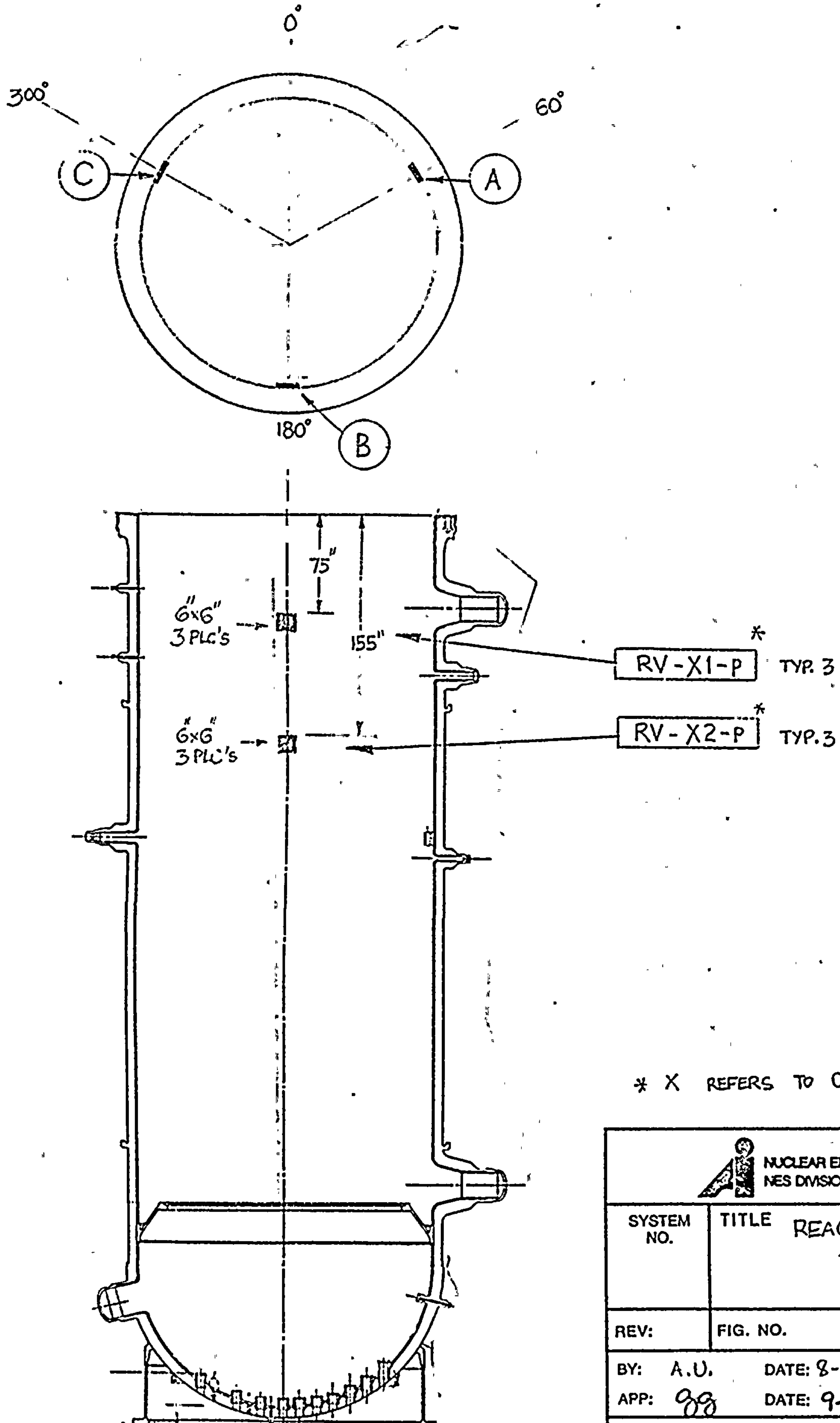
CH-XX-n
CH-XX-b.
RV-XX-l
RV-XX-t

*

TYP. 64

* XX REFERS TO STUD # (1 thru 64)

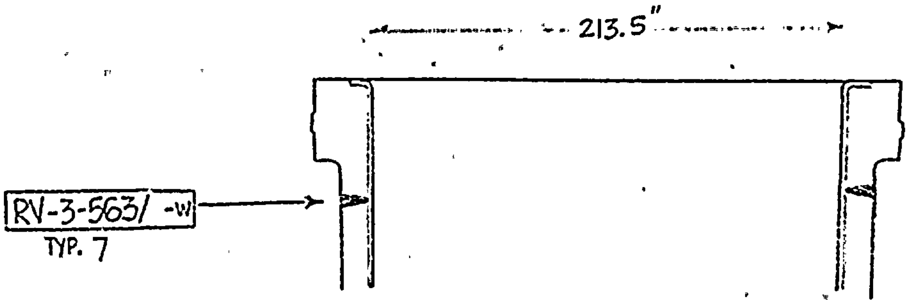
NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO.	TITLE REACTOR VESSEL STUD MAP
REV: O	FIG. NO. 14-4
BY: A.U. DATE: 8-21-75	
APP: gg DATE: 9-5-75	
PROJECT:	5530, 9MP
NES 112	NOT TO SCALE

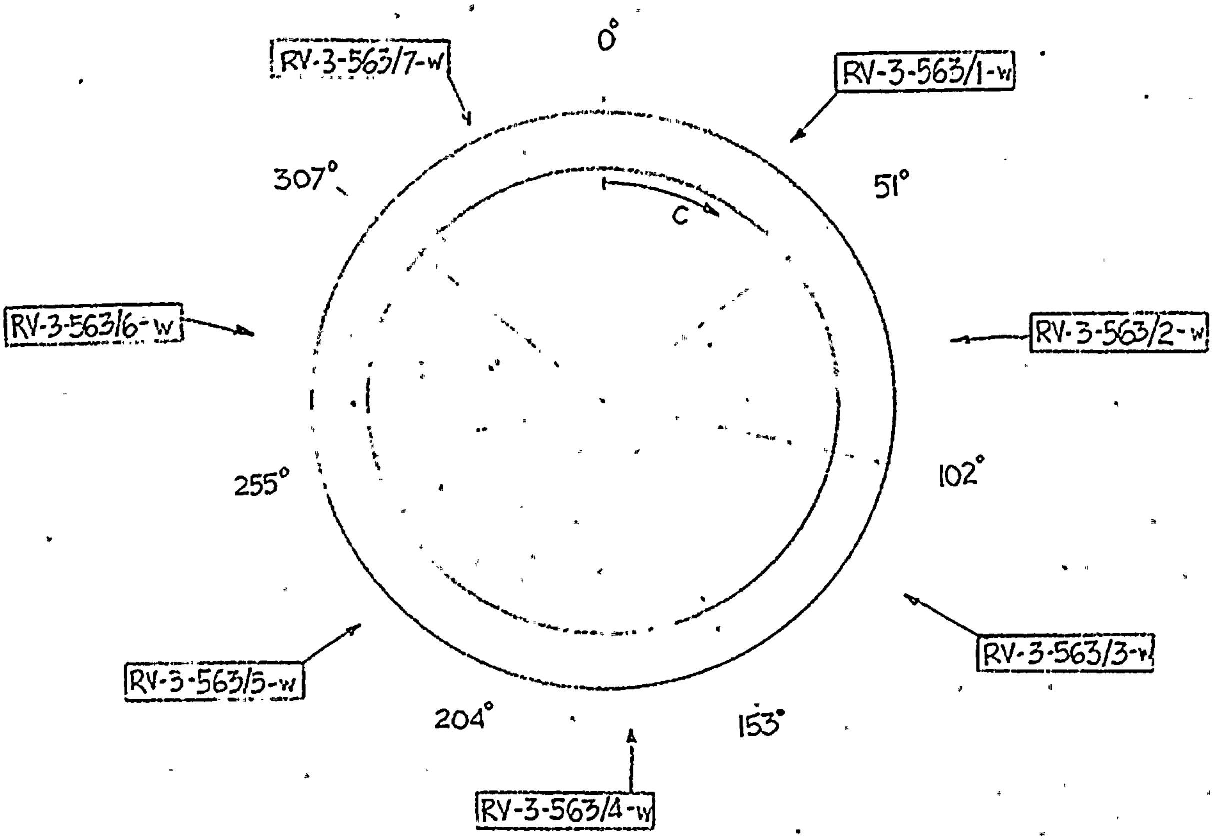


* X REFERS TO CIRC. POSITION (A, B OR C)

NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE REACTOR VESSEL PATCHES		
REV:	FIG. NO. 14-5		
BY: A.U.	DATE: 8-21-75		
APP: gg	DATE: 9-5-75		
PROJECT:	5530 - 9MP		
NES 112	NOT TO SCALE		

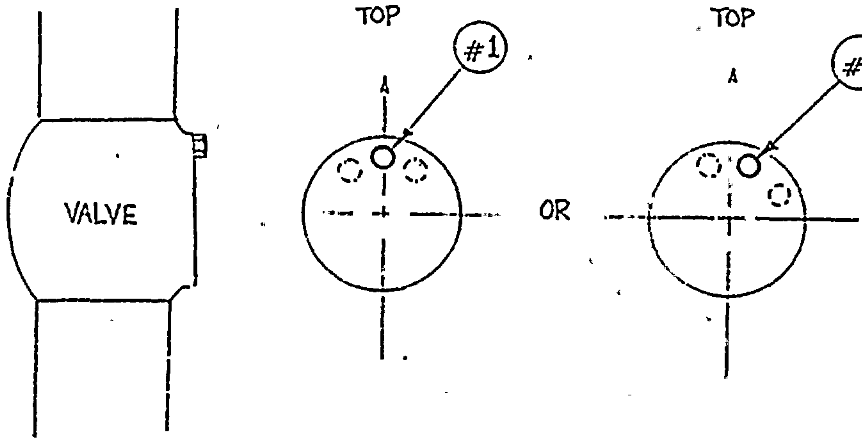




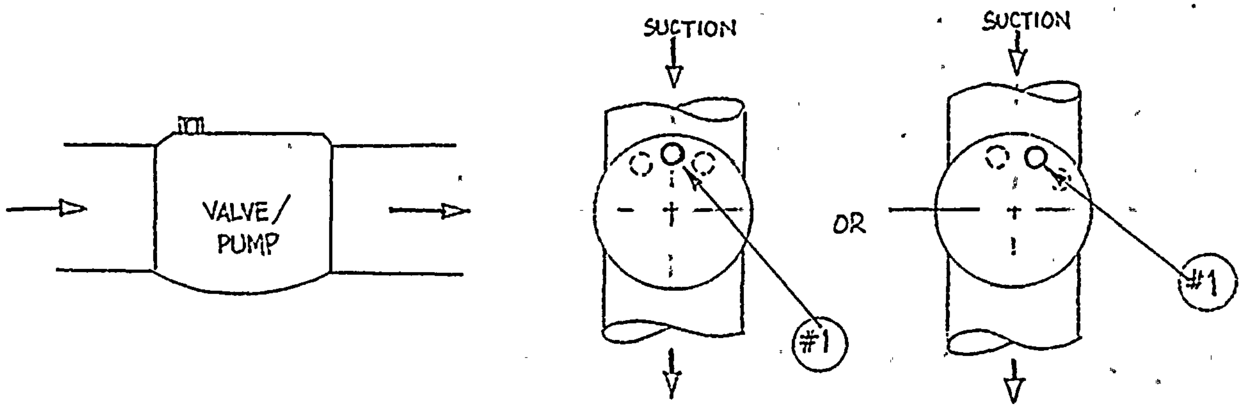
ANGLE	DISTANCE C FROM 0°
51°	96"
102°	192"
153°	288"
204°	384"
255°	480"
307°	576"
360°	671"

NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE REACTOR VESSEL FLANGE WELD	
REV: 0	FIG. NO. 14-6	
BY: A.U.	DATE: 8-21-75	
APP: gg	DATE: 9-5-75	
PROJECT:	5530 - 9MP	
NES 112	NOT TO SCALE	



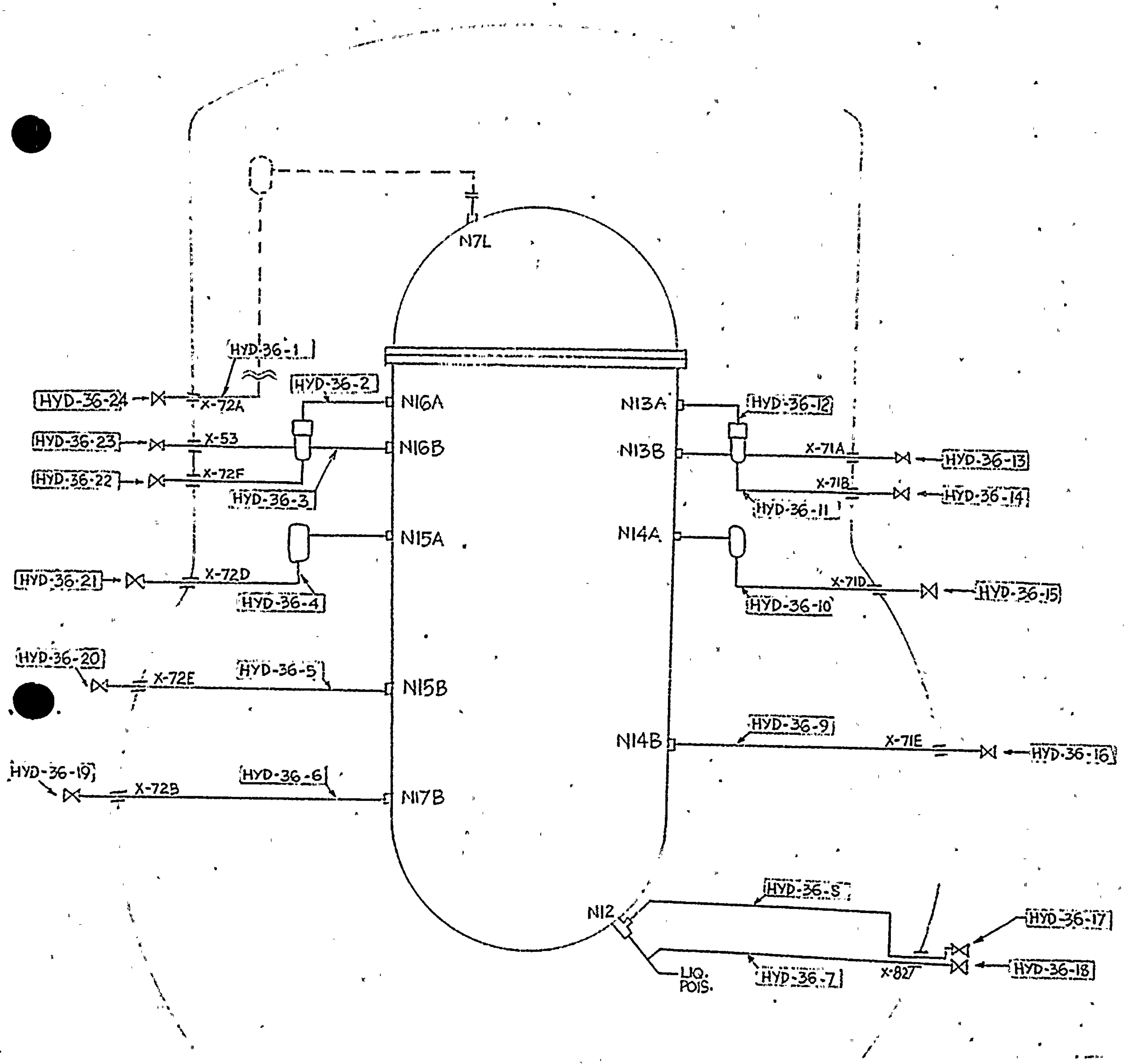
VERTICAL BOLT/STUD PLATE



HORIZONTAL BOLT/STUD PLATE

ALL STUDS/BOLTS AND NUTS TO BE NUMBERED SEQUENTIALLY CLOCKWISE FROM BOLT #1.

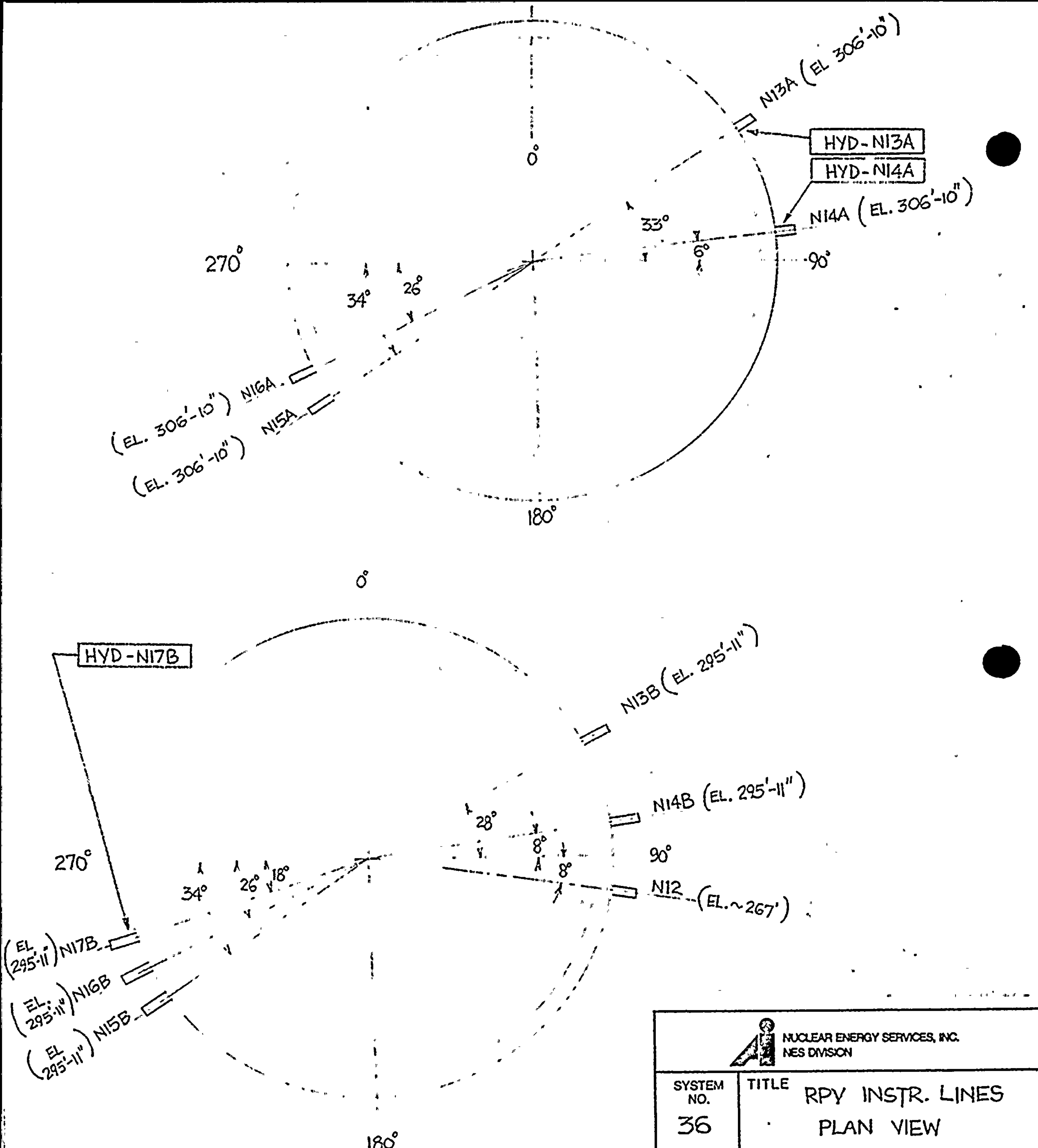
NUCLEAR ENERGY SERVICES, INC. NES DIVISION			
SYSTEM NO.	TITLE BOLT/NUT DESIGNATION SYSTEM		
REV: 0	FIG. NO. 14-7		
BY: A.D	DATE: 10-22-75		
APP: 88	DATE: 10-22-75		
PROJECT:	5530-9MP		
NES 112	NOT TO SCALE		



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 36	TITLE RPV INSTR. LINES
REV: 0	FIG. NO. 15-1
BY: A.U. DATE: 8-14-75	
APP: [illegible] DATE: 9-5-75	
PROJECT: 5530, 9MP	

NES 112 NOT TO SCALE

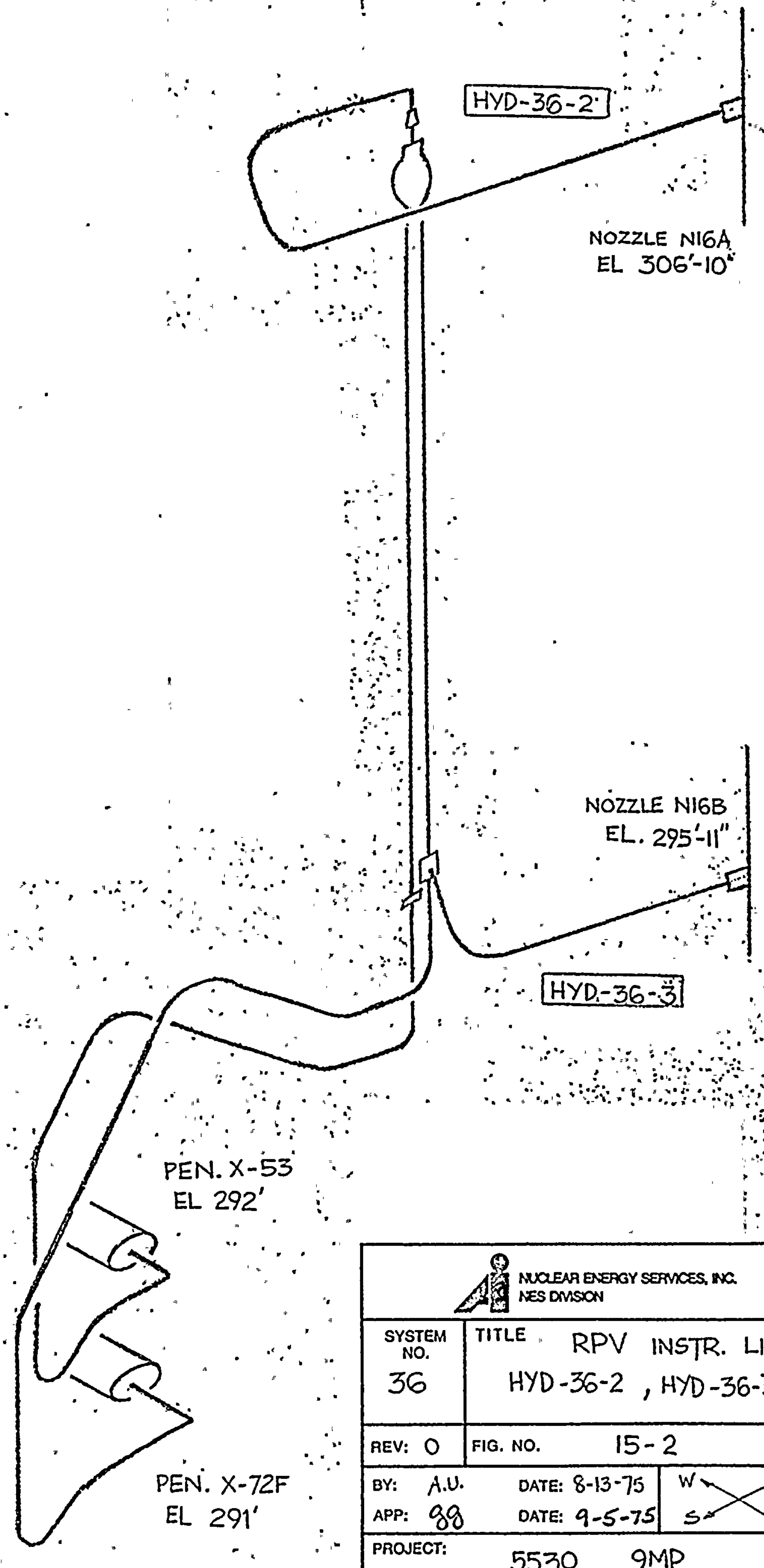


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 36	TITLE RPV INSTR. LINES PLAN VIEW
REV: 0	FIG. NO. 15-1A
BY: A.U DATE: 8-14-75	N
APP: gg DATE: 9-5-75	
PROJECT: 5530 , 9MP	

NOT TO SCALE

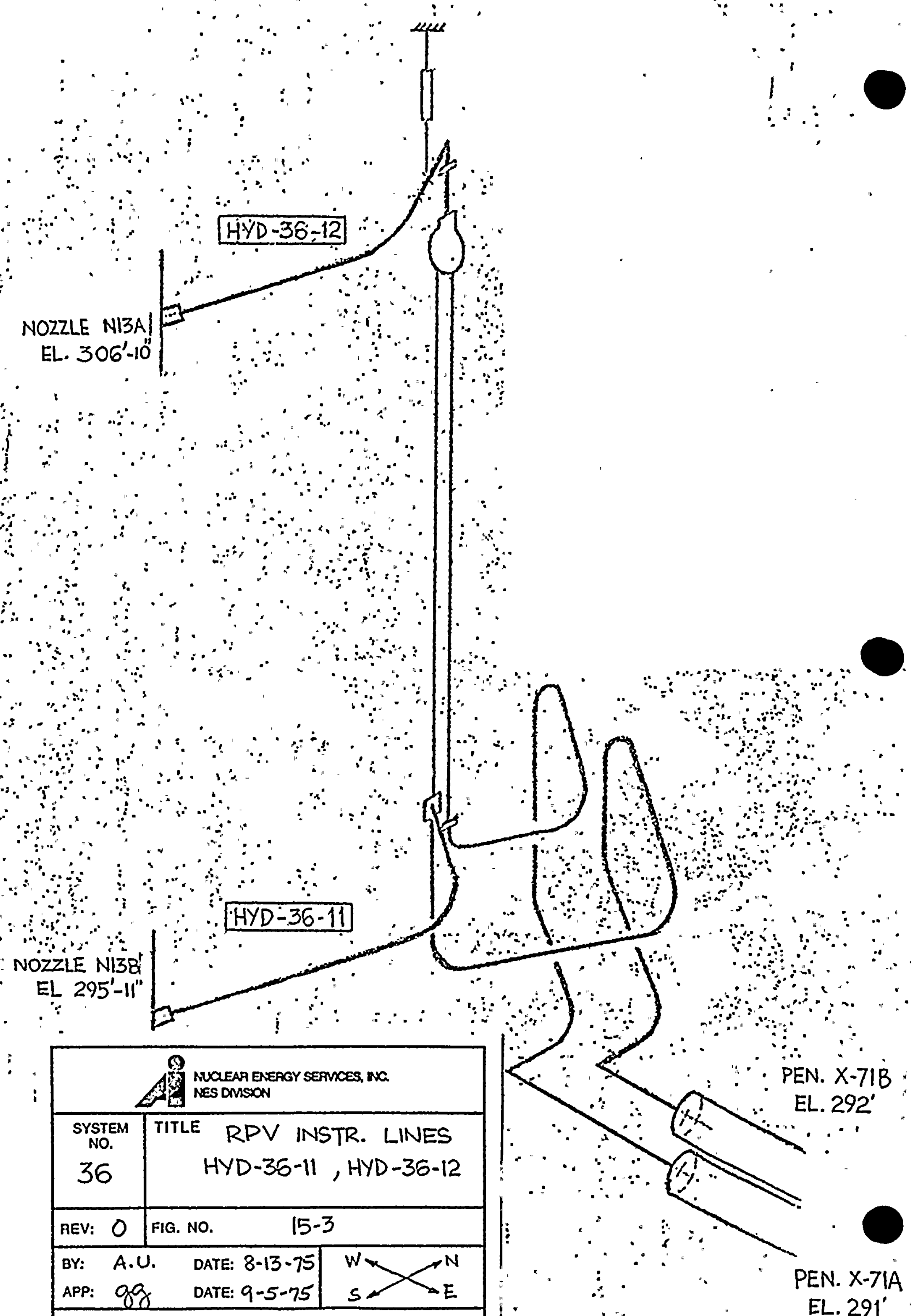
NES 112



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

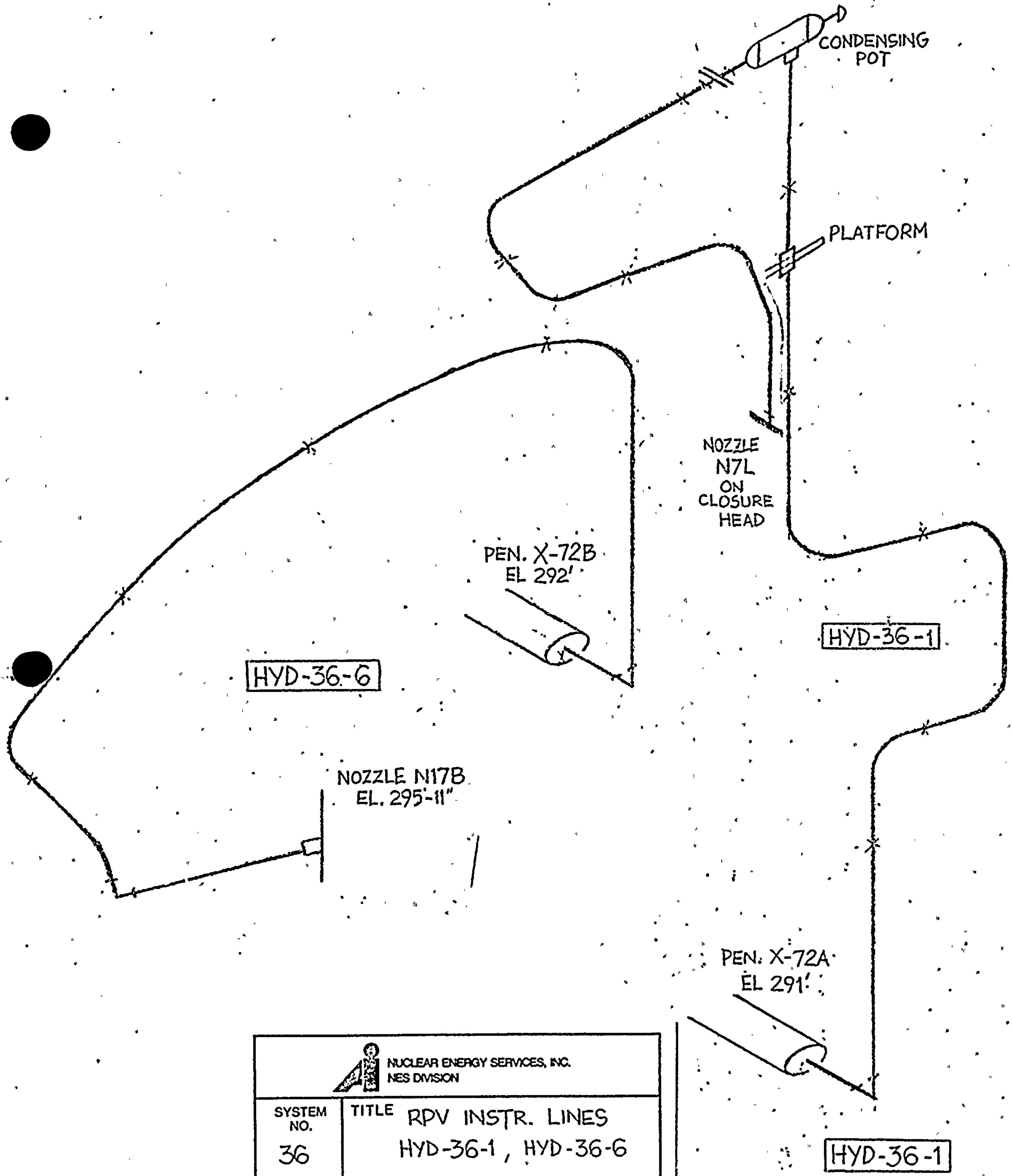
SYSTEM NO.	TITLE RPV INSTR. LINES HYD-36-2 , HYD-36-3	
36		
REV: 0	FIG. NO. 15-2	
BY: A.U.	DATE: 8-13-75	W N S E
APP: gg	DATE: 9-5-75	
PROJECT:	5530 , 9MP	

NES 112 NOT TO SCALE

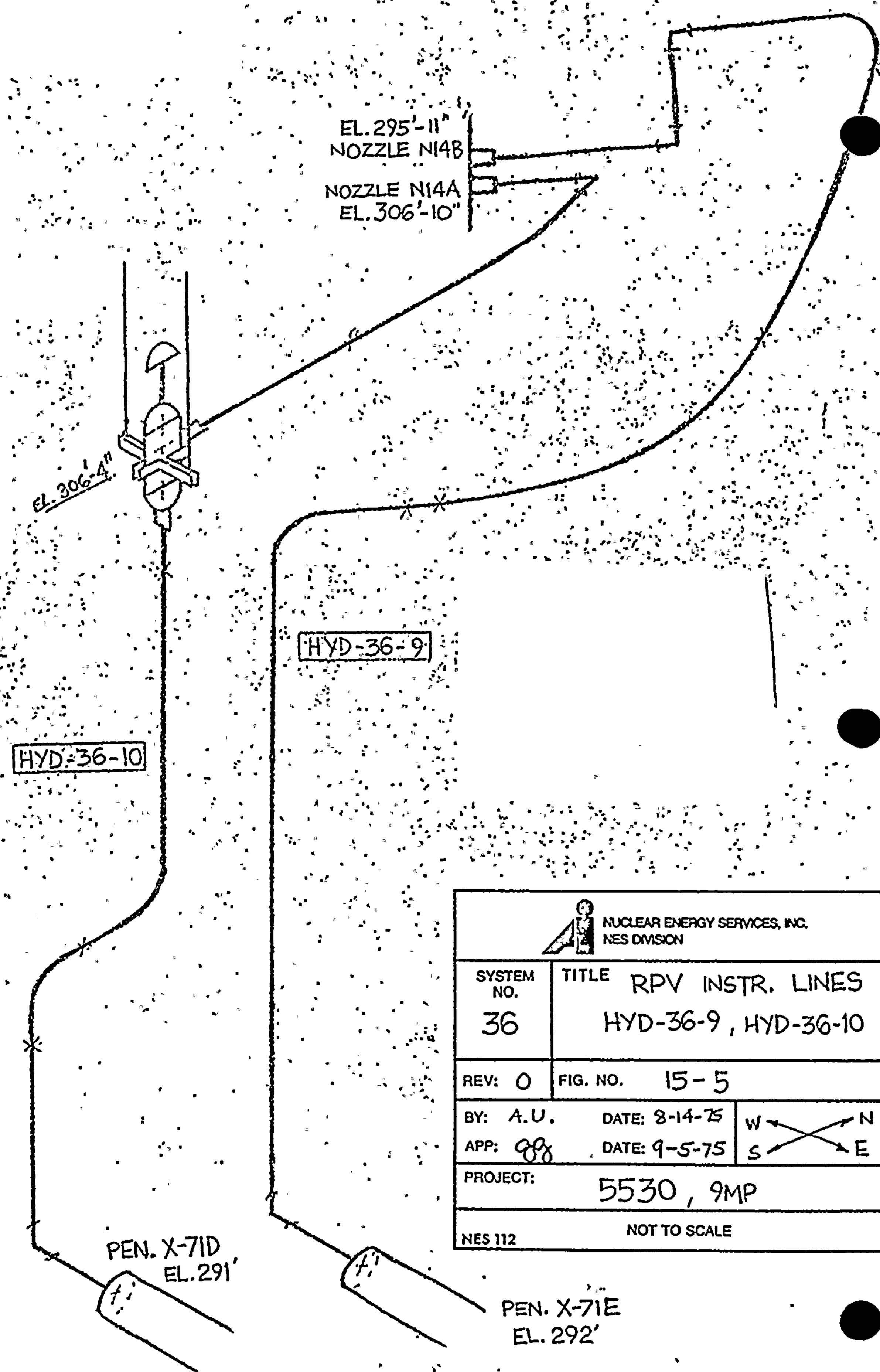


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 36	TITLE RPV INSTR. LINES HYD-36-11 , HYD-36-12		
REV: 0	FIG. NO. 15-3		
BY: A.U.	DATE: 8-13-75		
APP: gg	DATE: 9-5-75		
PROJECT:	5530 , 9MP		
NES 112	NOT TO SCALE		



NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO. 36	TITLE RPV INSTR. LINES HYD-36-1, HYD-36-6
REV: 0	FIG. NO. 15-4
BY: A.U. DATE: 8-13-75	W S N E
APP: gg DATE: 9-5-75	
PROJECT: 5530, 9MP	
NES 112 NOT TO SCALE	

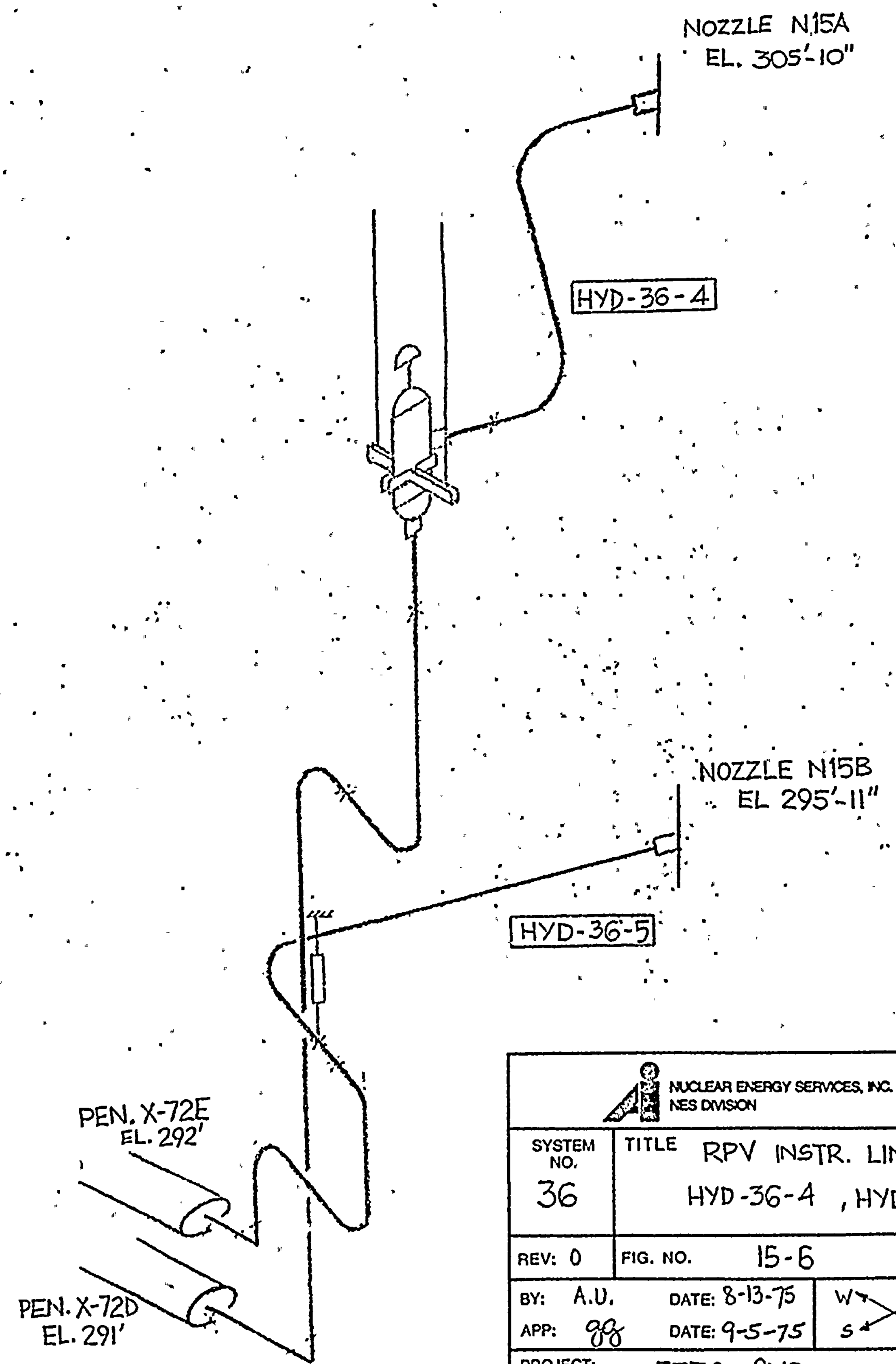


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 36	TITLE RPV INSTR. LINES HYD-36-9 , HYD-36-10
REV: 0	FIG. NO. 15-5
BY: A.U. DATE: 8-14-75	W — N, S — E
APP: 98 DATE: 9-5-75	
PROJECT: 5530 , 9MP	

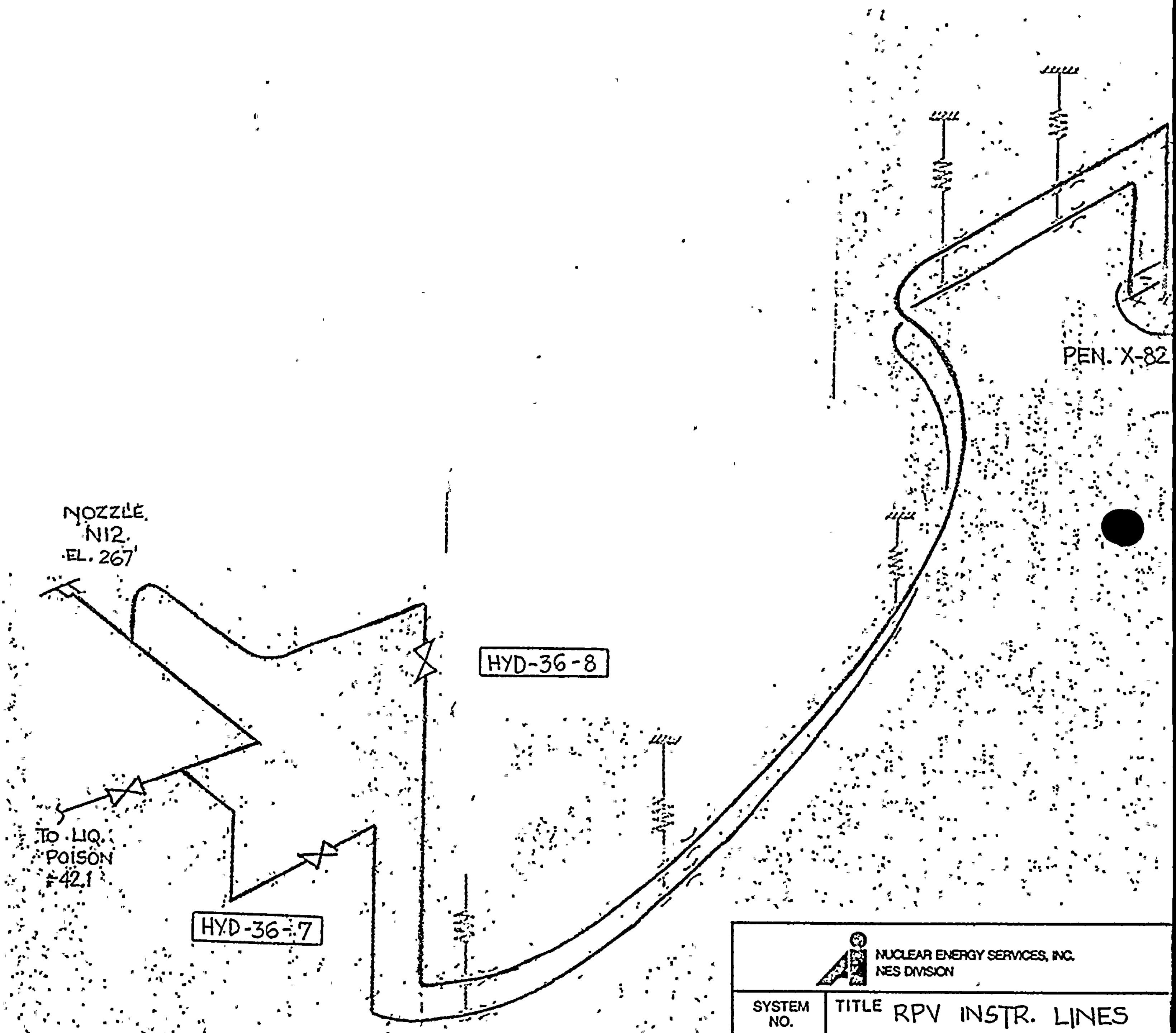
NES 112

NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 36	TITLE RPV INSTR. LINES HYD-36-4 , HYD-36-5
REV: 0	FIG. NO. 15-6
BY: A.U. DATE: 8-13-75	W N S E
APP: gg DATE: 9-5-75	
PROJECT: 5530 , 9MP	
NES 112	NOT TO SCALE

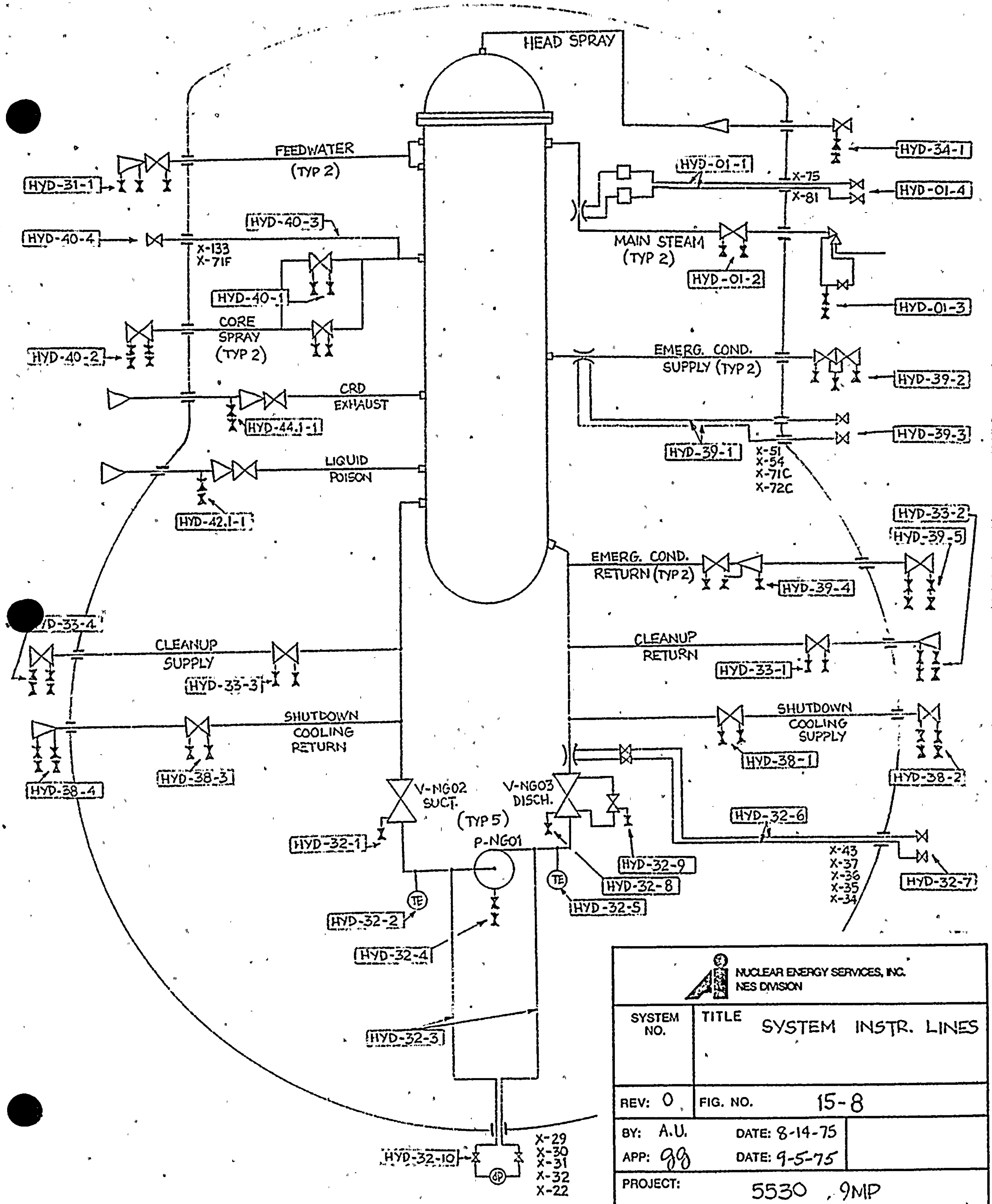


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 36	TITLE RPV INSTR. LINES HYD-36-7, HYD-36-8
REV: 0	FIG. NO. 15-7
BY: A.U. DATE: 8-17-75	W N S E
APP: gg DATE: 9-5-75	
PROJECT: 5530, 9MP	

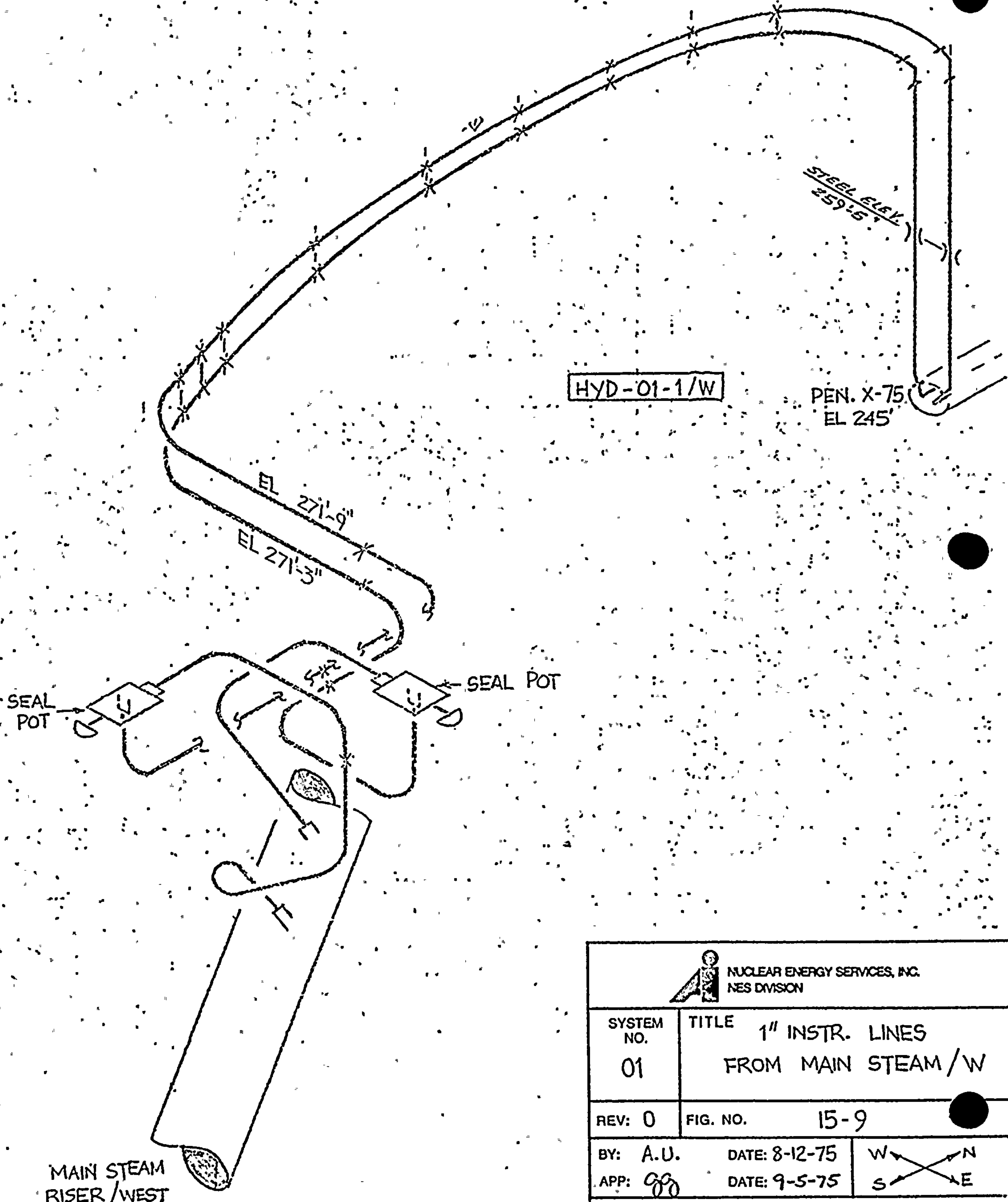
NES 112

NOT TO SCALE



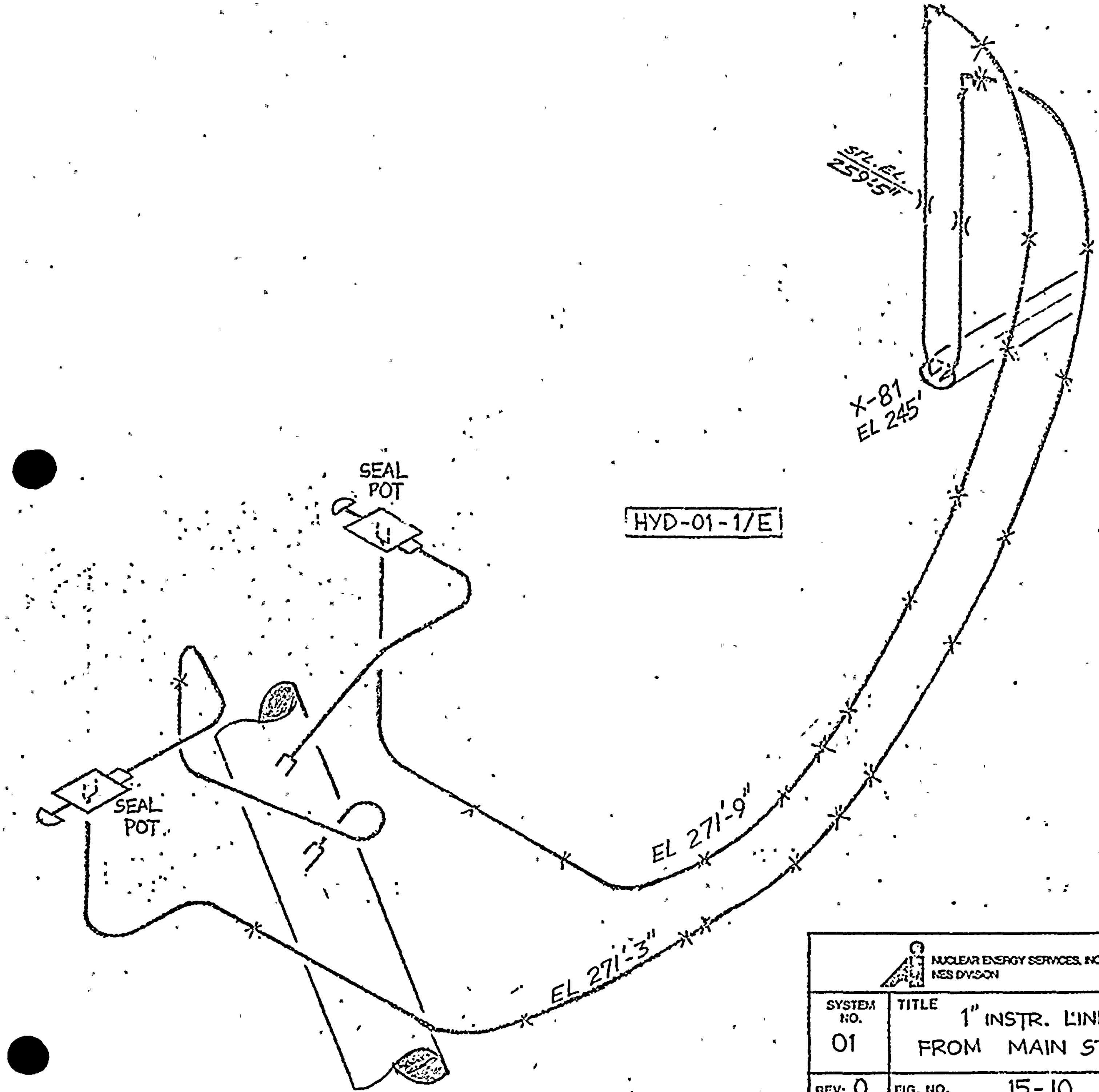
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE SYSTEM INSTR. LINES		
REV: 0	FIG. NO. 15-8		
BY: A.U.	DATE: 8-14-75		
APP: gg	DATE: 9-5-75		
PROJECT:	5530 , 9MP		
NES 112	NOT TO SCALE		



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 01	TITLE 1" INSTR. LINES FROM MAIN STEAM/W	
REV: 0	FIG. NO. 15-9	
BY: A.U. DATE: 8-12-75	APP: [illegible] DATE: 9-5-75	W N S E
PROJECT:	5530, 9MP	
NES 112	NOT TO SCALE	



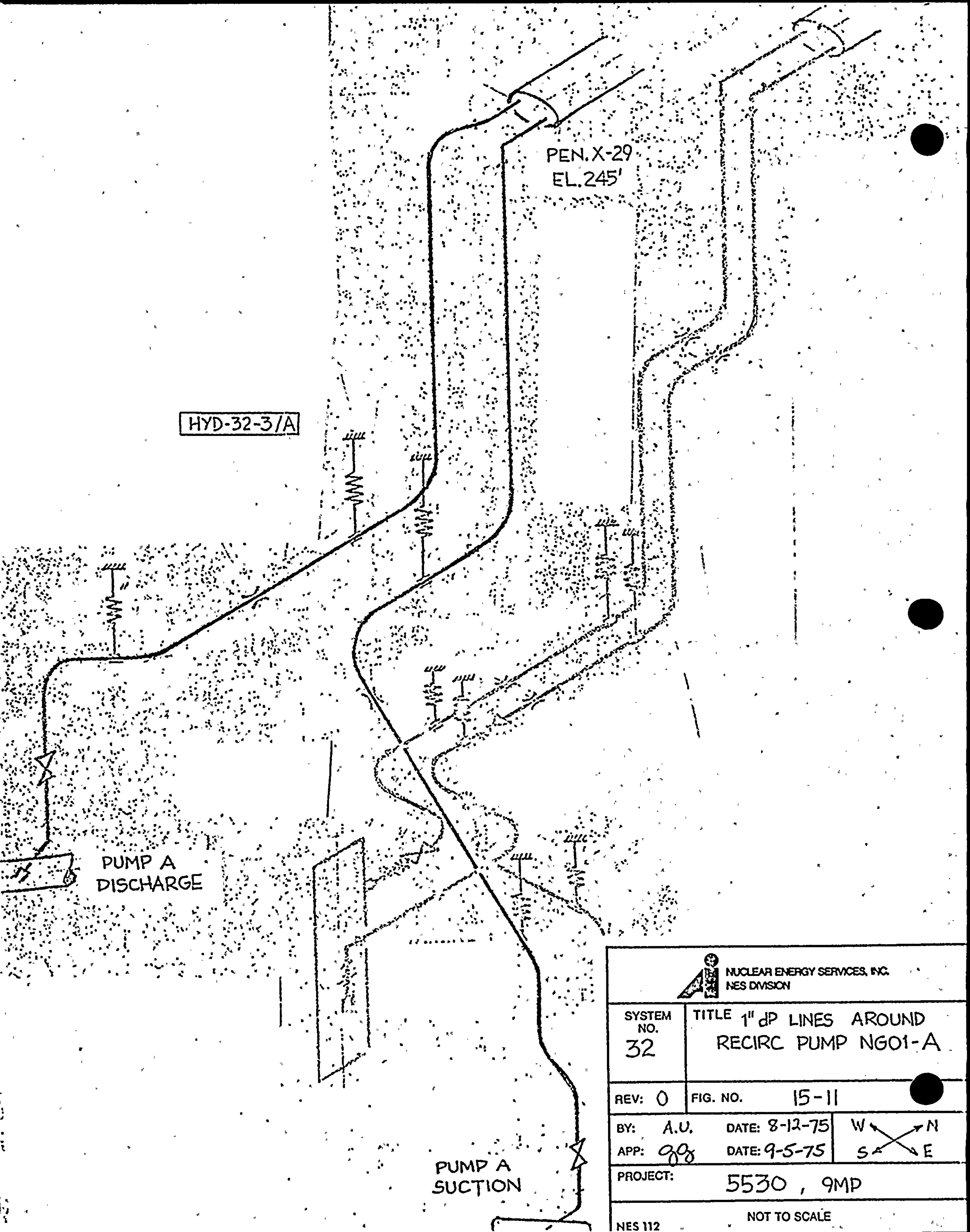
MAIN STEAM
RISER/EAST

NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 01	TITLE 1" INSTR. LINES FROM MAIN STEAM/E		
REV: 0	FIG. NO. 15-10		
BY: A.U.	DATE: 18-12-75	W N S E	
APP: ggg	DATE: 9-5-75		
PROJECT:	5530 , 9MP		

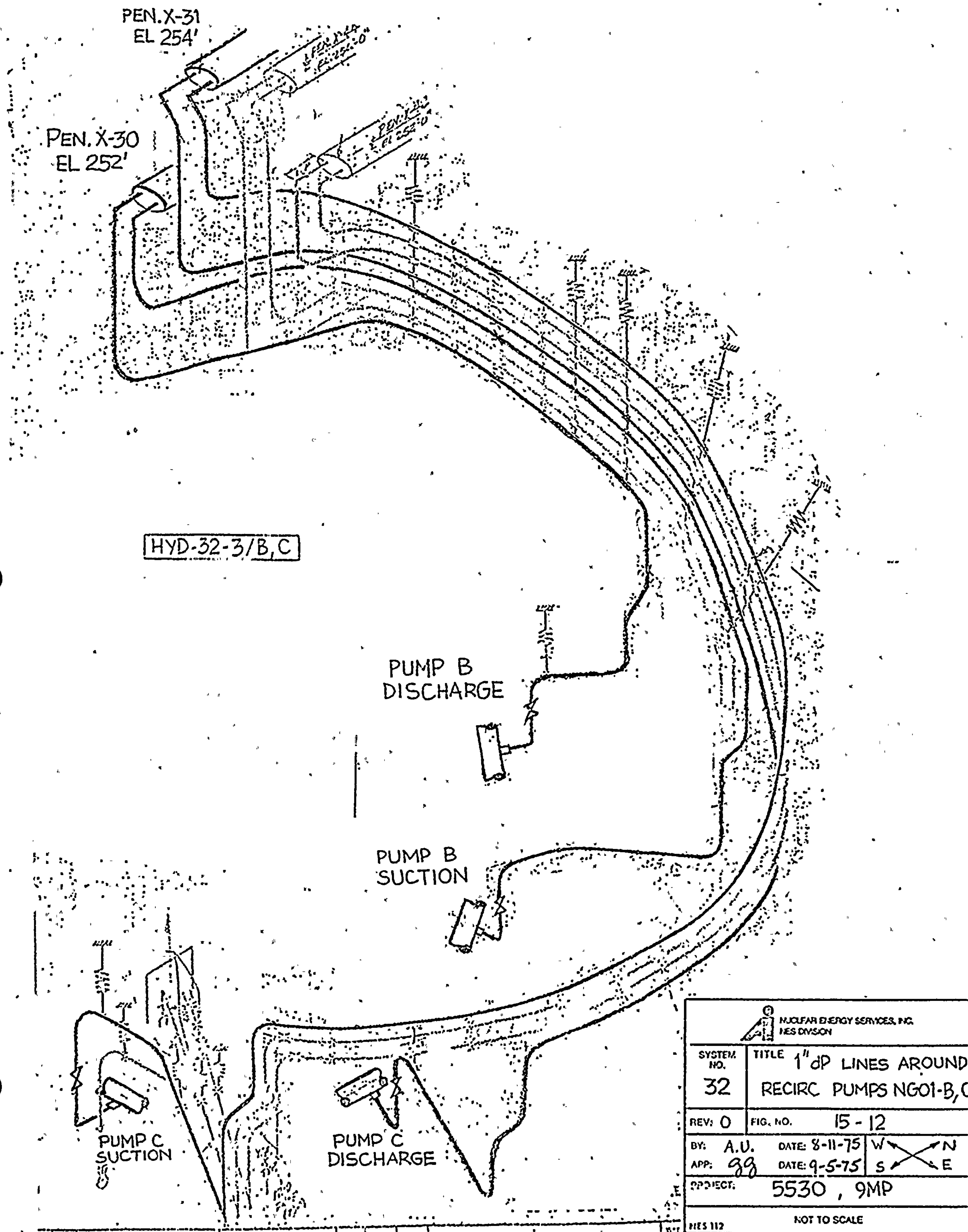
NOT TO SCALE

NES 112



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 32	TITLE 1" dP LINES AROUND RECIRC PUMP NG01-A		
REV: 0	FIG. NO. 15-11		
BY: A.U.	DATE: 8-12-75	W S N E	
APP: [illegible]	DATE: 9-5-75		
PROJECT:	5530 , 9MP		
NES 112	NOT TO SCALE		

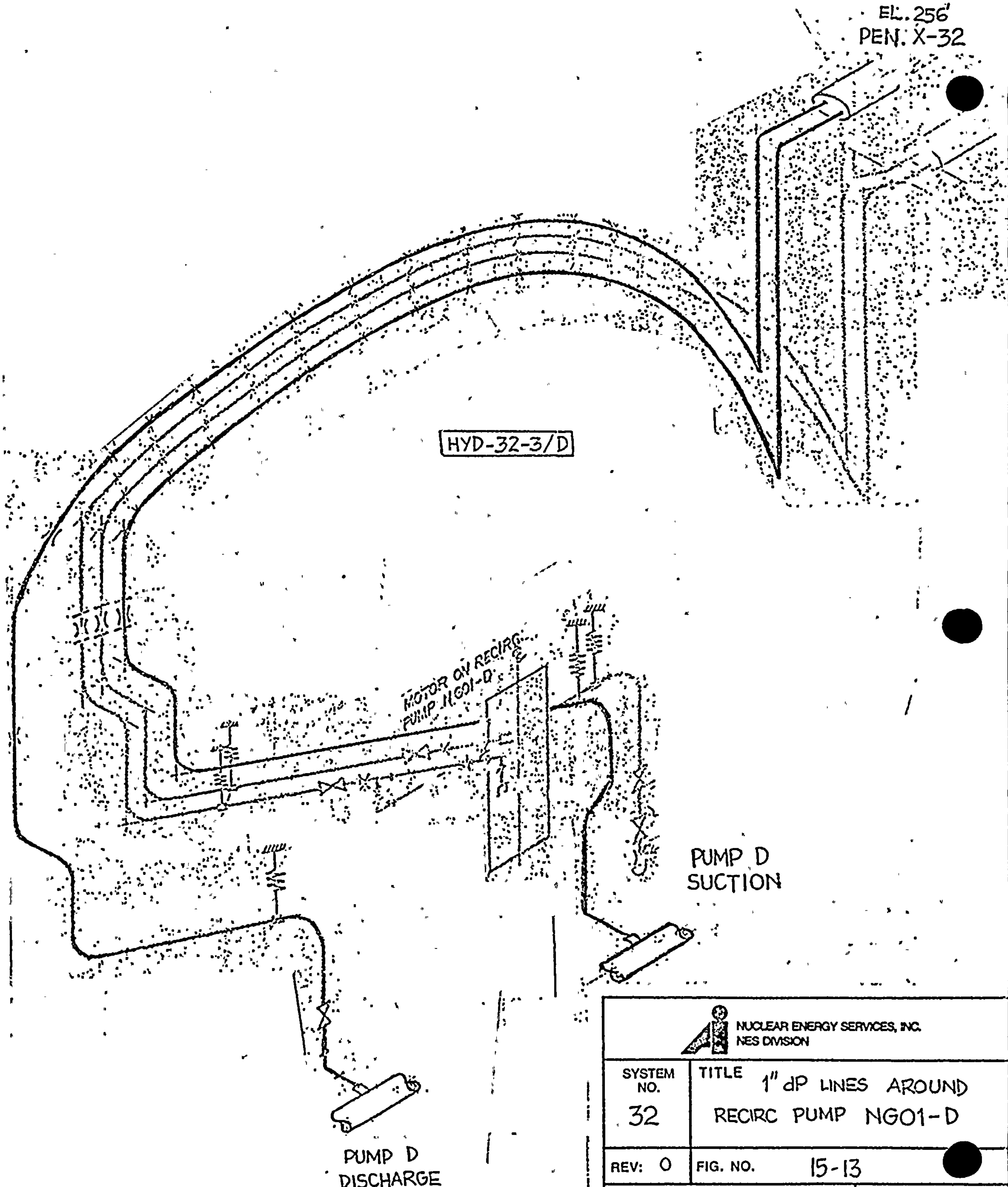


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 32	TITLE 1" dP LINES AROUND RECIRC PUMPS NG01-B,C
REV: 0	FIG. NO. 15 - 12
BY: A.U. DATE: 8-11-75	W N
APP: gg DATE: 9-5-75	S E
PROJECT:	5530 , 9MP

NOT TO SCALE

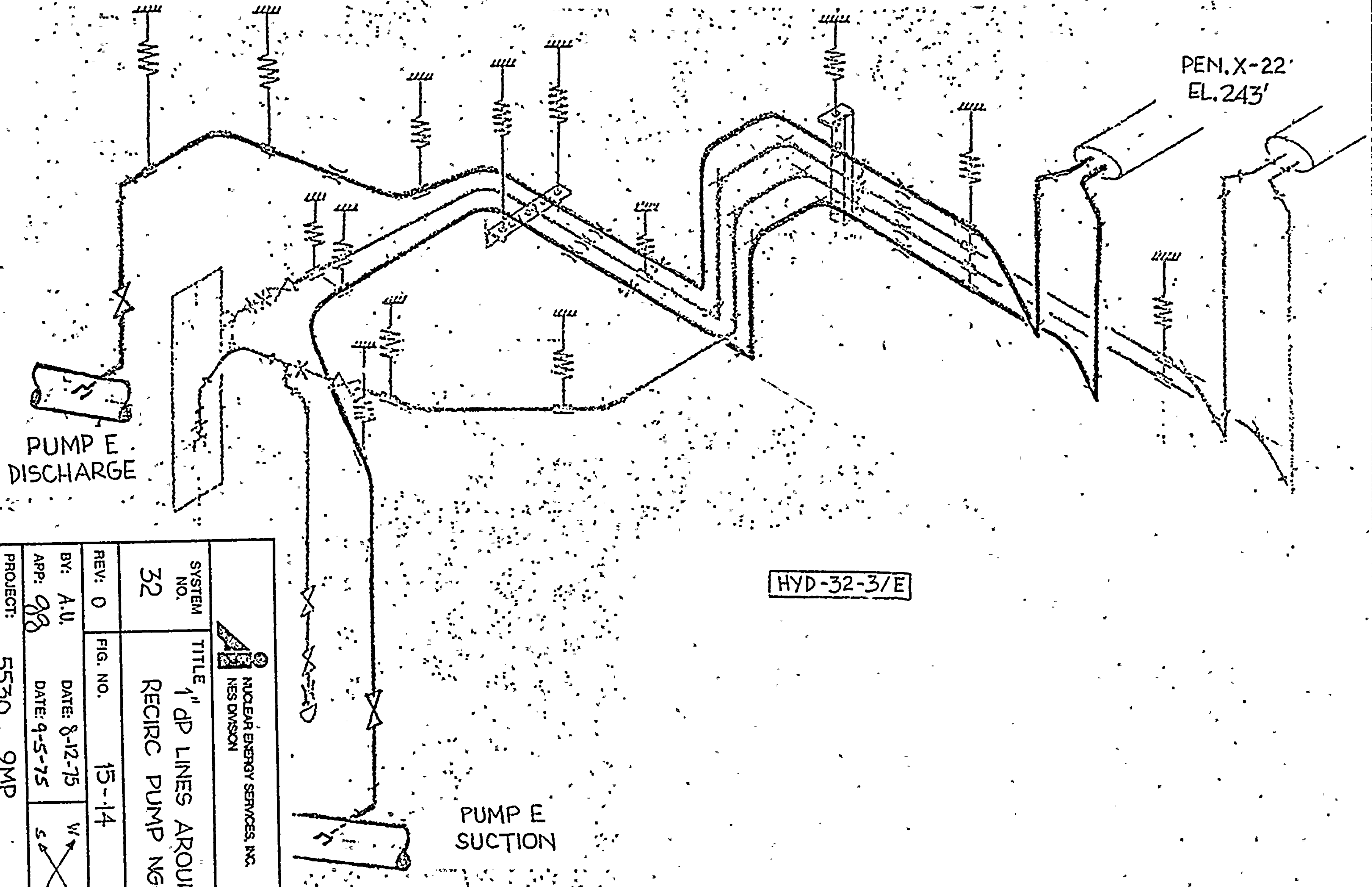
NES 112



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE	
32	1" dP LINES AROUND RECIRC PUMP NG01-D	
REV: 0	FIG. NO. 15-13	
BY: A.U.	DATE: 8-13-75	W, N, S, E
APP: [illegible]	DATE: 9-5-75	
PROJECT:	5530, 9MP	

NES 112 NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 32

TITLE 1" dP LINES AROUND RECIRC PUMP NG01-E

REV: 0

FIG. NO. 15-14

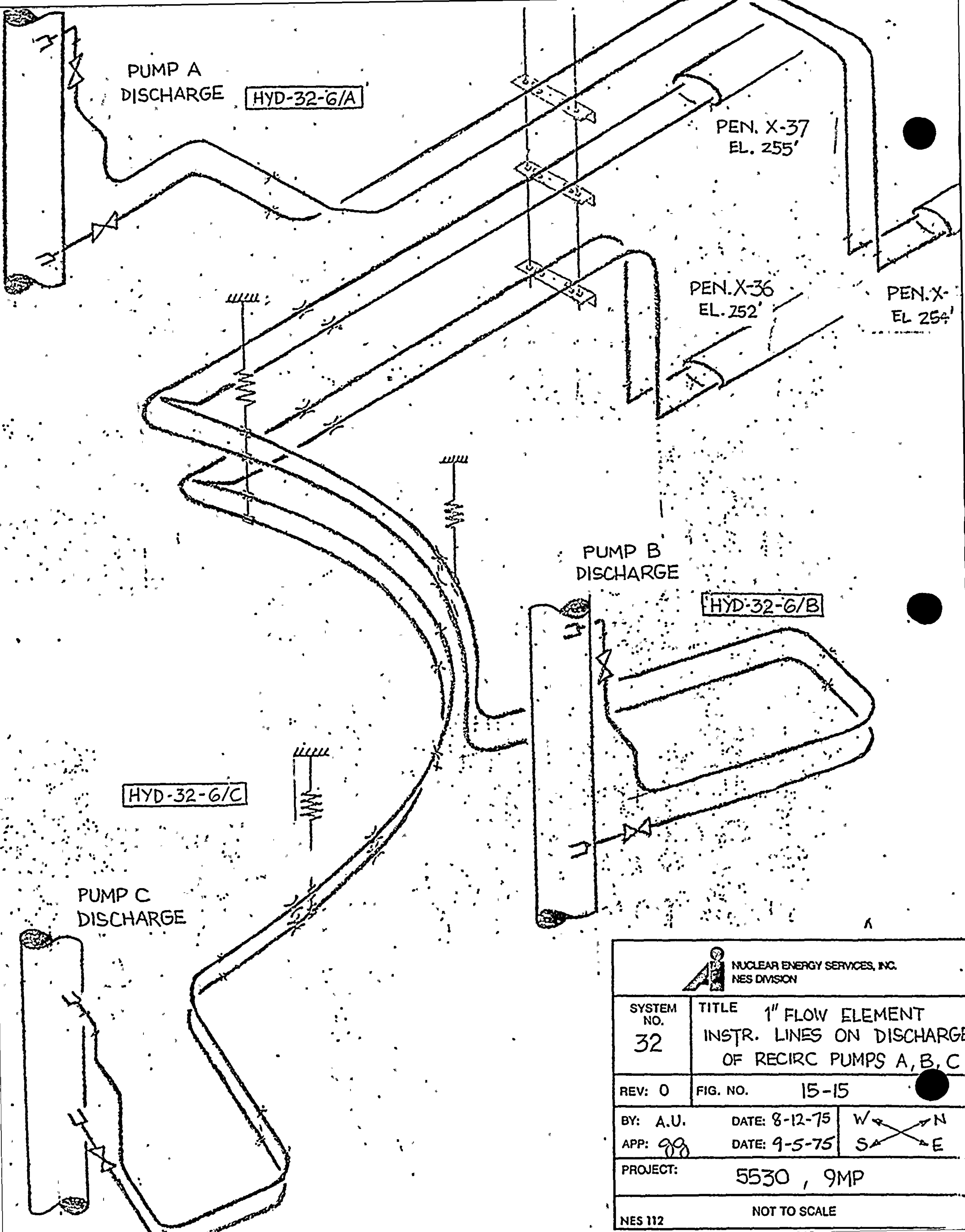
BY: A.U. DATE: 8-12-75

APP: [illegible] DATE: 9-5-75

PROJECT: 5530, 9MP

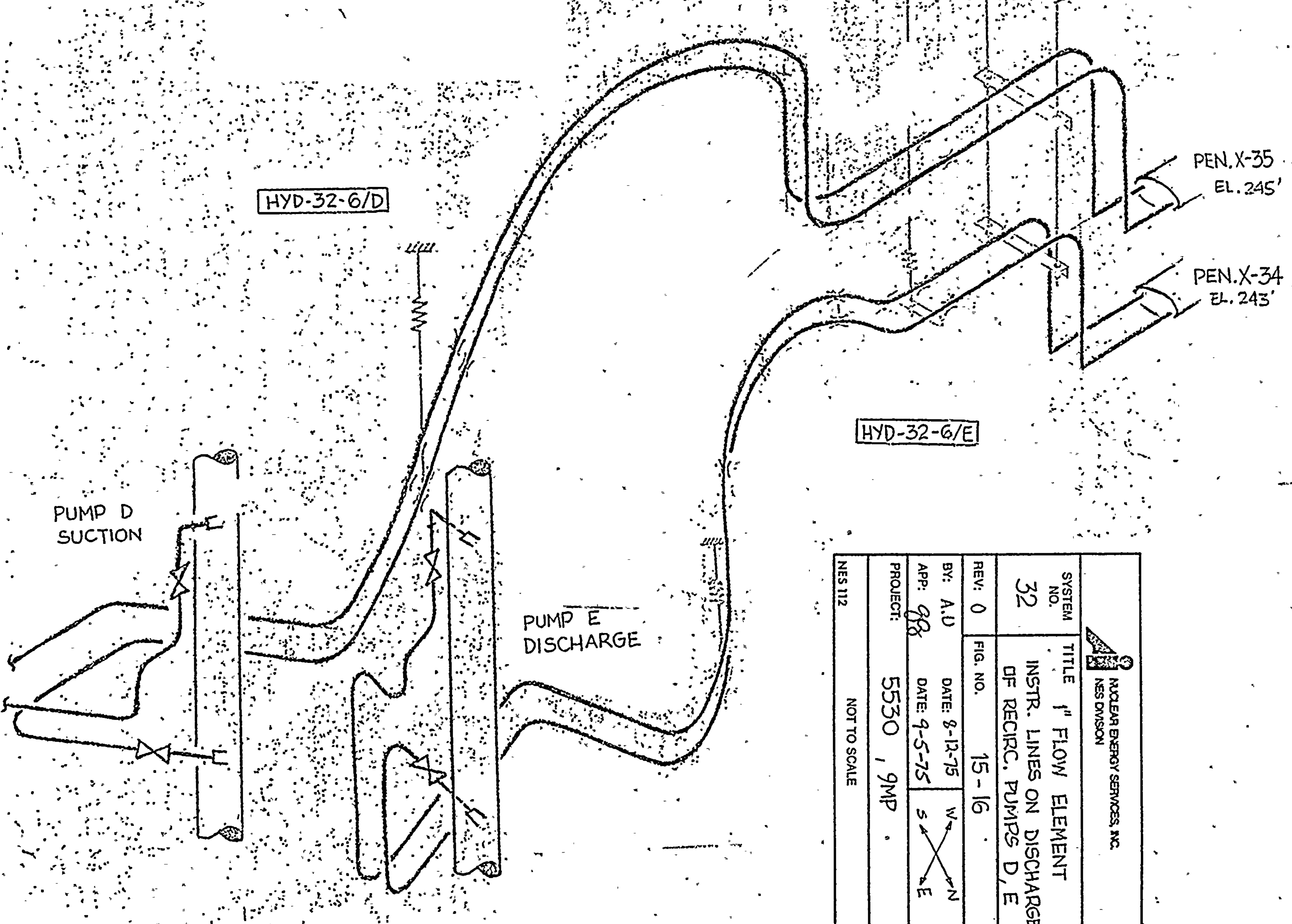
W N S E

NES 112 NOT TO SCALE

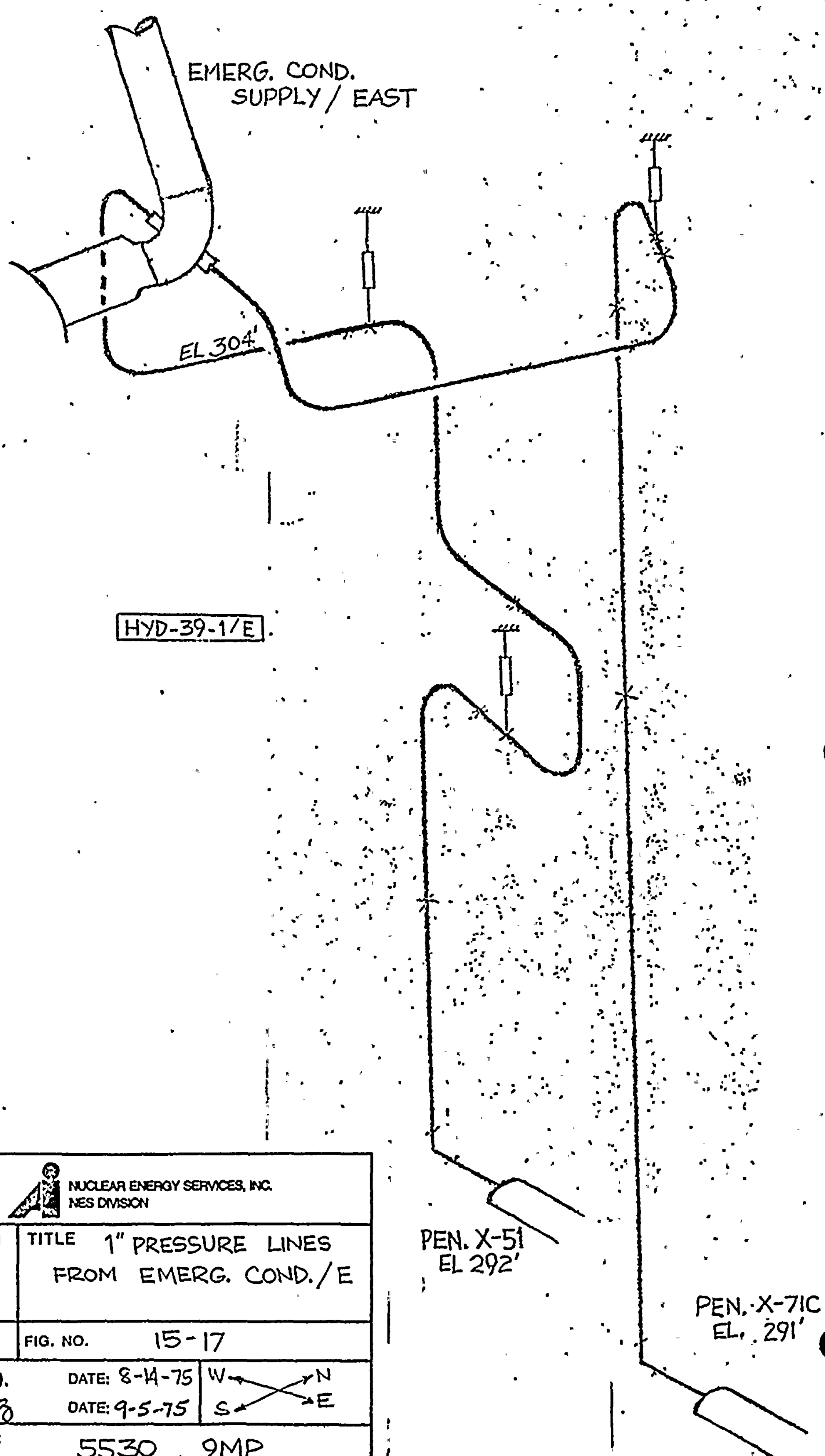


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 32	TITLE 1" FLOW ELEMENT INSTR. LINES ON DISCHARGE OF RECIRC PUMPS A, B, C	
REV: 0	FIG. NO. 15-15	
BY: A.U.	DATE: 8-12-75	W N S E
APP: gg	DATE: 9-5-75	
PROJECT:	5530, 9MP	
NES 112	NOT TO SCALE	

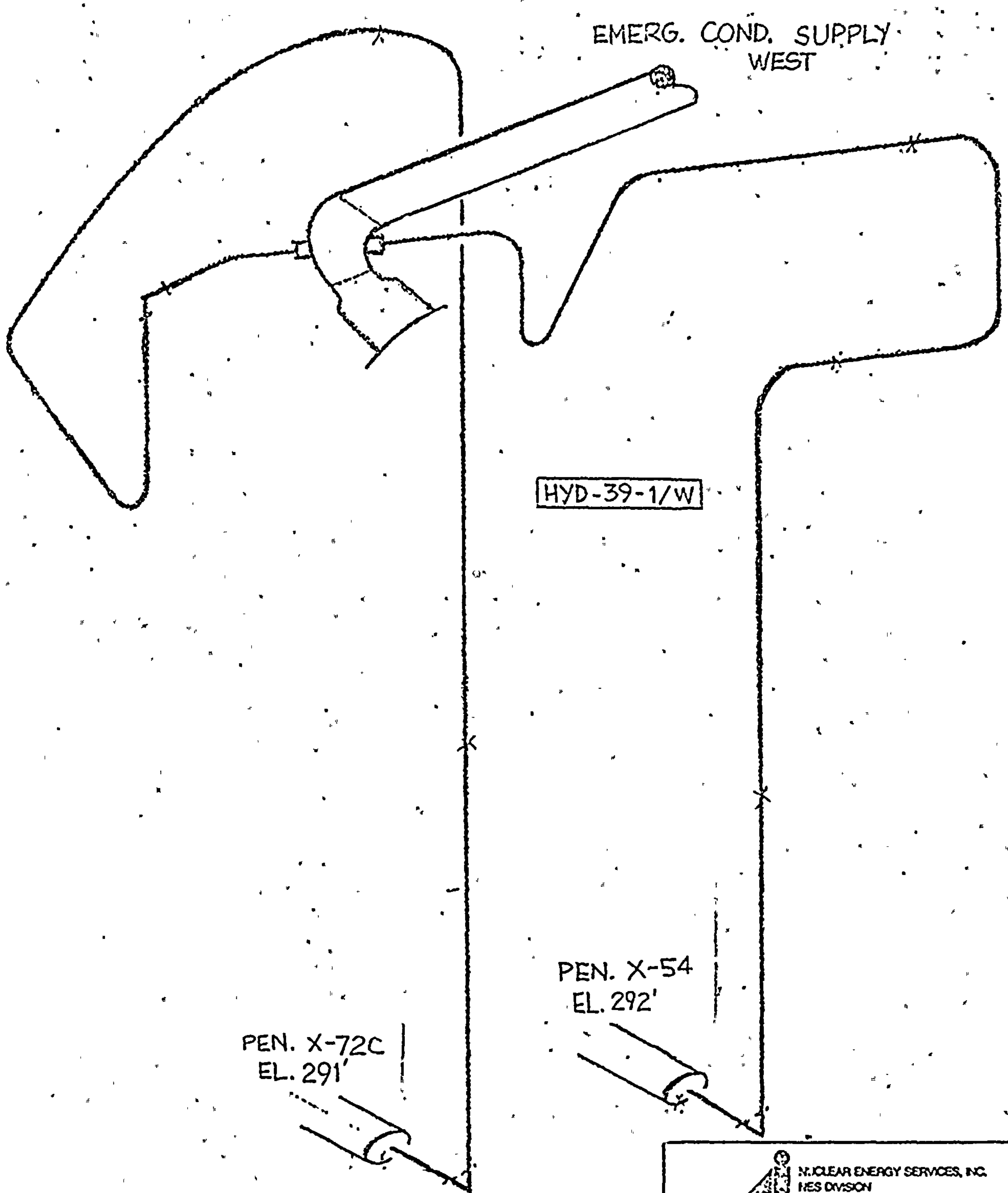


NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO. 32	TITLE 1" FLOW ELEMENT INSTR. LINES ON DISCHARGE OF RECIRC. PUMPS D, E
REV: 0	FIG. NO. 15-16
BY: A.D	DATE: 8-12-75
APP: [illegible]	DATE: 9-5-75
PROJECT: 5530, 9MP	
NES 112	NOT TO SCALE



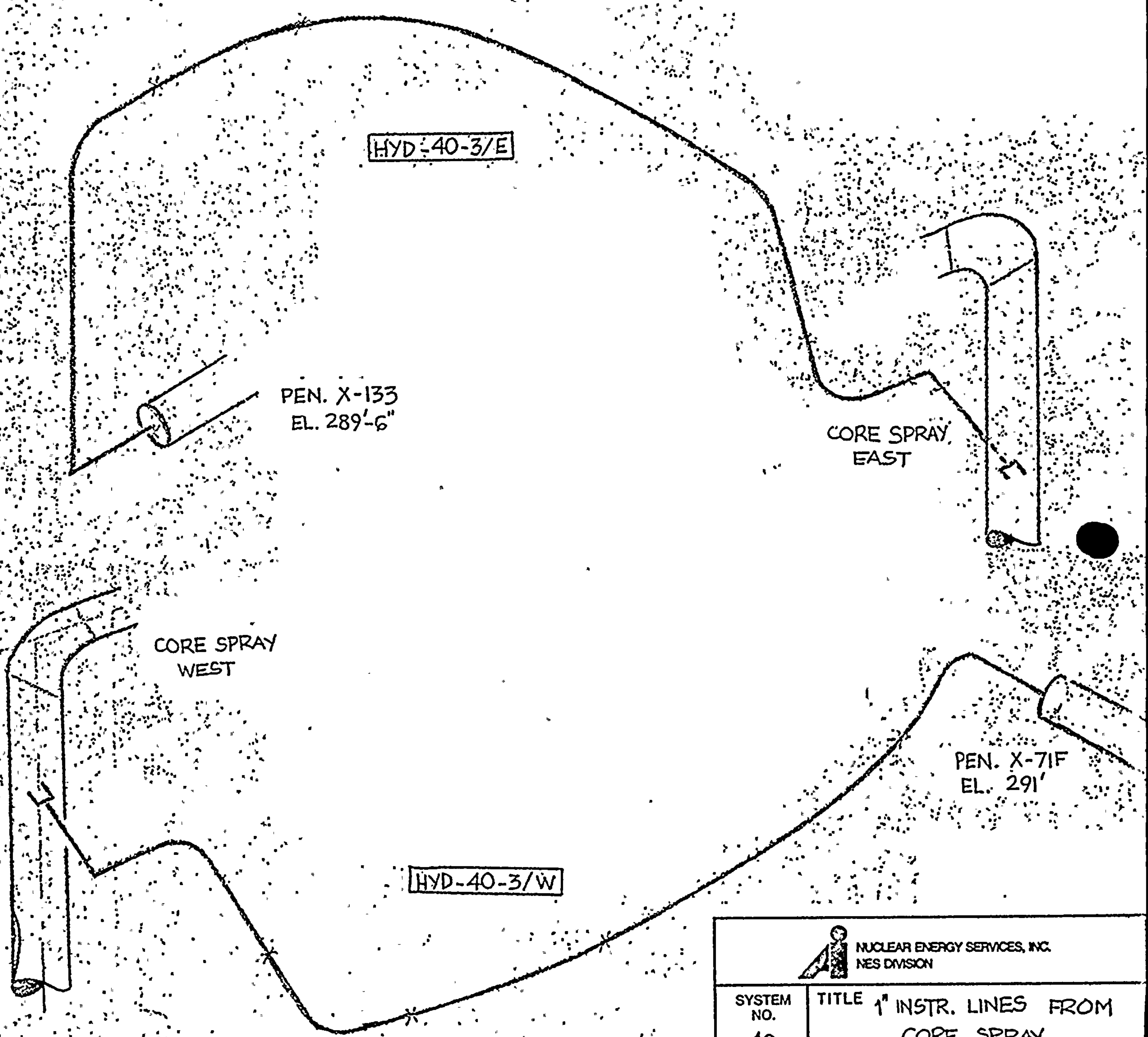
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 39	TITLE 1" PRESSURE LINES FROM EMERG. COND./E	
REV: 0	FIG. NO. 15-17	
BY: A.U. / APP: [illegible]	DATE: 8-14-75 / DATE: 9-5-75	W → E, S → N
PROJECT: 5530, 9MP		
NES 112	NOT TO SCALE	



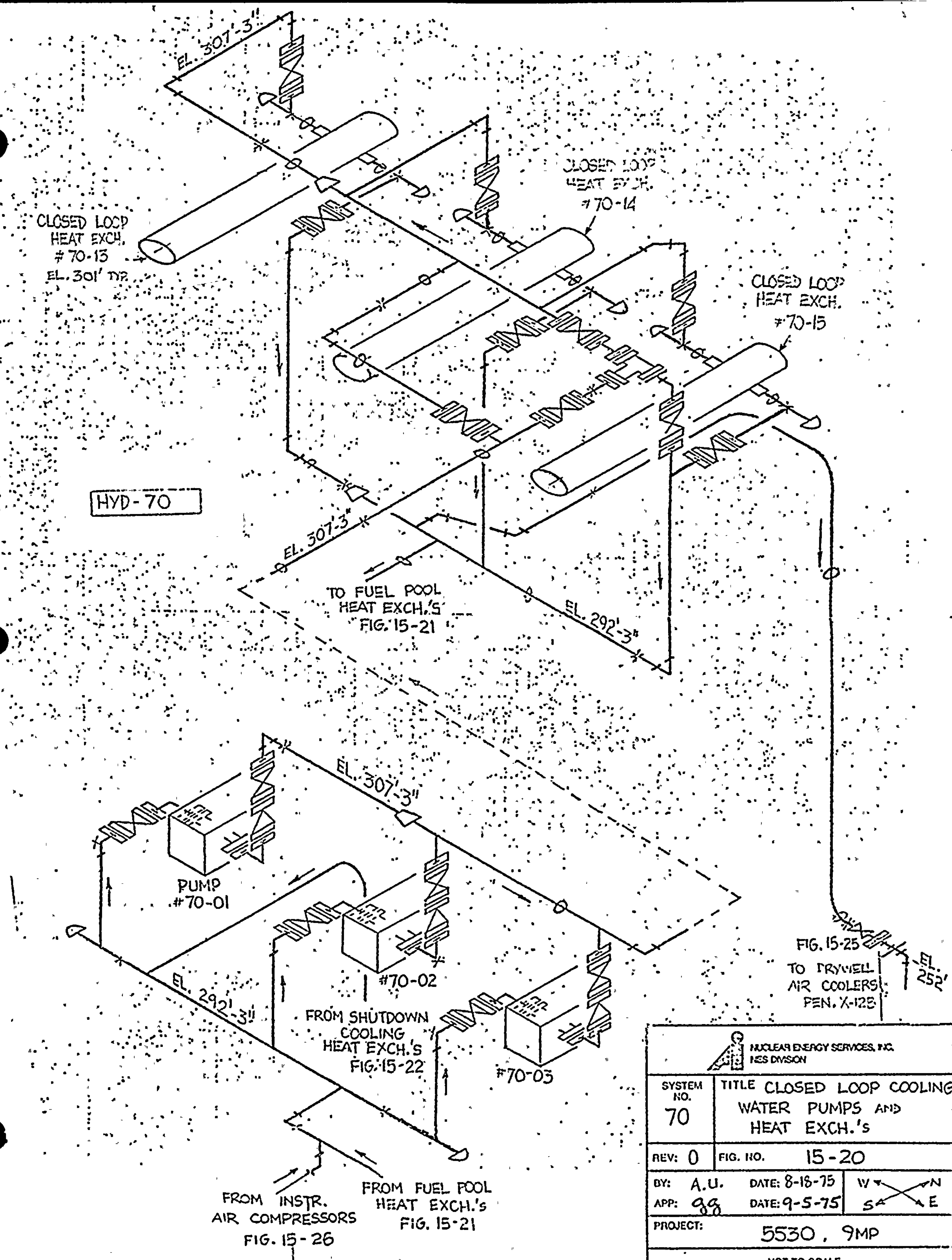
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE
39	1" PRESSURE LINES FROM EMERG. COND./W
REV: 0	FIG. NO. 15-18
BY: A.U. DATE: 8-14-75 APP: gg DATE: 9-5-75	W N S E
PROJECT:	5530 , 9MP
NES 112	NOT TO SCALE



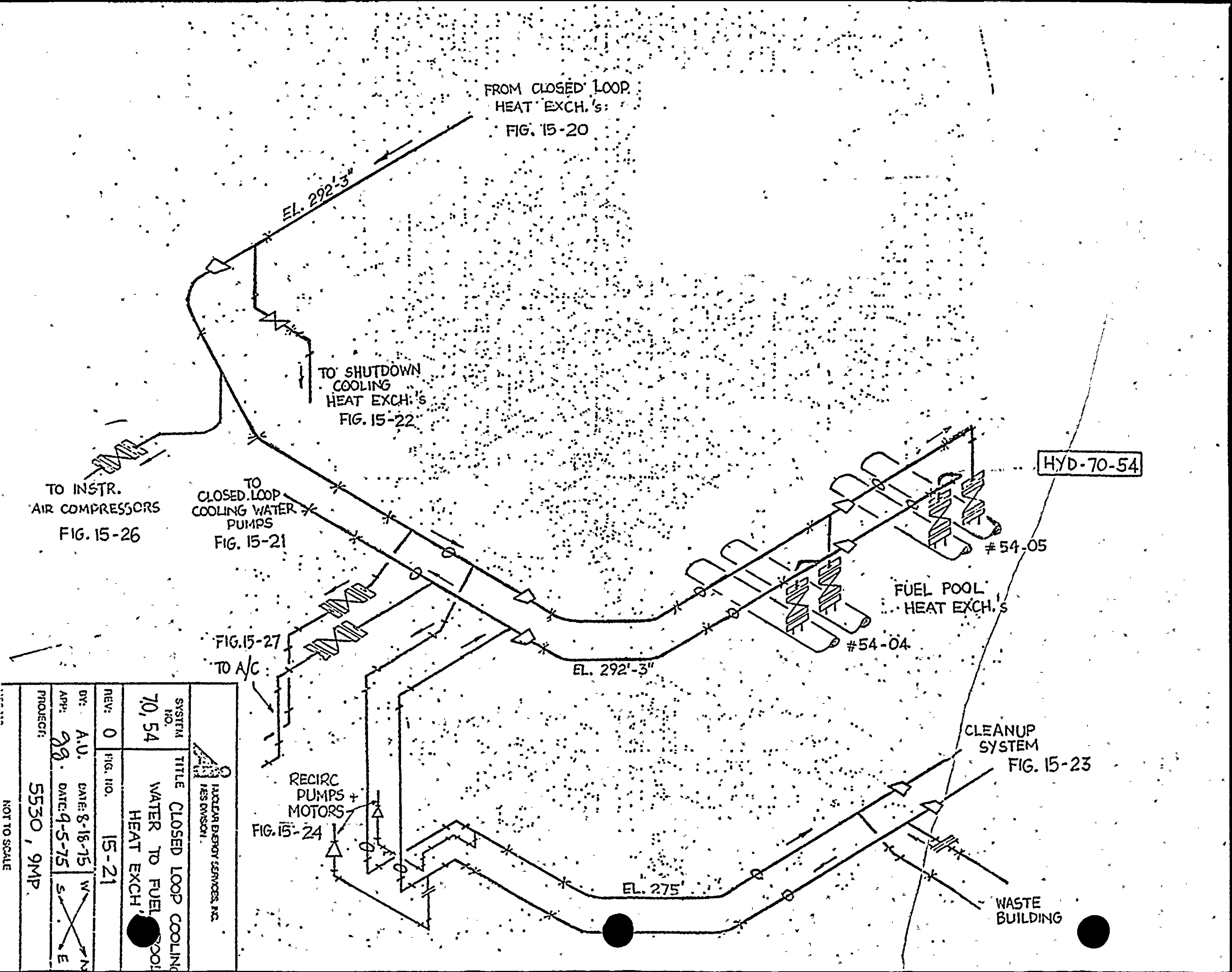
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 40	TITLE 1" INSTR. LINES FROM CORE SPRAY		
REV: 0	FIG. NO. 15-19		
BY: A.U.	DATE: 8-14-75		W N S E
APP: ЯЯ	DATE: 9-5-75		
PROJECT:	5530, 9MP		
NES 112	NOT TO SCALE		

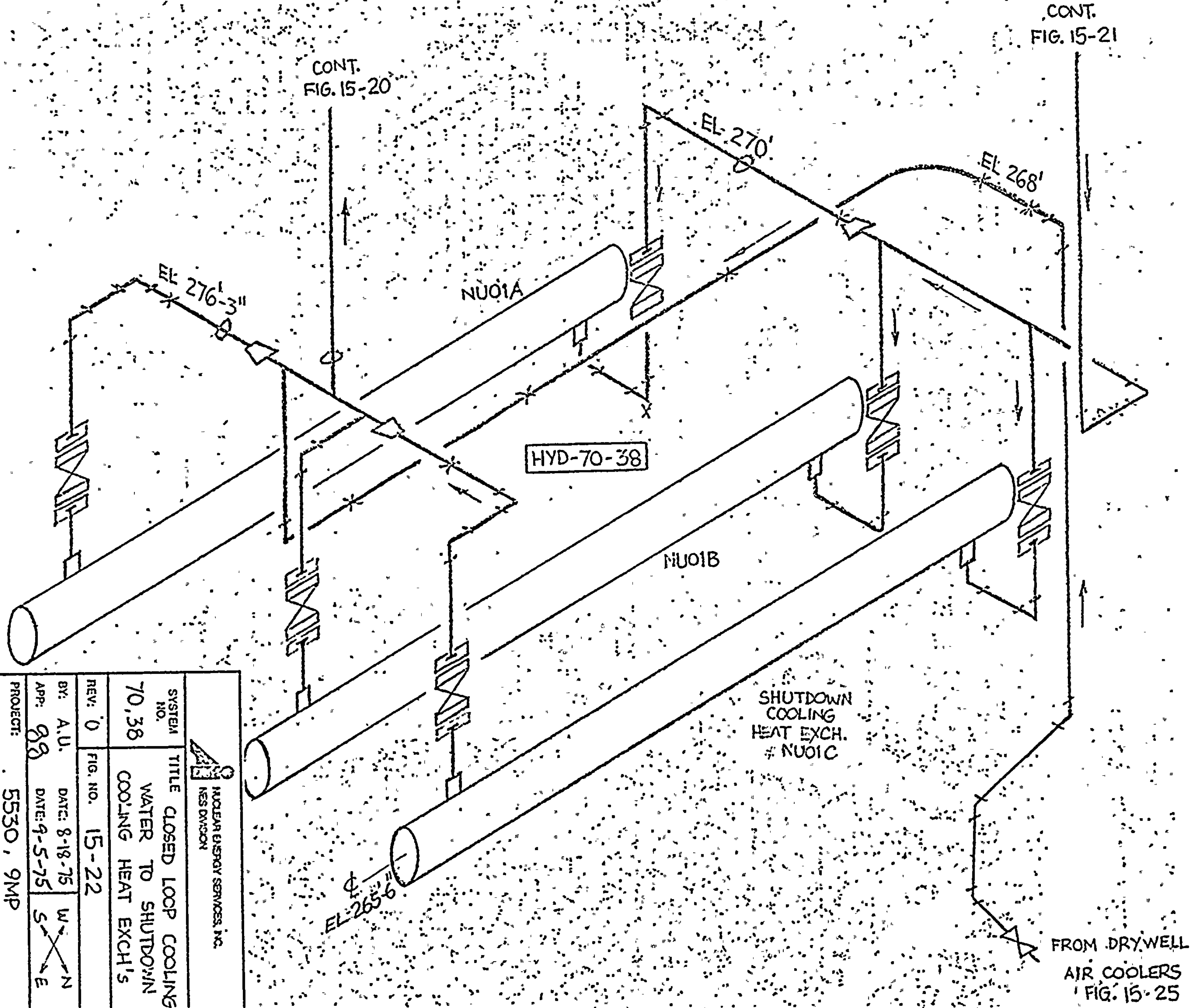


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 70	TITLE CLOSED LOOP COOLING WATER PUMPS AND HEAT EXCH.'s		
REV: 0	FIG. NO. 15-20		
BY: A.U.	DATE: 8-18-75	W N S E	
APP: gg	DATE: 9-5-75		
PROJECT:	5530, 9MP		
NES 112	NOT TO SCALE		



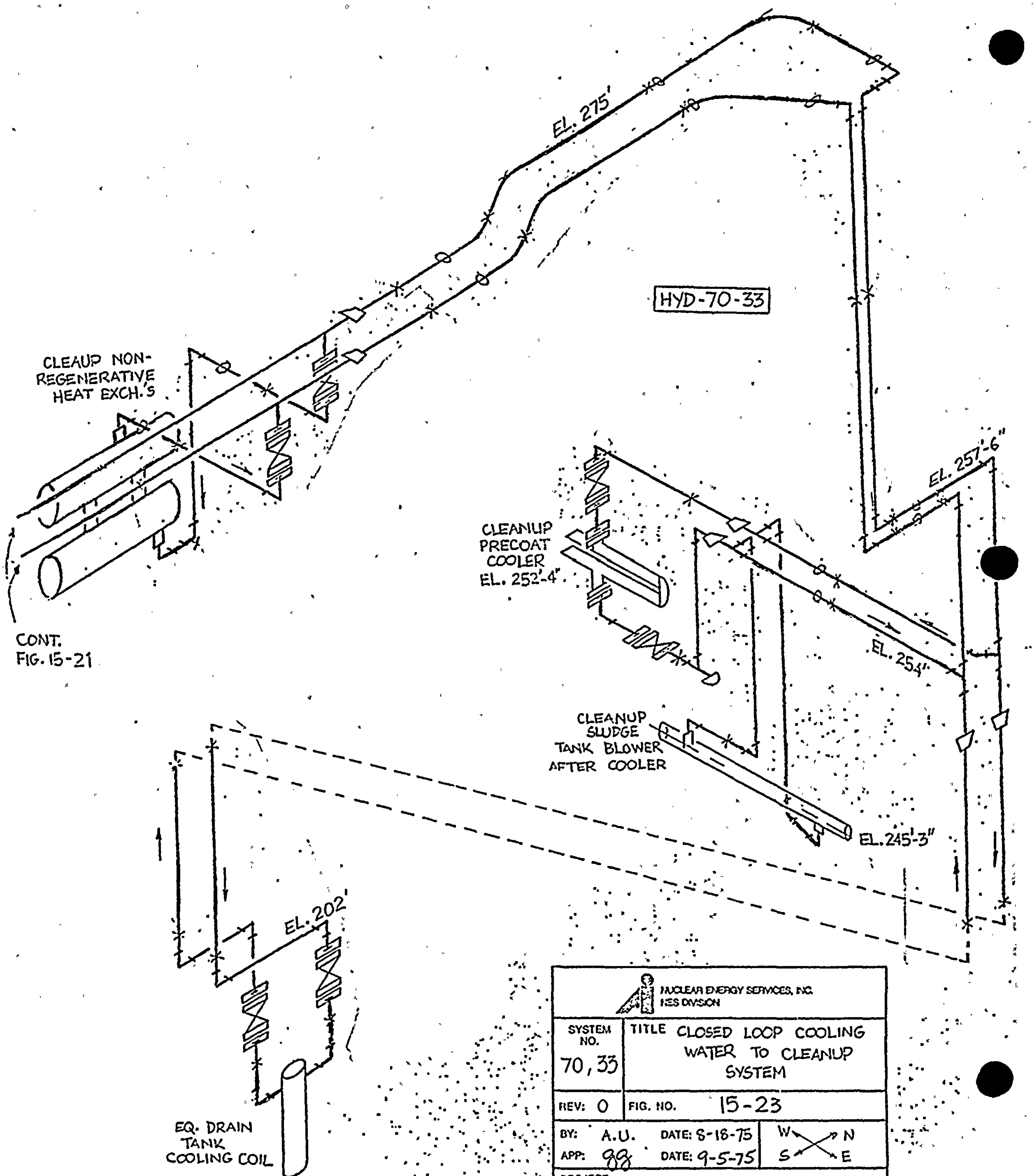
FROM CLOSED LOOP HEAT EXCH.'s: FIG. 15-20
EL. 292'-3"
TO SHUTDOWN COOLING HEAT EXCH.'s FIG. 15-22
TO INSTR. AIR COMPRESSORS FIG. 15-26
TO CLOSED LOOP COOLING WATER PUMPS FIG. 15-21
HYD-70-54
#54-05
FUEL POOL HEAT EXCH.'s
#54-04
FIG.15-27
TO A/C
EL. 292'-3"
CLEANUP SYSTEM FIG. 15-23
RECIRC PUMPS + MOTORS
FIG. 15-24
EL. 275'
WASTE BUILDING
NUCLEAR ENERGY SERVICES, INC. NES DIVISION
SYSTEM NO. 70, 54
TITLE CLOSED LOOP COOLIN
WATER TO FUEL
HEAT EXCH
REV: 0
FIG. NO. 15-21
BY: A.U. DATE: 8-18-75
APP: DATE: 9-5-75
PROJECT: 5530, 9MP
W N S E
NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

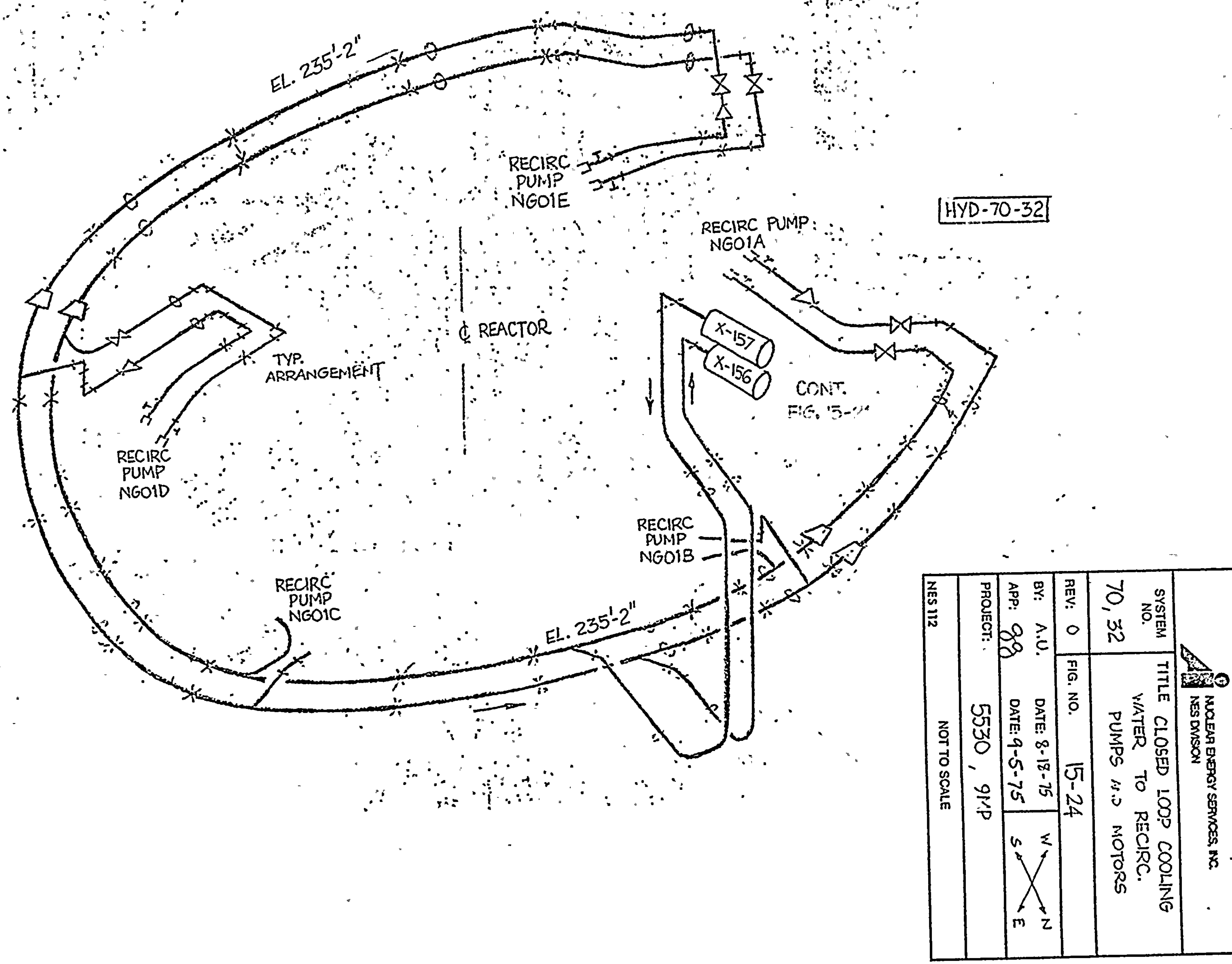
SYSTEM NO. 70,38	TITLE CLOSED LOOP COOLING WATER TO SHUTDOWN COOLING HEAT EXCH'S
REV: 0	FIG. NO. 15-22
BY: A.U. DATE: 8-18-75	W N S E
APP: 88 DATE: 9-5-75	
PROJECT: 5530, 9MP	

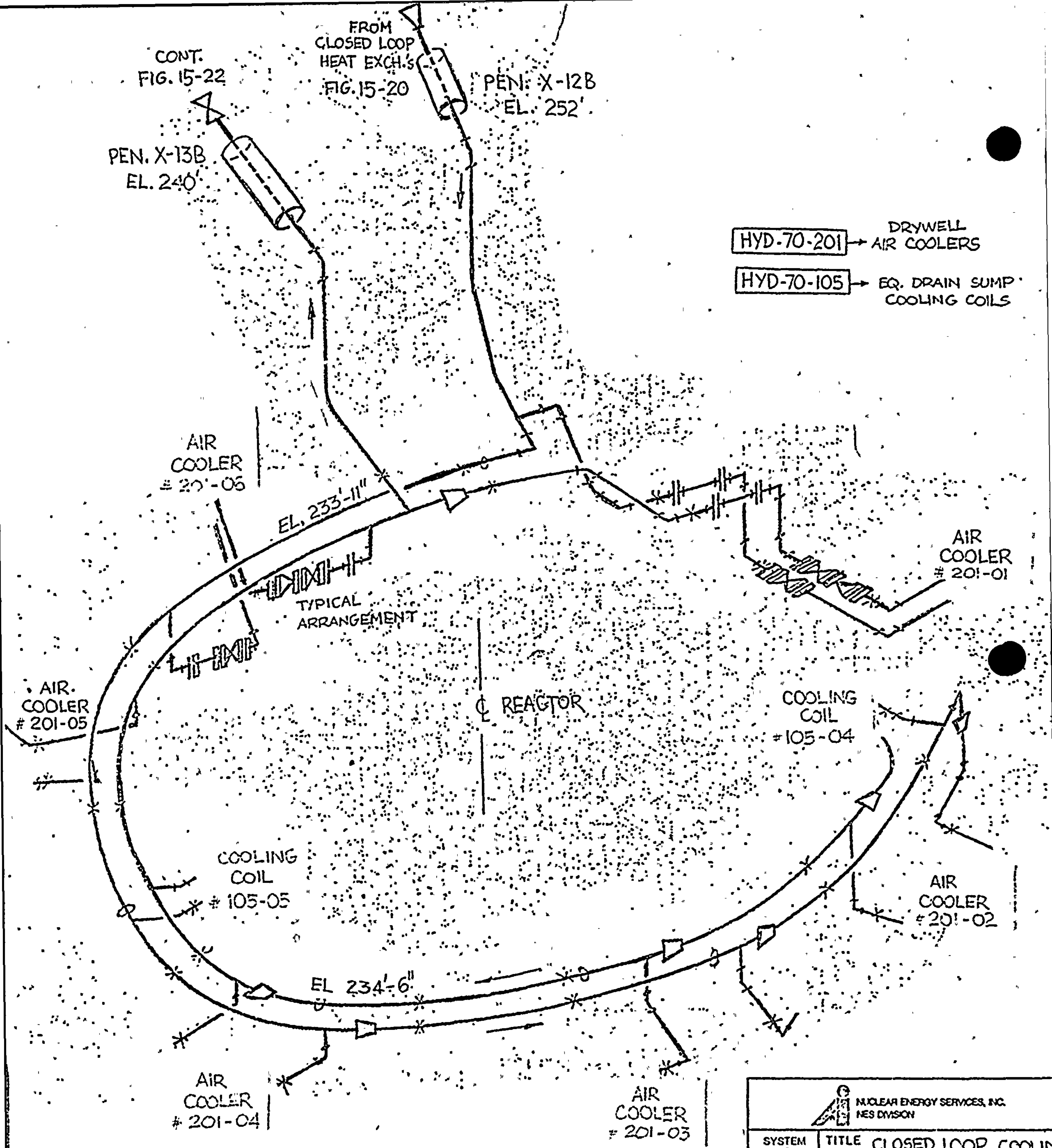
NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE CLOSED LOOP COOLING WATER TO CLEANUP SYSTEM
70, 33	
REV: 0	FIG. NO. 15-23
BY: A.U. DATE: 8-18-75	W N S E
APP: gg DATE: 9-5-75	
PROJECT:	5530, 9MP
NES 112	NOT TO SCALE

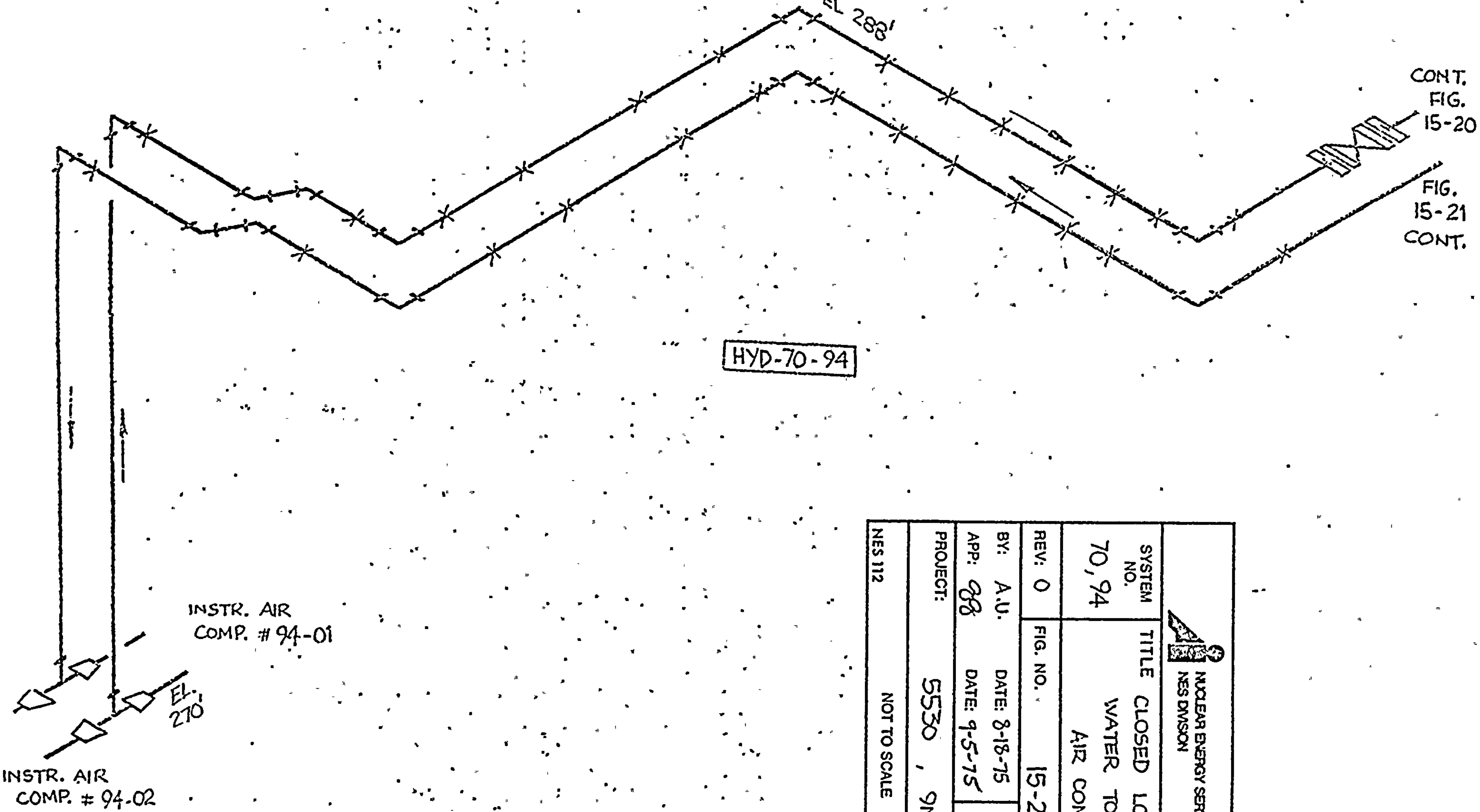

EL. 235'-2"
RECIRC PUMP NG01E
HYD-70-32
RECIRC PUMP NG01A
X-157
X-156
CONT. FIG. 15-24
℄ REACTOR
TYP. ARRANGEMENT
RECIRC PUMP NG01D
RECIRC PUMP NG01B
RECIRC PUMP NG01C
EL. 235'-2"
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION
TITLE CLOSED LOOP COOLING WATER TO RECIRC. PUMPS AND MOTORS
SYSTEM NO. 70, 32
REV: 0
FIG. NO. 15-24
BY: A.U. DATE: 8-18-75
APP: DATE: 9-5-75
W N S E
PROJECT: 5530, 91P
NES 112
NOT TO SCALE



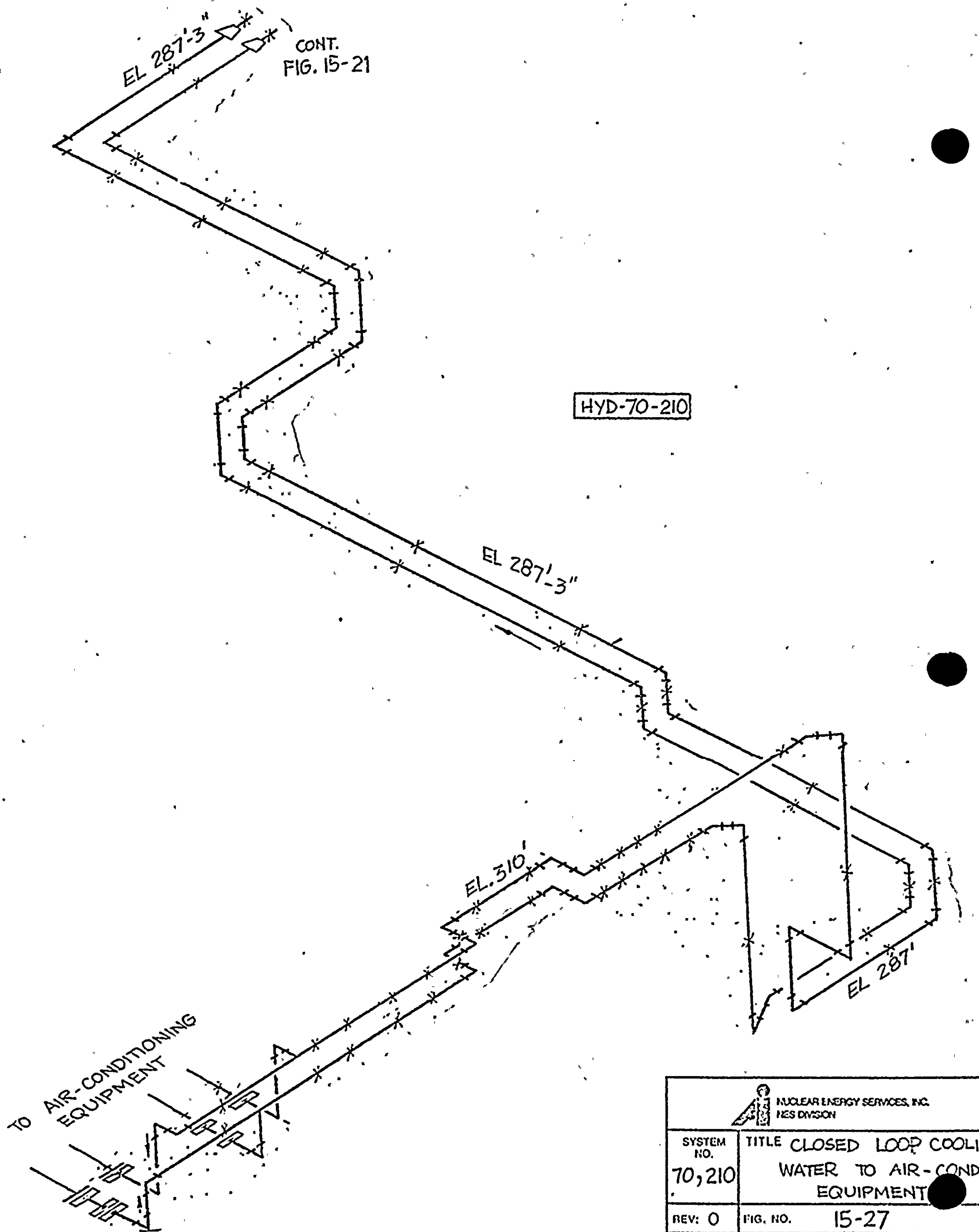
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE CLOSED LOOP COOLIN WATER TO AIR LE AND EQ. DRAIN UMP	
70, 201 105		
REV: 0	FIG. NO.	15-25
BY: A.U.	DATE: 8-18-75	W N S E
APP: 98	DATE: 9-5-75	
PROJECT:	5530, 9MP	

NOT TO SCALE

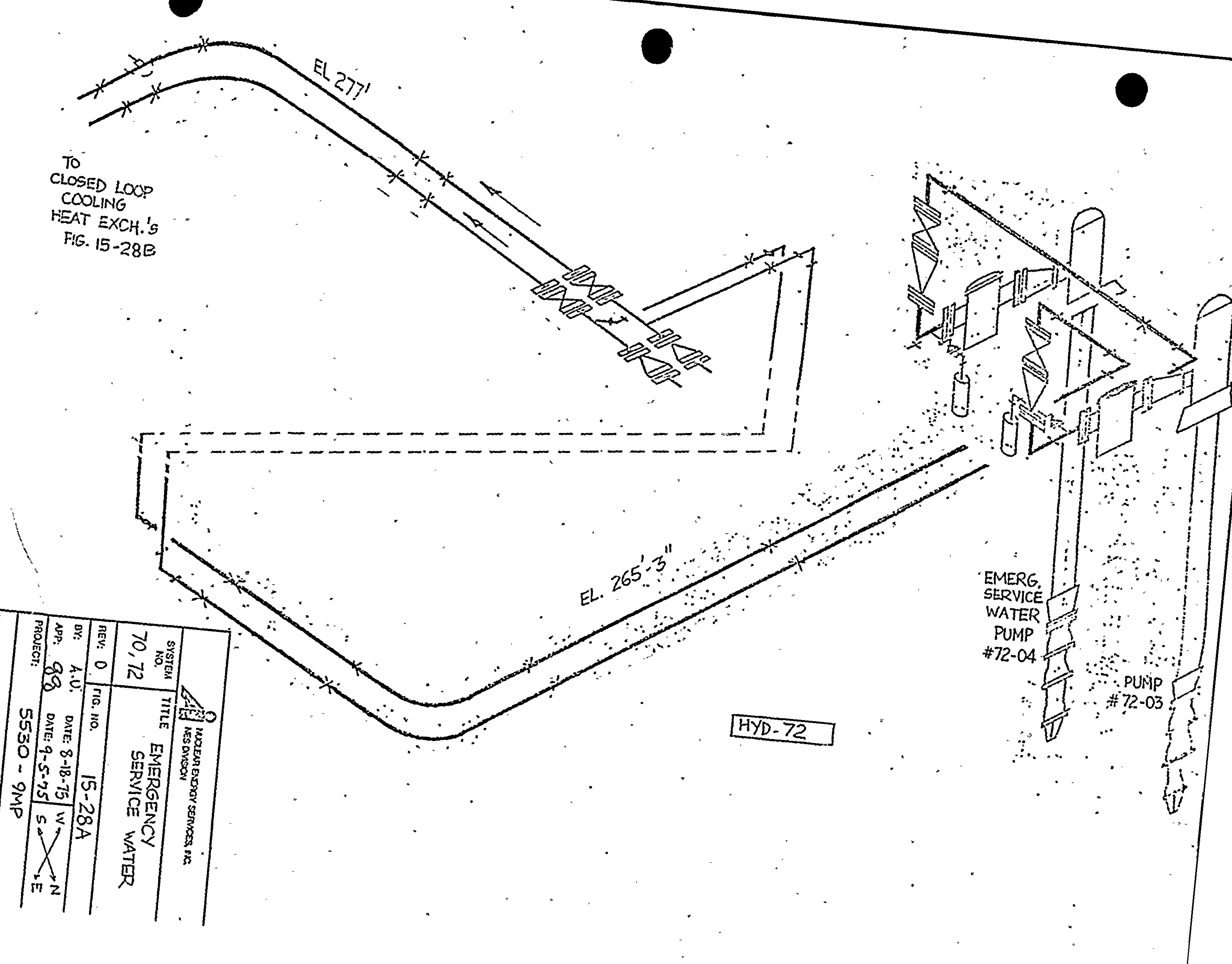


NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO. 70, 94	TITLE CLOSED LOOP COOLING WATER TO INSTR. AIR COMPRESSORS
REV: 0	FIG. NO. 15-26
BY: A.U. DATE: 8-18-75	W N S E
APP: [illegible] DATE: 9-5-75	
PROJECT: 5530, 9MP	
NES 112	NOT TO SCALE

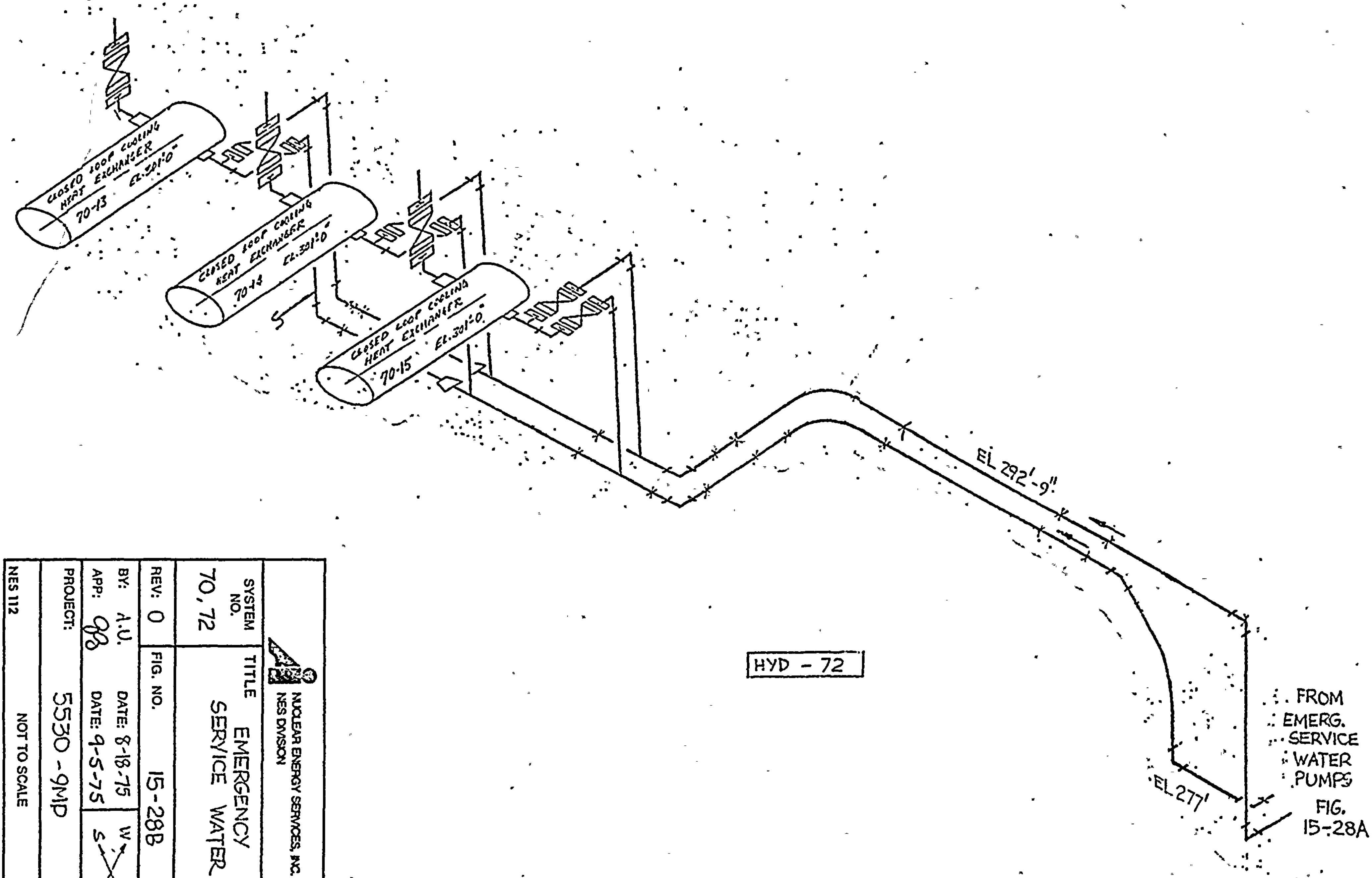


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 70,210	TITLE CLOSED LOOP COOLIN WATER TO AIR-COND. EQUIPMENT		
REV: 0	FIG. NO. 15-27		
BY: A.U.	DATE: 8-18-75	W N S E	
APP: gg	DATE: 9-5-75		
PROJECT:	5530 , 9MP		
NES 112	NOT TO SCALE		



EL 277'
TO CLOSED LOOP COOLING HEAT EXCH.'s FIG. 15-28B
EL. 265'-3"
EMERG. SERVICE WATER PUMP #72-04
PUMP #72-03
HYD-72
NUCLEAR ENERGY SERVICES, INC. NES DIVISION
SYSTEM NO. 70, 72
TITLE EMERGENCY SERVICE WATER
REV: 0
FIG. NO. 15-28A
BY: A.U. DATE: 8-18-75
APP: DATE: 9-5-75
PROJECT: 5530 - 9MP
N W S E

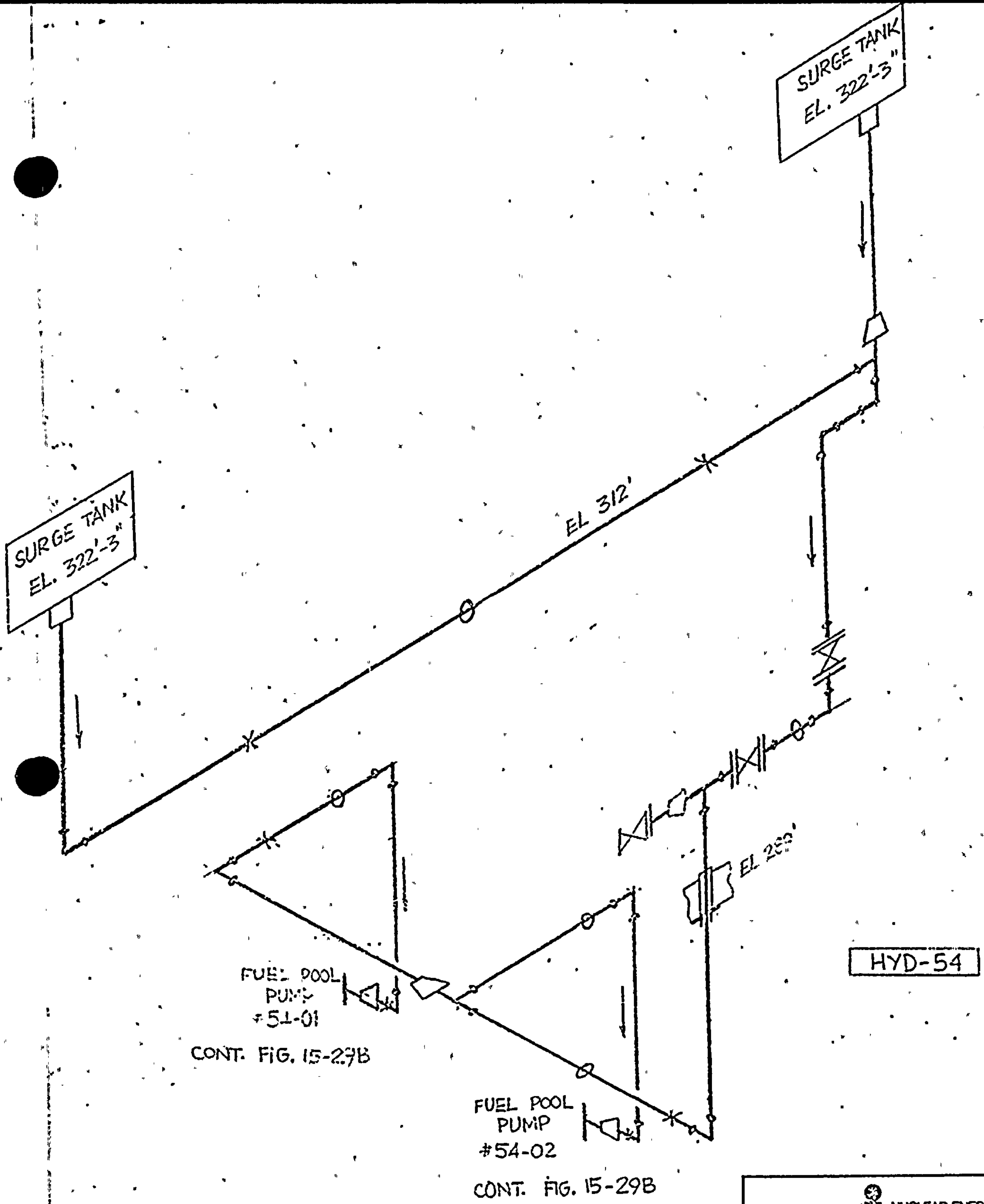


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 70, 72	TITLE EMERGENCY SERVICE WATER
REV: 0	FIG. NO. 15-28B
BY: A.U. DATE: 8-18-75	
APP: DATE: 9-5-75	
PROJECT: 5530-9MP	

NES 112

NOT TO SCALE

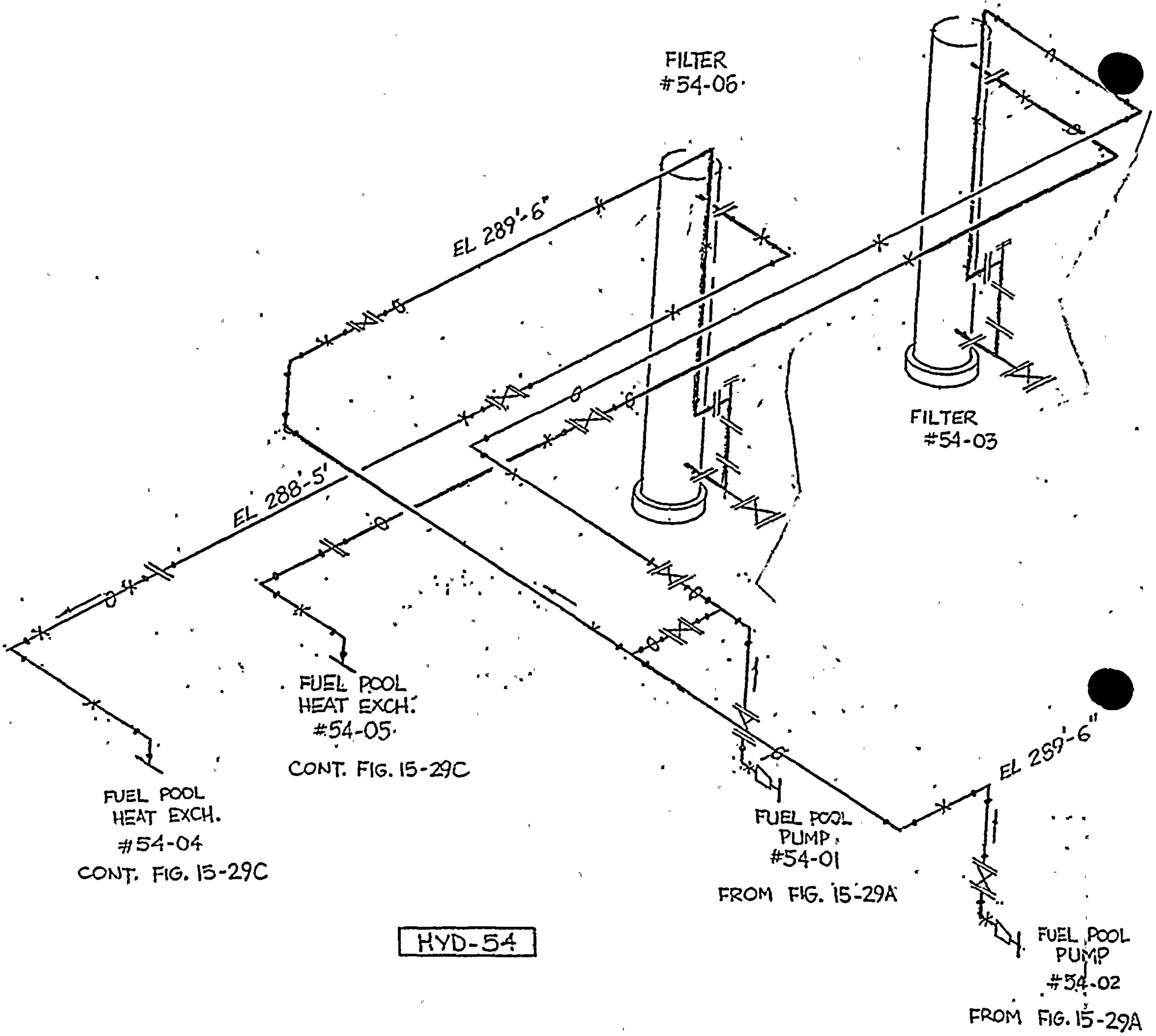


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 54	TITLE FUEL POOL HYD-54	
REV: 0	FIG. NO. 15-29A	
BY: A.U.	DATE: 8-18-75	W N S E
APP: [illegible]	DATE: 9-5-75	
PROJECT:	5530 - 9MP	

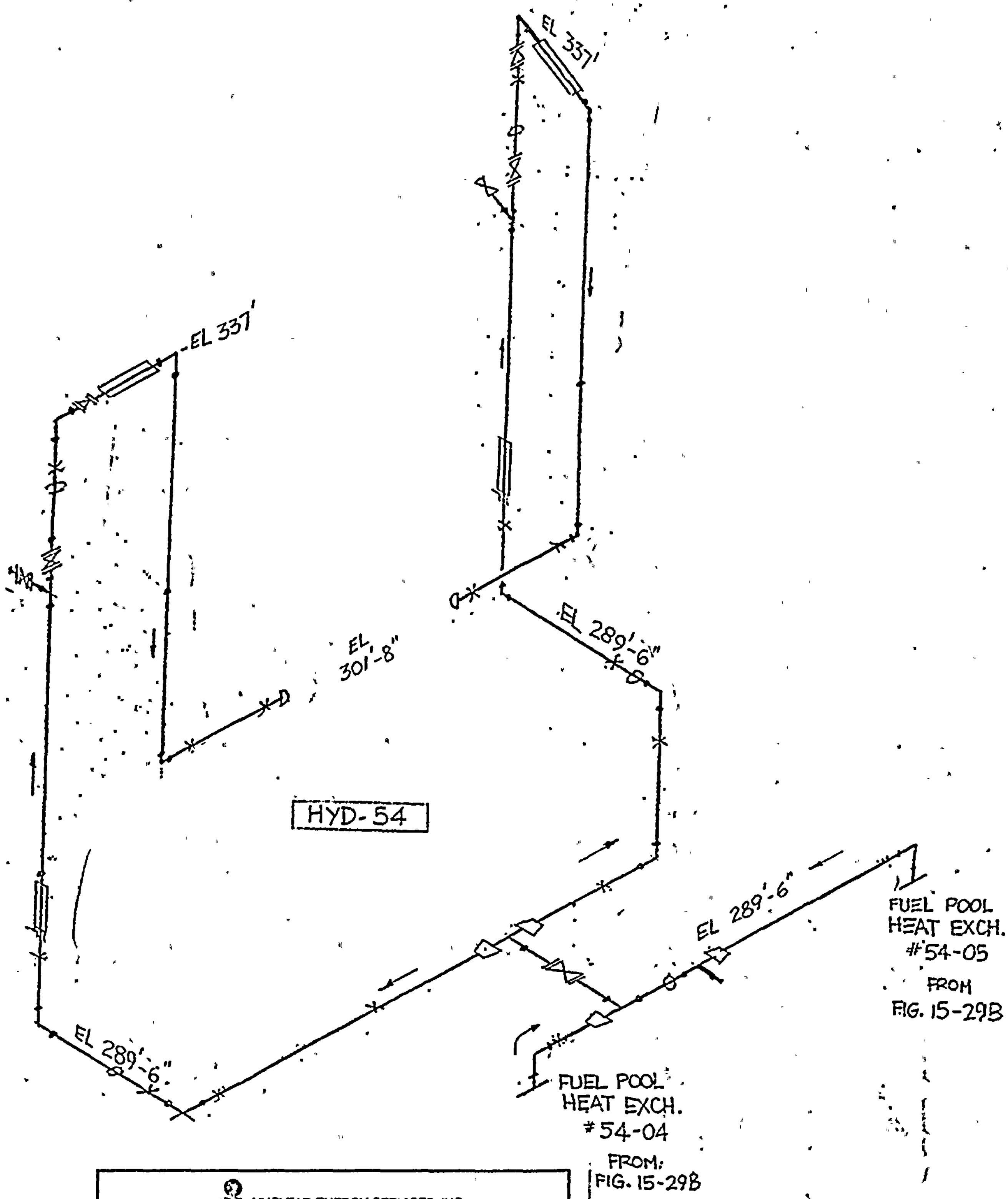
NES 112

NOT TO SCALE



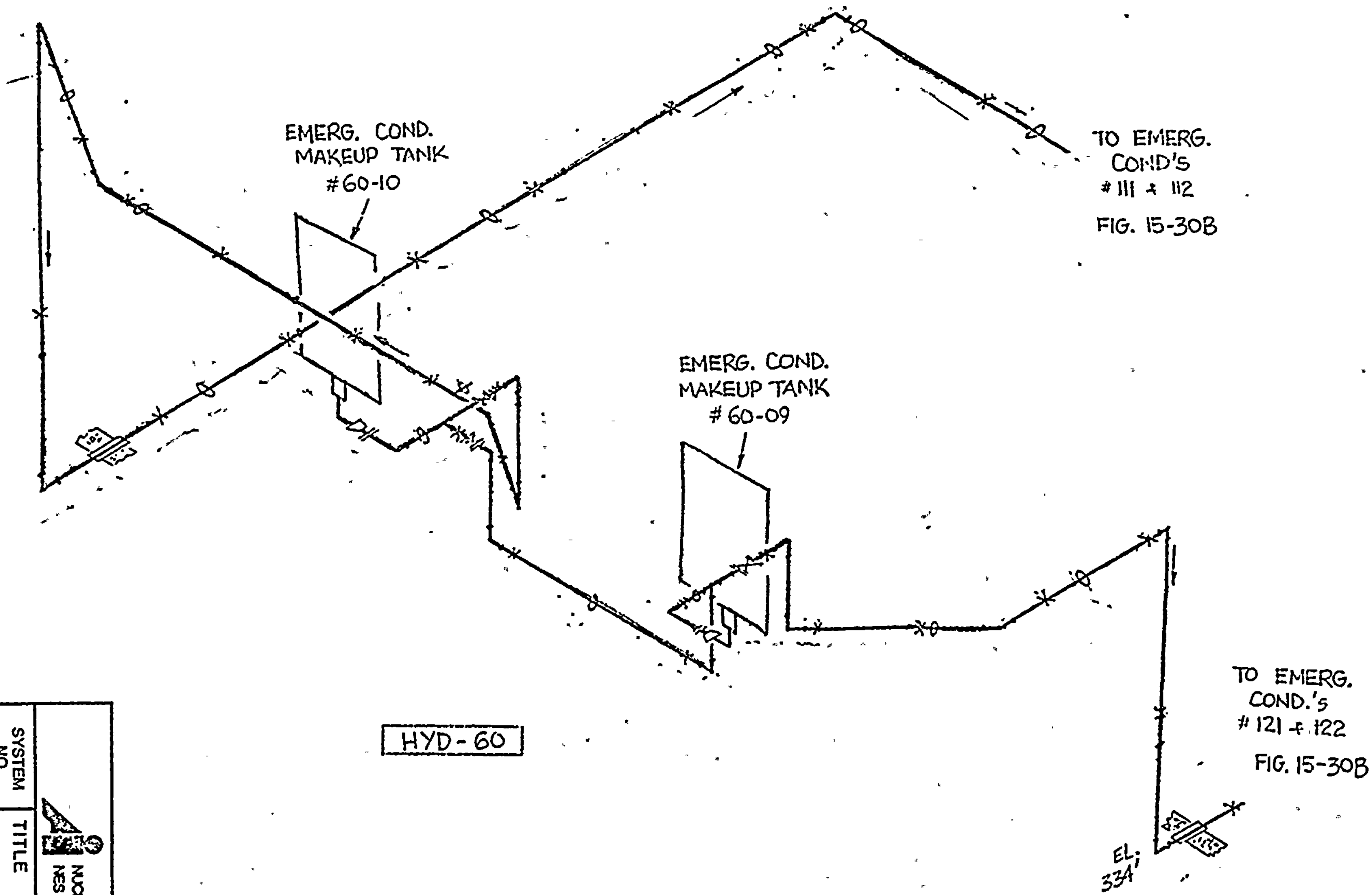
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 54	TITLE FUEL POOL HYD-54		
REV: 0	FIG. NO. 15-29B		
BY: A.U.	DATE: 8-18-75	W N S E	
APP: 98	DATE: 9-5-75		
PROJECT:	5530 - 9MP		
NES 112	NOT TO SCALE		



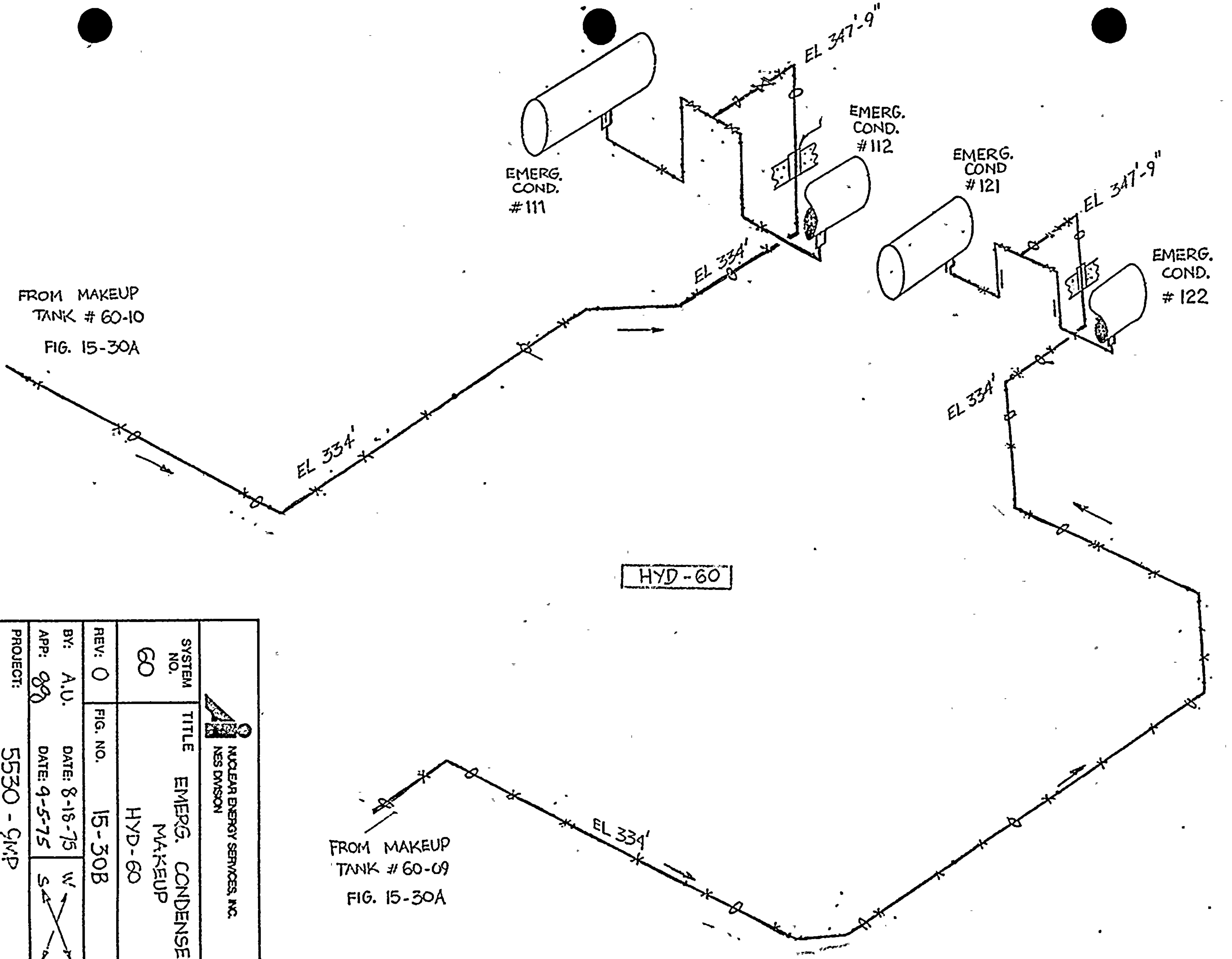
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 54	TITLE FUEL POOL HYD-54	
REV: 0	FIG. NO. 15-29C	
BY: A.U. DATE: 8-18-75	APP: gg DATE: 9-5-75	W N S E
PROJECT: 5530 - 9MP		
NES 112	NOT TO SCALE	



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

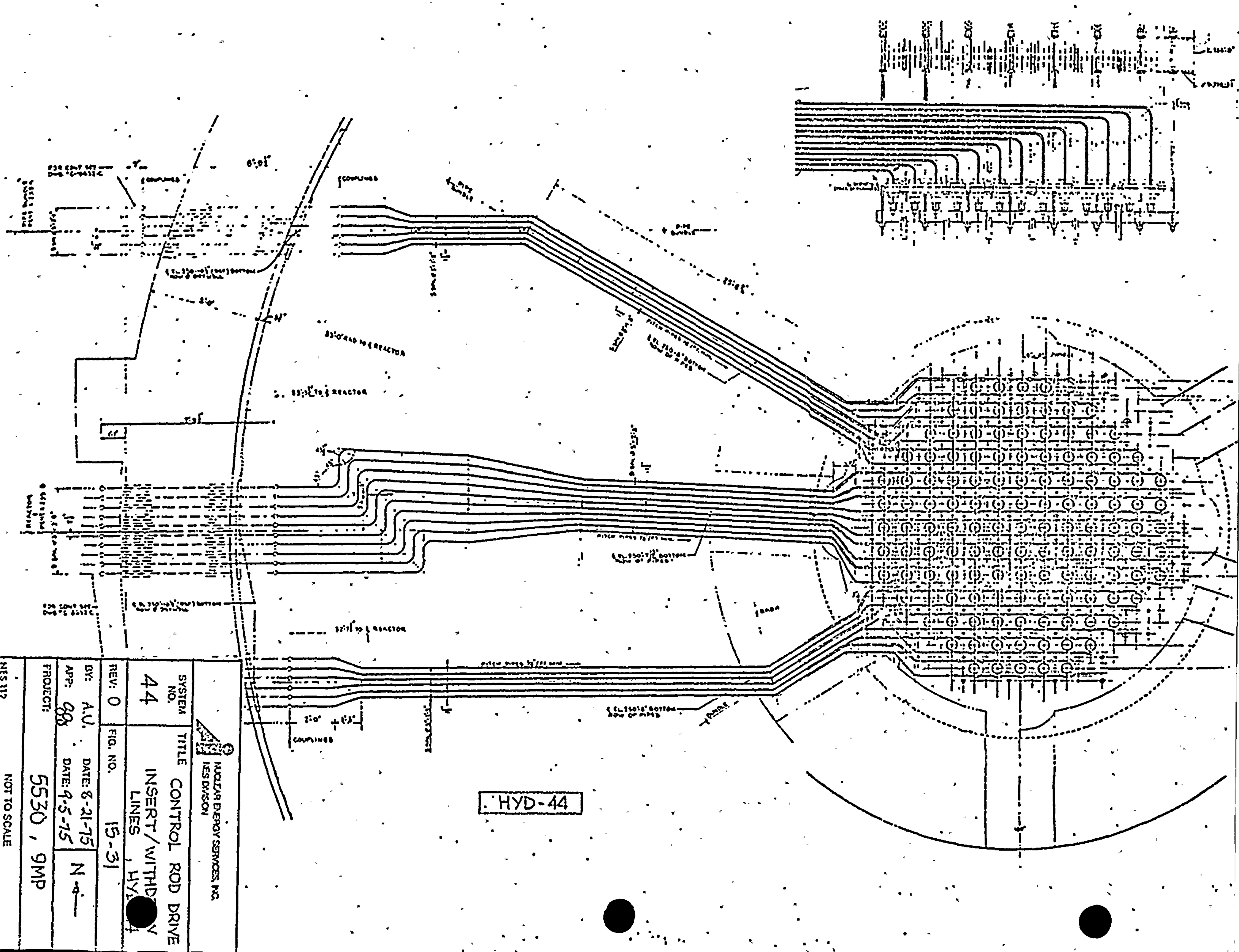
SYSTEM NO. 60	TITLE EMERG. CONDENSER MAKEUP HYD-60
REV: 0	FIG. NO. 15-30A
BY: A.U. DATE: 8-18-75	
APP: DATE: 9-5-75	N S E W
PROJECT: 5530 - 9MP	
NES 112	NOT TO SCALE

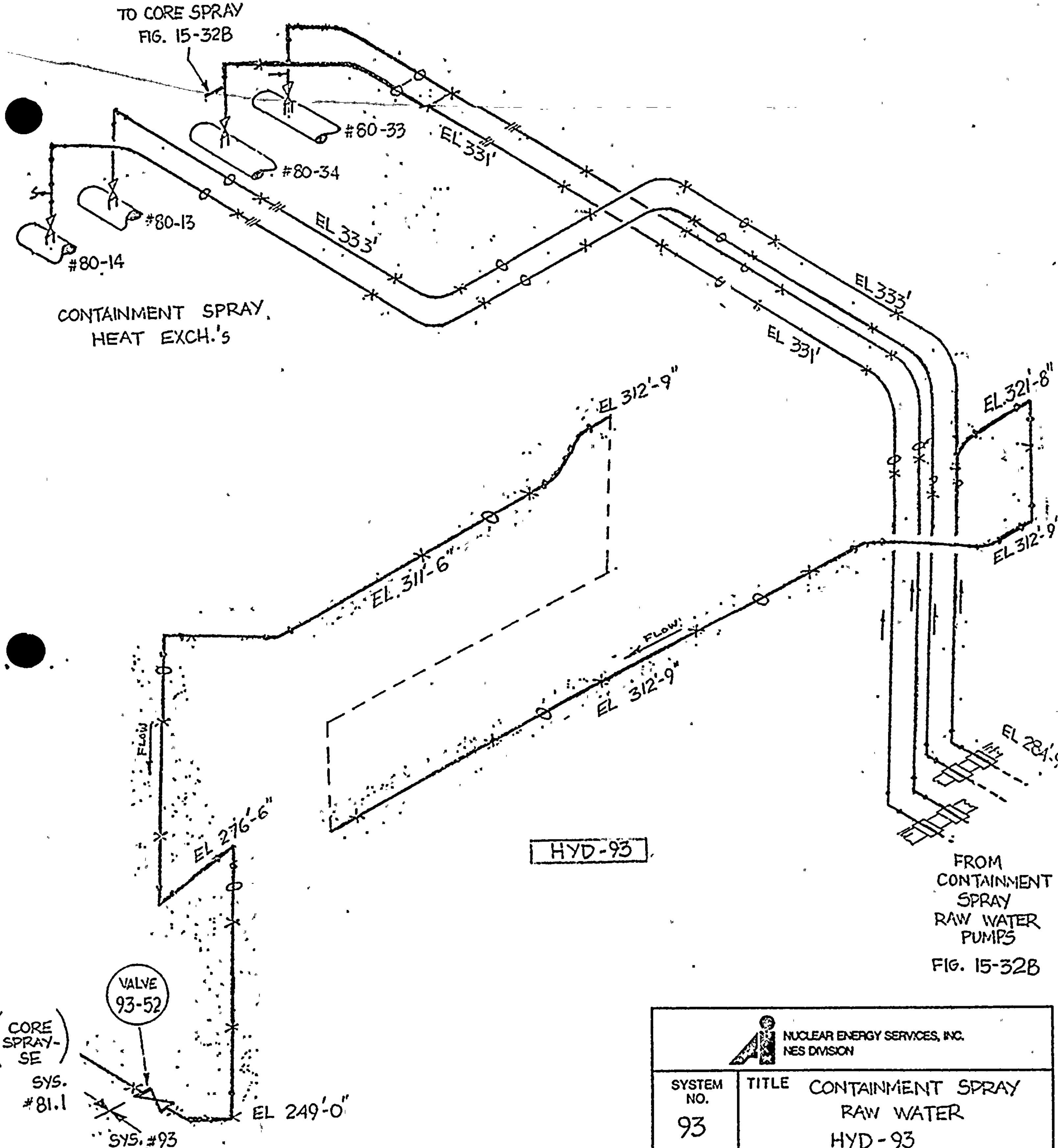


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 60	TITLE EMERG. CONDENSER MAKEUP HYD-60
REV: 0	FIG. NO. 15-30B
BY: A.U. DATE: 8-18-75	
APP: DATE: 9-5-75	
PROJECT: 5530 - GMP	

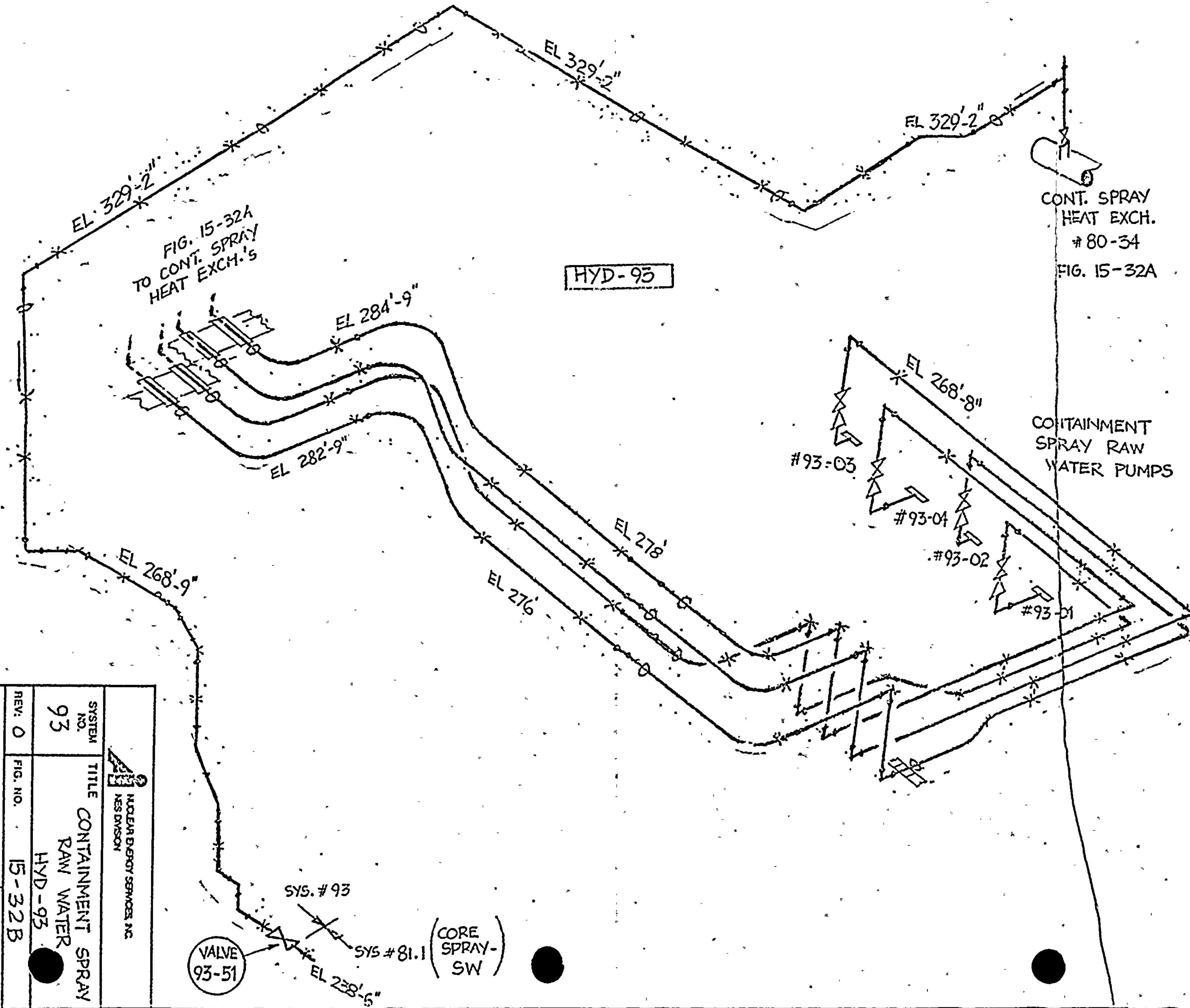
NES 112 NOT TO SCALE


HYD-44
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION
TITLE CONTROL ROD DRIVE INSERT/WITHD
LINES
SYSTEM NO. 44
REV: 0
FIG. NO. 15-31
BY: A.U.
DATE: 8-21-75
DATE: 9-5-75
N
PROJECT: 5530, 9MP
NES 117
NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 93	TITLE CONTAINMENT SPRAY RAW WATER HYD-93		
REV: 0	FIG. NO. 15-32A		
BY: A.U.	DATE: 8-20-75	W – N / S – E	
APP: 98	DATE: 9-5-75		
PROJECT:	5530 - 9MP		
NES 112	NOT TO SCALE		



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 93	TITLE CONTAINMENT SPRAY RAW WATER HYD-93
REV: 0	FIG. NO. 15-32B
BY: A.U. DATE: 8-20-75	W N S E
APP: [illegible] DATE: 9-5-75	
PROJECT: 5530-9MP	

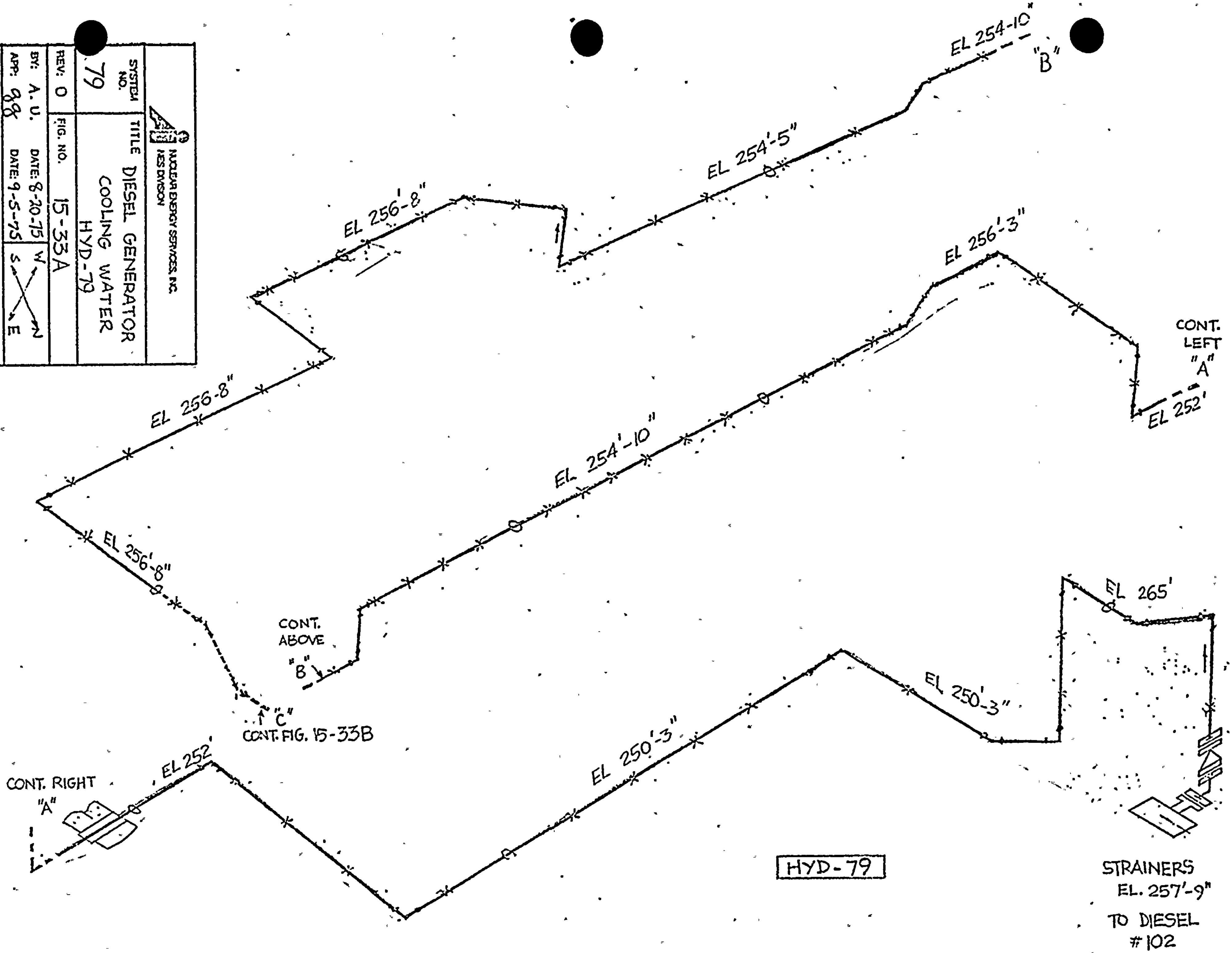
NES 112 NOT TO SCALE

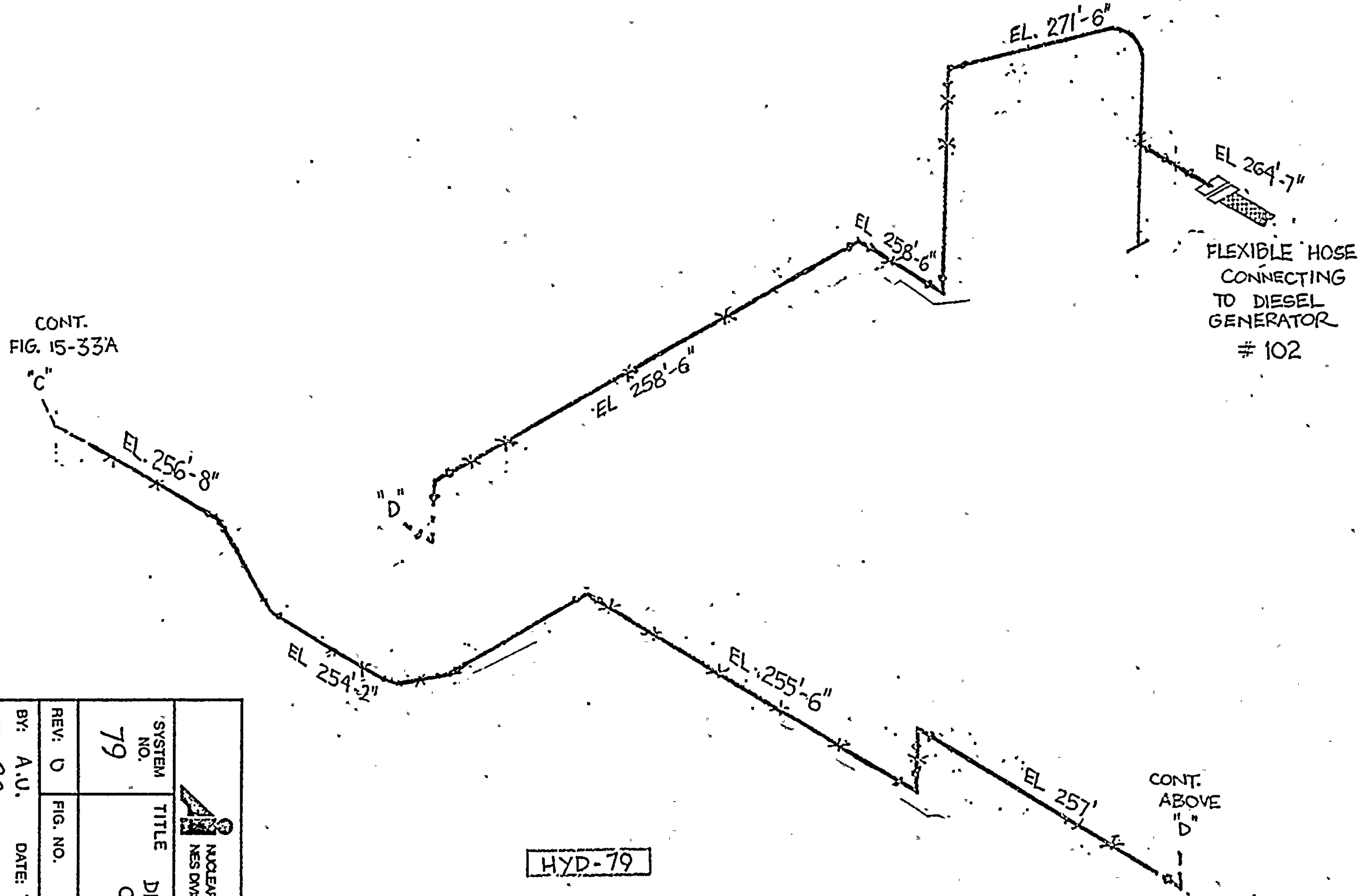
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 79	TITLE: DIESEL GENERATOR COOLING WATER HYD-79
REV: 0	FIG. NO. 15-33A
BY: A. U.	DATE: 8-20-75
APP: gg	DATE: 9-5-75
PROJECT: 5530-9MP	

NES 112

NOT TO SCALE



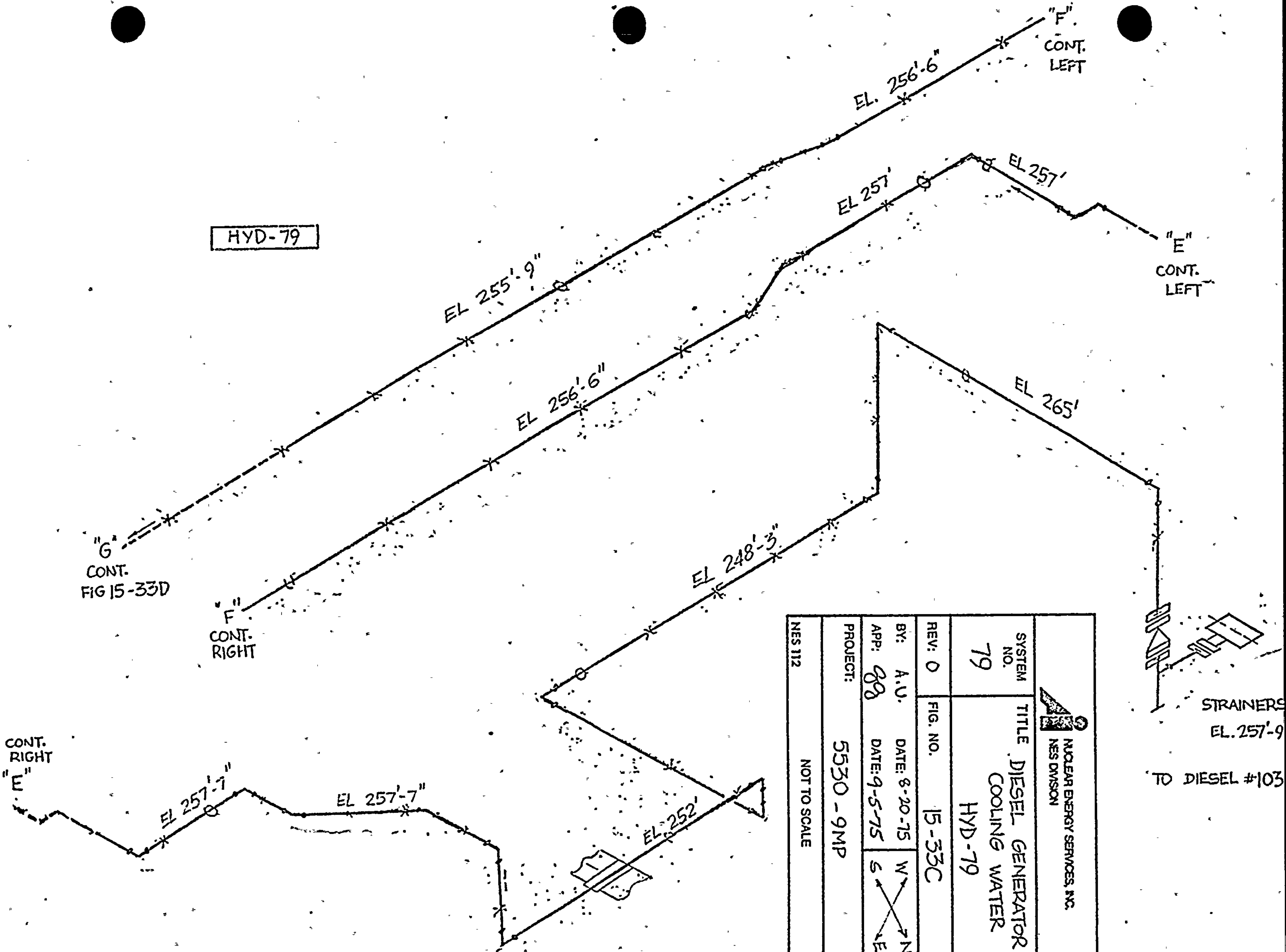


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 79	TITLE DIESEL GENERATOR COOLING WATER HYD-79
REV: 0	FIG. NO. 15-33B
BY: A.U. DATE: 8-20-75	W N S E
APP: [illegible] DATE: 9-5-75	
PROJECT: 5530 - 9MP	

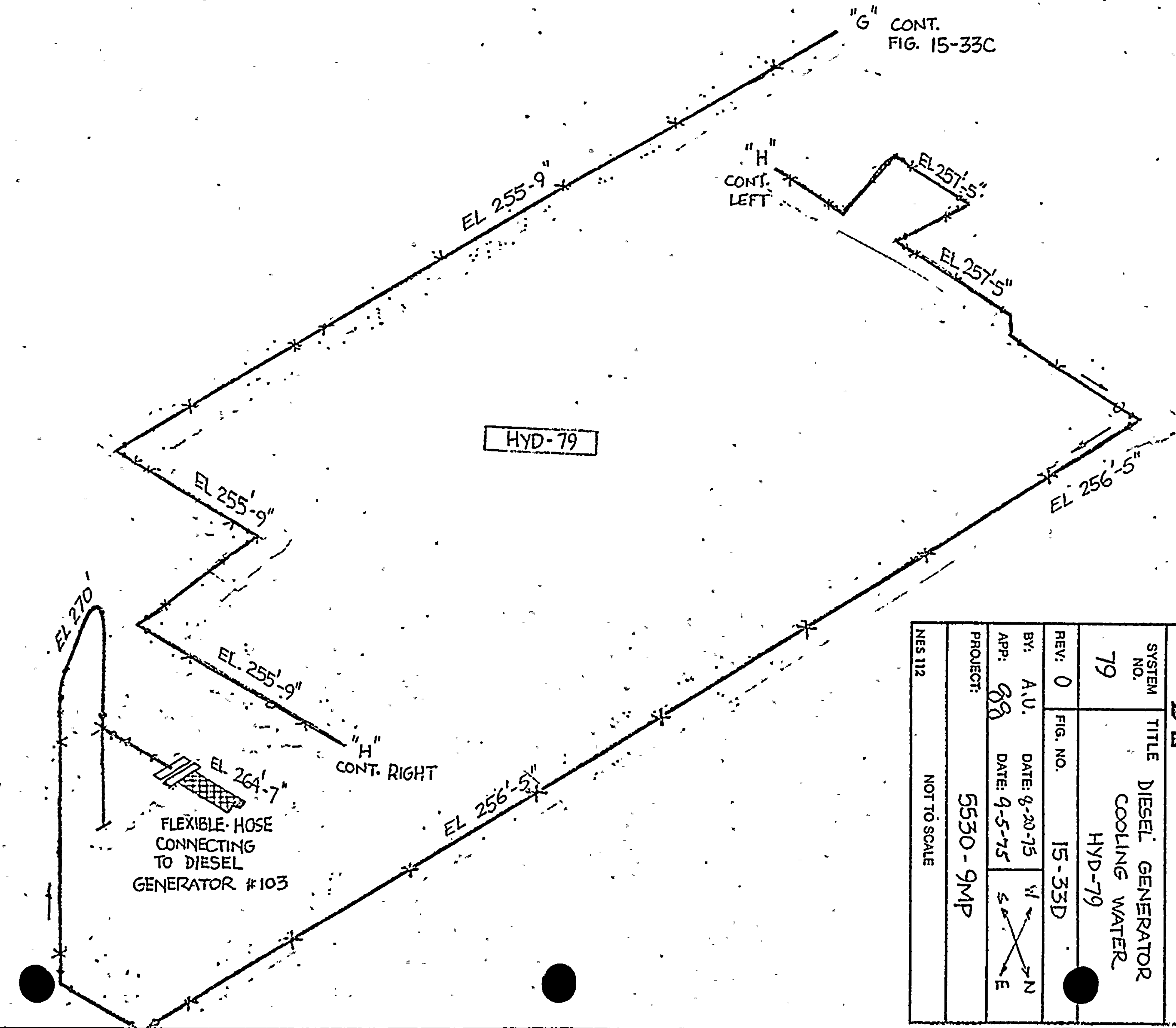
NES 112

NOT TO SCALE

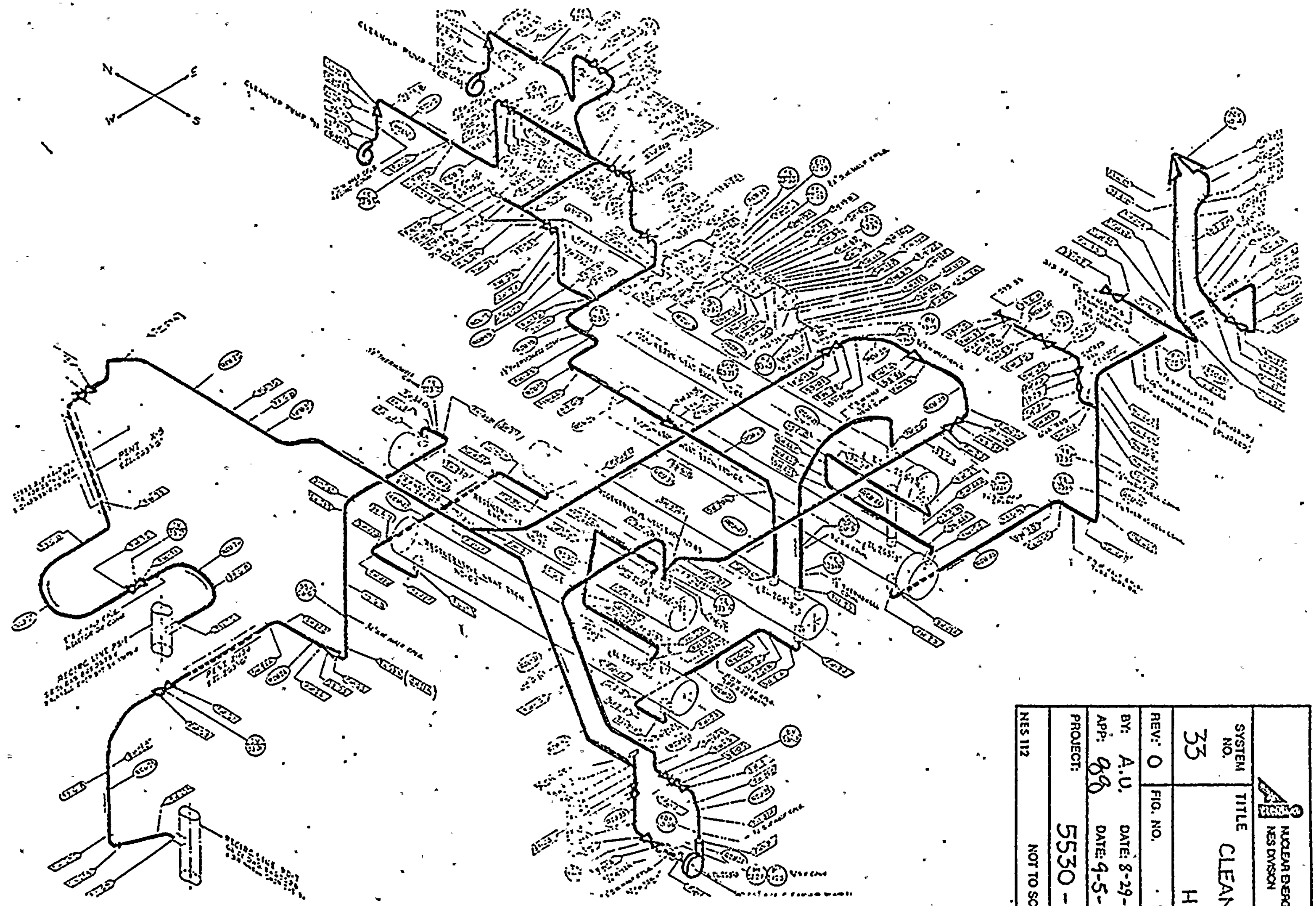


NUCLEAR ENERGY SERVICES, INC. NES DIVISION

SYSTEM NO. 79	TITLE DIESEL GENERATOR COOLING WATER HYD-79
REV: 0	FIG. NO. 15-33C
BY: A.U.	DATE: 8-20-75
APP:	DATE: 9-5-75
PROJECT: 5530-9MP	W N S E
NES 112	NOT TO SCALE



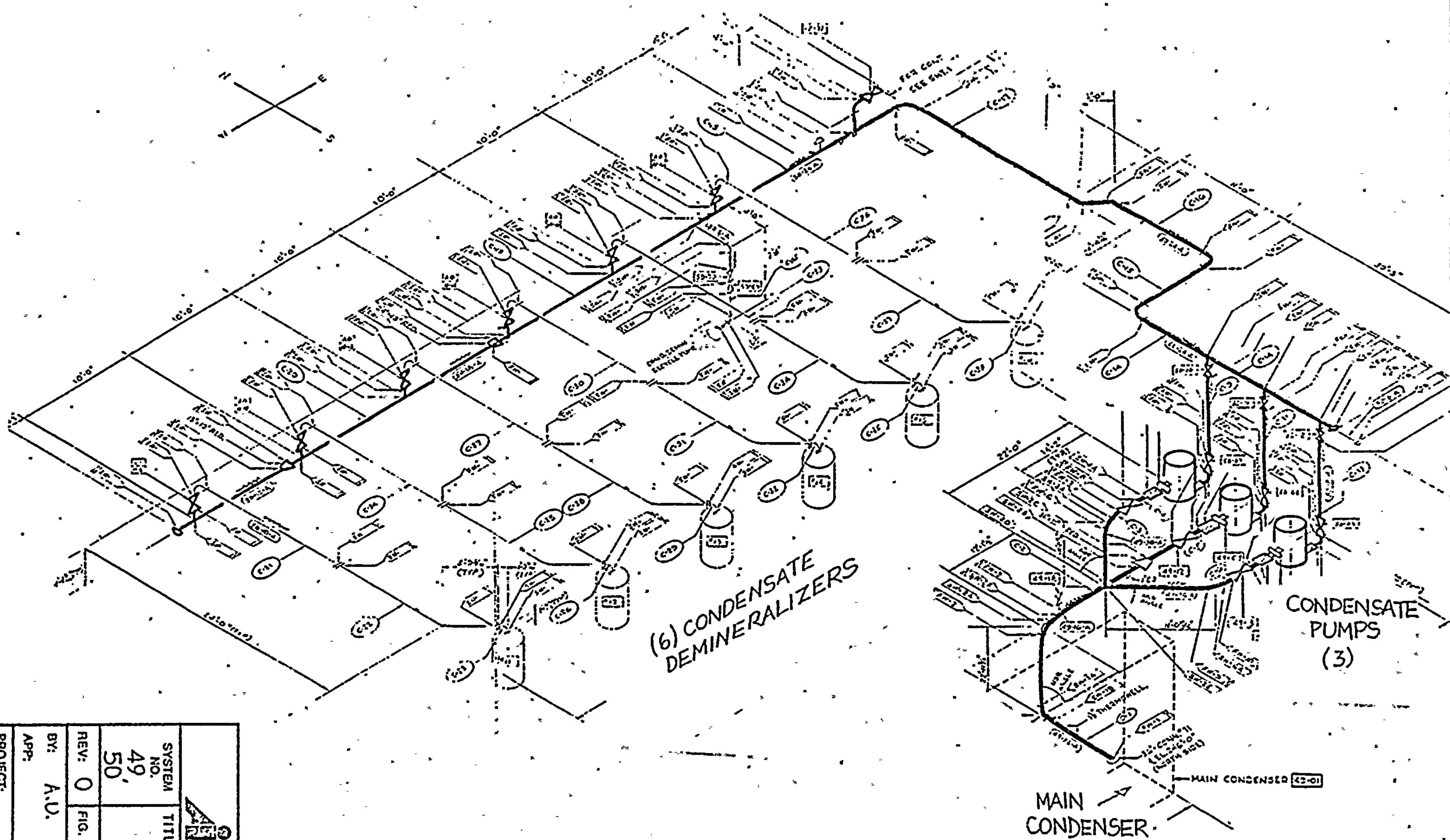
NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO. 79	TITLE DIESEL GENERATOR COOLING WATER HYD-79
REV: 0	FIG. NO. 15-33D
BY: A.U. DATE: 8-20-75	W N S E
APP: [signature] DATE: 9-5-75	
PROJECT: 5530-9MP	
NES 112	NOT TO SCALE



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 33	TITLE CLEAN-UP SYSTEM HYD-33
REV. 0	FIG. NO. 15-34
BY: A.U. DATE: 8-29-75	
APP: [illegible] DATE: 9-5-75	
PROJECT: 5530-9MP	

NES 112 NOT TO SCALE

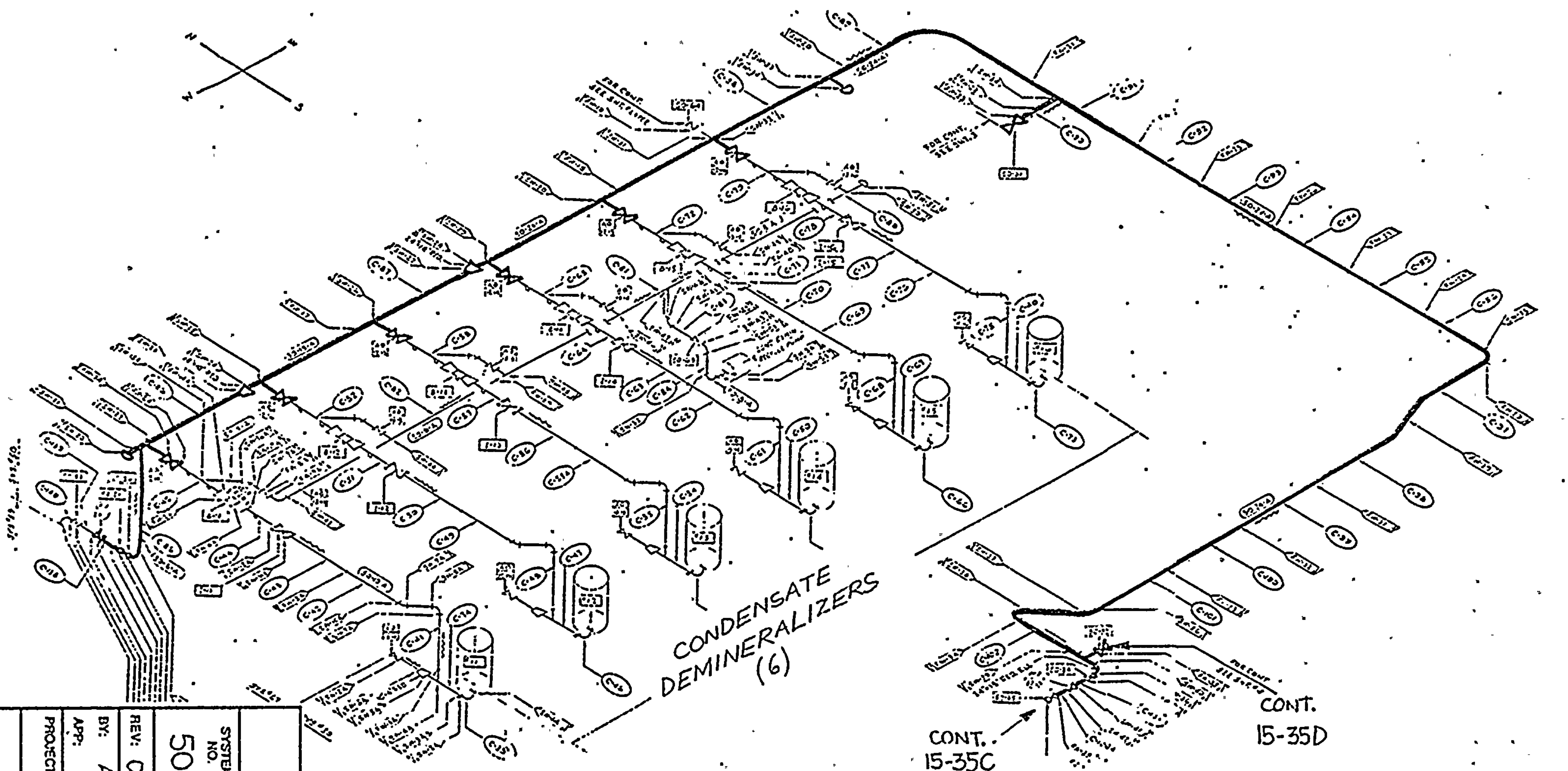


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 49, 50	TITLE FEEDWATER HYD-49, HYD-
REV: 0	FIG. NO. 15-35A
BY: A.U.	DATE: 9-11-15
APP:	DATE:
PROJECT: 5530-9MP	

NES 112

NOT TO SCALE

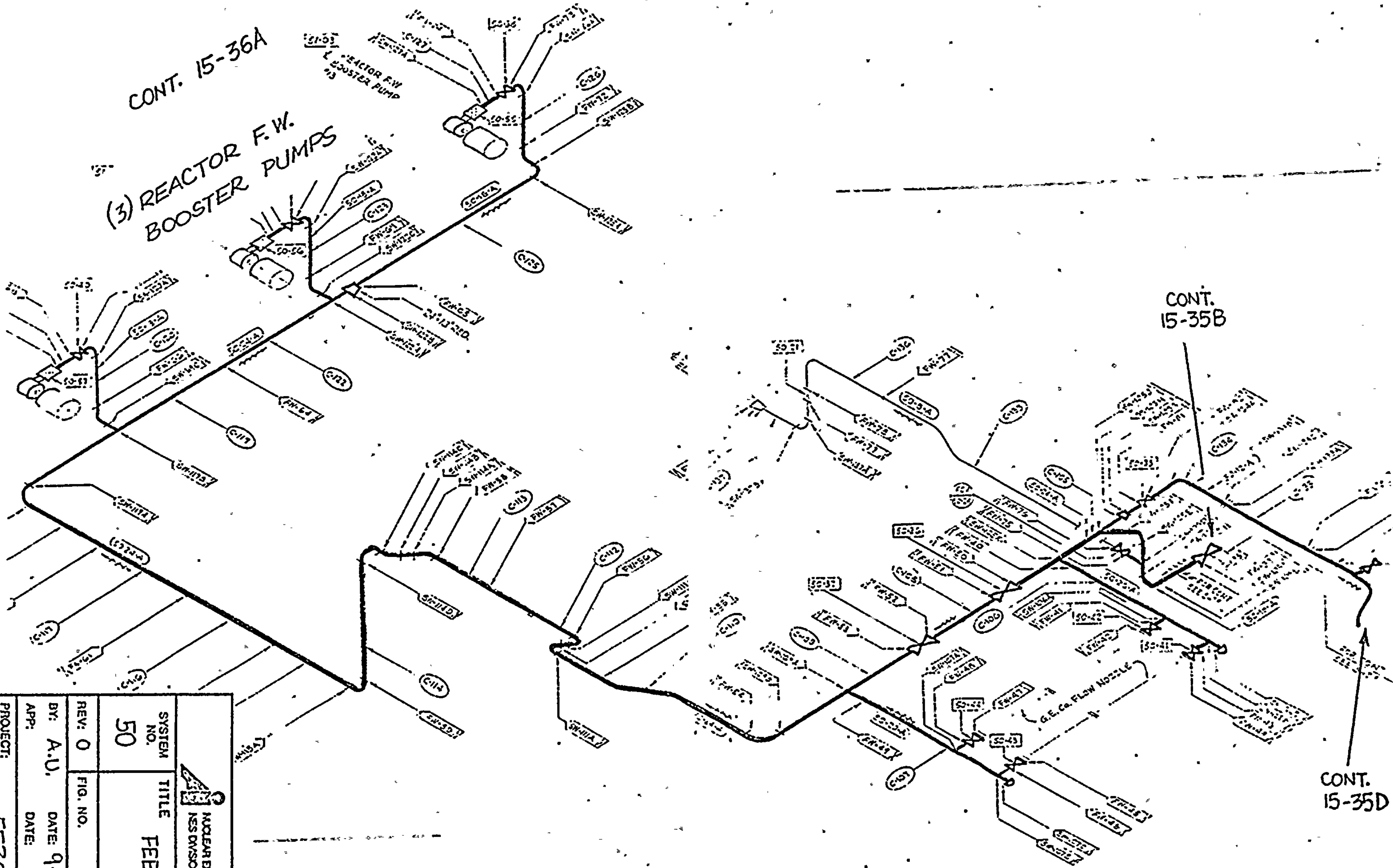


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 50	TITLE FEEDWATER HYD-50
REV: 0	FIG. NO. 15-35B
BY: A.U. DATE: 9-11-75	
APP: DATE:	
PROJECT: 5530-9MP	

NES 112

NOT TO SCALE

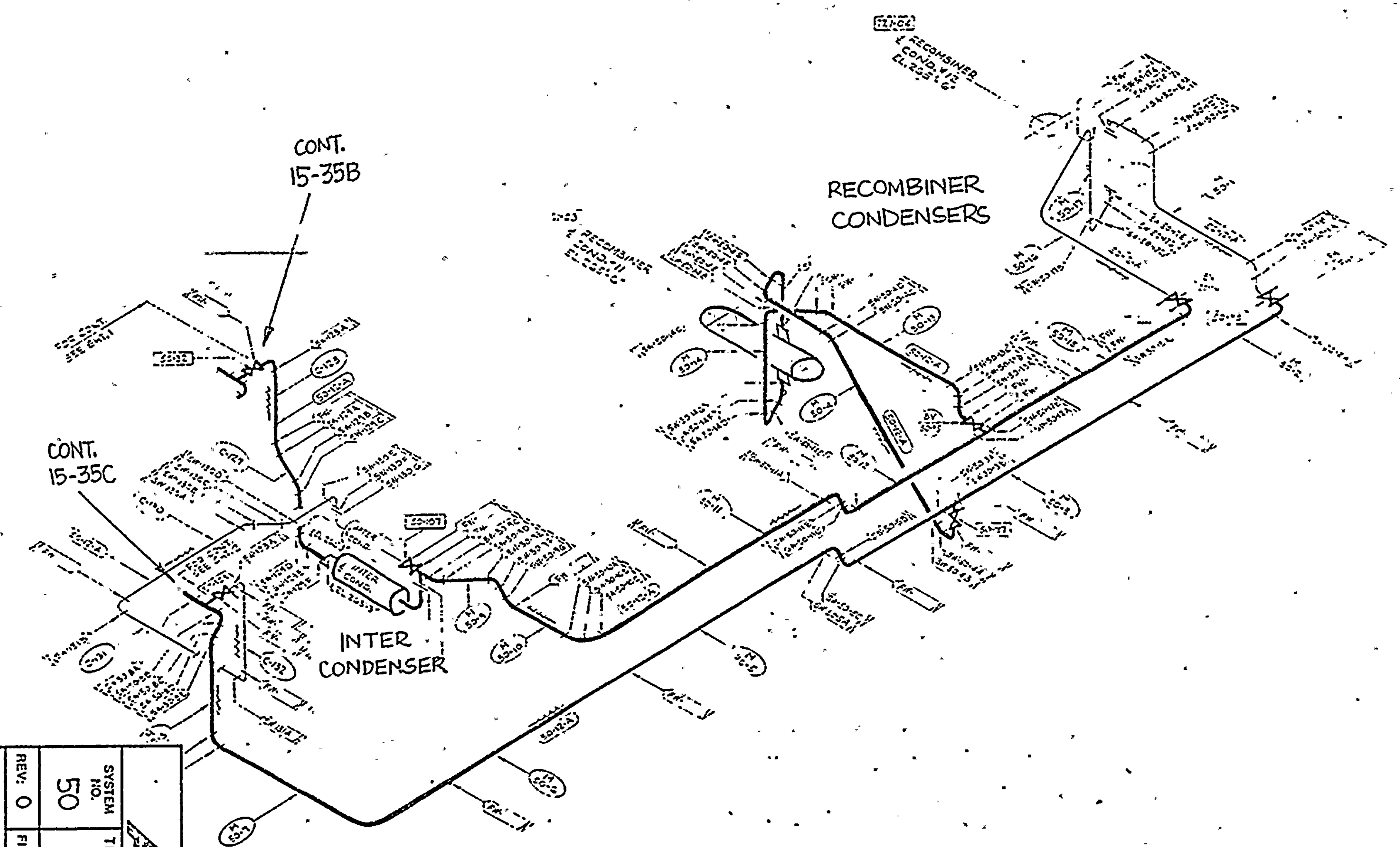


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 50	TITLE FEEDWATER HYD-50
REV: 0	FIG. NO. 15-35C
BY: A.U.	DATE: 9-11-75
APP:	DATE:
PROJECT: 5530-9MP	N E W S

NES 112

NOT TO SCALE

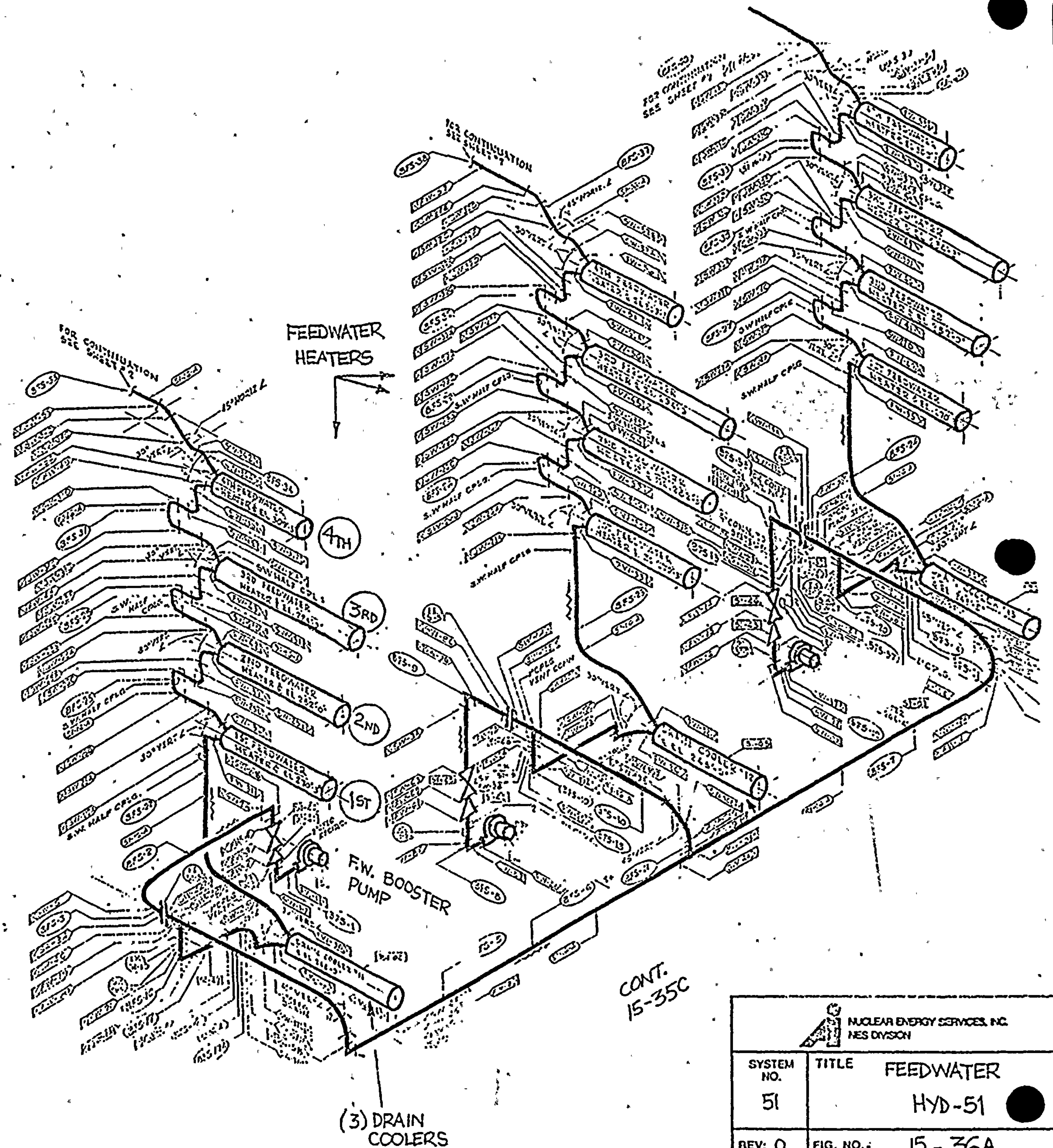


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 50	TITLE FEEDWATER HYD-50
REV: 0	FIG. NO. 15-35D
BY: A.U.	DATE: 9-11-75
APP:	DATE:
PROJECT: 5530-9MP	N E S W

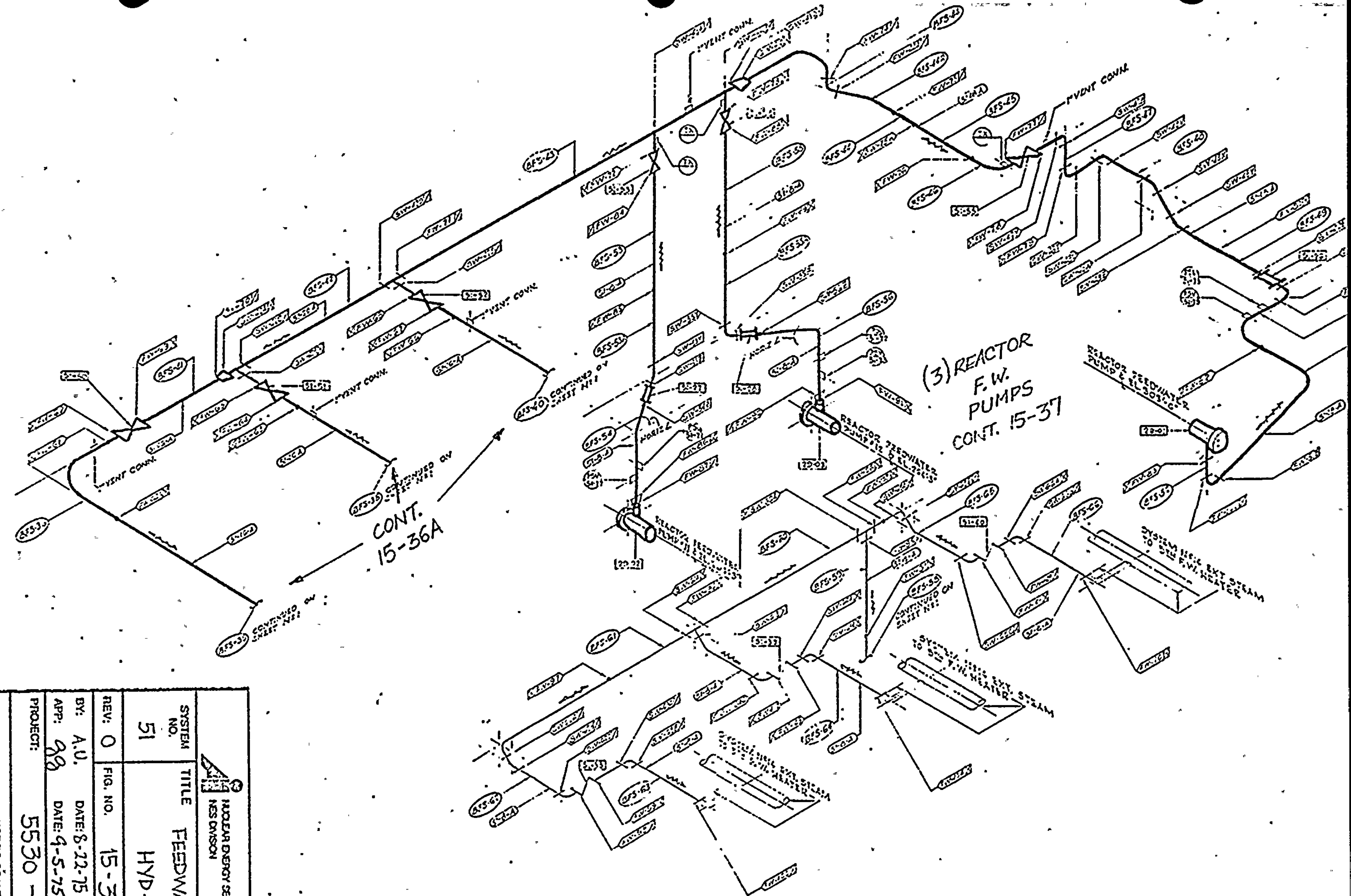
NOT TO SCALE

NES 112



NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO.	TITLE
51	FEEDWATER HYD-51
REV: 0	FIG. NO.: 15 - 36A
BY: A.U. DATE: 8-22-75 APP: gg DATE: 9-5-75	
PROJECT:	5530 - 9MP
NES 112	NOT TO SCALE

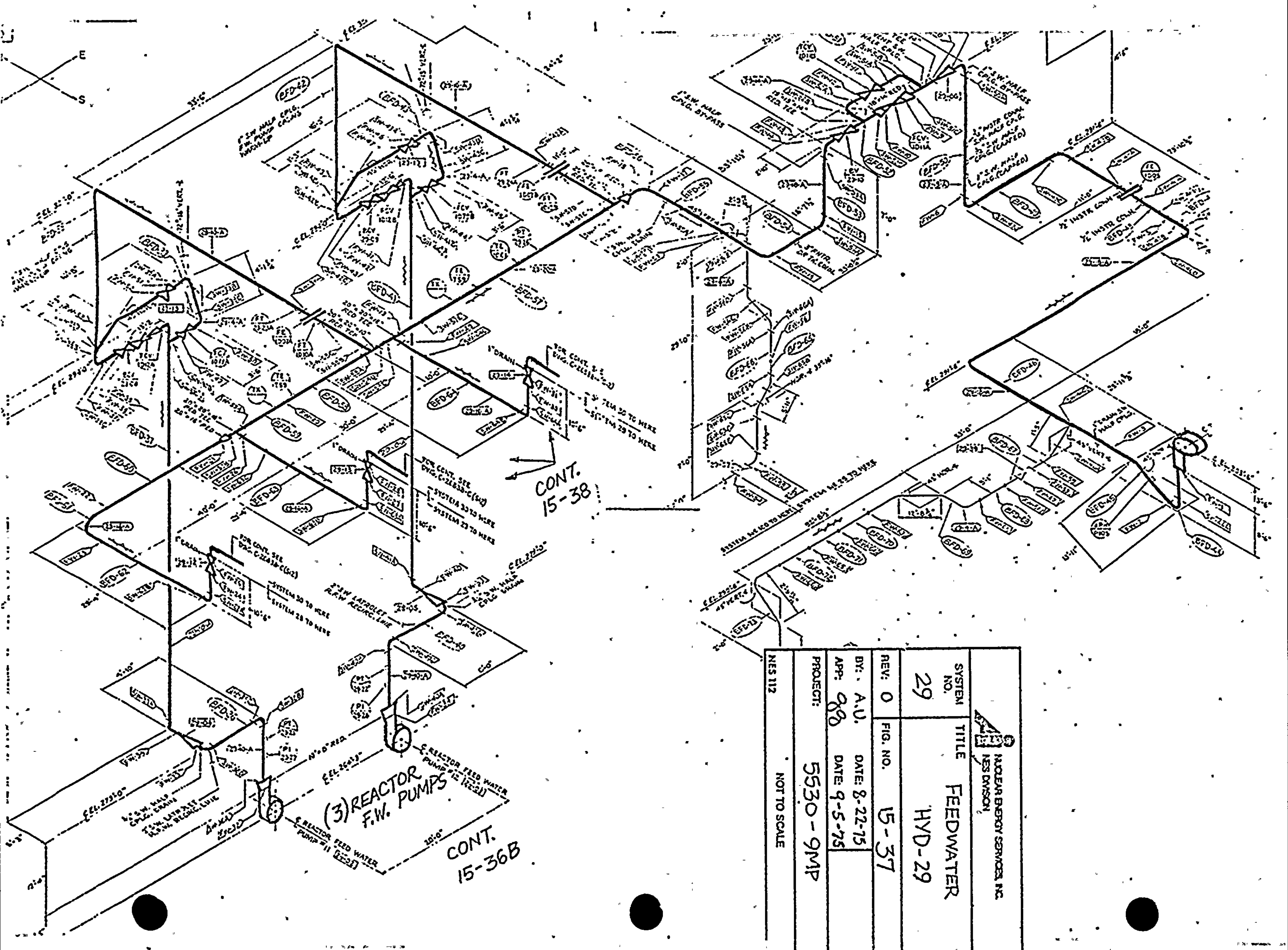


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

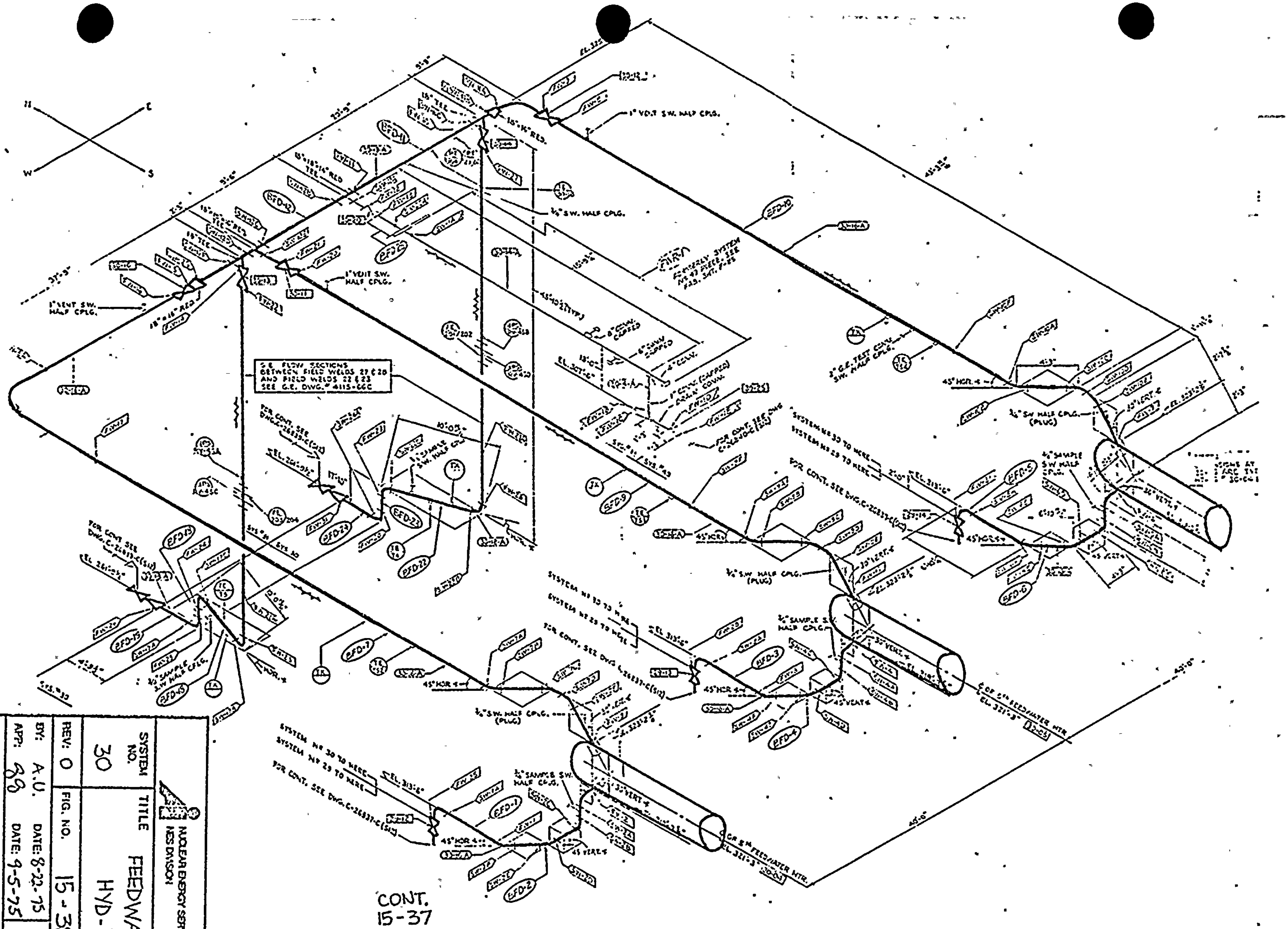
SYSTEM NO. 51	TITLE FEEDWATER HYD-51
REV: 0	FIG. NO. 15-36B
BY: A.U. DATE: 8-22-75	
APP: [illegible] DATE: 9-5-75	
PROJECT: 5530-9MP	

NES 112

NOT TO SCALE



CONT. 15-38
(3) REACTOR F.W. PUMPS
CONT. 15-36B
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION
SYSTEM NO. 29
TITLE FEEDWATER
HYD-29
REV: 0
FIG. NO. 15-37
BY: A.U.
DATE: 8-22-75
APP:
DATE: 9-5-75
PROJECT: 5530-9MP
NES 112
NOT TO SCALE

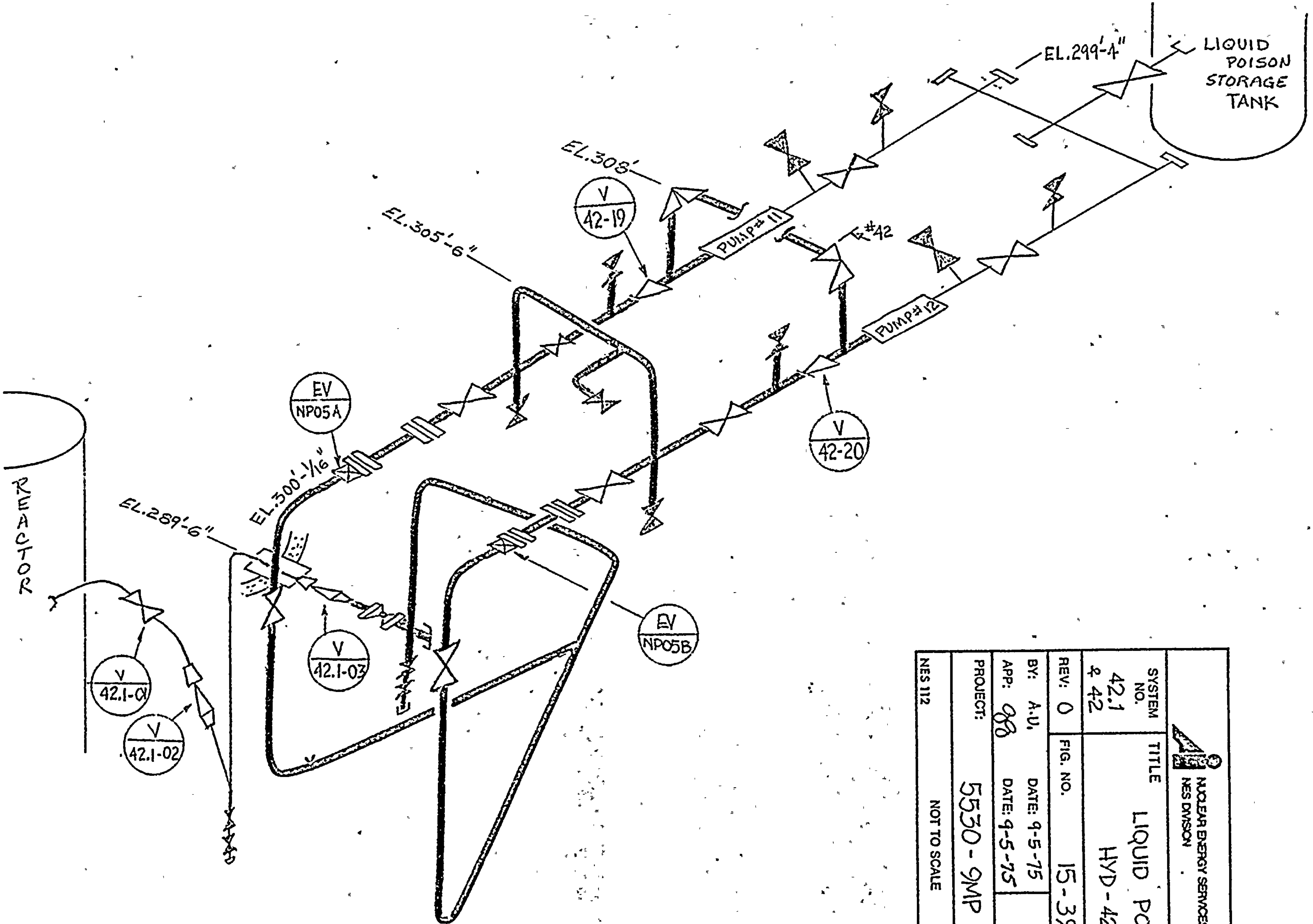


NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 30	TITLE FEEDWATER HYD-30
REV: 0	FIG. NO. 15-38
BY: A.U. DATE: 8-22-75	
APP: [illegible] DATE: 9-5-75	
PROJECT: 5530-9MP	

NES 112

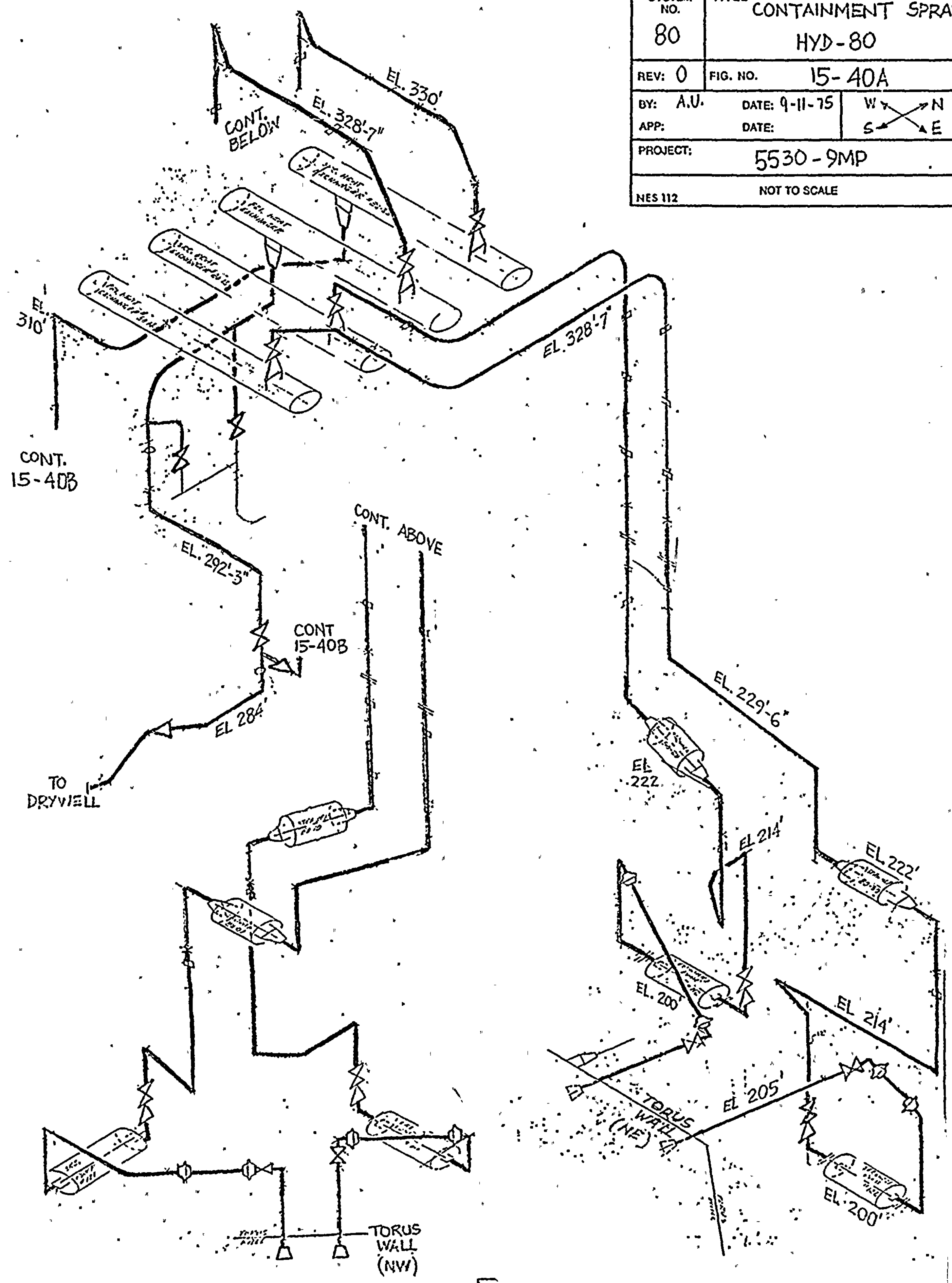
NOT TO SCALE

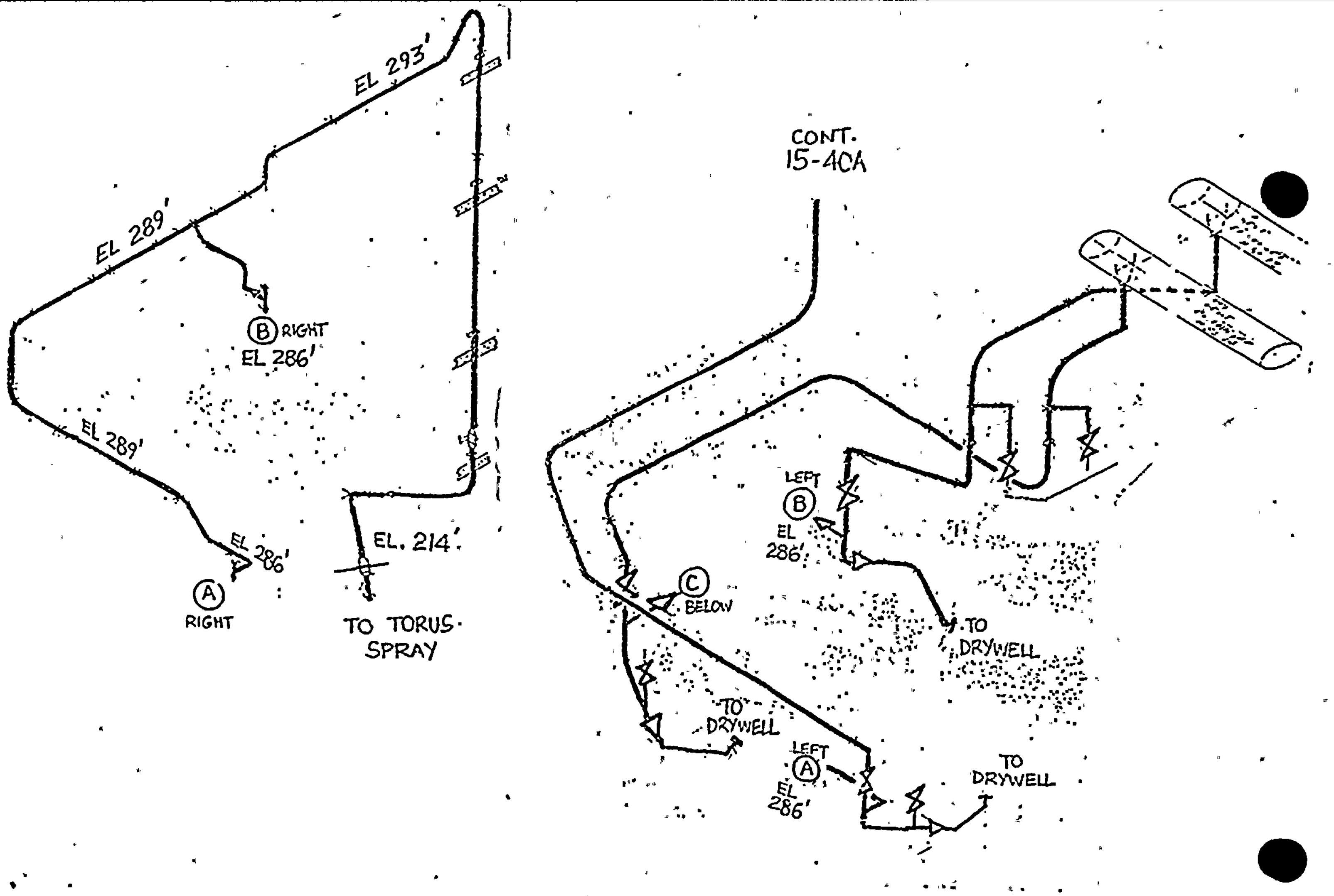


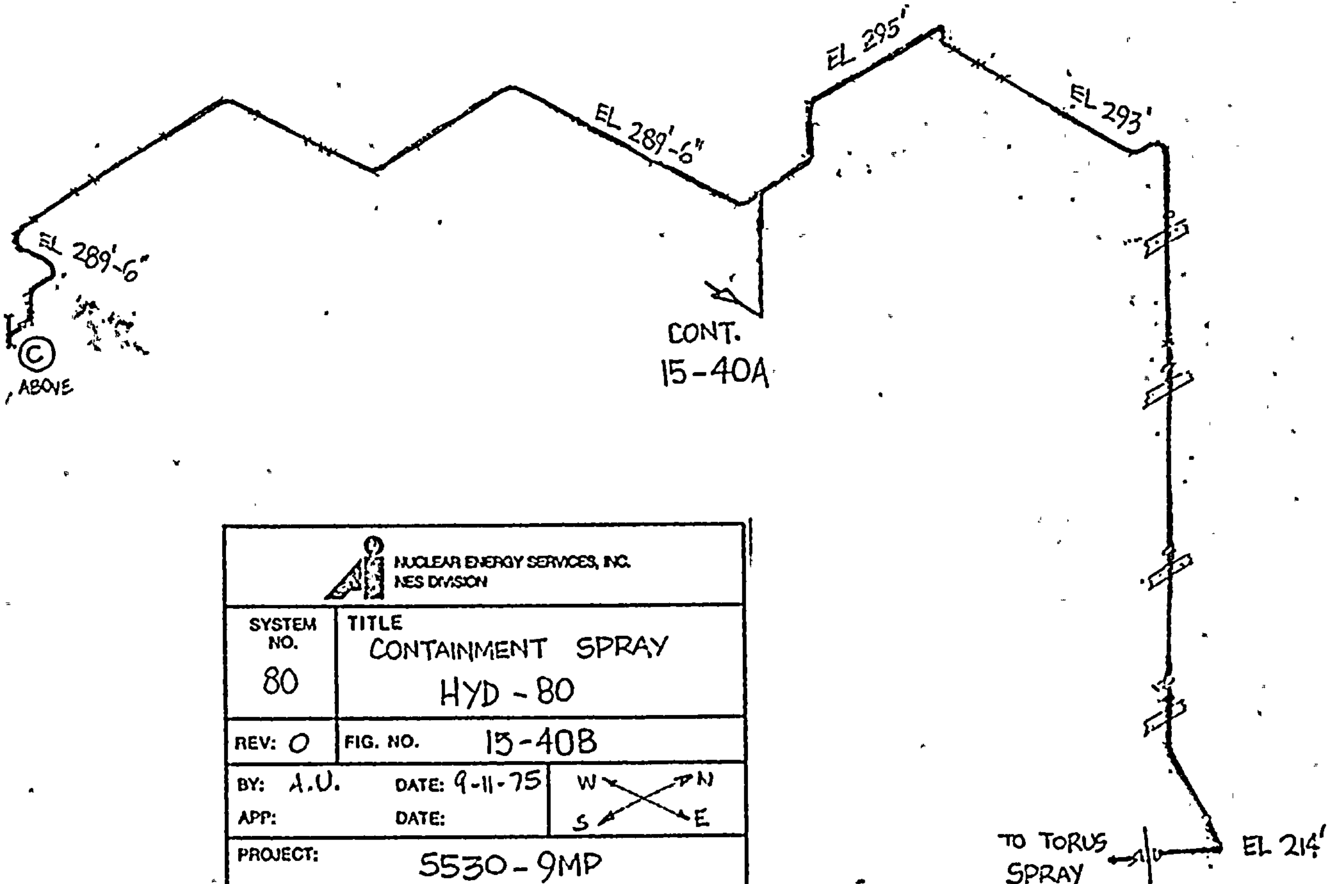
NUCLEAR ENERGY SERVICES, INC.
NES DIVISION

SYSTEM NO. 42.1 & 42	TITLE LIQUID POISON HYD-42.1
REV: 0	FIG. NO. 15-39
BY: A.U.	DATE: 9-5-75
APP: GG	DATE: 9-5-75
PROJECT:	5530-9MP
NES 112	NOT TO SCALE

NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO. 80	TITLE CONTAINMENT SPRAY HYD-80
REV: 0	FIG. NO. 15-40A
BY: A.U. DATE: 9-11-75	W S N E
APP: DATE:	
PROJECT:	5530-9MP
NES 112	NOT TO SCALE







NUCLEAR ENERGY SERVICES, INC. NES DIVISION	
SYSTEM NO. 80	TITLE CONTAINMENT SPRAY HYD - 80
REV: O	FIG. NO. 15-40B
BY: A.U. DATE: 9-11-75	W N S E
APP: DATE:	
PROJECT: 5530-9MP	
NES 112	NOT TO SCALE

APPENDIX E

TECHNICAL SPECIFICATIONS DEVIATIONS

APPENDIX E

TECHNICAL SPECIFICATIONS DEVIATIONS

The Niagara Mohawk Power Corporation Nine Mile Point Unit 1 was designed and constructed prior to the adoption of Section XI of the ASME Boiler and Pressure Code. Accordingly, provisions for direct accesibility to portions of some examination areas or for removable insulation were not incorporated into the plant design. In addition, certain Section XI requirements have been excluded from the ten-year inservice inspection program since they are not applicable to BWR's (i.e. pressurizer, steam generators, and removable core-support structures).

As established in Table 4.2.6a of Nine Mile Point Technical Specifications, the following examination categories are excluded from the requirements of the ASME Code Section XI, because plant design and high radiation levels preclude access to these areas:

(1) Category B-A, Pressure Retaining Welds in Reactor Vessel Beltline Region, not accessible.

(2) Category B-B, Pressure Retaining Welds in Vessels: Only Closure Head circumferential and meridional welds will be examined, corresponding welds in the reactor vessel and bottom head not accessible.

(3) Category B-D, Full Penetration Welds of Nozzles in Vessels: The nozzle to vessel welds will not be examined as they are covered by non-replaceable insulation. Recirculation <u>inlet</u> nozzle to vessel welds will be examined.

(4) Category B-G-1, Pressure Retaining Bolting, 2 inches and larger in diameter: a visual examination has been substituted for the required volumetric method for the Class A feedwater check valves since non-replaceable insulation makes the valves inaccessible for volumetric and surface examinations. A visual examination has been substituted for the required surface examination for the Closure Head studs and nuts since they have been Parkerized (corrosion treatment), rendering surface examination results invalid.

(5) Category B-H, Vessel Support, not accessible.

(6) Category B-K-1, Support Members for Piping, Valves, and Pumps: A liquid penetrant examination has been selected in lieu of the required volumetric examination for the Group A integrally welded external support attachments due to geometrical considerations. A visual examination will be recommended if the surface conditions can not be made compatible with proper surface penetrant examination prerequirements.

(7) Category B-L-2, Pump Bodies: The internal pressure boundary surface of the recirculation pumps is not accessible.

(8) Category B-M-2, Valve Bodies: The internal pressure boundary surface of the recirculation suction and discharge valves is not accessible since this would require draining reactor vessel water.

(9) Category B-N-1, Interior of Reactor Vessels: The core plate, lower core grid and liquid poison spargers are not accessible for visual inspection during normal refueling outages.

(10) Category C-B, Pressure-Retaining Nozzle Welds in Vessels: A liquid penetrant examination has been substituted for the required volumetric method for the shutdown cooling heat exchanger inlet/outlet nozzle welds since they are effectively non-full-penetration socket welds.

(11) Category C-E-1, Support Members for Piping, Valves and Pumps: A visual examination may be substituted for the required liquid penetrant examination for the Group B integrally-welded external support attachments due to surface conditions and geometrical considerations.

(12) Category C-F, Pressure-Retaining Welds in Piping, Pumps, and Valves in Systems Which Circulate Reactor Coolant: A hydrostatic pressure test has been substituted for the required volumetric examination in all of non-exempt Group B Feedwater System (System No.'s 29, 30, 50). These portions of the Feedwater System are covered by Non-replaceable insulation and thus are considered inaccessible for volumetric and surface examination according to Nine Mile Point Unit 1 Technical Specifications Paragraph 4.2.6 stipulations. Portions of Feedwater (System 50) and Cleanup (System 35) that are in high radiation areas (demineralizers, filters, sludge tanks, etc.) will not be examined.

APPENDIX F

PRE-EXAMINATION REQUIREMENTS

APPENDIX F

Pre-examination Requirements

General provisions for accessibility have been defined by Subarticle IWA-1500 of Section XI of the ASME Boiler and Pressure Vessel Code.

In addition to the requirements of the Code, adequate water, electricity and air outlets should be provided at convenient locations for operation of the examination equipment. Sufficient lighting should also be provided to permit free movement to and illumination of all the required examination areas.

Access platforms and ladders as well as temporary radiation shielding in high radiation areas should be given special consideration to reduce examination personnel exposure time.

Access routes should be planned to permit the free passage of examination personnel and equipment, also any temporary ladders or scaffolding required.

Where piping passes directly underneath floor grating, removing the grating, permitting access from the top, should be considered rather than a tight, time-consuming, crawl route.

In all cases where manual examination techniques are employed, it is required that the access be sufficient to enable a man's head and shoulders to be within 24 inches of the area to be examined.

Insulation must be removed as required to perform the component and system piping weld examinations.

When Category B-L-2 valve internal pressure boundary visual examinations are required, the subject components must be taken apart and after the examinations, re-assembled.

APPENDIX G

QUALITY ASSURANCE

APPENDIX G

Quality Assurance

The Quality Assurance Program to be implemented for the Nine Mile Point Unit 1 Inservice Inspection Program is governed by four basic document sets:

(1) The Quality Assurance Manuals of the NES (80A9002) and Conam Inspection Divisions (25-QCM-001).

(2) The Quality Assurance Plan (81A0402)

(3) The individual implementing procedures and task plans invoked by the above.

(4) ISI Program QA Manual; NES 80A9021, Rev. 0, July 9, 1976. △1

The Quality Assurance Manuals define the policies and practices employed by both divisions in meeting the requirements of 10 CFR 50, Appendix B. Since the manuals apply to all work performed by the divisions, they are not project specific.

The Quality Assurance Plan is specific to the inservice inspection program for the Nine Mile Point Unit 1. The plan includes the detailed quality assurance requirements that are common to all phases of the program including organization, responsibilities, management, liaison, project procedures and quality assurance audits. The Quality Assurance Plan is presented in this Appendix.

The new ISI Program QA Manual (NES 80A9021, Rev. 0, July 9, 1976) shall be applicable for all future field implementation tasks such as personnel certification, material specifications, procedure revisions, etc. △1

NES 81A-0402

QUALITY ASSURANCE PLAN

FOR

INSERVICE INSPECTION
PROGRAM FOR NINE MILE
POINT - UNIT 1

Prepared For

NIAGARA MOHAWK POWER CORPORATION
Syracuse, New York

By

NUCLEAR ENERGY SERVICES, INC.
Danbury, Connecticut 06810

Prepared by: W J Manion
W. J. Manion

Date: 9/8/75

NUCLEAR ENERGY SERVICES, INC.

NES81A- 0402

QUALITY ASSURANCE PLAN

FOR

INSERVICE INSPECTION
PROGRAM FOR NINE MILE
POINT - UNIT 1

SPEC. NO. NES 81A-0402 LATEST REV. 0 DATE ____ REV. DESCRIPTIONS START ON PAGE NO. ____	PROJECT APPLICATION 5530	PREPARED BY W. J. Manion WJM DATE 9/8/75

APPROVED BY	DATE	ORGANIZATION
REV. 1 W J Manion for T.S.L.	3/11/77	NES

1. INTRODUCTION

The Quality Assurance Program to be implemented for the Nine Mile Point Unit 1 Inservice Inspection Program is governed by three basic document sets. They are:

1. the Quality Assurance Manuals of the NES and Conam Inspection Divisions; (80A9002 and 25-QCM-001)
2. the Quality Assurance Plan (herein); and
3. the individual implementing procedures invoked by the above.
4. ISI Program QA Manual NES 80A9021, Rev. 0, July 9, 1976.

The scope of the tasks comprising the inservice inspection program is defined in the Work Plan for this inspection program.

The Quality Assurance Manuals define the policies and practices employed by both divisions in meeting the requirements of 10CFR 50, Appendix B. Since the manuals apply to all work performed by the divisions, they are not project-specific.

The Quality Assurance Plan is specific to the inservice inspection program for the Nine Mile Unit. The plan includes the detailed quality assurance requirements that are common to all tasks of the program including organization, management and group liaison.

The ISI Program QA Manual (NES 80A9021) shall be applicable for all future field implementation tasks such as personnel certification, material specification, procedure revisions, etc.

2. ORGANIZATION

2.1 PROJECT STRUCTURE

The Nuclear Energy Services philosophy of management relative to inservice inspection programs is to provide consistent, routine and uniform management control for all such projects. As such, the responsibility for coordination of all inservice inspection programs rests with the Inservice Inspection (ISI) Program Manager. The ISI Program Manager reports directly to the President of the NES Division. Each ISI project is assigned a Project Manager. The Project Manager is responsible for the technical and financial performance of the entire project. He retains this responsibility throughout the duration of the project.

Each project is divided into tasks, i.e. major groupings of work activities. A task engineer is appointed for each task who is responsible to the Project Manager for satisfactory technical and budgetary performance of the task effort. The task engineer will be appointed from the department or division with the greatest involvement in the task.

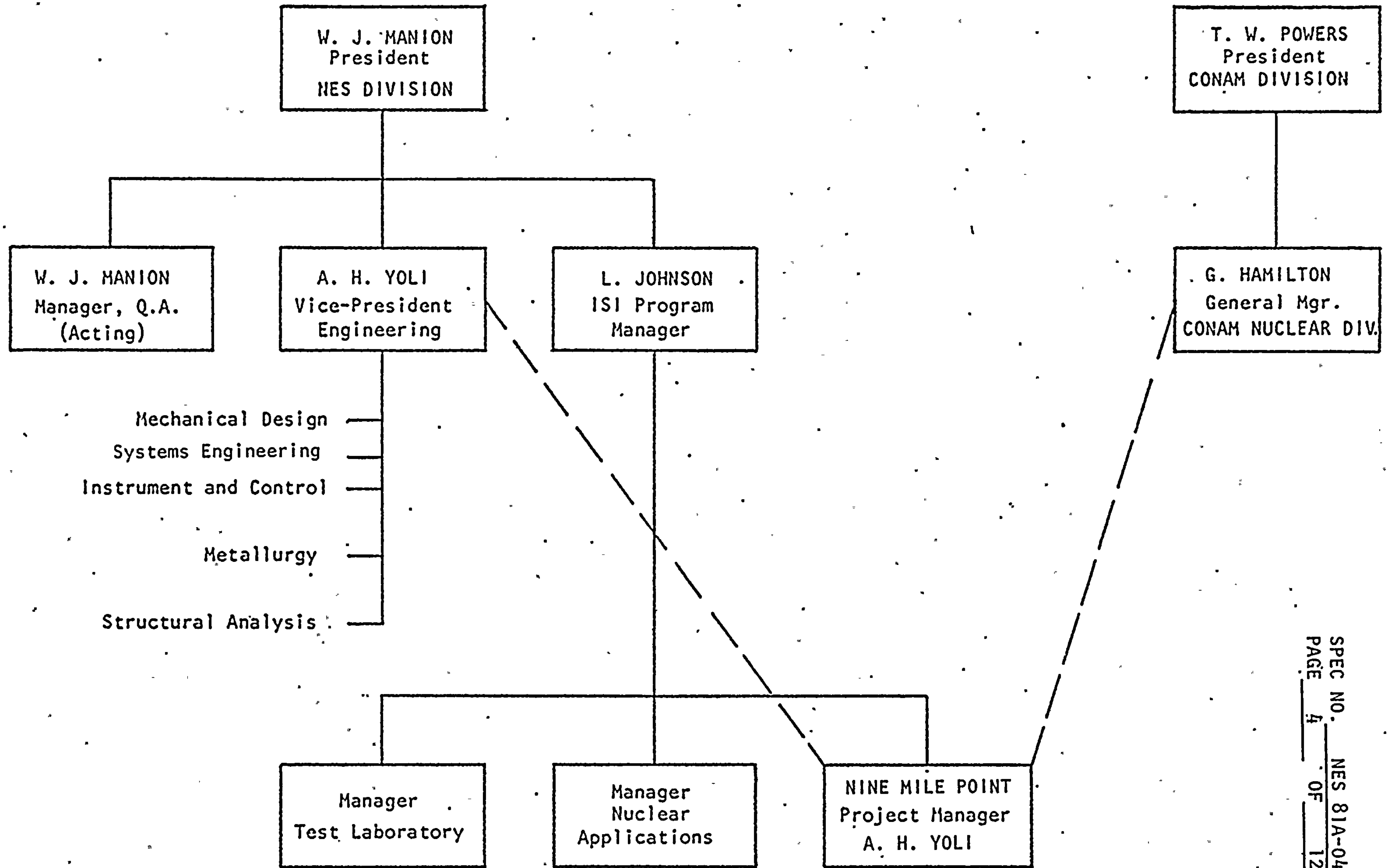
The project organization for the Nine Mile Point Unit 1 ISI program is shown in Figure 2.1. Mr. A. H. Yoli, Vice President of Engineering, is assigned as Project Manager for this program.

2.2 PROJECT RESPONSIBILITIES

2.2.1 Nine Mile Point Unit 1 ISI Project Manager

1. Define the specific scope, schedule and budget for each task.
2. Ensure that each task is performed in full compliance with scope, schedule and budget requirements.
3. Establish and maintain communications with Niagara Mohawk (NM).
4. Maintain the NM Project Engineer aware of task progress and of all problem areas as they develop.
5. Obtain all formal approvals from the customer.
6. Solely responsible for making all commitments to the Customer other than those explicit in the work plan.
7. Maintain the ISI Program Manager and cognizant functional department managers aware of project progress and problems.
8. Prepare and approve the work plan and task plans.

FIGURE 2.1


W. J. MANION
President
NES DIVISION
T. W. POWERS
President
CONAM DIVISION
W. J. MANION
Manager, Q.A.
(Acting)
A. H. YOLI
Vice-President
Engineering
L. JOHNSON
ISI Program
Manager
G. HAMILTON
General Mgr.
CONAM NUCLEAR DIV.
Mechanical Design
Systems Engineering
Instrument and Control
Metallurgy
Structural Analysis
Manager
Test Laboratory
Manager
Nuclear
Applications
NINE MILE POINT
Project Manager
A. H. YOLI

2.2.2 Nine Mile Point Unit 1 ISI Task Engineer

1. Responsible to the Project Manager for accomplishing his assigned task in accordance with the defined scope, schedule and budget.

2. Obtain commitment of resources necessary for accomplishment of the task.

3. Maintain the Project Manager aware of progress and of any developing problems.

4. Accomplish task goals in accordance with the task implementation plan.

2.2.3 Manager, Quality Assurance

1. Prepare the Quality Assurance Plan.

2. Periodically audit each task work effort to ensure compliance with program quality assurance requirements.

3. Ensure, by formal audit, that any noncompliance item is corrected within 30 days.

3. PROGRAM MANAGEMENT

3.1 PROJECT/TASK APPROACH

Nuclear Energy Services utilizes the Project/Task approach to implement ISI projects. The Project Manager has total responsibility for technical performance, administration and cost control of all work.

Tasks are established to define the major work areas of the project. All tasks are defined in detail in the approved project Work Plan. Task Plans are prepared for each task based on the scope, schedule and budget information of the Work Plan. The larger tasks will be divided into as many as eight sub-tasks to provide more effective administration and control of task activities. For example, Task 300 has sub-tasks 310 to 380. Project charges will be accrued by task. The Task Plan specifies the task engineer responsible for accomplishment of the task and, where appropriate, any assigned sub-task engineers.

3.2 WORK PLAN

The Work Plan for the Nine Mile Point Unit 1 ISI Program shall describe the four basic tasks of the project, establish the overall project schedule, and present cumulative estimated program costs and manhours keyed to major project milestones.

3.3 TASK PLANS

All work performed under the project shall be accomplished in accordance with specific task plans. Each task plan shall be based on and be in agreement with the Work Plan. Task plans shall include the following information:

1. statement of objective of task;

2. detailed description of work to be accomplished including output of task;

3. specific quality assurance requirements including required documentation, check lists and review meetings;

4. identity of Task Engineer and assigned Sub-task Engineer;

5. detailed schedule for accomplishing task;

4. PROJECT LIAISON

4.1 COMMUNICATION GUIDELINES

Maintenance of adequate communications is a particular necessity in the Nine Mile Point ISI Program becuase of the extended duration of the contract period., the goal of keeping program performance off the "critical path", and the necessity for providing the field inspection service when plant operational factors dictate. To ensure proper coordination of ISI related work, certain basic guidelines must be adhered to:

1. Informal communication between Nuclear Energy Services personnel and cognizant personnel within Niagara Mohawk is encouraged for purposes of exchanging information. This is necessary to facilitate efficient accomplishment of the project.

2. Communications that involve transmittal of documents, data required or input to task work, or data resulting from task work shall be made in writing.

3. All communications from Nuclear Energy Services involving transmittal of controlled documents or requests for approval shall be directed to the NM Project Engineer.

4.2 TRIP REPORTS

Every trip made by Nuclear Energy Services personnel shall be documented by a trip report which clearly defines the subject of the trip, and summarizes all discussions and decisions.

4.3 LIAISON CONTACTS

The following personnel shall be the primary contact for all formal communications relative to the Nine Mile Unit 1 ISI program:

1. Niagara Mohawk Power Corporation -

   Mr. Robert Baker, NM Project Engineer

2. Nuclear Energy Services, Inc. -

   Mr. A. H. Yoli, Nine Mile Point Unit 1 ISI Project Manager

5. PROCEDURES

5.1 CONTROLLED DOCUMENTS

Throughout the performance of the project work scope a number of controlled documents will be generated. They include, for example, boundary diagrams and inspection procedures. All controlled documents to be generated in a task shall be specifically identified in each task plan. Controlled documents prepared by NES Division shall be filed, distributed, reproduced

and modified in accordance with NES Document Control Procedure No. 80A9003. A controlled document requiring Customer approval shall not be entered into the NES document control system until formal approval of the document is received from the NM Project.

Controlled documents prepared by the Conam Inspection Division shall be controlled in accordance with the Conam Quality Control Manual 25-QCM-001.

5.2 FIELD INSPECTION PROCEDURES

5.2.1 Calibration Standards Records

Prior to initiation of instrument calibration at the plant site, a copy of the certification of the calibration blocks to be used shall be furnished to the Task Engineer.

5.2.2 Certification of Equipment

5.2.2.1 Certification of Ultrasonic Instruments

Each ultrasonic instrument's linearity shall be verified and documented within ninety (90) days of the use of such equipment. Ultrasonic instrument linearity shall be verified by Conam Inspection Division Procedure 25-PS-002,Rev. 1. This document provides for verification of horizontal linearity, vertical linearity and control linearity. It also contains an ultrasonic instrument linearity record.

The linearity records for each instrument shall be maintained at the Conam Division site in Rahway, New Jersey. The linearity record shall accompany each instrument to the examination site.

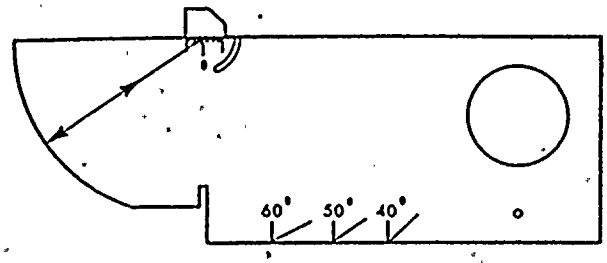
5.2.2.2 Certification of Ultrasonic Transducers

Ultrasonic transducers shall be certified as to frequency via a transmitted spectrum analysis obtained from the manufacturer or generated by NES after receipt of the transducers. The spectrum analysis shall identify the transducer by serial number and indicate graphically the center frequency and band width of the transducer. The measured center frequency shall not exceed $\pm$ 10% of the specified frequency. The spectrum analysis shall be verified by a certified LEVEL III examiner. A copy of the transmitted spectrum analysis shall accompany all transducers to an examination site. The original document shall be maintained in the Conam Division, Rahway, New Jersey office.

5.2.2.3 Verification of Refracted Angle and Point of Incidence for Flat Search Unit Wedges and Manual Scan Fixtures

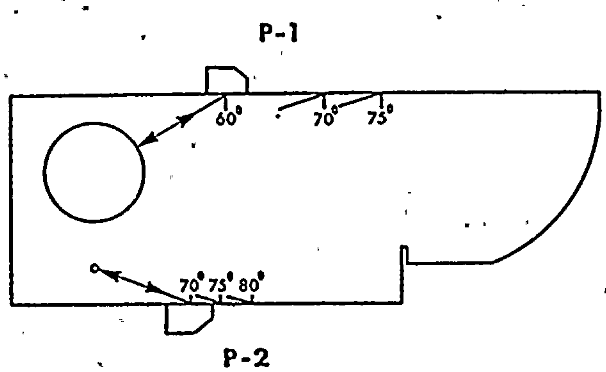
The point of incidence (beam exit point) and the refracted angle of flat search unit wedges and manual scan fixtures shall be verified using an IIW Block in accordance with ASTM E-164-74 Annex A.1. A summary of this annex is as follows:

1. Point of Incidence



1. Obtain peak signal from 4" (100mm) radius.
2. Sound beam point of incidence coincides with 0 on test block.

2. Angle Determination



1. Set 60°-75° search units at P-1 and obtain peak amplitude signal from 2" (50mm) dia. hole. Read exact refracted angle where point of incidence intersects scale.
2. Set 70°-80° search units at P-2 and obtain peak amplitude signal from 0.060" (1.5mm) dia. hole. Read exact refracted angles as above.
3. Reverse block for determination of angles 35° to 65°.

The points of incidence shall have a tolerance of ± 1/8 inch from the reference mark on the wedge. For wedges or scan fixtures which have no reference mark, a scribed line shall be placed on the wedge or fixture within ± 1/16 of the beam exit point. The refracted angle shall be ± 3° for the 60° and 45° wedges or scan fixtures.

The point of incidence and refracted angle shall be verified during initial calibration and at the beginning of each shift during the inspection period.

5.2.2.4 Final Verification of Examination Calibration

At the conclusion of the complete examination or when an instrument is taken out of service, the examination calibration shall be verified in accordance with the examination procedure. This will insure data reliability for the last 8 hour period of instrument use.

5.2.3 Certification of Inspection Personnel

Inspection personnel supplied by Nuclear Energy Services, Inc. to perform the examinations of this task shall be certified in accordance with CONAM personnel certification procedures. A permanent record of each examiner's qualifications shall be maintained at the Conam home office as per these procedures.

The certification documentation to be presented on-site for each examiner is the "Personnel Qualification Summary". This is a summary of the individual's certification level, training, experience, physical examination and technical examination record. A copy of the Examiner's certification shall also be provided. A copy of each examiner's eye test results, including the title and certifying signature of the person who administered the eye test, shall be provided.

5.2.4 Certification of Materials

A certification of the chemical content of couplant, cleaners and penetrant materials to be used in the examinations shall be provided with the material on-site. The original shall be maintained in the Conam Division, Rahway, New Jersey office.

5.2.5 Field Data Control System

The control of the inspection data obtained in the field shall be in accordance with "Inservice Inspection Data Control System", 25-DC-001, Rev. 1, of July 24, 1975.

5.3 CORRESPONDENCE

All correspondence associated with the Project, both direct and by copy, shall be sent to the following cognizant organization representatives:

1. Niagara Mohawk Power Corporation:

   Mr. T. Perkins
   NIAGARA MOHAWK POWER CORPORATION
   Nine Mile Point Nuclear Station-Unit 1
   P.O. Box 32
   Lycoming, NY 13093

2. Nuclear Energy Services, Inc.

   Mr. A. H. Yoli, Project Manager
   NES Division
   Nuclear Energy Services, Inc.
   Shelter Rock Road
   Danbury, Connecticut 06810 (Tel. 203 - 748-3581)

The number of copies of all correspondence, including enclosures, shall be as follows (unless otherwise stated in the contract):

	Sent To	No. of Copies
1.	NM	3
2.	NES	3

The NES Project Manager shall maintain a chronological file of all project correspondence both incoming and outgoing.

5.4 APPROVAL ACTION PERIODS

Approval actions shall be accomplished by NM within the following periods:

	Working Days
Quality Assurance Plan	10
Changes to Q. A. Plan	30
Task Output Segments	5

5.5 OTHER PROCEDURES

There may be other administrative procedures required in the performance of a specific task. These procedures shall be included or referenced in the quality assurance section of the appropriate task plan.

6. QUALITY ASSURANCE AUDITS

6.1 GENERAL

An exit interview shall be held at the completion of all audits between the auditor(s) and the cognizant NES, Inc. personnel. All deficiencies shall be thoroughly discussed at that time.

The auditor shall issue a written audit report within ten working days of the audit.

6.2 INTERNAL

A minimum of one audit shall be performed by the NES Manager of Quality Assurance, or his representative, during the accomplishment of each of the four basic tasks comprising the project scope. Any "unsatisfactory" condition noted in an audit will require a formal re-audit to assure correction of the condition.

6.3 EXTERNAL

Niagara Mohawk may perform audits of any task work. Audits performed at Nuclear Energy Services facilities shall be accommodated by Nuclear Energy Services personnel. A minimum of three days prior notice for such an audit is required to assure availability of cognizant task personnel during the audit.

WORK PLAN

FOR THE

NINE MILE POINT NUCLEAR STATION UNIT I

TEN YEAR INSERVICE INSPECTION PROGRAM

Prepared For

Niagara Mohawk Power Corporation

Syracuse, New York

by

NUCLEAR ENERGY SERVICES, INC.

Danbury, Connecticut 06810

Prepared by: A. H. Yale

Approved by: [illegible]

Date: 9/2/75

1. INTRODUCTION

The function of this Work Plan is to define the purpose, scope of work, schedule, and projected costs for the Nine Mile Point I Inservice Inspection Program as presented in NES Proposal 74045.

2. PURPOSE

The purpose of this work is to develop and implement an inservice inspection program which meets NRC requirements for Niagara Mohawk Power Corporation's Nine Mile Point Nuclear Station Unit I. The inservice inspection program covers the first ten year inservice inspection interval.

3. SCOPE OF WORK

To develop and implement an inservice inspection program which covers the first ten year inservice inspection interval, the work has been divided into a series of tasks (and subtasks as applicable) as shown in Table I. Task 100, Project Management, is used to review the performance and status of individual tasks, to provide liaison between different divisions of Automation Industries and for contact/liaison between Niagara Mohawk Power Corporation and Automation Industries. Tasks 200 and 300 are the tasks required to develop the inservice inspection program. Task 200, Design Review, provides the basic plant information required to prepare the program. Task 300, ISI Program Plan Preparation, is the task under which the detailed program plan book is actually prepared. Task 400, Implementation of the Inservice Inspection, covers the inservice inspection scheduled to be performed during the ten year inspection interval. Task 500 is the task under which calibration blocks which are required for the 10-year inspection interval will be procured and fabricated.

Detail Task Plans have been prepared for Task 100 through 500.

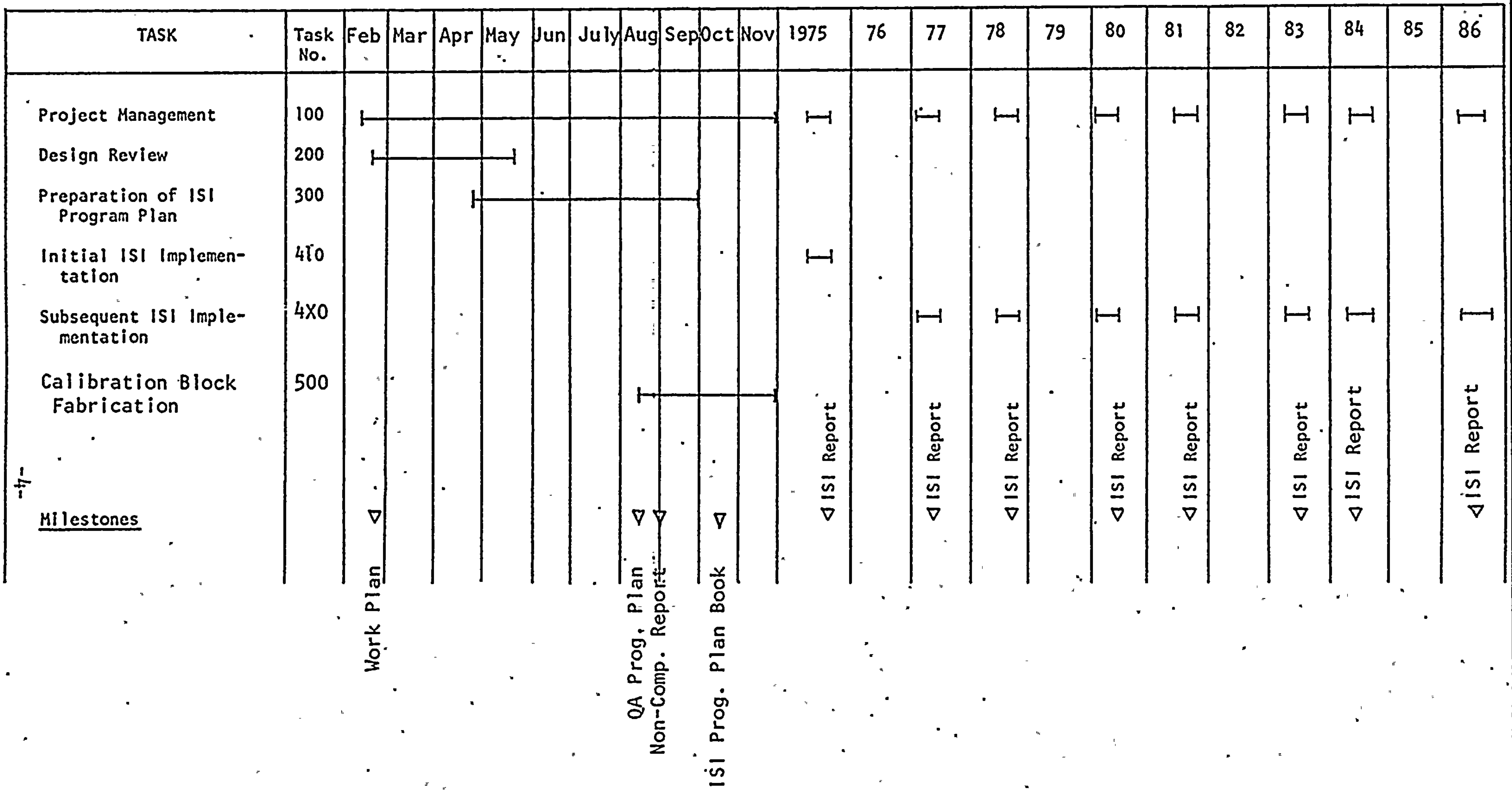
TABLE I

NINE MILE POINT I - ISI PROJECT TASKS

Task	Subtask		Title
100			Project Management
200			Design Review
	210		Preparation of Boundary Diagrams
	220		Development of Zone Designations
	230		Component Design Review
	240		Systems Design Review
	250		Preparation of Non-Compliance Report
300			ISI Program Plan Preparation
	310		Preparation of Piping System (isometric) and Component Drawings
	320		Development of ten year ISI Program
	330		Definition of Pre-examination Requirements.
	340		Development of Personnel Requirements and Schedule
	350		Preparation of Detailed Examination Procedures
	360		Preparation of Calibration Block Detail Drawings
	370		Preparation of QA Program Plan for ten year ISI program
	380		Preparation of ISI Program Plan Book
400			Implementation of ISI Program (10-year interval)
	410		Implementation of 1975 ISI program
		411	Pre-examination Preparation
		412	Examination
		413	Preparation of Report
	420	/421,22,23/	Implementation of 1977 ISI program
	430	"	" " 1978 " "
	440	"	" " 1980 " "
	450	"	" " 1981 " "
	460	"	" " 1983 " "
	470	"	" " 1984 " "
	480	"	" " 1986 " "
500			Calibration Block Fabrication

FIGURE I

OVERALL PROJECT SCHEDULE



4. SCHEDULE

The overall schedule for the ten year ISI program for Nine Mile Point I is presented in Figure 1. The ISI program development phase is scheduled in months with the ISI Program Plan Book to be completed and submitted to Niagara Mohawk in early October, 1975. The ISI program implementation phase is scheduled in years and is based on the next Nine Mile Point I outage occurring in September, 1975 and a projected 18 month refueling cycle. The 18 month refueling cycle is not compatible with the ten year inservice inspection interval so that the proposed schedule for the final 1/3 of the interval is arbitrary.

PROGRAM MANAGEMENT TASK PLAN

(TASK 100)

For The

NINE MILE POINT NUCLEAR STATION UNIT 1
TEN YEAR INSERVICE INSPECTION PROGRAM

Prepared For

NIAGARA MOHAWK POWER CORPORATION
Syracuse, New York

NUCLEAR ENERGY SERVICES, INC.
Danbury, Connecticut 06810

Prepared by: A. A. Yoli

Approved by: W J Maa

Date: 9/2/75

1. OBJECTIVE

The objective of this task is to perform the management/administrative functions required to execute the project workscope.

2. METHOD OF APPROACH

1. The initial activity in this task is to prepare the Project Work Plan which defines the purpose, general workscope, schedule and projected costs for the Nine Mile Point 1 Ten Year Inservice Inspection Program. The Project Work Plan is supplemented by Task Plans which define in detail the method of approach and workscope for the major project activities.

2. Subsequent activities in this task will include the preparation of information requests (e.g. for plant and plant component drawings), liaison contacts with Niagara Mohawk personnel, holding status review meetings both in-house and with the Customer and performing technical reviews of task output.

3. Implement Ten Year Inservice Inspection Program activities in accordance with the Program Plan and Nine Mile Point 1 plant outage schedules. This effort includes the preparation of the ISI Implementation Task Plans, liaison with the Conam Inspection Division to initiate/execute preparations for the examinations and the review/issuance of examination reports.

3. WORKSCOPE

1. Prepare Project Work Plan and Task Plans as required. Request Niagara Mohawk review and approval.

2. Request Nine Mile Point 1 plant system drawings (P&IDs, piping isometrics, component drawings, etc. as required to perform design review (Task 200) and prepare the Inservice Inspection Program Plan (Task 300).

3. Make liaison contacts with Customer to expedite performance of Project Workscope.

4. Hold status and technical review meetings with Customer and/or with in-house personnel.

5. Plan and execute Inservice Inspection Program activities in accordance with the Nine Mile Point 1 ISI Program Plan and Nine Mile Point 1 outage schedules.

4. QUALITY ASSURANCE REQUIREMENTS

Program management activities (e.g. status review meetings, etc.) will be performed in accordance with the requirements of the NES Quality Assurance Manual (NES 81A9003) as supplemented by the Project Quality Assurance Plan (NES 81A0402).

5. TASK ENGINEER

The Project Engineer, Mr. A. H. Yoli, is Task Engineer for Task 100.

6. SCHEDULE

This task is scheduled to cover the 10 year ISI interval.

DESIGN REVIEW TASK PLAN

(Task 200)

for the

NINE MILE POINT NUCLEAR STATION UNIT 1

TEN YEAR INSERVICE INSPECTION PROGRAM

Prepared For

NIAGARA MOHAWK POWER CORPORATION
Syracuse, New York

NUCLEAR ENERGY SERVICES, INC.

Danbury, Connecticut 06810

Prepared by A. H. Yoli

Approved by [illegible]

Date 9/2/75

1. OBJECTIVE

The objectives of this task are: 1. to specify the required examination areas for each Class 1, Class 2 and Class 3 reactor plant piping system; 2. to determine accessibility to each specific examination area; 3. to select suitable ISI techniques, equipment and procedures for each specific examination area, and 4. to develop recommendations for correcting areas which have been identified as inaccessible or alternative examination methods.

2. METHOD OF APPROACH

To achieve the task objectives, this task has been subdivided into five subtasks as follows:

Subtask	Title
210	Preparation of Boundary Diagrams
220	Preparation of Zone Designations
230	Design Review of Reactor Plant Water and Steam Containing Components
240	Design Review of Reactor Plant Water and Steam Containing Piping Systems
250	Preparation of Non-Compliance Report

2.1 SUBTASK 210 - PREPARATION OF BOUNDARY DIAGRAMS

1. Under the Project Management task, Niagara Mohawk would be requested to make available to NES (at the NMP1 site if necessary) all of the basic system diagrams for reactor plant water and steam containing systems which may have sections which can be classified either ASME Class 1, 2 or 3. Furthermore, Niagara Mohawk would be requested to provide any classification information that has been previously developed.

2. NES would review the basic system diagrams for each system and establish the ASME Class 1, 2 and/or 3 boundaries in accordance with the requirements of Section 50.55a of 10 CFR 50 and NRC Regulatory Guide 1.26, "Quality Group Classification and Standards".

3. NES would compare the boundaries established by the review with any previously developed classification information (based on NRC Quality Groups). Differences in classification would be resolved with Niagara Mohawk.

4. At this point NES would prepare, Boundary Diagrams for the systems which contain sections classified ASME Class 1, 2 and/or 3. These Diagrams, which are basically flow diagrams, include each component within each classified section with its plant identification number. Sections of the system outside the Class 3 boundary will not be shown unless required for clarity. If any Boundary Diagrams have been previously developed for Niagara Mohawk by other vendors, they will be reviewed by NES for completeness and compliance with the mutually agreed to boundaries (paragraph 3). If the diagrams are suitable, NES would recommend their use in order to avoid duplication of effort.

5. NES personnel would check the completed Boundary Diagrams against a prepared check list in order to ensure accuracy and completeness. The Diagrams would be reworked as required to satisfy the check list requirements.

6. The checked Boundary Diagrams would be submitted to Niagara Mohawk for approval.

2.2 SUBTASK 220 - PREPARATION OF ZONE DESIGNATIONS

1. This subtask would be performed in parallel with Subtask 210.

2. Under the Project Management Task, Niagara Mohawk would be requested to make available to NES any information about a Zone Designation System developed by either Niagara Mohawk and/or other vendors. In addition, NES would require access to the reactor and turbine building drawings (plan and elevation views).

3. NES would evaluate the suitability of any existing Zone Designation System against the standard NES system and recommend to Niagara Mohawk which system should be used for the ten year ISI program plan. If another Boundary Designation System is suitable and already in use, NES would recommend its use in order to avoid duplication of effort.

4. NES would prepare Zone Designation drawings using the Zone Designation System which was mutually selected by NES and Niagara Mohawk (in item 3 above). If suitable Zone Designation drawings prepared by others are available, NES would recommend their use in order to avoid duplication of effort.

5. NES personnel would check the completed Zone Designation Drawings against a prepared check list to ensure accuracy and completeness. The drawings would be reworked as required to satisfy the check list requirements.

6. The checked Zone Designation Drawings would be submitted to Niagara Mohawk for approval.

2.3 SUBTASK 230 - DESIGN REVIEW OF REACTOR PLANT WATER AND STEAM CONTAINING COMPONENTS

1. This subtask would be initiated when the engineering work on the preceding subtasks is completed and available as input for this subtask along with the Nine Mile Point 1 plant drawings.

2. For each reactor plant water and steam containing system, develop a list of components for each ASME Class (1, 2 or 3). The objective of the list is to develop sufficient information about a component so that identical components can readily be correlated. Basic information would be listed as follows: component name, component identification number, reference drawing(s), component type (and size, rating, and material), manufacturer's name and model number.

3. For each Class 1 or Class 2 component which has been determined to be different (e.g. different size, rating, type, manufacturer, etc) NES personnel would review the available component detail drawings and manuals to establish for each weld requiring examination, per ASME Section XI, the following information: material, weld configuration, and ASME examination category. Weld configuration information would be in the form of sketches which would include clearance information.

   NOTE:

   NES intends to prepare forms to facilitate the recording and checking of basic design review information developed in paragraphs 2 and 3 above.

2.4 SUBTASK 240 - DESIGN REVIEW OF REACTOR PLANT WATER AND STEAM CONTAINING PIPING SYSTEMS

1. This subtask would be initiated when subtask 230 is completed.

2. Under the Project Management Task, Niagara Mohawk would be requested to make available to NES any weld identification system and/or information developed by others for NMP1.

3. NES would evaluate the suitability of any existing weld identification system against the standard NES system and recommend to Niagara Mohawk which should be used for the ten year ISI program plan. If another weld identification system is suitable and already in use, NES would recommend its use in order to avoid duplication of effort.

4. For each system involving ASME Class 1 and/or 2 components, NES personnel would review the building and piping layout drawings to assign identification numbers to each piping weld and piping-to-component weld. The component welds (identified under Subtask 230) are also assigned identification numbers.

5. For each identified weld, NES personnel would complete the design review by developing and recording the following information on the appropriate form: weld description, ASME Code Class (and examination category and method), zone designation, weld configuration clearances, (radial, axial), accessibility, examination time, personnel requirements, insulation (shielding removal requirements, potential radiation levels. In addition, pertinent comments such as the effect of improved surface preparation on reduced examination time (cost benefits) would be included where applicable.

6. For each system involving ASME Class 3, NES personnel would review the building and piping layout drawings to assign identification numbers to each area (components and their supports) which are to be inspected visually. Areas which may provide evidence of unanticipated component leakage, structural distress, corrosion, inadequate support and unintended restraint are of specific interest.

7. NES personnel would check the completed weld identification number from (Class 1 and Class 2) against a prepared check list to ensure accuracy and completeness.

8. For selected areas, NES would verify to the maximum extent permitted by NMP1 plant conditions that the information developed in paragraphs 5 and 6 is correct. The weld and visual inspection area identification number forms would be revised as required to reflect field conditions.

2.5 SUBTASK 250 - PREPARATION OF NON-COMPLIANCE REPORT

1. This subtask would be initiated when Subtask 240 is completed.

2. For each Class 1 or 2 weld identified in Subtask 240 as not fully inspectable, NES would prepare a report which provides the following information: weld identification number, zone designation, location on piping or in component, ASME Class (and examination category and method), and nature of interfering conditions (e.g. inadequate surface preparation, insufficient clearance/access, excessive radiation levels, etc.). In addition, NES would include in the report recommendations for corrective action and/or alternative examination methods (e.g. the use of remote examination equipment). Critical Class 3 components which cannot be visually inspected will be similarly characterized in the report.

3. NES would submit the report to Niagara Mohawk for approval and action relating to the NES recommendations.

3. WORK SCOPE

3.1 SUBTASK 210 - PREPARATION OF BOUNDARY DIAGRAMS

1. Review the basic reactor plant system diagrams and establish the ASME Class 1, 2 and/or 3 boundaries in accordance with AEC requirements.

2. Compare boundary information developed in 1 above with any previously developed classification information. Resolve discrepancies as required.

3. Prepare Boundary Diagrams.

4. Check Boundary Diagrams against prepared check list. Rework diagrams as required to satisfy check list requirements.

5. Submit Boundary Diagrams to Niagara Mohawk for approval.

3.2 SUBTASK 220 - PREPARATION OF ZONE DESIGNATIONS

1. Evaluate suitability of any existing Zone Designation system against NES system and select appropriate system for NMP1.

2. Prepare Zone Designation Drawings.

3. Check Zone Designation Drawings against prepared check list. Rework drawings as required to satisfy check list requirements.

4. Submit Zone Designation Drawings to Niagara Mohawk for approval.

3.3 SUBTASK 230 - DESIGN REVIEW OF REACTOR PLANT WATER AND STEAM CONTAINING COMPONENTS

1. Develop a comprehensive list of ASME Class 1, 2 and/or 3 components for each reactor plant water and steam containing system and establish which components are identical and in same ASME Class.

2. For each Class 1 or 2 component which is unique, review component detail drawings and manuals to define, characterize and sketch component welds.

3. For each Class 3 component which is unique, review component detail drawings and manuals to identify component areas to be visually inspected.

3.4 SUBTASK 240 - DESIGN REVIEW OF REACTOR PLANT WATER AND STEAM CONTAINING PIPING SYSTEMS

1. Evaluate suitability of any existing weld identification system against NES system and select appropriate system for NMP1.

2. Assign weld identification numbers to each piping and component weld in each Class 1 and/or 2 piping system.

3. Complete system design review for the Class 1 and/or 2 piping systems by developing and recording comprehensive information for each weld on its ability to be examined (e.g. surface preparation, accessibility, radiation levels, etc.).

4. Assign visual inspection area identification numbers to each Class 3 piping system.

5. Check completed identification forms against prepared check list. Revise forms as required to satisfy check list requirements.

6. For selected areas, verfiy to the maximum extend permitted by NMP1 plant conditions that the information developed in items 3 and 4 is correct. The identification forms would be revised as required to reflect field conditions.

3.5 SUBTASK 250 - PREPARATION OF NON-COMPLIANCE REPORT

1. Prepare non-compliance report which lists all Class 1 or 2 welds identified in Subtask 240 as not fully inspectable. Report would include nature of non-complying (or interfering) condition and recommendations for corrective action and/or alternative methods of examination (e.g. use of remote examination equipment).

2. Submit report to Niagara Mohawk for approval and action relating to NES recommendations.

4. QUALITY ASSURANCE REQUIREMENTS

4.1 REQUIRED DOCUMENTATION

1. The following documents are defined as controlled documents:

   a. Boundary Diagrams
   b. Zone Designation Drawings
   c. Weld Identification Forms
   d. Non-Compliance Report

2. Controlled documents (reports and drawings) will be recorded, approved, issued and revised in accordance with the NES 80A9003, NES Document Control Procedure.

3. Niagara Mohawk approval is required for documents a , b , and d.

4. Niagara Mohawk action is required for documents c and d.

4.2 Q. A. AUDIT CHECK LISTS

1. Documents a , b , and c , will be audited in accordance with the following QA Audit Check Lists:

   1. ISI Design Review Boundary Diagram, #80A0532
   2. ISI Design Review Zone Designations, #80A0533
   3. ISI Design Review Weld Identification, #80A0534

2. Documents a , b , and c , will not be released to Niagara Mohawk until appropriate check list requirements have been fully satisfied.

3. Check lists will be completed by designated representative of Quality Assurance Manager. Check lists will be signed by person preparing check list, countersigned by Task Engineer, and approved by Quality Assurance Manager.

4. Check lists shall be retained in Project file by Project Engineer and in Project Quality Assurance file by the Q.A. Manager.

4.3 STATUS MEETINGS

1. Internal technical status meetings will be held by the Project Engineer at the midpoints of Subtasks 230 and 240.

2. The first technical status meeting with the Customer will be held at the completion of this Task.

5. TASK ENGINEER

Mr. Albert Uziel is Task Engineer for Task 200. He is responsible for the performance of all work items listed in Section 3 for each subtask.

6. SCHEDULE

This task is scheduled to be initiated on February 3, 1975 pending Niagara Mohawk approval of the basic Work Plan and this Task Plan. Based on the expected start date, all work will be completed by June. 1975.

The principal Task outputs are scheduled for completion as follows:

Date	Item
4-25-75	Boundary Diagrams
5-16-75	Zone Designation Drawings
5-30-75	Weld Identification Forms (Class 1 and 2 piping and components)
8-29-75	Non-Compliance Report

ISI PROGRAM PLAN PREPARATION TASK PLAN

(Task 300)

for the

NINE MILE POINT NUCLEAR STATION UNIT 1

TEN YEAR INSERVICE INSPECTION PROGRAM

Prepared For

NIAGARA MOHAWK POWER CORPORATION

Syracuse, New York

NUCLEAR ENERGY SERVICES, INC.

Danbury, Connecticut 06810

Prepared by A. H. Yoli

Approved by W. J. Mann

Date 4/2/75

1. OBJECTIVE

The objective of this task is to prepare the Inservice Inspection Program Plan, a comprehensive document which contains all the information necessary for the performance of the inservice examination for the Nine Mile Point Nuclear Station Unit 1 over the ten year inspection interval in accordance with the mandating NRC requirements.

2. METHOD OF APPROACH

To achieve the task objective, this task has been subdivided into eight subtasks as follows:

Subtask	Title
310	Preparation of Piping System (isometric) and Component Drawings
320	Development of ten year ISI Program
330	Definition of Pre-Examination Requirements
340	Development of Personnel Requirements and Schedule
350	Preparation of Detailed Examination Procedures
360	Preparation of Calibration Block Detail Drawings
370	Preparation of Quality Assurance Program Plan for the ten year ISI Program
380	Preparation of ISI Program Plan Book

2.1 SUBTASK 310 - PREPARATION OF PIPING SYSTEM AND COMPONENT DRAWINGS

1. This subtask would be initiated after the Design Review of Reactor Plant Components (Subtask 230) is completed. Input for this task would be obtained from Subtasks 210, 220, 230 and 240.

2. NES would prepare isometric drawings of the piping systems for which Boundary Diagrams were developed (Subtask 210). The purpose of the drawings is to give a pictorial location of each piping and piping-to-component weld. Weld Identification Numbers and Reactor Plant Component Identification Numbers would be included in the drawings.

3. NES would prepare component drawings to give a pictorial location of each weld, Weld Identification Numbers and Reactor Plant Component Identification Number.

4. NES personnel would check the completed drawings against a prepared check list in order to ensure accuracy and completeness. Drawings would be reworked as required to satisfy the check list requirements.

5. The checked drawings would be transmitted to Niagara Mohawk for information.

2.2 SUBTASK 320 - PREPARATION OF TEN YEAR ISI PROGRAM

1. This subtask would be initiated after the Design Review of Reactor Plant Piping Systems (Subtask 240) was completed. Input for this subtask would be obtained primarily from Subtask 240, ASME Section XI, Subtask 340 (Preparation of Detailed Examination Procedures), and Niagara Mohawk reports on any previous ISI examinations.

2. For each ASME Class 1 and/or 2 reactor plant system weld, NES personnel would develop and record the following information. The purpose of the information is to define the specific ISI requirements for each Class 1 and/or 2 system weld (including component welds).

Information	Source
Weld identification number	Weld Identification Table (Subtask 240)
Weld description	" " "
Reference document	" " "
ASME class	" " "
ASME examination category	" " "
ASME examination method	" " "
ASME examination requirements	ASME Section XI
Inspection year	NES / ASME Section XI
ISI examination procedure	Subtask 350

3. For each ASME Class 3 reactor plant system or component area identified in Subtask 240, NES personnel would develop and record the following information. The purpose of the information is to define the specific ISI requirements for each identified Class 3 area.

Information	Source
Visual inspection area identification number	Subtask 240
Description of area	" "
Reference document	" "
Examination requirements	ASME Section XI
Inspection year	NES/ASME Section XI
ISI examination procedure	Subtask 350

4. The following information for each inspection year identified in paragraph 2, NES personnel would develop and record for each Class 1 and/or 2 weld in the same zone and utilizing the same ISI examination procedure:

Information		Source
Inspection year	) same for each	Paragraph 2
Examination procedure	) weld listed	" "
Zone designation	) on form	" "
Reference drawing for location		Subtask 310
ASME examination requirements		Paragraph 2
Calibration block		Subtask 350

5. For each inspection year identified in paragraph 3, NES personnel would develop and record the following information for each Class 3 visual inspection area in the same zone and utilizing the same ISI examination procedure:

Information		Source
Inspection year	) same for each	Paragraph 3
Examination procedure	) weld listed	" "
Zone designation	) on form	" "
Reference drawing for location		Subtask 310
Examination requirements		Paragraph 3

6. The data developed in paragraphs 4 and 5 properly organized and indexed constitute the basic ten year inservice inspection program for NMP1. The information defines each weld or visual inspection area which is to be inspected in each inspection year. The welds or visual inspection areas are grouped according to common zone and examination procedure. In addition, the information would reflect the effect of previous ISI examinations.

7. NES personnel check the recorded data against a prepared check list. Data would be reworked as required to satisfy the check list requirements.

2.3 SUBTASK 330 - DEFINITION OF PRE-EXAMINATION REQUIREMENTS

1. This subtask would be initiated upon the completion of Subtask 320. Input for this subtask would be obtained from Subtasks 230, 240, and 320.

2. Using information developed primarily in the Design Review, NES personnel would define, for each inspection year, the requirements for utility services (electricity, water, air), facilities insulation removal, and scaffolding (permanent and temporary).

3. The requirements would be transmitted to Niagara Mohawk for information and action (as required).

2.4 SUBTASK 340 - DEVELOPMENT OF PERSONNEL REQUIREMENTS AND SCHEDULE

1. This subtask would be initiated when Subtask 330 is completed. Input for this subtask would be obtained from Subtask 330 and Niagara Mohawk.

2. For each inspection year, NES would determine the available inspection period based on outage information supplied by Niagara Mohawk (both actual and projected).

3. For each inspection year, NES personnel would determine the man-hours required to perform the Class 1 and 2 weld examinations. Any manhours used in preparation for the inspection which require the reactor plant to be shutdown would also be included. A similar determination would be made for the Class 3 examinations.

4. NES would establish the field crew requirements for each inspection year based on the data developed in paragraphs 2 and 3 and the personnel requirements specified in the ISI procedures.

5. NES would complete the personnel requirements and scheduling by determining the pre-examination preparation effort (prior to the reactor plant outage) and post-examination effort (preparation of final report and, as required, evaluation of flaw indication).

6. NES would prepare, for each inspection year, a schedule format which will display schedule and manpower requirements for the pre-examination, examination, and post-examination periods. In addition, the format would include the specific inspection work assignments (using the data developed in Section 2.2 paragraphs 4, 5 and 6).

2.5 SUBTASK 350 - PREPARATION OF DETAILED EXAMINATION PROCEDURES

1. This subtask is initiated (along with Subtask 320) when Subtask 240 has been completed.

2. For the Class 1 and/or 2 systems, NES would prepare a list of the detailed examination procedures which must be prepared based on the information developed in Subtask 240. This list would include calibration block requirements. A similar list of detailed examination procedures would be prepared for the Class 3 systems.

3. Using standard outline for weld examination procedures (see Attachment A), NES would prepare detailed examination procedures for each procedure identified in paragraph 2. Similar procedures would be developed for the Class 3 examinations.

2.6 SUBTASK 360 - PREPARATION OF CALIBRATION BLOCK DETAIL DRAWINGS

1. This subtask would be initiated near the end of Subtask 350. Input for this task would be obtained from Subtasks 230, 240 and primarily 350.

2. NES would prepare a detail drawing for each calibration block identified in Section 2.5, paragraph 2. The drawing would have sufficient detail and instructions to permit fabrication and be in accordance with ASME Section XI requirements.

3. NES personnel would check the completed drawings against a prepared check list. Drawings would be reworked as required to satisfy check list requirements.

2.7 SUBTASK 370 - PREPARATION OF QUALITY ASSURANCE PROGRAM PLAN FOR TEN YEAR ISI PROGRAM

1. This subtask would be initiated when Subtask 340 is completed.

2. The NES Quality Assurance Manager would prepare a Quality Assurance Program Plan which would cover each inspection year in the ten year ISI Program. The program would be in accordance with the requirements of the NES Quality Assurance Manual which is in compliance with Appendix B of 10 CFR 50.

2.8 SUBTASK 380 - PREPARATION OF ISI PROGRAM PLAN BOOK

1. This subtask would be initiated near the completion of Subtask 350. Input for this subtask is obtained from the Task 300 and 300 subtasks as required.

2. NES would prepare the ISI Program Plan Book in accordance with the standard book outline (Attachment B).

3. NES personnel would check the completed master copy against a prepared check list. Revisions to the master copy would be made as required to satisfy check list requirements.

4. NES would submit copies of the ISI Program Plan Book to Niagara Mohawk for comment and approval.

3. WORK SCOPE

3.1 SUBTASK 310 - PREPARATION OF PIPING SYSTEM AND COMPONENT DRAWINGS

1. Prepare isometric drawings to provide pictorial location of piping welds, piping-to-component welds, and components. Weld identification numbers and reactor plant component identification numbers would be included in the drawings.

2. Prepare component drawings to give pictorial location of each weld.

3. Check completed drawings in accordance with prepared check list.

4. Transmit completed and checked drawings to Niagara Mohawk for information.

3.2 SUBSTASK 320 - PREPARATION OF TEN YEAR ISI PROGRAM

1. Develop and record information required to define the specific ISI requirements for each Class 1 and/or 2 system welds (including component welds).

2. Develop and record information required to define specific ISI requirements for each Class 3 system or component area identified in Subtask 240.

3. Organize Class 1 and/or 2 system (or component) welds considered in item 2 according to common inspection year, zone, and inspection procedure.

4. Repeat item 3 for the Class 3 system or component areas considered in item 2.

5. Incorporate into the recorded information the effect of previous ISI examinations.

6. Check recorded information against a prepared check list.

3.3 SUBTASK 330 - DEFINITION OF PRE-EXAMINATION REQUIREMENTS

1. Define, for each inspection year, the requirements for utility services, facilities, insulation removal and scaffolding.

2. Transmit requirements to Niagara Mohawk for information and action as required.

3.4 SUBTASK 340 - DEVELOPMENT OF PERSONNEL REQUIREMENTS AND SCHEDULE

1. Establish outage durations for each inspection year based on actual/projected information from Niagara Mohawk.

2. Determine manhours required to perform Class 1 and 2 weld examinations for each inspection year. Include any manhours used for ISI preparation which require the plant to be shutdown. Make similar determination for Class 3 examinations.

3. Establish field crew requirements for each inspection year based on items 1 and 2.

4. Complete personnel requirements and scheduling by determining pre-examination effort (prior to plant shutdown) and post examination effort (preparation of final report and, as required, evaluation of flaw indication).

5. Prepare, for each inspection year, a schedule which displays manpower requirements for the pre-examination, examination, and post-examination periods.

3.5 SUBTASK 350 - PREPARATION OF DETAILED EXAMINATION PROCEDURES

1. Prepare list of examination procedures (including calibration block requirements required for the Class 1, 2 and 3 systems.

2. Using standard outline for weld examination procedures (Attachment A), prepare detailed procedures for each procedure identified in item 1. Develop similar procedures for the Class 3 examinations.

3. Check each procedure against a prepared check list.

3.6 SUBTASK 360 - PREPARATION OF CALIBRATION BLOCK DETAIL DRAWINGS

1. Prepare detail drawings for each calibration block identified in Section 3.5, Item 1. Drawings would be in accordance with ASME Section XI requirements.

2. Check completed drawings against prepared check list.

3. Transmit drawings to Niagara Mohawk for information and action as required.

3.7 SUBTASK 380 - PREPARATION OF ISI PROGRAM PLAN BOOK

1. Prepare ISI Program Plan Book in accordance with the standard book outline (Attachment B).

2. Check completed master copy against prepared check list. Make revisions as required to satisfy check list requirements.

3. Submit ISI Program Plan Book to Niagara Mohawk for comment and approval.

4. QUALITY ASSURANCE REQUIREMENTS

4.1 REQUIRED DOCUMENTATION

1. The following documents are defined as controlled documents:

   a. Piping System (isometric) and Component Drawings
   b. ISI Program Plan Forms
   c. Pre-examination Requirements
   d. Examination Procedures
   e. Calibration Block Drawings
   f. Quality Assurance Program Plan
   g. ISI Program Plan Book

2. Controlled documents (reports and drawings) will be recorded, approved, issued and revised in accordance with the NES 80A9003, NES Document Control Procedure.

3. Niagara Mohawk approval is required for documents f and g.

4. Niagara Mohawk action is required for documents c and e.

4.2 Q. A. AUDIT CHECK LIST

1. Documents a , b , d , e , and g will be audited in accordance with the following QA Audit Check Lists:

   1. ISI Design Review Isometric Drawings, #80A0535
   2. ISI Design Review Ten-Year Program, #80A0536
   3. ISI Design Review Examination Procedures, 80A0537
   4. ISI Design Review Calibration Block Drawings, 80A0538
   5. ISI Design Review Program Plan Book, #80A0539

2. Documents a , b , d , e , and g will not be released to Niagara Mohawk until appropriate check list requirements have been fully satisfied.

3. Check lists will be completed by designated representative of Quality Assurance Manager. Check lists will be signed by person preparing check list, countersigned by Task Engineer and approved by Quality Assurance Manager.

4. Check lists shall be retained in Project file (by Project Engineer) and in Project Quality Assurance file (by the Q. A. Manager).

4.3 STATUS MEETINGS

1. Internal technical status meetings will be held by the Project Engineer at the midpoints of Subtasks 320 and 340.

2. The second project technical status meeting with the Customer will be held at the midpoint of Subtask 380.

5. TASK ENGINEER

Mr. A. Uziel is Task Engineer for Task 300. He is responsible for the performance of all work items listed in Section 3 for each subtask.

6. SCHEDULE

This task is scheduled to be initiated on March 3, 1975 pending Niagara Mohawk approval of the basic Work Plan and this Task Plan. Based on the expected start date, all work will be completed by November, 1975.

The principal Task outputs are scheduled for completion as follows:

Date	Item
6-20-75	Isometric drawings
7-18-75	Calibration Block Diagrams
10-31-75	ISI Program Plan Book

ATTACHMENT A

UT PROCEDURE OUTLINE

1.0 Scope

- 1.1 Area of Examination
- 1.2 Type of Examination
- 1.3 Time of Examination
- 1.4 Configuration
- 1.5 Materials

2.0 References

- 2.1 Reference Documents
- 2.2 Applicable Drawings
- 2.3 Operational Manuals

3.0 Procedure Certification

4.0 Personnel Certification

- 4.1 Personnel Certification Requirements
- 4.2 Personnel Records

5.0 Examination Requirements

- 5.1 Examination Frequency
- 5.2 Examination Angles
- 5.3 Liquid Couplant
- 5.4 Surface Preparation
- 5.5 Weld Identification
- 5.6 Datum Point
- 5.7 Examination Coverage

6.0 Equipment Requirements

- 6.1 Examination Contractor's Equipment
- 6.2 Plant Owner's Equipment

7.0 Calibration Requirements

- 7.1 Reference Standards
- 7.2 Reference Sensitivity Level
- 7.3 Times of Calibration
- 7.4 Calibration Response

8.0 Calibration Procedures

UT PROCEDURE OUTLINE

(Continued)

9.0 Examination Procedures

10.0 Evaluation Criteria

- 10.1 Recording of Indications
- 10.2 Evaluation of Indications

11.0 Examination Records

- 11.1 Certification of Records
- 11.2 Filing of Records

12.0 Examiner's Critique

- 12.1 Procedure Corrections and Additions
- 12.2 Critique Report

ATTACHMENT B

TYPICAL INSERVICE INSPECTION PROGRAM PLAN

1. PROGRAM DESCRIPTION

   1.1 Objective - scope of program

   1.2 Code Compliance - definition of legal requirement and definition of NMPC intent

   1.3 Method of Inspection - summary of NDE methods selected

   1.4 Overall Schedule - summary of selected frequency

2. SYSTEM CLASSIFICATION

   2.1 Class 1 - Boundary Diagram

   2.2 Class 2 - Boundary Diagram

   2.3 Class 3 - Boundary Diagram

3. ZONE DESIGNATIONS

   Definition of plant areas

4. DETAILED PROGRAM PLAN

   Note: Data pertinent to each piping and component weld within a zone

   4.1 Weld Information

      Identification and reference drawing

      Code category

      Code examination method requirement

      Code examination extent requirement

      Inspection procedure reference

      Calibration block reference

      Year of inspection

4.2 Piping Isometrics and Component Drawings - pictorial location of welds.

4.3 Exclusions and Exceptions - identification of specific items of noncompliance and explanation of reason.

4.4 Pre-examination Requirements - specification of services, facilities, insulation removals, etc. prerequisite to program performance.

4.5 Calibration Block Details - block drawings and definitions of application.

4.6 Records and Reports - Retention of calibrations and qualification information; recording of data, evaluation, and final report requirements.

5. EVALUATION CRITERIA

Definition of allowable type, magnitude and orientation of indication

6. PERSONNEL QUALIFICATION REQUIREMENTS

Specification of SNT-TC-1A application

7. QUALITY ASSURANCE

Q.A. program plan requirements covering control of design review, program preparation and field work.

8. DETAILED EXAMINATION PROCEDURES

Includes all calibration and NDE procedures referenced in 4.1.

FIRST YEAR INSERVICE INSPECTION
SEPTEMBER 1975
TASK PLAN

(TASK 410)

For the

NINE MILE POINT NUCLEAR STATION UNIT 1
TEN YEAR INSERVICE INSPECTION PROGRAM

Prepared for

NIAGARA MOHAWK POWER CORPORATION
Syracuse, New York

NUCLEAR ENERGY SERVICES, INC.
Danbury, Connecticut 06810

Prepared by: A. H. Yoli

Approved by: [illegible]

Date: 9/2/75

1. OBJECTIVE

The objective of this task plan is to perform the First Year Inservice Inspection in accordance with the requirements of the NMP1 Ten Year Inservice Inspection Program. Included in this task is the preparation of the ISI report which presents the results of the inspection.

2. METHOD OF APPROACH

To achieve the task objective, this task has been subdivided into three subtasks as follows:

Subtask	Title
411	Pre-examination Preparation
412	Examination
413	Preparation of Examination Report

2.1 SUBTASK 411 PRE-EXAMINATION PREPARATION

1. The Project Manager or his designate shall review the scope of the First Ten Year Inservice Inspection Program (prepared under Task 300) with the assigned Conam Inspection Division Site Supervisor.

Note: The Site Supervisor is designated as Task Engineer for this Task.

2. The Task Engineer will prepare a tentative manpower estimate and schedule for the performance of the inspection.

3. The Project Manager or his designate will develop the overall Task schedule which is compatible with the Nine Mile Point 1 outage schedule and the Task Engineer's inspection schedule. He will transmit this schedule to Niagara Mohawk for their action and approval. The schedule shall contain as a minimum the following information:

   a. Date of site planning meeting;

   b. Dates for performing inspection;

   c. Date of issuance of inspection report.

4. The Project Manager or his designate shall transmit the First Year ISI Program information to Niagara Mohawk for their action and approval. This information includes the following:

   a. Program Plan and Schedule Tables;

   b. Piping System Isometric Drawings;

   c. Zone Designation Drawings

   d. Inspection Procedures (ultrasonic, liquid penetrant and visual) identified in item a.

   e. Quality Assurance Documents identified in the Project Quality Assurance Plan (NES 81A0402).

5. The Project Manager or his designate will resolve Niagara Mohawk comments with cognizant NM personnel and incorporate final comments in appropriate documents in accordance with requirements of the Project Quality Assurance Plan.

6. The Project Manager will distribute approved issues of the documents listed in Step 4 to Niagara Mohawk and to the Task Engineer (the Conam Inspection Site Supervisor).

7. The Task Engineer (Conam Inspection Division Site Supervisor) will select the personnel, equipment, and materials to be used in the examination. He will determine that personnel certifications (including eye tests), equipment calibration documentation and material certifications are in order. The Data Controller assigned to the examination will ensure that the required calibration and data sheets are available for the examination.

8. The site planning meeting will be held in accordance with the schedule developed in Step 3. The site planning meeting shall be attended by the following NES, Inc. personnel:

   a. Project Manager or his designate;

   b. Conam Inspection Division Site Supervisor;

   c. Conam Inspection Division Data Controller.

   Niagara Mohawk personnel attending the meeting should include representatives from Maintenance, the group responsible for ISI project, and Quality Assurance. In addition, it is highly desirable that the meeting be attended by Niagara Mohawk's Code Inspector.

The purpose of the site planning meeting is to accomplish the following activities:

a. Final review of First Year Program Plan and associated procedures;

b. Review of data control procedure including calibration forms and data sheets;

c. Presentation and review of personnel certifications, eye tests, equipment calibration documentation and material certifications for personnel, equipment and material selected to perform the examination.

d. Plant walk-through to identify requirements for scaffolding, lighting, cleaning and obstruction removal in the plant examination areas.

e. Inspection of work areas provided to NES, Inc. for the preparation of data packages, the calibration of UT instruments and the storage of instruments, tools, materials and records.

f. Final verification with on-site Niagara Mohawk contacts for support services, Q. A. and project management.

2.2 SUBTASK 412 EXAMINATION

1. The examination team for the First Year Inservice Inspection Program will be on-site in accordance with the schedule developed in Subtask 411 (Section 2.1, Step 3). The tentative examination team consists of the following personnel:

a. Site Supervisor

b. Data Controller

c. Two (2) Level II UT technicians

d. Two (2) Level I UT technicians

e. Two (2) Level II VT technicians

f. One (1) Level II PT technician

Crew complement would be changed as required to meet on-site conditions and/or schedules.

<u>Note:</u> The Project Manager or his designate will be on-site during the first week of the First Year ISI Program examination. The principal purpose of his presence will be to verify the remainder of the 10 year ISI Program.

2. The examination will be performed in accordance with the requirements of the First Year Inservice Inspection Program and in accordance with the examination procedures contained therein.

3. The Data Controller will control all data generated during the examination and provide examination status information to Niagara Mohawk in accordance with Conam Inspection Division Procedure 25-DC-001, Rev. 1.

4. The Site Supervisor will keep the Project Manager informed on a regular basis about the status of the examination.

5. Deviations from the Program resulting from inaccessibility/interference and discrepancies between Program isometric drawings (e.g. weld locations) and actual plant piping arrangements will be reported to the Project Manager or his designate at the end of the working day.

6. Any revisions, if any, to the First Year Program Plan as a result of discrepancies and/or deviations will require the same approvals as the original Program Plan. In general, it is NES' intention to accommodate Program discrepancies, etc. uncovered in one examination by revising the subsequent examination(s).

7. The Site Supervisor will inform the Project Manager or his designate and Niagara Mohawk of any examinations which yield reportable indications. The Project Manager, in turn, will inform the NES Inservice Inspection Program Manager who will review the results of the examination to determine if additional examination information should be obtained.

8. Under the direction of the ISI Program Manager, NES personnel will prepare an engineering analysis for each reportable indication. The analyses will include the characterization of the reportable indication (in accordance with the methods of Section XI of the ASME Code), the evaluation of the reportable indication with respect to determining its acceptance or rejection (in accordance with the Standards of Section III and XI of the ASME Code) and a repair method which meets the requirements of Sections III, IX and XI of the ASME Code. These analyses will be prepared rapidly and accurately to minimize plant downtime. Each engineering analysis will be submitted to Niagara Mohawk for review and approval.

2.3 SUBTASK 413 PREPARATION OF THE EXAMINATION REPORT

1. The examination report shall be prepared by NES and will include, but not be limited to, the following details:

   a. A chronological summary of all inspections made that will reference the test and calibration records, and other documents that verify the tests. This summary will also certify that the tests were performed in accordance with all applicable codes and specifications.

b. Copies of all calibration records, test records, test readouts, test results, and isometrics properly cataloged and cross-referenced.

c. Copies of all inspection procedures used.

d. Copies of the engineering analyses which characterize reportable indications in accordance with the methods of Section XI of the ASME Code.

2. The examination report will be submitted to Niagara Mohawk for approval in accordance with the schedule identified in Subtask 411 (Section 2.1, Step 3).

3. WORKSCOPE

3.1 SUBTASK 411 PRE-EXAMINATION PREPARATION

1. Prepare manpower estimate and schedule to meet requirements of First Year Inservice Inspection Program.

2. Transmit First Year Inservice Inspection Program and Schedule to Niagara Mohawk for approval. Incorporate NM comments in final issue.

3. Select examination personnel, equipment and material. Provide required certifications and documentation for each.

4. Hold site planning meeting to review the Plan, certifications and procedures; to inspect plant areas to be examined; and to inspect work areas.

3.2 SUBTASK 412 EXAMINATION

1. Perform examination in accordance with the First Year Inservice Inspection Program and the examination procedures contained therein.

2. Control/distribute data generated during examination in accordance with Conam Procedure 25-DC-001.

3. Document and report discrepancies with deviations from the First Year Program Plan. Revise Program Plan as required and obtain necessary approvals.

4. Perform engineering analyses for reportable indications. Define repair procedures for unacceptable indications.

5. Provide copies of all data and calibration sheets for inclusion in the examination report. Transmit Data Control Book to Niagara Mohawk for permanent retention.

3.3 SUBTASK 413 PREPARATION OF EXAMINATION REPORT

1. Prepare examination report in accordance with task schedule.

2. Submit report to Niagara Mohawk for approval. Revise report as required to reflect NM comments.

4. QUALITY ASSURANCE REQUIREMENTS

4.1 REQUIRED DOCUMENTATION

1. The following documents are defined as controlled documents:

   a. The First Year Inservice Inspection Program Plan (NES).

   b. Data Control Procedure (Conam).

2. Document a. will be recorded, approved, issued and revised in accordance with NES 80A9003, NES Document Control Procedure. Document b. will be controlled in accordance with the requirements of the Conam Quality Control Manual 25-QCM-001.

3. Niagara Mohawk approval is required for document a.

4.2 CHECK LIST

1. Appropriate portions of the Q. A. Check List 80A9539 will be completed for document a. NES will also audit the examinations in accordance with Q. A. Check List 80A0541. The check lists will be prepared by a designated representative of the NES Quality Assurance Manager, countersigned by the Task Engineer for Task 300 and approved by the Quality Assurance Manager. Document a. will not be released to Niagara Mohawk until the check list requirements have been satisfied.

4.3 REVIEW MEETING

1. The site planning meeting with the Customer will be held during the week of 9-19-75.

5. TASK ENGINEER

Mr. Frank Carr of the Conam Inspection Division of NES, Inc. is Task Engineer for Task 410. He is responsible for the performance of the principal work items in Subtask 411 and 412. Mr. A. Uziel of NES Division is responsible for the performance of Subtask 413.

6. SCHEDULE

This task is scheduled to be initiated on 9-8-75. Based on the expected starting date, all work will be completed by 11-28-75.

The principal Task Outputs are scheduled to be completed as follows:

Pre-examination preparation	9-22-75
Examinations	10-31-75
Examination report	11-28-75

CALIBRATION BLOCK FABRICATION
TASK PLAN

(TASK 500)

For The

NINE MILE POINT NUCLEAR STATION UNIT 1
TEN YEAR INSERVICE INSPECTION PROGRAM

Prepared For

NIAGARA MOHAWK POWER CORPORATION

Syracuse, New York

NUCLEAR ENERGY SERVICES, INC.
Danbury, Connecticut 06810

Prepared by: A. H. Yale

Approved by: W. J. Mc[illegible]

Date: 9/2/75

1. OBJECTIVE

The objective of this task is to provide three calibration blocks which, together with existing nine Mile Point 1 calibration blocks, will permit the inservice ultrasonic inspection of all Class 1 and Class 2 stainless and carbon steel piping.

2. METHOD OF APPROACH

Under Task 300, NES would identify calibration block requirements (Subtask 350) and prepare detail drawings for any block not available at the Nine Mile Point 1 Plant (Subtask 360).

Under this task (Task 500), NES would procure the calibration blocks required for the first inspection to be performed under the Ten Year Inservice Inspection Program. The required calibration blocks supplement the existing Nine Mile Point 1 calibration blocks to provide all of the stainless steel and carbon steel blocks required to examine the NMP1 Class 1 and Class 2 piping systems.

3. WORKSCOPE

1. Procure calibration block material in accordance with the requirements of the following NES Drawings:

    1. Standard Calibration Block, Butt Welds, NMPC, Nine Mile
       NES Dwg. #80C0531, Rev. 1.

    2. Standard Calibration Block, Butt Welds, NMPC, Nine Mile
       NES Dwg. #80C0528, Rev. 0.

2. Inspect received material for conformance with drawing requirements. Check that material certifications and heat numbers have been received for each piece of material. Perform ultrasonic examination to verify that the material is free of defects.

3. Fabricate calibration blocks from procured material in accordance with NES Drawings 80C0531, and 80C0528.

4. Inspect finished calibration blocks for conformance with drawing requirements. Check that block identification number and material heat number have been indelibly engraved on each calibration block.

5. Ship/transport calibration blocks to Nine Mile Point 1 site on time for first inservice inspection (~ September 22) of Ten Year Program.

4. QUALITY ASSURANCE REQUIREMENTS

4.1 REQUIRED DOCUMENTATION

1. The quality assurance requirements for the calibration block drawings are presented in the Task Plan for Task 300. The calibration block drawings are controlled documents and have been audited in accordance with Q. A. Check List 80A0538.

2. The following information must be received and documented for the material used in each calibration block:

   a. Material properties (per Material Certification form);

   b. Material heat number.

4.2 INSPECTION

1. NES will perform ultrasonic examination on the procured material to verify that it is free of defects prior to block fabrication.

2. NES will perform dimensional and visual inspection of each calibration block to ensure conformance with NES Drawings 80C0528 and 80C0531.

3. Any deviations from drawing requirements will be processed in accordance with the non-conformance procedures and requirements presented in the NES Quality Assurance Manual 81A9002.

4.3 CHECK LIST

1. NES will complete Q. A. Check List 80A0540 for each calibration block. The check list will be prepared by designated representative of Quality Assurance Manager, countersigned by the Task Engineer and approved by the Quality Assurance Manager.

2. Calibration blocks will not be released to Niagara Mohawk until check list requirements have been fully satisfied.

3. Check lists shall be retained in Project file (by Project Engineer) and in Project Quality Assurance file (by Q. A. Manager).

5. TASK ENGINEER

Mr. Don Matteson is Task Engineer for Task 500. He is responsible for the performance of all work items listed in Section 3.

6. SCHEDULE

This task is to be completed prior to the first inservice inspection of the Ten Year Program. The first inservice inspection is scheduled to start on or about September 22, 1975.

APPENDIX H

EXAMINATION PROCEDURES

APPENDIX H

Examination Procedures

The Nine Mile Point Unit 1 inservice inspection program is based upon meeting the requirements of the Nine Mile Point Technical Specifications and the ASME Boiler and Pressure Vessel Code, Section XI, 1974 Edition through the Summer of 1974 Addenda to the maximum extent possible. Subarticle IWA-1400 (d) of the Code requires the development and preparation of written examination procedures necessary for the conduct of the non-destructive examinations associated with the program. Accordingly, written procedures have been included for the performance of visual, surface and volumetric examinations. These procedures have been included in this Appendix.

Visual and surface examination procedures are in accordance with standard examination practices and comply with the 1974 Editions of Section III and Section V of the ASME Boiler and Pressure Vessel Code, as referenced by Section XI.

Volumetric examinations are performed using ultrasonic methods. The procedures prepared for these examinations comply, in general, with the 1974 Edition of Section XI requirements. Wherever Appendix I of Section XI does not apply directly, the provisions of Sections III and V have been used. However, in keeping with Niagara Mohawk's desire to perform the best examination possible by employing the most current accepted techniques, more conservative features of Section XI have been incorporated in the procedures, even when following Sections III and/or V guidelines. This is also in anticipation of the future

extention of current Section XI methods to the ultrasonic examination of components other than ferritic vessels with 2 1/2 inch and over wall thickness, as presently specified in Appendix I (I-1200) of Section XI.

A standard format has been employed, as far as practicable, during the preparation of all procedures. A typical outline has been included in this Appendix as Table H-1 to acquaint the user with structure, organization and content of the procedures. Table H-2, also contained in this Appendix, gives a complete listing of all visual, surface and volumetric procedures required to perform the inservice examinations for the ten-year program in the Nine Mile Point Unit 1. These procedures have been approved by the Niagara Mohawk Power Corporation (NMPC) and by the inservice inspection contractor/agency (NES).

TABLE H-1 UT PROCEDURE OUTLINE

1.0 Scope

- 1.1 Area of Examination
- 1.2 Type of Examination
- 1.3 Time of Examination
- 1.4 Configuration
- 1.5 Materials

2.0 References

- 2.1 Reference Documents
- 2.2 Applicable Drawings
- 2.3 Operational Manuals

3.0 Procedure Certification

4.0 Personnel Certification

- 4.1 Personnel Certification Requirements
- 4.2 Personnel Records

5.0 Examination Requirements

- 5.1 Examination Frequency
- 5.2 Examination Angles
- 5.3 Liquid Couplant
- 5.4 Surface Preparation
- 5.5 Weld Identification
- 5.6 Datum Point
- 5.7 Examination Coverage

6.0 Equipment Requirements

- 6.1 Examination Contractor's Equipment
- 6.2 Plant Owner's Equipment

7.0 Calibration Requirements

- 7.1 Reference Standards
- 7.2 Reference Sensitivity Level
- 7.3 Times of Calibration
- 7.4 Calibration Response

8.0 Calibration Procedures

TABLE H-1 UT PROCEDURE OUTLINE

(Continued)

9.0 Examination Procedures

10.0 Evaluation Criteria

10.1 Recording of Indications
10.2 Evaluation of Indications

11.0 Examination Records

11.1 Certification of Records
11.2 Filing of Records

12.0 Examiner's Critique

12.1 Procedure Corrections and Additions
12.2 Critique Report

TABLE H-2 LIST OF EXAMINATION PROCEDURES

Procedure Number	Title
NIP 528	Liquid Penetrant Examination Procedure
529	Visual Examination Procedure
533	Ultrasonic Examination Procedures for Reactor Vessel to Flange Weld
534	Ultrasonic Examination Procedures for Reactor Vessel Flange Ligament Areas
536	Ultrasonic Examination Procedures for Reactor Vessel and Closure Head Nozzle Inner Radii
538	Ultrasonic Examination Procedures for Closure Head Meridional, Circumferential Dome and Flange Welds
539	Ultrasonic Examination Procedures for Closure Head to Nozzle Welds
541	Ultrasonic Examination Procedures for Component Bolts, Studs and Nuts
544	Ultrasonic Examination Procedures for Recirculation Inlet Nozzle and Safe-end Welds
554	Ultrasonic Examination Procedures for Piping Butt Welds and Longitudinal Welds
562	Ultrasonic Examination Procedures for Closure Head Nozzle to Flange Weld
563	Ultrasonic Examination Procedures for Reactor Vessel Nozzle to Safe-end Welds
564	Ultrasonic Examination Procedures for Emergency Condenser Dome and Nozzle Welds

PROCEDURE NO. NIP 528
SUBJECT: LIQUID PENETRANT
REVISION: 0; DATE:
DATE: 8-7-75
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LIQUID PENETRANT

EXAMINATION PROCEDURE

NIAGARA MOHAWK POWER CORPORATION
Nine Mile Point, Unit 1

Originator(s)

Signature ~~Gary Guasco~~ 9-2-75 Date

Signature Date

Approved By:

N.E.S.I. Signature SNT-TC-1A Level III 9/9/75 Date

N.M.P.C. Signature SNT-TC-1A Level III Date

RECORD OF REVISIONS

Rev. No.	Date	Description	Reason	Approvals Originator	N.M.P.C.	N.E.S.I.
1 (pg.9)	10-24-75	Para. 8.2.1, change Type II penetration time from "15 minutes" to "20 minutes".	Reflects the Requirements of Section III, 1974 ED. of ASME Code	G. Guasco		[signature]
1 (pg.15)	9-1-76	Add Para. 1.1.3	Reflects the Requirements of Section XI, 1974 ED. of ASME Code	G. Guasco		[signature]
1 (pg.4)	9-1-76	Para. 2.1.1 (3) change "Revision 1, September 1970" to "Revision 3, April 1975"	Reflects most recent revision	G. Guasco		[signature]

LIQUID PENETRANT EXAMINATION PROCEDURE

1.0 SCOPE

1.1 Intent

1.1.1 This procedure shall be followed whenever liquid penetrant examination of nuclear reactor systems or components is to be performed as required by ASME Boiler and Pressure Vessel Code, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, 1974 Edition to and including Summer 1974 Addenda. The method described herein is to be used for the detection of discontinuities open to the surface.

1.1.2 This procedure may be used on ferrous and non-ferrous materials but shall not be utilized for surface examinations of porous materials.

1.2 Types of Examination

1.2.1 Either a color-contrast or fluorescent penetrant method may be used. For each method, there are three types of penetrant:

- water-washable
- solvent-removable
- Post-emulsifying

1.3 Time of Examination

1.3.1 This procedure shall govern inservice examinations and examinations after repairs of piping systems and components as required by the ASME Boiler and Pressure Vessel Code, Section XI.

2.0 REFERENCES

2.1 Reference Documents

2.1.1 The following documents form a part of this examination procedure:

(1) ASME Boiler and Pressure Vessel Code Sect. V and Sect. XI, 1974 Edition to and including Summer 1974 Addenda.

(2) SNT-TC-1A, Recommended Practice for Nondestructive Testing Personnel Qualifications and Certification, with Supplement D, "Liquid Penetrant Testing Method" (1971).

(3) Procedure CPTP-1 for Certifying Penetrant Test Personnel, Revision 3, April 1975.

3.0 PROCEDURE CERTIFICATION

3.1 The examination procedures described in this document comply with Section XI of the ASME Boiler and Pressure Vessel Code, 1974 Edition. This procedure has been previously qualified to Section XI requirements and shall be revalidated, upon request, by actual demonstration to the satisfaction of the plant witnesses and/or Code inspector.

4.0 PERSONNEL CERTIFICATION

4.1 Personnel Certification Requirements

4.1.1 Each person performing examinations governed by this procedure shall be certified as qualified in accordance with Procedure No. CPTP-1.

4.1.2 Each person performing examinations shall have a minimum qualification Level II in accordance with the requirements of SNT-TC-1A, Supplement D, and CPTP-1.

4.2 Personnel Records

4.2.1 Records of personnel qualification shall be maintained by the Examination Contractor.

4.2.2 A copy of each examiner's certification and a current eye test, as required by SNT-TC-1A, shall be filed with the permanent examination record, with a copy to the Plant Owner, or his agent, prior to performing examinations as per this procedure.

5.0 EXAMINATION REQUIREMENTS

5.1 Surface Preparation

5.1.1 All surfaces of the component or part to be examined by the liquid penetrant method of examination must be free of spatter, scale, grease, paint, oily films, dirt and other extraneous matter that would obscure surface openings or otherwise interfere with examinations. Components or parts must have a surface finish which will permit proper interpretation of developed indications. The surface shall be even with no abrupt ridges or valleys. In general, satisfactory results may be obtained when the surface is in the as-welded, as-rolled, as-cast, or as-formed condition; however, in some cases surface preparation by grinding or machining may be necessary when surface irregularities would otherwise mask the indications of unacceptable discontinuities. Wire brushing shall be accomplished after grinding to ensure removal of all foreign material from the surface.

5.2 Examination Area Identification

5.2.1 Each examination area shall be located or identified on the appropriate weld map, isometric or system boundary diagram.

5.3 Examination Coverage

5.3.1 The intent of this procedure is to provide maximum examination coverage of Class 1 and Class 2 systems in areas identified in Tables IWB-2500 and IWC-2520 of Section XI of the ASME Boiler and Pressure Vessel Code.

6.0 EQUIPMENT REQUIREMENTS

6.1 Examination Contractor's Equipment

6.1.1 The following test equipment or its equivalent shall be provided and/or utilized by the Examination Contractor as required for examinations:

(1) Cleaning agent such as acetone, isopropyl alcohol or equivalent

(2) Dye penetrant or fluorescent penetrant

(3) Emulsifying agent (for post-emulsifying penetrants only)

(4) Remover

(5) Developer

(6) Clean, lint-free rags or cloths or absorbent paper

(7) Mirror

(8) Portable light source(s)

(9) Camera

(10) Low-power magnifying lens

(11) Black light source (if fluorescent penetrant is used)

(12) Lightmeter

(13) Thermometer with a range greater than or equal to 50°F to 140° F.

(14) Portable curtains to darken area where fluorescent penetrant is used

(15) Timer or watch

(16) Hot air gun

6.1.2 A light source shall be used and shall be sufficient to obtain good definition and contrast at the surface of the object being examined. Color of the light source may be white (incandescent) or any other which will produce the desired definition and contrast. In all cases, light position, direction and distance shall be adjusted to the best angle for viewing the component being examined. Where feasible, it shall be moved to various positions during the examination so that the light will fall on the component from a number of directions to improve the interpretation of conditions which may be present. In addition, the level of illumination shall be adjusted by changing the distance or the intensity so that the best visual contrast is obtained.

6.2 Plant Owner's Equipment

6.2.1 The plant owner of his agent shall provide the following service facilities and equipment as required:

(1) Scaffolding -- temporary or permanent

(2) Water, air and electricity (110 volts, 50-60 Hz)

(3) Temporary lighting

(4) Crane or lifting devices

(5) Radiation monitoring equipment

(6) Radiation shielding

(7) Anti-contamination clothing

(8) Personnel decontamination facilities

(9) Test surface preparation

(10) Post-examination cleanup of test area

(11) Decontamination of the test area where required

7.0 PRECAUTIONS AND PREREQUISITES

7.1 The penetrant, cleaning agents, emulsifiers and developer materials shall be analyzed for sulfur content and total halogens in accordance with ASTM D-129-64, Test for Sulfur in Petroleum Products by the Bomb Method, and ASTM D-808-63, Test for Chlorine in New and Used Petroleum Products (Bomb Method). The residual amounts of total sulfur or halogens shall not exceed one (1) percent by weight. The Examination Contractor shall obtain certification of these tests for each penetrant material used, giving batch numbers and test results. These records shall be maintained in accordance with Section 10.0 of this procedure.

7.2 Fluorescent penetrant examination shall not immediately follow a color-contrast penetrant examination.

7.3 Intermixing of penetrant materials (penetrant, emulsifier if used, remover and developer) from different family groups is not permitted.

7.4 The brand name and type of penetrant to be used is "Spot-Check" Type SKL/S by Magnaflux Corporation. The material shall be in the form of spray or bulk. Equivalent material may be used subject to the approval of the examination contractor, plant owner and inspector.

7.5 As a standard technique, the temperature of the surface to be examined shall not be below 60°F nor above 125°F throughout the examination period. Local heating or cooling is permitted provided temperatures remain in the range of 60 - 125°F during the examination.

7.6 Cleaner materials and penetrants being highly inflammable will be stored in metal containers with protective covers and away from heat or open flames.

7.7 Examinations will not be conducted near open flames, welding or burning.

7.8 Smoking within 20 feet of the examination area is not permitted.

7.9 Examinations will be conducted only under conditions allowing sufficient ventilation to prevent explosions or toxic inhalation.

8.0 EXAMINATION PROCEDURE

8.1 Pre-Examination Cleaning

8.1.1 Immediately prior to the examination, all surfaces to be examined and all adjacent areas within one inch shall be cleaned by heavy swabbing with clean, lint-free cloths or absorbent paper saturated with a cleaning agent. The excess cleaning agent shall then be removed using clean, dry cloths or absorbent paper.

8.1.2 The surfaces to be examined must be completely dried prior to application of the penetrant. A minimum of five minutes waiting time shall be observed prior to application of the penetrant. The drying may be accomplished by normal evaporation or with forced hot air, if necessary. The solvent acts as a penetrant and must be allowed to evaporate from all discontinuities.

8.2 Penetrant Application and Removal

8.2.1 After the surface has dried, it shall be thoroughly and uniformly coated with penetrant by spraying, dipping or brushing. The surface shall be kept wetted during the entire applications time.

Penetrant	Penetration Time for all Applications
Type I (water-washable)	20 minutes
Type II (solvent-removable)	20 minutes
Type III (post-emulsifying)	10 minutes

8.2.1.1 If the penetrant does not wet the surface but tends to pull away, leaving local islands of unwet surfaces or if the penetrant is allowed to become dry or tacky, the surface shall be recleaned in accordance with Section 8.1 and the procedure shall be repeated.

8.2.1.2 If the penetrant is applied by spraying using a compressed air type apparatus, filters shall be placed at the air inlet to preclude contamination of the penetrant from oil, water and/or dirt sediment that may have collected in the lines.

8.2.2 After the penetration time specified in 8.2.1 has elapsed, any penetrant remaining on the surface shall be removed as stipulated below. Insufficient removal will leave a background which will interfere with subsequent indication of defects. Care shall be exercised to limit the removal of penetrant from any discontinuity to as little as possible.

(1) With water-washable penetrants, excess penetrant shall be removed by swabbing with a clean cloth saturated with clear water (Grade A demineralized).

(2) With solvent removable penetrants, excess penetrant shall be removed by using clean, dry cloths or absorbent paper. The operation should be repeated until most traces of penetrant have been removed. A clean, dry cloth or absorbent paper shall then be moistened with solvent and the surface shall be wiped lightly until all remaining traces of excess penetrant have been removed. Care shall be employed not to use an excess of the solvent in order to avoid removing penetrant from discontinuities. Flushing the surface with solvent following the application of the penetrant and prior to drying is prohibited.

(3) With post-emulsifying penetrants, the emulsifier shall be applied by spraying. It should not be applied by means of a brush since stroking with a brush may remove the penetrant from shallow or scratch-like discontinuities. Emulsification time is critical and depends on surface roughness and type of discontinuities sought. Five minutes shall be the maximum time. After emulsification, the mixture shall be removed using the same procedure as water-washable penetrants.

8.2.3 Drying Before Application of Developer

8.2.3.1 If a water-washable or post-emulsifying method is employed the surface shall be dry before application of the developer. Drying shall be accomplished by blotting with absorbent paper or clean, lint-free rags or by circulating warm air provided the temperature of the surface is not raised above 125°F.

8.2.3.2 With the solvent removable method, drying shall be accomplished by allowing a minimum of five (5) minutes for normal evaporation.

8.3 Developing

8.3.1 General

8.3.1.1 The developer shall be applied immediately after the drying operation is complete. There are two types of developer, dry and liquid, either of which may be used with fluorescent penetrants. With color contrast penetrants, only the liquid developer is permitted.

8.3.2 Dry Developer

8.3.2.1 The dry developer shall be a powder, applied by a hand powder bath or powder gun. Other means more suitable to the size and geometry of the specimen may be used, provided the powder is evenly dusted over the entire surface being examined.

8.3.3 Liquid Developer

8.3.3.1 The liquid developer is a suspension of powder in water or a volatile solvent and shall be applied by spraying approximately eight (8) to fourteen (14) inches from the test surface. Insufficient coatings may not be adequate to draw the dye out of the discontinuities. Conversely, excessive coatings of developer may result in pooling and may mask indications. Prior to applying the liquid developer to the surface, the developer must be thoroughly agitated to ensure that the particles in suspension are dispersed. Where a water suspension developer is used, drying time may be decreased by the use of warm air. Developer must be thoroughly dry before interpretation.

8.4 Observation of Results

8.4.1 General

8.4.1.1 The true size and type of discontinuity are difficult to appraise if the dye diffuses excessively in the developer. Consequently, it is good practice to observe the surface during the application of the developer in order to detect the nature of certain indications which might tend to bleed out profusely. Final interpretation, however, shall be made after allowing the penetrant to bleed out for a minimum of seven (7) minutes to a maximum of thirty (30) minutes. If the surface is sufficiently large to preclude complete examination within the prescribed time, the surface shall be examined in suitable increments.

8.4.2 Nature of Indications with Color-Contrast Penetrants

8.4.2.1 With color-contrast penetrants, the developer forms a more or less uniform white coating. Surface discontinuities are indicated by bleeding out of the penetrant which is normally of a deep red color. Indications which exhibit a light pink color may indicate excessive or inadequate cleaning.

8.4.2.2 Illumination shall be provided which is adequate to ensure that there is no loss in the sensitivity of the examination.

8.4.3 Nature of Indications with Fluorescent Penetrants

8.4.3.1 With fluorescent penetrants, the indications are essentially the same as for color-contrast penetrants, but the examination is conducted in a darkened area using black light. The light intensity shall be at least 90 foot-candles at the work. The intensity of illumination at the work shall be measured with a Weston 703 Type III meter or equal. The black light shall emit ultraviolet radiation of a wave length within the range of 3300 to 3900 angstrom units. The bulb shall be allowed to warm up for a minimum of five (5) minutes prior to its use in the examination.

8.4.4 Evaluation of Results

8.4.4.1 Evaluation of results shall be in accordance with Section 9.0.

8.5 Post-Examination Cleaning

8.5.1 Remove developer with cleaners and/or solvents recommended in this procedure, using as many clean rags or absorbent paper towels as necessary.

9.0 EVALUATION CRITERIA

9.1 Recording of Indications

9.1.1 All indications shall be reported and detailed on the data sheet (see Appendix of Forms) and shall contain the following information:

(1) Date of examination

(2) Identification and signature of examiner

(3) Identification of item examined

(4) Brand name and specific type (number and/or letter designation if available) of penetrant, penetrant remover, emulsifier (if used) and developer and batch number if available.

(5) Cleaning materials used and time allowed for drying for pre-examination cleaning.

(6) The length of time that the penetrant remains on the surface.

(7) The length of developing time before evaluation.

(8) Photographs may be used to assist in evaluation.

(9) All indications shall be described with respect to a convenient datum point on the object being examined.

(10) Other information as required.

9.2 Evaluation of Indications

9.2.1 The following indications are not acceptable:

(1) Cracks or other linear indications

(2) Rounded indications greater than 3/16 inch in maximum dimension

(3) Four or more smaller rounded indications, if aligned and separated 1/16 inch or less, edge to edge

(4) (a) Ten or more rounded indications within a six square inch area whose major dimension is not to exceed six inches, with the area defined in the least favorable location with respect to the indications being evaluated

(b) Indications of whose major dimensions are greater than 1/16 inch shall be considered relevent.

NOTE: Linear indications are those indications in which the length is more than three times the width. Rounded indications are indications which are circular to elliptical with length less than three (3) times the width.

9.2.2 Any indication that is believed to be non-relevant shall be regarded as an unacceptable surface defect and shall be re-examined to verify whether actual defects are present. Surface conditioning may precede the re-examination.

9.2.3 Bolts and bolting material shall have no axial linear defects greater than 1" on bolting over 1" and all non-axial defects are unacceptable.

9.2.4 Forging/Safe-ends:

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

(b) The following relevant indications are unacceptable:

(1) Any linear indications greater than 1/16 in. long for materials less than 5/8 in. thick, greater than 1/8 in. long for materials from 5/8 in. thick to under 2 in. thick and 3/16 in. long for materials 2 in. thick and greater;

(2) Rounded indications with dimensions greater than 1/8 in. for thicknesses less than 5/8 in. and greater than 3/16 in. for thicknesses 5/8 in. and greater;

(3) Four or more indications in a line separated by 1/16 in. or less edge to edge;

(4) Ten or more indications in any 6 sq. in. of area whose major dimension is no more than 6 in. with the dimensions taken in the most unfavorable location relative to the indications being evaluated.

9.2.5 All indications shall be evaluated in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI and Section III.

9.2.6 Results of this evaluation shall be reported to the Plant Owner or his agent in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, as defined in the Program Plan Book.

10.0 EXAMINATION RECORDS

10.1 Certification of Records

10.1.1 The examiner shall complete and sign the appropriate data sheet(s) immediately upon completion of each examination.

10.2 Filing of Records

10.2.1 The examiner shall be responsible for submitting to the Plant Owner or his agent a complete set of examination records including certification of personnel qualifications with current eye test in accordance with Section 4.2.2.

10.2.2 Permanent records shall be maintained by the owner-operator for the life of the component.

11.0 EXAMINER'S CRITIQUE

11.1 Procedure Corrections and Additions

11.1.1 All procedure corrections and/or additions required during the inservice and/or repair examinations shall be made in accordance with Plan # NES 81A 0402 and shall be documented in the record of revisions section of this procedure.

11.2 Critique Report

11.2.1 Upon completion of the examination of all items, the examiner shall submit a written report to the Plant Owner, or his agent, listing pertinent information for future examinations such as procedure additions, corrections and revisions or unique problems or action to be taken.

11.3 Additional Examinations

11.3.1 When indications exceeding allowable standards are found, additional examinations shall be performed as stipulated in Section XI, paragraphs IWB-2530 and IWC-2430.

12.0 APPENDIX OF FORMS

12.1 Form 1 -- Examination Data Sheet

LIQUID PENETRATION DATA SHEET

Plant Name: ______________________ Date: ______________

Identification of Item Examined: ______________ Temperature: ______________

Photograph: Roll #: ______________

Frame #: ______________

Examiner's Name: ______________ Signature: ______________

Level of Qualification: ______________ Inspector's Signature: ______________

Cleaner: Brand Name: ______________ Type: ______________

Batch No.: ______________ Drying Time: ______________

Penetrant: Brand Name: ______________ Type: ______________

Batch No.: ______________ Dwell Time: ______________

Emulsifier: Brand Name: ______________ Type: ______________

Batch No. ______________ Application Time: ______________

Remover: Brand Name: ______________ Type: ______________

Batch No. ______________ Application Time: ______________

Developer: Brand Name: ______________ Type: ______________

Batch No. ______________ Evaluation Time: ______________

Penetrant Indications: If none, indicate none. Sketches, if necessary, may be made on the reverse side.

Location	Description	Accept	Reject

SUBJECT: VISUAL EXAM
PROCEDURE NO: NIP 529
REVISION: 0; Date:
DATE: 8/7/75
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VISUAL EXAMINATION PROCEDURE

NIAGARA MOHAWK POWER CORPORATION
Nine Mile Point, Unit 1

Originator(s)

Gary Graso 9/2/75
Signature Date

Signature Date

Approved By:

N.E.S.I. SNT-TC-1A Level III 9/5/75
Signature Date

N.M.P.C. SNT-TC-1A Level III
Signature Date

NUCLEAR ENERGY SERVICES, INC.

RECORD OF REVISIONS

Rev. No.	Date	Description	Reason	APPROVALS Originator	N.M.P.C.	N.E.S.I.
1 (Pg.4)	9/24/75	Para. 4.1.1 Change "CVIP-1, and CVEP-PSIS" to CVIP-1, or CVEP-PSIS, as applicable.	Qualification to both procedures not required.	G. Guasco		
1 (Pg.4)	9/24/75	Para. 4.1.2 Change "CVIP-1, and CVEP-PSIS" to CVIP-1, or CVEP-PSIS, as applicable.	Qualification to both procedures not required.	G. Guasco		
(Pg.16)	10/8/75	Delete "Accept" and "Reject" columns.	Section XI does not define evaluation criteria.	G. Guasco		
1 (Pg.13)	10/8/75	Para. 8.0 Change "EVALUATION CRITERIA" to "RECORDING".	Section XI does not define evaluation criteria.	G. Guasco		
1 (Pg.13)	10/8/75	Delete Para. 8.2 completely.	Section XI does not define evaluation criteria.	G. Guasco		
1 (Pg.11)	10/23/75	Change Para. 7.8.1	Make Procedure applicable to Group B and C hydrotesting	Du		
1 (Pg.12)	10/23/75	Change Para. 7.8.8				
2 (Pg.13)	10/23/75	Add Para.s 7.8.9 and 7.8.10				
(Pg.14)	9-1-76	Add Para. 10.3	Reflects the Requirements of Section XI 1974 ED. of ASME Code	G. Guasco		

VISUAL EXAMINATION PROCEDURE

1.0 SCOPE

1.1 Intent

1.1.1. This procedure shall be followed whenever visual examination of nuclear reactor systems or components is to be performed as required by ASME Boiler and Pressure Vessel Code, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, 1974 Edition to and including Summer 1974 Addenda. Examinations may be performed with the naked eye or may include visual aids such as telescopes, borescopes, periscopes, fiber optics or T.V. cameras. This procedure does not include those visual methods which are aided by magnetic particle or liquid penetrant means since these are considered surface examinations under the provisions of Section XI.

1.2 Types of Examination

1.2.1. This document shall apply to the following types of visual examinations:

1.2.1.1 Weld Visual Examination

1.2.1.2 Support Member Visual Examination

1.2.1.3 Valve Visual Examination

1.2.1.4 Pump Visual Examination

1.2.1.5 Fastener Visual Examination

1.2.1.6 Cladding Visual Examination

1.2.1.7 Visual Examination During Hydrotest

1.3 Time of Examination

1.3.1 This procedure shall govern inservice examinations and examinations after repairs of piping systems and components as required by ASME Boiler and Pressure Vessel Code, Section XI.

2.0 REFERENCES

2.1 Reference Documents

2.1.1 The following documents form a part of this examination procedure:

(1) ASME Boiler and Pressure Vessel Code, Sect. V and Sect. XI, 1974, Edition to and including Summer 1974 Addenda.

(2) Procedure CVIP-1 for Certifying Visual Weld Inspection Personnel, Revision 2, November 30, 1973; and CVEP-PSIS, Procedure for Certifying Visual Examination Personnel for Preservice/Inservice Examinations, Revision 0, January 1, 1973.

3.0 PROCEDURE CERTIFICATION

3.1 The examination procedures described in this document comply with Section XI of the ASME Boiler and Pressure Vessel Code, 1974 Edition.

4.0 PERSONNEL CERTIFICATION

4.1 Personnel Certification Requirements

4.1.1 Each person performing visual examinations governed by this procedure shall be certified as qualified in accordance with Procedure Nos. CVIP-1, or CVEP-PSIS, as applicable.

4.1.2 Each person performing examinations shall have a minimum qualification Level II in accordance with the requirements of CVIP-1, or CVEP-PSIS, as applicable.

4.2. Personnel Records

4.2.1 Records of personnel qualification shall be maintained by the Examination Contractor.

4.2.2 A copy of each examiner's certification and a current eye test shall be filed with the permanent examination record, with a copy to the Plant Owner, or his agent, prior to performing examinations per this procedure.

5.0 EXAMINATION REQUIREMENTS

5.1 Surface Preparation

5.1.1 Visual examinations which require clean surfaces for valid interpretation of results shall be cleaned using demineralized water or acetone and clean lint-free rags or other method approved by the Plant Owner or his agent.

5.2 Examination Area Identification

5.2.1 Each examination area shall be located or identified on the appropriate weld map, isometric or system boundary diagram.

5.3 Examination Coverage

5.3.1 The intent of this procedure is to provide maximum examination coverage of Class 1, Class 2, and Class 3 systems in areas identified in Tables IWB-2500 and IWC-2520 and Paragraph IWD-2600 of Section XI of the ASME Boiler and Pressure Vessel Code.

6.0 EQUIPMENT REQUIREMENTS

6.1 Examination Contractor's Equipment

6.1.1 The following test equipment or its equivalent may be required due to lack of access or personnel hazards and shall be provided and/or operated by the Examination Contractor for examinations:

(1) Borescope

(2) Fiber Optics Device

(3) Closed-Circuit Television System

(4) Telescope/Binoculars

(5) Low-Power Magnifying Lens

(6) Microscope

(7) Mirror

(8) Portable Light Source(s)

(9) Camera

(10) 18% gray card with 1/32" black line.

6.1.2 A light source shall be used and shall be sufficient to obtain good definition and contrast at the surface of the object being examined. Color of the light source may be white (incandescent) or any other which will produce the desired definition and contrast. In all cases, light position, direction and distance shall be adjusted to the best angle for viewing the component being examined. Where feasible, it shall be moved to various positions during the examination so that the light will fall on the component from a number of directions to improve the interpretation of conditions which may be present. In addition, the level of illumination shall be adjusted by changing the distance or the intensity so that the best visual contrast is obtained. The intensity of illumination at the work surface shall be a minimum of 350 lux or 32.5 foot-candles and shall be measured with a standard lightmeter, or shall be equivalent to the intensities provided by standard light bulbs as shown in Table I.

TABLE I

Bulb Wattage	Distance from Workpiece (inches) to Assure Adequate Viewing
40	6 - 7
75	9 - 11
100	11 - 13
150	14 - 17
200	16 - 19

6.1.3 Resolution shall be tested by placing an 18 percent neutral gray color card or plate containing a black line 1/32 inch in width in the area to be examined or a replica of that area. Resolution is considered adequate if this line can be resolved from this background. Where remote equipment is used, similar resolution tests shall apply. This shall be tested by actual demonstration to the satisfaction of the plant witnesses and/or insurance inspector.

6.2 Plant Owner's Equipment

6.2.1 The plant owner or his agent shall provide the following service facilities and equipment as required:

(1) Scaffolding -- temporary or permanent

(2) Water, air and electricity (110 volts, 50-60 Hz)

(3) Temporary lighting

(4) Crane or lifting devices

(5) Radiation monitoring equipment

(6) Radiation shielding

(7) Anti-contamination clothing

(8) Personnel decontamination facilities

(9) Test surface preparation

(10) Post-examination cleanup of test area

(11) Decontamination of the test area where required

7.0 EXAMINATION PROCEDURES

7.1 General Requirements

7.1.1 Direct visual examination may be performed when access is sufficient to place 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. Mirrors may be used to improve the angle of vision.

7.1.2 The visual examination is employed to provide a report on the general condition of the part, component or surface to be examined, including but not limited to such conditions as scratches, wear, cracks, structural distress, corrosion or erosion on the surfaces or misalignment or movement of the part or component or evidence of leakage.

7.1.3 Remote visual examination may be substituted for direct visual examination to permit the examiner to determine the conditions in areas where access is restricted. Remote visual examination may include visual aids such as but not limited to telescopes, periscopes, borescopes, fiber optics or T.V. cameras and monitoring systems with or without attachments for permanent recording.

7.1.4 Indications found shall be noted on the appropriate examination data sheet.

7.2 Weld Visual Examination

7.2.1 Ensure that the examination surface is clean enough to allow examination of the weld.

7.2.2 Examine the weld surface for evidence of leakage, cracks and other symptoms of structural distress.

7.2.3 Report findings on the Visual Examination Data Sheet.

7.3 Support Member Visual Examination

7.3.1 This section defines the requirements for visual examination of nuclear reactor piping system support members. The purpose of the examination is to provide a check that operation of the system has not damaged, misaligned or otherwise adversely affected the support member. The Plant Owner or his agent shall remove insulation as necessary to facilitate examination.

7.3.2 Observe the condition of the insulation around the hanger for evidence of distress or dented or abraided insulation due to extraordinary movement of the pipe relative to the hanger.

7.3.3 Observe and record the hanger setting (if of that type) and note any abnormal condition. This includes constant and variable spring-type hangers, snubbers and shock absorbers.

7.3.4 Observe all bolting and pinned connections for missing or bent parts or other damaged conditions.

7.3.5 Observe support weldments for cracks, misalignment or other evidence of distress.

7.3.6 On uninsulated piping, observe and report wear, rubbing and/or scratch marks which might indicate relative motion.

7.3.7 Report all findings on the Support Member Data Sheet.

7.4 Valve Visual Examination

7.4.1 The purpose of this section is to provide the examiner with necessary guidelines to visually examine the various valves included within the system boundary in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI. Provisions for valve internal inspection have been included if the Plant Owner or his agent deems it necessary to disassemble the valve. The Plant Owner or his agent shall remove insulation as necessary to facilitate examination.

7.4.2 External Examination

(1) Observe the condition of the valve insulation prior to removal for evidence of distress caused by leakage. Leakage will be indicated by a white residue in the area. Dented insulation or abrasion will indicate that the valve in the hot condition might be touching stationary objects.

(2) Examine the service connections to the valve operator (if applicable) for signs of distress.

(3) Examine the exposed portion of the valve stem (if applicable) for evidence of galling.

(4) Examine the valve packing gland (if applicable) and note any deficiencies.

7.4.3 Internal Examination

The following parts should be examined for mechanical damage such as galling and breakage: (not all the following parts are applicable to all valves)

(1) Stem

(2) Disc

(3) Seat

(4) Packing

(5) Internal pilot valve

(6) Rings

(7) Stem-to-disc connection

The following areas should be examined for evidence of metallurgical damage such as erosion and cracking:

(1) Valve bowl

(2) Seat

(3) Disc

(4) Stem

Report findings on the Visual Examination Data Sheet.

7.5 Pump Visual Examination

7.5.1 The purpose of this procedure is to provide the examiner with the necessary guidelines to visually examine the pumps to assure the owner-operator that no damage has occurred which can be considered detrimental to the pump's function. Provisions for pump internal inspection have been included if the plant owner or his agent deem it necessary to disassemble the pump. The plant owner or his agent shall remove insulation as necessary to facilitate examination.

7.5.2 External Examination

(1) Examine the external surfaces of the pump, motor and insulation for evidence of leakage (white residue), external damage and loose or broken service connections.

(2) Report observations on the Visual Examination Data Sheet.

7.5.3 Internal Examination

(1) Examine the pump bowl for evidence of erosion, cracking, galling (caused by close clearance between rotating or reciprocating and stationary parts), mechanical damage or other abnormal conditions.

(2) Examine the pump impeller or piston for erosion, cracking, galling or other abnormal conditions.

(3) Record observations on the Visual Examination Data Sheet.

7.6 Fastener Visual Examination

7.6.1 Examine all surfaces, especially the thread root area (if applicable) for evidence of cracking, galling, mechanical damage or other abnormal conditions.

7.6.2 Record observations on the Visual Examination Data Sheet.

7.7 Cladding Visual Examination

7.7.1 Examine the clad surface for evidence of cracking, mechanical damage or other abnormal conditions.

7.7.2 Record observations on the Visual Examination Data Sheet.

7.8 Visual Examination During Hydrotest

7.8.1 This examination shall be performed at that time when the system boundary is subjected to a hydrostatic test as specified by the program plan and schedule. For all systems, the system shall be at test pressure for a minimum of four (4) hours prior to examination.

7.8.2 The external surfaces of all accessible areas of the components and piping within the hydrostatic test area shall be directly or remotely examined for evidence of uncontrolled coolant leakage from the system. The examination may be conducted without the removal of insulation when the external surfaces of the insulation joints are accessible for visual examination.

7.8.3 The examination, which may be conducted without the removal of insulation, shall be performed by inspecting (1) the exposed surfaces of and joints in component insulation to locate evidence of reactor coolant leakage and (2) the floor areas (or equipment) directly underneath components for evidence of accumulated leakage which might drip from components.

7.8.3.1 When evidence of leakage is found, then the following steps shall be taken:

(a) The specific location of the leak shall be determined by the removal of any insulation which interferes with the determination of the leakage source.

(b) The leakage source, when determined, shall be identified and its specific location defined by:

(1) marking the area on the leaking component, using a suitable marking device, and/or

(2) documenting its location on the data sheet using supplementary sketches, if necessary, by measured distances from convenient, adjacent reference locations such as welds, components, etc.

7.8.4 Examination of insulation joints along vertical surfaces of vessel walls and piping need not be performed provided the lowest terminal ends of vertical surfaces are examined, and the insulation design is such that any leakages originating along the vertical surfaces can accumulate and leak from the insulation joint at the lowest elevation.

7.8.5 Examination of insulation joints along horizontal surfaces of components shall be conducted at each insulation join except where accessibility is limited by structural members or other components. In the latter cases, either the insulation shall be removed to permit component examination, or provisions shall be included to channel potential leakages to areas accessible for examination.

7.8.6 At locations where reactor coolant leakages are normally expected and collected (e.g., valve stem, pump seals), the examination shall verify that the leakage collection system is operative.

7.8.7 During the examination, particular attention shall be given to the insulated areas of components constructed of ferritic steels to detect evidence of boric acid residues whose source derives from borated reactor coolant, and which might have accumulated during the service period preceding the inspection.

7.8.8 In the case of storage tanks, the nominal hydrostatic pressure developed with the tank filled to its design capacity shall be acceptable as the system test pressure. Open-ended portions of a nonclosed system (e.g. suction line from a storage tank, or discharge line of a containment spray header) extending to the first shutoff valve may be exempted from the hydrostatic test requirements.

7.8.9. For Class C Components, the following shall apply :

7.8.9.1 Visual examination shall be conducted for evidence of component leakages (other than controlled or collected leakages), structural distress, or corrosion when the system is undergoing either a system inservice test, component functional test(i.e., valves and pumps) or a system pressure test.

7.8.9.2 In the case of buried components (e.g., underground piping), valves shall be provided to permit isolation of the buried portions of piping for the purpose of conducting a system pressure test in lieu of the visual examination. A loss of system pressure during the test shall constitute evidence of component leakage.

7.8.9.3 Supports (restraints) and hangers for components exceeding four-inch nominal pipe size whose structural integrity is relied upon to withstand design loads when the system function is required shall be visually examined to detect any loss of support capability, and evidence of inadequate restraint.

7.8.10 Record all instances when evidence of leakage, structural distress or corrosion is found on the Hydrostatic Examination Data Sheets.

8.0 RECORDING OF INDICATIONS

All visible indications shall be reported and detailed on the appropriate data sheet (see Appendix of Forms) and shall contain the following data:

(1) Date of examination

(2) Identification and signature of examiner

(3) Identification of item examined

(4) Examination results

(5) Special equipment used

(6) Photographs may be used to assist in evaluation

(7) The location of indications shall be described with respect to a convenient datum point on the object being examined

(8) Other information as required

9.0 EXAMINATION RECORDS

9.1 Certification of Records

9.1.1 The examiner shall complete and sign the appropriate data sheet(s) immediately upon completion of each examination.

9.2 Filing of Records

9.2.1 The examiner shall be responsible for submitting to the Plant Owner or his agent a complete set of examination records including certification of personnel qualifications with current eye test in accordance with Section 4.2.2.

9.2.2 Permanent records shall be maintained by the owner-operator for the life of the component.

10.0 EXAMINER'S CRITIQUE

10.1 Procedure Corrections and Additions

10.1.1 All procedure corrections and/or additions required during the inservice and/or repair examination shall be made in accordance with the requirements of NES QA Plan # NES 81A 0402 and shall be documented in the record of revisions section of this procedure.

10.2 Critique Report

10.2.1 Upon completion of the examination of all examination items, the examiner shall submit a written report to the Plant Owner, or his agent, listing pertinent information for future examinations such as procedure additions, corrections and revisions or unique problems or action to be taken.

10.3 Evaluation of Results

10.3.1 Evaluation of all findings shall be made by qualified personnel from NES and Niagara Mohawk to interpret results and to establish the requirements for corrective action.

VISUAL EXAMINATION DATA SHEET

Examiner's Name: ____________________
Examiner's Qualification Level: ____________________
Examiner's Signature: ____________________
Date: ____________________

Plant Name: ____________________
Identification of Item Examined: ____________________
Photograph Identification:
Roll # __________ Frame # __________
Inspector's Signature: ____________________

Finding	Yes	No	N/A	Location and Other Information (Additional Comments on Reverse Side)
Disc				
Valve Stem				
Stem to Disc Connection				
Seat				
Packing				
Rings				
Internal Pilot Valve				
Valve or Pump Service Connections				
Packing Gland				
Valve or Pump Bowl				
Piston or Impeller				
Evidence of Leakage				
Symptoms of Structural Distress				
Dented or Abrased Insulation				
Thread Root Area				
Corrosion				
Erosion				
Gouges				
Grind Marks				
Scratches				
Cracks				
Arc Strikes				
Misalignment				
Breakage				
Movement				
Pits				
Wear				
Galling				
Other				

SUPPORT MEMBER EXAMINATION DATA SHEET

Plant Name: ______________________________ Date: ______________

Examiner's Name: ______________________ Inspector's Signature: ______________________

Examiner's Qualification Level: ______________________ Photograph Identification: Roll # ________ Frame # ________

Examiner's Signature: ______________________

Hanger or Support Member Identification	Condition	Setting (if applicable)		Comments (System - Temp., Pressure, Wet, Dry)
		Required	Actual	

HYDROTEST VISUAL EXAMINATION DATA SHEET

Plant Name:______________________ Date:__________

Temperature:__________

Pressure:__________

Photograph Identification:
Roll #________ Frame #________

Examiner's Name:__________

Examiner's Qualification Level:__________

Examiner's Signature:__________

Inspector's Signature:__________

Area Examined	Leakage		Comments
	Yes	No	

Procedure No.: NIP 533
Subject: RPV to Flange Weld
Issue Date: November 18, 1975
Revision No.: 1 ; Date: 10-5-77
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ULTRASONIC EXAMINATION PROCEDURES FOR REACTOR VESSEL TO FLANGE WELD

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT, UNIT 1

Originator(s):

Signature Date

[signature] 5-7-76

Signature Date

Approved by:

N.E.S.I. [signature] SNT-TC-1A Level III 6-3-76

Signature Date

N.M.P.C. SNT-TC-1A Level III

Signature Date

NUCLEAR ENERGY SERVICES, INC.

Procedure No.: NIP 533
Subject: RPV to Flange Weld
Issue Date: November 18, 1975
Revision No.: 1 ; Date: 10-5-77

RECORD OF REVISIONS

Revision Number	Date	Description	Reason	Originator	NMPC	NES
1	10-5-77	General Revision	To reflect field changes and "as built" conditions	AU		psb

ULTRASONIC EXAMINATION PROCEDURES FOR REACTOR VESSEL TO FLANGE WELD

1.0 SCOPE

1.1 Area of Examination

1.1.1 This document covers the ultrasonic examination procedures for:

(1) Vessel to flange weld (CE drawing E-231-570, Detail X) shown in Figure 1.

1.2 Type of Examination

1.2.1 Volumetric examination shall be performed using ultrasonic pulse echo 4°, 6.5° and 11° angle beam longitudinal wave techniques applied to the top surface of the reactor vessel upper flange.

1.2.2 The examination shall be performed using manual search units and/or scan fixtures.

1.3 Time of Examination

1.3.1 These procedures shall govern the inservice examination and re-examination of repaired areas of the welds as required by the ASME Boiler and Pressure Vessel Code, Section XI (1974).

1.4 Weld Configuration

1.4.1 The reactor vessel to upper flange weld is basically a circumferential butt weld as shown in Figure 1. Thickness at the weld area is approximately 7-1/8". However, metal travel depth from examination surface is 23-5/32".

1.5 Materials

1.5.1 The reactor vessel and flange assembly are constructed of alloy steel SA-336 with stainless cladding on the ID surfaces.

2.0 REFERENCES

2.1 Reference Documents

2.1.1 The following documents form a part of this examination procedure:

(1) ASME Boiler and Pressure Vessel Code, Section XI 1974 Edition, and the Summer of 1974 Addenda.

(2) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(3) CONAM Procedure for Certifying Inspection Personnel, CUTP-1, Rev.1, September 1970.

2.2 Applicable Drawings

2.2.1 The following drawing is a part of this procedure:

(1) CE Assembly Drawing E-231-570, Detail X.

2.3 Operation Manuals

2.3.1 The equipment operational manuals for the particular ultrasonic instruments used form a part of this procedure.

3.0 PROCEDURE CERTIFICATION

3.1 The examination procedures described in this document comply with Section XI of the ASME Boiler and Pressure Vessel Code, 1974 Edition, except where examination coverage is limited by part geometry or access.

4.0 PERSONNEL CERTIFICATION

4.1 Personnel Certification Requirements

4.1.1 Each person performing ultrasonic examination governed by this procedure shall be certified in accordance with the following:

(1) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(2) CONAM Inspection Inc., Procedure for Certifying Ultrasonic Test Personnel CUTP-1, Rev. 1, September 1970.

(3) ASME Boiler and Pressure Vessel Code, Section XI (1974 Ed.)

4.1.2 An examination crew shall consist of one or two members as needed. At least one member of each crew shall have a minimum qualification Level II in accordance with the above referenced documents. The remaining member(s) shall have a minimum qualification of Level I or Level I trainee.

4.2 Personnel Records

4.2.1 Records of personnel qualification shall be maintained by Examination Contractor.

4.2.2 A copy of the examiner's certification, and a current eye test as required by SNT-TC-1A shall be filed with each permanent examination record, with a copy submitted to the plant owner or his agent, prior to performing examinations per this procedure.

5.0 EXAMINATION REQUIREMENTS

5.1 Examination Frequency

5.1.1 The nominal examination frequencies shall be 2.25 MHz for all angle beam examinations.

5.1.2 Other pulse frequencies shall be used if such variables as material attenuation, grain structure, etc., necessitates their use to achieve penetration or resolution. This information shall be recorded on the data sheets.

5.2 Examination Angles

5.2.1 Examination angles for the reactor vessel to flange weld shall be 4°, 6.5° and 11° refracted longitudinal angle beam one direction through the weld as shown in Fig. 1.

5.2.2 Other beam angles may be used as determined necessary; i.e. for evaluation of reflectors, to compensate for geometric constraints, etc. All information shall be recorded on the data sheets.

5.3 Liquid Couplant

5.3.1 The ultrasonic couplant shall be Trim Regular or Trim HD (Master Chemical Corporation, Perrysburg, Ohio).

5.3.2 The couplant shall be supplied in clean containers of sufficient quantity to facilitate the examination.

5.3.3 The couplant shall be pumped from the container to the search unit scan fixtures thru clear tygon flexible tubing or shall be applied manually with a brush or other suitable device.

5.3.4 Where required, the examiner shall be responsible for removing couplant from the examination surface at the conclusion of the examination.

5.4 Surface Preparation

5.4.1 All examination surfaces should be clean and free of dirt, weld spatter, etc., or any other condition which would interfere with the examination or impair proper transmission of the sound beam.

5.4.2 Irregularity of surface contour to be contacted by the search unit should not exceed 1/8" in any 2" of surface travel. Weld crown and edges should blend smoothly into adjacent base material.

5.5 Weld Identification

5.5.1 Each weld shall be located and identified per the appropriate weld map, located in the Program Plan Book.

5.6 Datum Point

5.6.1 The examiner shall permanently mark, or verify that there has been marked, a reference datum point for each weld from which all examination data and reported indications shall be referenced.

5.6.2 Datum points shall be marked by the use of low stress stamps or vibratooling and shall not be deeper than 1/64".

5.6.3 Due to limited accessibility to the flange weld surfaces, the datum point shall be located at vessel 0° at the highest point on the flange O.D. surface (shown in Figure 1) rather than on the weld.

5.6.4 All welds and indications shall be recorded in degrees clockwise from (when viewed from the top of the vessel) the datum point and in inches below the scan surface.

5.6.5 Each weld datum point along with respective weld reference points and divisions shall be shown on each examination report.

5.7 Examination Coverage

5.7.1 The intent of this procedure is to provide maximum examination coverage to insure weld integrity. Each weld shall be scanned with minimum 25% overlap of the transducer width(diameter) for each scan pass.

5.7.2 The rate of search unit movement shall not exceed 6 inches per second.

5.7.3 Due to limited accessibility, the vessel to flange weld will be examined only from the flange surface as shown in Figure 1 with 4°, 6.5° and 11° beam propagating in one direction towards the weld.

5.7.4 Where the examination surface or other conditions (weld contour, access, etc.) do not permit a meaningful ultrasonic examination. to be performed, the examiner shall record the area of non-examination and the particular interfering condition in the space provided on the Weld Data Sheet (Figure 5).

6.0 EQUIPMENT REQUIREMENTS

6.1 Examination Contractor's Equipment

6.1.1 The following test equipment or its equivalent shall be provided and/or operated by the Examination Contractor for examination of the reactor vessel welds:

(1) Pulse Echo Ultrasonic Instrument
(2) Sled Assembly 85D137
(3) 3 Search Units 1-1/8" Dia., 2.25 MHZ
(4) Couplant
(5) Camera

6.2 Plant Owner's Equipment

6.2.1 The Plant Owner or his agent shall provide and maintain the following service facilities and equipment as required:

(1) Scaffolding
(2) Water, Air and Electricity
(3) Temporary Lighting
(4) Crane or Lifting Devices
(5) Reference Standard Nos. PI-LF-1 and PIF-4.31C
(6) Radiation Monitoring Equipment
(7) Radiation Shielding
(8) Test Surface Preparation (cleaning & finishing)
(9) Couplant
(10) Drawings of Each Examination Area
(11) Post Examination Cleanup of Test Area

7.0 CALIBRATION REQUIREMENTS

7.1 Reference Standards

7.1.1 The reference standards designated in 6.2.1 (5) and shown in Figure 2 shall be used for basic instrument calibration and for establishing reference sensitivity levels for examination of the reactor vessel to flange weld.

7.1.2 The reference standard and appropriate calibration holes corresponding to each respective weld thickness shall be recorded on the calibration sheet. Figure 4 is an example of the Calibration Data Sheet to be used with this procedure.

7.1.3 Calibration Data Sheets shall be numbered 533-1, 533-2, 533-3, etc., at the time of calibration and shall be signed by the examiner(s) upon completion.

7.1.4 Calibration procedures shall be performed using the <u>clad</u> surface of the reference standard.

7.1.5 The temperature of the reference standard shall be within 25° F of the part weld temperature.

7.2 Reference Sensitivity Level

7.2.1 The reference sensitivity level shall be the distance-amplitude curve initially obtained directly from the reference standard and shall be the sensitivity level used for evaluating and recording all indications.

7.2.2 During actual weld scanning, the reference sensitivity level shall be increased 2X or 6dB.

7.3 Times of Calibration

7.3.1 Basic instrument calibration shall be performed using the appropriate reference standard, search units and instrumentation immediately prior to the examination of the flange welds specified in this procedure.

7.3.2 Instrument calibration checks shall be performed at the beginning of each day of examination in accordance with Section 8.0 of this procedure.

7.3.3 Examination system calibration checks shall be performed at least at the beginning and at the completion of each 4 hour period of examination and/or at the change of examination personnel, equipment, search units, coupler shoes, etc., and at the completion of the examination of each similar series of welds in accordance with Sections 9.2 and 9.4 of this procedure.

7.4 Calibration Response

7.4.1 Calibration response shall be checked at the primary reference sensitivity level.

7.4.2 Signal response obtained during calibration check shall be within plus or minus 20% of that established during basic instrument calibration.

7.4.3 If any point on the Distance Amplitude Correction (DAC) curve is above or below the 20% limit, the examiner shall:

(1) Mark all weld data sheets since previous calibration void.

(2) Recalibrate examination system.

(3) Reexamine voided areas.

7.4.4 If any point on the DAC curve has moved horizontally more than 5% of the sweep line from its original settings, the examiner shall:

(1) Correct the sweep calibration and note it on the Calibration Data Sheet.

(2) Void any data sheets made since the previous calibration which have recorded indication and reexamine those areas.

8.0 INSTRUMENT CALIBRATION VERIFICATION

8.1 Amplitude Linearity

8.1.1 The linearity of the ultrasonic instrument shall be checked as follows:

(1) Position a search unit on a reference standard so that two indications are visible. (These indications may be obtained from a reference hole and back surface, from two reference holes, or from a reference hole and a corner seen simultaneously on the instrument screen.)

(2) Manipulate search unit to establish a 2 to 1 ratio of amplitudes between the two indications with the largest at 80% full screen height (FSH).

(3) Without moving search unit, adjust sensitivity (gain) to run the higher response from approximately 100% to 20% FSH in 2 dB steps (10% if fine control is available).

(4) Read and record the relative amplitudes of the two indications to the nearest 1%.

(5) If the smaller indication does not fall within 5% FSH of 50% of the larger indication, the instrument shall not be used for examinations until corrected.

8.2 Amplitude Control Linearity

8.2.1 The linearity of the instrument gain (attenuation) control shall be checked as follows:

(1) Position an angle beam search unit on the reference standard to obtain an 80% FSH indication froma ref. hole.

(2) Using amplitude control, decrease signal amplitude by 6 dB and by 12dB to obtain nominal 40% FSH and 20% FSH signals. Read and record actual signal amplitudes to closest 1%.

(3) Obtain a 40% FSH indication from a ref. hole and increase amplitude with the amplitude control by 6 dB to obtain a nominal 80% signal. Read and record as in (2).

(4) Obtain a 20% FSH indication from a ref. hole and increase amplitude with the amplitude control by 12 dB to obtain a nominal 80% FSH signal. Read and record as in (2).

(5) If the indications obtained in (2), (3) and (4) are not within ± 20% of nominal, the instrument shall not be used for examination until corrected.

9.0 EXAMINATION SYSTEM CALIBRATION

9.1 Angle Beam Calibration (4°, 6.5°, 11°)

9.1.1 Angle beam sweep calibration and distance-amplitude correction shall be performed as follows and as shown in Figure 3. The appropriate combination of search units and reference standard for each respective weld are shown in Figures 1 and 2.

(1) Adjust the instrument sweep controls so that the signal response from the A and B or C holes occur at the 7th and 8th horizontal screen divisions as shown in Figure 3.

(2) Position search unit to obtain maximum response from the hole which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on CRT.

(3) Without changing sensitivity, position search unit respectively on the remaining angle beam calibration holes and mark signal amplitudes and locations on CRT.

(4) Plot a DAC curve by connecting the locations (marked on the CRT) with a continuous line extended to cover the full examination range (horizontal screen divisions 0 thru 8) as shown in Figure 3.

(5) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(6) Instrument is now calibrated for examination of welds of the thickness for which calibration was just performed.

(7) Record all data and instrument settings on the Calibration Data Sheet.

9.2 Angle Beam Calibration Check

9.2.1 Angle beam calibration check as required by Section 7.3.2 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.3.1 (2).

(2) Reposition search unit at each respective test hole and observe signal response amplitudes and horizontal screen positions.

(3) See Section 7.4 for signal response requirements during calibration check.

10.0 EXAMINATION PROCEDURES

10.1 Angle Beam Examinations

10.1.1 All angle beam examinations shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.1.2 The search unit shall be swivelled to ensure maximum coverage as it is moved along a rectilinear scan pattern allowing a minimum of 25% overlap of the transducer element width (diameter).

10.1.3 See Table 1 and Figure 1 for scan path distances and weld identifications.

10.1.4 Continue scanning until all welds have been examined. Equipment must not be removed from weld area or disassembled until all indications have been evaluated.

11.0 EVALUATION CRITERIA

11.1 Recording of Indications

11.1.1 For all angle beam examinations, all indications showing a signal amplitude response equal to or greater than 50% of the reference response shall be recorded on the appropriate data sheet at the time of weld examination and prior to removing equipment from the flange weld.

(1) Each recorded indication shall be identified as to depth (as a percent of thickness), distance from surface, length, signal amplitude and location relative to the weld datum point.

11.1.2 Indications from the reactor vessel to flange weld shall be reported in inches below the examination surface and in degrees CW from the weld datum point when looking down upon the top of the reactor vessel.

11.2 Evaluation of Indications

11.2.1 Evaluation of all indications shall be made at the reference sensitivity and in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWB-3000.

Results of this evaluation shall be reported to the Plant Owner or his Agent in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWA-6000. Disposition of evaluation results shall be made in accordance with the Owner's Plant Procedures.

12.0 EXAMINATION RECORDS

12.1 Certification of Records

12.1.1 The examiner shall complete and sign the appropriate Weld Scan Data Sheet(s) immediately upon the completion of each weld examination.

12.2 Filing of Records

12.2.1 The examiner shall be responsible for submitting to the Plant Owner, or his Agent, a completely documented set of examination records including certification of personnel qualifications with a current eye test report in accordance with SNT-TC-1A.

13.0 EXAMINER'S CRITIQUE

13.1 Procedure Corrections and Additions

13.1.1 All procedure corrections and/or additions required during the inservice examinations shall be made in accordance with requirements of NES QA Plan # NES 81A0402 and documented in the record of revisions section of this procedure.

13.2 Critique Report

13.2.1 Upon completion of the examination of the Reactor Vessel to Flange weld, the examiner shall submit a written report to the Plant Owner or his Agent listing pertinent information for future examinations such as procedure additions, corrections and revisions or unique problems or actions to be taken.

13.3 Additional Examinations

13.3.1 When indications exceeding allowable standards are found, additional examinations shall be performed as stipulated in Section XI, paragraph IWB-2430.

Drawing: E-231-570 Detail X
Tooling: Manual Search Units
Reference Standard No. PI-LF-1

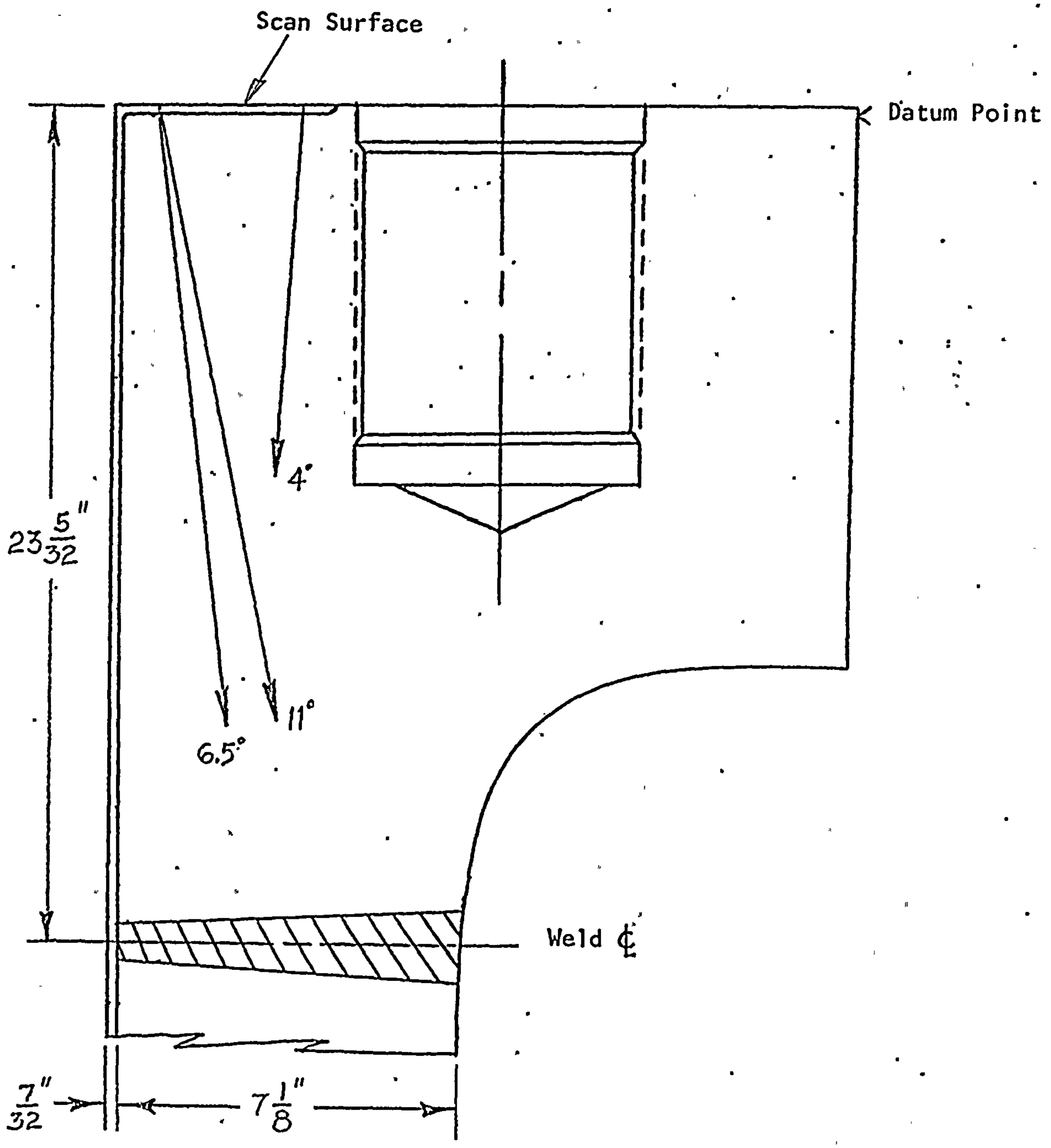
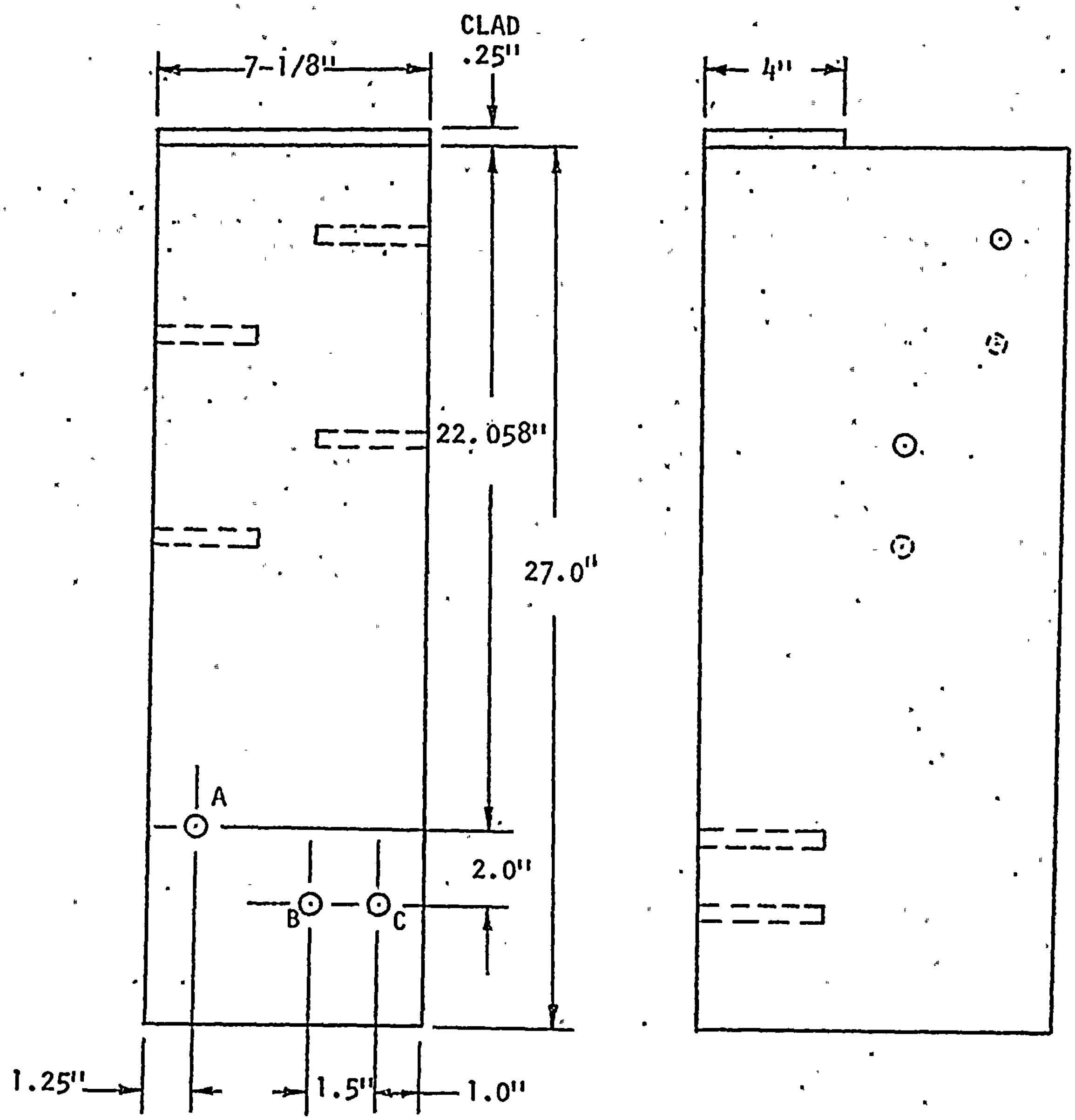


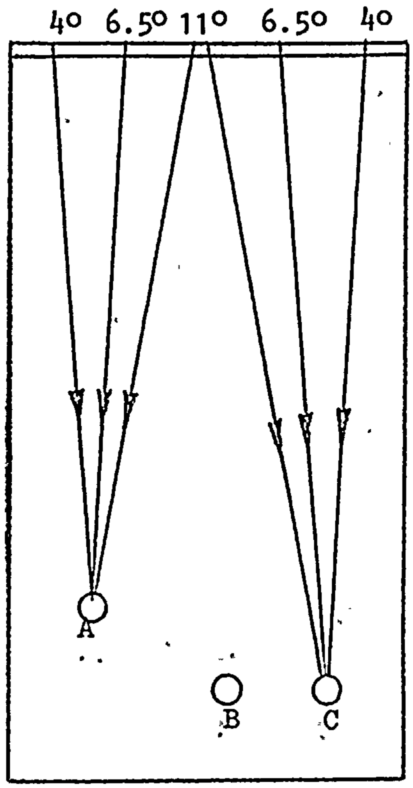
Figure 1. Ultrasonic Examination of Reactor Vessel to Flange Weld



Note: Holes A, B, and C are for Flange Weld Examination

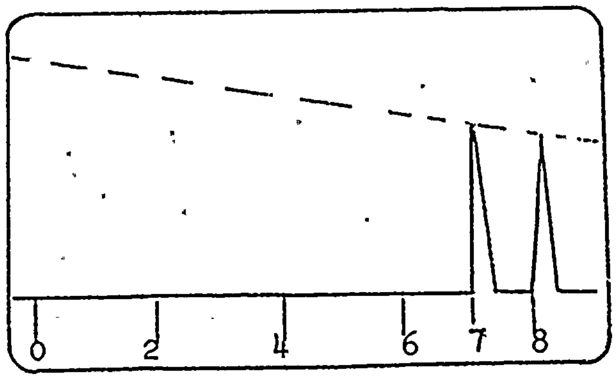
Figure 2. Ultrasonic Reference Standard (P1-LF-1) for Vessel to Flange Weld

Search Unit Positions



Pl-LF-1

Typical DAC Curve



Step 1 - Adjust sweep controls so that A and B or C holes are located respectively on the 7th and 8th horizontal screen divisions.

Step 2 - Adjust sensitivity to provide 80% FSH indication from hole giving maximum response - mark position on screen.

Step 3 - Position search unit for maximum response from remaining holes - mark position on screen.

Step 4 - Plot DAC by connecting points marked on screen with line extended to cover entire examination range.

Step 5 - Record all sweep and sensitivity control settings on respective data sheets.

FIGURE 3. REFERENCE SENSITIVITY AND DAC CALIBRATION PROCEDURES FOR ULTRASONIC EXAMINATION OF WELDS.

Procedure No.: NIP 533
Subject: RPV to Flange Weld
Issue Date: November 18, 1975
Revision No.: 1 ; Date: 10-5-77

CALIBRATION DATA SHEET NO. 533-1
MANUAL EXAMINATION

EXAMINATION AREA ____________________

TRANSDUCER IDENTIFICATION

STYLE OR TYPE NO. ____________________
SIZE ____________________
FREQUENCY ____________________
SERIAL NO. ____________________
ANGLE & MODE ____________________
BEAM DIRECTION (= or ⊥ to weld) __________
SCAN FIXTURE ____________________

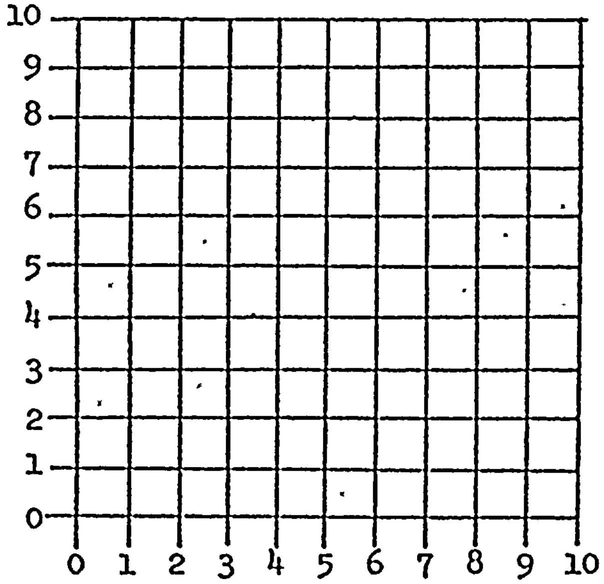
CALIBRATION BLOCK

ID NO. ____________________
SIZE ____________________
EXAMINATION SURFACE ____________________

Hole IDENT	Depth IN.	Amp. %	Atten. dB

TEMPERATURE = Ref. Std. __________
Component __________

DAC PLOT



ULTRASONIC INSTRUMENT

MODEL NO. ____________________
SERIAL NO. ____________________

CONTROL SETTINGS

PULSE LENGTH ____________________
FREQUENCY ____________________
dB GAIN ____________________
SWEEP LENGTH ____________________
SWEEP DELAY ____________________
VIDEO FILTER ____________________
REJECT ____________________
COUPLANT ____________________

INSTRUMENT LINEARITY CALIBRATION

Amplitude			
High	Low	High	Low
1.		5.	
2.		6.	
3.		7.	
4.		8.	

AMPLITUDE CONTROL LINEARITY

Initial	Δ dB	Result	Limit
80	-6		32% - 48%
80	-12		16% - 24%
40.	+6		64% - 96%
20	+12		64% - 96%

EXAMINER(S) (Signature Required)

1. ____________________ SNT-TC-1A Level
2. ____________________ SNT-TC-1A Level

DATE: __________ TIME: __________

Reviewed by: ____________________

NUCLEAR ENERGY SERVICES, INC.

Figure 4

WELD SCAN DATA SHEET

1. Calibration Data Sheet No. ____
2. Examination Angle ____
3. Area of Examination ____
4. Examination Surface ____

Procedure No.: NIP 533
Subject: RPV to Flange Weld
Issue Date: November 18, 1975
Revision No.: 1; Date: 10-5-77
Page 19 of 21

Weld, Item or Scan No.	Scan Completion				No Reportable Indications	Reportable Indications	Supplement Attached	Comments: Reason for Incompleted Scans
	0° Base Metal	0° WHAZ	Normal to Weld Centerline	Parallel to Weld Centerline				

Calibration Checks			
Instrument		Examination System	
Time	Date	Time	Date

Additional Sheets Attached:

Continuation ____ Supplements ____

Examiner(s):

1. ____ SNT-TC-1A Level ____
2. ____ SNT-TC-1A Level ____

Date: ____

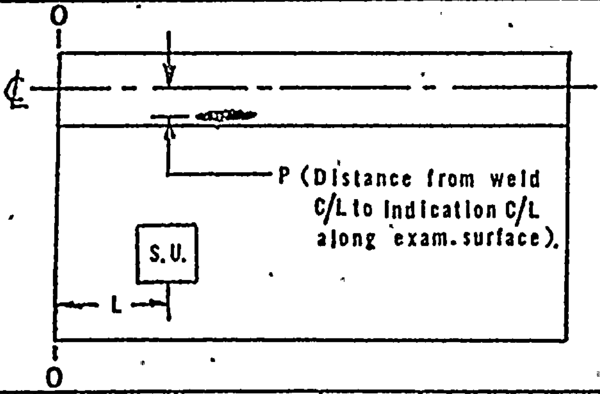
NUCLEAR ENERGY SERVICES, INC.

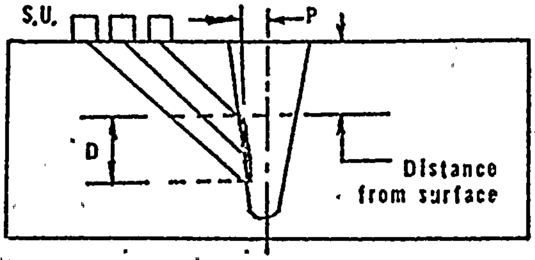
Figure 5

WELD SCAN DATA SHEET SUPPLEMENT B	Procedure No.: NIP 533 Subject: RPV to Flange Weld Issue Date: November 18, 1975 Revision No.: 1 ; Date: 10-5-77 Page 20 of 21

Weld No. ______________________ Sheet ________ of ________

Calibration Data Sheet No. ______________ EXAM. ANGLE ______________





Note: Location increments are not to exceed allowable scan increments.

Ind. No.	BEAM DIR.	L Location	Max % DAC	Dist. From Surface	P	50% Forward		50% Back		Depth (D)	
						Dist. From Surface	P	Dist. From Surface	P	Inches	% T

NOTE:
End points of L are the smaller of 50% DAC or 50% Max.

Examiner(s):

1. ______________________ SNT-TC-1A Level ________

2. ______________________ SNT-TC-1A Level ________

Date: ______________________

NUCLEAR ENERGY SERVICES, INC.

Figure 5A

TABLE I

WELD IDENTIFICATION

NUCLEAR COMPONENTS

Weld No.	Description	Ref. Block	Reference Figures	Notes
RV-3-563/1-w thru RV-3-563/7-w	Circumferential Reactor Vessel to Flange Weld	P1-LF-1	Figure 1 - Weld Figure 2 - Ref. Block	Scan in 96" increments

ULTRASONIC EXAMINATION PROCEDURES FOR REACTOR VESSEL FLANGE LIGAMENT AREAS

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT, UNIT I

Originator(s):

Signature Date

5-7-76

Signature Date

Approved by:

N.E.S.I. SNT-TC-1A Level III 6-3-76

Signature Date

N.M.P.C. SNT-TC-1A Level III

Signature Date

RECORD OF REVISIONS

Revision Number	Date	Description	Reason	Originator	NMPC	NES

ULTRASONIC EXAMINATION PROCEDURES FOR REACTOR VESSEL FLANGE LIGAMENT AREAS

1.0 SCOPE

1.1 Area of Examination

1.1.1 This document covers the ultrasonic examination procedures for the reactor vessel flange ligament areas.

(1) Vessel Flange Ligament Areas between stud holes (CE drawing E-231-570, Detail X and Section "A-A").

1.2 Type of Examination

1.2.1 Volumetric examination shall be performed using ultrasonic pulse echo 0° straight beam techniques applied to the upper surface of the reactor vessel flange as shown in Figure 1.

1.2.2 The examination shall be performed using manual search units and/or scan fixtures.

1.3 Time of Examination

1.3.1 These procedures shall govern the inservice examination and re-examination of repaired areas of the ligaments as required by the ASME Boiler and Pressure Vessel Code, Section XI (1974).

1.4 Weld Configuration

1.4.1 The configuration of the reactor vessel flange ligament area is shown in Figures 1 and 2.

1.4.2 The examination area consists of a 360°, 1½" wide band approximately 10" deep around each stud hole.

1.5 Materials

1.5.1 The flange ligament area is constructed of alloy steel (SA 336).

2.0 REFERENCES

2.1 Reference Documents

2.1.1 The following documents form a part of this examination procedure:

(1) ASME Boiler and Pressure Vessel Code, Section XI 1974 Edition, and the Summer of 1974 Addenda.

(2) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(3) CONAM Procedure for Certifying Inspection Personnel, CUTP-1, Rev.1, September 1970.

2.2 Applicable Drawings

2.2.1 The following drawings form a part of this procedure:

(1) CE assembly drawing E-231-570, Detail X and Section "A-A".

2.3 Operation Manuals

2.3.1 The equipment operational manuals for the particular ultrasonic instruments used form a part of this procedure.

3.0 PROCEDURE CERTIFICATION

3.1 The examination procedures described in this document comply with Section XI of the ASME Boiler and Pressure Vessel Code, 1974 Edition, except where examination coverage is limited by part geometry or access.

4.0 PERSONNEL CERTIFICATION

4.1 Personnel Certification Requirements

4.1.1 Each person performing ultrasonic examination governed by this procedure shall be certified in accordance with the following:

(1) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(2) CONAM Inspection Inc., Procedure for Certifying Ultrasonic Test Personnel CUTP-1, Rev. 1, September 1970.

(3) ASME Boiler and Pressure Vessel Code, Section XI (1974 Ed.)

4.1.2 An examination crew shall consist of one or two members as needed. At least one member of each crew shall have a minimum qualification Level II in accordance with the above referenced documents. The remaining member(s) shall have a minimum qualification of Level I or Level I trainee.

4.2 Personnel Records

4.2.1 Records of personnel qualification shall be maintained by Examination Contractor.

4.2.2 A copy of the examiner's certification, and a current eye test as required by SNT-TC-1A shall be filed with each permanent examination record, with a copy submitted to the plant owner or his agent, prior to performing examinations per this procedure.

5.0 EXAMINATION REQUIREMENTS

5.1 Examination Frequency

5.1.1 The nominal examination frequency shall be 2.25 MHz for the straight beam examination of the flange ligament area.

5.1.2 Other pulse frequencies shall be used if such variables as material attenuation, grain structure, etc., necessitates their use to achieve penetration or resolution. This information shall be recorded on the data sheets.

5.2 Examination Angles

5.2.1 Examination angles for the reactor vessel flange ligament areas between stud holes shall be as follows and as defined in paragraph 5.7 and as shown in Figure 1.

(1) 0° straight beam from the flange ligament areas and directed parallel with and to the depth of the ligament stud holes.

(2) Other beam angles may be used as determined necessary; i.e. for evaluation of reflectors, to compensate for geometric constraints, etc. All information shall be recorded on the data sheets.

5.3 Liquid Couplant

5.3.1 The ultrasonic couplant shall be Trim Regular or Trim HD (Master Chemical Corporation, Perrysburg, Ohio).

5.3.2 The couplant shall be supplied in clean containers of sufficient quantity to facilitate the examination.

5.3.3 The couplant shall be pumped from the container to the search unit scan fixtures thru clear tygon flexible tubing or shall be applied manually with a brush or other suitable device.

5.3.4 Where required, the examiner shall be responsible for removing couplant from the examination surface at the conclusion of the examination.

5.4 Surface Preparation

5.4.1 All examination surfaces should be clean and free of dirt, weld spatter, etc., or any other condition which would interfere with the examination or impair proper transmission of the sound beam.

5.4.2 Irregularity of surface contour to be contacted by the search unit should not exceed 1/8" in any 2" of surface travel.

5.5 Weld Identification

5.5.1 Each ligament area shall be located and identified per the appropriate weld map found in the Program Plan Book.

5.6 Datum Point

5.6.1 The examiner shall permanently mark, or verify that there has been marked, a reference datum point at vessel 0°. from which all examination data and reported indications shall be referenced.

5.6.2 Datum points shall be marked by the use of low stress stamps or vibratooling and shall not be deeper than 1/64".

5.6.3 The Ref. point for each ligament shall be on the highest point on the flange at the intersection of an imaginary line from the center of the reactor thru the stud hole and the OD surface of the flange.

5.6.4 All indications shall be recorded in inches below the flange surface, and in degrees clockwise from the reference point, when looking down on the finished surface of the flange.

5.6.5 Flange ligament identification numbers, along with respective reference points and division, shall be shown on each examination report.

5.7 Examination Coverage

5.7.1 The intent of this procedure is to provide maximum examination coverage to insure integrity of the flange ligament areas. Each area shall be scanned with minimum 25% overlap of the transducer element width (diameter) for each scan pass.

5.7.2 The rate of search unit movement shall not exceed 6 inches per second.

5.7.3 Each ligament area shall be ultrasonically examined where part geometry and access permit using 0° straight beam techniques, propagating the sound beam parallel with each stud hole to a depth of 10", as shown in Figure 1.

5.7.4 Where the examination surface or other conditions (weld, contour, access, etc.) do not permit a meaningful ultrasonic examination to be performed, the examiner shall record the area of non-examination and the particular interfering condition in the space provided on the Weld Scan Data Sheet (Figure 6).

6.0 EQUIPMENT REQUIREMENTS

6.1 Examination Contractor's Equipment

6.1.1 The following test equipment or its equivalent shall be provided by the Examination Contractor for examination of the flange ligament areas:

(1) Pulse Echo Ultrasonic Instrument
(2) Scan Fixture, 0° , (AI No. 85C157, or other)
(3) Search Unit, 1 " Dia., 2.25 MHz
(4) Couplant
(5) Camera

6.2 Plant Owner's Equipment

6.2.1 The Plant Owner or his Agent shall provide the following service facilities and equipment as required:

(1) Scaffolding
(2) Water, Air and Electricity
(3) Temporary Lighting
(4) Crane or Lifting Devices
(5) Reference Standard No. P1-LF-1
(6) Radiation Monitoring Equipment
(7) Radiation Shielding
(8) Test Surface Preparation (cleaning and finishing)
(9) Drawings of each Examination Area
(10) Post Examination Cleanup of Test Area

7.0 CALIBRATION REQUIREMENTS

7.1 Reference Standards

7.1.1 The reference standard designated in 6.2.1(5) shall be used for basic instrument calibration and for establishing reference sensitivity levels for examination of the reactor vessel flange ligament areas (See Figure 3).

7.1.2 The number of the reference standard and appropriate calibration holes corresponding to the examination depth shall be recorded on each Calibration Data Sheet. Figure 5 is an example of the Calibration Data Sheet to be used with this procedure.

7.1.3 Calibration Data Sheets shall be numbered 534-1, 534-2, 534-3 etc., at the time of calibration and shall be signed by the examiner(s) upon completion.

7.1.4 Calibration procedures shall be performed using the unclad surface of the reference standard.

7.1.5 The temperature of the reference standard shall be within 25° F of the component temperature.

7.2 Reference Sensitivity Level

7.2.1 The reference sensitivity level shall be the distance-amplitude curve initially obtained directly from the reference standard and shall be the sensitivity level used for evaluating and recording all indications.

7.2.2 During actual weld scanning, the reference sensitivity level shall be increased 2X or 6dB.

7.3 Times of Calibration

7.3.1 Basic instrument calibration shall be performed using the appropriate reference standard, search units and instrumentation immediately prior to the examination of the flange ligament areas specified in this procedure.

7.3.2 Instrument calibration checks shall be performed at the beginning of each day of examination in accordance with Section 8.0 of this procedure.

7.3.3 Examination system calibration checks shall be performed at least at the beginning and at the completion of each 4 hour period of examination and/or at the change of examination personnel, equipment, search units, coupler shoes, etc., in accordance with Section 9.2 of this procedure.

7.4 Calibration Response

7.4.1 Calibration response shall be checked at the primary reference sensitivity level.

7.4.2 Signal response obtained during calibration check shall be within plus or minus 20% of that established during basic instrument calibration.

7.4.3 If any point on the Distance Amplitude Correction (DAC) curve is above or below the 20% limit, the examiner shall:

(1) Mark all weld data sheets since previous calibration void.

(2) Recalibrate examination system.

(3) Reexamine voided areas.

7.4.4 If any point on the DAC curve has moved horizontally more than 5% of the sweep line from its original settings, the examiner shall:

(1) Correct the sweep calibration and note it on the Calibration Data Sheet.

(2) Void any data sheets made since the previous calibration which have recorded indication and reexamine those areas.

8.0 INSTRUMENT CALIBRATION VERIFICATION

8.1 Amplitude Linearity

8.1.1 The linearity of the ultrasonic instrument shall be checked as follows:

(1) Position a search unit on a reference standard so that two indications are visible. (These indications may be obtained from a reference hole and back surface, from two reference holes, or from a reference hole and a corner seen simultaneously on the instrument screen.)

(2) Manipulate search unit to establish a 2 to 1 ratio of amplitudes between the two indications with the largest at 80% full screen height (FSH).

(3) Without moving search unit, adjust sensitivity (gain) to run the higher response from approximately 100% to 20% FSH in 2 dB steps (10% if fine control is available).

(4) Read and record the relative amplitudes of the two indications to the nearest 1%.

(5) If the smaller indication does not fall within 5% FSH of 50% of the larger indication, the instrument shall not be used for examinations until corrected.

8.2 Amplitude Control Linearity

8.2.1 The linearity of the instrument gain (attenuation) control shall be checked as follows:

(1) Position a straight beam search unit on the reference standard to obtain an 80% FSH indication from a 1/2T equivalent(F) hole.

(2) Using amplitude control, decrease signal amplitude by 6 dB and by 12 dB to obtain nominal 40% FSH and 20% FSH signals. Read and record actual signal amplitudes to closest 1%.

(3) Obtain a 40% FSH indication from the 1/2T equivalent(F) hole and increase amplitude with the amplitude control by 6 dB to obtain a nominal 80% signal. Read and record as in (2).

(4) Obtain a 20% FSH indication from the 1/2T equivalent(F) hole and increase amplitude with the amplitude control by 12 dB to obtain a nominal 80% FSH signal. Read and record as in (2).

(5) If the indications obtained in (2), (3) and (4) are not within ± 20% of nominal, the instrument shall not be used for examination until corrected.

9.0 EXAMINATION SYSTEM CALIBRATION

9.1 Straight Beam Calibration

9.1.1 Straight beam sweep calibration and distance-amplitude correction shall be performed as follows and as shown in Figure 4. The appropriate combination of search units and reference standard for each respective weld are shown in Figures 1 and 2.

(1) Adjust the instrument sweep controls so that the signal responses from the 1/4T equivalent(D) and 3/4T equivalent(E) holes occur at the 2nd and 6th horizontal screen divisions as shown in Figure 4.

(2) Position search unit to obtain maximum response from the hole which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on the CRT.

(3) Without changing sensitivity, position the search unit respectively on the remaining holes and mark signal amplitudes and locations on the CRT.

(4) Plot a DAC curve by connecting the locations (marked on the CRT) with a continuous line extended to cover the full examination range (horizontal screen divisions 0 thru 8) as shown in Figure 4.

(5) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(6) System is now calibrated for examination of the ligaments of the thickness for which calibration was just performed.

(7) Record all data and instrument settings on the Calibration Data Sheet.

9.2 <u>Straight Beam Calibration Check</u>

9.2.1 Straight beam calibration check as required by Section 7.3.3 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.1.1 (2).

(2) Reposition search unit at each respective test hole and observe maximum signal response amplitudes, and horizontal screen positions.

(3) See Section 7.4 for signal response requirements during calibration check.

10.0 EXAMINATION PROCEDURES

10.1 Straight Beam Examination

10.1.1 Straight beam examination of the flange ligament areas shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.1.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer element width (diameter) for each scan pass.

10.1.3 See Table I and Figures 1 and 2 for scan path distances and area identifications.

10.1.4 Continue scanning until all areas have been examined. Equipment must not be removed from the area until all indications have been evaluated.

11.0 EVALUATION CRITERIA

11.1 Recording of Indications

11.1.1 All indications showing a signal amplitude response equal to or greater than 50% of the reference response shall be recorded on the appropriate data sheet at the time of flange ligament area examination and prior to removing equipment from the flange ligament area.

(1) Each recorded indication shall be identified as to depth (as a percent of thickness), distance from surface, length, signal amplitude and location relative to the flange ligament datum point.

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter(width).

11.1.2 Indications from the reactor vessel flange ligament areas shall be reported in inches below the examination surface and in degrees CW from the datum point when looking down upon the top of the reactor vessel.

11.2 Evaluation of Indications

11.2.1 Evaluation of all indications shall be made at the reference sensitivity and in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWB-3000.

Results of this evaluation shall be reported to the Plant Owner or his Agent in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWA-6000. Disposition of evaluation results shall be made in accordance with the Owner's Plant Procedures.

12.0 EXAMINATION RECORDS

12.1 Certification of Records

12.1.1 The examiner shall complete and sign the appropriate Weld Scan Data Sheet(s) immediately upon the completion of each weld examination.

12.2 Filing of Records

12.2.1 The examiner shall be responsible for submitting to the Plant Owner, or his Agent, a completely documented set of examination records including certification of personnel qualifications with a current eye test report in accordance with SNT-TC-1A.

13.0 EXAMINER'S CRITIQUE

13.1 Procedure Corrections and Additions

13.1.1 All procedure corrections and/or additions required during the inservice examinations shall be made in accordance with requirements of NES QA Plan # NES 81A 0402 and documented in the record of revisions section of this procedure.

13.2 Critique Report

13.2.1 Upon completion of the examination of all Reactor Vessel Flange Ligaments, specified in this procedure, the examiner shall submit a written report to the Plant Owner or his Agent listing pertinent information for future examinations such as procedure additions, corrections and revisions or unique problems or actions to be taken.

13.3 Additional Examinations

When indications exceeding allowable standards are found, additional examinations shall be performed as stipulated in Section XI, paragraph IWB-2430.

CE Drawing: E-231-570 Detail X, Section "A-A"
Tooling: Manual Search Unit
Reference Standard: P1-LF-1

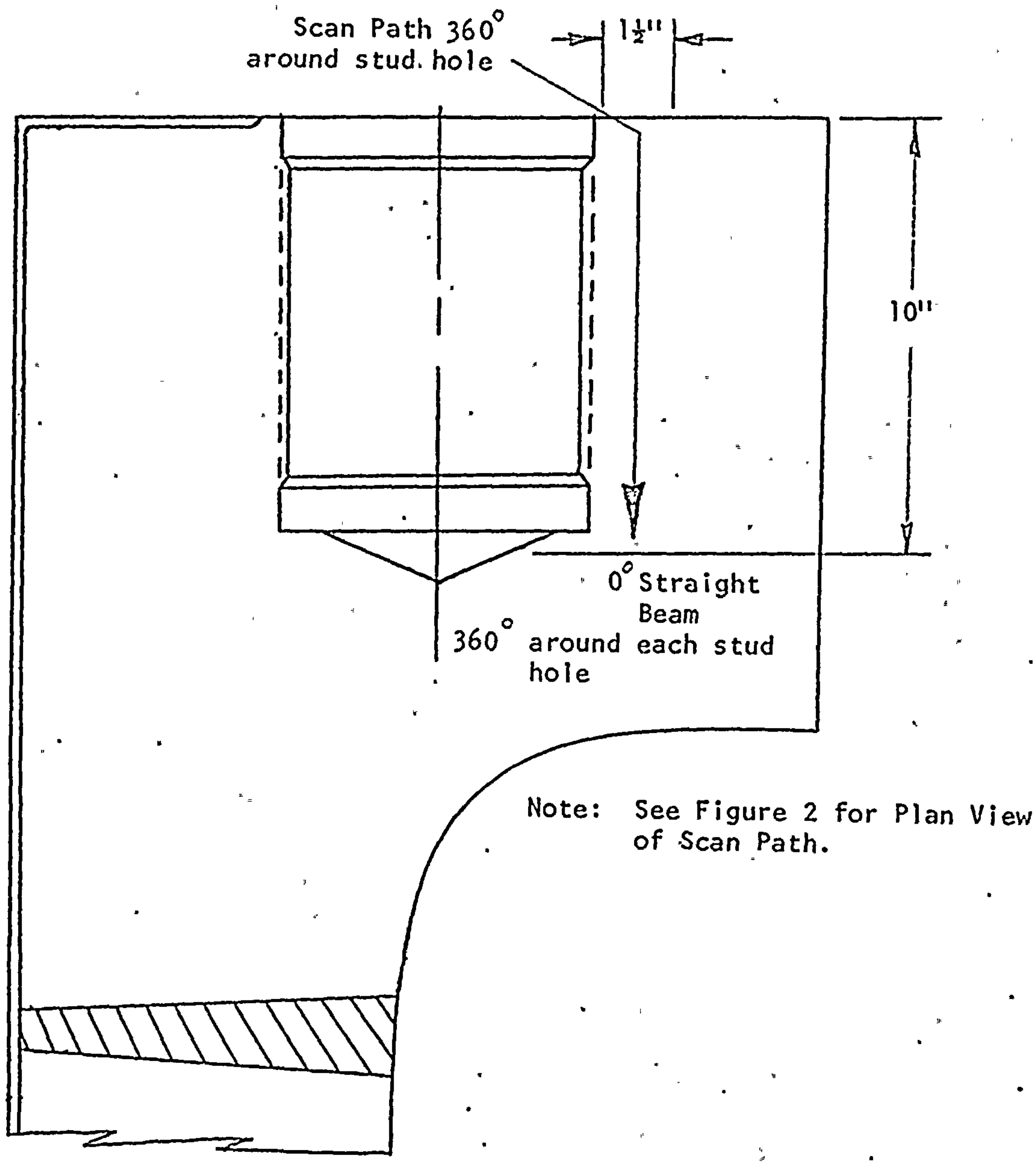


Figure 1. Ultrasonic Examination of Reactor Vessel Ligament Areas between Stud Holes.

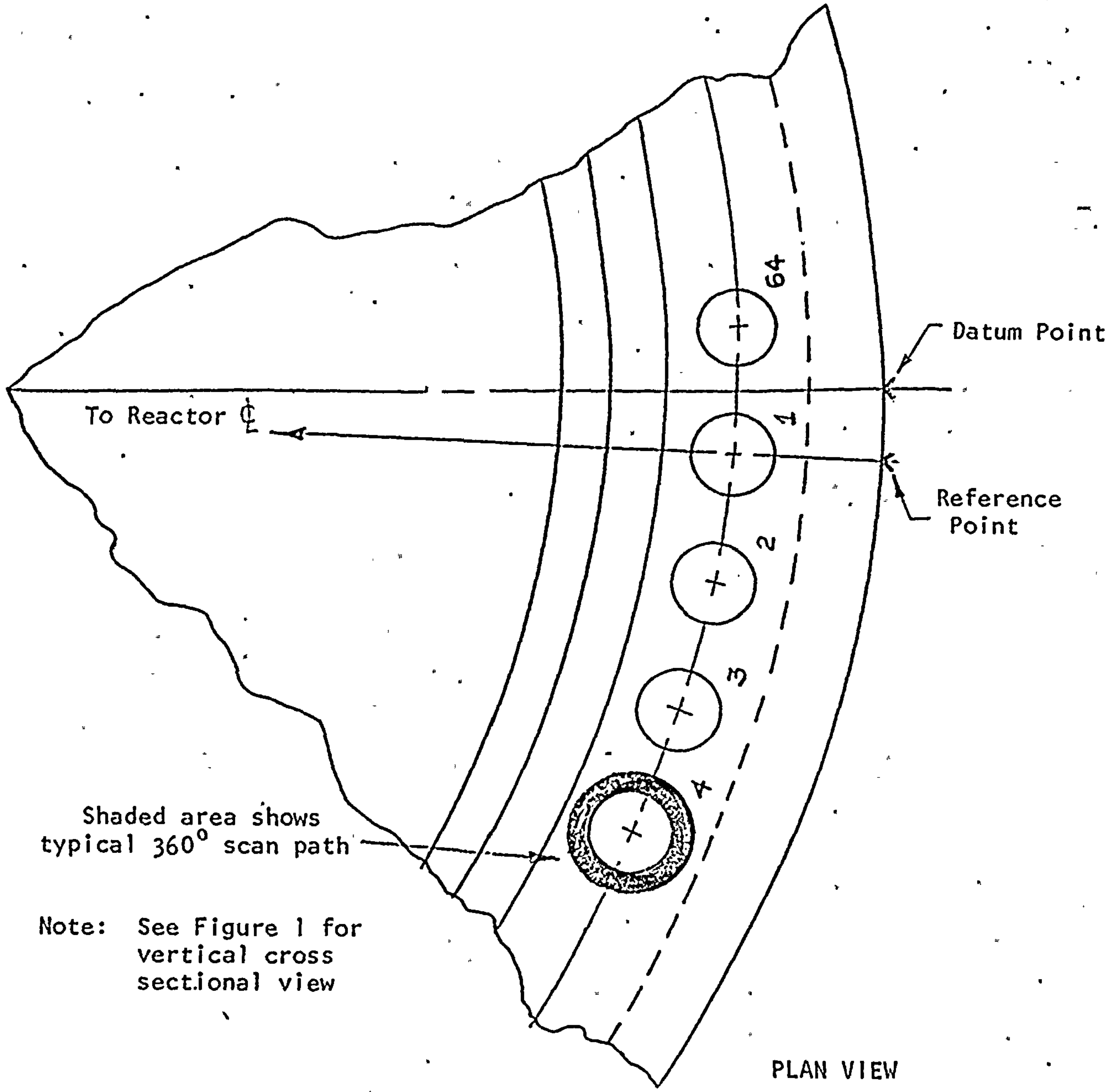
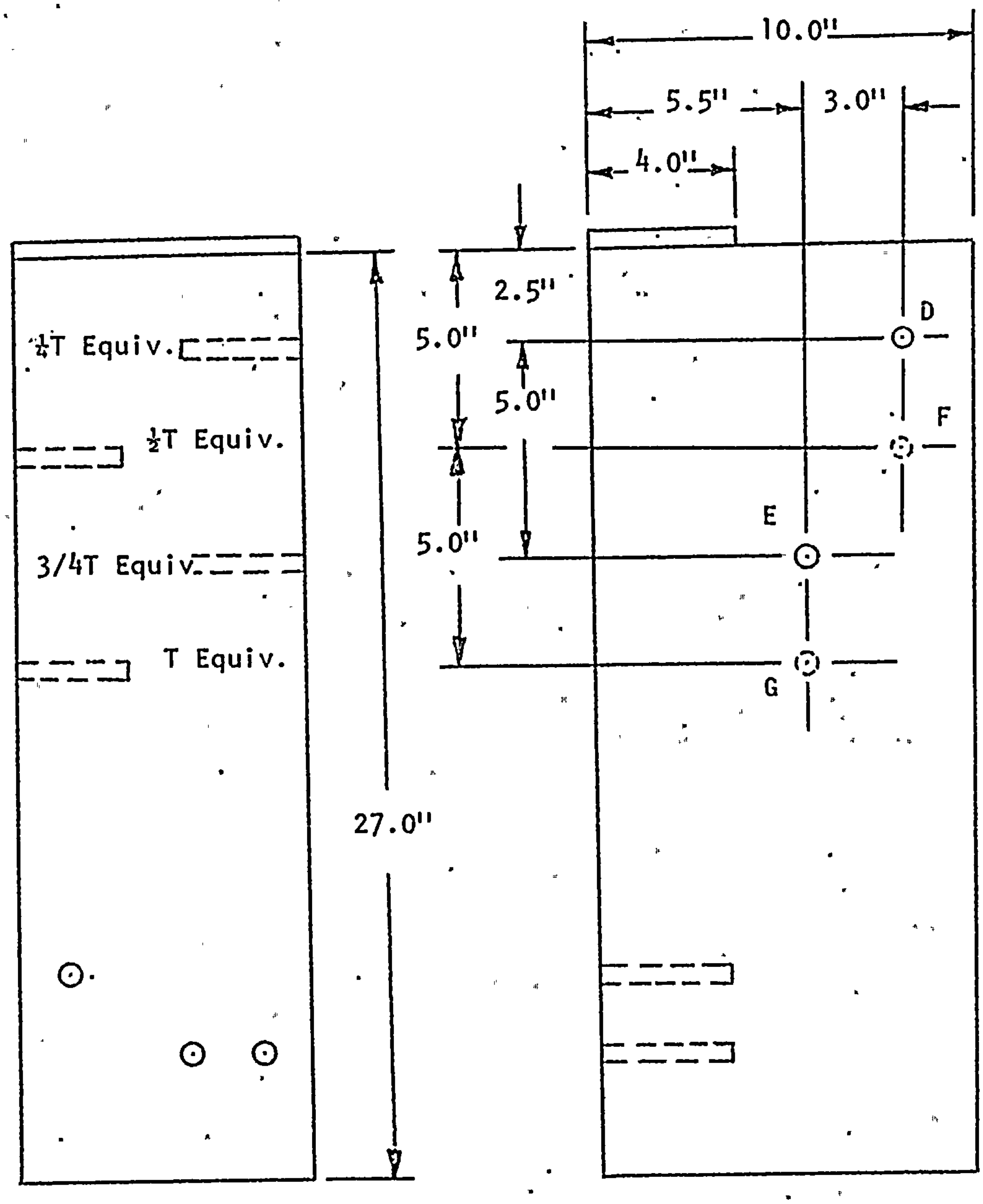
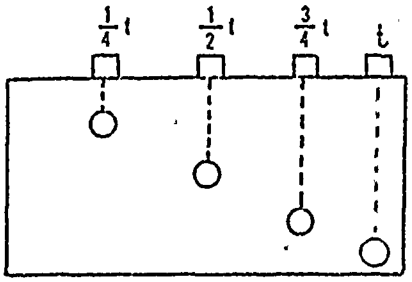


Figure 2. Ultrasonic Examination of Reactor Vessel Ligament Areas between Stud Holes.



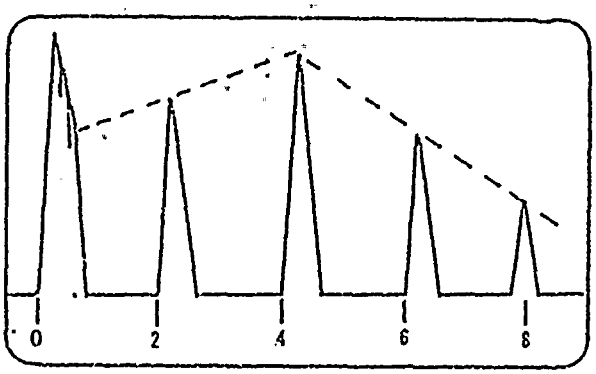
Note: Holes D,E,F & G are for Ligament Examination.

Figure 3. Ultrasonic Reference Standard (P1-LF-1) for R.V. Flange Ligament.



Straight Beam
Search Unit Positions

Typical DAC Curve



Step 1 - Adjust sweep controls so that E, F, G and H holes are located respectively on the 2nd, 4th, 6th and 8th horizontal screen divisions.

Step 2 - Adjust sensitivity to provide 80% FSH indication from hole giving maximum response - mark position on screen.

Step 3 - Position search unit for maximum response from remaining holes - mark position on screen.

Step 4 - Plot DAC by connecting points marked on screen with line extended to cover entire examination range.

Step 5 - Record all sweep and sensitivity control settings on respective data sheets.

FIGURE 4 . REFERENCE SENSITIVITY AND DAC CALIBRATION PROCEDURES FOR ULTRASONIC EXAMINATION OF LIGAMENTS

Procedure No.: NIP 534
Subject: R.V. Flange Ligaments
Issue Date: November 18, 1975
Revision No.: 0; Date: ____
Page 19 of 22

CALIBRATION DATA SHEET NO. 534-1
MANUAL EXAMINATION

EXAMINATION AREA ____

TRANSDUCER IDENTIFICATION

STYLE OR TYPE NO. ____
SIZE ____
FREQUENCY ____
SERIAL NO. ____
ANGLE & MODE ____
BEAM DIRECTION (= or ⊥ to weld) ____
SCAN FIXTURE ____

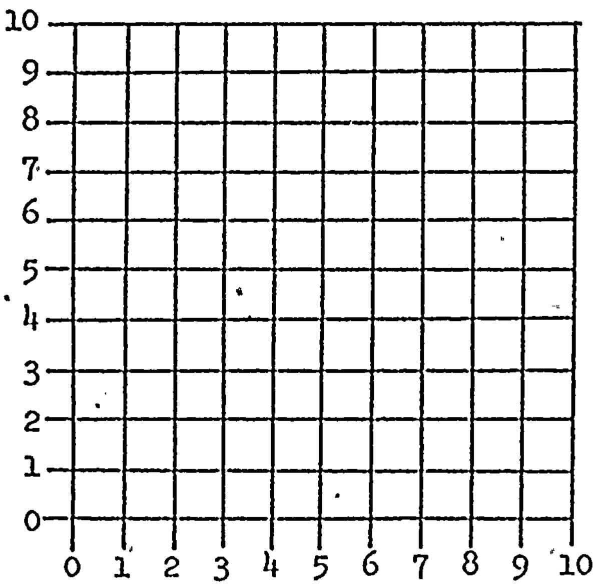
CALIBRATION BLOCK

ID NO. ____
SIZE ____
EXAMINATION SURFACE ____

Hole ID	Depth IN.	Amp. %	Atten. dB

TEMPERATURE = Ref. Std. ____
Component ____

DAC PLOT



ULTRASONIC INSTRUMENT

MODEL NO. ____
SERIAL NO. ____

CONTROL SETTINGS

PULSE LENGTH ____
FREQUENCY ____
dB GAIN ____
SWEEP LENGTH ____
SWEEP DELAY ____
VIDEO FILTER ____
REJECT ____
COUPLANT ____

INSTRUMENT LINEARITY CALIBRATION

Amplitude			
High	Low	High	Low
1.		5.	
2.		6.	
3.		7.	
4.		8.	

AMPLITUDE CONTROL LINEARITY

Initial	Δ dB	Result	Limit
80	-6		32% - 48%
80	-12		16% - 24%
40	+6		64% - 96%
20	+12		64% - 96%

EXAMINER(S) (Signature Required)

1. ____ SNT-TC-1A Level ____
2. ____ SNT-TC-1A Level ____

DATE: ____ TIME: ____

Reviewed by: ____

Figure 5.

NUCLEAR ENERGY SERVICES, INC.

WELD SCAN DATA SHEET	Procedure No.: NIP 534
1. Calibration Data Sheet No. ______	Subject: R.V. Flange Ligaments
2. Examination Angle ______	Issue Date: November 18, 1975
3. Area of Examination ______	Revision No.: 0; Date: ______
4. Examination Surface ______	Page 20 of 22

Weld, Item or Scan No.	Scan Completion: 0° Base Metal	Scan Completion: 0° WHAZ	Scan Completion: Normal to Weld Centerline	Scan Completion: Parallel to Weld Centerline	No Reportable Indications	Reportable Indications	Supplement Attached	Comments: Reason for Incompleted Scans

Calibration Checks

Instrument: Time	Instrument: Date	Examination System: Time	Examination System: Date

Additional Sheets Attached:

Continuation ______ Supplements ______

Examiner(s):

1. ______ SNT-TC-1A Level ______
2. ______ SNT-TC-1A Level ______

Date: ______

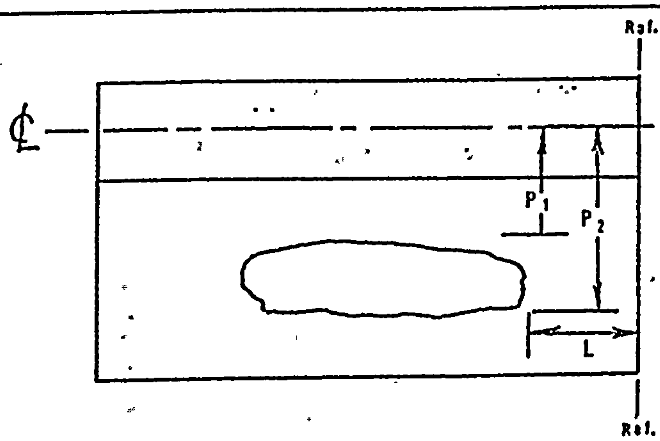
NUCLEAR ENERGY SERVICES, INC.

Figure 6.

WELD SCAN DATA SHEET SUPPLEMENT A (BASE METAL)	Procedure No.: NIP 534 Subject: R.V. Flange Ligaments Issue Date: November 18, 1975 Revision No.: 0; Date: Page 21 of 22

Weld No. ______________________ Sheet ________ of ________

Calibration Data Sheet No. ______________ Back Echo Amplitude ____________



Note: Location increments are not to exceed allowable scan increments.

Indication No.	Depth	L(inches)	P1	P2	Echo(% FSH)	Back(% FSH)

Examiner(s):

1.______________________ SNT-TC-1A Level__________

2.______________________ SNT-TC-1A Level__________

Date:________________

Figure 6A

TABLE I

PART IDENTIFICATION

NUCLEAR COMPONENTS

Part No.	Description	Ref. Block	Reference Figures	Notes
RV-1-1 thru RV-64-1	Ligament Areas Between Stud Holes	P1-LF-1	Figures 1 & 2-Test Figure 3-Ref. Block	0^0 Only

PROCEDURE NIP 536

ULTRASONIC EXAMINATION PROCEDURES FOR REACTOR VESSEL AND CLOSURE HEAD NOZZLE INNER RADII

LATER

ULTRASONIC EXAMINATION PROCEDURES FOR CLOSURE HEAD MERIDIONAL, CIRCUMFERENTIAL DOME AND FLANGE WELDS

NIAGARA MOHAWK POWER CORPORATION
Nine Mile Point, Unit 1

Originator(s):

Signature Date

5-7-76
Signature Date

Approved by:

N.E.S.I. SNT-TC-1A Level III 6-3-76
Signature Date

N.M.P.C. SNT-TC-1A Level III
Signature Date

RECORD OF REVISIONS

Revision Number	Date	Description	Reason	Originator	NMPC	NESI-

ULTRASONIC EXAMINATION PROCEDURES FOR CLOSURE HEAD MERIDIONAL, CIRCUMFERENTIAL DOME AND FLANGE WELDS

1.0 SCOPE

1.1 Area of Examination

1.1.1 This document covers the ultrasonic examination procedures for the Closure Head:

(1) Meridional welds OD examination (CE Dwg. E-231-574, Sect. B-B) shown in Fig. 1.

(2) Circumferential dome weld OD examination (CE Dwg. E-231-574, Det. G) shown in Fig. 2.

(3) Closure Head - flange weld OD examination (CE Dwg. E-231-574, Det. E) shown in Fig. 3.

1.2 Type of Examination

1.2.1 Volumetric examination shall be performed using ultrasonic pulse echo 45° and 60° angle beam shear wave and 0° straight beam techniques applied to the outside surfaces of the Closure Head.

1.2.2 The examination shall be performed manually using contact search units and/or scan fixtures.

1.3 Time of Examination

1.3.1 These procedures shall govern the inservice examination and re-examination of repaired areas of the Closure Head as required by the ASME Boiler and Pressure Vessel Code, Section XI. (1974).

1.4 Weld Configuration

1.4.1 The Closure Head meridional, circumferential dome and flange welds have a nominal thickness of 4-5/16".

1.4.2 Typical Closure Head weld configurations and nominal weld thicknesses are shown in Figures 1 through 3.

1.5 Materials

1.5.1 The Closure Head is constructed of low carbon steel (SA 302) with stainless steel cladding on the ID surfaces.

2.0 REFERENCES

2.1 Reference Documents

2.1.1 The following documents form a part of this examination procedure:

(1) ASME Boiler and Pressure Vessel Code, Section XI 1974 Edition and the Summer of 1974 Addenda.

(2) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(3) CONAM Procedure for Certifying Inspection Personnel, CUTP-1, Rev. 1, September 1970.

2.2 Applicable Drawings

2.2.1 The following drawings are part of this procedure:

(1) CE Assembly Dwg. E-231-574, Det's. E and G, and Sec. B-B.

2.3 Operational Manuals

2.3.1 The equipment operational manuals for the particular ultrasonic instruments used form a part of this procedure.

3.0 PROCEDURE CERTIFICATION

3.1 The examination procedures described in this document comply with Section XI of the ASME Boiler and Pressure Vessel Code except where examination coverage is limited by part geometry or access.

4.0 PERSONNEL CERTIFICATION

4.1 Personnel Certification Requirements

4.1.1 Each person performing ultrasonic examination governed by this procedure shall be certified in accordance with the following:

(1) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(2) CONAM Inspection, Inc., Procedure for Certifying Ultrasonic Test Personnel CUTP-1, Rev. 1, September 1970.

(3) ASME Boiler and Pressure Vessel Code. Section XI (1974 Ed.)

4.1.2 Examination crews shall have one or more members as necessary. At least one member of each crew shall have a minimum qualification Level II in accordance with the above referenced documents. The remaining member(s) shall have a minimum qualification of Level I or Level I Trainee.

4.2 Personnel Records

4.2.1 Records of personnel qualification shall be maintained by Examination Contractor.

4.2.2 A copy of the examiner's certification, and a current eye test as required by SNT-TC-1A shall be filed with each permanent examination record, with a copy submitted to the plant owner or his agent, prior to performing examinations per this procedure.

5.0 EXAMINATION REQUIREMENTS

5.1 Examination Frequency

5.1.1 The nominal examination frequencies shall be 2.25 MHz for all straight beam and angle beam examinations.

5.1.2 Other Pulse frequencies shall be used only if such variables as material attenuation, grain structure, etc., necessitates their use to achieve penetration or resolution. This information shall be recorded on the data sheets.

5.2 Examination Angles

5.2.1 Examination angles for the Closure Head Meridional, Circumferential Dome and Flange welds shall be as follows:

(1) 0° straight beam from the unclad surface thru the weld and thru all parent material at each side of the weld thru which the angle beams will pass during angle beam examination. In the event of non-parallel front and back surfaces when scanning for laminar reflectors, the longitudinal beam shall be directed at an angle normal to the back surface.

(2) 45° angle beam from the unclad surface two directions perpendicular to the weld axis and two directions parallel with the weld axis.

(3) 60° angle beam from the unclad surface two directions perpendicular to the weld axis and two directions parallel with the weld axis.

5.3 Liquid Couplant

5.3.1 The ultrasonic couplant shall be Trim Regular or Trim HD (Master Chemical Corporation, Perrysburg, Ohio).

5.3.2 The couplant shall be supplied in clean containers of sufficient quantity to facilitate the examination.

5.3.3 The couplant shall be pumped from the container to the search unit scan fixtures thru clear tygon flexible tubing or shall be applied manually with a brush or other suitable device.

5.3.4 Where required, the examiner shall be responsible for removing couplant from the examination surface at the conclusion of the examination.

5.4 Surface Preparation

5.4.1 All examination surfaces should be clean and free of dirt, weld spatter, etc., or any other conditon which would interfere with the examination or impair proper transmission of the sound beam.

5.4.2 Irregularity of surface contour to be contacted by the search unit should not exceed 1/8" in any 2" of surface travel. Weld crown and edges should blend smoothly into adjacent base material.

5.5 Weld Identification

5.5.1 Each weld shall be located and identified per the appropriate weld map located in the Program Plan Book.

5.6 Datum Point

5.6.1 The examiner shall permanently mark, or verify that there has been marked, a reference datum point on each weld from which all examination data and reported indications shall be referenced.

5.6.2 Datum points shall be marked by the use of low stress stamps or vibratooling and shall not be deeper than 1/64".

5.6.3 Circumferential dome head welds and closure head to flange weld(s) datum points shall be located on the weld centerline at vessel 0°.

5.6.4 Meridional weld datum points shall be located on the weld centerline at the bottom end of each weld.

5.6.5 Each weld datum point along with respective weld reference points and divisions shall be shown on each examination report.

5.7 Examination Coverage

5.7.1 The intent of this procedure is to provide maximum examination coverage to insure weld integrity. Each weld shall be scanned with minimum 25% overlap of the transducer element width (diameter) for each scan pass.

5.7.2 The rate of search unit movement shall not exceed 6 inches per second.

5.7.3 Each weld and the volume of metal for 1/2T on each side of the weld shall be ultrasonically examined where part geometry and access permit using 45° and 60° angle beam techniques applied in two directions towards the weld and in two directions parallel with the weld, and on both sides of the weld.

5.7.4 Straight beam techniques shall be appled, where part geometry permits, to all parent material through which the angle beams will pass during angle beam examinations. Indications detected are to be recorded in accordance with Section 11.1.1 of this procedure, except in areas where no back echo can be obtained.

In addition, straight beam techniques shall be applied to the weld surface and heat-affected zone where part geometry permits. Indications shall be recorded in accordance with Section 11.1.2 of this procedure. This shall include straight beam examination of parent material when no back echo is obtainable.

5.7.5 Where the examination surface or other conditions (weld, contour, access, etc.) do not permit a meaningful ultrasonic examination to be performed, the examiner shall record the area of non-examination and the particular interfering condition in the space provided on the Weld Scan Data Sheet (Fig.8).

6.0 EQUIPMENT REQUIREMENTS

6.1 Examination Contractor's Equipment

6.1.1 The following test equipment or its equivalent shall be provided by the Examination Contractor for examination of the Closure Head welds.

(1) Pulse Echo Ultrasonic Instrument

(2) Scan Fixture, 45°, (AI No. 85C134 or 57A8407, or other)

(3) Scan Fixture, 60°, (AI No. 85C155 or 57A8417, or other)

(4) Scan Fixture, 0°, (AI No. 85C157, or other)

(5) Search Unit, 3/4" Dia., 2.25 MHz, or 1/2" Dia. 2.25 MHz.

(6) Search Units, 1/2" x 1", 2.25 MHz
(7) Couplant
(8) Camera

6.2 Plant Owner's Equipment

6.2.1 The Plant Owner or his Agent shall provide the following service facilities and equipment as required:

(1) Scaffolding

(2) Water, Air and Electricity

(3) Temporary Lighting

(4) Crane or Lifting Devices

(5) Reference Standard No. PIF-4.31C

(6) Radiation Monitoring Equipment

(7) Radiation Shielding

(8) Test Surface Preparation (cleaning and finishing)

(9) Drawings of each Examination Area

(10) Post Examination Cleanup of Test Area

7.0 CALIBRATION REQUIREMENTS

7.1 Reference Standards

7.1.1 The reference standard designated in 6.2.1 (5) shall be used for basic instrument calibration and for establishing reference sensitivity levels for examination of the closure head welds. See Figure 4.

7.1.2 Spot thickness checks of the components may be made to ensure that the proper reference standard is used.

7.1.3 The number of the reference standard used for performing calibration shall be recorded on each Calibration Data Sheet. Figure 7 is an example of the Calibration Data Sheet to be used with this procedure.

7.1.4 Calibration Data Sheets shall be numbered 538-1, 538-2, 538-3, etc., at the time of calibration and shall be signed by the examiner(s) upon completion.

7.1.5 Calibration procedures shall be performed using the unclad surface of the reference standard.

7.1.6 The temperature of the reference standard shall be within 25°F of the component temperature.

7.2 Reference Sensitivity Level

7.2.1 The reference sensitivity level shall be the distance-amplitude curve initially obtained directly from the reference standard and shall be the sensitivity level used for evaluating and recording all indications.

7.2.2 During actual weld scanning, the reference sensitivity level shall be increased 2X or 6 dB.

7.3 Times of Calibration

7.3.1 Basic instrument calibration shall be performed using the appropriate reference standard, search units and instrumentation immediately prior to the examination of the Closure Head.

7.3.2 Instrument calibration checks shall be performed at the beginning of each day of examination in accordance with Section 8.0 of this procedure.

7.3.3 Examination system calibration checks shall be performed at least at the beginning and at the completion of each 4 hour period of examination and/or at the change of examination personnel, equipment, search units, coupler shoes, etc., and at the completion of the examination of each similar series of welds in accordance with Sections 9.2 and 9.4 of this procedure.

7.4 Calibration Response

7.4.1 Calibration response shall be checked at the primary reference sensitivity level.

7.4.2 Signal response obtained during calibration check shall be within plus or minus 20% of that established during basic system calibration.

7.4.3 If any point on the DAC curve has changed by more than 20% of its amplitude, the examiner shall:

(1) Mark all weld data sheets since previous calibration void.

(2) Recalibrate examination system.

(3) Reexamine voided areas.

7.4.4 If any point on the DAC curve has moved horizontally more than 5% of the sweep line from its original settings, the examiner shall:

(1) Correct the sweep calibration and note it on the Calibration Data Sheet.

(2) Void any data sheets made since the previous calibration which have recorded indications and reexamine those areas.

8.0 INSTRUMENT CALIBRATION VERIFICATION

8.1 Amplitude Linearity

8.1.1 The linearity of the ultrasonic instrument shall be checked as follows:

(1) Position an angle beam search unit on the reference standard so that indications from both the 1/2T and 3/4T holes are visible (other reflectors which provide the 2 to 1 ratio required in (2) may be substituted).

(2) Manipulate search unit to establish a 2 to 1 ratio of amplitudes between the two indications with the largest at 80% FSH.

(3) Without moving search unit, adjust sensitivity to run the higher response from approximately 100% to 20% FSH in 2 dB steps (10% if fine control available).

(4) Read and record the relative amplitudes of the two indications to the nearest 1%.

(5) If the smaller indication does not fall within 5% FSH of 50% of the larger indication, the instrument shall not be used for examinations until corrected.

8.2 Amplitude Control Linearity

8.2.1 The linearity of the instrument gain (attenuation) control shall be checked as follows:

(1) Position an angle beam search unit on the reference standard to obtain an 80% FSH indication from the 1/2T hole.

(2) Using amplitude control, decrease signal amplitude by 6 dB and by 12 dB to obtain nominal 40% FSH and 20% FSH signals. Read and record actual signal amplitudes to closest 1%.

(3) Obtain a 40% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 6 dB to obtain a nominal 80% signal. Read and record as in (2).

(4) Obtain a 20% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 12 dB to obtain a nominal 80% FSH signal. Read and record as in (2).

(5) If the indications obtained in (2), (3) and (4) are not within ± 20% of nominal, the instrument shall not be used for examination until corrected.

9.0 EXAMINATION SYSTEM CALIBRATION

9.1 Straight Beam Calibration

9.1.1 Straight beam sweep calibration and distance-amplitude correction shall be performed as follows and as shown in Figure 5. The appropriate combination of search units and reference standard for each respective weld are shown in Figures 1 thru 3 and Table 1.

(1) Adjust the instrument sweep controls so that the signal responses from the 1/4T and 3/4T holes occur at the 2nd and 6th horizontal screen divisions as shown in Figure 5.

(2) Position search unit to obtain maximum response from the hole which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on the CRT.

(3) Without changing sensitivity, position the search unit respectively on the remaining holes and mark signal amplitudes and locations on the CRT.

(4) Plot a DAC curve by connecting the locations (marked on the CRT) with a continuous line extended to cover the full examination range (horizontal screen divisions 0 thru 8) as shown in Figure 5.

(5) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(6) System is now calibrated for examination of welds of the thickness for which calibration was just performed.

(7) Record all data and instrument settings on the Calibration Data Sheet.

9.2 Straight Beam Calibration Check

9.2.1 Straight beam calibration check as required by Section 7.3.3 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.1.1 (2).

(2) Reposition search unit at each respective test hole and observe maximum signal response amplitudes, and horizontal screen positions.

(3) See Section 7.4 for signal response requirements during calibration check.

9.3 Angle Beam Calibration

9.3.1 Angle beam sweep calibration and distance-amplitude correction shall be performed as follows and as shown in Figure 5. The appropriate search units and reference standard for each weld are shown in Figures 1 thru 3 and Table 1.

(1) Adjust the instrument sweep controls so that the signal response from the 1/4T and 3/4T holes occur at the 2nd and 6th horizontal screen divisions as shown in Figure 5. To verify sweep calibration, insure that response from square notch appears near the 8th horizontal division. Note on the Calibration Data Sheet any displacement of more than 1/2 of one horizontal screen division.

(2) Position search unit to obtain maximum response from the hole which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on CRT.

(3) Without changing sensitivity, position search unit respectively on the remaining angle beam calibration holes and mark signal amplitudes and locations on CRT.

(4) Plot a DAC curve by connecting the locations (marked on the CRT) with a continuous line extended to cover the full examination range (horizontal screen divisions 0 thru 8) as shown in Figure 5.

(5) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(6) Instrument is now calibrated for examination of welds of the thickness for which calibration was just performed.

(7) Record all data and instrument settings on the Calibration Data Sheet.

9.3.2 Angle beam sensitivity correction for far and near surface indications shall be established as follows and as shown in Figure 5.

(1) Position search unit to obtain maximum amplitude from far surface notch and with instrument at reference sensitivity, mark the screen to show its peak amplitude (near the 8th horizontal division).

(2) Position search unit over near surface notch and, if detected, mark the screen to show its peak amplitude (near the zero horizontal division).

(3) When evaluating indications which occur at the far or near surfaces, they shall be compared directly with the relative amplitude of the square notches.

9.3.3 Angle beam position calibration shall consist of fabricating an indication locating rule as follows and as shown in Figure 6.

(1) Position search unit to obtain peak indication from the 1/4T hole.

(2) Place a taped ruler or other suitable indexing strip against the front of the search unit and mark the distance from the test surface to the hole (in inches and with respect to T) on the strip where it crosses the surface scribe line over the holes. (Mark the search unit if it covers the scribe line.)

(3) Successively position the search unit to peak on the 1/2T hole, 3/4T hole and opposite notch and mark the respective distances from the surface (in inches and in terms of T) on the ruler where it crosses the surface scribe line over the holes.

(4) If the near surface notch can be detected, mark its location on the side of the search unit.

(5) Subdivide the scale made in the above steps so that distance from surface to an indication may be read to the nearest 1/8T.

9.3.4 Beam spread measurements for the vertical plane of each angle beam search unit and weld thickness combination shall be made using the locating rule (see 9.3.3) as follows and as shown in Figure 6.

(1) Increase instrument sensitivity 2X or 6 dB over reference sensitivity.

(2) Position search unit for maximum response from 1/4T hole and move the search unit toward the hole until signal amplitude is equal to the DAC curve drawn on the screen. Mark a small 1 on the depth scale where it crosses the scribe line over the 1/4T hole.

(3) Move the search unit away from the 1/4T hole, thru the maximum amplitude point, until the signal amplitude is again equal to the DAC curve drawn on the screen. Again, mark a small 1 on the depth scale.

(4) Repeat steps (2) and (3) for the 1/2T and 3/4T holes using numbers 2 and 3 respectively.

(5) Using suitable paper, mark a full size plot of the data from the locating rule and determine the refracted beam angle and angle of divergence for 50% DAC amplitude.

NOTE: Curvature of the reference standard used may cause some deviation in beam spread and beam angle information.

(6) Beam spread plots shall become part of the examination record.

9.4 Angle Beam Calibration Check

9.4.1 Angle beam calibration check as required by Section 7.3.2 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.3.1 (2).

(2) Reposition search unit at each respective test hole and observe signal response amplitudes and horizontal screen positions.

(3) See Section 7.4 for signal response requirements during calibration check.

10.0 EXAMINATION PROCEDURES

10.1 Straight Beam Examination of Weld and Heat Zone

10.1.1 Straight beam examination of the weld and heat affected zone and areas of base material where no back echo is available, shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.1.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer element width (diameter) for each scan pass.

10.1.3 See Table 1 and Figs. 1 thru 3 for scan path distances and weld identifications.

10.1.4 Continue scanning until all welds have been examined. Equipment must not be removed from the weld area until all indications have been evaluated.

10.2 Straight Beam Examination of Base Material

10.2.1 Straight beam examination of all base material, where a back echo is obtainable, thru which the angle beams will pass during angle beam examination shall be performed at a sensitivity level which gives a minimum back reflection signal amplitude of 50% of FSH.

10.2.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer element width (diameter) for each scan pass.

10.2.3 See Table 1 and Figs. 1 thru 3 for scan path distances and weld identifications.

10.2.4 Continue scanning until all welds have been examined. Equipment must not be removed from the weld area until all indications have been evaluated.

10.3 Angle Beam Examinations

10.3.1 All angle beam examinations shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.3.2 The search unit shall be swivelled to ensure maximum coverage as it is moved along a rectilinear scan pattern allowing a minimum of 25% overlap of the transducer element width (diameter).

10.3.3 See Table 1 and Figs. 1 thru 3 for scan path distances and weld identifications.

10.3.4 Continue scanning until all welds have been examined. Equipment must not be removed from weld area or disassembled until all indications have been evaluated.

11.0 EVALUATION CRITERIA

11.1 Recording of Indications

11.1.1 For straight beam examinations of base metal for laminations, all areas giving indications equal to or greater than the remaining back reflection shall be recorded on the appropriate data sheet prior to angle beam examination of the weld and heat affected zone.

(1) Each recorded area shall be identified as to distance from surface, length and position relative to the weld datum point.

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter (width).

11.1.2 For straight beam examinations of weld and heat-affected zone and angle beam examinations, all indications showing a signal amplitude response equal to or greater than 50% of the reference response shall be recorded on the appropriate data sheet at the time of weld examination and prior to removing equipment from the Closure Head.

(1) Each recorded indication shall be identified as to depth (as a percent of thickness), distance from surface, length, signal amplitude and location relative to the weld datum point.

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter (width).

11.1.3 Indications from all meridional welds shall be reported in inches above the weld datum point and in inches clockwise (CW) or counterclockwise (CCW) from the weld centerline when looking down upon the top of the closure head.

11.1.4 Indications from all circumferential dome and flange welds shall be reported in inches above or below the weld centerline and in inches CW or CCW from the weld datum point when looking down upon the top of the closure head.

11.2 Evaluation of Indications

11.2.1 Evaluation of all indications shall be made at the reference sensitivity and in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWB-3000.

Results of this evaluation shall be reported to the Plant Owner or his Agent in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWA-6000.

12.0 EXAMINATION RECORDS

12.1 Certification of Records

12.1.1 The examiner shall complete and sign the appropriate Weld Scan Data Sheet(s) immediately upon the completion of each weld examination.

12.2 Filing of Records

12.2.1 The examiner shall be responsible for submitting to the Plant Owner, or his Agent, a completely documented set of examination records including certification of personnel qualifications with a current eye test report in accordance with SNT-TC-1A.

13.0 EXAMINER'S CRITIQUE

13.1 Procedure Corrections and Additions

13.1.1 All procedure corrections and/or additions required during the preoperational and/or inservice examinations shall be made in accordance with requirements of NES QA Plan No. NES 81A0402 and documented in the record of revisions section of this procedure.

13.2 Critique Report

13.2.1 Upon completion of the examination of all Closure Head welds, the examiner shall submit a written report to the Plant Owner or his Agent listing pertinent information for future examinations such as procedure additions, corrections and revisions or unique problems or actions to be taken.

13.3 Additional Examinations

When indications exceeding allowable standards are found, additional examinations shall be performed as stipulated in Section XI, paragraph IWB-2430.

Drawing: E-231-574, Sect. B-B
Tooling: Manual Scan Fixtures
Ref. Std.: PIF-4.31C

Procedure No.: NIP 538
Subject: Closure Head Welds
Issue Date: 9-1-75
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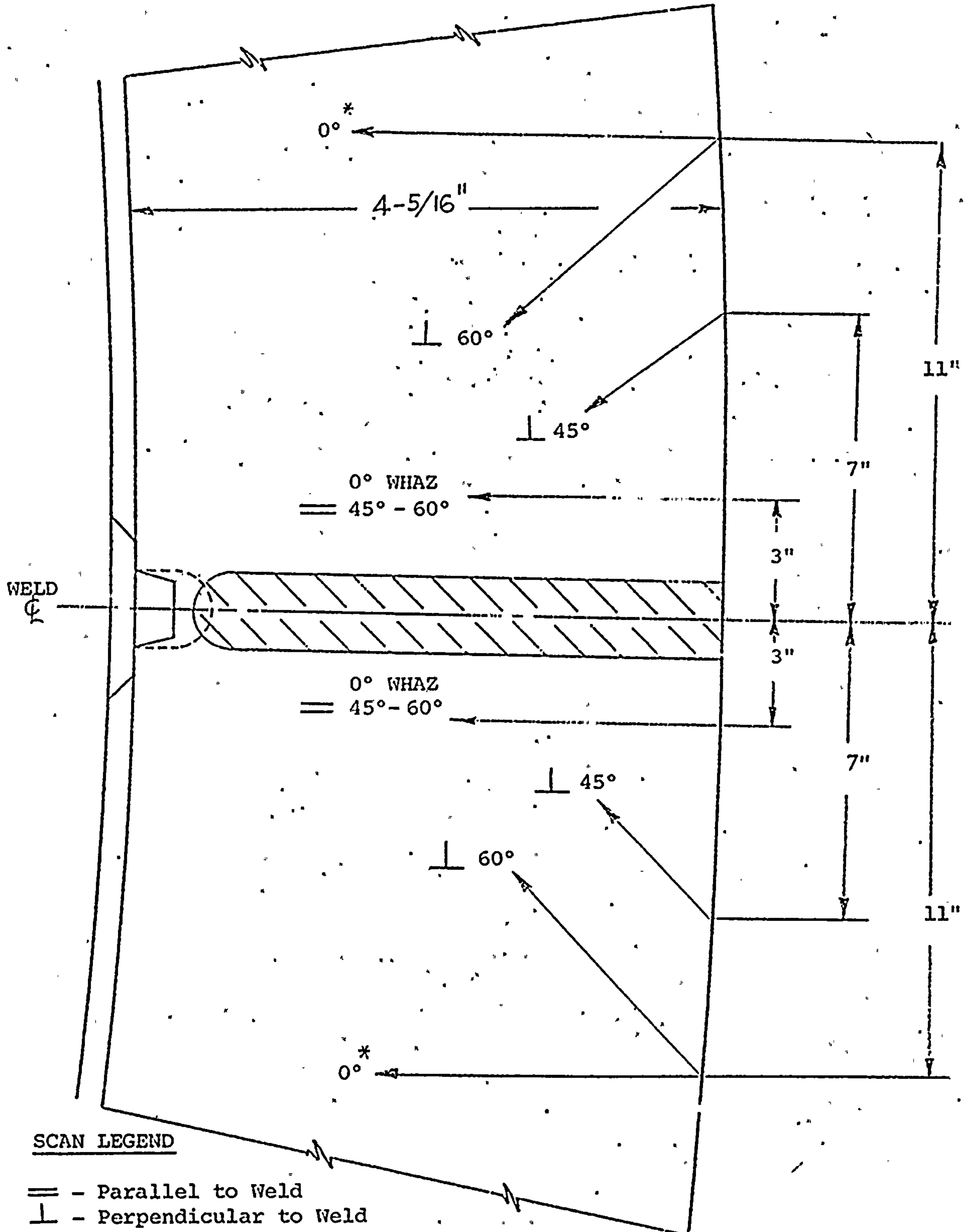


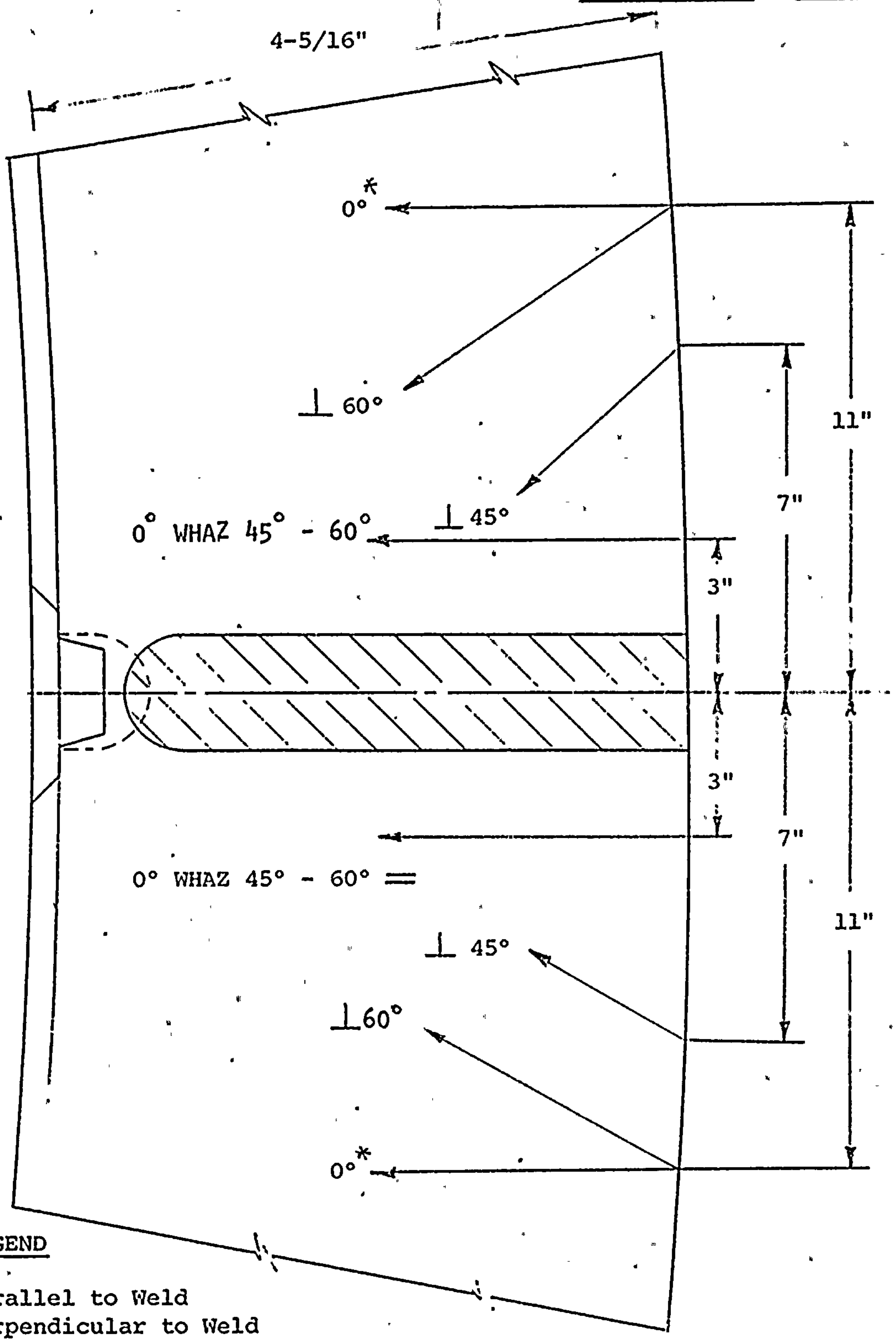
SCAN LEGEND

═ - Parallel to Weld
⊥ - Perpendicular to Weld
* - 0° Base Metal
0°WHAZ - Weld & Heat Affected Zone

FIGURE 1. ULTRASONIC EXAMINATION OF CLOSURE HEAD MERIDIONAL WELDS

Drawing: E-231-574, Det. G
Tooling: Manual Scan Fixtures
Ref. Std.: P1F-4.31C

Procedure No.: NIP 538
Subject: Closure Head Welds
Issue Date: 9-1-75
Revision No.: 0; Date

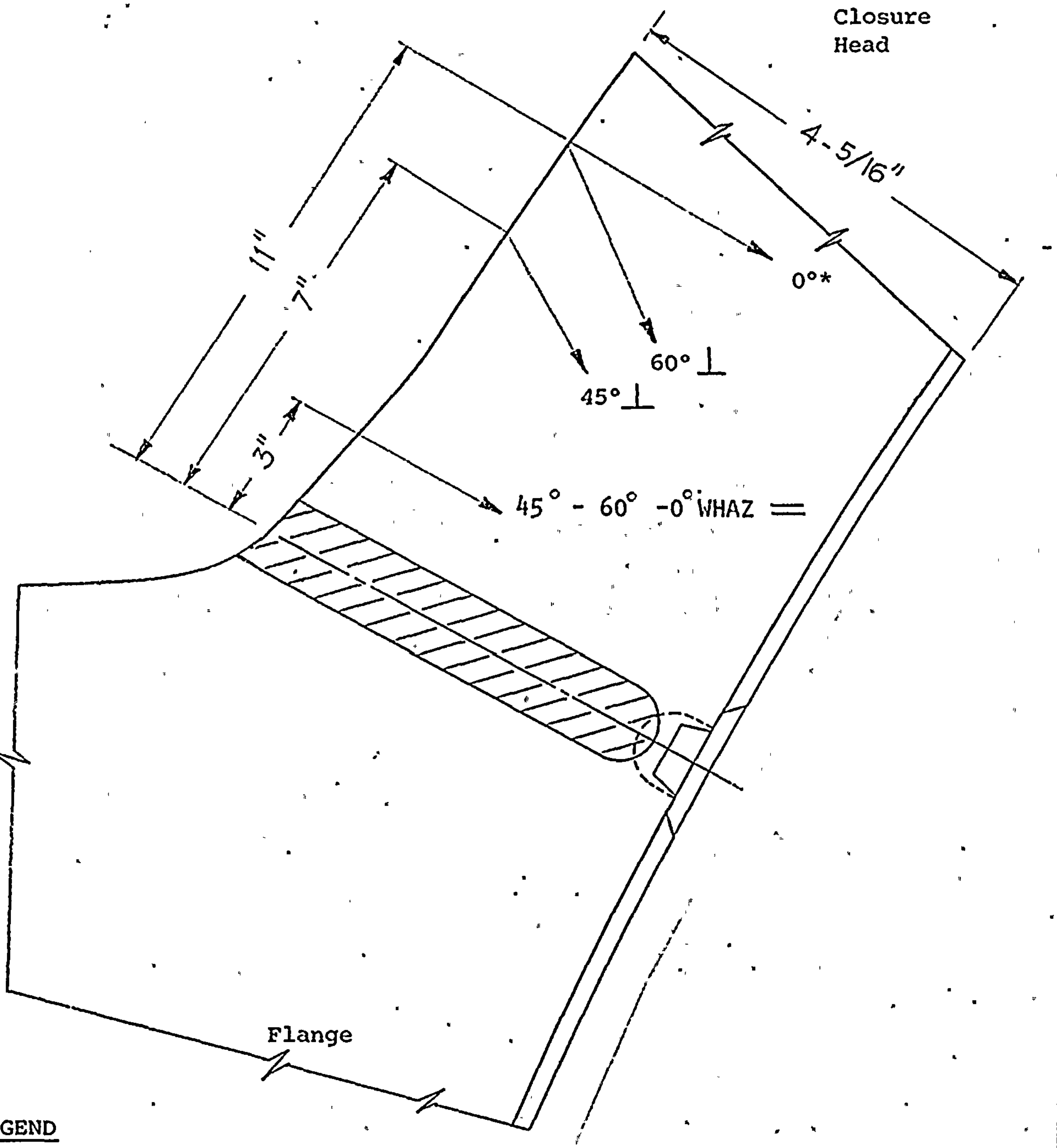


SCAN LEGEND

═ - Parallel to Weld
⊥ - Perpendicular to Weld
* - 0° Base Metal
0°WHAZ - Weld & Heat Affected Zone

FIGURE 2. ULTRASONIC EXAMINATION OF CLOSURE HEAD CIRCUMFERENTIAL DOME WELDS

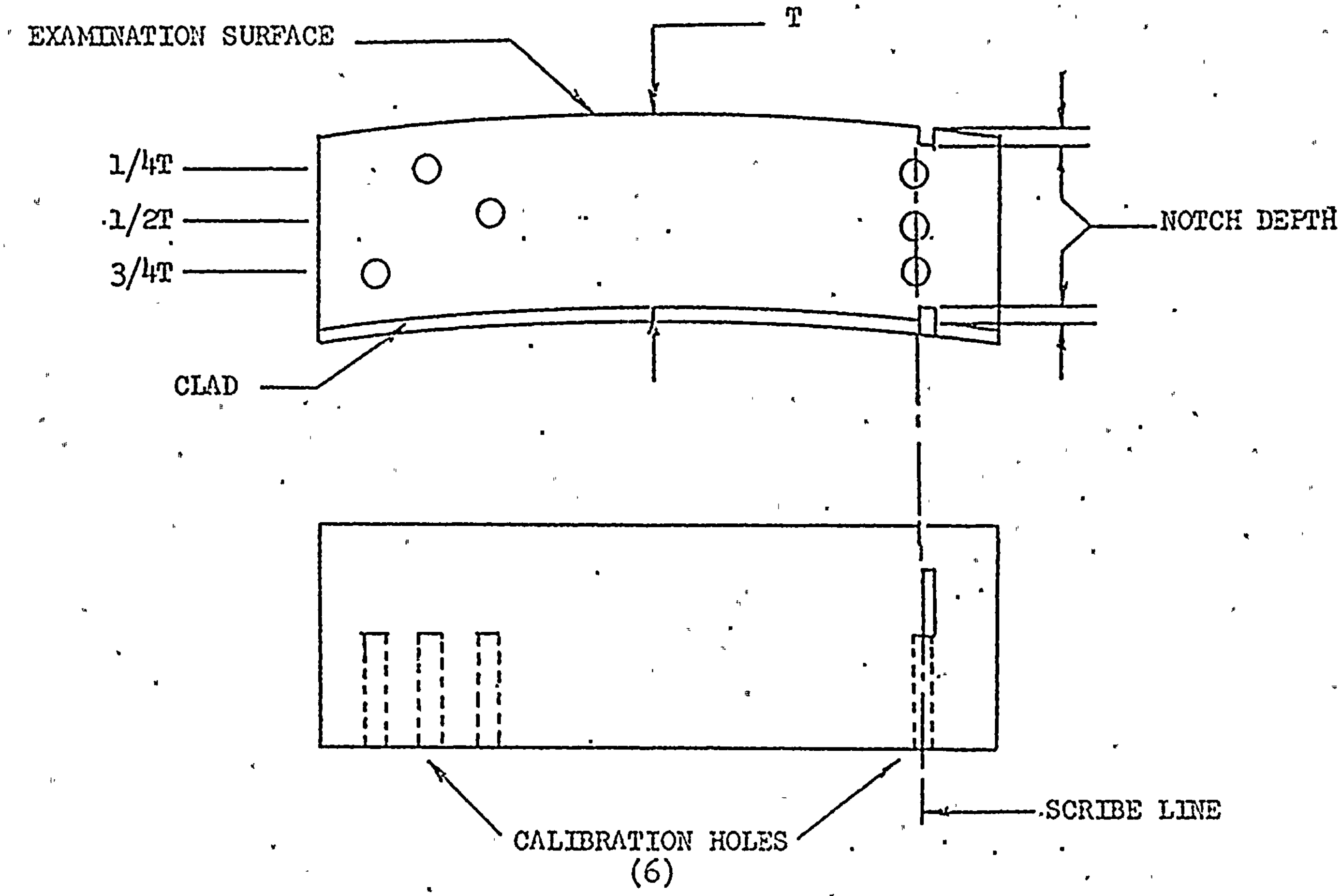
Drawing: E-231-574, Det. E.
Tooling: Manual Scan Fixtures
Ref. Std.: P1F-4.31C



SCAN LEGEND

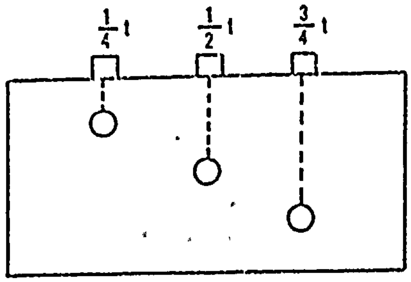
═ - Parallel Scan
⊥ - Perpendicular Scan
* - 0° Base Metal
0°WHAZ - Weld & Heat Affected Zone

FIGURE 3. ULTRASONIC EXAMINATION OF CLOSURE HEAD FLANGE WELD

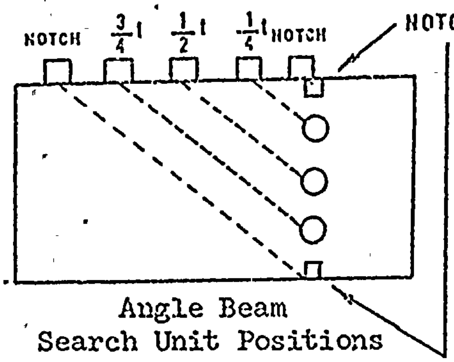


Block Number	Block Thickness	1/4T	1/2T	3/4T	Hole Dia.	Notch Depth
P1F-4.31C	4.31"	1.08"	2.16"	3.24"	.25"	.086"

FIGURE 4. ULTRASONIC REFERENCE STANDARD, P1F-4.31C, FOR CLOSURE HEAD WELDS.

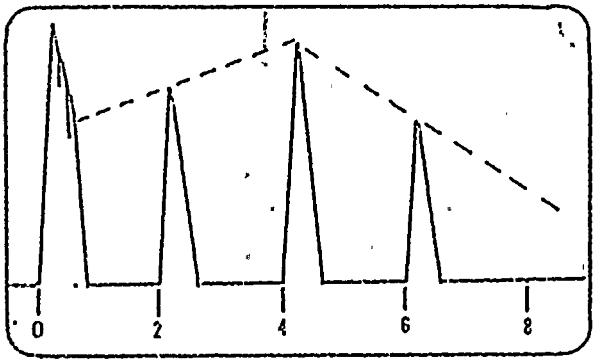


Straight Beam
Search Unit Positions

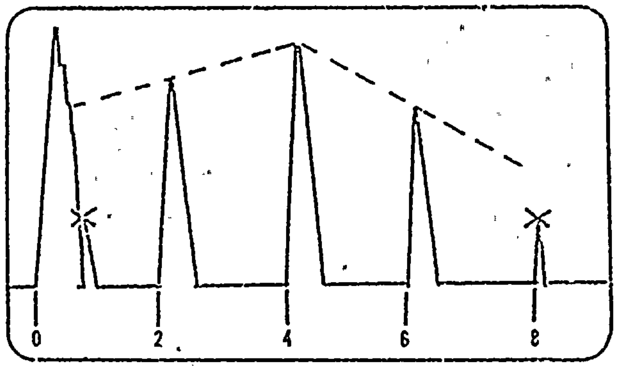


Angle Beam
Search Unit Positions

Typical DAC Curve



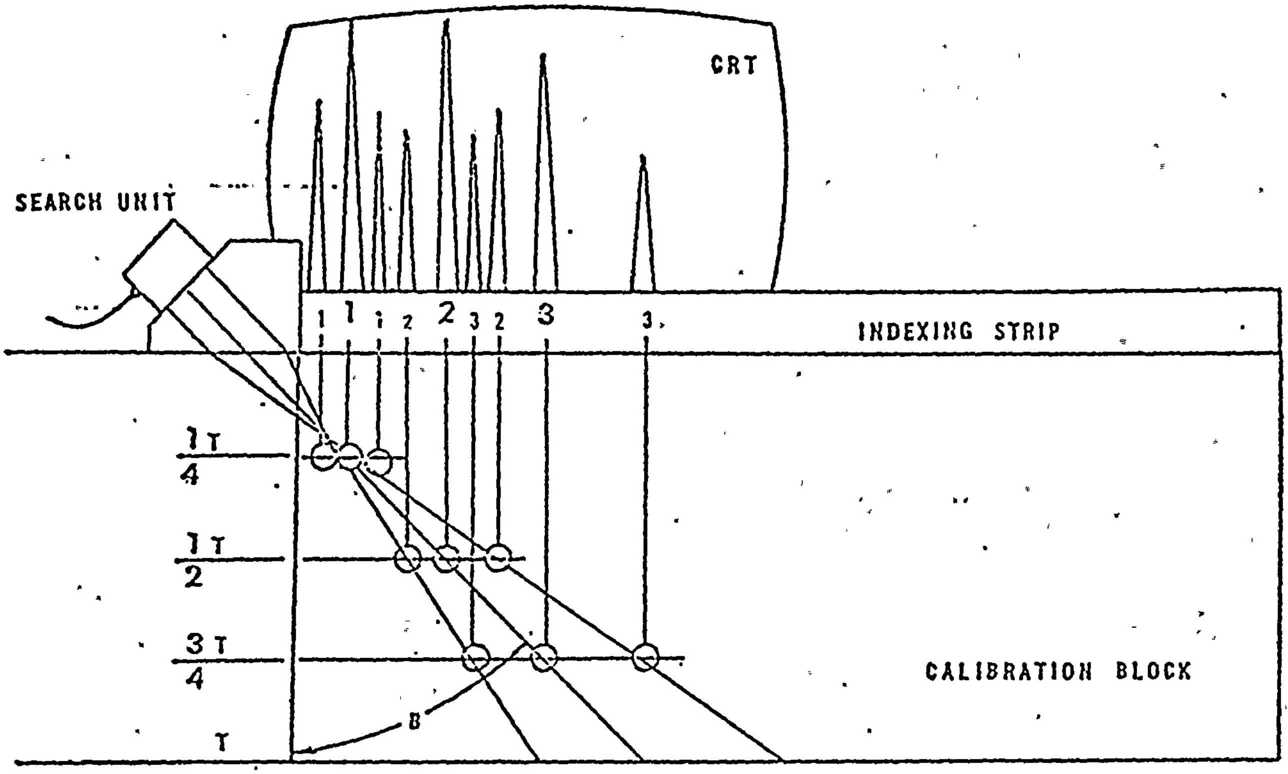
Typical DAC Curve



NOTE: For welds under 1" thick, use 1/2T hole only, no DAC required.

Step 1 - Adjust sweep controls so that 1/4T, 1/2T, and 3/4T holes are located respectively on the 2nd, 4th, and 6th horizontal screen divisions.
Step 2 - Adjust sensitivity to provide 80% FSH indication from hole giving maximum response - mark position on screen.
Step 3 - Position search unit for maximum response from remaining holes - mark position on screen.
Step 4 - Plot DAC by connecting points marked on screen with line extended to cover entire examination range.
Step 5 - Record all sweep and sensitivity control settings on respective data sheets.
Step 6 - Position search unit for maximum response from far surface notch and "X" mark screen and data sheet to indicate amplitude.
Step 7 - Repeat Step 6 for near surface notch if detectable.

FIGURE 5. REFERENCE SENSITIVITY AND DAC CALIBRATION PROCEDURES FOR ULTRASONIC EXAMINATION OF WELDS.



1. Fabricate position (surface location) scale as per Section 9.3.3.
2. Mark 50% DAC amplitude points on scale per Section 9.3.4 (1) thru (4).
3. Plot graphically all points from scale per Section 9.3.4 (5) in full size.

NOTE: Use Form 85C-75-122 for beam plots on standards with vessel curvature.

FIGURE 6. ANGLE BEAM CALIBRATION - POSITION CALIBRATION AND BEAM SPREAD MEASUREMENT.

CALIBRATION DATA SHEET NO. 538-1
MANUAL EXAMINATION

EXAMINATION AREA ______

TRANSDUCER IDENTIFICATION

STYLE OR TYPE NO. ______
SIZE ______
FREQUENCY ______
SERIAL NO. ______
ANGLE & MODE ______
BEAM DIRECTION (= or ⊥ to weld) ______
SCAN FIXTURE ______

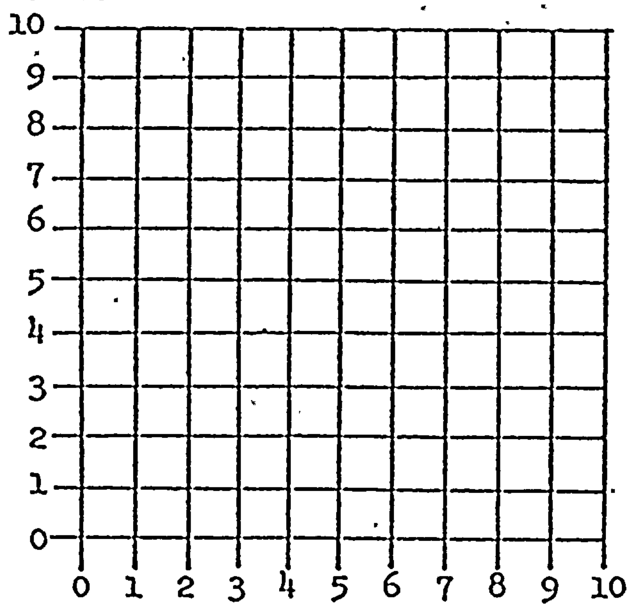
CALIBRATION BLOCK

ID NO. ______
SIZE ______
EXAMINATION SURFACE ______

Hole IDENT	Depth IN.	Amp. %	Atten. dB

TEMPERATURE = Ref. Std. ______
Component ______

DAC PLOT



ULTRASONIC INSTRUMENT

MODEL NO. ______
SERIAL NO. ______

CONTROL SETTINGS

PULSE LENGTH ______
FREQUENCY ______
dB GAIN ______
SWEEP LENGTH ______
SWEEP DELAY ______
VIDEO FILTER ______
REJECT ______
COUPLANT ______

INSTRUMENT LINEARITY CALIBRATION

Amplitude High	Low	High	Low
1.		5.	
2.		6.	
3.		7.	
4.		8.	

AMPLITUDE CONTROL LINEARITY

Initial	Δ dB	Result	Limit
80	-6		32% - 48%
80	-12		16% - 24%
40.	+6		64% - 96%
20	+12		64% - 96%

EXAMINER(S) (Signature Required)

1. ______ SNT-TC-1A Level ______
2. ______ SNT-TC-1A Level ______

DATE: ______ TIME: ______

Reviewed by: ______

Figure 7

WELD SCAN DATA SHEET	Procedure No.: NIP 538 Subject: Closure Head Welds Issue Date: 9-1-75 Revision No.: 0; Date: Page 27 of 30
1. Calibration Data Sheet No. ______ 2. Examination Angle ______ 3. Area of Examination ______ 4. Examination Surface ______	

Weld, Item or Scan No.	Scan Completion: 0° Base Metal	0° WHAZ	Normal to Weld Centerline	Parallel to Weld Centerline	No Reportable Indications	Reportable Indications	Supplement Attached	Comments: Reason for Incompleted Scans

Calibration Checks			
Instrument		Examination System	
Time	Date	Time	Date

Additional Sheets Attached:

Continuation ______ Supplements ______

Examiner(s):

1. ______ SNT-TC-1A Level ______

2. ______ SNT-TC-1A Level ______

Date: ______

FIGURE 8

NUCLEAR ENERGY SERVICES, INC.

WELD SCAN DATA SHEET

SUPPLEMENT A

(BASE METAL)

Procedure No.: NIP 538
Subject: Closure Head Welds
Issue Date: 9-1-75
Revision No.: 0; Date:
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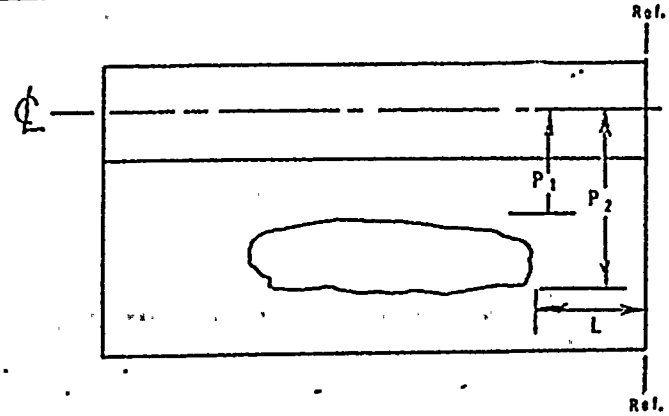
Weld No. ____________ Sheet ______ of ______

Calibration Data Sheet No. ____________ Back Echo Amplitude ____________



Note: Location increments are not to exceed allowable scan increments.

Indication No.	Depth	L(inches)	P1	P2	Echo(% FSH)	Back(% FSH)

FIGURE 8A

Examiner(s):

1. ____________ SNT-TC-1A Level ______

2. ____________ SNT-TC-1A Level ______

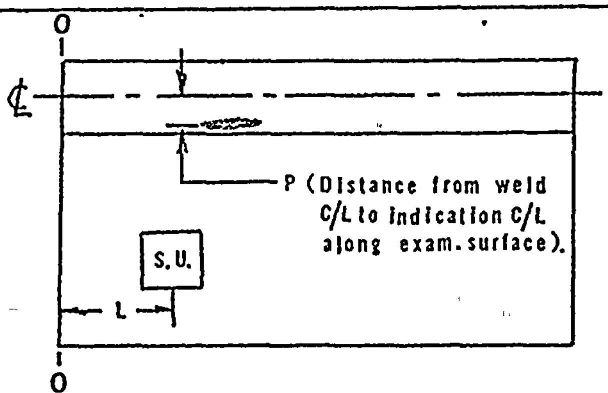
Date: ____________

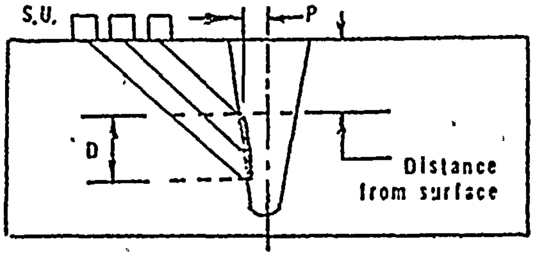
NUCLEAR ENERGY SERVICES, INC.

WELD SCAN DATA SHEET SUPPLEMENT B	Procedure No.: NTP 538 Subject: Closure Head Welds Issue Date: 9-1-75 Revision No.: 0; Date: Page 29 of 30

Weld No. ______________________ Sheet ________ of ________

Calibration Data Sheet No. ______________ EXAM. ANGLE ______________





Note: Location increments are not to exceed allowable scan increments.

Ind. No.	BEAM DIR.	L Location	Max % DAC	Dist. From Surface	P	50% Forward		50% Back		Depth (D)	
						Dist. From Surface	P	Dist. From Surface	P	Inches	% T

NOTE:
End points of L are the smaller of 50% DAC or 50% Max.

FIGURE 8B

Examiner(s):

1. ______________ SNT-TC-1A Level ________

2. ______________ SNT-TC-1A Level ________

Date: ______________

NUCLEAR ENERGY SERVICES, INC.

TABLE I

WELD IDENTIFICATION

NUCLEAR COMPONENTS

Weld No.	Description	Ref. Block	Reference Figures	Notes
CH-1-574 AB-w thru CH-1-574HA-w	Head-to-Flange	P1F-4.31C	Fig. 3-Weld Fig. 4 - Ref. Block	100% of Length
CH-2-574-w	Head Circ. Weld		Fig. 2-Weld Fig. 4 - Ref. Block	18" Length
CH-3-574-A	Head Meridional Weld		Fig. 1 Weld Fig. 4 Ref.Block	30°, 9" Length
CH-3-574-B				75°, 9" Length
CH-3-574-C				120°, 9" Length
CH-3-574-D				165°, 9" Length
CH-3-574-E				210°, 9" Length
CH-3-574-F				255°, 9" Length
CH-3-574-G				300°, 9" Length
CH-3-574-H				345°, 9" Length

Procedure No.: NIP 539
Subject: C.H. Nozzle Welds
Issue Date: 9-1-75
Revision No.: 0; Date:
Page 1 of 29

ULTRASONIC EXAMINATION PROCEDURES

For

CLOSURE HEAD TO NOZZLE WELDS

NIAGARA MOHAWK POWER CORPORATION
Nine Mile Point, Unit 1

Originator(s):

Signature Date

5-7-76
Signature Date

Approved by:

N.E.S.I. SNT-TC-1A Level III 6-3-76
Signature Date

N.M.P.C. SNT-TC-1A Level III
Signature Date

NUCLEAR ENERGY SERVICES, INC.

RECORD OF REVISIONS

Revision Number	Date	Description	Reason	Originator	NMPC	NES

ULTRASONIC EXAMINATION PROCEDURES FOR CLOSURE HEAD TO NOZZLE WELDS

1.0 SCOPE

1.1 Area of Examination

1.1.1 This document covers the ultrasonic examination procedures for

1) Closure Head to Vent Nozzle Weld (C.E. Dwg. E-231-576) shown in Fig. 1.

2) Closure Head to Safety Valve Nozzle Welds and Closure Head to Instrument Nozzle Welds (CE Dwgs. E-231-561, E-231-574, and E-231-576) shown in Fig. 2.

1.2 Type of Examination

1.2.1 Volumetric examination shall be performed using ultrasonic pulse echo 45° and 60° angle beam shear wave and 0° straight beam techniques applied to the outside surfaces of the Closure Head.

1.2.2 The examination shall be performed manually using contact search units and/or scan fixtures.

1.3 Time of Examination

1.3.1 These procedures shall govern the inservice examination and re-examination of repaired areas of the Closure Head to Nozzle Welds as required by the ASME Boiler and Pressure Vessel Code, Section XI. (1974)

1.4 Weld Configuration

1.4.1 The configurations of the Closure Head to Nozzle welds are shown in Figs. 1 and 2.

1.4.2 Nominal weld thickness is 4-5/16" for the welds specified in this procedure.

1.5 Materials

1.5.1 The Nozzles are constructed of alloy steel (SA 336) and the Closure Head is constructed of low carbon steel (SA 302) with stainless steel cladding on the ID surface.

2.0 REFERENCES

2.1 Reference Documents

2.1.1 The following documents form a part of this examination procedure:

(1) ASME Boiler and Pressure Vessel Code, Section XI 1974 Edition and the Summer of 1974 Addenda.

(2) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(3) CONAM Procedure for Certifying Inspection Personnel, CUTP-1, Rev.-1, September 1970

2.2 Applicable Drawings

2.2.1 The following drawings form a part of this procedure:

(1) C.E. Dwg. Nos. E-231-561; E-231-574; E-231-576

2.3 Operational Manuals

2.3.1 The equipment operational manuals for the particular ultrasonic instrument used form a part of this procedure.

3.0 PROCEDURE CERTIFICATION

3.1 The examination procedures described in this document comply with Section XI of the ASME Boiler and Pressure Vessel Code except where examination coverage is limited by part geometry or access.

4.0 PERSONNEL CERTIFICATION

4.1 Personnel Certification Requirements

4.1.1 Each person performing ultrasonic examination governed by this procedure shall be certified in accordance with the following:

(1) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(2) CONAM Inspection, Inc., Procedure for Certifying Ultrasonic Test Personnel CUTP-1, Rev.1, September 1970.

(3) ASME Boiler and Pressure Vessel Code. Section XI (1974 Ed.)

4.1.2 Examination crews shall have one or more members as necessary. At least one member of each crew shall have a minimum qualification Level II in accordance with the above referenced documents. The remaining member(s) shall have a minimum qualification of Level I or Level I Trainee.

4.2 Personnel Records

4.2.1 Records of personnel qualification shall be maintained by Examination Contractor.

4.2.2 A copy of the examiner's certification, and a current eye test as required by SNT-TC-1A shall be filed with each permanent examination record, with a copy submitted to the plant owner or his agent, prior to performing examinations per this procedure.

5.0 EXAMINATION REQUIREMENTS

5.1 Examination Frequency

5.1.1 The nominal examination frequencies shall be 2.25 MHz for all straight beam and angle beam examinations.

5.1.2 Other pulse frequencies shall be used only if such variables as material attenuation, grain structure, etc., necessitate their use to achieve penetration or resolution. This information shall be recorded on the data sheets.

5.2 Examination Angles

5.2.1 Examination angles for the Closure Head to Nozzle welds shall be as follows and as defined in paragraph 5.7.

(1) 0° straight beam from the unclad surface thru the weld and thru all parent material at the C.H. side of the weld thru which the angle beams will pass during angle beam examination. In the event of non-parallel front and back surfaces when scanning for laminar reflectors, the longitudinal beam shall be directed at an angle normal to the back surface.

(2) 45° angle beam from the unclad surface one direction perpendicular to the weld axis and two directions parallel with the weld axis.

(3) 60° angle beam from the unclad surface one direction perpendicular to the weld axis and two directions parallel with the weld axis.

5.3 Liquid Couplant

5.3.1 The ultrasonic couplant shall be Trim Regular or Trim HD (Master Chemical Corporation, Perrysburg, Ohio).

5.3.2 The couplant shall be supplied in clean containers of sufficient quantity to facilitate the examination.

5.3.3 The couplant shall be pumped from the container to the search unit scan fixtures thru clear tygon flexible tubing or shall be applied manually with a brush or other suitable device.

5.3.4 Where required, the examiner shall be responsible for removing couplant from the examination surface at the conclusion of the examination.

5.4 Surface Preparation

5.4.1 All examination surfaces should be clean and free of dirt, weld spatter, etc., or any other conditon which would interfere with the examination or impair proper transmission of the sound beam.

5.4.2 Irregularity of surface contour to be contacted by the search unit should not exceed 1/8" in any 2" of surface travel. Weld crown and edges should blend smoothly into adjacent base material.

5.5 Weld Identification

5.5.1 Each weld shall be located and identified per the appropriate weld maps, found in the Program Plan Book.

5.6 Datum Point

5.6.1 The examiner shall permanently mark, or verify that there has been marked, a reference datum point on each weld from which all examination data and reported indications shall be referenced.

5.6.2 Datum points shall be marked by the use of low stress stamps or vibratooling and shall not be deeper than 1/64".

5.6.3 The datum point for Closure Head to Vent Nozzle Weld shall be located on the weld centerline at vessel 0°.

5.6.4 The datum point for Closure Head to Safety Valve and Closure Head to Instrument Nozzle Weld shall be located on the weld centerline at the point closest to the vessel centerline.

5.6.5 Each weld datum point, along with respective weld reference points and divisions, shall be shown on each examination report.

5.7 Examination Coverage

5.7.1 The intent of this procedure is to provide maximum examination coverage to insure weld integrity. Each weld shall be scanned with minimum 25% overlap of the transducer element width (diameter) for each scan pass.

5.7.2 The rate of search unit movement shall not exceed 6 inches per second.

5.7.3 Each nozzle shall be ultrasonically examined where part geometry and access permit using 45° and 60" angle beam techniques applied in one direction toward the weld and in two directions parallel with the weld, on one side of the weld. See Figs. 1 and 2.

5.7.4 Straight beam techniques shall be appled, where part geometry permits, to all parent material through which the angle beams will pass during angle beam examinations. Indications detected are to be recorded in accordance with Section 11.1.1 of this procedure, except in areas where no back echo can be obtained.

In addition, straight beam techniques shall be applied to the weld surface and heat-affected zone where part geometry permits. Indications shall be recorded in accordance with Section 11.1.2 of this procedure. This shall include straight beam examination of parent material when no back echo is obtainable.

5.7.5 Where the examination surface or other conditions (weld, contour, access, etc.) do not permit a meaningful ultrasonic examination to be performed, the examiner shall record the area of non-examination and the particular interfering condition in the space provided on the Weld Scan Data Sheet (Fig. 7).

6.0 EQUIPMENT REQUIREMENTS

6.1 Examination Contractor's Equipment

6.1.1 The following test equipment or its equivalent shall be provided by the Examination Contractor for examination of the Closure Head Nozzle Welds.

(1) Pulse Echo Ultrasonic Instrument

(2) Scan Fixture, 45°, (AI No. 85C134 or 57A8407, or other)

(3) Scan Fixture, 60°, (AI No. 85C155 or 57A8417, or other)

(4) Scan Fixture, 0°, (AI No. 85C157, or other)

(5) Search Unit, 3/4" Dia., 2.25 MHz
or 1/2" Dia., 2.25 MHz

(6) Search Units, 1/2" x 1", 2.25 MHz
(7) Couplant
(8) Camera

6.2 Plant Owner's Equipment

6.2.1 The Plant Owner or his Agent shall provide the following service facilities and equipment as required:

(1) Scaffolding

(2) Water, Air and Electricity

(3) Temporary Lighting

(4) Crane or Lifting Devices

(5) Reference Standard Number PIF-4.31C

(6) Radiation Monitoring Equipment

(7) Radiation Shielding

(8) Test Surface Preparation (cleaning and finishing)

(9) Drawings of each Examination Area

(10) Post Examination Cleanup of Test Area

7.0 CALIBRATION REQUIREMENTS

7.1 Reference Standards

7.1.1 The reference standard designated in 6.2.1 (5) shall be used for basic instrument calibration and for establishing reference sensitivity levels for examination of the Closure Head to Nozzle Welds. See Fig. 3.

7.1.2 Spot thickness checks of the components may be made to ensure that the proper reference standard is used.

7.1.3 The number of the reference standard used for performing calibration shall be recorded on each Calibration Data Sheet. Fig. 6 is an example of the Calibration Data Sheet to be used with this procedure.

7.1.4 Calibration Data Sheets shall be numbered 539-1, 539-2, 539-3, etc. at the time of calibration and shall be signed by the examiner(s) upon completion.

7.1.5 Calibration procedures shall be performed using the unclad surface of the reference standard.

7.1.6 The temperature of the reference standard shall be within 25°F of the component temperature.

7.2 Reference Sensitivity Level

7.2.1 The reference sensitivity level shall be the distance-amplitude curve initially obtained directly from the reference standard and shall be the sensitivity level used for evaluating and recording all indications.

7.2.2 During actual weld scanning, the reference sensitivity level shall be increased 2X or 6 dB.

7.3 Times of Calibration

7.3.1 Basic instrument calibration shall be performed using the appropriate reference standard, search units and instrumentation immediately prior to the examination of the Closure Head to Nozzle welds.

7.3.2 Instrument calibration checks shall be performed at the beginning of each day of examination in accordance with Section 8.0 of this procedure.

7.3.3 Examination system calibration checks shall be performed at least at the beginning and at the completion of each 4 hour period of examination and/or at the change of examination personnel, equipment, search units, coupler shoes, etc., and at the completion of the examination of each similar series of welds in accordance with Sections 9.2 and 9.4 of this procedure.

7.4 Calibration Response

7.4.1 Calibration response shall be checked at the primary reference sensitivity level.

7.4.2 Signal response obtained during calibration check shall be within plus or minus 20% of that established during basic system calibration.

7.4.3 If any point on the DAC curve has changed by more than 20% of its amplitude, the examiner shall:

(1) Mark all weld data sheets since previous calibration void.

(2) Recalibrate examination system.

(3) Reexamine voided areas.

7.4.4 If any point on the DAC curve has moved horizontally more than 5% of the sweep line from its original settings, the examiner shall:

(1) Correct the sweep calibration and note it on the Calibration Data Sheet.

(2) Void any data sheets made since the previous calibration which have recorded indications and reexamine those areas.

8.0 INSTRUMENT CALIBRATION VERIFICATION

8.1 Amplitude Linearity

8.1.1 The linearity of the ultrasonic instrument shall be checked as follows:

(1) Position an angle beam search unit on the reference standard so that indications from both the 1/2T and 3/4T holes are visible (other reflectors which provide the 2 to 1 ratio required in (2) may be substituted).

(2) Manipulate search unit to establish a 2 to 1 ratio of amplitudes between the two indications with the largest at 80% FSH.

(3) Without moving search unit, adjust sensitivity to run the higher response from approximately 100% to 20% FSH in 2 dB steps (10% if fine control available).

(4) Read and record the relative amplitudes of the two indications to the nearest 1%.

(5) If the smaller indication does not fall within 5% FSH of 50% of the larger indication, the instrument shall not be used for examinations until corrected.

8.2 Amplitude Control Linearity

8.2.1 The linearity of the instrument gain (attenuation) control shall be checked as follows:

(1) Position an angle beam search unit on the reference standard to obtain an 80% FSH indication from the 1/2T hole.

(2) Using amplitude control, decrease signal amplitude by 6 dB and by 12 dB to obtain nominal 40% FSH and 20% FSH signals. Read and record actual signal amplitudes to closest 1%.

(3) Obtain a 40% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 6 dB to obtain a nominal 80% signal. Read and record as in (2).

(4) Obtain a 20% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 12 dB to obtain a nominal 80% FSH signal. Read and record as in (2).

(5) If the indications obtained in (2), (3) and (4) are not within ± 20% of nominal, the instrument shall not be used for examination until corrected.

9.0 EXAMINATION SYSTEM CALIBRATION

9.1 Straight Beam Calibration

9.1.1 Straight beam sweep calibration and distance-amplitude correction shall be performed as follows and as shown in Figure 4. The appropriate combination of search units and reference standard for each respective weld are shown in Figures 1, 2, and Table 1.

(1) Adjust the instrument sweep controls so that the signal responses from the 1/4T and 3/4T holes occur at the 2nd and 6th horizontal screen divisions as shown in Figure 4.

(2) Position search unit to obtain maximum response from the hole which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on the CRT.

(3) Without changing sensitivity, position the search unit respectively on the remaining holes and mark signal amplitudes and locations on the CRT.

(4) Plot a DAC curve by connecting the locations (marked on the CRT) with a continuous line extended to cover the full examination range (horizontal screen divisions 0 thru 8) as shown in Figure 4.

(5) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(6) System is now calibrated for examination of welds of the thickness for which calibration was just performed.

(7) Record all data and instrument settings on the Calibration Data Sheet.

9.2 Straight Beam Calibration Check

9.2.1 Straight beam calibration check as required by Section 7.3.3 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.1.1 (2).

(2) Reposition search unit at each respective test hole and observe maximum signal response amplitudes, and horizontal screen positions.

(3) See Section 7.4 for signal response requirements during calibration check.

9.3 Angle Beam Calibration

9.3.1 Angle beam sweep calibration and distance-amplitude correction shall be performed as follows and as shown in Figure 4. The appropriate search units and reference standard for each weld are shown in Figures 1, 2 and Table 1.

(1) Adjust the instrument sweep controls so that the signal response from the 1/4T and 3/4T holes occur at the 2nd and 6th horizontal screen divisions as shown in Figure 4. To verify sweep calibration, insure that response from square notch appears near the 8th horizontal division. Note on the Calibration Data Sheet any displacement of more than 1/2 of one horizontal screen division.

(2) Position search unit to obtain maximum response from the hole which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on CRT.

(3) Without changing sensitivity, position search unit respectively on the remaining angle beam calibration holes and mark signal amplitudes and locations on CRT.

(4) Plot a DAC curve by connecting the locations (marked on the CRT) with a continuous line extended to cover the full examination range (horizontal screen divisions 0 thru 8) as shown in Figure 4.

(5) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(6) Instrument is now calibrated for examination of welds of the thickness for which calibration was just performed.

(7) Record all data and instrument settings on the Calibration Data Sheet.

9.3.2 Angle beam sensitivity correction for far and near surface indications shall be established as follows and as shown in Figure 4.

4

(1) Position search unit to obtain maximum amplitude from far surface notch and with instrument at reference sensitivity, mark the screen to show its peak amplitude (near the 8th horizontal division).

(2) Position search unit over near surface notch and, if detected, mark the screen to show its peak amplitude (near the zero horizontal division).

(3) When evaluating indications which occur at the far or near surfaces, they shall be compared directly with the relative amplitude of the square notches.

9.3.3 Angle beam position calibration shall consist of fabricating an indication locating rule as follows and as shown in Figure 5.

(1) Position search unit to obtain peak indication from the 1/4T hole.

(2) Place a taped ruler or other suitable indexing strip against the front of the search unit and mark the distance from the test surface to the hole (in inches and with respect to T) on the strip where it crosses the surface scribe line over the holes. (Mark the search unit if it covers the scribe line.)

(3) Successively position the search unit to peak on the 1/2T hole, 3/4T hole and opposite notch and mark the respective distances from the surface (in inches and in terms of T) on the ruler where it crosses the surface scribe line over the holes.

(4) If the near surface notch can be detected, mark its location on the side of the search unit.

(5) Subdivide the scale made in the above steps so that distance from surface to an indication may be read to the nearest 1/8T.

9.3.4 Beam spread measurements for the vertical plane of each angle beam search unit and weld thickness combination shall be made using the locating rule (see 9.3.3) as follows and as shown in Figure 5.

(1) Increase instrument sensitivity 2X or 6 dB over reference sensitivity.

(2) Position search unit for maximum response from 1/4T hole and move the search unit toward the hole until signal amplitude is equal to the DAC curve drawn on the screen. Mark a small 1 on the depth scale where it crosses the scribe line over the 1/4T hole.

(3) Move the search unit away from the 1/4T hole, thru the maximum amplitude point, until the signal amplitude is again equal to the DAC curve drawn on the screen. Again, mark a small 1 on the depth scale.

(4) Repeat steps (2) and (3) for the 1/2T and 3/4T holes using numbers 2 and 3 respectively.

(5) Using suitable paper, mark a full size plot of the data from the locating rule and determine the refracted beam angle and angle of divergence for 50% DAC amplitude.

NOTE: Curvature of the reference standard used may cause some deviation in beam spread and beam angle information.

(6) Beam spread plots shall become part of the examination record.

9.4 Angle Beam Calibration Check

9.4.1 Angle beam calibration check as required by Section 7.3.2 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.3.1 (2).

(2) Reposition search unit at each respective test hole and observe signal response amplitudes and horizontal screen positions.

(3) See Section 7.4 for signal response requirements during calibration check.

10.0 EXAMINATION PROCEDURES

10.1 Straight Beam Examination of Weld and Heat Zone

10.1.1 Straight beam examination of the weld and heat affected zone and areas of base material where no back echo is available, shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.1.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer element width (diameter) for each scan pass.

10.1.3 See Table 1 and Figs. 1 and 2 for scan path distances and weld identifications.

10.1.4 Continue scanning until all welds have been examined. Equipment must not be removed from the weld area until all indications have been evaluated.

10.2 Straight Beam Examination of Base Material

10.2.1 Straight beam examination of all base material, where a back echo is obtainable, thru which the angle beams will pass during angle beam examination shall be performed at a sensitivity level which gives a minimum back reflection signal amplitude of 50% of FSH.

10.2.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer element width (diameter) for each scan pass.

10.2.3 See Table 1 and Figs. 1 and 2 for scan path distances and weld identifications.

10.2.4 Continue scanning until all welds have been examined. Equipment must not be removed from the weld area until all indications have been evaluated.

10.3 Angle Beam Examinations

10.3.1 All angle beam examinations shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.3.2 The search unit shall be swivelled to ensure maximum coverage as it is moved along a rectilinear scan pattern allowing a minimum of 25% overlap of the transducer element width (diameter).

10.3.3 See Table 1 and Figs. 1 and 2 for scan path distances and weld identifications.

10.3.4 Continue scanning until all welds have been examined. Equipment must not be removed from weld area or disassembled until all indications have been evaluated.

11.0 EVALUATION CRITERIA

11.1 Recording of Indications

11.1.1 For straight beam examinations of base metal for laminations, all areas giving indications equal to or greater than the remaining back reflection shall be recorded on the appropriate data sheet prior to angle beam examination of the weld and heat affected zone.

(1) Each recorded area shall be identified as to distance from surface, length and position relative to the weld datum point.

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter (width).

11.1.2 For straight beam examinations of weld and heat-affected zone and angle beam examinations, all indications showing a signal amplitude response equal to or greater than 50% of the reference response shall be recorded on the appropriate data sheet at the time of weld examination and prior to removing equipment from the closure head.

(1) Each recorded indication shall be identified as to depth (as a percent of thickness), distance from surface, length, signal amplitude and location relative to the weld datum point.

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter (width).

11.1.3 Indications from all Closure Head to Nozzle Welds shall be reported in inches CW or CCW from datum point when looking at the outside of the reactor vessel, and in inches inboard (toward center of nozzle) or outboard (away from center of nozzle) of the weld centerline.

11.2 Evaluation of Indications

11.2.1 Evaluation of all indications shall be made at the reference sensitivity and in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWB-3000.

Results of this evaluation shall be reported to the Plant Owner or his Agent in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWA-6000.

12.0 EXAMINATION RECORDS

12.1 Certification of Records

12.1.1 The examiner shall complete and sign the appropriate Weld Scan Data Sheet(s) immediately upon the completion of each weld examination.

12.2 Filing of Records

12.2.1 The examiner shall be responsible for submitting to the Plant Owner, or his Agent, a completely documented set of examination records including certification of personnel qualifications with a current eye test report in accordance with SNT-TC-1A.

13.0 EXAMINER'S CRITIQUE

13.1 Procedure Corrections and Additions

13.1.1 All procedure corrections and/or additions required during the preoperational and/or inservice examinations shall be made in accordance with requirements of NES QA Plan number. NES 81A0402, and documented in the record of revisions section of this procedure.

13.2 Critique Report

13.2.1 Upon completion of the examination of all Closure Head to Nozzle welds, the examiner shall submit a written report to the Plant Owner or his Agent listing pertinent information for future examinations such as procedure additions, corrections and revisions or unique problems or actions to be taken.

13.3 Additional Examinations

When indications exceeding allowable standards are found, additional examinations shall be performed as stipulated in Section XI, paragraph IWB-2430.

Drawing:	E-231-576	Procedure No.:	NIP 539
Tooling:	Manual Scan Fixtures and Search Units	Subject:	C.H. Nozzle Welds
Ref.Std:	No. PIF-4.31C	Issue Date:	9-1-75
		Revision No.:	0; Date
		Page	20 of 29

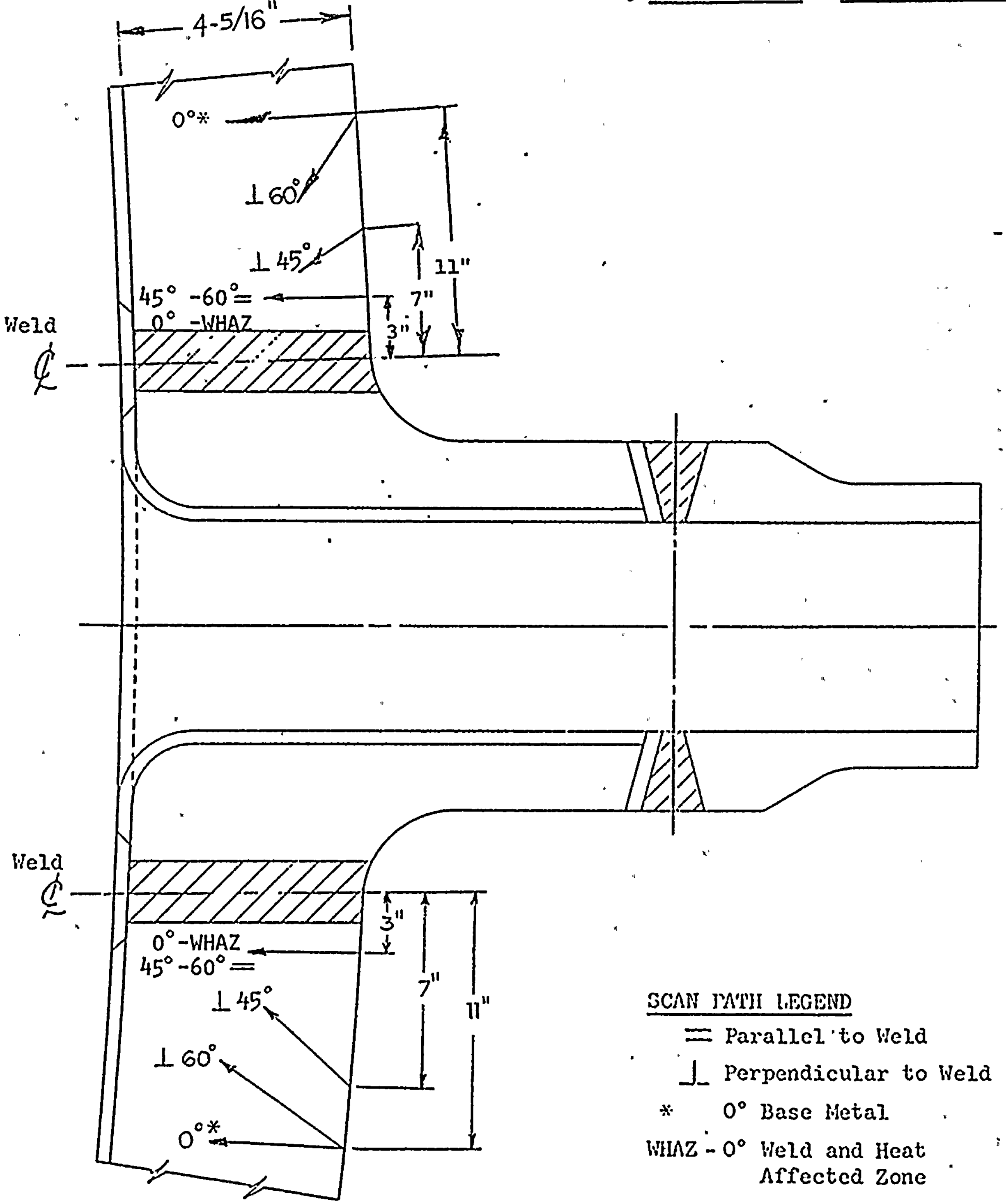
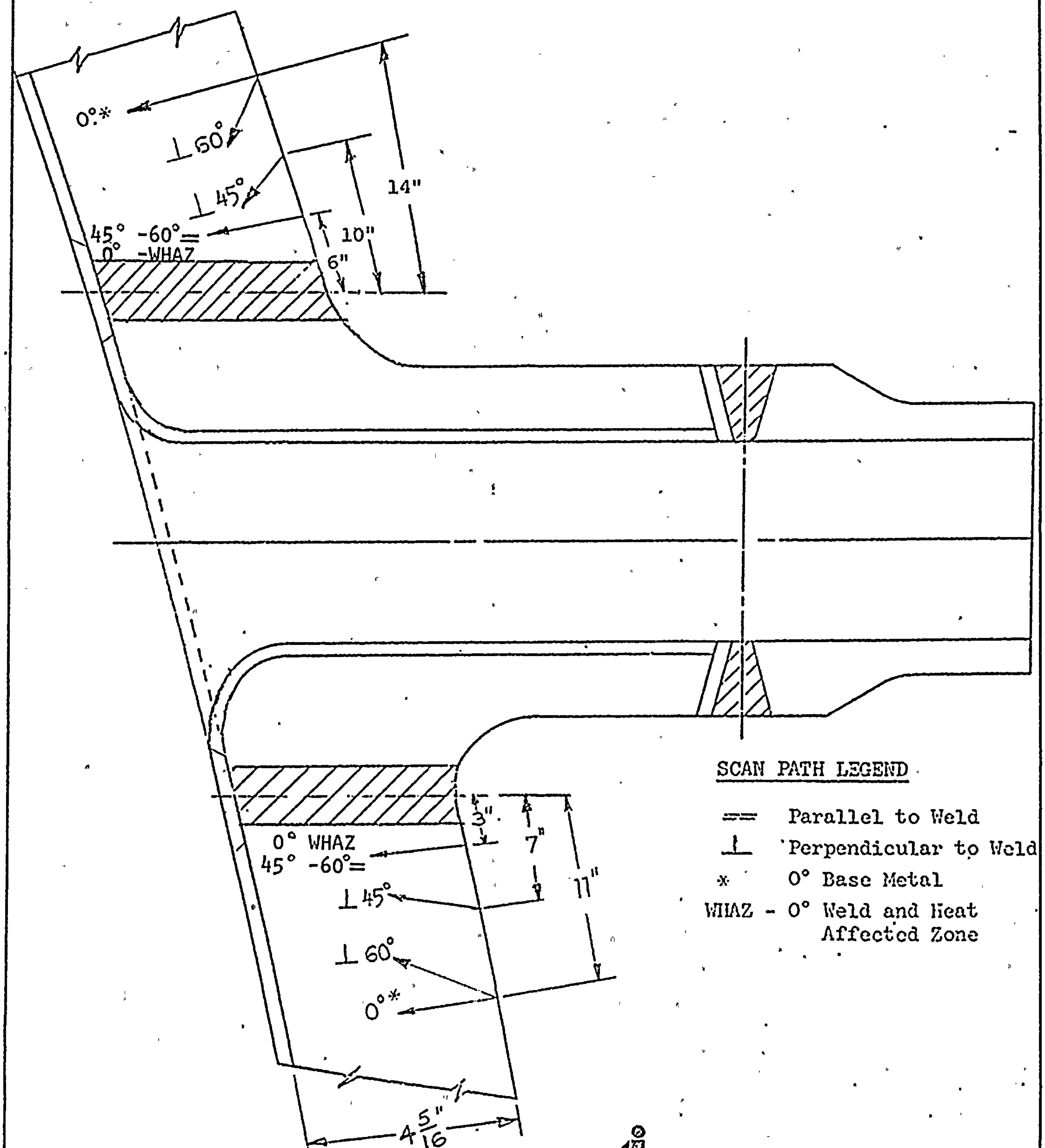


Figure 1: Ultrasonic Examination of Closure Head to Vent Nozzle Weld.

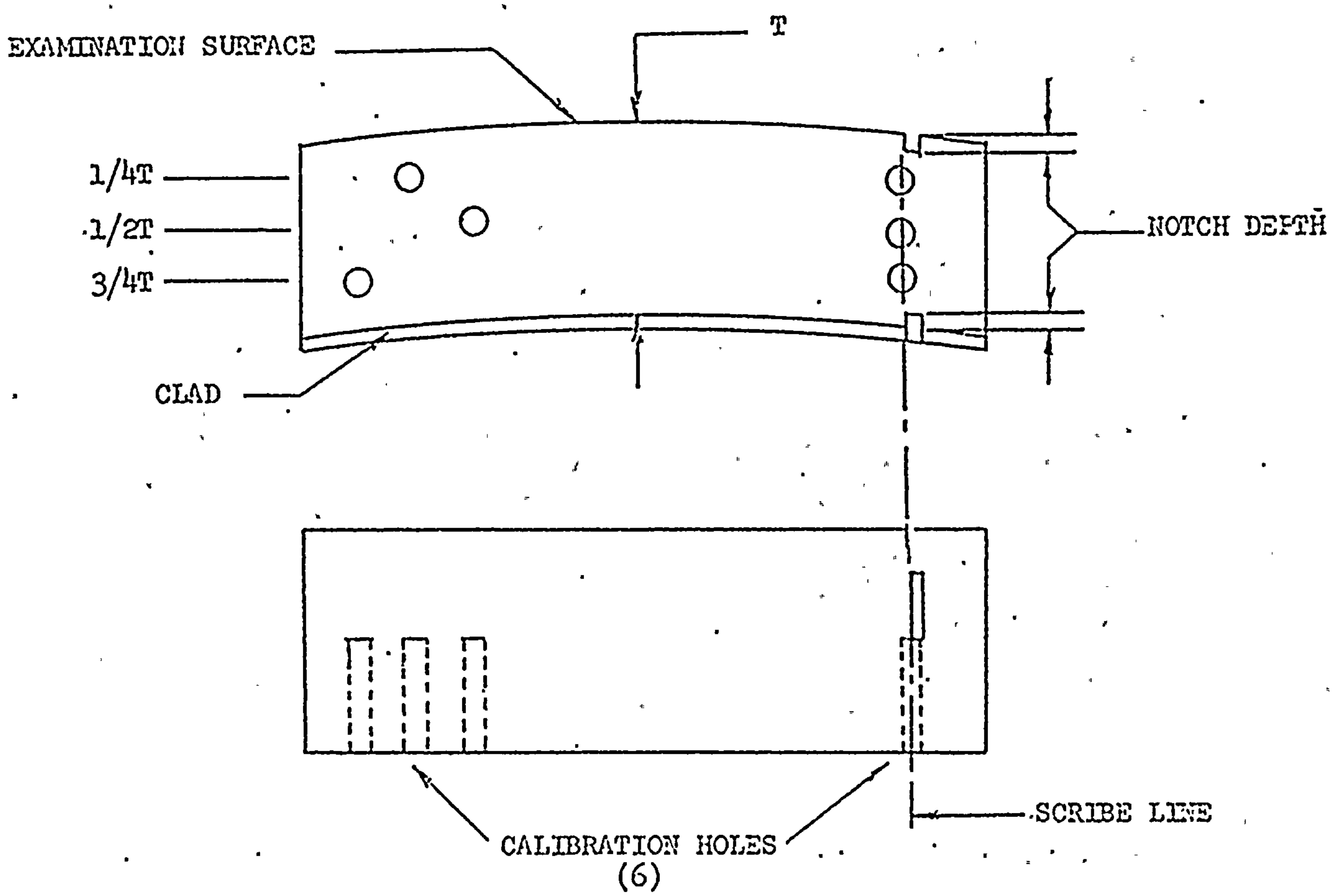
Drawing: E-231-576
Tooling: Manual Scan Fixtures and Search Units
Ref. Std.: P1F-4.31C

Procedure No.: NIP 539
Subject: C.H. Nozzle Welds
Issue Date: November 18, 1975
Revision No.: 0 Date:
Page 21 of 29



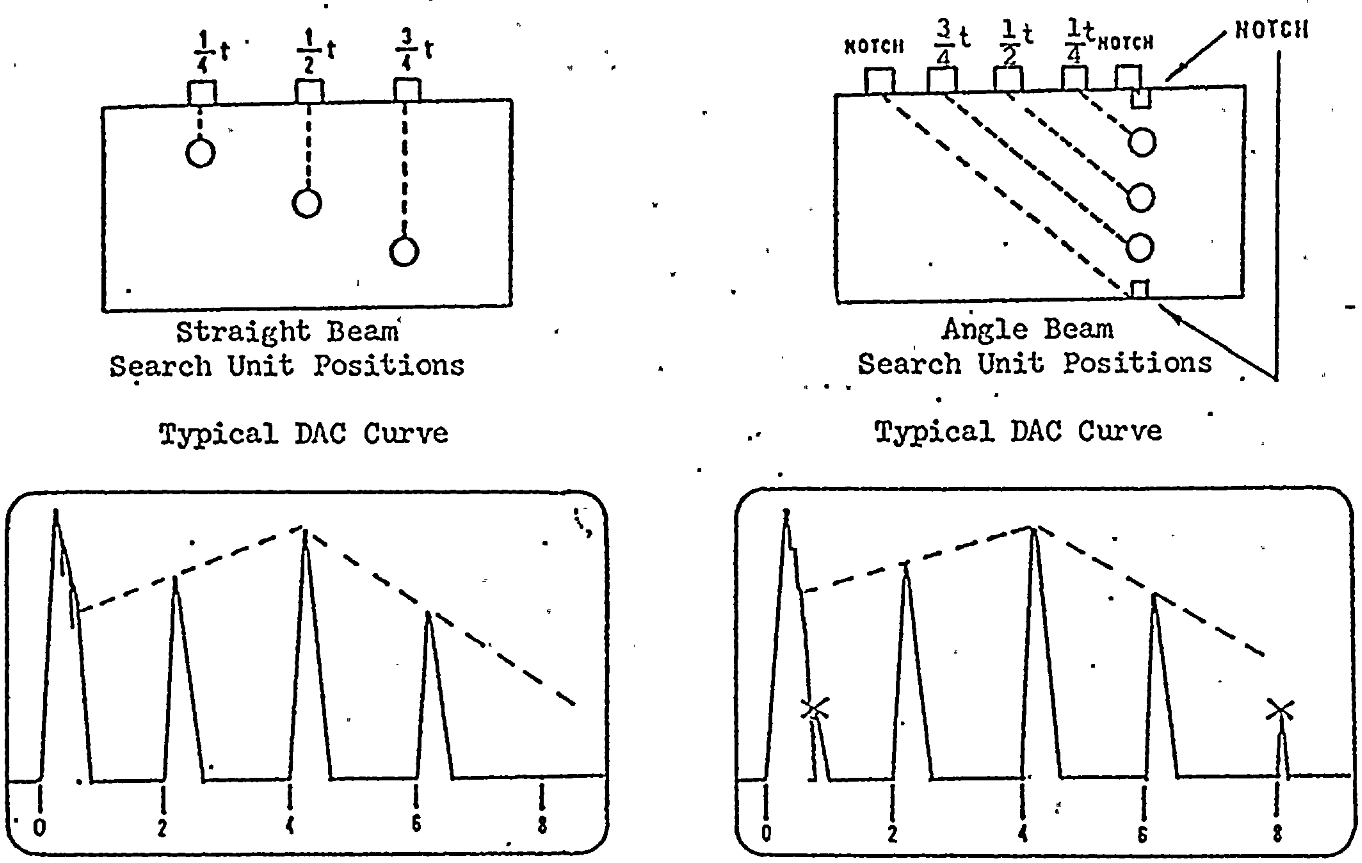
NUCLEAR ENERGY SERVICES, INC.

Figure 2. Ultrasonic Examination of Closure Head to Instrument and Safety Valve Nozzle Welds.



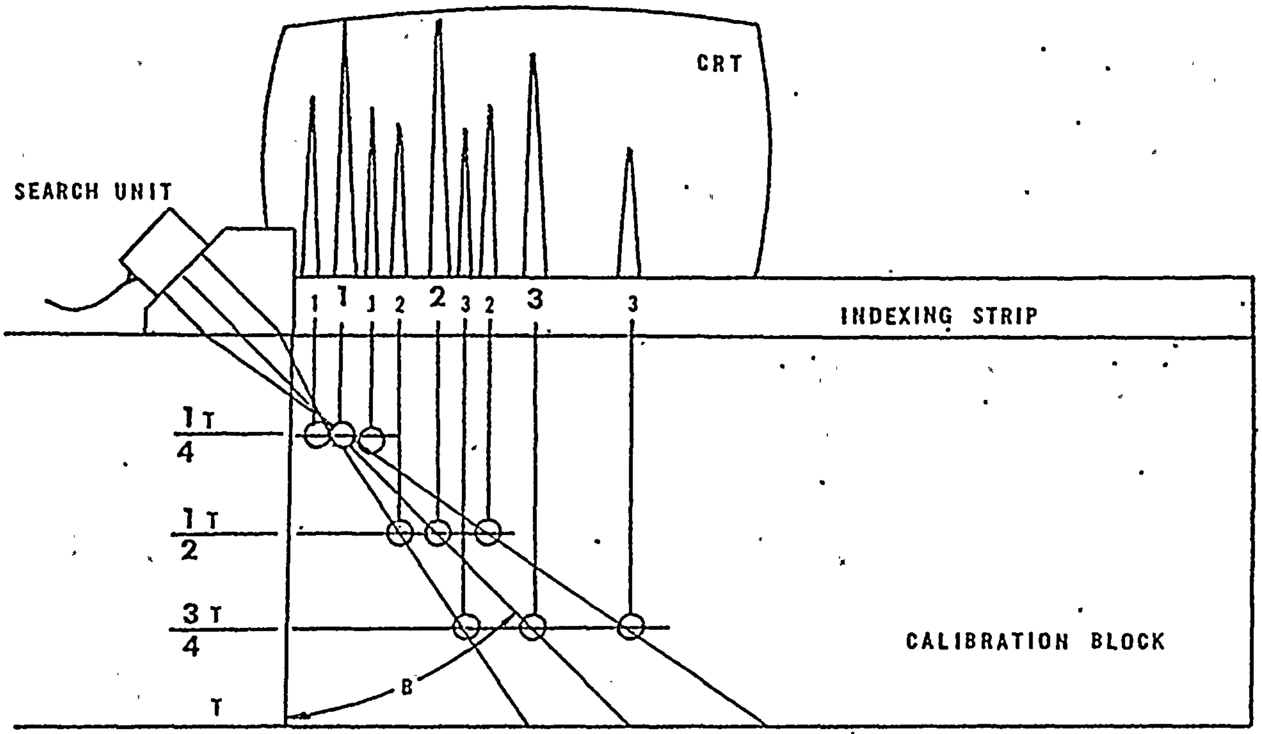
Block Number	Block Thickness	1/4T	1/2T	3/4T	Hole Dia.	Notch Depth
PIF-4.31C	4.31"	1.08"	2.16"	3.24"	.25"	0.086"

FIGURE 3. ULTRASONIC REFERENCE STANDARD, PIF-4.31C, FOR CLOSURE HEAD TO NOZZLE WELDS.



Step 1 - Adjust sweep controls so that 1/4T, 1/2T, and 3/4T holes are located respectively on the 2nd, 4th, and 6th horizontal screen divisions.
Step 2 - Adjust sensitivity to provide 80% FSH indication from hole giving maximum response - mark position on screen.
Step 3 - Position search unit for maximum response from remaining holes - mark position on screen.
Step 4 - Plot DAC by connecting points marked on screen with line extended to cover entire examination range.
Step 5 - Record all sweep and sensitivity control settings on respective data sheets.
Step 6 - Position search unit for maximum response from far surface notch and "X" mark screen and data sheet to indicate amplitude.
Step 7 - Repeat Step 6 for near surface notch if detectable.

FIGURE 4 . REFERENCE SENSITIVITY AND DAC CALIBRATION PROCEDURES FOR ULTRASONIC EXAMINATION OF WELDS.



1. Fabricate position (surface location) scale as per Section 9.3.3.
2. Mark 50% DAC amplitude points on scale per Section 9.3.4 (1) thru (4).
3. Plot graphically all points from scale per Section 9.3.4 (5) in full size.

NOTE: Use Form 85C-75-122 for beam plots on standards with vessel curvature.

FIGURE 5 . ANGLE BEAM CALIBRATION - POSITION CALIBRATION AND BEAM SPREAD MEASUREMENT.

CALIBRATION DATA SHEET NO. 539-1
MANUAL EXAMINATION

EXAMINATION AREA ____________________

TRANSDUCER IDENTIFICATION

STYLE OR TYPE NO. ____________________
SIZE ____________________
FREQUENCY ____________________
SERIAL NO. ____________________
ANGLE & MODE ____________________
BEAM DIRECTION (= or ⊥ to weld) ________
SCAN FIXTURE ____________________

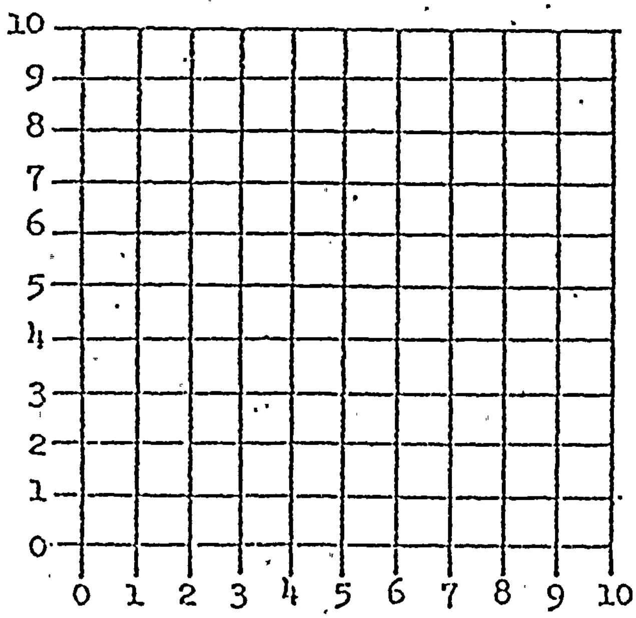
CALIBRATION BLOCK

ID NO. ____________________
SIZE ____________________
EXAMINATION SURFACE ____________________

Hole IDENT	Depth IN.	Amp. %	Atten. dB

TEMPERATURE = Ref. Std. ____________
Component ____________

DAC PLOT



ULTRASONIC INSTRUMENT

MODEL NO. ____________________
SERIAL NO. ____________________

CONTROL SETTINGS

PULSE LENGTH ____________________
FREQUENCY ____________________
dB GAIN ____________________
SWEEP LENGTH ____________________
SWEEP DELAY ____________________
VIDEO FILTER ____________________
REJECT ____________________
COUPLANT ____________________

INSTRUMENT LINEARITY CALIBRATION

Amplitude High	Low	High	Low
1.		5.	
2.		6.	
3.		7.	
4.		8.	

AMPLITUDE CONTROL LINEARITY

Initial	Δ dB	Result	Limit
80	-6		32% - 48%
80	-12		16% - 24%
40	+6		64% - 96%
20	+12		64% - 96%

EXAMINER(S) (Signature Required)

1. ____________________ SNT-TC-1A Level ____
2. ____________________ SNT-TC-1A Level ____

DATE: ____________ TIME: ____________

Reviewed by: ____________________

Figure 6

WELD SCAN DATA SHEET

1. Calibration Data Sheet No. ______
2. Examination Angle ______
3. Area of Examination ______
4. Examination Surface ______

Procedure No.: NIP 539
Subject: C. H. Nozzle Welds
Issue Date: 9-1-75
Revision No.: 0; Date:

Weld, Item or Scan No.	Scan Completion				No Reportable Indications	Reportable Indications	Supplement Attached	Comments: Reason for Incompleted Scans
	0° Base Metal	0° WHAZ	Normal to Weld Centerline	Parallel to Weld Centerline				

Calibration Checks			
Instrument		Examination System	
Time	Date	Time	Date

FIGURE 7

Additional Sheets Attached:

Continuation ______ Supplements ______

Examiner(s):

1. ______ SNT-TC-1A Level ______
2. ______ SNT-TC-1A Level ______

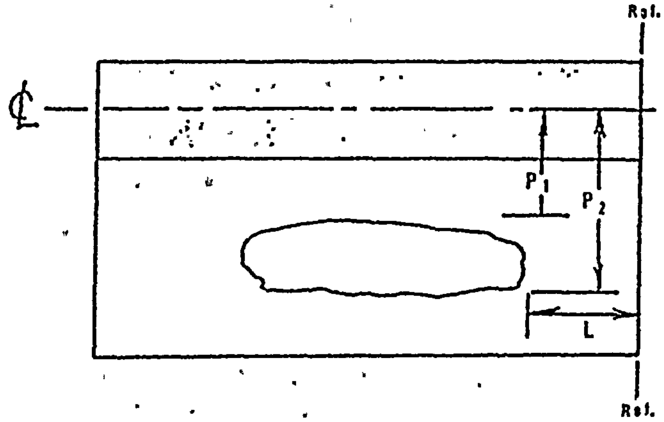
Date: ______

NUCLEAR ENERGY SERVICES, INC.

WELD SCAN DATA SHEET SUPPLEMENT A (BASE METAL)	Procedure No.: NIP 539 Subject: C. H. Nozzle Welds Issue Date: 9-1-75 Revision No.: 0; Date: Page 27 of 29

Weld No. ______________________ Sheet ________ of ________

Calibration Data Sheet No. ______________ Back Echo Amplitude ____________



Note: Location increments are not to exceed allowable scan increments.

Indication No.	Depth	L(inches)	P_1	P_2.	Echo(% FSH)	Back(% FSH)

FIGURE 7A

Examiner(s):

1. ______________________ SNT-TC-1A Level ________

2. ______________________ SNT-TC-1A Level ________

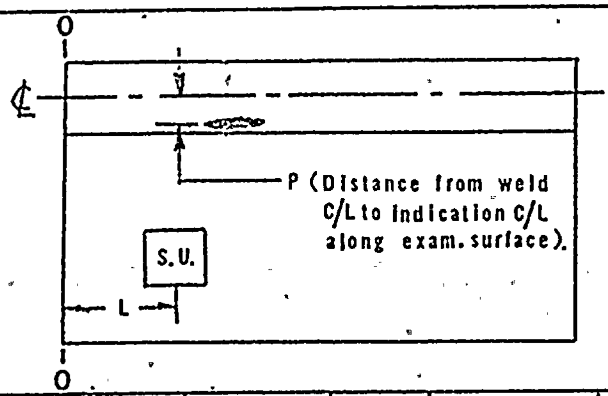
Date: ______________________

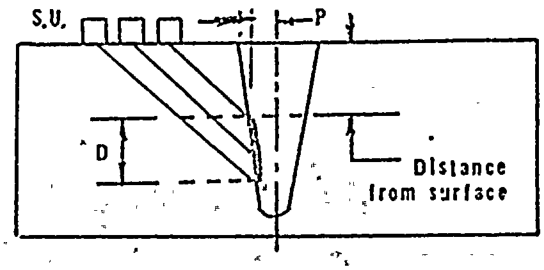
NUCLEAR ENERGY SERVICES, INC.

WELD SCAN DATA SHEET SUPPLEMENT B	Procedure No.: NIP 539 Subject: C. H. Nozzle Welds Issue Date: 9-1-75 Revision No.: 0; Date: Page 28 of 29

Weld No. ______________________ Sheet ________ of ________

Calibration Data Sheet No. ______________ EXAM. ANGLE ______________





Note: Location increments are not to exceed allowable scan increments.

Ind. No.	BEAM DIR.	L Location	Max % DAC	Dist. From Surface	P	50% Forward		50% Back		Depth (D)	
						Dist. From Surface	P	Dist. From Surface	P	Inches	% T

NOTE:
End points of L are the smaller of 50% DAC. or 50% Max.

FIGURE 7B

Examiner(s):

1. ______________________ SNT-TC-1A Level ________

2. ______________________ SNT-TC-1A Level ________

Date: ______________________

NUCLEAR ENERGY SERVICES, INC.

TABLE I

WELD IDENTIFICATION

NUCLEAR COMPONENTS

Weld No.	Description	Ref. Block	Reference Figures	Exam Requirements
CH5-576 -w	Head to 4" Vent Nozzle	PIF-431C	Fig. 1 Weld Fig. 3. Ref.Block	100% of Weld
CH3-576A -w thru CH3-576F -w and	Head to 6" Safety Valve (or Instrumentation) Nozzle - Inner Ring.	↓	Fig. 2 Weld Fig. 3. Ref.Block	↓
CH1-576A -w thru CH1-576M -w	Head to 6" Safety Valve (or Instrumentation) Nozzle - outer Ring	↓	Fig. 2 Weld Fig. 3 Ref.Block	↓

ULTRASONIC EXAMINATION PROCEDURES FOR COMPONENT BOLTS, STUDS AND NUTS

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT, UNIT 1

Originator(s):

Signature Date

[signature] 5-7-76
Signature Date

Approved by:

N.E.S.I. [signature] SNT-TC-1A Level III 6-3-76
Signature Date

N.M.P.C. SNT-TC-1A Level III
Signature Date

RECORD OF REVISIONS

Revision Number	Date	Description	Reason	Originator	NMPC	NESI
1	3-11-77	Fig.s 5,7,8	To reflect as-built conditions	[illegible]		[illegible]
1	10-5-77	Section 9.2.1 (5) add Note	Clarification	AU		PJB

ULTRASONIC EXAMINATION PROCEDURES FOR BOLTS, STUDS AND NUTS

1.0 SCOPE

1.1 Area of Examination

1.1.1 This document covers the ultrasonic examination procedures for:

(1) Closure Head Studs and Nuts (see Figures 2 and 4)
(2) Recirculation Pump Bolts (see Figure 1)
(3) Main Steam Isolation Valve Studs and Nuts (see Figures 3 & 4)
(4) Recirculation Suction and Discharge Valve Studs and Nuts (see Figures 3 and 4)

1.2 Type of Examination

1.2.1 Volumetric examination shall be performed using ultrasonic pulse echo 0° straight beam techniques applied to one end of the bolts and studs and to one surface of the nuts.

1.2.2 The examination shall be performed using manual search units and/or scan fixtures.

1.3 Time of Examination

1.3.1 These procedures shall govern the inservice examination and re-examination of repaired areas of studs and nuts as required by the ASME Boiler and Pressure Vessel Code, Section XI (1974).

1.4 Part Configuration

1.4.1 The bolt dimensions and configurations are shown in Figure 1.

1.4.2 The stud dimensions and configurations are shown in Figures 2 & 3.

1.4.3. The nut dimensions and configurations are shown in Figure 4.

1.5 Materials

1.5.1 The bolts, studs and nuts are constructed of low carbon steel.

2.0 REFERENCES

2.1 Reference Documents

2.1.1 The following documents form a part of this examination procedure:

(1) ASME Boiler and Pressure Vessel Code, Section XI 1974 Edition, and the Summer of 1974 Addenda.

(2) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(3) CONAM Procedure for Certifying Inspection Personnel, CUTP-1, Rev.1, September 1970.

(4) ASME Boiler and Pressure Vessel Code, Section V, 1974 Edition, and the Summer of 1974 Addenda.

2.2 Applicable Drawings

2.2.1 The following drawings form a part of this procedure:

(1) CE Drawing E-231-573

2.3 Operation Manuals

2.3.1 The equipment operational manuals for the particular ultrasonic instruments used form a part of this procedure.

3.0 PROCEDURE CERTIFICATION

3.1 The examination procedures described in this document comply with Section XI of the ASME Boiler and Pressure Vessel Code, 1974 Edition, except where examination coverage is limited by part geometry or access.

4.0 PERSONNEL CERTIFICATION

4.1 Personnel Certification Requirements

4.1.1 Each person performing ultrasonic examination governed by this procedure shall be certified in accordance with the following:

(1) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(2) CONAM Inspection Inc., Procedure for Certifying Ultrasonic Test Personnel CUTP-1, Rev.1, September 1970.

(3) ASME Boiler and Pressure Vessel Code, Section XI (1974 Ed.)

4.1.2 An examination crew shall consist of one or two members as needed. At least one member of each crew shall have a minimum qualification Level II in accordance with the above referenced documents. The remaining member(s) shall have a minimum qualification of Level I,or Level I trainee.

4.2 Personnel Records

4.2.1 Records of personnel qualification shall be maintained by Examination Contractor.

4.2.2 A copy of the examiner's certification, and a current eye test as required by SNT-TC-1A shall be filed with each permanent examination record, with a copy submitted to the plant owner or his agent, prior to performing examinations per this procedure.

5.0 EXAMINATION REQUIREMENTS

5.1 Examination Frequency

5.1.1 The nominal examination frequencies shall be 2.25 MHz for all straight beam examinations.

5.1.2 Other pulse frequencies shall be used if such variables as material attenuation, grain structure, etc., necessitates their use to achieve penetration or resolution. This information shall be recorded on the data sheets.

5.2 Examination Angles

5.2.1 Examination angles for the components specified in this procedure shall be as follows:

(1) For bolts and studs, 0° straight beam from the upper end of the stud.

(2) For nuts, 0° straight beam, from the upper surface of the nut.

5.3 Liquid Couplant

5.3.1 The ultrasonic couplant shall be Trim Regular or Trim HD (Master Chemical Corporation, Perrysburg, Ohio).

5.3.2 The couplant shall be supplied in clean containers of sufficient quantity to facilitate the examination.

5.3.3 The couplant shall be pumped from the container to the search unit scan fixtures thru clear tygon flexible tubing or shall be applied manually with a brush or other suitable device.

5.3.4 Where required, the examiner shall be responsible for removing couplant from the examination surface at the conclusion of the examination.

5.4 Surface Preparation

5.4.1 All examination surfaces should be clean and free of dirt, weld spatter, etc., or any other condition which would interfere with the examination or impair proper transmission of the sound beam.

5.4.2 Irregularity of surface contour to be contacted by the search unit should not exceed 1/8" in any 2" of surface travel.

5.5 Part Identification

5.5.1 Each part shall be located and identified per appropriate part maps, in the Program Plan Book.

5.6 Datum Point

5.6.1 The examiner shall permanently mark, or verify that there has been marked, a reference datum point on each part from which all examination data and reported indications shall be referenced.

5.6.2 Datum points shall be marked by the use of low stress stamps or vibratooling and shall not be deeper than 1/64".

5.6.3 The datum point for each bolt or stud shall be on a diametric line thru the bolt or stud identification number at the outer edge of the bolt or stud nearest the number.

5.6.4 The datum point for each nut shall be in line with the nut identification number at the outer edge of the nut.

5.6.5 Each datum point, along with respective part reference points and divisions, shall be shown on each examination report.

5.7 Examination Coverage

5.7.1 The intent of this procedure is to provide maximum examination coverage to insure part integrity. Each part shall be scanned with minimum 25% overlap of the transducer width (diameter) for each scan pass. The scan rate shall not exceed 6 inches per second.

5.7.2 Each bolt and stud shall be ultrasonically examined where part geometry and access permit using 0° straight beam techniques applied to the top end of the stud.

5.7.3 Each nut shall be ultrasonically examined where part geometry and access permit using 0° straight beam techniques applied to the upper surface of the nut.

5.7.4 Where the examination surface or other conditions (gouges, contour, access, etc.) do not permit a meaningful ultrasonic examination to be performed, the examiner shall record the area of non-examination and the particular interfering condition in the space provided on the Part Scan Data Sheet (Figure 11).

6.0 EQUIPMENT REQUIREMENTS

6.1 Examination Contractor's Equipment

6.1.1 The following test equipment or its equivalent shall be provided by the Examination Contractor for examination of the bolts, studs and nuts.

(1) Pulse Echo Ultrasonic Instrument
(2) Search Unit, 3/4" Dia., 2.25 MHz or 1/2" Dia.
(3) Scan Fixture, 0°, (AI No. 85C157 or other)
(4) Couplant
(5) Camera

6.2 Plant Owner's Equipment

6.2.1 The plant owner or his agent shall provide the following service facilities and equipment as required:

(1) Scaffolding
(2) Water, Air and Electricity
(3) Temporary Lighting
(4) Crane or Lifting Devices
(5) Bolt Reference Standard No.PIS-2.5
(6) Stud Reference Standard No's.PIS-6.25, PIS-2.0
(7) Nut Reference Standard No's. PIN-6.25, PIN-2.0
(8) Radiation Monitoring Equipment
(9) Radiation Shielding
(10) Test Surface Preparation (cleaning and finishing)
(11) Drawings of Each Examination Area
(12) Post Examination Cleanup of Test Area

7.0 CALIBRATION REQUIREMENTS

7.1 Reference Standards

7.1.1 The reference standards designated in 6.2.1 (5) thru (7) shall be used for basic instrument calibration and for establishing reference sensitivity levels for examination of the bolts, studs and nuts. See Figures 5 thru 8.

7.1.2 The appropriate reference standard corresponding to each part shall be recorded on each Calibration Data Sheet. Figure 10 is an example of the Calibration Data Sheet to be used with this procedure.

7.1.3 Calibration procedures shall be numbered 541-1, 541-2, 541-3 etc., at the time of calibration.

7.1.4 Calibration procedures shall be performed using the surface of the reference standard shown in Figures 5 through 8.

7.1.5 The temperature of the reference standard shall be within 25°F of the part temperature.

7.2 Reference Sensitivity Level

7.2.1 The reference sensitivity level shall be the distance-amplitude curve initially obtained directly from the reference standard and shall be the sensitivity level used for evaluating and recording all indications.

7.2.2 During actual part scanning, the reference sensitivity level shall be increased 2X or 6dB.

7.3 Times of Calibration

7.3.1 Basic instrument calibration shall be performed using the appropriate reference standard, search units and instrumentation immediately prior to the examination of the parts specified in this procedure.

7.3.2 Instrument calibration checks shall be performed at the beginning of each day of examination in accordance with Section 8.0 of this procedure.

7.3.3 Examination system calibration checks shall be performed at least at the beginning and at the completion of each 4 hour period of examination and/or at the change of examination personnel, equipment, search units, coupler shoes, etc., and at the completion of the examination of each similar series of parts in accordance with Section 9.4 of this procedure.

7.4 Calibration Response

7.4.1 Calibration response shall be checked at the primary reference sensitivity level.

7.4.2 Signal response obtained during calibration check shall be within plus or minus 20% of that established during basic instrument calibration.

7.4.3 If any point on the Distance Amplitude Correction (DAC) curve is above or below the 20% limit, the examiner shall:

(1) Mark all part data sheets since previous calibration void.

(2) Recalibrate examination system.

(3) Reexamine voided areas.

7.4.4 If any point on the DAC curve has moved horizontally more than 5% of the sweep line from its original settings, the examiner shall:

(1) Correct the sweep calibration and note it on the Calibration Data Sheet.

(2) Void any data sheets made since the previous calibration which have recorded indication and reexamine those areas.

8.0 INSTRUMENT CALIBRATION VERIFICATION

8.1 Amplitude Linearity

8.1.1 The linearity of the ultrasonic instrument shall be checked as follows:

(1) Position a search unit on a reference standard so that two indications are visible. (These indications may be obtained from a reference hole and back surface, from two reference holes, or from a reference hole and a corner seen simultaneously on the instrument screen.)

(2) Manipulate search unit to establish a 2 to 1 ratio of amplitudes between the two indications with the largest at 80% full screen height (FSH).

(3) Without moving search unit, adjust sensitivity (gain) to run the higher response from approximately 100% to 20% FSH in 2 dB steps (10% if fine control is available).

(4) Read and record the relative amplitudes of the two indications to the nearest 1%.

(5) If the smaller indication does not fall within 5% FSH of 50% of the larger indication, the instrument shall not be used for examinations until corrected.

8.2 Amplitude Control Linearity

8.2.1 The linearity of the instrument gain (attenuation) control shall be checked as follows:

(1) Position a straight beam search unit on the nut reference standard to obtain an 80% FSH indication from the 1/2T hole.

(2) Using amplitude control, decrease signal amplitude by 6 dB and by 12dB to obtain nominal 40% FSH and 20% FSH signals. Read and record actual signal amplitudes to closest 1%.

(3) Obtain a 40% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 6 dB to obtain a nominal 80% signal. Read and record as in (2).

(4) Obtain a 20% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 12 dB to obtain a nominal 80% FSH signal. Read and record as in (2).

(5) If the indications obtained in (2), (3) and (4) are not within ± 20% of nominal, the instrument shall not be used for examination until corrected.

9.0 CALIBRATION PROCEDURES

9.1 Nut Calibration

9.1.1 Straight beam calibration for nuts shall be performed as follows and as shown in Figure 9.

(1) Adjust the instrument sweep controls so that the signal response from the 1/4T and 3/4T holes occur at the 2nd and 6th horizontal screen as shown in Figure 9.

(2) Position search unit to obtain maximum response from the hole which gives the highest amplitude signal. Adjust the sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on the CRT.

(3) This is the primary reference sentitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(4) Without changing sensitivity, position the search unit respectively on the remaining holes and mark signal amplitudes and locations on the CRT.

(5) Plot a DAC curve by connecting the locations (marked on the CRT) with a continuous line extended to cover the full examination range (horizontal screen divisions 0 thru 8) as shown in Figure 9.

(6) Instrument is now calibrated for examination of parts of the thickness for which calibration was just performed.

(7) Record all data and instrument settings on the Calibration Data Sheet, and sign upon completion.

9.2 Stud Calibration

9.2.1 Straight beam calibration for all bolts and studs shall be performed as follows and as shown in Figure 9.

(1) Adjust the instrument sweep controls so that the signal response from the hole in the bolt or stud calibration block occurs at the 8th horizontal screen division and that the 3/4T hole from the corresponding nut calibration block occurs at about 1-1/2 horizontal screen divisions.

(2) Position search unit to obtain maximum response from the corresponding nut 3/4T hole. Adjust sensitivity to provide a signal amplitude of 80% FSH and mark its location and amplitude on the CRT.

(3) This is the primary reference sentitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(4) Without changing sensitivity, position the search unit respectively on the remaining holes and mark signal amplitudes and locations on the CRT.

(5) Plot a DAC curve by connecting the locations (marked on the CRT) with a continuous line extended to cover the full examination range (horizontal screen divisions 0 thru 8) as shown in Figure 9.

(6) Instrument is now calibrated for examination of parts of the thickness for which calibration was just performed.

(7) Record all data and instrument settings on the Calibration Data Sheet, and sign upon completion.

9.2 Stud Calibration

9.2.1 Straight beam calibration for all bolts and studs shall be performed as follows and as shown in Figure 9.

(1) Adjust the instrument sweep controls so that the signal response from the hole in the bolt or stud calibration block occurs at the 8th horizontal screen division and that the 3/4T hole from the corresponding nut calibration block occurs at about 1-1/2 horizontal screen divisions.

(2) Position search unit to obtain maximum response from the corresponding nut 3/4T hole. Adjust sensitivity to provide a signal amplitude of 80% FSH and mark its location and amplitude on the CRT.

(3) This is the primary reference sentitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(4) Without changing sensitivity, position the search unit respectively on the remaining holes and mark signal amplitudes and locations on the CRT.

(5) Plot a DAC curve by connecting the locations (marked on the CRT) with a continuous line extended to cover the full examination range (horizontal screen divisions 0 thru 8) as shown in Figure 9.

NOTE: If the response from the stud calibration hole is not detectable at the setting obtained in (2) abcve, increase the sensitivity setting to provide a minimum of 20% signal from the stud calibration hole. Record the sensitivity setting difference on the calibration data sheet for use in evaluation of indications.

(6) Instrument is now calibrated for examination of the applicable bolt or stud for which calibration was just performed.

(7) Record all data and instrument settings on the Calibration Data Sheet.

9.3 Straight Beam Calibration Check

9.3.1 Straight beam calibration check as required by Section 7.3.2 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.1.1 (2) for nuts or 9.2.1 (2) for bolts and studs.

(3) This is the primary reference sentivity. Record the sensitivity control setting on the Calibration Data Sheet.

(4) Position search unit to obtain maximum response from the bolt or stud calibration hole and mark signal amplitude on the CRT.

(5) Plot a DAC curve by connecting the two signal positions and amplitudes with a straight line extended to cover the full examination range.

(6) Instrument is now calibrated for examination of the applicable bolt or stud for which calibration was just performed.

(7) Record all data and instrument settings on the Calibration Data Sheet.

9.3 Straight Beam Calibration Check

9.3.1 Straight beam calibration check as required by Section 7.3.2 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.1.1 (2) for nuts or 9.2.1 (2) for bolts and studs.

(2) Reposition search unit at each respective test hole and observe maximum signal response amplitudes.

(3) See Section 7.4 for signal response requirements during calibration check.

10.0 EXAMINATION PROCEDURES

10.1 Straight Beam Examination of Bolts, Studs and Nuts

10.1.1 Straight beam examination of the bolts, studs and nuts shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.1.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer width (diameter) for each scan pass.

10.1.3 See Table I and Figures 1 thru 4 for scan path distances and part designations.

10.1.4 Continue scanning sequences until all parts have been examined. Equipment must not be removed from the area until all indications have been evaluated.

11.0 EVALUATION CRITERIA

11.1 Recording of Indications

11.1.1 All indications showing a signal amplitude response equal to or greater than 50% of the reference response shall be recorded on the appropriate data sheet at the time of part examination and prior to removing equipment from the examination area.

11.1.2 Each recorded indication shall be identified as to depth, length, signal amplitude and location relative to the part datum point.

(1) Indications from all bolts, studs and nuts shall be reported in inches below the part datum point and in inches clockwise (CW) or counterclockwise (CCW) from the datum point, and in inches outward from the center of the part, when looking down upon the top of the part.

11.2 Evaluation of Indications

11.2.1 Evaluation of all indications shall be made at the reference sensitivity and in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWB-3000.

Results of this evaluation shall be reported to the Plant Owner or his Agent in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWA-6000.

12.0 EXAMINATION RECORDS

12.1 Certification of Records

12.1.1 The examiner shall complete and sign the appropriate Data Sheet(s) immediately upon the completion of bolt, stud and nut examinations.

12.2 Filing of Records

12.2.1 The examiner shall be responsible for submitting to the Plant Owner, or his Agent, a completely documented set of examination records including certification of personnel qualifications with a current eye test report in accordance with SNT-TC-1A.

13.0 EXAMINER'S CRITIQUE

13.1 Procedure Corrections and Additions

13.1.1 All procedure corrections and/or additions required during the inservice examinations shall be made in accordance with requirements of NES QA Plan # NES 81A 0402 and documented in the record of revisions section of this procedure.

13.2 Critique Report

Upon completion of the examination of all the parts specified in this procedure, the examiner shall submit a written report to the Plant Owner or his Agent listing pertinent information for future examinations such as procedure additions, corrections and revisions or unique problems or actions to be taken.

13.3 Additional Examinations

When indications exceeding allowable standards are found, additional examinations shall be performed as stipulated in Section XI, paragraphs IWB-2430 and IWC-2430.

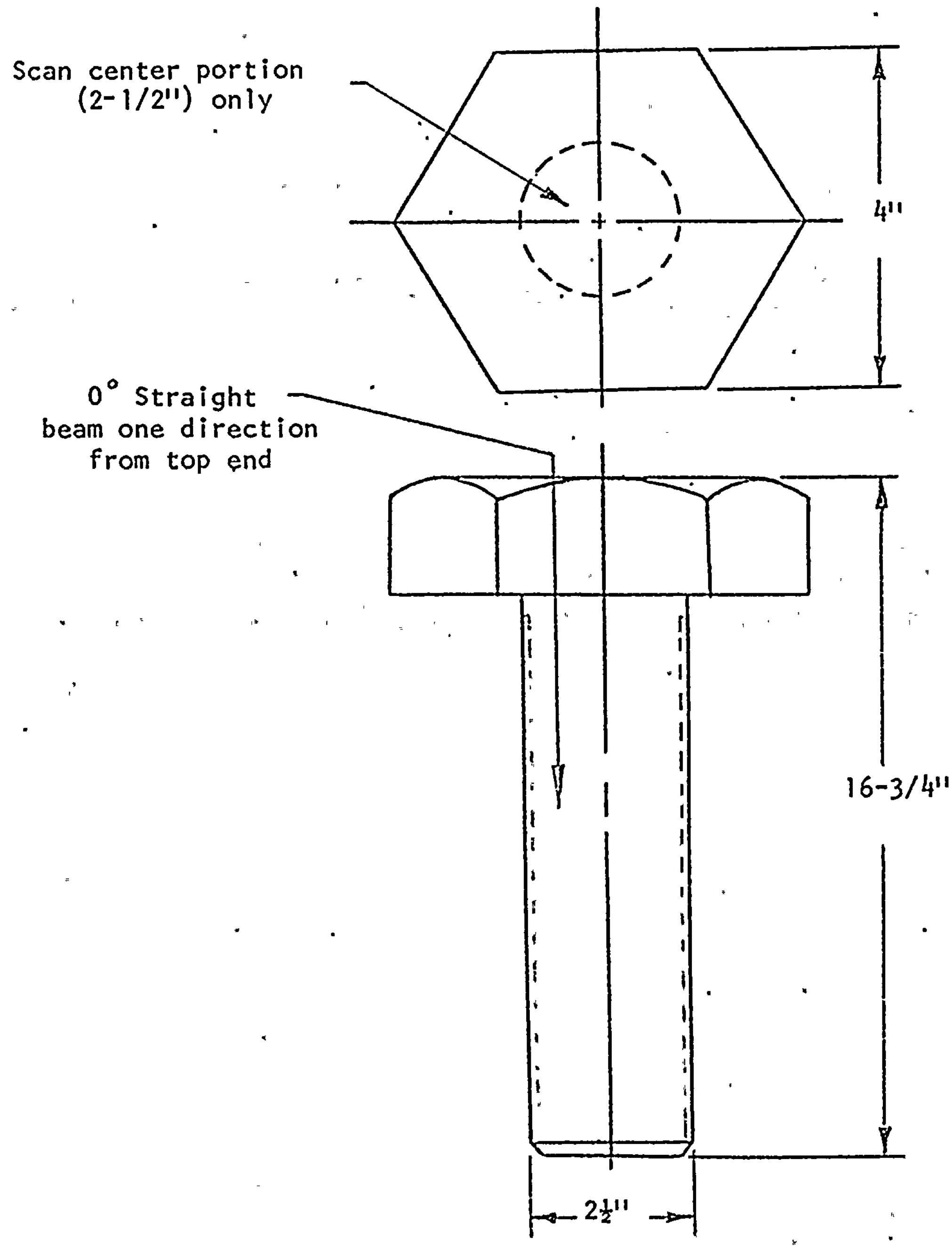


Figure 1. Ultrasonic Examination Procedures for Recirculation Pump Bolts

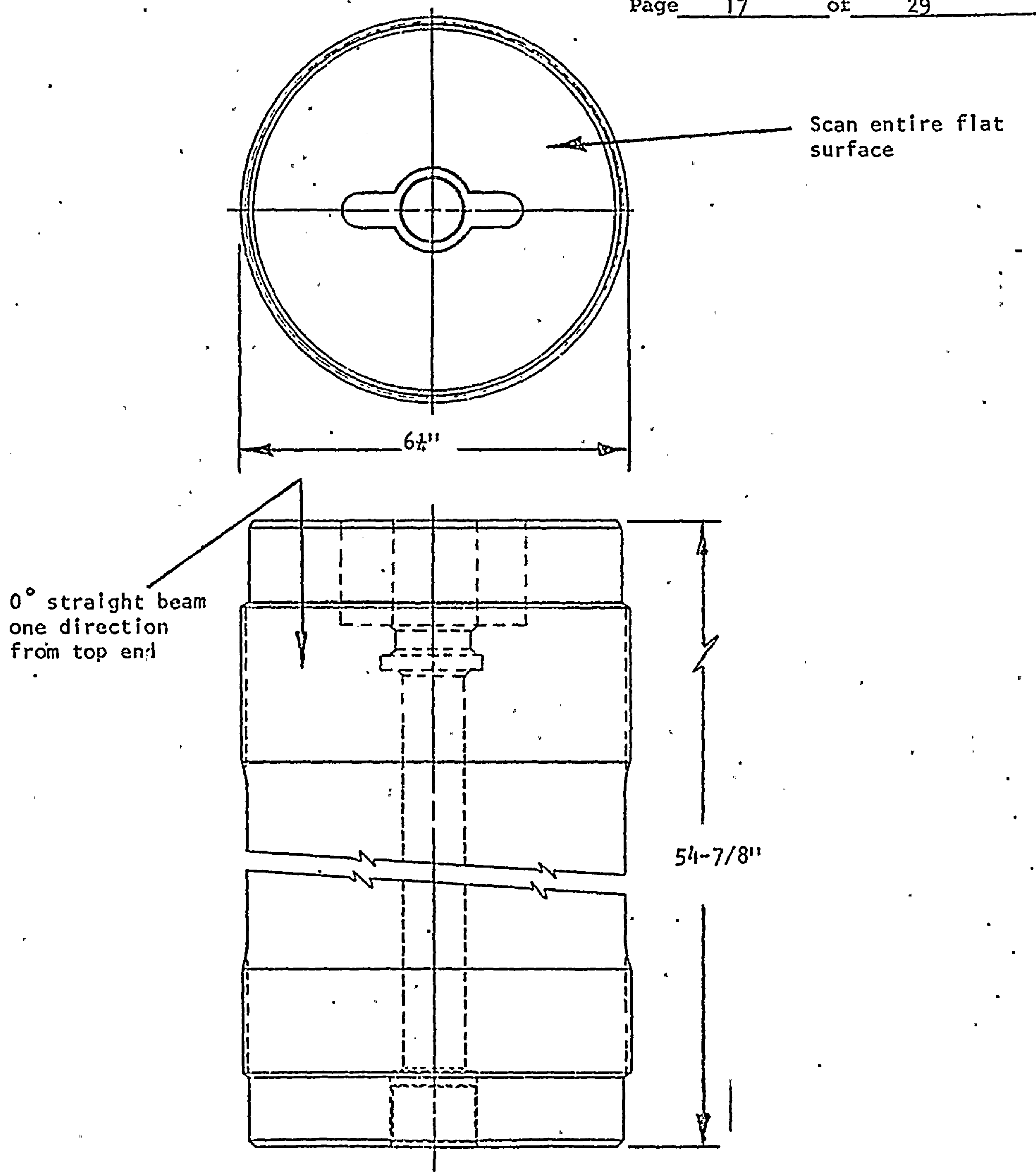
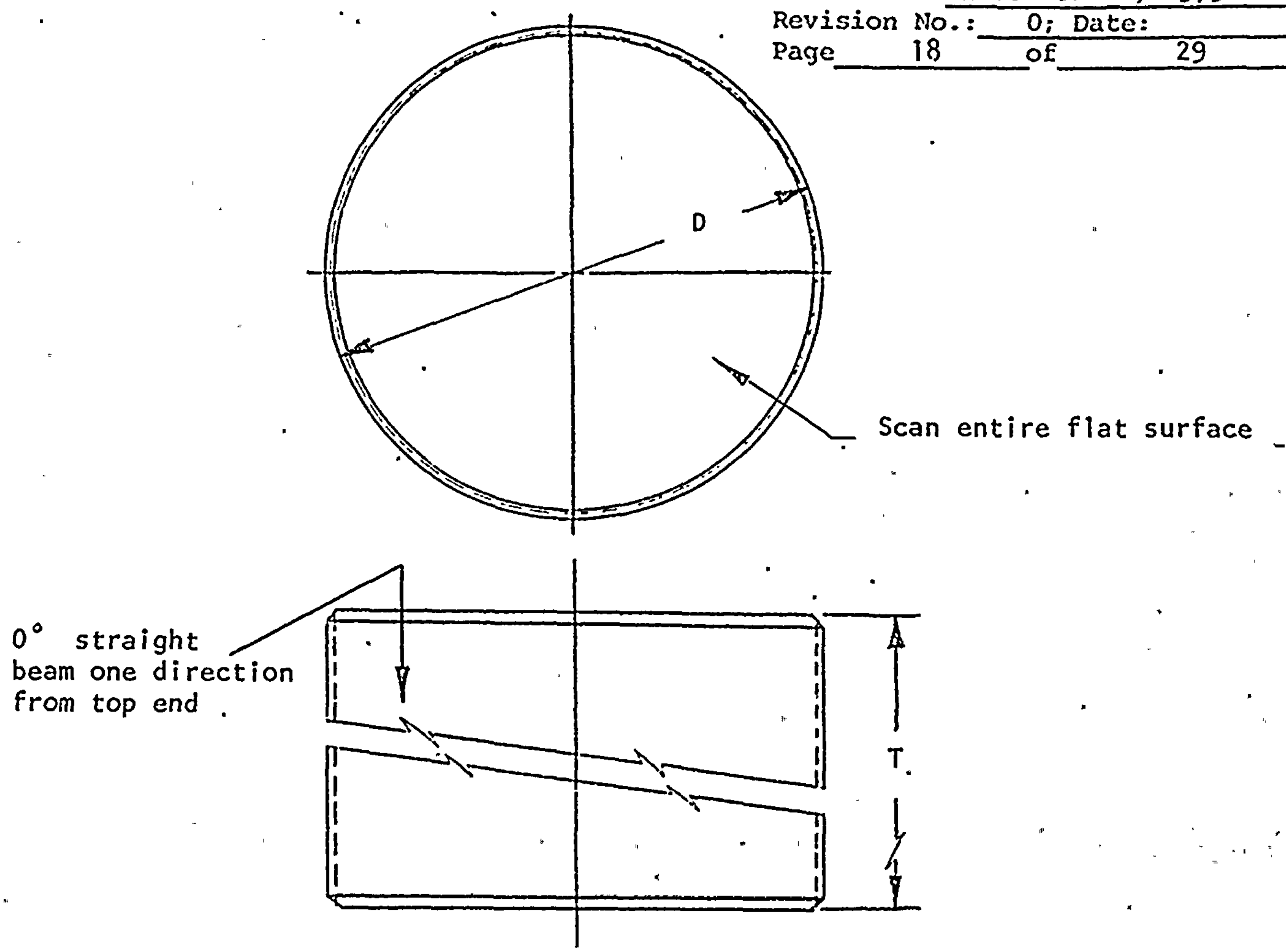
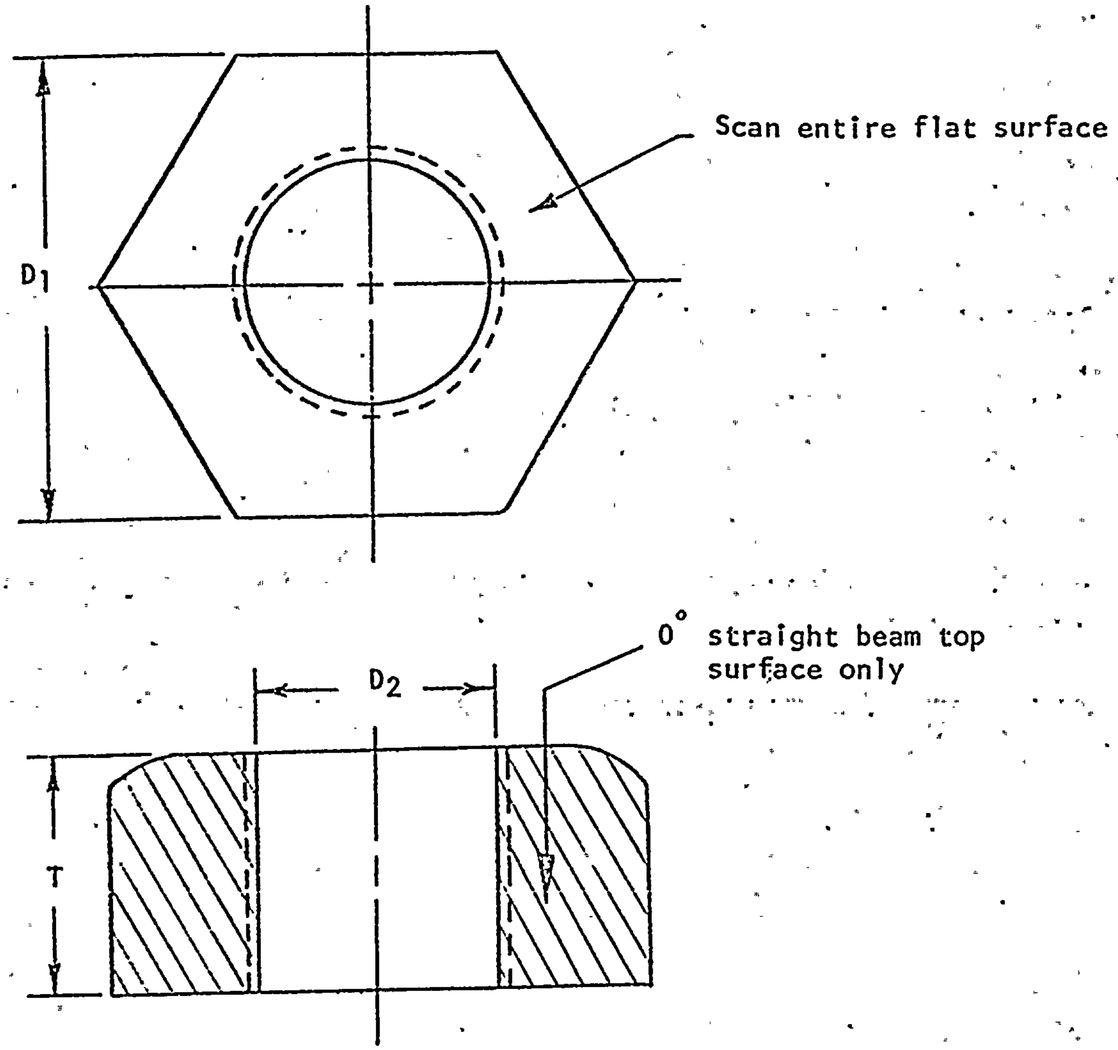


Figure 2. Ultrasonic Examination Procedures for Closure Head Studs



Component Description	D	T	Reference Standard
Recirc. Suction Valve Studs	2"	16"	P1S-2.0
Recirc. Discharge Valve Studs	2"	14-5/8"	↓
M.S. Inside IV Studs	2"	11-7/8"	↓
M.S. Outside IV Studs	2"	10"	↓

Figure 3. Ultrasonic Examination Procedures for Main Steam and Recirculation Valve Studs.



Component Description	D_1	D_2	T	Reference Standard
Closure Head Nuts	9-3/8"	6"	7"	PIN-6.25
MS Inside IV Nuts	3"	2"	2"	PIN-2.0
MS Outside IV Nuts	3"	2"	2"	
Recirc. Suction Valve Nuts	3"	2"	2"	
Recirc. Discharge Valve Nuts	3"	2"	2"	

Figure 4. Ultrasonic Examination Procedures for Nuts

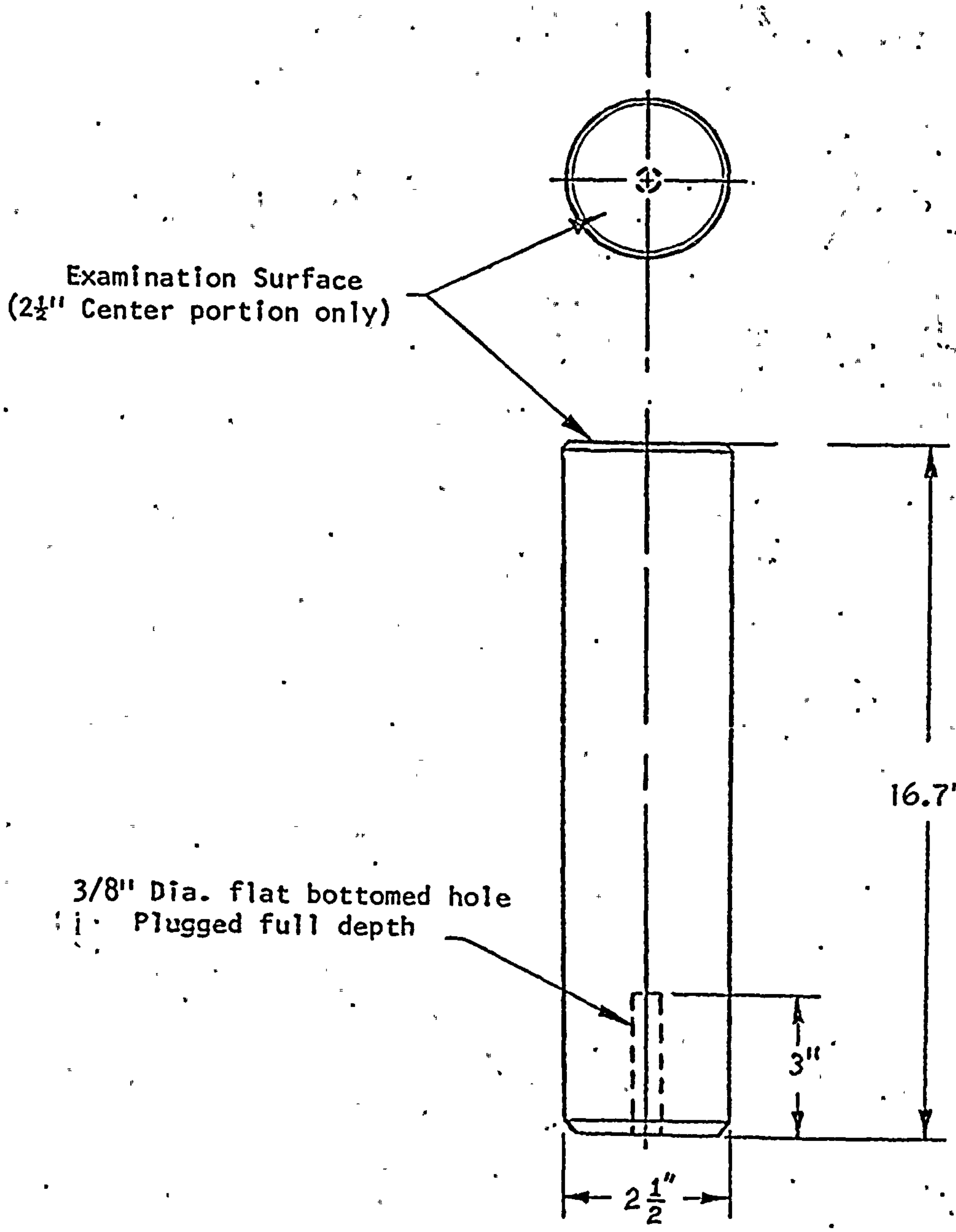


Figure 5. Ultrasonic Reference Standard (PIS-2.5) for Recirculation Pump Bolts

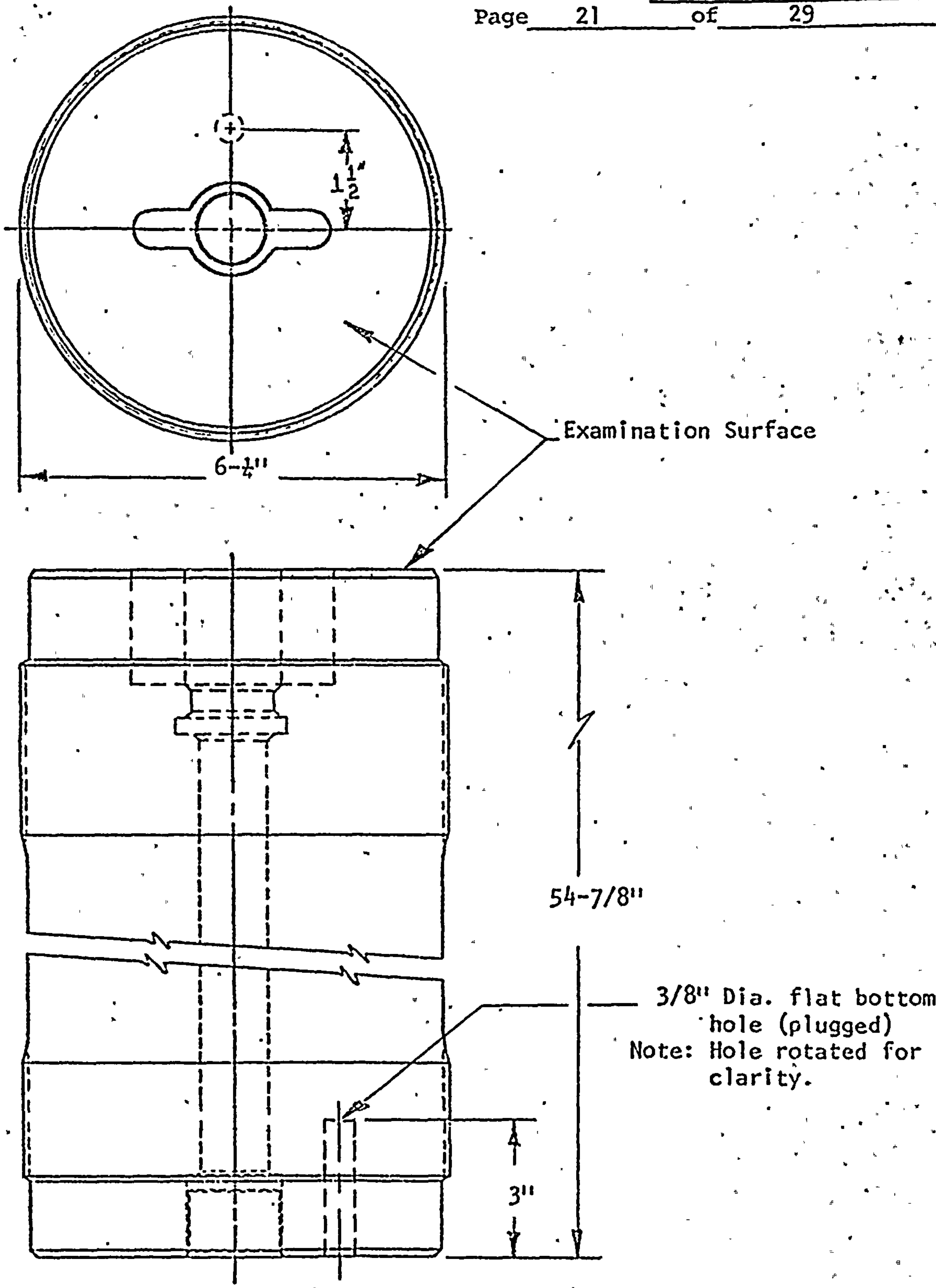


Figure 6. Ultrasonic Reference Standard (PIS-6.25) for C.H. Studs

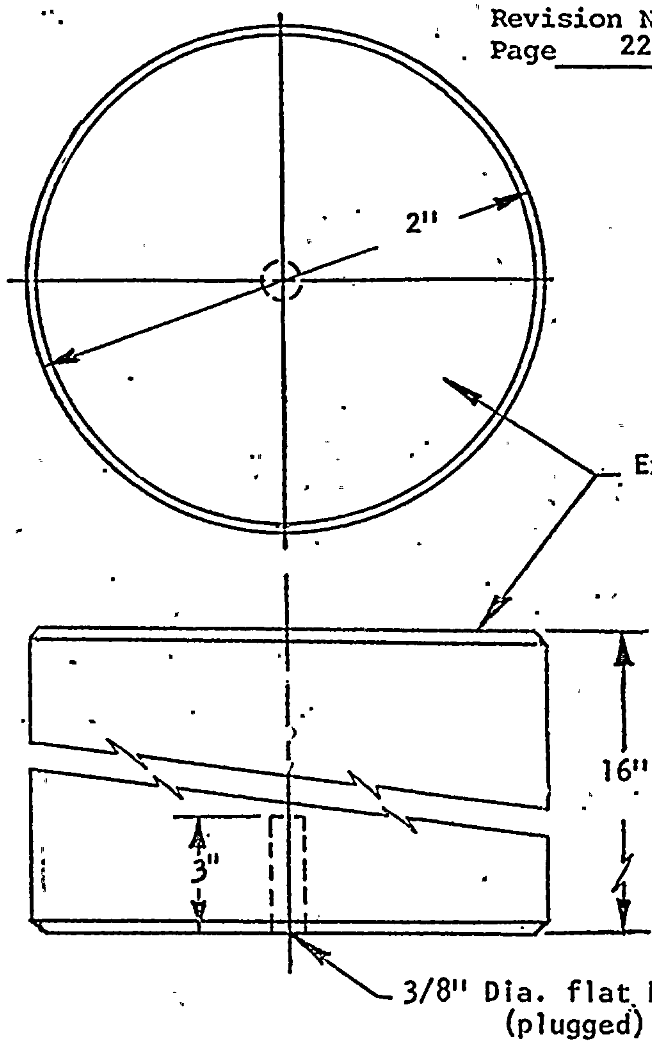
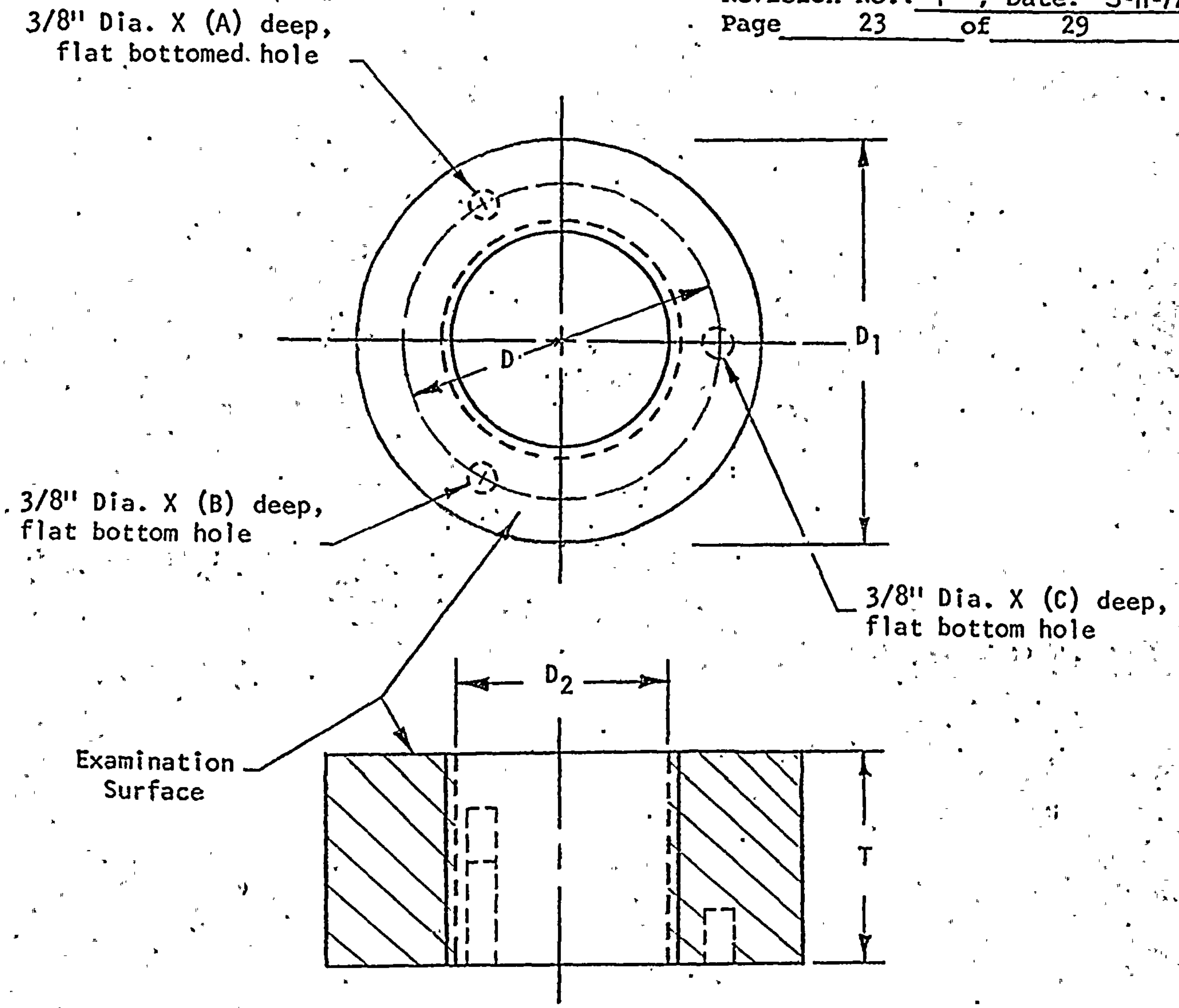
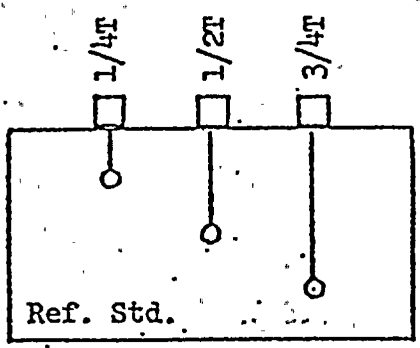


Figure 7. Ultrasonic Reference Standards (PIS-2.0) for Main Steam and Recirculation Valve Studs

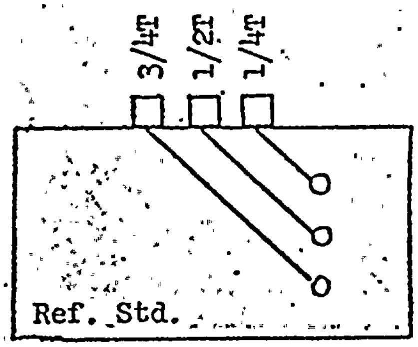


Reference Standard	D	D_1	D_2	T	A (3/4T)	B (½ T)	C (¼ T)
PIN-6.25	7-3/4"	9-3/8"	6"	7"	5¼"	3½"	1-3/4"
PIN-2.0	1½"	3"	-	2"	1½"	1"	½"

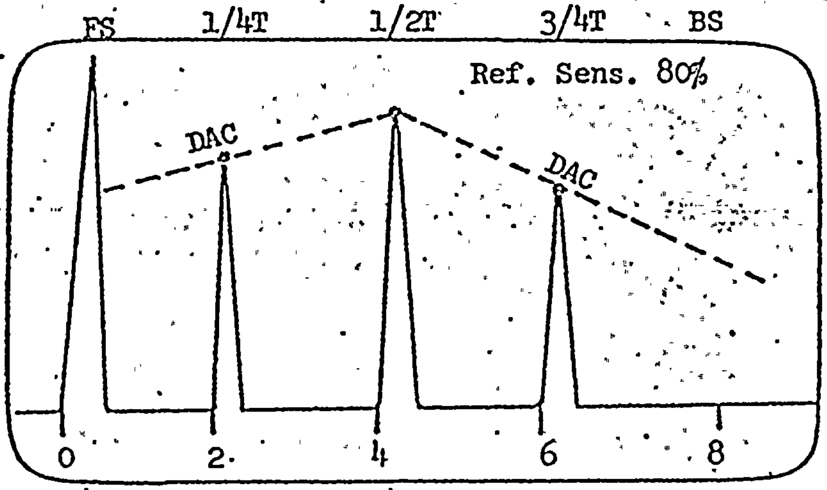
Figure 8: Ultrasonic Reference Standards for Nuts



Straight Beam
Search Unit Positions



Angle Beam
Search Unit Positions



Typical DAC Curve

Step 1 - Adjust sweep controls so that 1/4T, 1/2T, and 3/4T holes are located respectively on the 2nd, 4th, and 6th horizontal screen divisions.

Step 2 - Adjust sensitivity to provide 80% FSH indication from hole giving maximum response - mark position on screen.

Step 3 - Position search unit for maximum response from remaining holes - mark position on screen.

Step 4 - Plot DAC by connecting points marked on screen with line extended to cover entire examination range.

Step 5 - Record all sweep and sensitivity control settings on respective data sheets.

FIGURE 9. Reference Sensitivity and DAC Calibration Procedures for Ultrasonic Examination.

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CALIBRATION DATA SHEET NO. 541-1
MANUAL EXAMINATION

EXAMINATION AREA ____________________

TRANSDUCER IDENTIFICATION

STYLE OR TYPE NO. ____________________
SIZE ____________________
FREQUENCY ____________________
SERIAL NO. ____________________
ANGLE & MODE ____________________
BEAM DIRECTION (= or ⊥ to weld) ________
SCAN FIXTURE ____________________

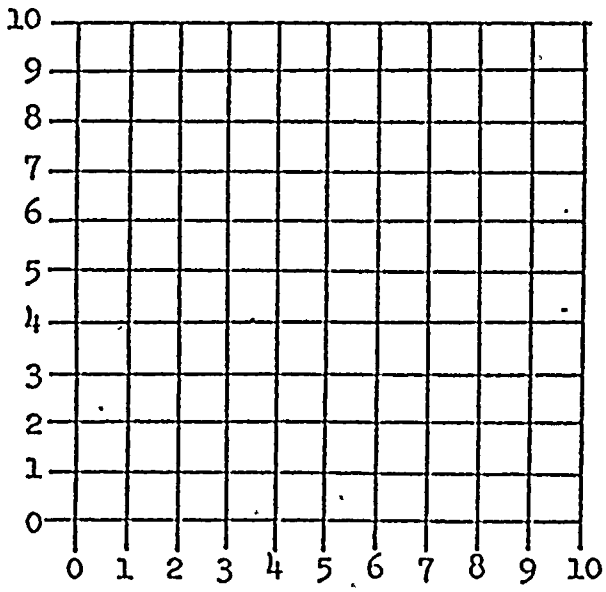
CALIBRATION BLOCK

ID NO. ____________________
SIZE ____________________
EXAMINATION SURFACE ____________________

Hole IDENT	Depth IN.	Amp. %	Atten. dB

TEMPERATURE = Ref. Std. ____________
Component ____________

DAC PLOT



ULTRASONIC INSTRUMENT

MODEL NO. ____________________
SERIAL NO. ____________________

CONTROL SETTINGS

PULSE LENGTH ____________________
FREQUENCY ____________________
dB GAIN ____________________
SWEEP LENGTH ____________________
SWEEP DELAY ____________________
VIDEO FILTER ____________________
REJECT ____________________
COUPLANT ____________________

INSTRUMENT LINEARITY CALIBRATION

Amplitude			
High	Low	High	Low
1.		5.	
2.		6.	
3.		7.	
4.		8.	

AMPLITUDE CONTROL LINEARITY

Initial	Δ dB	Result	Limit
80	-6		32% - 48%
80	-12		16% - 24%
40.	+6		64% - 96%
20	+12		64% - 96%

EXAMINER(S) (Signature Required)

1. ____________________ SNT-TC-1A Level ____
2. ____________________ SNT-TC-1A Level ____

DATE: ____________ TIME: ____________

Reviewed by: ____________________

Figure 10

NUCLEAR ENERGY SERVICES, INC.

PART SCAN DATA SHEET

1. Calibration Data Sheet No. ____________
2. Examination Angle ____________
3. Area of Examination ____________
4. Examination Surface ____________

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Weld, Item or Scan No.	Scan Completion: 0° Base Metal	Scan Completion: 0° WHAZ	Scan Completion: Normal to Weld Centerline	Scan Completion: Parallel to Weld Centerline	No Reportable Indications	Reportable Indications	Supplement Attached	Comments: Reason for Incompleted Scans

Calibration Checks

Instrument: Time	Instrument: Date	Examination System: Time	Examination System: Date

Additional Sheets Attached:

Continuation ______ Supplements ______

Examiner(s):

1. ____________ SNT-TC-1A Level ______
2. ____________ SNT-TC-1A Level ______

Date: ____________

NUCLEAR ENERGY SERVICES, INC.

Figure 11

PART SCAN DATA SHEET
SUPPLEMENT A

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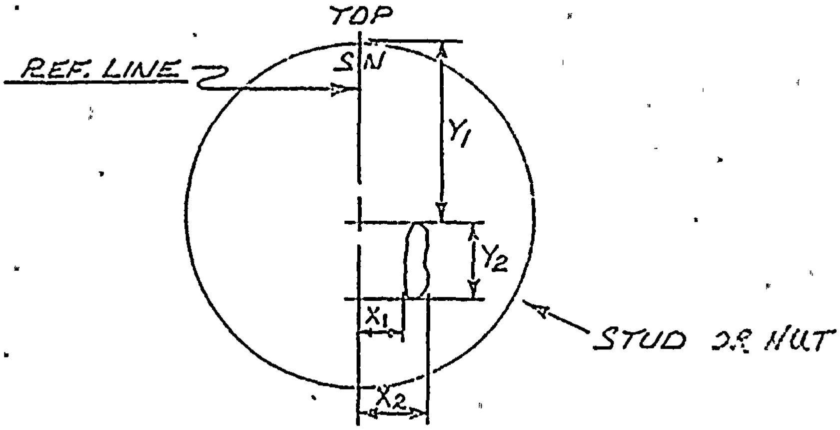
ITEM No. ________________ Sheet ________ of ________

Calibration Data Sheet No. ________________ Back Echo Amplitude ________________



Note: Location increments are not to exceed allowable scan increments.

IND. NO.	LEFT OR RIGHT OF REF. LINE	Depth	X_1	X_2	Y_1	Y_2	Echo(% FSH)	Back(% FSH)

Examiner(s):

1. ________________ SNT-TC-1A Level ________

2. ________________ SNT-TC-1A Level ________

Date: ________________

NUCLEAR ENERGY SERVICES, INC.

Figure 11A

TABLE I

PART IDENTIFICATION

NUCLEAR COMPONENTS

No.	Description	Ref. Block	Reference Figures	Notes
CH-1-b thru CH-64-b	C.H. Studs	PIS-6.25	2,6	Scan one end only
CH-1-n thru CH-64-n	C.H. Nuts	PIN-6.25	4,8	
V-01-01-b	Main Steam inside IV Studs	PIS-2.0	3,7	
V-01-02-b	Main Steam inside IV Studs			
V-01-03-b	Main Steam outside IV Studs			
V-01-04-b	Main Steam outside IV Studs			
V-01-01-n	Main Steam inside IV Nuts	PIN-2.0	4,8	
V-01-02-n	Main Steam inside IV Nuts			
V-01-03-n	Main Steam outside IV Nuts			
V-01-04-n	Main Steam outside IV Nuts			
PM-32-NG01A-b thru PM-32-NG01E-b	Recirc.Pump Bolts	PIS-2.5	1,5	

Figure 12

TABLE I

PART IDENTIFICATION (CONT'D.)

NUCLEAR COMPONENTS

No.	Description	Ref. Block	Reference Figures	Notes
V-32-NG02A-b thru V-32-NG02E-b	Recirc. Suction Valve Studs	PIS-2.0	3,7	Scan one end only
V-32-NG02A-n thru V-32-NG02E-n	Recirc. Suction Valve Nuts	PIN-2.0	4,8	
V-32-NG03A-b thru V-32-NG03E-b	Recirc.Discharge Valve Studs	PIS-2.0	3,7	
V-32-NG03A-n thru V-32-NG03E-n	Recirc.Discharge Valve Nuts	PIN-2.0	4,8	

ULTRASONIC EXAMINATION PROCEDURES FOR RECIRCULATION INLET NOZZLE AND SAFE END WELDS

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT, UNIT 1

Signature | Date

Signature 5-7-76 | Date

Approved by:

N.E.S.I. Signature SNT-TC-1A Level III 6-3-76 | Date

N.M.P.C. Signature SNT-TC-1A Level III | Date

Procedure No.: NIP 544
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RECORD OF REVISIONS

Revision Number	Date	Description	Reason	Originator	NMPC	NESI
1	10-5-77	Section 9.3.1; add Note	Clarification	AU		PSB
		Section 10.3.3; add "For full-vee path...etc."	Clarification			

ULTRASONIC EXAMINATION PROCEDURES FOR RECIRCULATION INLET NOZZLE AND SAFE END WELDS

1.0 SCOPE

1.1 Area of Examination

1.1.1 This document covers the ultrasonic examination for the:

(1) Recirculation Inlet Nozzle to Vessel Weld (see Figure 1).

(2) Recirculation Inlet Nozzle to Safe-end Weld(see Figure 2).

1.2 Type of Examination

1.2.1 Volumetric examination shall be performed using ultrasonic pulse echo 45° angle beam shear wave and 0° longitudinal straight beam techniques applied to the outside surfaces of the nozzle and safe-end.

1.2.2 The examination shall be performed using manual search units and/or scan fixtures.

1.3 Time of Examination

1.3.1 These procedures shall govern the inservice examination and re-examination of repaired areas of the nozzle and safe-end welds as required by the ASME Boiler and Pressure Vessel Code, Section XI (1974).

1.4 Weld Configuration

1.4.1 Configuration of the Recirculation Inlet Nozzle to Vessel weld is shown in Figure 1.

1.4.2 Configuration of the Nozzle to Safe-end weld is shown in Figure 2.

2.0 REFERENCES

2.1 Reference Documents

2.1.1 The following documents form a part of this examination procedure:

(1) ASME Boiler and Pressure Vessel Code, Sections XI and V, 1974 Edition and the Summer of 1974 Addenda.

(2) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(3) CONAM Procedure for Certifying Inspection Personnel, CUTP-1, Rev. 1, September 1970.

2.2 Applicable Drawings

2.2.1 The following drawings form a part of this procedure:

(1) CE Drawing No. E-231-565

2.3 Operational Manuals

2.3.1 The equipment operational manuals for the particular ultrasonic instruments used form a part of this procedure.

3.0 PROCEDURE CERTIFICATION

3.1 The examination procedures described in this document comply with Section XI of the ASME Boiler and Pressure Vessel Code, 1974 Edition, except where examination coverage is limited by part geometry or access.

4.0 PERSONNEL CERTIFICATION

4.1 Personnel Certification Requirements

4.1.1 Each person performing ultrasonic examination governed by this procedure shall be certified in accordance with the following:

(1) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(2) CONAM Inspection, Inc., Procedure for Certifying Ultrasonic Test Personnel CUTP-1, Rev.1, September 1970.

(3) ASME Boiler and Pressure Vessel Code, Section XI (1974 Ed.).

4.1.2 At least one member of each crew shall have a minimum qualification Level II in accordance with the above referenced documents. The remaining member shall have a minimum qualification of Level I Trainee.

4.2 Personnel Records

4.2.1 Records of personnel qualifications shall be maintained by Examination Contractor.

4.2.2 A copy of the examiner's certification, and a current eye test as required by SNT-TC-1A shall be filed with each permanent examination record, with a copy submitted to the Plant Owner or his Agent, prior to performing examinations per this procedure.

5.0 EXAMINATION REQUIREMENTS

5.1 Examination Frequency

5.1.1 The nominal examination frequencies shall be 2.25 MHz for all straight beam and angle beam examinations.

5.1.2 Other pulse frequencies shall be used only if such variables, as material attenuation, grain structure, etc., necessitates their use to achieve penetration or resolution. This information shall be recorded on the data sheets.

5.2 Examination Angles

5.2.1 Examination angles for the Recirculation Inlet Nozzle and safe-end welds shall be as follows:

(1) 0° straight beam one direction thru the weld and thru all parent material at each side of the weld thru which the angle beams will pass during angle beam examination. (one side only for nozzle to vessel weld)

(2) 45° angle beam two directions perpendicular to the weld axis and two directions parallel with the weld axis.

5.3 Liquid Couplant

5.3.1 The ultrasonic couplant shall be Trim Regular or Trim HD (Master Chemical Corporation, Perrysburg, Ohio).

5.3.2 The couplant shall be supplied in clean containers of sufficient quantity to facilitate the examination.

5.3.3 The couplant shall be pumped from the container to the search unit scan fixtures thru clear tygon flexible tubing or shall be applied manually with a brush, or other suitable device.

5.3.4 Where required, the examiner shall be responsible for removing couplant from the examination surface at the conclusion of the examination.

5.4 Surface Preparation

5.4.1 All examination surfaces should be clean and free of dirt, weld spatter, etc., or any other condition which would interfere with the examination or impair proper transmission of the sound beam.

5.4.2 Irregularity of surface contour to be contacted by the search unit should not exceed 1/8" in any 2" of surface travel. Weld crown and edges should blend smoothly into adjacent base material.

5.5 Weld Identification

5.5.1 Each weld shall be located and identified per the appropriate weld maps in the Program Plan Book.

5.6 Datum Point

5.6.1 The examiner shall permanently mark, or verify that there has been marked, a reference datum point on each weld from which all examination data and reported indications shall be referenced.

5.6.2 The datum points for both the Recirculation Inlet Nozzle to Vessel and Nozzle to Safe-end Welds shall be the highest point on the weld centerline.

5.6.3 Datum points shall be marked by the use of low stress stamps or vibratooling and shall not be deeper than 1/64".

5.6.4 Each weld datum point along with respective weld reference points and divisions shall be shown on each examination report.

5.7 Examination Coverage

5.7.1 The intent of this procedure is to provide maximum examination coverage to insure weld integrity. Each weld shall be scanned with minimum 25% overlap of the transducer width (diameter) for each scan pass. The rate of scan shall not exceed 6 inches per second.

5.7.2 Each weld shall be ultrasonically examined where part geometry and access permit using 45° angle beam techniques applied in two directions towards the weld and in two directions parallel with the weld, and on both sides of the weld, (one side only for Nozzle to Vessel Weld).

5.7.3 Straight beam techniques shall be applied, where part geometry permits, to all parent material through which the angle beams will pass during angle beam examinations of the weld. Indications discovered that might affect the interpretations of angle beam results are to be recorded on the data sheets in accordance with Section 11.1.1 of this procedure.

In addition, straight beam techniques shall be applied to the weld surface and Heat-affected zone where part geometry permits. Reportable indications will be recorded in accordance with Section 11.1.2 of this procedure.

5.7.4 Where the examination surface or other conditions (weld, contour, access, etc.) do not permit a meaningful ultrasonic examination to be performed, the examiner shall record the area of non-examination and the particular interfering condition in the space provided on the Weld Scan Data Sheet (Figure 8).

6.0 EQUIPMENT REQUIREMENTS

6.1 Examination Contractor's Equipment

6.1.1 The following test equipment or its equivalent shall be provided by the Examination Contractor for examination of

the welds specified in this procedure.

(1) Pulse Echo Ultrasonic Instrument

(2) Scan Fixture, 45°, (AI No. 85C166 or other)

(3) Scan Fixture, 0°, (AI No. 85C157 or other)

(4) Search Unit, 1/2" Dia., 2.25 MHz, or 1/4" Dia., 2.25 MHz

(5) Search Units, 1/2" x 1", 2.25 MHz

(6) Search Units, 1/2" x 1/2", 2.25 MHz

(7) Search Units, 1/4" x 1/4", 2.25 MHz

(8) Couplant

6.2 <u>Plant Owner's Equipment</u>

6.2.1 The Plant Owner, or his Agent, shall provide the following service facilities and equipment as required:

(1) Scaffolding

(2) Water, Air and Electricity

(3) Temporary Lighting

(4) Crane or Lifting Devices

(5) Reference Standard P1F-1.5C

(6) Reference Standard P8F-1.5-1

(7) Radiation Monitoring Equipment

(8) Radiation Shielding

(9) Test Surface Preparation (cleaning and finishing)

(10) Drawings of Each Examination Area

(11) Post Examination Cleanup of Test Area

7.0 CALIBRATION REQUIREMENTS

7.1 Reference Standards

7.1.1 The reference standard designated in 6.2.1 (5) shall be used for the nozzle and nozzle side of safe end and the standard in 6.2.1 (6) shall be used for the piping side of the safe end, for basic instrument calibration and for establishing reference sensitivity levels. See figures 3 and 4 respectively.

7.1.2 The reference standards used shall be recorded on each Calibration Data Sheet. Figure 7 is an example of the Calibration Data Sheet to be used with this procedure.

7.1.3 Calibration Data Sheets shall be numbered 544-1, 544-2, 544-3, etc., at the time of calibration.

7.1.4 Calibration procedures shall be performed using the O.D. surface of the reference standard.

7.1.5 The temperature of the Reference Standard shall be within 25°F of the component temperature.

7.2 Reference Sensitivity Level

7.2.1 Reference sensitivity levels shall be initially calibrated directly on the reference standard and shall be the sensitivity levels used for evaluating and recording all indications.

7.2.2 During actual weld scanning, the reference sensitivity levels shall be increased 2X or 6 dB.

7.3 Times of Calibration

7.3.1 Basic instrument calibration shall be performed using the appropriate reference standard, search units and instrumentation immediately prior to the examination of the welds specified in this procedure.

7.3.2 Instrument calibration checks shall be performed at the beginning of each day of examination in accordance with Section 8.0 of this procedure.

7.3.3 Examination system calibration checks shall be performed at least at the beginning and at the completion of each 4 hour period of examination and/or at the change of examination personnel, equipment, search units, coupler shoes, etc., and at the completion of the examination of each similar series of welds in accordance with Sections 9.2 and 9.4 of this procedure.

7.4 Calibration Response

7.4.1 Calibration response shall be checked at the primary reference sensitivity level.

7.4.2 Signal response obtained during calibration check shall be within plus or minus 20% of that established during basic system calibration.

7.4.3 If any point on the DAC curve has changed by more than 20% of its amplitude, the examiner shall:

(1) Mark all weld data sheets since previous calibration void.

(2) Recalibrate examination system.

(3) Reexamine voided areas.

7.4.4 If any point on the DAC curve has moved horizontally more than 5% of the sweep line from its original settings, the examiner shall:

(1) Correct the sweep calibration and note it on the Calibration Data Sheet.

(2) Void any data sheets made since the previous calibration which have recorded indication and reexamine those areas.

8.0 INSTRUMENT CALIBRATION VERIFICATION

8.1 Amplitude Linearity

8.1.1 The linearity of the ultrasonic instrument shall be checked as follows:

(1) Position a search unit on a reference standard so that two indications are visible. (These indications may be obtained from a reference hole and back surface, from two reference holes, or from a reference hole and a corner seen simultaneously on the instrument screen.)

(2) Manipulate search unit to establish a 2 to 1 ratio of amplitudes between the two indications with the largest at 80% full screen height (FSH).

(3) Without moving search unit, adjust sensitivity (gain) to run the higher response from approximately 100% to 20% FSH in 2 dB steps (10% if fine control is available).

(4) Read and record the relative amplitudes of the two indications to the nearest 1%.

(5) If the smaller indication does not fall within 5% FSH of 50% of the larger indication, the instrument shall not be used for examinations until corrected.

8.2 Amplitude Control Linearity

8.2.1 The linearity of the instrument gain (attenuation) control shall be checked as follows:

(1) Position an angle beam search unit on the reference standard to obtain an 80% FSH indication from the 1/2T hole.

(2) Using amplitude control, decrease signal amplitude by 6 dB and by 12 dB to obtain nominal 40% FSH and 20% FSH signals. Read and record actual signal amplitudes to closest 1%.

(3) Obtain a 40% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 6 dB to obtain a nominal 80% signal. Read and record as in (2).

(4) Obtain a 20% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 12 dB to obtain a nominal 80% FSH signal. Read and record as in (2).

(5) If the indications obtained in (2), (3) and (4) are not within ± 20% of nominal, the instrument shall not be used for examination until corrected.

9.0 EXAMINATION SYSTEM CALIBRATION

9.1 Straight Beam Calibration

9.1.1 Straight beam calibration shall be performed as follows. The appropriate combinations of search unit, reference standard and test holes for each respective weld are listed in Figures 1 and 2, in Table 1 and Section 6.1.1.

(1) Adjust the instrument sweep controls so that the examination area is displayed on the CRT screen. Mark the horizontal screen positions selected for the hole or holes directly on the CRT screen and on the chart on the Calibration Data sheet.

(2) Position search unit to obtain maximum response from the hole which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on the CRT.

(3) Without changing sensitivity, position the search unit respectively on the remaining holes and mark signal amplitudes and locations on the CRT.

(4) Plot a DAC curve by connecting the locations (marked on the CRT) with a continuous line extended to cover the full examination range (horizontal screen divisions 0 thru 8) as shown in Figure 5 or 6.

(5) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(6) System is now calibrated for examination of welds of the thickness for which calibration was just performed.

(7) Record all data and instrument settings on the Calibration Data Sheet.

9.2 Straight Beam Calibration Check

9.2.1 Straight beam calibration check as required by Section 7.3.3 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.1.1 (2).

(2) Reposition search unit at each respective test hole and observe maximum signal response amplitudes, and horizontal screen positions.

(3) See Section 7.4 for signal response requirements during calibration check.

9.3 Angle Beam Calibration

9.3.1 Angle beam calibration shall be performed as follows. The appropriate combinations of search unit, reference standard and test holes for each respective weld are listed in Figures 1, 2, and in Table I.

(1) Adjust the instrument sweep controls so that the examination area is displayed on the CRT screen. Mark the horizontal screen positions selected for the hole or holes directly on the CRT screen and on the chart on the Calibration Data Sheet.

(2) Position search unit to obtain maximum response from the hole which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on CRT. (See note below)

(3) Without changing sensitivity, position search unit respectively on the remaining angle beam calibration holes and mark signal amplitudes and locations on CRT.

(4) Plot a DAC curve by connecting the locations (marked on the CRT) with a continuous line extended to cover the full examination range (horizontal screen divisions 0 thru 8) as shown in Figure 5 or 6.

(5) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(6) Instrument is now calibrated for examination of welds of the thickness for which calibration was just performed.

(7) Record all data and instrument settings on the Calibration Data Sheet.

NOTE:

Full vee-path angle beam calibration using Reference Standard PIF-1.5c shall require a two (2) zone DAC. The first DAC zone shall include the half-vee path encompassing the 1/4 T, 1/2 T, and 3/4 T calibration holes. The reference sensitivity for the first zone shall be set at 80% FSH on the 1/4 T hole; the second DAC zone shall include the half-vee path encompassing the 1-1/4 T, 1-1/2 T, 1-3/4 T, calibration holes. The reference sensitivity for the second zone shall be set at 80% FSH on the 1-1/4 T hole.

The respective sensitivity settings for each DAC zone calibration shall be noted and recorded on the appropriate calibration data sheets.

(1) Adjust the instrument sweep controls so that the examination area is displayed on the CRT screen. Mark the horizontal screen positions selected for the hole or holes directly on the CRT screen and on the chart on the Calibration Data Sheet.

(2) Position search unit to obtain maximum response from the hole which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on CRT.

(3) Without changing sensitivity, position search unit respectively on the remaining angle beam calibration holes and mark signal amplitudes and locations on CRT.

(4) Plot a DAC curve by connecting the locations (marked on the CRT) with a continuous line extended to cover the full examination range (horizontal screen divisions 0 thru 8) as shown in Figure 5 or 6.

(5) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(6) Instrument is now calibrated for examination of welds of the thickness for which calibration was just performed.

(7) Record all data and instrument settings on the Calibration Data Sheet.

9.4 Angle Beam Calibration Check

9.4.1 Angle beam calibration check as required by Section 7.3.2 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.3.1 (2).

(2) Reposition search unit at each respective test hole and observe signal response amplitudes and horizontal screen positions.

(3) See Section 7.4 for signal response requirements during calibration check.

10.0 EXAMINATION PROCEDURES

10.1 Straight Beam Examination of Weld and Heat Zone

10.1.1 Straight beam examination of the weld and heat affected zone and areas of base material where no back echo is available, shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.1.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer element width (diameter) for each scan pass.

10.1.3 See Table I and Figures 1 and 2 for scan path distances and weld identifications.

10.1.4 Continue scanning sequences until all welds have been examined. Equipment must not be removed from the weld area until all indications have been evaluated per 11.1.2.

10.2 Straight Beam Examination of Base Material

10.2.1 Straight beam examination of all base material, where a back echo is obtainable, thru which the angle beams will pass during angle beam examination shall be performed at a sensitivity level which gives a minimum back reflection signal amplitude of 50% of FSH.

10.2.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer element width (diameter) for each scan pass.

10.2.3 See Table I and Figures 1 and 2 for scan path distances and weld identifications.

10.2.4 Continue scanning sequences until all welds have been examined. Equipment must not be removed from the weld area until all indications have been evaluated per 11.1.1.

10.3 Angle Beam Examinations

10.3.1 All angle beam examinations shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.3.2 The search unit shall be swivelled to ensure maximum coverage as it is moved along a rectilinear scan pattern allowing a minimum of 25% overlap of the transducer element width (diameter).

10.3.3 See Table I and Figures 1 and 2 for scan path distances and weld identifications.

For full-vee path examinations using a two (2) zone DAC, the initial scan shall be performed at a sensitivity setting corresponding to the first zone calibration; and a second scan performed at a sensitivity setting corresponding to the second zone calibration.

10.3.4 Continue scanning sequences until all welds have been examined. Equipment must not be removed from weld area or disassembled until all indications have been evaluated per 11.1.2.

11.0 EVALUATION CRITERIA

11.1 Recording of indications

11.1.1 For straight beam examinations of base metal for laminations, all areas giving indications equal to or greater than the remaining back reflection shall be recorded on the appropriate data sheet prior to angle beam examination of the weld and heat-affected zone.

(1) Each recorded area shall be identified as to distance from surface, length and position relative to the weld datum point.

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter (width).

11.1.2 For straight beam and angle beam examinations of weld and heat-affected zone, all indications showing a signal amplitude response equal to or greater than 20% of the reference response shall be recorded on the appropriate data sheet at the time of weld examination and prior to removing equipment.

(1) Each recorded indication shall be identified as to depth (as percent of thickness), distance from surface, length, signal amplitude and location relative to the weld datum point.

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter (width).

11.1.3 Indications from all welds shall be reported in inches above or below the weld centerline and in inches CW or CCW from the weld datum point when looking with direction of flow.

11.2 Evaluation of Indications

11.2.1 Evaluation of all indications shall be made at the reference sensitivity and in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWB-3000.

Results of this evaluation shall be reported to the Plant Owner or his Agent in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWA-6000. Disposition of evaluation results shall be made in accordance with the Owner's Plant Procedures.

12.0 EXAMINATION RECORDS

12.1 Certification of Records

12.1.1 The examiner shall complete and sign the appropriate Weld Scan Data Sheet(s) immediately upon the completion of each weld examination.

12.2 Filing of Records

12.2.1 The examiner shall be responsible for submitting to the Plant Owner, or his Agent, a completely documented set of examination records including certification of personnel qualifications with a current eye test report in accordance with SNT-TC-1A.

13.0 EXAMINER'S CRITIQUE

13.1 Procedure Corrections and Additions

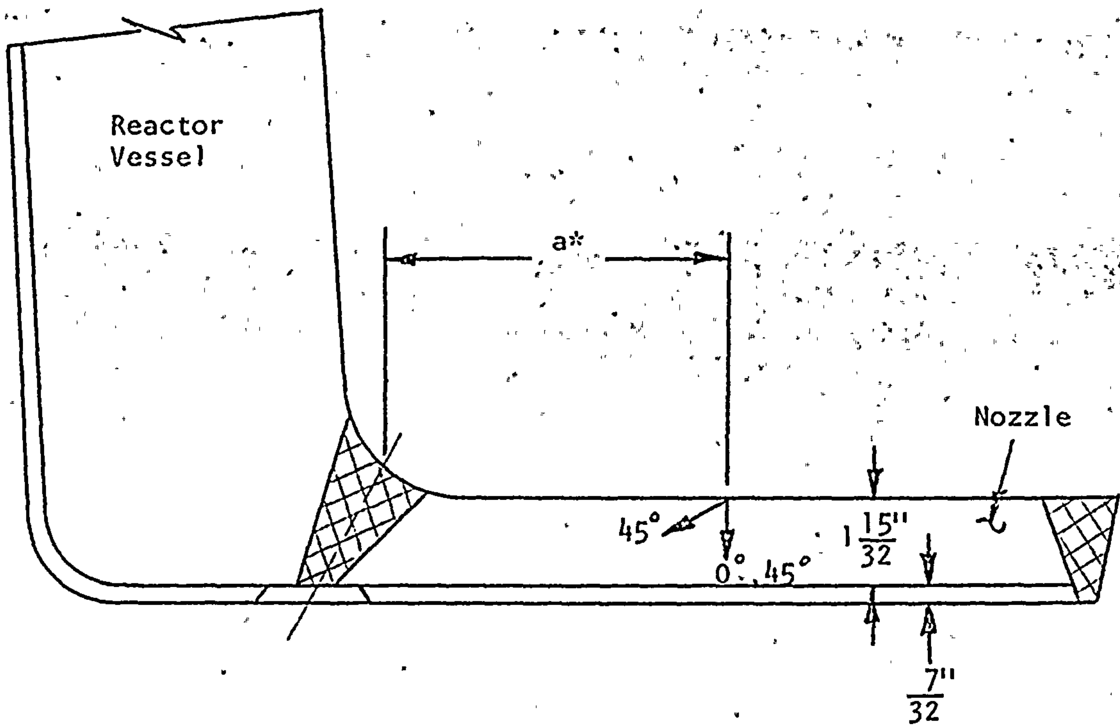
13.1.1 All procedure corrections and/or additions required during the inservice examinations shall be made in accordance with requirements of NES QA Plan # NES 81A 0402 and documented in the record of revisions section of this procedure.

13.2 Critique Report

Upon completion of the examination of all welds specified in this procedure, the examiner shall submit a written report to the Plant Owner or his Agent listing pertinent information for future examinations such as procedure additions, corrections and revisions or unique problems or actions to be taken.

13.3 Additional Examinations

When indications exceeding allowable standards are found, additional examinations shall be performed as stipulated in Section XI, paragraph IWB-2430.

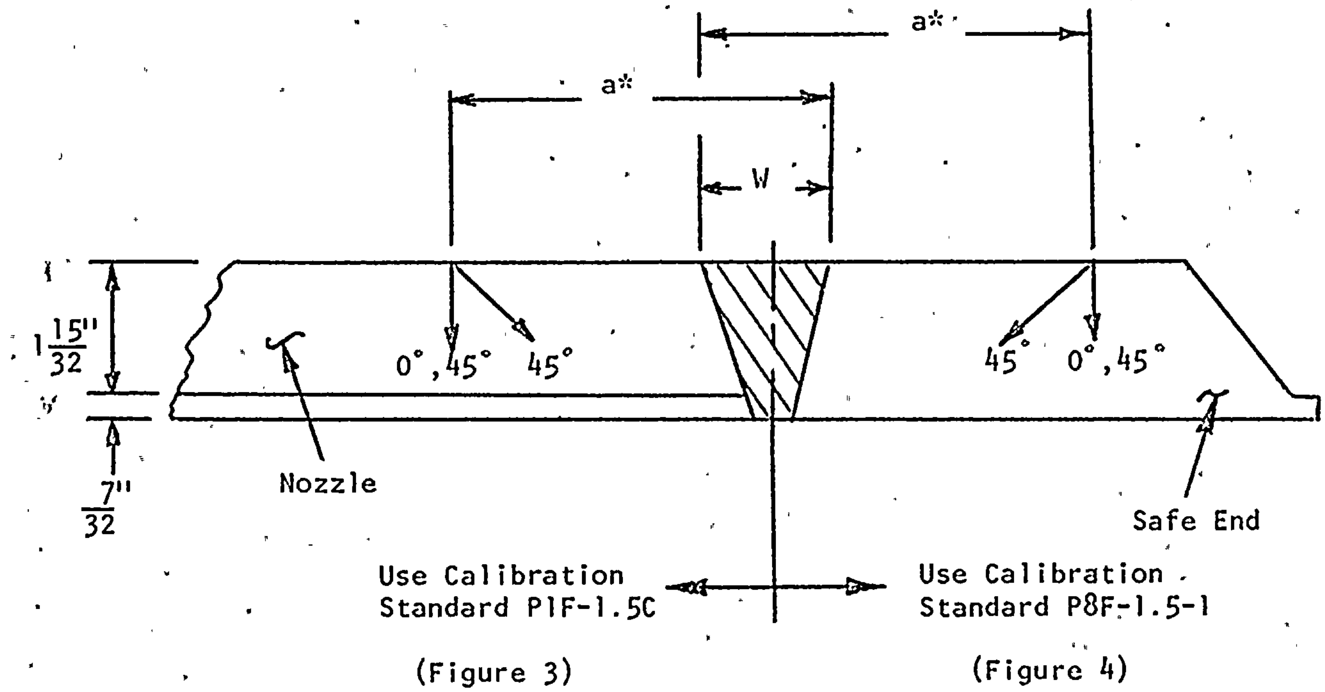


a* = W + 2½T for Axial Scan

a* = W + ½T for Circ. Scan

Reference Standard = PIF-1.5C (Figure 3)

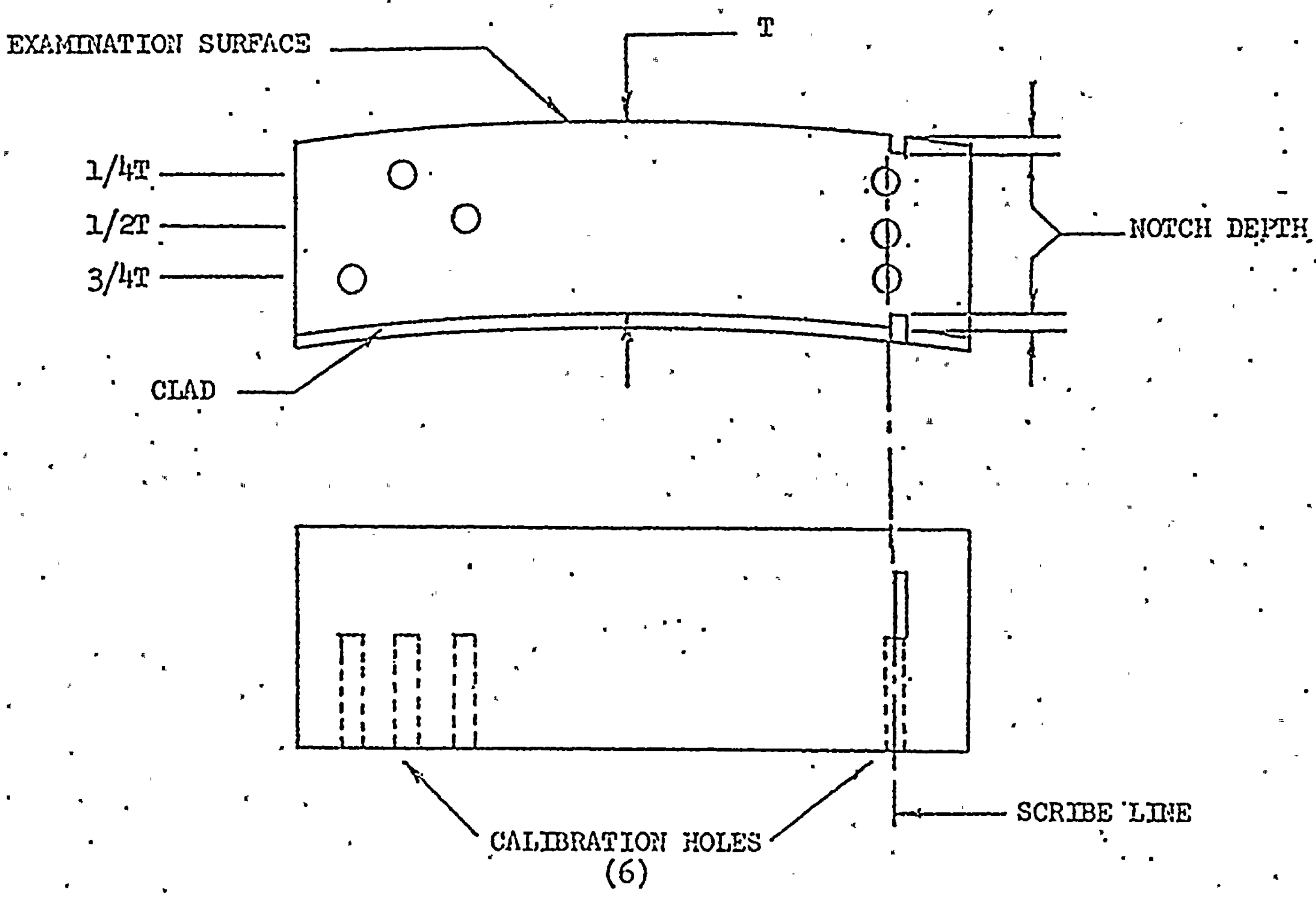
FIGURE 1. - ULTRASONIC EXAMINATION OF RECIRCULATION INLET NOZZLE TO VESSEL WELD



a* = W + $2\frac{1}{2}$T for Axial Scan

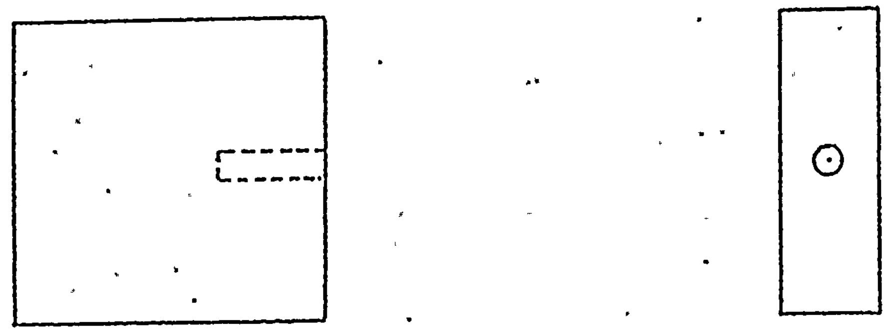
a* = W + $\frac{1}{2}$T for Circ. Scan

FIGURE 2. - ULTRASONIC EXAMINATION OF RECIRCULATION INLET SAFE-END



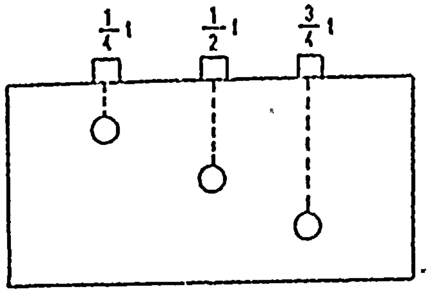
Block Number	Block Thickness	1/4T	1/2T	3/4T	Hole Dia.	Notch Depth
PIF-1.5C	1.5"	.375"	.75"	1.125"	1/8"	.03"

FIGURE 3. ULTRASONIC REFERENCE STANDARD, PIF-1.5C, FOR RECIRCULATION INLET NOZZLE TO VESSEL AND NOZZLE TO SAFE END (NOZZLE SIDE) WELDS

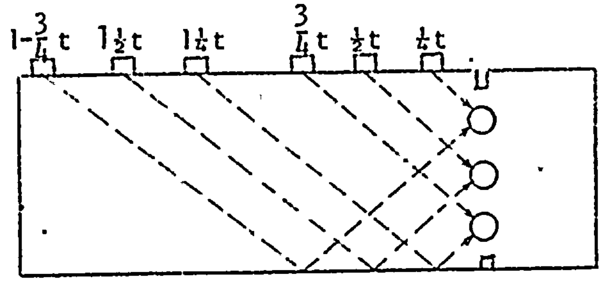


Ref. Std. No.	O.D.	Wall Thickness	Hole Dia.	Hole Depth	Hole Length	Pipe O.D. Range
P8F-1.5-1	Flat	1.5"	1/8"	1/4T	1½" Min	Greater than 20.00"

FIGURE 4. - ULTRASONIC REFERENCE STANDARD, P8F-1.5-1, FOR RECIRCULATION INLET NOZZLE TO SAFE END (PIPE SIDE) WELD

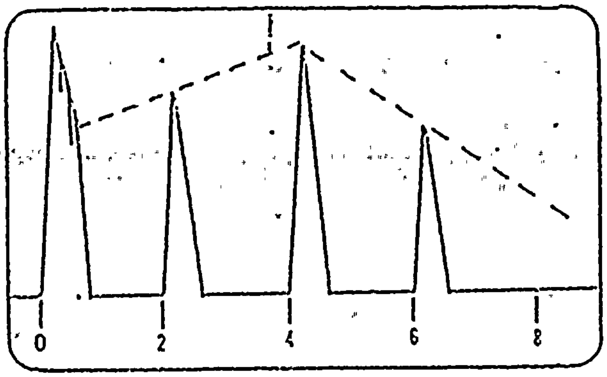


Straight Beam
Search Unit Positions

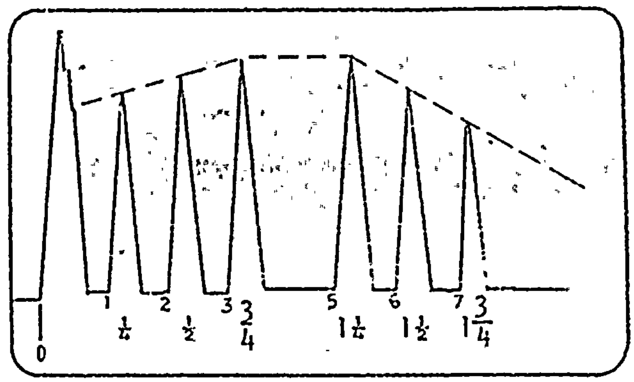


Angle Beam
Search Unit Positions

Typical DAC Curve



Typical DAC Curve



NOTE: For welds under 1" thick, use 1/2T hole only, no DAC required.

Step 1 - Adjust sweep controls so that 1/4T, 1/2T, and 3/4T holes are located respectively on the horizontal screen divisions as shown above for straight beam and angle beam calibrations.

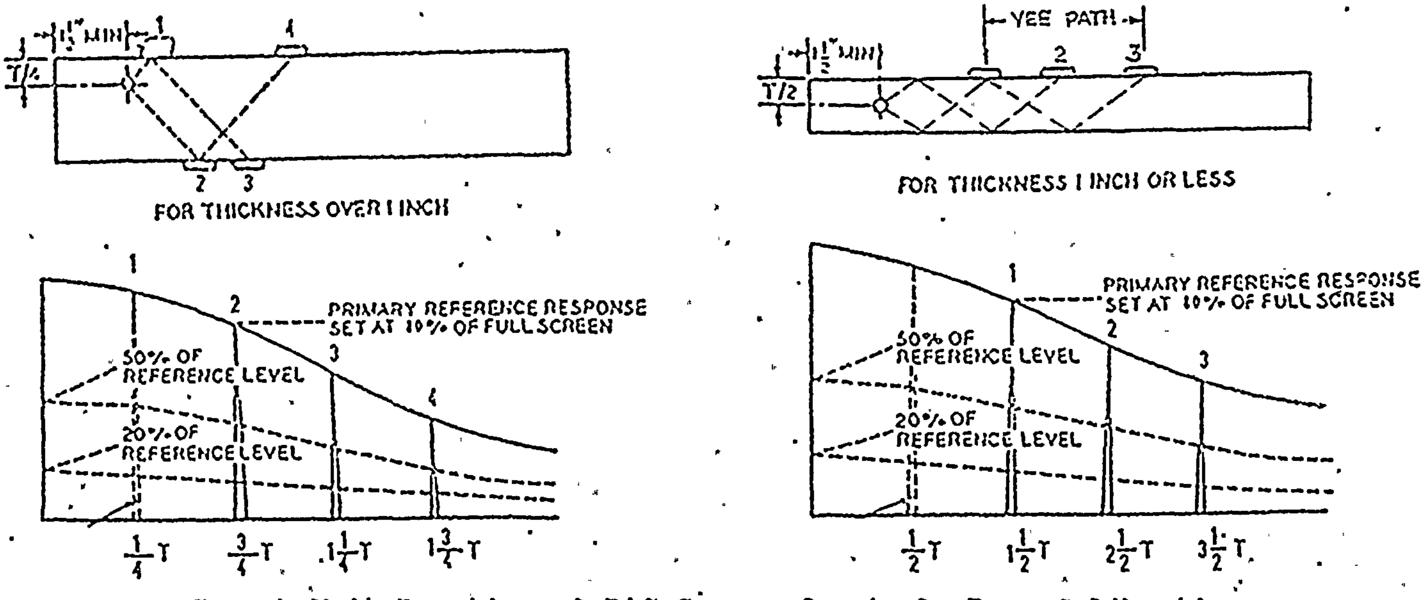
Step 2 - Adjust sensitivity to provide 80% FSH indication from hole giving maximum response - mark position on screen.

Step 3 - Position search unit for maximum response from remaining holes - mark position on screen.

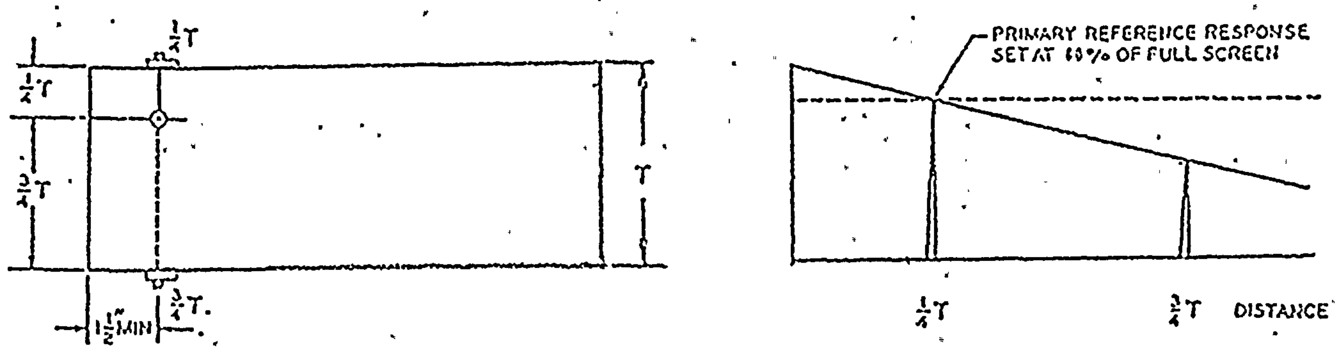
Step 4 - Plot DAC by connecting points marked on screen with line extended to cover entire examination range.

Step 5 - Record all sweep and sensitivity control settings on respective data sheets.

FIGURE 5 . REFERENCE SENSITIVITY AND DAC CALIBRATION PROCEDURES FOR ULTRASONIC EXAMINATION OF WELDS.



Search Unit Locations & DAC Curves for Angle Beam Calibration



Search Unit Locations & DAC Curve for Straight Beam Calibration

NOTE: For straight beam calibration on welds under 1" thick, use 1/2T hole only, no DAC required.

Step 1 - Adjust sweep controls so that the entire examination area is displayed on CRT screen.

Step 2 - Adjust sensitivity to provide 80% FSH indication from hole giving maximum response - mark position on screen.

Step 3 - Position search unit for maximum response from remaining holes - mark position on screen.

Step 4 - Plot DAC by connecting points marked on screen with line extended to cover entire examination range.

Step 5 - Record all sweep and sensitivity control settings on respective data sheets.

FIGURE 6. REFERENCE SENSITIVITY AND DAC CALIBRATION PROCEDURES FOR ULTRASONIC EXAMINATION OF WELDS.

Procedure No.: NIP 544
Subject: Recirc. Inlet Nozzle
Issue Date: December 18, 1975
Revision No.: 0; Date:

CALIBRATION DATA SHEET NO. 544-1
MANUAL EXAMINATION

EXAMINATION AREA ______

TRANSDUCER IDENTIFICATION

STYLE OR TYPE NO. ______
SIZE ______
FREQUENCY ______
SERIAL NO. ______
ANGLE & MODE ______
BEAM DIRECTION (= or ⊥ to weld) ______
SCAN FIXTURE ______

CALIBRATION BLOCK

ID NO. ______
SIZE ______
EXAMINATION SURFACE ______

Hole ID	Depth IN.	Amp. %	Atten. dB

TEMPERATURE = Ref. Std. ______
Component ______

DAC PLOT

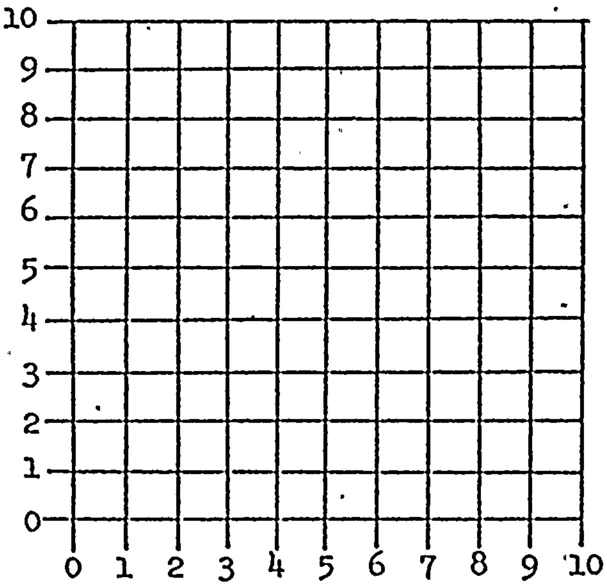


FIGURE 7

ULTRASONIC INSTRUMENT

MODEL NO. ______
SERIAL NO. ______

CONTROL SETTINGS

PULSE LENGTH ______
FREQUENCY ______
dB GAIN ______
SWEEP LENGTH ______
SWEEP DELAY ______
VIDEO FILTER ______
REJECT ______
COUPLANT ______

INSTRUMENT LINEARITY CALIBRATION

Amplitude High	Low	High	Low
1.		5.	
2.		6.	
3.		7.	
4.		8.	

AMPLITUDE CONTROL LINEARITY

Initial	Δ dB	Result	Limit
80	-6		32% - 48%
80	-12		16% - 24%
40.	+6		64% - 96%
20	+12		64% - 96%

EXAMINER(S) (Signature Required)

1. ______ SNT-TC-1A Level ______
2. ______ SNT-TC-1A Level ______

DATE: ______ TIME: ______

Reviewed by: ______

NUCLEAR ENERGY SERVICES, INC.

WELD SCAN DATA SHEET

1. Calibration Data Sheet No. ______	Procedure No.: NIP 544
2. Examination Angle ______	Subject: Recirc. Inlet Nozzle
3. Area of Examination ______	Issue Date: December 18, 1975
4. Examination Surface ______	Revision No.: 0; Date:
	Page 27 of 30

Weld, Item or Scan No.	Scan Completion				No Reportable Indications	Reportable Indications	Supplement Attached	Comments: Reason for Incompleted Scans
	0° Base Metal	0° WHAZ	Normal to Weld Centerline	Parallel to Weld Centerline				

Calibration Checks			
Instrument		Examination System	
Time	Date	Time	Date

Additional Sheets Attached:

Continuation ______ Supplements ______

Examiner(s):

1. ______ SNT-TC-1A Level ______

2. ______ SNT-TC-1A Level ______

Date: ______

NUCLEAR ENERGY SERVICES, INC.

FIGURE 8

WELD SCAN DATA SHEET

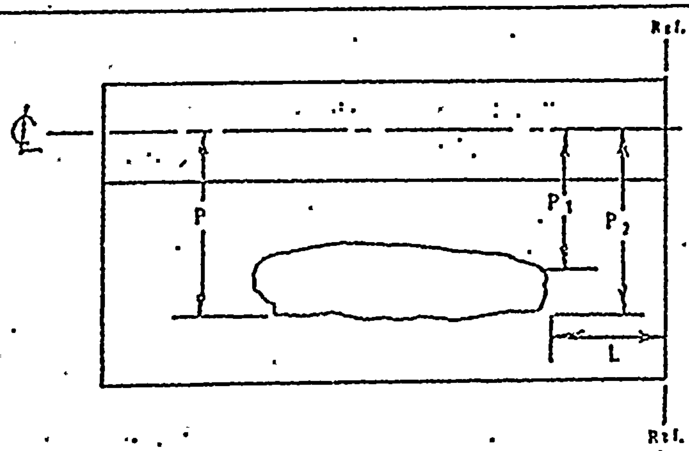
SUPPLEMENT A

(BASE METAL)

Procedure No.: NIP 544
Subject: Recirc. Inlet Nozzle
Issue Date: December 18, 1975
Revision No.: 0 ; Date:
Page 28 of 30

Weld No. ______________ Sheet ______ of ______

Calibration Data Sheet No. ______________ Back Echo Amplitude ______________



Note: Location increments are not to exceed allowable scan increments.

Indication No.	L(inches)	P_1	P_2	Echo(% FSH)	Back(% FSH)

FIGURE 8A

Examiners:

1. ______________ SNT-TC-1A Level ______

2. ______________ SNT-TC-1A Level ______

Date: ______________

NUCLEAR ENERGY SERVICES, INC.

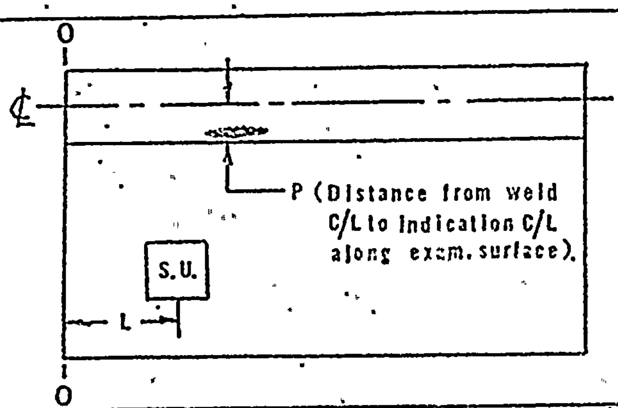
WELD SCAN DATA SHEET

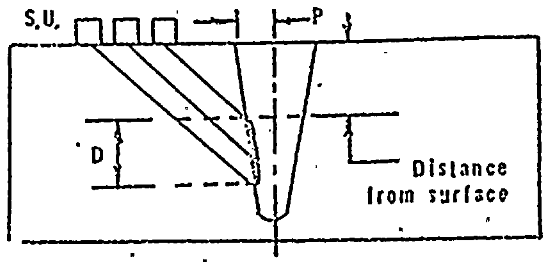
SUPPLEMENT B

Procedure No.: NIP 544
Subject: Recirc. Inlet Nozzle
Issue Date: December 18, 1975
Revision No.: 0; Date:
Page 29 of 30

Weld No. ______________________ Sheet ________ of ________

Calibration Data Sheet No. ____________ EXAM. ANGLE ____________





Note: Location increments are not to exceed allowable scan increments.

Ind. No.	BEAM DIR.	L Location	Max % DAC.	Dist. From Surface	P	50% Forward		50% Back		Depth (D)	
						Dist. From Surface	P	Dist. From Surface	P	Inches	% T

NOTE:
End points of L are the smaller of 50% DAC. or 50% Max.

FIGURE 8B

Examiner(s):

1. ______________ SNT-TC-1A Level ________

2. ______________ SNT-TC-1A Level ________

Date: ______________

NUCLEAR ENERGY SERVICES, INC.

TABLE I

WELD IDENTIFICATION
NUCLEAR COMPONENTS

Weld No.	Description	Ref. Block	Ref. Figures	Notes
RV-1-565A-W thru RV-1-565E-W	Recirculation Inlet Nozzle to Vessel	P1F-1.5C	1, 3	Scan from nozzle side only
RV-2-565A-W thru RV-2-565E-W	Recirculation Inlet Safe-End	P1F-1.5C	2, 3	Nozzle Side of Weld
		&		
		P8F-1.5-1	2, 4	Piping Side of Weld

Procedure No.: NIP 554
Subject: Piping Welds
Issue Date: 8-9-75
Revision No.: 0; Date:

ULTRASONIC EXAMINATION PROCEDURES FOR PIPING BUTT WELDS AND LONGITUDINAL WELDS

NIAGARA MOHAWK POWER CORPORATION
Nine Mile Point, Unit 1

Originator(s)

Signature 9-2-75 Date

Signature Date

Approved By:

N.E.S.I. Signature SNT-TC-1A Level III 9/4/75 Date

N.M.P.C. Signature SNT-TC-1A Level III Date

NUCLEAR ENERGY SERVICES, INC.

Procedure NO.: NIP 554
Subject: PIPING WELDS
Issue Date: 8-9-75
Revision No.: 1 ; Date: 10-24-75

RECORD OF REVISIONS

Rev No.	Date	Description	Reason	Originator	NMPC	NES I
1 (pg 4)	10-24-75	Para. 2.1.1 (3) Change "Rev. 0, Jan. 1969" to "Rev. 1 Sept, 1970".	Reflects latest revision	*(initials)*		*(signature)*
1 (pg 5)	10-24-75	Para. 4.1.1 (2) Change "Rev. 0, Jan. 1969" to "Rev. 1, Sept, 1970".	Reflects latest revision	*(initials)*		*(signature)*
1 (pg 16)	10-24-75	Para. 10.2.2 Change "patch" to path and change "sequence of examinations" to "weld identifications".	Spelling correction & clarification	*(initials)*		*(signature)*
1 (pg 18)	9-1-76	Add paragraph 13.3	Reflects Requirements of Section XI, 1974 ED. of ASME Code	*(initials)*		*(signature)*

ULTRASONIC EXAMINATION PROCEDURES FOR PIPING BUTT WELDS AND LONGITUDINAL WELDS

1.0 SCOPE

1.1 Area of Examination

1.1.1 This document covers the ultrasonic examination procedures for:

(1) Austenitic Stainless Steel pipe-to-pipe, pipe-to-fitting, and pipe to safe-end butt welds shown in Figure 1 and longitudinal welds shown in Figure 3.

(2) Carbon steel pipe-to-pipe, pipe-to-fitting, and pipe to transition piece butt welds shown in Figure 2.

1.2 Type of Examination

1.2.1 Volumetric examination shall be performed using ultrasonic pulse echo angle beam shear wave and 0° longitudinal straight beam techniques applied to the outside surfaces of the piping.

1.2.2 The examination shall be performed using manual search units and/or scan fixtures.

1.3 Time of Examination

1.3.1 These procedures shall govern the inservice examination and re-examination of repaired areas of the pipe welds as required by the ASME Boiler and Pressure Vessel Code, Section XI.

1.4 Weld Configuration

1.4.1 The pipe and safe-end weld configurations covered by this procedure are shown in Figures 1, 2 and 3.

1.4.2 Nominal weld thicknesses range from 0.300" to 1.453" and are specified in the Tables accompanying Figures 1, 2 and 3.

1.5 Materials

1.5.1 The piping, safe-ends, and fittings are constructed of austenitic stainless steel or carbon steel.

2.0 REFERENCES

2.1 Reference Documents

2.1.1 The following documents form a part of this examination procedure:

(1) ASME Boiler and Pressure Vessel Code, Section XI 1974 Edition, and the Summer of 1974 Addenda.

(2) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(3) CONAM Procedure for Certifying Inspection Personnel, CUTP-1, Rev. 1, Sept. 1970.

(4) ASME Boiler and Pressure Vessel Code, Section V, 1974 Edition, and the Summer of 1974 Addenda.

2.2 Applicable Drawings

2.2.1 The following drawings form a part of this procedure:

(1) NMP Piping Spec., Drawing No. C-18600-C

(2) GE Drawing SK 76359-60-D1, D3, D4.

2.3 Operation Manuals

2.3.1 The equipment operational manuals for the particular ultrasonic instruments used form a part of this procedure.

3.0 PROCEDURE CERTIFICATION

3.1 The examination procedures described in this document comply with Section XI of the ASME Boiler and Pressure Vessel Code, 1974 Edition, except where examination coverage is limited by part geometry or access.

4.0 PERSONNEL CERTIFICATION

4.1 Personnel Certification Requirements

4.1.1 Each person performing ultrasonic examination governed by this procedure shall be certified in accordance with the following:

(1) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(2) CONAM Inspection Inc., Procedure for Certifying Ultrasonic Test Personnel CUTP-1, Rev.1, Sept.1970.

(3) ASME Boiler and Pressure Vessel Code, Section XI (1974 Ed.)

4.1.2 An examination crew shall consist of one or two members as needed. At least one member of each crew shall have a minimum qualification Level II in accordance with the above referenced documents. The remaining member(s) shall have a minimum qualification of Level I or Level I trainee.

4.2 Personnel Records

4.2.1 Records of personnel qualification shall be maintained by Examination Contractor.

4.2.2 A copy of the examiner's certification, and a current eye test as required by SNT-TC-1A shall be filed with each permanent examination record, with a copy submitted to the plant owner or his agent, prior to performing examinations per this procedure.

5.0 EXAMINATION REQUIREMENTS

5.1 Examination Frequency

5.1.1 The nominal examination frequencies shall be 2.25 MHz for all straight beam and angle beam examinations.

5.1.2 Other pulse frequencies shall be used if such variables as material attenuation, grain structure, etc., necessitates their use to achieve penetration or resolution. This information shall be recorded on the data sheets.

5.2 Examination Angles

5.2.1 Examination angles for piping welds specified in this procedure shall be as follows:

(1) 0° straight beam from the O.D. surface one direction thru the weld and thru the parent material at each side of the weld.

(2) 45° angle beam two directions perpendicular to the weld axis and two directions parallel with the weld axis.

(3) Other beam angles may be used as determined necessary; i.e. for evaluation of reflectors, to compensate for geometric constraints, etc. All information shall be recorded on the data sheets

5.3 Liquid Couplant

5.3.1 The ultrasonic couplant shall be Trim Regular or Trim HD (Master Chemical Corporation, Perrysburg, Ohio).

5.3.2 The couplant shall be supplied in clean containers of sufficient quantity to facilitate the examination.

5.3.3 The couplant shall be pumped from the container to the search unit scan fixtures thru clear tygon flexible tubing or shall be applied manually with a brush or other suitable device.

5.3.4 Where required, the examiner shall be responsible for removing couplant from the examination surface at the conclusion of the examination.

5.4 Surface Preparation

5.4.1 All examination surfaces should be clean and free of dirt, weld spatter, etc., or any other condition which would interfere with the examination or impair proper transmission of the sound beam.

5.4.2 Irregularity of surface contour to be contacted by the search unit should not exceed 1/8" in any 2" of surface travel. Weld crown and edges should blend smoothly into adjacent base material.

5.5 Weld Identification

5.5.1 Each weld shall be located and identified per appropriate weld maps in the Program Plan Book.

5.6 Datum Point

5.6.1 The examiner shall permanently mark, or verify that there has been marked, a reference datum point on each weld from which all examination data and reported indications shall be referenced.

5.6.2 Datum points shall be marked by the use of low stress stamps or vibratooling and shall not be deeper than 1/64".

5.6.3 The datum point for all pipe butt welds in horizontal lines shall be located on the top of the pipe at weld centerline.

5.6.4 The datum point for all pipe butt welds in vertical lines shall be at the most visible portion of the pipe at weld centerline.

5.6.5 Longitudinal weld datum points shall be located at the weld centerline at the intersection with the circumferential weld nearest the reactor vessel.

5.6.6 Each weld datum point, along with respective weld reference points and divisions, shall be shown on each examination report.

5.7 Examination Coverage

5.7.1 The intent of this procedure is to provide maximum examination coverage to insure weld integrity. Each weld shall be scanned with minimum 25% overlap of the transducer element width (diameter) for each scan pass.

5.7.2 The rate of search unit movement shall not exceed six (6) inches per second.

5.7.3 Each weld and the volume of metal for 1/2T on each side of the weld shall be ultrasonically examined where part geometry and access permit using 45° angle beam techniques applied in two directions towards the weld and in two directions parallel with the weld, and on both sides of the weld.

5.7.4 Straight beam techniques shall be applied, where part geometry permits, to all parent material through which the angle beams will pass during angle beam examinations. Indications detected are to be recorded in accordance with Section 11.1.1 of this procedure, except in areas where no back echo can be obtained. Indications detected shall be recorded and data used during evaluation of angle beam examination results.

In addition, straight beam techniques shall be applied to the weld surface and heat-affected zone where part geometry permits. Indications shall be recorded in accordance with Section 11.1.2 of this procedure. This shall include straight beam examination of parent material when no back echo is obtainable.

5.7.5 Where the examination surface, geometry, or other conditions (weld, contour, access, etc.) do not permit a meaningful ultrasonic examination to be performed, the examiner shall record the area of non-examination and the particular interfering condition in the space provided on the Weld Scan Data Sheet. In addition, he shall make a sketch of the weld and adjacent pipe and fitting conditions in the appropriate area on the same Weld Scan Data Sheet. (See Figure 9.) Photos will be taken when possible and incorporated as part of the report.

6.0 EQUIPMENT REQUIREMENTS

6.1 Examination Contractor's Equipment

6.1.1 The following test equipment or its equivalent shall be provided by the Examination Contractor for examination of welds specified in this procedure.

(1) Pulse echo ultrasonic instrument

(2) Scan Fixture, 45°, No. 85C134, or 57A8407

(3) Scan Fixture, 60°, No. 85C155 or 57A8417

(4) Scan Fixture, 0°, No. 85C157

(5) Search Unit, 0°, ½" Dia., 2.25 MH_z, Ceramic*

(6) Search Unit, ½" x 1", 2.25 MH_z, Ceramic*

(7) Search Unit, 45°, ½" x ½", 2.25 MH_z, Ceramic; or ½" dia.*

(8) Search Unit, 60°, ½" x ½", 2.25 MH_z, Ceramic; or ½" dia.*

(9) Search Unit, 45°, ¼" x ¼", 2.25 MH_z, Ceramic; or ¼" dia.*

(10) Search Unit, 60°, ¼" x ¼", 2.25 MH_z, Ceramic; or ¼" dia.*

(11) Search Unit, 0°, ½" Dia., 5.0 MH_z, Ceramic*

(12) Couplant

(13) Camera

* See comments in Fig.s 1, 2, 3.

6.2 Plant Owner's Equipment

6.2.1 The Plant Owner or his Agent shall provide the following service facilities and equipment as required:

(1) Scaffolding

(2) Water, Air and Electricity

(3) Temporary Lighting

(4) Crane or Lifting Devices

(5) Reference Standard No.P8R-.3-1 (3.5" O.D. x 0.30" wall)

(6) Reference Standard No. P8R-.75-2 (10.0" O.D. x 0.75" wall)

(7) Reference Standard No. P8R-.75-3 (6.25" O.D. x 0.75" wall)

(8) Reference Standard No. P8F-1.5-1 (Flat, 1.5" wall)

(9) Reference Standard No. P1F-1.5-1 (Flat, 1.5" wall)

(10) Reference Standard No. P1R-1.5-1 (16.0", 1.5" wall)

(11) Reference Standard No. P1R-.75-2 (10.0", .75" wall)

(12) Reference Standard No. P1R-.75-1 (6.59", .75" wall)

(13) Radiation Monitoring Equipment

(14) Radiation Shielding

(15) Test Surface Preparation (cleaning and finishing)

(16) Drawings of Each Examination Area

(17) Post Examination Cleanup of Test Area

7.0 CALIBRATION REQUIREMENTS

7.1 Reference Standards

7.1.1 The reference standards designated in 6.2.1 (5) thru 12 shall be used for basic instrument calibration and for establishing reference sensitivity levels for examination of the piping welds specified in this procedure. Figures 1 thru 5 provide a cross-reference between the welds to be examined and the applicable standard.

7.1.2 The appropriate reference standard corresponding to each respective weld thickness shall be recorded on each Calibration Data Sheet. Figure 8 is an example of the Calibration Data Sheet to be used with this procedure.

7.1.3 Calibration Data Sheets shall be numbered 554-1, 554-2, 554-3, etc., at the time of calibration and shall be signed by the examiner(s) upon completion.

7.1.4 Calibration procedures shall be performed using the O.D. surface of the reference standard.

7.1.5 The temperature of the reference standard shall be within 25°F of the pipe weld temperature.

7.2 Reference Sensitivity Level

7.2.1 The reference sensitivity level shall be the distance-amplitude curve initially obtained directly from the reference standard and shall be the sensitivity level used for evaluating and recording all indications.

7.2.2 During actual weld scanning, the reference sensitivity level shall be increased 2X or 6dB.

7.3 Times of Calibration

7.3.1 Basic instrument calibration shall be performed using the appropriate reference standard, search units and instrumentation immediately prior to the examination of the piping welds specified in this procedure.

7.3.2 Instrument calibration checks shall be performed at the beginning of each day of examination in accordance with Section 8.0 of this procedure.

7.3.3 Examination system calibration checks shall be performed at least at the beginning and at the completion of each 4 hour period of examination and/or at the change of examination personnel, equipment, search units, coupler shoes, etc., and at the completion of the examination of each similar series of welds in accordance with Sections 9.2 and 9.4 of this procedure.

7.4 Calibration Response

7.4.1 Calibration response shall be checked at the primary reference sensitivity level.

7.4.2 Signal response obtained during calibration check shall be within plus or minus 20% of that established during basic instrument calibration.

7.4.3 If any point on the Distance Amplitude Correction (DAC) curve is above or below the 20% limit, the examiner shall:

(1) Mark all weld data sheets since previous calibration void.

(2) Recalibrate examination system.

(3) Reexamine voided areas.

7.4.4 If any point on the DAC curve has moved horizontally more than 5% of the sweep line from its original settings, the examiner shall:

(1) Correct the sweep calibration and note it on the Calibration Data Sheet.

(2) Void any data sheets made since the previous calibration which have recorded indication and reexamine those areas.

8.0 INSTRUMENT CALIBRATION VERIFICATION

8.1 Amplitude Linearity

8.1.1 The linearity of the ultrasonic instrument shall be checked as follows:

(1) Position a search unit on a reference standard so that two indications are visible. (These indications may be obtained from a reference hole and back surface, from two reference holes, or from a reference hole and a corner seen simultaneously on the instrument screen.)

(2) Manipulate search unit to establish a 2 to 1 ratio of amplitudes between the two indications with the largest at 80% full screen height (FSH).

(3) Without moving search unit, adjust sensitivity (gain) to run the higher response from approximately 100% to 20% FSH in 2 dB steps (10% if fine control is available).

(4) Read and record the relative amplitudes of the two indications to the nearest 1%.

(5) If the smaller indication does not fall within 5% FSH of 50% of the larger indication, the instrument shall not be used for examinations until corrected.

8.2 Amplitude Control Linearity

8.2.1 The linearity of the instrument gain (attenuation) control shall be checked as follows:

(1) Position an angle beam search unit on the reference standard to obtain an 80% FSH indication from the 1/2T hole.

(2) Using amplitude control, decrease signal amplitude by 6 dB and by 12dB to obtain nominal 40% FSH and 20% FSH signals. Read, and record actual signal amplitudes to closest 1%.

(3) Obtain a 40% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 6 dB to obtain a nominal 80% signal. Read and record as in (2).

(4) Obtain a 20% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 12 dB to obtain a nominal 80% FSH signal. Read and record as in (2).

(5) If the indications obtained in (2), (3) and (4) are not within ± 20% of nominal, the instrument shall not be used for examination until corrected.

9.0 EXAMINATION SYSTEM CALIBRATION

9.1 Straight Beam Calibration

9.1.1 Straight beam calibration shall be performed as follows. The appropriate combinations of search unit, reference standard and test holes for each respective weld are listed in Figures 1 thru 5.

(1) Adjust the instrument sweep controls so that the examination area is displayed on the CRT screen. Mark the horizontal screen positions selected for the hole or holes directly on the CRT screen and on the chart on the Calibration Data sheet.

(2) Position search unit to obtain maximum response from the side drilled calibration hole which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on CRT screen.

(3) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet. (This completes calibration for thicknesses under one (1) inch).

(4) No DAC is necessary for weld thicknesses under one (1) inch. For weld thicknesses one (1) inch and greater a DAC shall be established as follows and as shown in Figure 6 or 7 depending on calibration standard design.

(a) Without changing the sensitivity obtained in (2) above position the search unit for maximum response from the remaining holes and mark amplitude on the CRT screen.

(b) Plot a DAC curve by connecting the two signal response positions with a continuous line extending over the full examination range.

(5) Record all data and instrument settings on the Calibration Data Sheet, and sign and date upon completion.

(6) Repeat steps (1) through (6) for each different weld thickness just prior to examination.

9.2 Straight Beam Calibration Check

9.2.1 Straight beam calibration check as required by Section 7.3.3 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.1.1(2).

(2) Reposition search unit at each respective test hole and observe maximum signal response amplitudes.

(3) See Section 7.4 for signal response requirements during calibration check.

9.3 Angle Beam Calibration

9.3.1 Angle beam calibration shall be performed as follows. The appropriate combinations of search unit, reference standard and test holes for each respective weld are listed in Figures 1 thru 5.

(1) Adjust the instrument sweep controls so that the examination area is displayed on the CRT screen. Mark the horizontal screen positions selected for the hole or holes directly on the CRT screen and on the chart on the Calibration Data Sheet.

(2) Position search unit to obtain maximum response from the calibration hole (3/4T or 1-1/2T) which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on CRT screen.

(3) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(4) Where required, DAC curves for angle beam examinations shall be established as follows and as shown in Figures 6 or 7.

Weld Thickness Less Than One (1) Inch

(a) Position the search unit for maximum response from the calibration hole at the 1-1/2T position. Adjust the instrument sensitivity controls to provide a signal amplitude of 80% of FSH and mark location and amplitude on the CRT screen. (See 9.3.1(2))

(b) Without changing sensitivity, position the search unit for maximum responses from the calibration hole at the ½T, 2½T and 3½ T positions respectively and mark location and amplitudes on the CRT screen.

(c) Plot a DAC curve by connecting the signal response positions with a continuous line extending over the full examination range.

Weld Thickness: One (1) Inch and Greater

(a) Position the search unit for maximum response from the calibration hole at the 3/4T position. Adjust the instrument sensitivity controls to provide a signal amplitude of 80% of FSH and mark location and amplitude on the CRT screen. (See 9.3.1(2)).

(b) Without changing sensitivity, position the search unit for maximum responses from the calibration hole at the 1/4T, 1-1/4T, and 1-3/4T positions respectively and mark location and amplitudes on the CRT screen.

(c) Plot a DAC curve by connecting the signal response positions with a continuous line extending over the full examination range.

(5) Instrument is now calibrated for examination of welds of the thickness for which calibration was just performed.

(6) Record all data and instrument settings on the Calibration Data Sheet, and sign upon completion.

(7) Repeat steps (1) through (6) for each different weld thickness just prior to examination.

9.4 Angle Beam Calibration Check

9.4.1 Angle beam calibration check as required by Section 7.3.2 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.3.1 (2).

(2) Reposition search unit at each respective test hole and observe signal response amplitudes.

(3) See Section 7.4 for signal response requirements during calibration check.

10.0 EXAMINATION PROCEDURES

10.1 Straight Beam Examination

10.1.1 Straight beam examination of the weld and heat affected zone shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.1.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer element width (diameter) for each scan pass.

10.1.3 See Table I and Figures I thru 5 for scan path distances and weld identifications.

10.1.4 Continue scanning sequences until all welds have been examined. Examination shall not be considered complete until all recordable indications have been evaluated per 11.1.2.

10.2 Straight Beam Examination of Base Material for Laminations

10.2.1 Straight beam examination of all base material through which the angle beams will pass during angle beam examination shall be performed at a sensitivity level which gives a minimum back reflection signal amplitude of 50% of FSH.

10.2.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer element width (diameter) for each scan pass.

10.2.3 See Table I and Figure 1 thru 5 for scan path distances and weld identifications.

10.2.4 Continue scanning sequences until all base material has been examined. Examination shall not be considered complete until all recordable indications have been evaluated per 11.1.1.

10.3 Angle Beam Examinations

10.3.1 All angle beam examinations shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.3.2 The search unit shall be swivelled to ensure maximum coverage as it is moved along a rectilinear scan pattern allowing a minimum of 25% overlap of the transducer element width (diameter).

10.3.3 See Table 1 and Figures 1 thru 5 for scan path distances and weld identifications.

10.3.4 Continue scanning sequences until all welds have been examined. Examination shall not be considered complete until all recordable indications have been evaluated per 11.1.2.

11.0 EVALUATION CRITERIA

11.1 Recording of indications

11.1.1 For straight beam examinations of base metal for laminations, all areas giving indications equal to or greater than the remaining back reflection shall be recorded on the appropriate data sheet prior to angle beam examination of the weld and heat-affected zone.

(1) Each recorded area shall be identified as to distance from surface, length and position relative to the weld datum point.

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter (width).

11.1.2 For straight beam and angle beam examinations of weld and heat-affected zone, all indications showing a signal amplitude response equal to or greater than 20% of the reference response shall be recorded on the appropriate data sheet at the time of weld examination and prior to removing equipment.

(1) Each recorded indication shall be identified as to depth (as percent of thickness), distance from surface, length, signal amplitude and location relative to the weld datum point.

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter (width).

11.1.3 Indications from all welds shall be reported in inches above or below the weld centerline and in inches CW or CCW from the weld datum point when looking with direction of flow.

11.2 Evaluation of Indications

11.2.1 Evaluation of all indications shall be made at the reference sensitivity and in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWB-3000.

Results of this evaluation shall be reported to the Plant Owner or his Agent in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWA-6000. Disposition of evaluation results shall be made in accordance with the Owner's Plant Procedures.

12.0 EXAMINATION RECORDS

12.1 Certification of Records

12.1.1 The examiner shall complete and sign the appropriate Weld Scan Data Sheet(s) immediately upon the completion of each weld examination.

12.2 Filing of Records

12.2.1 The examiner shall be responsible for submitting to the Plant Owner, or his Agent, a completely documented set of examination records including certification of personnel qualifications with a current eye test report in accordance with SNT-TC-1A.

13.0 EXAMINER'S CRITIQUE

13.1 Procedure Corrections and Additions

13.1.1 All procedure corrections and/or additions required during the inservice examinations shall be made in accordance with requirements of NES QA Plan # NES 81A 0402 and documented in the record of revisions section of this procedure.

13.2 Critique Report

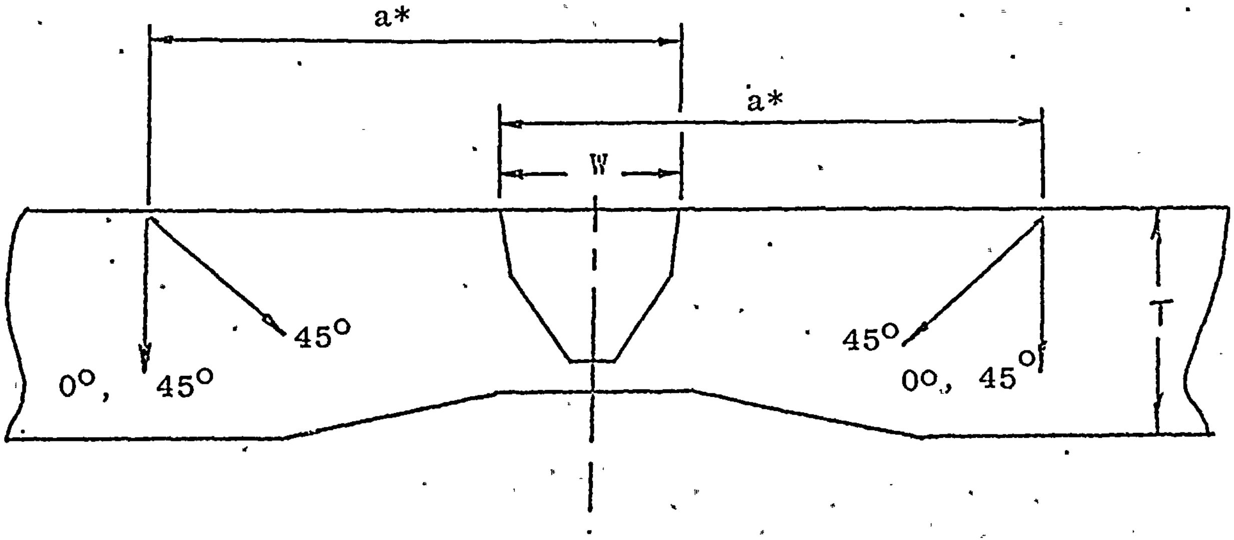
Upon completion of the examination of all welds specified in this procedure, the examiner shall submit a written report to the Plant Owner or his Agent listing pertinent information for future examinations such as procedure additions, corrections and revisions or unique problems or actions to be taken.

13.3 Additional Examinations

When indications exceeding allowable standards are found, additional examinations shall be performed as stipulated in Section XI, paragraphs IWB-2430 and IWC-2430.

NOTE: $a^* = W + 3\frac{1}{2}T$ for $T \leq 1''$) Axial Scan
$= W + 2\frac{1}{2}T$ for $T > 1''$)

$a^* = W + \frac{1}{2}T$ for Circ. Scan



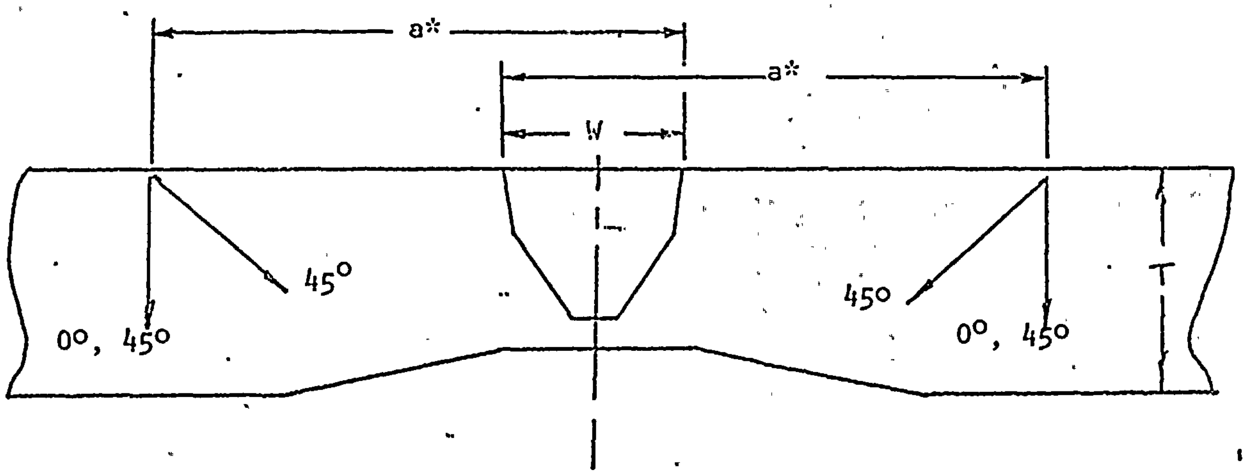
Nom Pipe Dia.	Pipe Sched.	t	Act. O.D.	a*	Reference Standard	0° Search Unit	Angle Search Units	Scan Fixtures
3"	80	.300"	3.50"	See Note	P8R-.3-1	½" Dia.	¼"X¼"	See Para. 6.1.1
6"	80	.432"	6.625"	" "	P8R-.75-3	½" Dia.	¼"X¼"	
8"	Min.t	.352	8.625	" "	P8R-.75-3	½" Dia.	¼"X¼"	
10"	Min.t	.522"	10.750	" "	P8R-.75-2	½" Dia.	¼"X¼"	
12"	Min.t	.672" .622"	12.750"	" "	P8R-.75-2	½" Dia.	½"X½"	
14"	Min.t	.685"	14.0"	" "	P8R-.75-2	½" Dia.	½"X1"	57A8407 57A8417
28"	Min.t	1.453"	28.0"	" "	P8F-1.5-1	½" Dia.	½"X1"	57A8407 57A8417

Search unit designations are intended as a guide only and are to be used at operator's discretion. For example, a ½" diameter search unit may be used in place of a ½"X½" search unit.

FIGURE 1. ULTRASONIC EXAMINATION OF 3", 6", 8", 10", 12", 14" & 28" O.D. PIPING BUTT WELDS IN AUSTENITIC STAINLESS STEEL PIPING.

NOTE: $a^* = W + 3\frac{1}{2}T$ for $T \leq 1''$) Axial Scan
$\quad\;\; = W + 2\frac{1}{2}T$ for $T > 1''$)

$a^* = W + \frac{1}{2}T$ for Circ. Scan



Nom Pipe Dia.	Pipe Sched.	t	Act. O.D.	a*	Reference Standard	0° Search Unit	Angle Search Unit	Scan Fixtures
6"	80	.432	6.625	See Note	PIR-.75-1	½" Dia.	¼"X¼"	See Para 6.1.1
10"	100	.718"	10.75	" "	PIR-.75.2	½" Dia.	¼"X¼"	See Para. 6.1.1
12"	Std.	.375"	12.75"	" "	PIR-.75-2		½"X½"	See Para. 6.1.1
14"	Std.	.375"	14.0"	" "	PIR-.75-2		½"X½"	57A84017 57A8417
16"	100	1.031"	16.0"	" "	PIR-1.5-1		½" x ½"	
18"	100	1.156"	18.0"	" "	PIR-1.5-1		½"X½"	
24"	80	1.218"	24.0"	" "	PIF-1.5-1		½"X½"	

Search unit designations are intended as a guide only and are to be used at operator's discretion. For example, a ½" diameter search unit may be used in place of a ½" x ½" search unit.

FIGURE 2. ULTRASONIC EXAMINATION OF 6", 10", 12", 14", 16", 18", & 24" O.D. PIPING BUTT WELDS IN CARBON STEEL PIPING.

SCAN PATH LEGEND

⊥ - Perpendicular to Weld

== - Parallel to Weld

* - 0° Base Metal

0° WHAZ - Weld and Heat Affected Zone

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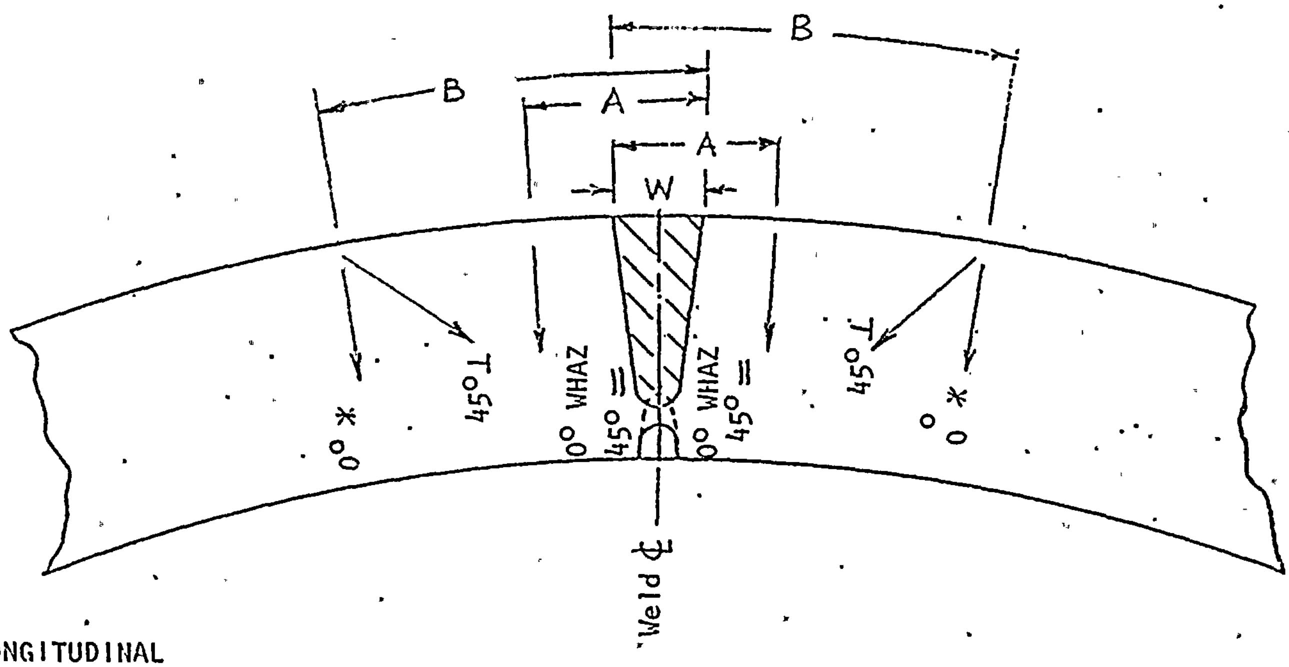


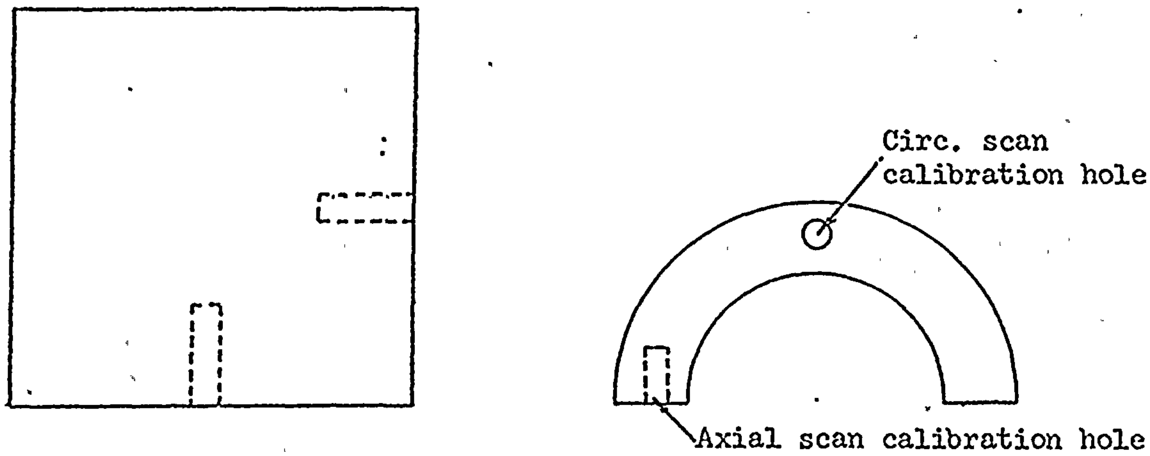
LONGITUDINAL

Nom Pipe Dia.	Pipe Schd.	t	A	B	Reference Standard	0° Search Unit	Angle Search Unit	Scan-Fix
28"	Min.t	1.453"	see note	see note	P8F-1.5-1	½" Dia.	½"X1"	57A8407 57A8417
14"	Min.t	.685"			P8R-.75-2			
12"	Min.t	.622"			P8R-.75-2		½"X½"	See Para. 6.1.1
10"	Min.t	.522"			P8R-.75-2		¼"X¼"	
8"	Min.t	.352"			P8R-.75-3			

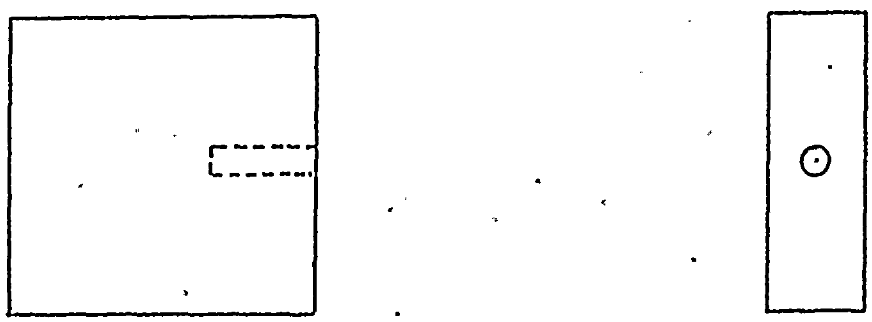
Search unit designations are intended as guide only and are to be used at operator's discretion. For example, a ½" diameter search unit may be used in place of a ½" x ½" search unit.

NOTE: $A = W + \frac{1}{2}\,t$
$B = W + 3\frac{1}{2}\,t$ for $t \leq 1"$
$B = W + 2\frac{1}{2}\,t$ for $t \geq 1"$

FIGURE 3: ULTRASONIC EXAMINATION PROCEDURES FOR PIPE AND FIXTURE LONGITUDINAL WELDS (8",10",12",14" and 28" O.D.).

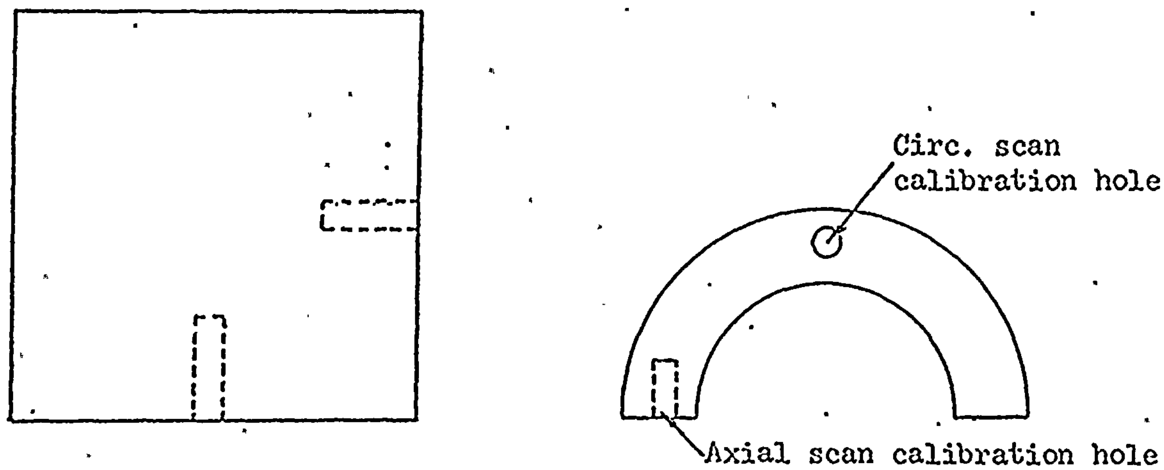


Ref. Std. No.	O.D.	Wall Thickness	Hole Dia.	Hole Depth	Hole Length	Pipe O.D. Range
P8R-.3-1	3.50"	0.30"	3/32"	1/2T	$1\frac{1}{2}$" Min	3.15" - 5.25"
P8R-.75-2	10.00"	0.75"	3/32"	1/2T	$1\frac{1}{2}$" Min	9.00" -15.00"
P8R-.75-3	6.25"	0.75"	3/32"	1/2T	$1\frac{1}{2}$" Min	5.51" - 9.19"

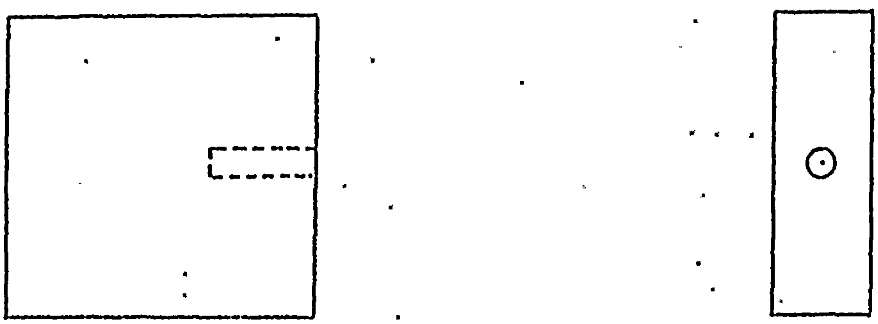


Ref. Std. No.	O.D.	Wall Thickness	Hole Dia.	Hole Depth	Hole Length	Pipe O.D. Range
P8F-1.5-1	Flat	1.5"	1/8"	1/4T	$1\frac{1}{2}$" Min	Greater than 20.00"

FIGURE 4. ULTRASONIC REFERENCE STANDARDS FOR 3", 6", 8", 10", 12", 14" & 28" O.D. PIPING BUTT WELDS, IN AUSTENITIC STAINLESS STEEL PIPING

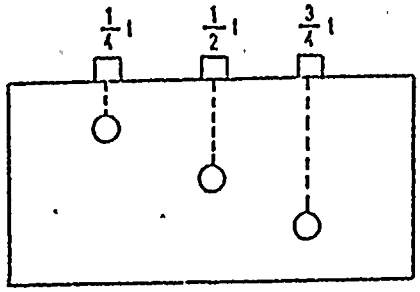


Ref. Std. No.	O.D.	Wall Thickness	Hole Dia.	Hole Depth	Hole Length	Pipe O.D. Range
PIR-.75-2	10.0"	.75"	3/32"	1/2 T	1 ½" Min.	9.00" - 15.00"
PIR-1.5-1	16.0"	1.5"	1/8"	½,¼,3/4T	1½" Min.	14.4" - 24.0"
PIR-.75-1	6.59"	.75"	3/32"	1/2T	1½" Min.	5.93" - 9.88"

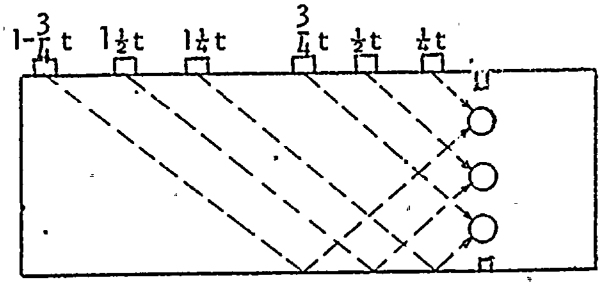


Ref. Std. No.	O.D.	Wall Thickness	Hole Dia.	Hole Depth	Hole Length	Pipe O.D. Range
PIF-1.5-1	Flat	1.5"	1/8"	¼T	1½" Min	Greater than 20.00"

FIGURE 5. ULTRASONIC REFERENCE STANDARDS FOR 6", 10", 12", 14", 16", 18" & 24" O.D. PIPING BUTT WELDS, IN CARBON STEEL PIPING

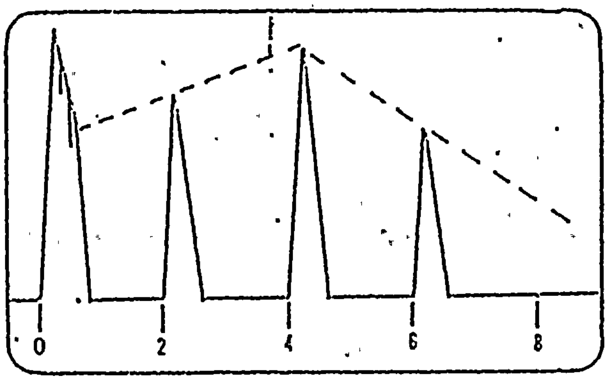


Straight Beam
Search Unit Positions

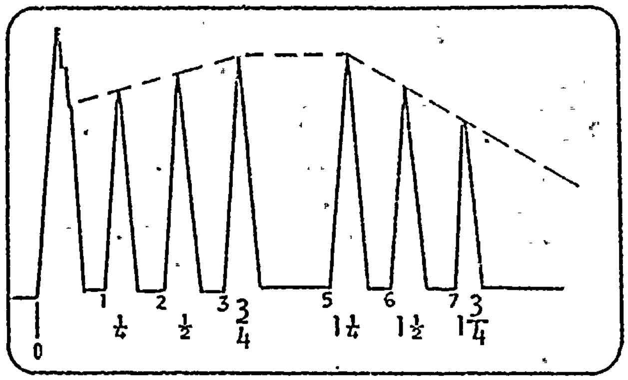


Angle Beam
Search Unit Positions

Typical DAC Curve



Typical DAC Curve



<u>NOTE:</u> For welds under 1" thick, use 1/2T hole only, no DAC required.

Step 1 - Adjust sweep controls so that 1/4T, 1/2T, and 3/4T holes are located respectively on the horizontal screen divisions as shown above for straight beam and angle beam calibrations.

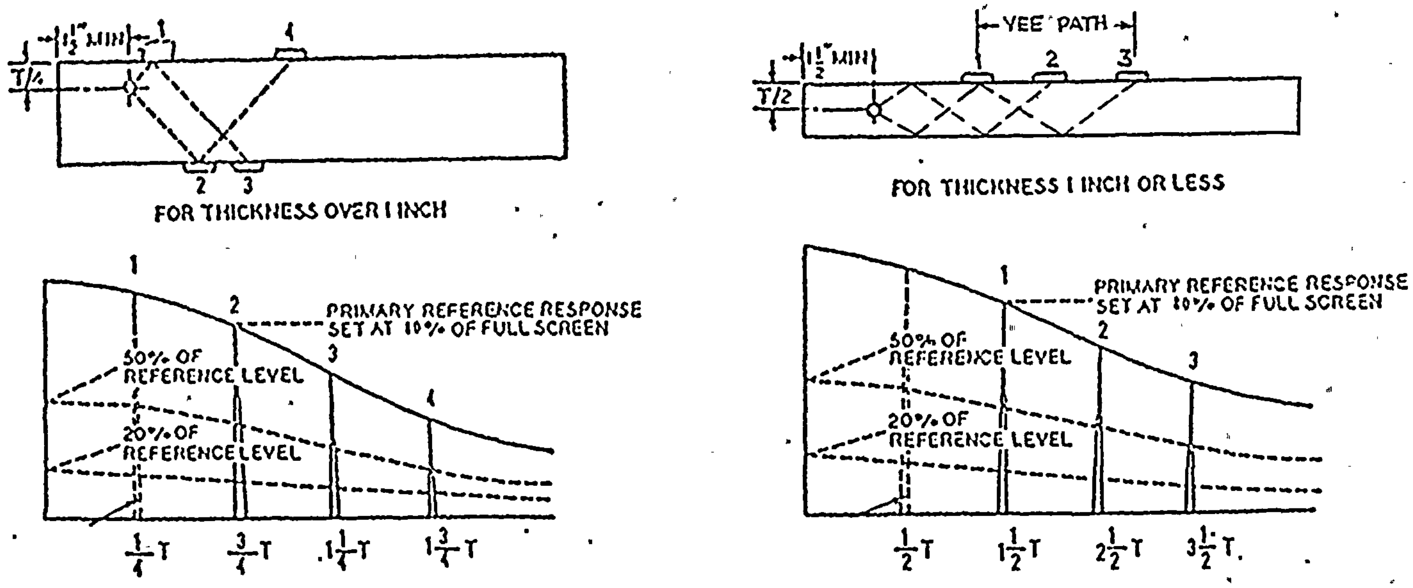
Step 2 - Adjust sensitivity to provide 80% FSH indication from hole giving maximum response - mark position on screen.

Step 3 - Position search unit for maximum response from remaining holes - mark position on screen.

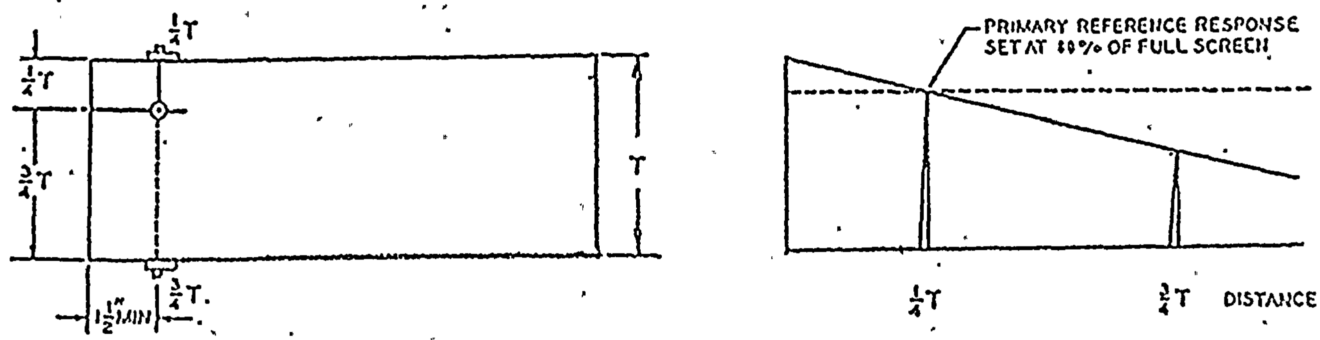
Step 4 - Plot DAC by connecting points marked on screen with line extended to cover entire examination range.

Step 5 - Record all sweep and sensitivity control settings on respective data sheets.

FIGURE 6. REFERENCE SENSITIVITY AND DAC CALIBRATION PROCEDURES FOR ULTRASONIC EXAMINATION OF WELDS.



Search Unit Locations & DAC Curves for Angle Beam Calibration



Search Unit Locations & DAC Curve for Straight Beam Calibration

NOTE: For straight beam calibration on welds under 1" thick, use 1/2T hole only, no DAC required.

Step 1 - Adjust sweep controls so that the entire examination area is displayed on CRT screen.

Step 2 - Adjust sensitivity to provide 80% FSH indication from hole giving maximum response - mark position on screen.

Step 3 - Position search unit for maximum response from remaining holes - mark position on screen.

Step 4 - Plot DAC by connecting points marked on screen with line extended to cover entire examination range.

Step 5 - Record all sweep and sensitivity control settings on respective data sheets.

FIGURE 7. REFERENCE SENSITIVITY AND DAC CALIBRATION PROCEDURES FOR ULTRASONIC EXAMINATION OF WELDS.

CALIBRATION DATA SHEET NO. 554-1
MANUAL EXAMINATION

EXAMINATION AREA

TRANSDUCER IDENTIFICATION

STYLE OR TYPE NO. ______________________
SIZE ______________________
FREQUENCY ______________________
SERIAL NO. ______________________
ANGLE & MODE ______________________
SCAN FIXTURE ______________________

CALIBRATION BLOCK

ID NO. ______________________
SIZE ______________________
EXAMINATION SURFACE ______________________

Hole IDENT.	Depth IN.	Amp. %	Atten. dB

DAC PLOT

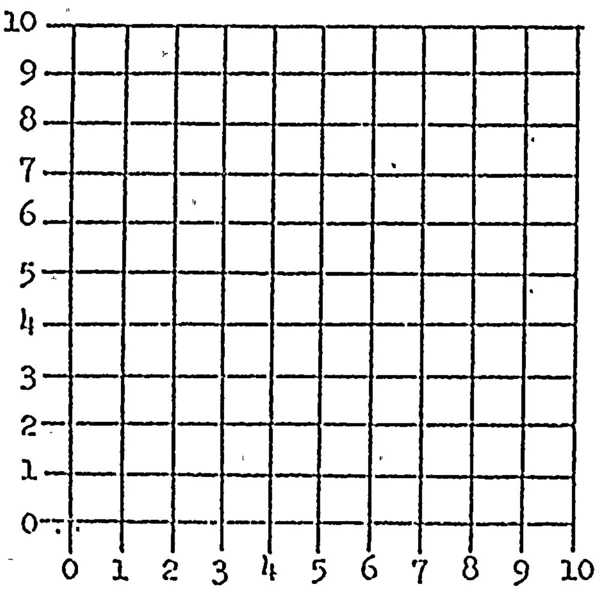


FIGURE 8

ULTRASONIC INSTRUMENT

MODEL NO. ______________________
SERIAL NO. ______________________

CONTROL SETTINGS

PULSE LENGTH ______________________
FREQUENCY ______________________
dB GAIN ______________________
SWEEP LENGTH ______________________
SWEEP DELAY ______________________
VIDEO FILTER ______________________
REJECT ______________________

INSTRUMENT LINEARITY CALIBRATION

	Amplitude High	Amplitude Low
1.		
2.		
3.		
4.		

AMPLITUDE CONTROL LINEARITY

Initial	Δ dB	Result
80	-6	
80	-12	
40	+6	
20	+12	

EXAMINERS

1. ______________________ SNT-TC-1A Level
2. ______________________ SNT-TC-1A Level

DATE: ______________________

REVIEWED BY: ______________________

WELD SCAN DATA SHEET	Procedure No.: NIP 554
1. Calibration Data Sheet No. ________ 2. Examination Angle ________ 3. Area of Examination ________ 4. Examination Surface ________	Subject: PIPING WELDS Issue Date: 8-9-75 Revision No.: 0; Date: Page 27 of 30

Weld, Item or Scan No.	Scan Completion: 0° Base Metal	Scan Completion: 0° WHAZ	Scan Completion: Normal to Weld Centerline	Scan Completion: Parallel to Weld Centerline	No Reportable Indications	Reportable Indications	Supplement Attached	Comments: Reason for Incompleted Scans

Calibration Checks

Instrument: Time	Instrument: Date	Examination System: Time	Examination System: Date

Additional Sheets Attached:

Continuation ______ Supplements ______

Examiner(s):

1. __________ SNT-TC-1A Level ______

2. __________ SNT-TC-1A Level ______

Date: ________

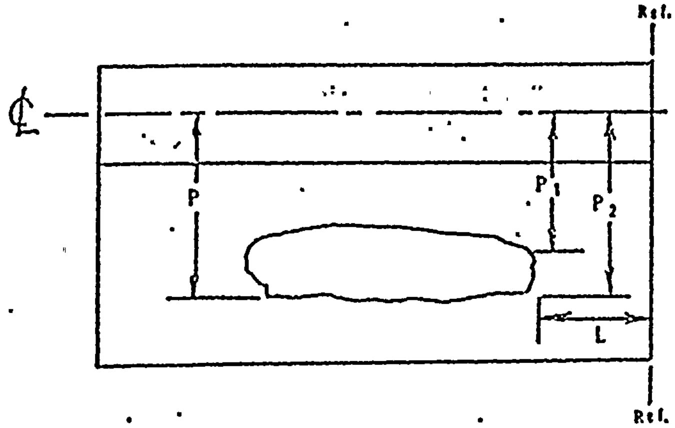
FIGURE 9

NUCLEAR ENERGY SERVICES, INC.

WELD SCAN DATA SHEET SUPPLEMENT A (BASE METAL)	Procedure No.: NIP 554 Subject: PIPING WELDS Issue Date: 8-9-75 Revision No.: 0 ; Date: Page 28 of 30

Weld No. ______________ Sheet ______ of ______

Calibration Data Sheet No. ______________ Back Echo Amplitude ______________



Note: Location increments are not to exceed allowable scan increments.

Indication No.	L(inches)	P1	P2	Echo(% FSH)	Back(% FSH)

FIGURE 9A

Examiners:

1. ______________ SNT-TC-1A Level ______

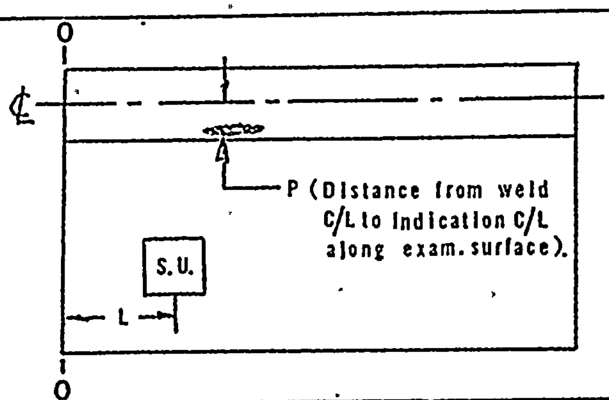
2. ______________ SNT-TC-1A Level ______

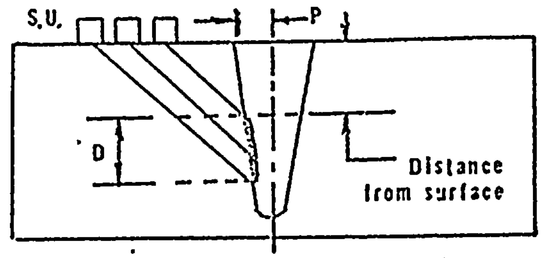
Date: ______________

WELD SCAN DATA SHEET SUPPLEMENT B	Procedure No.: NIP 554 Subject: PIPING WELDS Issue Date: 8-7-75 Revision No.: 0; Date: Page 29 of 30

Weld No. ______________________ Sheet ________ of ________

Calibration Data Sheet No. ______________ EXAM. ANGLE ______________





Note: Location increments are not to exceed allowable scan increments.

Ind. No.	BEAM DIR.	L Location	Max % DAC	Dist. From Surface	P	50% Forward		50% Back		Depth (D)	
						Dist. From Surface	P	Dist. From Surface	P	Inches	% T

NOTE:
End points of L are the smaller of 50% DAC. or 50% Max.

FIGURE 9B

Examiner(s):

1. ______________________ SNT-TC-1A Level ________

2. ______________________ SNT-TC-1A Level ________

Date: ______________________

NUCLEAR ENERGY SERVICES, INC.

TABLE I

WELD IDENTIFICATION

NUCLEAR COMPONENTS

System No.	Description	Ref. Block	Reference Figures	Notes
01, 02, 03	Main Steam	P1F-1.5-1 P1R-1.5-1	2,5 "	24" Sch 80 16" Sch 100
31	Feedwater	P1R-1.5-1 P1R-.75-2	" "	18" Sch 100 10" Sch 120
32	Recirc.	P8F-1.5-1	1, 3, 4	28" Min. Wall 1.453"
33	Cleanup	P8R-.75-3	1, 4	6" Sch 80
38	Shutdown Cool.	P8R-.75-2 P8R-.75-2 P8R-.75-3	1, 3, 4 " "	14" Min. Wall .685" 12" " " .672" 8" " " .352
39	Emerg. Cond.	P8R-.75-2 P8R-.75-2	1, 3, 4 "	10" Min. Wall .522" 12" Min. Wall .672"
40	Core Spray	P8R-.75-2 P8R-.75-3	1, 3, 4 1, 4	12" Min. Wall .622" 6" Sch 80
44.1	CRD Return	P8R-.3-1	1, 4	3" Sch 80
-	CRD Housings	P8R-.75-3	1, 4	OD 5.975", .613"Wall

Procedure No.: NIP 562
Subject: C.H. NOZZLE TO FLANGE WELD
Issue Date: 9-25-75
Revision No.: 0; Date;
Page 1 of 26

ULTRASONIC EXAMINATION PROCEDURES FOR CLOSURE HEAD NOZZLE TO FLANGE WELD

NIAGARA MOHAWK POWER CORPORATION
Nine Mile Point, Unit 1

Originator(s)

Signature 9-29-75 Date

Signature Date

Approved By:

N.E.S.I. Signature SNT-TC-1A Level III 9/29/75 Date

N.M.P.C. Signature SNT-TC-1A Level III Date

RECORD OF REVISIONS

Revision Number	Date	Description	Reason	Originator	NMPC	NESI
1 (pg. 20)	10/24/75	Add calibration holes in Reference Standard drawing	Required for circumferential and axial scan calibration	ZM		[illegible]
1 (pg. 18)	9-1-76	Add Para. 13.3	Reflects Requirements of Section XI, 1974 ED. of ASME Code	ZM		[illegible]
1 (pg. 3)	10-5-77	Add "and 25°" to para. 1.2.1	Required for circ. scan on 4" pipe	AU		PSB
1 (pg. 6)	10-5-77	Add "25° angle beam..." etc. to para. 5.2.1(2)	↓			
1 (pg. 7)	10-5-77	Add "25° angle beam..." etc. to para. 5.7.3.	↓			
1 (pg. 8)	10-5-77	Add "6.1.1 (11) Scan Fixture, 25°"	↓			
1 (pg. 19)	10-5-77	Add to Figure 1.; "25° Used for circ. scan on 4" pipe"	↓			

ULTRASONIC EXAMINATION PROCEDURES FOR CLOSURE HEAD NOZZLE TO FLANGE WELD

1.0 SCOPE

1.1 Area of Examination

1.1.1 This document covers the ultrasonic examination procedures for:

(1) Closure Head vent nozzle to flange weld. (From flange side only)

(2) Closure Head instrumentation and safety valve nozzle to flange welds. (From flange side only)

1.2 Type of Examination

1.2.1 Volumetric examination shall be performed using ultrasonic pulse echo 45° & 25° angle beam shear waves and 0° longitudinal straight beam techniques applied to the outside surfaces of the piping.

1.2.2 The examination shall be performed using manual search units and/or scan fixtures.

1.3 Time of Examination

1.3.1 These procedures shall govern the inservice examination and re-examination of repaired areas of the pipe welds as required by the ASME Boiler and Pressure Vessel Code, Section XI.

1.4 Weld Configuration

1.4.1 The flange to nozzle weld configurations covered by this procedure are shown in Figure 1.

1.4.2 Nominal weld thicknesses are 1.5" for the instrumentation and safety valve nozzles and 1-7/32" for the vent nozzle.

1.5 Materials

1.5.1 The flanges are constructed of austenitic stainless steel, and the weld is inconel.

ULTRASONIC EXAMINATION PROCEDURES FOR CLOSURE HEAD NOZZLE TO FLANGE WELD

1.0 SCOPE

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(1) Closure Head vent nozzle to flange weld. (From flange side only)

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1.5 Materials

1.5.1 The flanges are constructed of austenitic stainless steel, and the weld is inconel.

2.0 REFERENCES

2.1 Reference Documents

2.1.1 The following documents form a part of this examination procedure:

(1) ASME Boiler and Pressure Vessel Code, Section XI 1974 Edition, and the Summer of 1974 Addenda.

(2) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(3) CONAM Procedure for Certifying Inspection Personnel, CUTP-1, Rev.-1, Sept. 1970

(4) ASME Boiler and Pressure Vessel Code, Section V, 1974 Edition, and the Summer of 1974 Addenda.

2.2 Applicable Drawings

2.2.1 The following drawings form a part of this procedure:

(1) CE Assembly drawing E-231-576

(2) NES isometric drawing 13-2 (NES 81A0403)

2.3 Operation Manuals

2.3.1 The equipment operational manuals for the particular ultrasonic instruments used form a part of this procedure.

3.0 PROCEDURE CERTIFICATION

3.1 The examination procedures described in this document comply with Section XI of the ASME Boiler and Pressure Vessel Code, 1974 Edition, except where examination coverage is limited by part geometry or access.

4.0 PERSONNEL CERTIFICATION

4.1 Personnel Certification Requirements

4.1.1 Each person performing ultrasonic examination governed by this procedure shall be certified in accordance with the following:

(1) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(2) CONAM Inspection Inc., Procedure for Certifying Ultrasonic Test Personnel CUTP-1, Rev. 1, Sept, 1970

(3) ASME Boiler and Pressure Vessel Code, Section XI (1974 Ed.)

4.1.2 An examination crew shall consist of one or two members as needed. At least one member of each crew shall have a minimum qualification Level II in accordance with the above referenced documents. The remaining member(s) shall have a minimum qualification of Level I or Level I trainee.

4.2 Personnel Records

4.2.1 Records of personnel qualification shall be maintained by Examination Contractor.

4.2.2 A copy of the examiner's certification, and a current eye test as required by SNT-TC-1A shall be filed with each permanent examination record, with a copy submitted to the plant owner or his agent, prior to performing examinations per this procedure.

5.0 EXAMINATION REQUIREMENTS

5.1 Examination Frequency

5.1.1 The nominal examination frequencies shall be 2.25 MHz for all straight beam and angle beam examinations.

5.1.2 Other pulse frequencies shall be used if such variables as material attenuation, grain structure, etc., necessitates their use to achieve penetration or resolution. This information shall be recorded on the data sheets.

5.2 Examination Angles

5.2.1 Examination angles for flange welds specified in this procedure shall be as follows:

(1) 0° straight beam from the O.D. surface one direction thru the weld and thru the parent material on the flange side of the weld.

(2) 45° angle beam two directions perpendicular to the weld axis and two directions parallel with the weld axis.

(3) Other beam angles may be used as determined necessary; i.e. for evaluation of reflectors, to compensate for geometric constraints, etc. All information shall be recorded on the data sheets

5.3 Liquid Couplant

5.3.1 The ultrasonic couplant shall be Trim Regular or Trim HD (Master Chemical Corporation, Perrysburg, Ohio).

5.3.2 The couplant shall be supplied in clean containers of sufficient quantity to facilitate the examination.

5.3.3 The couplant shall be pumped from the container to the search unit scan fixtures thru clear tygon flexible tubing or shall be applied manually with a brush or other suitable device.

5.3.4 Where required, the examiner shall be responsible for removing couplant from the examination surface at the conclusion of the examination.

5.4 Surface Preparation

5.4.1 All examination surfaces should be clean and free of dirt, weld spatter, etc., or any other condition which would interfere with the examination or impair proper transmission of the sound beam.

5.4.2 Irregularity of surface contour to be contacted by the search unit should not exceed 1/8" in any 2" of surface travel. Weld crown and edges should blend smoothly into adjacent base material.

5.2 Examination Angles

5.2.1 Examination angles for flange welds specified in this procedure shall be as follows:

(1) 0° straight beam from the O.D. surface one direction thru the weld and thru the parent material on the flange side of the weld.

(2) 45° angle beam two directions perpendicular to the weld axis and two directions parallel with the weld axis. (25° angle beam for circ. scan on 4" pipe)

(3) Other beam angles may be used as determined necessary; i.e. for evaluation of reflectors, to compensate for geometric constraints, etc. All information shall be recorded on the data sheets.

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5.4.2 Irregularity of surface contour to be contacted by the search unit should not exceed 1/8" in any 2" of surface travel. Weld crown and edges should blend smoothly into adjacent base material.

5.5 Weld Identification

5.5.1 Each weld shall be located and identified per appropriate weld maps in the Program Plan Book.

5.6 Datum Point

5.6.1 The examiner shall permanently mark, or verify that there has been marked, a reference datum point on each weld from which all examination data and reported indications shall be referenced.

5.6.2 Datum points shall be marked by the use of low stress stamps or vibratooling and shall not be deeper than 1/64".

5.6.3 The datum point for all flange to nozzle welds shall be located on the weld centerline, at vessel 0^{o}.

5.6.4 Each weld datum point, along with respective weld reference points and divisions, shallbe shown on each examination report.

5.7 Examination Coverage

5.7.1 The intent of this procedure is to provide maximum examination coverage to insure weld integrity. Each weld shall be scanned with minimum 25% overlap of the transducer element width (diameter) for each scan pass.

5.7.2 The rate of search unit movement shall not exceed six (6) inches per second.

5.7.3 Each weld and the volume of metal on the flange side of the weld shall be ultrasonically examined where part geometry and access permit using 45^{o} angle beam techniques applied in two directions normal to the weld and in two directions parallel with the weld. (25^{o} angle beam to be used for circ. scan on 4" pipe)

5.7.4 Straight beam techniques shall be applied to the stainless steel base metal, weld surface, and heat-affected zone where part geometry permits. Indications shall be recorded in accordance with Section 11.1.2 of this procedure.

5.7.5 Where the examination surface, geometry, or other conditions (weld, contour, access, etc.) do not permit a meaningful ultrasonic examination to be performed, the examiner shall record the area of non-examination and the particular interfering condition in the space provided on the Weld Scan Data Sheet. In addition, he shall make a sketch of the weld and adjacent pipe and fitting conditions in the appropriate area on the same Weld Scan Data Sheet. (See Figure 5.) Photos will be taken when possible and incorporated as part of the report.

6.0 EQUIPMENT REQUIREMENTS

6.1 Examination Contractor's Equipment

6.1.1 The following test equipment or its equivalent shall be provided by the Examination Contractor for examination of welds specified in this procedure.

(1) Pulse echo ultrasonic instrument

(2) Scan Fixture, 45°, (AI No. 85C134, or 57A8407 or other)

(3) Scan Fixture, 0°, (AI No. 85C157 or other)

(4) Search Unit, 0°, ½" Dia., 2.25 MHz, Ceramic*

(5) Search Unit, ½" x 1", 2.25 MHz, Ceramic*

(6) Search Unit, 45°, ½" x ½", 2.25 MHz, Ceramic; or 1" dia.*

(7) Search Unit, 45°, ¼" x ¼", 2.25 MHz, Ceramic; or ½" dia.*

(8) Search Unit, 0°, ½" Dia, 5.0 MHz, Ceramic*

(9) Couplant

(10) Camera

(11) Scan Fixture, 25°

* See comment in Fig. 1

6.2 Plant Owner's Equipment

6.2.1 The Plant Owner or his Agent shall provide the following service facilities and equipment as required:

(1) Scaffolding

(2) Water, Air and Electricity

(3) Temporary Lighting

(4) Crane or Lifting Devices

(5) Reference Standard No.P8R-1.5-2 (7.2" O. D. x 1.5" wall)

(6) Reference Standard No. P8R-1.5-3 (5.0 " O.D. x 1.5" wall)

(7) Radiation Monitoring Equipment

(8) Radiation Shielding

(9) Test Surface Preparation (cleaning and finishing)

(10) Drawings of each Examination Area

(11) Post Examination Cleanup of Test Area

7.1 Reference Standards

7.1.1 The reference standards designated in 6.2.1 (5) and (6) shall be used for basic instrument calibration and for establishing reference sensitivity levels for examination of the welds and parent material specified in this procedure. See Figure 1.

7.1.2 The appropriate reference standard corresponding to each respective weld thickness shall be recorded on each Calibration Data Sheet. Figure 4 is an example of the Calibration Data Sheet to be used with this procedure.

7.1.3 Calibration Data Sheets shall be numbered 562-1, 562-2, 562-3 etc., at the time of calibration and shall be signed by the examiner(s) upon completion.

7.1.4 Calibration procedures shall be performed using the O.D. surface of the reference standard.

7.1.5 The temperature of the reference standard shall be within 25° F of the pipe weld temperature.

7.2 Reference Sensitivity Level

7.2.1 The reference sensitivity level shall be the distance-amplitude curve initially obtained directly from the reference standard and shall be the sensitivity level used for evaluating and recording all indications.

7.2.2 During actual weld scanning, the reference sensitivity level shall be increased 2X or 6dB.

7.3 Times of Calibration

7.3.1 Basic instrument calibration shall be performed using the appropriate reference standard, search units and instrumentation immediately prior to the examination of the welds and parent material specified in this procedure.

7.3.2 Instrument calibration checks shall be performed at the beginning of each day of examination in accordance with Section 8.0 of this procedure.

7.3.3 Examination system calibration checks shall be performed at least at the beginning and at the completion of each 4 hour period of examination and/or at the change of examination personnel, equipment, search units, coupler shoes, etc., and at the completion of the examination of each similar series of welds in accordance with Sections 9.2 and 9.4 of this procedure.

7.4 Calibration Response

7.4.1 Calibration response shall be checked at the primary reference sensitivity level.

7.4.2 Signal response obtained during calibration check shall be within plus or minus 20% of that established during basic instrument calibration.

7.4.3 If any point on the Distance Amplitude Correction (DAC) curve is above or below the 20% limit, the examiner shall:

(1) Mark all weld data sheets since previous calibration void.

(2) Recalibrate examination system.

(3) Reexamine voided areas.

7.4.4 If any point on the DAC curve has moved horizontally more than 5% of the sweep line from its original settings, the examiner shall:

(1) Correct the sweep calibration and note it on the Calibration Data Sheet.

(2) Void any data sheets made since the previous calibration which have recorded indication and reexamine those areas.

8.0 INSTRUMENT CALIBRATION VERIFICATION

8.1 Amplitude Linearity

8.1.1 The linearity of the ultrasonic instrument shall be checked as follows:

(1) Position a search unit on a reference standard so that two indications are visible. (These indications may be obtained from a reference hole and back surface, from two reference holes, or from a reference hole and a corner seen simultaneously on the instrument screen.)

(2) Manipulate search unit to establish a 2 to 1 ratio of amplitudes between the two indications with the largest at 80% full screen height (FSH).

(3) Without moving search unit, adjust sensitivity (gain) to run the higher response from approximately 100% to 20% FSH in 2 dB steps (10% if fine control is available).

(4) Read and record the relative amplitudes of the two indications to the nearest 1%.

(5) If the smaller indication does not fall within 5% FSH of 50% of the larger indication, the instrument shall not be used for examinations until corrected.

8.2 Amplitude Control Linearity

8.2.1 The linearity of the instrument gain (attenuation) control shall be checked as follows:

(1) Position an angle beam search unit on the reference standard to obtain an 80% FSH indication from the 1/2T hole.

(2) Using amplitude control, decrease signal amplitude by 6 dB and by 12dB to obtain nominal 40% FSH and 20% FSH signals. Read, and record actual signal amplitudes to closest 1%.

(3) Obtain a 40% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 6 dB to obtain a nominal 80% signal. Read and record as in (2).

(4) Obtain a 20% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 12 dB to obtain a nominal 80% FSH signal. Read and record as in (2).

(5) If the indications obtained in (2), (3) and (4) are not within ± 20% of nominal, the instrument shall not be used for examination until corrected.

9.0 EXAMINATION SYSTEM CALIBRATION

9.1 Straight Beam Calibration

9.1.1 Straight beam calibration shall be performed as follows. The appropriate combinations of search unit, reference standard and test holes for each respective weld are listed in Figures 1 and 2 and in Table 1.

(1) Adjust the instrument sweep controls so that the examination area is displayed on the CRT screen. Mark the horizontal screen positions selected for the hole or holes directly on the CRT screen and on the chart on the Calibration Data sheet.

(2) Position search unit to obtain maximum response from the side drilled calibration hole which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on CRT screen.

(3) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(4) DAC curves shall be established as follows and as shown in Figure 3.

(a) Without changing the sensitivity obtained in (2) above position the search unit for maximum response from the remaining holes and mark amplitude on the CRT screen.

(b) Plot a DAC curve by connecting the two signal response positions with a continuous line extending over the full examination range.

(5) Record all data and instrument settings on the Calibration Data Sheet, and sign and date upon completion.

(6) Repeat steps (1) through (5) for each different weld thickness just prior to examination.

9.2 Straight Beam Calibration Check

9.2.1 Straight beam calibration check as required by Section 7.3.3 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.1.1(2)

(2) Reposition search unit at each respective test hole and observe maximum signal response amplitudes.

(3) See Section 7.4 for signal response requirements during calibration check.

9.3 Angle Beam Calibration

9.3.1 Angle beam calibration shall be performed as follows. The appropriate combinations of search unit, reference standard and test holes for each respective weld are listed in Figures 1 and 2 and in Table 1.

(1) Adjust the instrument sweep controls so that the examination area is displayed on the CRT screen. Mark the horizontal screen positions selected for the hole or holes directly on the CRT screen and on the chart on the Calibration Data Sheet.

(2) Position search unit to obtain maximum response from the calibration hole (3/4T or 1-1/2T) which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on CRT screen.

(3) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(4) DAC curves for angle beam examinations shall be established as follows and as shown in Figure 3.

(a) Position the search unit for maximum response from the calibration hole at the 3/4T position. Adjust the instrument sensitivity controls to provide a signal amplitude of 80% of FSH and mark location and amplitude on the CRT screen. (See 9.3.1(2)).

(b) Without changing sensitivity, position the search unit for maximum responses from the calibration hole at the 1/4T, 1-1/4T, and 1-3/4T positions respectively and mark location and amplitudes on the CRT screen.

(c) Plot a DAC curve by connecting the signal response positions with a continuous line extending over the full examination range.

(5) Instrument is now calibrated for examination of welds of the thickness for which calibration was just performed.

(6) Record all data and instrument settings on the Calibration Data Sheet, and sign upon completion.

(7) Repeat steps (1) through (6) for each different weld thickness just prior to examination.

9.4 Angle Beam Calibration Check

9.4.1 Angle beam calibration check as required by Section 7.3.2 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.3.1 (2).

(2) Reposition search unit at each respective test hole and observe signal response amplitudes.

(3) See Section 7.4 for signal response requirements during calibration check.

10.0 EXAMINATION PROCEDURES

10.1 Straight Beam Examination

10.1.1 Straight beam examination of the weld, heat affected zone and base material shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.1.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer element width (diameter) for each scan pass.

10.1.3 See Table 1 and Figure 1 for scan path distances and weld identifications.

10.1.4 Continue scanning sequences until all welds have been examined. Examination shall not be considered complete until all recordable indications have been evaluated per 11.1.2.

10.2 Angle Beam Examinations

10.2.1 All angle beam examinations shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.2.2 The search unit shall be swivelled to ensure maximum coverage as it is moved along a rectilinear scan pattern allowing a minimum of 25% overlap of the transducer element width (diameter).

10.2.3 See Table 1 and Figure 1 for scan path distances and weld identifications.

10.2.4 Continue scanning until all welds have been examined. Examination shall not be considered complete until all recordable indications have been evaluated per 11.1.3.

11.0 EVALUATION CRITERIA

11.1 Recording of indications

11.1.1 For straight beam and angle beam examinations of weld and heat-affected zone, all indications showing a signal amplitude response equal to or greater than 20% of the reference response shall be recorded on the appropriate data sheet at the time of weld examination and prior to removing equipment.

(1) Each recorded indication shall be identified as to depth (as percent of thickness), distance from surface, length, signal amplitude and location relative to the weld datum point.

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter (width).

11.1.2 For straight beam and angle beam examinations of base material, all indications showing a signal amplitude response equal to or greater than 20% of the reference response shall be recorded on the appropriate data sheet at the time of examination and prior to removing equipment.

(1) Each recorded indication shall be identified as to depth (as percent of thickness), distance from surface, length, signal amplitude and location relative to the weld datum point.

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter (width).

11.1.3 Indications from all welds shall be reported in inches above or below the weld centerline and in inches CW or CCW from the weld datum point when looking down on the closure head.

11.2 Evaluation of Indications

11.2.1 Evaluation of all indications shall be made at the reference sensitivity and in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWB-3000.

Results of this evaluation shall be reported to the Plant Owner or his Agent in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWA-6000. Disposition of evaluation results shall be made in accordance with the Owner's Plant Procedures.

12.0 EXAMINATION RECORDS

12.1 Certification of Records

12.1.1 The examiner shall complete and sign the appropriate Weld Scan Data Sheet(s) immediately upon the completion of each weld examination.

12.2 Filing of Records

12.2.1 The examiner shall be responsible for submitting to the Plant Owner, or his Agent, a completely documented set of examination records including certification of personnel qualifications with a current eye test report in accordance with SNT-TC-1A.

13.0 EXAMINER'S CRITIQUE

13.1 Procedure Corrections and Additions

13.1.1 All procedure corrections and/or additions required during the inservice examinations shall be made in accordance with requirements of NES QA Plan # NES 81A 0402 and documented in the record of revisions section of this procedure.

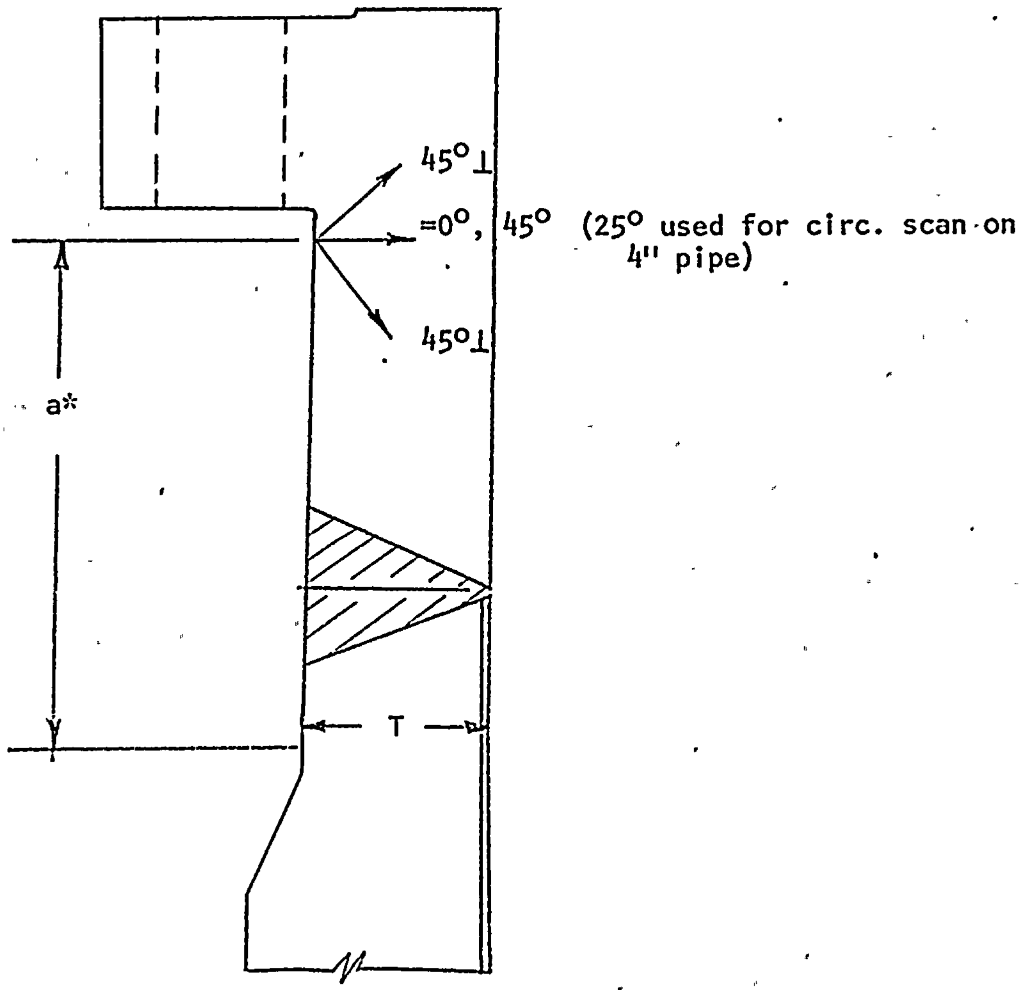
13.2 Critique Report

Upon completion of the examination of all welds specified in this procedure, the examiner shall submit a written report to the Plant Owner or his Agent listing pertinent information for future examinations such as procedure additions, corrections and revisions or unique problems or actions to be taken.

13.3 Additional Examinations

When indications exceeding allowable standards are found, additional examinations shall be performed as stipulated in Section XI, paragraph IWB-2430.

NOTE: a* = maximum coverage allowed by flange geometries.

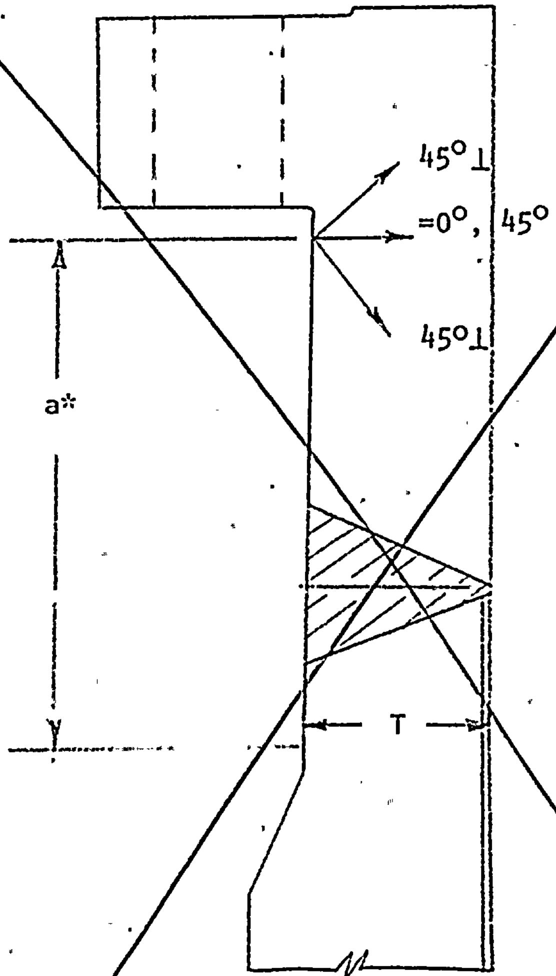


NOMINAL NOZZLE SIZE	T	ACTUAL O.D.	a*	REFERENCE STANDARD	0° SEARCH UNIT	ANGLE SEARCH UNIT	SCAN FIXTURES
6"	1.5"	9"	see NOTE	P8R-1.5-2	½" Dia.	½"x½"	see Para. 6.1.1
4"	1-7/32"	6-3/8"	↓	P8R-1.5-3	↓	↓	↓

Search unit designations are intended as a guide only and are to be used at operator's discretion. For example, a ½" diameter search unit may be used in place of a ½" x ½" search unit.

FIGURE 1. ULTRASONIC EXAMINATION OF CLOSURE HEAD NOZZLE TO FLANGE WELD.

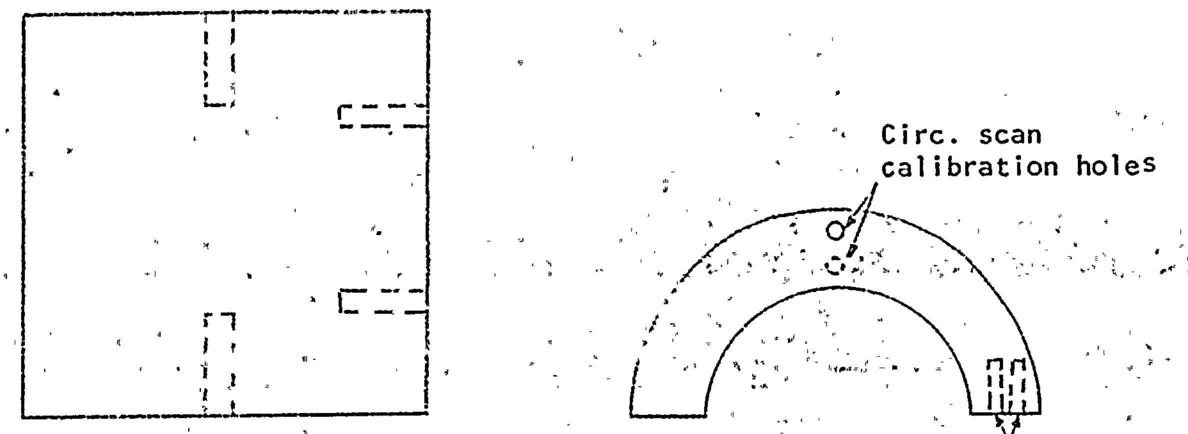
NOTE: a* = maximum coverage allowed by flange geometries.



NOMINAL NOZZLE SIZE	T	ACTUAL O.D.	a*	REFERENCE STANDARD	0° SEARCH UNIT	ANGLE SEARCH UNIT	SCAN FIXTURES
6"	1.5"	9"	see NOTE	P8R-1.5-2	½" Dia.	½"x½"	see Para. 6.1.1
4"	1-7/32"	6-3/8"	↓	P8R-1.5-3	↓	↓	↓

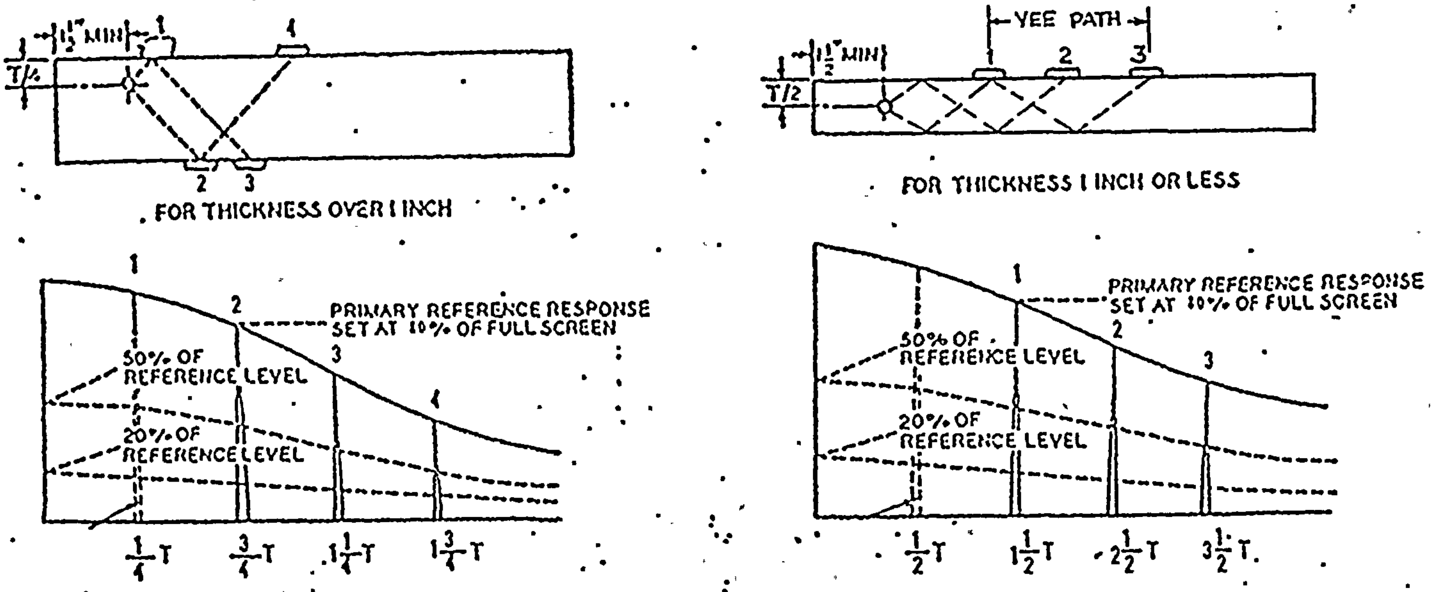
Search unit designations are intended as a guide only and are to be used at operator's discretion. For example, a ½" diameter search unit may be used in place of a ½" x ½" search unit.

FIGURE 1. ULTRASONIC EXAMINATION OF CLOSURE HEAD NOZZLE TO FLANGE WELD.

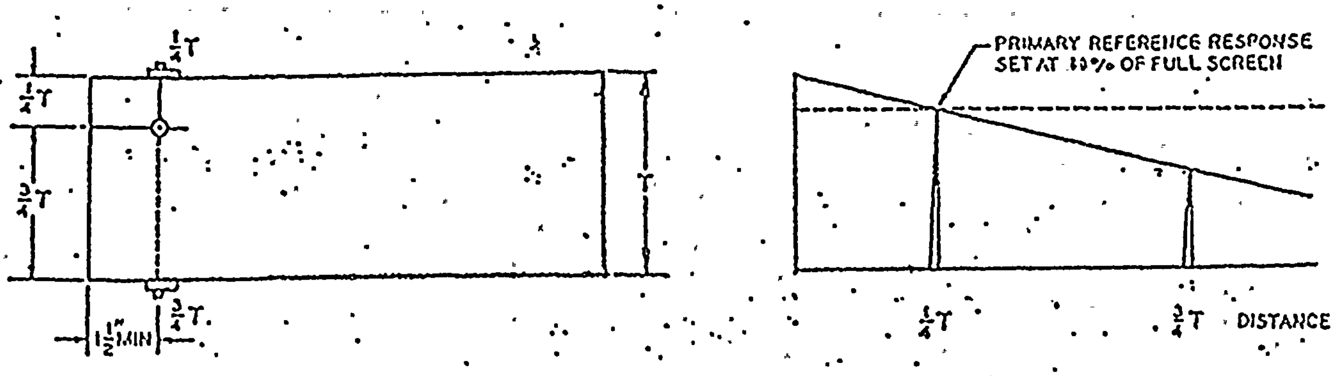


Ref. Std. No.	O.D.	Wall Thickness	Hole Dia.	Hole Depth	Hole Length	Pipe O. D. Range
P8R-1.5-2	7.2"	1.5"	1/8"	¼T, 3/4T	1-1/2" Min	6.48" - 10.8"
P8R-1.5-3	5"	1.5"	1/8"	½T, 3/4T	1-1/2" Min	4.5" - 7.5"

FIGURE 2. ULTRASONIC REFERENCE STANDARDS FOR CLOSURE HEAD NOZZLE TO FLANGE WELDS



Search Unit Locations & DAC Curves for Angle Beam Calibration



Search Unit Locations & DAC Curve for Straight Beam Calibration

NOTE: For straight beam calibration on welds under 1" thick, use 1/2T hole only, no DAC required.

Step 1 - Adjust sweep controls so that the entire examination area is displayed on CRT screen.

Step 2 - Adjust sensitivity to provide 80% FSH indication from hole giving maximum response - mark position on screen.

Step 3 - Position search unit for maximum response from remaining holes - mark position on screen.

Step 4 - Plot DAC by connecting points marked on screen with line extended to cover entire examination range.

Step 5 - Record all sweep and sensitivity control settings on respective data sheets.

FIGURE 3. REFERENCE SENSITIVITY AND DAC CALIBRATION PROCEDURES FOR ULTRASONIC EXAMINATION OF WELDS.

CALIBRATION DATA SHEET NO. 562-1
MANUAL EXAMINATION

EXAMINATION AREA

TRANSDUCER IDENTIFICATION

STYLE OR TYPE NO. ____
SIZE ____
FREQUENCY ____
SERIAL NO. ____
ANGLE & MODE ____
SCAN FIXTURE ____

CALIBRATION BLOCK

ID NO. ____
SIZE ____
EXAMINATION SURFACE ____

Hole IDENT.	Depth IN.	Amp. %	Atten. dB

ULTRASONIC INSTRUMENT

MODEL NO. ____
SERIAL NO. ____

CONTROL SETTINGS

PULSE LENGTH ____
FREQUENCY ____
dB GAIN ____
SWEEP LENGTH ____
SWEEP DELAY ____
VIDEO FILTER ____
REJECT ____

INSTRUMENT LINEARITY CALIBRATION

Amplitude High	Amplitude Low
1.	
2.	
3.	
4.	

AMPLITUDE CONTROL LINEARITY

Initial	△ dB	Result
80	-6	
80	-12	
40	+6	
20	+12	

DAC PLOT

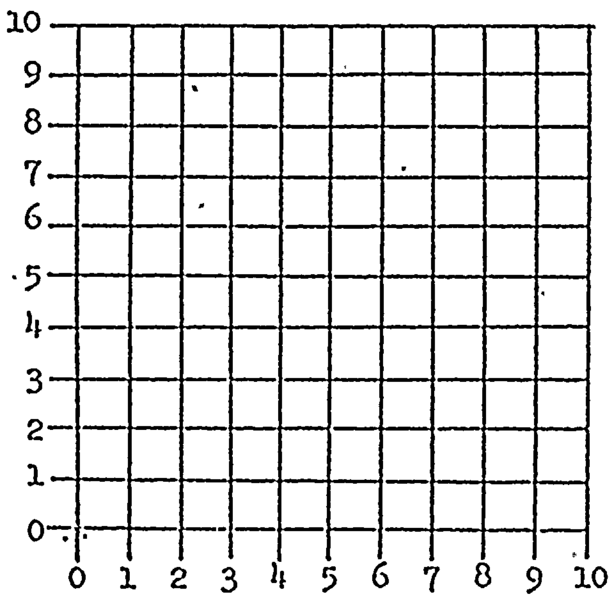


FIGURE 4

EXAMINERS

1. ____ SNT-TC-1A Level ____
2. ____ SNT-TC-1A Level ____

DATE: ____

REVIEWED BY: ____

WELD SCAN DATA SHEET

Procedure No.: NIP 562
Subject: C.H.NOZZLE TO FLANGE WELD
Issue Date: 9-26-75
Revision No.: 0; Date: ______
Page 23 of 26

1. Calibration Data Sheet No. ______
2. Examination Angle ______
3. Area of Examination ______
4. Examination Surface ______

Weld, Item or Scan No.	Scan Completion: 0° Base Metal	Scan Completion: 0° WHAZ	Scan Completion: Normal to Weld Centerline	Scan Completion: Parallel to Weld Centerline	No Reportable Indications	Reportable Indications	Supplement Attached	Comments: Reason for Incompleted Scans

Calibration Checks			
Instrument		Examination System	
Time	Date	Time	Date

FIGURE 5

Additional Sheets Attached:
Continuation ______ Supplements ______

Examiner(s):
1. ______ SNT-TC-1A Level ______
2. ______ SNT-TC-1A Level ______

Date: ______

NUCLEAR ENERGY SERVICES, INC.

WELD SCAN DATA SHEET

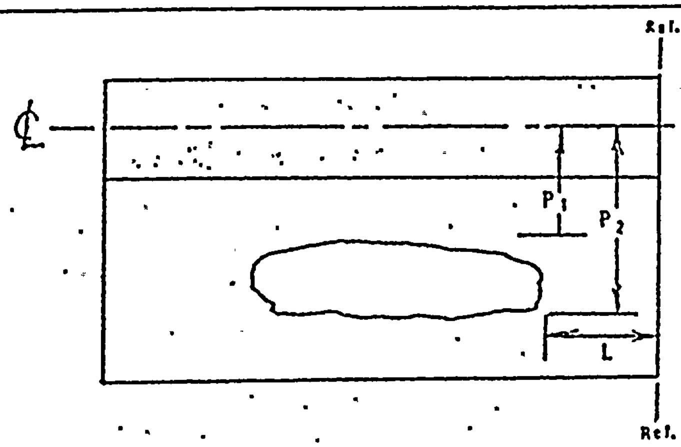
SUPPLEMENT A

(BASE METAL)

Procedure No.: NIP 562
Subject: C.H.NOZZLE TO FLANGE WELD
Issue Date: 9-26-75
Revision No.: 0; Date: ____
Page 24 of 26

Weld No. ____________ Sheet ______ of ______

Calibration Data Sheet No. ____________ Back Echo Amplitude ____________



Note: Location increments are not to exceed allowable scan increments.

Indication No.	Depth	L(inches)	P1	P2.	Echo(% FSH)	Back(% FSH)

FIGURE 5A

Examiner(s):

1. ____________ SNT-TC-1A Level ______

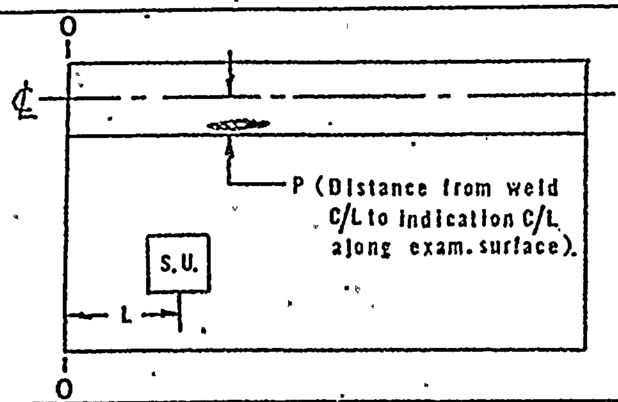
2. ____________ SNT-TC-1A Level ______

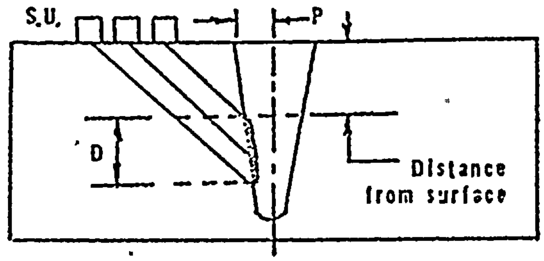
Date: ____________

WELD SCAN DATA SHEET SUPPLEMENT B	Procedure No.: NIP 562 Subject: C.H.NOZZLE TO FLANGE WELD Issue Date: 9-26-75 Revision No.: 0; Date: Page 25 of 26

Weld No. ______________________ Sheet ________ of ________

Calibration Data Sheet No. ______________ EXAM. ANGLE ______________





Note: Location increments are not to exceed allowable scan increments.

Ind. No.	BEAM DIR.	L Location	Max. % DAC	Dist. From Surface	P	50% Forward		50% Back		Depth (D)	
						Dist. From Surface	P	Dist. From Surface	P	Inches	% T

NOTE:

- End points of L are the smaller of 50% DAC or 50% Max.

FIGURE 5B

Examiner(s):

1. ______________________ SNT-TC-1A Level ________

2. ______________________ SNT-TC-1A Level ________

Date: ______________

NUCLEAR ENERGY SERVICES, INC.

TABLE I

WELD IDENTIFICATION

NUCLEAR COMPONENTS

Weld No.	Description	Ref. Block	Reference Figures	Notes
CH-2-576A-w thru CH-2-576M-w (N7A thru N7M)	Closure Head safety valve or instrument nozzle to flange weld. (outer ring)	P8R-1.5-2	1,2	9" O. D., 1.5" wall
CH-4-576A-w thru CH-4-576F-w (N7N thru N7U)	(inner ring)	P8R-1.5-2	1,2	9" O. D., 1.5" wall
CH-6-576-w (N8)	Closure Head vent nozzle to flange weld	P8R-1.5-3	1,2	6-3/8" O. D., 1-7/32" wall

Procedure No.: NIP 563
Subject: Nozzle to Safe-end Welds
Issue Date: November 18, 1975
Revision No.: 0; Date:
Page 1 of 26

ULTRASONIC EXAMINATION PROCEDURES FOR NOZZLE TO SAFE-END WELDS

NIAGARA MOHAWK POWER CORPORATION

NINE-MILE POINT, UNIT 1

Originator(s):

Signature Date

5-7-76

Signature Date

Approved by:

N.E.S.I. SNT-TC-1A Level III 6-3-76

Signature Date

N.M.P.C. SNT-TC-1A Level III

Signature Date

NUCLEAR ENERGY SERVICES, INC.

RECORD OF REVISIONS

Revision Number	Date	Description	Reason	Originator	NMPC	NESI-

ULTRASONIC EXAMINATION PROCEDURES FOR NOZZLE TO SAFE-END WELDS

1.0 SCOPE

1.1 Area of Examination

1.1.1 This document covers the ultrasonic examination procedures for:

(1) Steam Outlet (Emergency Condensate) Nozzle to Safe-End Welds (E-231-566)
(2) CRD Return Nozzle to Safe-End Weld (E231-567)
(3) Core Spray Nozzle to Safe-End Welds (E-231-567)
(4) Recirculation Outlet Nozzle to Safe-End Welds (E-231-565)

1.2 Type of Examination

1.2.1 Volumetric examination shall be performed using ultrasonic pulse echo 45° angle beam shear wave and 0° straight beam techniques applied to the outside surfaces of the Safe-ends.

1.2.2 The examination shall be performed manually using contact search units and/or scan fixtures.

1.3 Time of Examination

1.3.1 These procedures shall govern the inservice examination and re-examination of repaired areas of the nozzle to safe-end welds as required by the ASME Boiler and Pressure Vessel Code, Section XI (1974).

1.4 Weld Configuration

1.4.1 The configurations of the nozzle to safe-end welds are shown in Figure 1.

1.4.2 Nominal weld thickness covered by this procedure range from $\frac{25}{32}''$ to $1\text{-}\frac{35}{64}''$ as shown in Figure 1.

1.5 Materials

1.5.1 All nozzles specified in this procedure are constructed of low carbon steel and have a stainless steel cladding, 7/32" thick. The safe-end rings for these nozzles are constructed of stainless steel.

2.0 REFERENCES

2.1 Reference Documents

2.1.1 The following documents form a part of this examination procedure:

(1) ASME Boiler and Pressure Vessel Code, Section XI 1974 Edition, and the Summer of 1974 Addenda.

(2) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(3) CONAM Procedure for Certifying Inspection Personnel, CUTP-1, Rev. 1, September 1970.

(4) ASME Boiler and Pressure Vessel Code, Section V, 1974 Edition, and the Summer of 1974 Addenda.

2.2 Applicable Drawings

2.2.1 The following drawings form a part of this procedure:

(1) CE drawings E-231-565, E-231-566, E-231-567

2.3 Operation Manuals

2.3.1 The equipment operational manuals for the particular ultrasonic instruments used form a part of this procedure.

3.0 PROCEDURE CERTIFICATION

3.1 The examination procedures described in this document comply with Section XI of the ASME Boiler and Pressure Vessel Code, 1974 Edition, except where examination coverage is limited by part geometry or access.

4.0 PERSONNEL CERTIFICATION

4.1 Personnel Certification Requirements

4.1.1 Each person performing ultrasonic examination governed by this procedure shall be certified in accordance with the following:

(1) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(2) CONAM Inspection Inc., Procedure for Certifying Ultrasonic Test Personnel CUTP-1, Rev. 1, September 1970.

(3) ASME Boiler and Pressure Vessel Code, Section XI (1974 Ed.)

4.1.2 An examination crew shall consist of one or two members as needed. At least one member of each crew shall have a minimum qualification Level II in accordance with the above referenced documents. The remaining member(s) shall have a minimum qualification of Level I or Level I trainee.

4.2 Personnel Records

4.2.1 Records of personnel qualification shall be maintained by Examination Contractor.

4.2.2 A copy of the examiner's certification, and a current eye test as required by SNT-TC-1A shall be filed with each permanent examination record, with a copy submitted to the plant owner or his agent, prior to performing examinations per this procedure.

5.0 EXAMINATION REQUIREMENTS

5.1 Examination Frequency

5.1.1 The nominal examination frequencies shall be 2.25 MHz for all straight beam and angle beam examinations.

5.1.2 Other pulse frequencies shall be used if such variables as material attenuation, grain structure, etc., necessitate their use to achieve penetration or resolution. This information shall be recorded on the data sheets.

5.2 Examination Angles

5.2.1 Examination angles for the nozzle to safe-end welds in this procedure shall be as follows:

(1) 0° straight beam from the O.D. surface thru the weld and thru the parent material at one side of the weld.

(2) 45° angle beam two directions perpendicular to the weld axis and two directions parallel with the weld axis.

(3) Other beam angles may be used as determined necessary; i.e. for evaluation of reflectors, to compensate for geometric constraints, etc. All information shall be recorded on data sheets.

5.3 Liquid Couplant

5.3.1 The ultrasonic couplant shall be Trim Regular or Trim HD (Master Chemical Corporation, Perrysburg, Ohio).

5.3.2 The couplant shall be supplied in clean containers of sufficient quantity to facilitate the examination.

5.3.3 The couplant shall be pumped from the container to the search unit scan fixtures thru clear tygon flexible tubing or shall be applied manually with a brush or other suitable device.

5.3.4 Where required, the examiner shall be responsible for removing couplant from the examination surface at the conclusion of the examination.

5.4 Surface Preparation

5.4.1 All examination surfaces should be clean and free of dirt, weld spatter, etc., or any other condition which would interfere with the examination or impair proper transmission of the sound beam.

5.4.2 Irregularity of surface contour to be contacted by the search unit should not exceed 1/8" in any 2" of surface travel. Weld crown and edges should blend smoothly into adjacent base material.

5.5 Weld Identification

5.5.1 Each weld shall be located and identified per appropriate weld maps in the Program Plan Book.

5.6 Datum Point

5.6.1 The examiner shall permanently mark, or verify that there has been marked, a reference datum point on each weld from which all examination data and reported indications shall be referenced.

5.6.2 Datum points shall be marked by the use of low stress stamps or vibratooling and shall not be deeper than 1/64".

5.6.3 The datum point for all nozzles specified in this procedure shall be located at the upper most point on the weld centerline.

5.6.4 Each weld datum point, along with respective weld reference points and divisions, shall be shown on each examination report.

5.7 Examination Coverage

5.7.1 The intent of this procedure is to provide maximum examination coverage to insure weld integrity. Each weld shall be scanned with minimum 25% overlap of the transducer element width (diameter) for each scan pass.

5.7.2 The rate of search unit movement shall not exceed six (6) inches per second.

5.7.3 Each weld and the volume of metal for 1/2T on one side of the weld shall be ultrasonically examined where part geometry and access permit using 45° angle beam techniques applied in two directions normal to the weld and in two directions parallel with the weld.

5.7.4 Straight beam techniques shall be applied, where part geometry permits, to all parent material through which the angle beams will pass during angle beam examinations. Indications detected are to be recorded in accordance with Section 11.1.1 of this procedure, except in areas where no back echo can be obtained. Indications detected shall be recorded and data used during evaluation of angle beam examination results.

5.7.4 In addition, straight beam techniques shall be applied to the weld surface and heat-affected zone where part geometry permits. Indications shall be recorded in accordance with Section 11.1.2 of this procedure. This shall include straight beam examination of parent material when no back echo is obtainable.

5.7.5 Where the examination surface or other conditions (weld, contour, access, etc.) do not permit a meaningful ultrasonic examination to be performed, the examiner shall record the area of non-examination and the particular interfering condition in the space provided on the Weld Scan Data Sheet (Figure 5).

In addition, he shall make a sketch of the weld, nozzle and safe-end conditions in the appropriate area on the same Weld Scan Data Sheet. Photos will be taken when possible and incorporated as part of the report.

6.0 EQUIPMENT REQUIREMENTS

6.1 Examination Contractor's Equipment

6.1.1 The following test equipment or its equivalent shall be provided by the Examination Contractor for examination of the Nozzle to Safe-end Welds.

(1) Pulse Echo Ultrasonic Instrument
(2) Scan Fixture, 45°, (AI No. 85C134 or 57A8407 or other)
(3) Scan Fixture, 0°, (AI No. 85C157 or other)
(4) Search Unit, ½" X ½", 2.25 MHz, or ½" Dia. 2.25 MHz
(5) Search Unit, ¼" X ¼", 2.25 MHz,
(6) Search Units, ½ X 1", 2.25 MHz or ¼" Dia., 2.25 MHz.
(7) Couplant
(8) Camera

6.2 Plant Owner's Equipment

6.2.1 The Plant Owner or his Agent shall provide the following service facilities and equipment as required:

(1) Scaffolding

(2) Water, Air and Electricity

(3) Temporaty Lighting

(4) Crane or Lifting Devices

(5) Reference Standard Number P8R-.75-1 (3.5" O.D. X 0.75"Wall)

(6) Reference Standard Number P8R-.75-3 (6.25" O.D. X 0.75"Wall)

(7) Reference Standard, Number P8R-1.5-1 (9.5" O.D. X 1.5" Wall)

(8) Reference Standard Number P8F-1.5-1 (Flat, 1.5" Wall)

(9) Radiation Monitoring Equipment

(10) Radiation Shielding

(11) Test Surface Preparation (cleaning and finishing)

(12) Drawings of each Examination Area

(13) Post Examination Cleanup of Test Area

7.0 CALIBRATION REQUIREMENTS

7.1 Reference Standards

7.1.1 The reference standards designated in 6.2.1 (5) thru (8) shall be used for basic instrument calibration and for establishing reference sensitivity levels for examination fo the nozzle to safe-end welds. See Figure 2.

7.1.2 Spot thickness checks of the components may be made to ensure that the proper reference standard is used.

7.1.3 The number of the reference standard used for performing calibration shall be recorded on each Calibration Data Sheet. Figure 4 is an example of the Calibration Data Sheet to be used with this procedure.

7.1.4 Calibration Data Sheets shall be numbered 563-1, 563-2, 563-3, etc., at the time of calibration and shall be signed by the examiner(s) upon completion.

7.1.5 Calibration procedures shall be performed using the O.D. surface of the reference standard.

7.1.6 The temperature of the reference standard shall be within 25° F of the pipe weld temperature.

7.2 Reference Sensitivity Level

7.2.1 The reference sensitivity level shall be the distance-amplitude curve initially obtained directly from the reference standard and shall be the sensitivity level used for evaluating and recording all indications.

7.2.2 During actual weld scanning, the reference sensitivity level shall be increased 2X or 6dB.

7.3 Times of Calibration

7.3.1 Basic instrument calibration shall be performed using the appropriate reference standard, search units and instrumentation immediately prior to the examination of the safe-end welds specified in this procedure.

7.3.2 Instrument calibration checks shall be performed at the beginning of each day of examination in accordance with Section 8.0 of this procedure.

7.3.3 Examination system calibration checks shall be performed at least at the beginning and at the completion of each 4 hour period of examination and/or at the change of examination personnel, equipment, search units, coupler shoes, etc., and at the completion of the examination of each similar series of welds in accordance with Sections 9.2 and 9.4 of this procedure.

7.4 Calibration Response

7.4.1 Calibration response shall be checked at the primary reference sensitivity level.

7.4.2 Signal response obtained during calibration check shall be within plus or minus 20% of that established during basic instrument calibration.

7.4.3 If any point on the Distance Amplitude Correction (DAC) curve is above or below the 20% limit, the examiner shall:

(1) Mark all weld data sheets since previous calibration void.

(2) Recalibrate examination system.

(3) Reexamine voided areas.

7.4.4 If any point on the DAC curve has moved horizontally more than 5% of the sweep line from its original settings, the examiner shall:

(1) Correct the sweep calibration and note it on the Calibration Data Sheet.

(2) Void any data sheets made since the previous calibration which have recorded indication and reexamine those areas.

8.0 INSTRUMENT CALIBRATION VERIFICATION

8.1 Amplitude Linearity

8.1.1 The linearity of the ultrasonic instrument shall be checked as follows:

(1) Position a search unit on a reference standard so that two indications are visible. (These indications may be obtained from a reference hole and back surface, from two reference holes, or from a reference hole and a corner seen simultaneously on the instrument screen.)

(2) Manipulate search unit to establish a 2 to 1 ratio of amplitudes between the two indications with the largest at 80% full screen height (FSH).

(3) Without moving search unit, adjust sensitivity (gain) to run the higher response from approximately 100% to 20% FSH in 2 dB steps (10% if fine control is available).

(4) Read and record the relative amplitudes of the two indications to the nearest 1%.

(5) If the smaller indication does not fall within 5% FSH of 50% of the larger indication, the instrument shall not be used for examinations until corrected.

8.2 <u>Amplitude Control Linearity</u>

8.2.1 The linearity of the instrument gain (attenuation) control shall be checked as follows:

(1) Position an angle beam search unit on the reference standard to obtain an 80% FSH indication from the 1/2T hole.

(2) Using amplitude control, decrease signal amplitude by 6 dB and by 12dB to obtain nominal 40% FSH and 20% FSH signals. Read and record actual signal amplitudes to closest 1%.

(3) Obtain a 40% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 6 dB to obtain a nominal 80% signal. Read and record as in (2).

(4) Obtain a 20% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 12 dB to obtain a nominal 80% FSH signal. Read and record as in (2).

(5) If the indications obtained in (2), (3) and (4) are not within ± 20% of nominal, the instrument shall not be used for examination until corrected.

9.0 EXAMINATION SYSTEM CALIBRATION

9.1 Straight Beam Calibration

9.1.1 Straight beam calibration shall be performed as follows. The appropriate combinations of search unit, reference standard and test holes for each respective weld are listed in Figure 1.

(1) Adjust the instrument sweep controls so that the examination area is displayed on the CRT screen. Mark the horizontal screen positions selected for the hole or holes directly on the CRT screen and on the chart on the Calibration Data sheet.

(2) Position search unit to obtain maximum response from the side drilled calibration hole which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on CRT screen.

(3) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet. (This completes calibration for thicknesses under one (1) inch).

(4) No DAC is necessary for weld thicknesses under one (1) inch. For weld thicknesses one (1) inch and greater a DAC shall be established as follows and as shown in Figure 3.

(a) Without changing the sensitivity obtained in (2) above position the search unit for maximum response from the remaining holes and mark amplitude on the CRT screen.

(b) Plot a DAC curve by connecting the two signal response positions with a continuous line extending over the full examination range.

(5) Record all data and instrument settings on the Calibration Data Sheet, and sign and date upon completion.

(6) Repeat steps (1) through (6) for each different weld thickness just prior to examination.

9.2 Straight Beam Calibration Check

9.2.1 Straight beam calibration check as required by Section 7.3.3 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.1.1(2).

(2) Reposition search unit at each respective test hole and observe maximum signal response amplitudes.

(3) See Section 7.4 for signal response requirements during calibration check.

9.3 Angle Beam Calibration

9.3.1 Angle beam calibration shall be performed as follows. The appropriate combinations of search unit, reference standard and test holes for each respective weld are listed in Figure 1 & Table I.

(1) Adjust the instrument sweep controls so that the examination area is displayed on the CRT screen. Mark the horizontal screen positions selected for the hole or holes directly on the CRT screen and on the chart on the Calibration Data Sheet.

(2) Position search unit to obtain maximum response from the calibration hole (3/4T or 1-1/2T) which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on CRT screen.

(3) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(4) Where required, DAC curves for angle beam examinations shall be established as follows and as shown in Figure 3.

Weld Thickness Less Than One (1) Inch

(a) Position the search unit for maximum response from the calibration hole at the $1\frac{1}{2}$T position. Adjust the instrument sensitivity controls to provide a signal amplitude of 80% of FSH and mark location and amplitude on the CRT screen. (See 9.3.1(2))

(b) Without changing sensitivity, position the search unit for maximum responses from the calibration hole at the $\frac{1}{2}$T, $2\frac{1}{2}$T and $3\frac{1}{2}$ T positions respectively and mark location and amplitudes on the CRT screen.

(c) Plot a DAC curve by connecting the signal response positions with a continuous line extending over the full examination range.

Weld Thickness: One (1) Inch and Greater

(a) Position the search unit for maximum response from the calibration hole at the 3/4T position. Adjust the instrument sensitivity controls to provide a signal amplitude of 80% of FSH and mark location and amplitude on the CRT screen. (See 9.3.1(2)).

(b) Without changing sensitivity, position the search unit for maximum responses from the calibration hole at the 1/4T, 1-1/4T, and 1-3/4T positions respectively and mark location and amplitudes on the CRT screen.

(c) Plot a DAC curve by connecting the signal response positions with a continuous line extending over the full examination range.

(5) Instrument is now calibrated for examination of welds of the thickness for which calibration was just performed.

(6) Record all data and instrument settings on the Calibration Data Sheet, and sign upon completion.

(7) Repeat steps (1) through (6) for each different weld thickness just prior to examination.

9.4 Angle Beam Calibration Check

9.4.1. Angle beam calibration check as required by Section 7.3.2 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.3.1(2).

(2) Reposition search unit at each respective test hole and observe signal response amplitudes.

(3) See Section 7.4 for signal response requirements during calibration check.

10.0 EXAMINATION PROCEDURES

10.1 Straight Beam Examination

10.1.1 Straight beam examination of the weld and heat affected zone shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.1.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer element width (diameter) for each scan pass.

10.1.3 See Table I and Figure 1 for scan path distances and weld identifications.

10.1.4 Continue scanning sequences until all welds have been examined. Examination shall not be considered complete until all recordable indications have been evaluated per 11.1.2.

10.2 Straight Beam Examination of Base Material for Laminations

10.2.1 Straight beam examination of all base material through which the angle beams will pass during angle beam examination shall be performed at a sensitivity level which gives a minimum back reflection signal amplitude of 50% of FSH.

10.2.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer element width (diameter) for each scan pass.

10.2.3 See Table I and Figure 1 for scan path distances and weld identifications.

10.2.4 Continue scanning until all welds have been examined. Examination shall not be considered complete until all recordable indications have been evaluated per 11.1.1.

10.3 Angle Beam Examinations

10.3.1 All angle beam examinations shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.3.2 The search unit shall be swivelled to ensure maximum coverage as it is moved along a rectilinear scan pattern allowing a minimum of 25% overlap of the transducer element width (diameter).

10.3.3 See Table I and Figure 1 for scan path distances and weld identifications.

10.3.4 Continue scanning until all welds have been examined. Equipment must not be removed from weld area or disassembled until all indications have been evaluated.

11.0 EVALUATION CRITERIA

11.1 Recording of indications

11.1.1 For straight beam examinations of base metal for laminations, all areas giving indications equal to or greater than the remaining back reflection shall be recorded on the appropriate data sheet prior to angle beam examination of the weld and heat-affected zone.

(1) Each recorded area shall be identified as to distance from surface, length and position relative to the weld datum point..

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter (width).

11.1.2 For straight beam and angle beam examinations of weld and heat-affected zone, all indications showing a signal amplitude response equal to or greater than 20% of the reference response shall be recorded on the appropriate data sheet at the time of weld examination and prior to removing equipment.

(1) Each recorded indication shall be identified as to depth (as percent of thickness), distance from surface, length, signal amplitude and location relative to the weld datum point.

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter (width).

11.1.3 Indications from all nozzle to safe-end welds shall be recorded in inches, towards or away from the appropriate component, from the weld centerline, and in inches CW or CCW from the datum point when looking along the center axis of the nozzle towards the center of the component.

11.2 Evaluation of Indications

11.2.1 Evaluation of all indications shall be made at the reference sensitivity and in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWB-3000.

Results of this evaluation shall be reported to the Plant Owner or his Agent in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWA-6000. Disposition of evaluation results shall be made in accordance with the Owner's Plant Procedures.

12.0 EXAMINATION RECORDS

12.1 Certification of Records

12.1.1 The examiner shall complete and sign the appropriate Weld Scan Data Sheet(s) immediately upon the completion of each weld examination.

12.2 Filing of Records

12.2.1 The examiner shall be responsible for submitting to the Plant Owner, or his Agent, a completely documented set of examination records including certification of personnel qualifications with a current eye test report in accordance with SNT-TC-1A.

13.0 EXAMINER'S CRITIQUE

13.1 Procedure Corrections and Additions

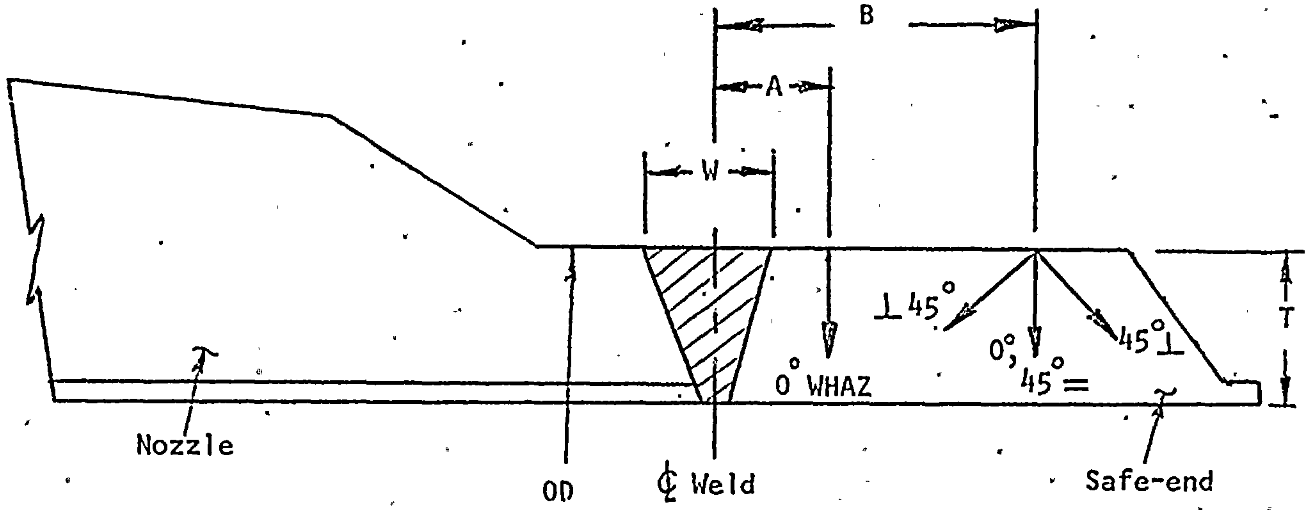
13.1.1 All procedure corrections and/or additions required during the inservice examinations shall be made in accordance with requirements of NES QA Plan # NES 81A 0402 and documented in the record of revisions section of this procedure.

13.2 Critique Report

Upon completion of the examination of all nozzle to safe-end welds specified in this procedure, the examiner shall submit a written report to the Plant Owner or his Agent listing pertinent information for future examinations such as procedure additions, corrections and revisions or unique problems or actions to be taken.

13.3 Additional Examinations

When indications exceeding allowable standards are found, additional examinations shall be performed as stipulated in Section XI, paragraph IWB-2430.

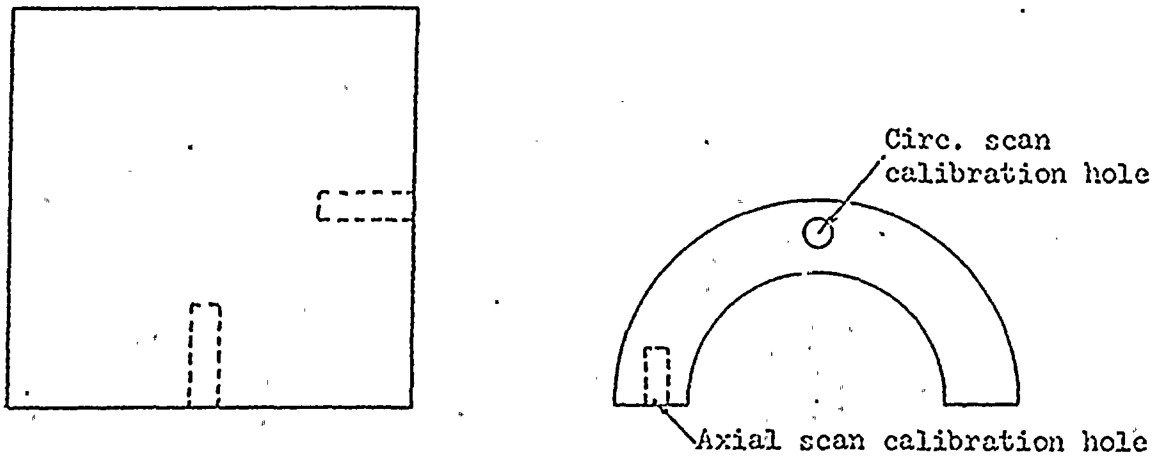


Nozzle	Nominal Size	OD	T	A	B	Reference Standard	0° Search Unit	Angle Search Unit	Scan-Fix
CRD	3"	5-1/8"	.9"	See Note	See Note	P8R-.75-1	½" Dia.	¼"x¼"	See Par. 6.1.1
Core Spray	6"	7-3/8"	25/32"	↓	↓	P8R-.75-3	↓	↓	↓
Emerg. Cond.	10"	$11\text{-}\frac{5}{8}$"	1-1/8"	↓	↓	P8R-1.5-1	↓	↓	↓
Recirc. Outlet	28"	$29\text{-}\frac{7}{32}$"	$1\text{-}\frac{35}{64}$"	↓	↓	P8F-1.5-1	↓	½"x½"	↓

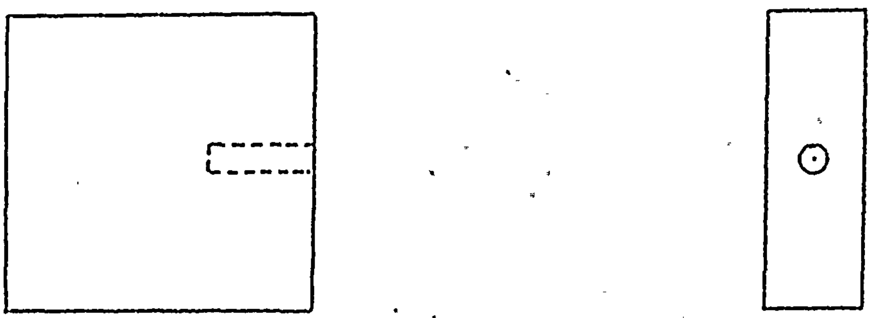
Note: $A = W + \frac{1}{2}T$
$B = W + 2\frac{1}{2}T$ for $T > 1"$
$W + 3\frac{1}{2}T$ for $T \leq 1"$

Search unit designations are intended as guide only and are to be used at operator's discretion. For example, a ½" diameter search unit may be used in place of a ½" x ½" search unit.

Figure 1. Ultrasonic Examination Procedure for Nozzle to Safe-end Welds.

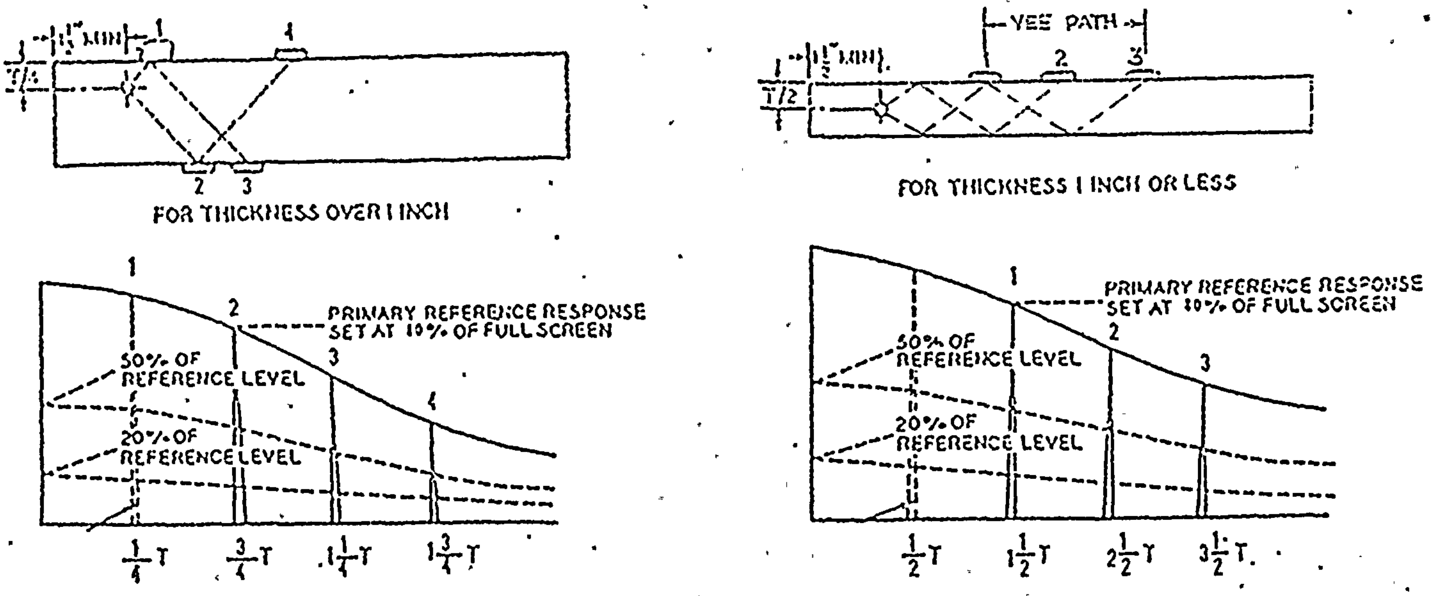


Ref. Std. No.	O.D.	Wall Thickness	Hole Dia.	Hole Depth	Hole Length	Pipe O.D. Range
P8R-.75-1	3.50"	0.75"	3/32"	1/2T	1½" Min	3.15" - 5.25"
P8R-1.5-1	9.50"	1.5 "	1/8"	1/4T	1½" Min	8.55" - 14.25"
P8R-.75-3	6.25"	0.75"	3/32"	1/2T	1½" Min	5.51" - 9.19"

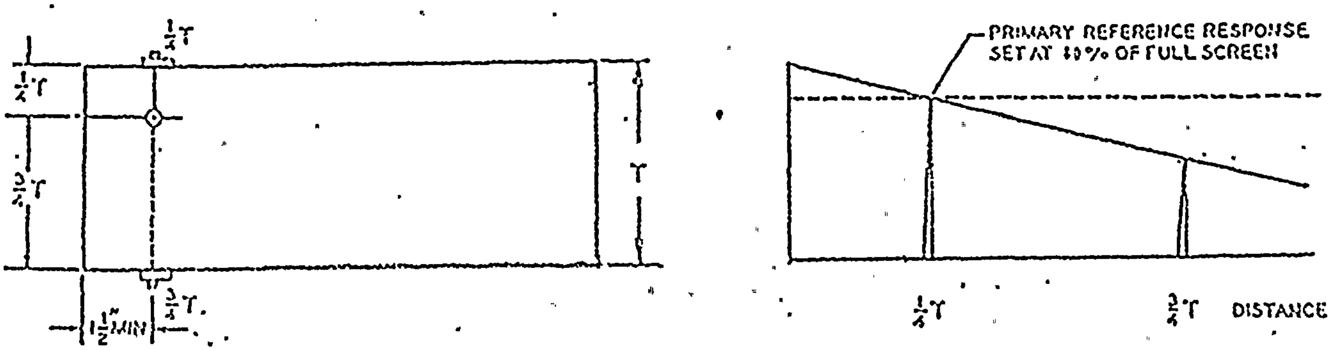


Ref. Std. No.	O.D.	Wall Thickness	Hole Dia.	Hole Depth	Hole Length	Pipe O.D. Range
P8F-1.5-1	Flat	1.5"	1/8"	1/4T	1½" Min	Greater than 20.00"

Figure 2. Ultrasonic Reference Standards for Nozzle to Safe-end Welds.



Search Unit Locations & DAC Curves for Angle Beam Calibration



Search Unit Locations & DAC Curve for Straight Beam Calibration

NOTE: For straight beam calibration on welds under 1" thick, use 1/2T hole only, no DAC required.

Step 1 - Adjust sweep controls so that the entire examination area is displayed on CRT screen.
Step 2 - Adjust sensitivity to provide 80% FSH indication from hole giving maximum response - mark position on screen.
Step 3 - Position search unit for maximum response from remaining holes - mark position on screen.
Step 4 - Plot DAC by connecting points marked on screen with line extended to cover entire examination range.
Step 5 - Record all sweep and sensitivity control settings on respective data sheets.

Figure 3. Reference Sensitivity and DAC Calibration Procedures for Ultrasonic Examination of Welds.

CALIBRATION DATA SHEET NO. 563-1
MANUAL EXAMINATION

EXAMINATION AREA ______

TRANSDUCER IDENTIFICATION

STYLE OR TYPE NO. ______
SIZE ______
FREQUENCY ______
SERIAL NO. ______
ANGLE & MODE ______
BEAM DIRECTION (= or ⊥ to weld) ______
SCAN FIXTURE ______

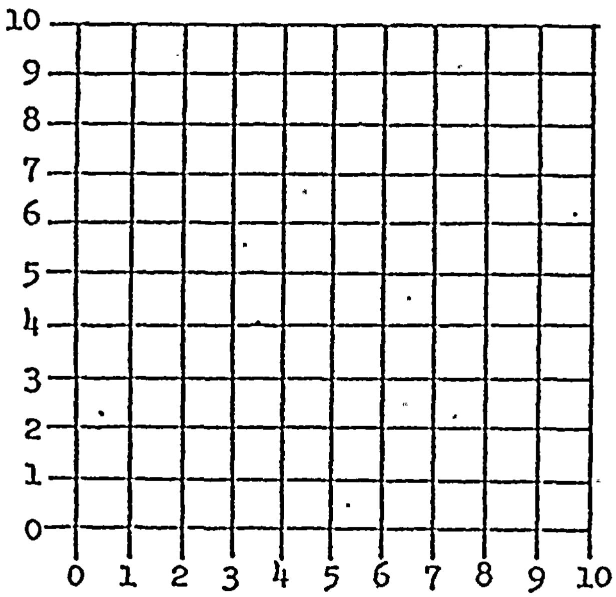
CALIBRATION BLOCK

ID NO. ______
SIZE ______
EXAMINATION SURFACE ______

Hole IDENT	Depth IN.	Amp. %	Atten. dB

TEMPERATURE = Ref. Std. ______
Component ______

DAC PLOT



ULTRASONIC INSTRUMENT

MODEL NO. ______
SERIAL NO. ______

CONTROL SETTINGS

PULSE LENGTH ______
FREQUENCY ______
dB GAIN ______
SWEEP LENGTH ______
SWEEP DELAY ______
VIDEO FILTER ______
REJECT ______
COUPLANT ______

INSTRUMENT LINEARITY CALIBRATION

Amplitude			
High	Low	High	Low
1.		5.	
2.		6.	
3.		7.	
4.		8.	

AMPLITUDE CONTROL LINEARITY

Initial	Δ dB	Result	Limit
80	-6		32% - 48%
80	-12		16% - 24%
40.	+6		64% - 96%
20	+12		64% - 96%

EXAMINER(S) (Signature Required)

1. ______ SNT-TC-1A Level ______
2. ______ SNT-TC-1A Level ______

DATE: ______ TIME: ______

Reviewed by: ______

Figure 4.

NUCLEAR ENERGY SERVICES, INC.

WELD SCAN DATA SHEET	Procedure No.: NIP563-
1. Calibration Data Sheet No. ________	Subject: Nozzle to Safe-end Welds
2. Examination Angle ________	Issue Date: November 18, 1975
3. Area of Examination ________	Revision No.: 0; Date:
4. Examination Surface ________	Page 23 of 26

Weld, Item or Scan No.	Scan Completion				No Reportable Indications	Reportable Indications	Supplement Attached	Comments: Reason for Incompleted Scans
	0° Base Metal	0° WHAZ	Normal to Weld Centerline	Parallel to Weld Centerline				

Calibration Checks			
Instrument		Examination System	
Time	Date	Time	Date

Additional Sheets Attached:

Continuation ________ Supplements ________

Examiner(s):

1. ________________ SNT-TC-1A Level ________

2. ________________ SNT-TC-1A Level ________

Date: ________________

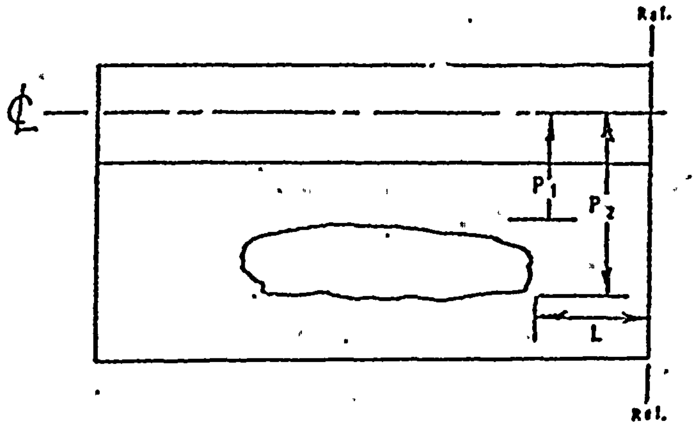
NUCLEAR ENERGY SERVICES, INC.

Figure 5.

WELD SCAN DATA SHEET SUPPLEMENT A (BASE METAL)	Procedure No.: NIP 563 Subject: Nozzle to Safe-end Welds Issue Date: November 18, 1975 Revision No.: 0; Date: Page 24 of 26

Weld No. ______________ Sheet ______ of ______

Calibration Data Sheet No. ______________ Back Echo Amplitude ______________



Note: Location increments are not to exceed allowable scan increments.

Indication No.	Depth	L(inches)	P1	P2	Echo(% FSH)	Back(% FSH)

Examiner(s):

1. ______________ SNT-TC-1A Level ______

2. ______________ SNT-TC-1A Level ______

Date: ______________

Figure 5A

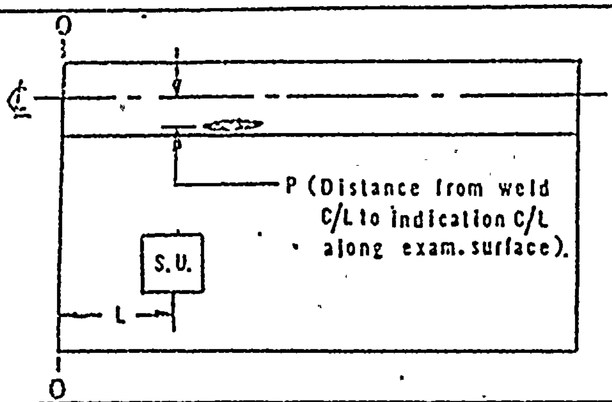
NUCLEAR ENERGY SERVICES, INC.

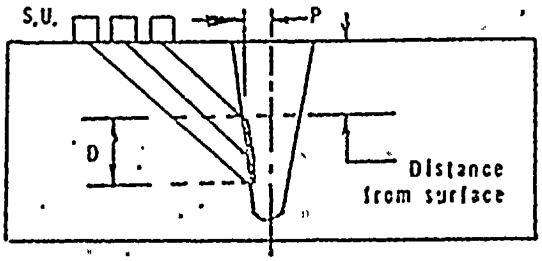
WELD SCAN DATA SHEET

SUPPLEMENT B

Weld No. ______________________ Sheet ________ of __________

Calibration Data Sheet No. ______________ EXAM. ANGLE ______________





<u>Note:</u> Location increments are not to exceed allowable scan increments.

Ind. No.	BEAM DIR.	L Location	Max % DAC	Dist. From Surface	P	50% Forward		50% Back		Depth (D)	
						Dist. From Surface	P	Dist. From Surface	P	Inches	% T

<u>NOTE:</u>
End points of L are the smaller of 50% DAC or 50% Max.

FIGURE 5B

Examiner(s):

1. ______________________ SNT-TC-1A Level ________

2. ______________________ SNT-TC-1A Level ________

Date: ______________

NUCLEAR ENERGY SERVICES, INC.

TABLE I

WELD IDENTIFICATION

NUCLEAR COMPONENTS

Weld No.	Description	Ref. Block	Reference Figures	Notes *
RV-1-566 A-w	Emerg. Condensate	P8R-1.5-1	Fig.1 Weld Fig.2 Ref.Std.	70°
RV-1-566B-w	Emerg. Condensate	P8R-1.5-1	↓	290°
RV-5-567-w	CRD Return	P8R-.75-1	↓	270°
RV-1-567A-w	Core Spray	P8R-.75-3	↓	60°
RV-1-567B-w	Core Spray	P8R-.75-3	↓	240°
RV-4-565A-w thru RV-4-565E-w	Recirc. Outlet	P8F-1.5-1	↓	Located respectively at 42°, 114°, 186°, 258°, 330°

*All angles measured CW from vessel 0°.

ULTRASONIC EXAMINATION PROCEDURES FOR EMERGENCY CONDENSER DOME AND NOZZLE WELDS

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT, UNIT 1

Originator(s):

Signature Date

5-7-76

Signature Date

Approved by:

N.E.S.I. SNT-TC-1A Level III 6-3-76

Signature Date

N.M.P.C. SNT-TC-1A Level III

Signature Date

NUCLEAR ENERGY SERVICES, INC.

RECORD OF REVISIONS

Revision Number	Date	Description	Reason	Originator	NMPC	NESI

ULTRASONIC EXAMINATION PROCEDURES FOR EMERGENCY CONDENSER DOME AND NOZZLE WELDS

1.0 SCOPE

1.1 Area of Examination

1.1.1 This document covers the ultrasonic examination procedures for:

(1) Emergency Condenser Dome to shell welds shown in Figure 1.

(2) Emergency Condenser supply and return nozzle to vessel welds shown in Figure 2.

1.2 Type of Examination

1.2.1 Volumetric examination shall be performed using ultrasonic pulse echo angle beam shear wave and 0° straight beam techniques applied to the outside surfaces of the emergency condenser.

1.2.2 The examination shall be performed using manual search units and/or scan fixtures.

1.3 Time of Examination

1.3.1 These procedures shall govern the inservice examination and re-examination of repaired areas of the pipe welds as required by the ASME Boiler and Pressure Vessel Code, Section XI (1974).

1.4 Weld Configuration

1.4.1 The Dome and nozzle weld configurations covered by this procedure are shown in Figures 1,and 2.

1.4.2 Nominal weld thickness is 1.25" as shown in Figures 1 and 2.

1.5 Materials

1.5.1 The emergency condenser dome and nozzles are constructed of austenitic stainless steel.

2.0 REFERENCES

2.1 Reference Documents

2.1.1 The following documents form a part of this examination procedure:

(1) ASME Boiler and Pressure Vessel Code, Section XI 1974 Edition, and the Summer of 1974 Addenda.

(2) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(3) CONAM Procedure for Certifying Inspection Personnel, CUTP-1, Rev.1, September 1970.

(4) ASME Boiler and Pressure Vessel Code, Section V, 1974 Edition, and the Summer of 1974 Addenda.

2.2 Applicable Drawings

2.2.1 The following drawings form a part of this procedure:

(1) Foster Wheeler assembly drawing M-655-27 Rev.D.

2.3 Operation Manuals

2.3.1 The equipment operational manuals for the particular ultrasonic instruments used form a part of this procedure.

3.0 PROCEDURE CERTIFICATION

3.1 The examination procedures described in this document comply with Section XI of the ASME Boiler and Pressure Vessel Code, 1974 Edition, except where examination coverage is limited by part geometry or access.

4.0 PERSONNEL CERTIFICATION

4.1 Personnel Certification Requirements

4.1.1 Each person performing ultrasonic examination governed by this procedure shall be certified in accordance with the following:

(1) ASNT Recommended Practice, SNT-TC-1A, Supplement C, Third Edition (1971).

(2) CONAM Inspection Inc., Procedure for Certifying Ultrasonic Test Personnel CUTP-1, Rev. 1, September 1970.

(3) ASME Boiler and Pressure Vessel Code, Section XI (1974 Ed.)

4.1.2 An examination crew shall consist of one or two members as needed. At least one member of each crew shall have a minimum qualification Level II in accordance with the above referenced documents. The remaining member(s) shall have a minimum qualification of Level I or Level I trainee.

4.2 Personnel Records

4.2.1 Records of personnel qualification shall be maintained by Examination Contractor.

4.2.2 A copy of the examiner's certification, and a current eye test as required by SNT-TC-1A shall be filed with each permanent examination record, with a copy submitted to the plant owner or his agent, prior to performing examinations per this procedure.

5.0 EXAMINATION REQUIREMENTS

5.1 Examination Frequency

5.1.1 The nominal examination frequencies shall be 2.25 MHz for all straight beam and angle beam examinations.

5.1.2 Other pulse frequencies shall be used if such variables as material attenuation, grain structure, etc., necessitates their use to achieve penetration or resolution. This information shall be recorded on the data sheets.

5.2 Examination Angles

5.2.1 Examination angles for those welds specified in this procedure shall be as follows:

(1) 0° straight beam from the O.D. surface one direction thru the weld and thru the parent material as indicated in Figures 1 and 2.

(2) 45° angle beam two directions perpendicular to the weld axis and two directions parallel with the weld axis, as indicated in Figures 1 and 2.

(3) Other beam angles may be used as determined necessary; i.e. for evaluation of reflectors, to compensate for geometric constraints, etc. All information shall be recorded on the data sheets

5.3 Liquid Couplant

5.3.1 The ultrasonic couplant shall be Trim Regular or Trim HD (Master Chemical Corporation, Perrysburg, Ohio).

5.3.2 The couplant shall be supplied in clean containers of sufficient quantity to facilitate the examination.

5.3.3 The couplant shall be pumped from the container to the search unit scan fixtures thru clear tygon flexible tubing or shall be applied manually with a brush or other suitable device.

5.3.4 Where required, the examiner shall be responsible for removing couplant from the examination surface at the conclusion of the examination.

5.4 Surface Preparation

5.4.1 All examination surfaces should be clean and free of dirt, weld spatter, etc., or any other condition which would interfere with the examination or impair proper transmission of the sound beam.

5.4.2 Irregularity of surface contour to be contacted by the search unit should not exceed 1/8" in any 2" of surface travel. Weld crown and edges should blend smoothly into adjacent base material.

5.5 Weld Identification

5.5.1 Each weld shall be located and identified per appropriate weld maps in the Program Plan Book.

5.6 Datum Point

5.6.1 The examiner shall permanently mark, or verify that there has been marked, a reference datum point on each weld from which all examination data and reported indications shall be referenced.

5.6.2 Datum points shall be marked by the use of low stress stamps or vibratooling and shall not be deeper than 1/64".

5.6.3 The datum point for all welds shall be located at the highest point on the weld at the weld centerline.

5.6.4 Each weld datum point, along with respective weld reference points and divisions, shall be shown on each examination report.

5.7 Examination Coverage

5.7.1 The intent of this procedure is to provide maximum examination coverage to insure weld integrity. Each weld shall be scanned with minimum 25% overlap of the transducer element width (diameter) for each scan pass.

5.7.2 The rate of search unit movement shall not exceed six (6) inches per second.

5.7.3 Each weld and the volume of metal for 1/2T on the side (s) the weld shall be ultrasonically examined where part geometry and access permit using 45^{o} angle beam techniques applied in the direction (s) indicated in Figures 1 and 2.

5.7.4 Straight beam techniques shall be applied, where part geometry permits, to all parent material through which the angle beams will pass during angle beam examinations. Indications detected are to be recorded in accordance with Section 11.1.1 of this procedure, except in areas where no back echo can be obtained. Indications detected shall be recorded and data used during evaluation of angle beam examination results.

5.7.5 Straight beam techniques shall be applied to the weld surface, and heat-affected zone where part geometry permits. Indications shall be recorded in accordance with Section 11.1.2 of this procedure.

5.7.6 Where the examination surface, geometry, or other conditions (weld, contour, access, etc.) do not permit a meaningful ultrasonic examination to be performed, the examiner shall record the area of non-examination and the particular interfering condition in the space provided on the Weld Scan Data Sheet. In addition, he shall make a sketch of the weld and adjacent part and fitting conditions in the appropriate area on the same Weld Scan Data Sheet. (See Figure 6.) Photos will be taken when possible and incorporated as part of the report.

6.0 EQUIPMENT REQUIREMENTS

6.1 Examination Contractor's Equipment

6.1.1 The following test equipment or its equivalent shall be provided by the Examination Contractor for examination of welds specified in this procedure.

(1) Pulse echo ultrasonic instrument
(2) Scan Fixture, 45°, (AI No. 85C134, or 57A8407 or other)
(3) Scan Fixture, 0°, (AI No. 85C157, or other)
(4) Search Unit, 0°, ½" Dia., 2.25 MHz
(5) Search Unit, ½" X 1", 2.25 MHz
(6) Search Unit, 45°, ½" X ½", 2.25 MHz or 1" dia.
(7) Search Unit, 45°, ½" X ½", 2.25 MHz or ½" dia.
(8) Search Unit, 0°, ½" Dia, 5.0 MHz.
(9) Couplant
(10) Camera

6.2 Plant Owner's Equipment

6.2.1 The Plant Owner or his Agent shall provide the following service facilities and equipment as required:

(1) Scaffolding

(2) Water, Air and Electricity

(3) Temporary Lighting

(4) Crane or Lifting Devices

(5) Reference Standard No. P8F-1.5-1 (Flat X 1.5" wall)

(6) Radiation Monitoring Equipment

(7) Radiation Shielding

(8) Test Surface Preparation (cleaning and finishing)

(9) Drawings of each Examination Area

(10) Post Examination Cleanup of Test Area

7.1 Reference Standards

7.1.1 The reference standard designated in 6.2.1 (5) shall be used for basic intrument calibration and for establishing reference sensitivity levels for examination of the welds and parent material specified in this procedure. See Figures 1 and 2.

7.2 7.1.2 The appropriate reference standard corresponding to each respective weld thickness shall be recorded on each Calibration Data Sheet. Figure 5 is an example of the Calibration Data Sheet to be used with this procedure.

7.1.3 Calibration Data Sheets shall be numbered 564-1, 564-2, 564-3, etc., at the time of calibration and shall be signed by the examiner(s) upon completion.

7.1.4 Calibration procedures shall be performed using the O.D. surface of the reference standard.

7.1.5 The temperature of the reference standard shall be within 25°F of the pipe weld temperature.

7.2 Reference Sensitivity Level

7.2.1 The reference sensitivity level shall be the distance-amplitude curve initially obtained directly from the reference standard and shall be the sensitivity level used for evaluating and recording all indications.

7.2.2 During actual weld scanning, the reference sensitivity level shall be increased 2X or 6dB.

7.3 Times of Calibration

7.3.1 Basic instrument calibration shall be performed using the appropriate reference standard, search units and instrumentation immediately prior to the examination of the welds specified in this procedure.

7.3.2 Instrument calibration checks shall be performed at the beginning of each day of examination in accordance with Section 8.0 of this procedure.

7.3.3 Examination system calibration checks shall be performed at least at the beginning and at the completion of each 4 hour period of examination and/or at the change of examination personnel, equipment, search units, coupler shoes, etc., and at the completion of the examination of each similar series of welds in accordance with Sections 9.2 and 9.4 of this procedure.

7.4 Calibration Response

7.4.1 Calibration response shall be checked at the primary reference sensitivity level.

7.4.2 Signal response obtained during calibration check shall be within plus or minus 20% of that established during basic instrument calibration.

7.4.3 If any point on the Distance Amplitude Correction (DAC) curve is above or below the 20% limit, the examiner shall:

(1) Mark all weld data sheets since previous calibration void.

(2) Recalibrate examination system.

(3) Reexamine voided areas.

7.4.4 If any point on the DAC curve has moved horizontally more than 5% of the sweep line from its original settings, the examiner shall:

(1) Correct the sweep calibration and note it on the Calibration Data Sheet.

(2) Void any data sheets made since the previous calibration which have recorded indication and reexamine those areas.

8.0 INSTRUMENT CALIBRATION VERIFICATION

8.1 Amplitude Linearity

8.1.1 The linearity of the ultrasonic instrument shall be checked as follows:

(1) Position a search unit on a reference standard so that two indications are visible. (These indications may be obtained from a reference hole and back surface, from two reference holes, or from a reference hole and a corner seen simultaneously on the instrument screen.)

(2) Manipulate search unit to establish a 2 to 1 ratio of amplitudes between the two indications with the largest at 80% full screen height (FSH).

(3) Without moving search unit, adjust sensitivity (gain) to run the higher response from approximately 100% to 20% FSH in 2 dB steps (10% if fine control is available).

(4) Read and record the relative amplitudes of the two indications to the nearest 1%.

(5) If the smaller indication does not fall within 5% FSH of 50% of the larger indication, the instrument shall not be used for examinations until corrected.

8.2 Amplitude Control Linearity

8.2.1 The linearity of the instrument gain (attenuation) control shall be checked as follows:

(1) Position an angle beam search unit on the reference standard to obtain an 80% FSH indication from the 1/2T hole.

(2) Using amplitude control, decrease signal amplitude by 6 dB and by 12dB to obtain nominal 40% FSH and 20% FSH signals. Read and record actual signal amplitudes to closest 1%.

(3) Obtain a 40% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 6 dB to obtain a nominal 80% signal. Read and record as in (2).

(4) Obtain a 20% FSH indication from the 1/2T hole and increase amplitude with the amplitude control by 12 dB to obtain a nominal 80% FSH signal. Read and record as in (2).

(5) If the indications obtained in (2), (3) and (4) are not within ± 20% of nominal, the instrument shall not be used for examination until corrected.

9.0 EXAMINATION SYSTEM CALIBRATION

9.1 Straight Beam Calibration

9.1.1 Straight beam calibration shall be performed as follows: (Refer also to Figures 1 and 2 and Table 1)

(1) Adjust the instrument sweep controls so that the examination area is displayed on the CRT screen. Mark the horizontal screen positions selected for the hole or holes directly on the CRT screen and on the chart on the Calibration Data sheet.

(2) Position search unit to obtain maximum response from the side drilled calibration hole which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on CRT screen.

(3) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(4) DAC curves shall be established as follows and as shown in Figure 4.

(a) Without changing the sensitivity obtained in (2) above position the search unit for maximum response from the remaining holes and mark amplitude on the CRT screen.

(b) Plot a DAC curve by connecting the two signal response positions with a continuous line extending over the full examination range.

(5) Record all data and instrument settings on the Calibration Data Sheet, and sign and date upon completion.

9.2 Straight Beam Calibration Check

9.2.1 Straight beam calibration check as required by Section 7.3.3 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.1.1(2)

(2) Reposition search unit at each respective test hole and observe maximum signal response amplitudes.

(3) See Section 7.4 for signal response requirements during calibration check.

9.3 Angle Beam Calibration

9.3.1 Angle-beam calibration shall be performed as follows: (Refer also to Figures 1 and 2, and Table 1)

(1) Adjust the instrument sweep controls so that the examination area is displayed on the CRT screen. Mark the horizontal screen positions selected for the hole or holes directly on the CRT screen and on the chart on the Calibration Data Sheet.

(2) Position search unit to obtain maximum response from the calibration hole which gives the highest amplitude signal. Adjust sensitivity control to provide a signal amplitude of 80% of FSH and mark location and amplitude on CRT screen.

(3) This is the primary reference sensitivity. Record all sensitivity control settings on the appropriate Calibration Data Sheet.

(4) DAC curves for angle beam examinations shall be established as follows and as shown in Figure 4.

(a) Position the search unit for maximum response from the calibration hole at the 3/4T position. Adjust the instrument sensitivity controls to provide a signal amplitude of 80% of FSH and mark location and amplitude on the CRT screen. (See 9.3.1(2)).

(b) Without changing sensitivity, position the search unit for maximum responses from the calibration hole at the 1/4T, and the 3/4T positions respectively and mark location and amplitudes on the CRT screen.

(c) Plot a DAC curve by connecting the signal response positions with a continuous line extending over the full examination range.

(5) Instrument is now calibrated for examination of welds of the thickness for which calibration was just performed.

(6) Record all data and instrument settings on the Calibration Data Sheet, and sign upon completion.

9.4 Angle Beam Calibration Check

9.4.1 Angle beam calibration check as required by Section 7.3.2 shall be performed as follows:

(1) Adjust the sensitivity control settings to those recorded for the calibrated reference sensitivity. See Section 9.3.1 (2).

(2) Reposition search unit at each respective test hole and observe signal response amplitudes.

(3) See Section 7.4 for signal response requirements during calibration check.

10.0 EXAMINATION PROCEDURES

10.1 Straight Beam Examination

10.1.1 Straight beam examination of the weld and heat affected zone shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.1.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer element width (diameter) for each scan pass.

10.1.3 See Table I and Figures I and 2 for scan path distances and weld identifications.

10.1.4 Continue scanning sequences until all welds have been examined. Examination shall not be considered complete until all recordable indications have been evaluated per 11.1.2.

10.2 Straight Beam Examination of Base Material for Laminations

10.2.1 Straight beam examination of all base material through which the angle beams will pass during angle beam examination shall be performed at a sensitivity level which gives a minimum back reflection signal amplitude of 50% of FSH.

10.2.2 A rectilinear scan pattern shall be used allowing a minimum of 25% overlap of the transducer element width (diameter) for each scan pass.

10.2.3 See Table I and Figures 1 and 2 for scan patch distances and weld identifications.

10.2.4 Continue scanning sequences until all base material has been examined. Examination shall not be considered complete until all recordable indications have been evaluated per 11.1.1.

10.3 Angle Beam Examinations

10.3.1 All angle beam examinations shall be performed at a scanning sensitivity level 2X or 6 dB greater than the calibrated reference sensitivity level.

10.3.2 The search unit shall be swivelled to ensure maximum coverage as it is moved along a rectilinear scan pattern allowing a minimum of 25% overlap of the transducer element width (diameter).

10.3.3 See Table 1 and Figures 1 and 2 for scan path distances and weld identifications.

10.3.4 Continue scanning until all welds have been examined. Examination shall not be considered complete until all recordable indications have been evaluated per 11.1.2.

11.0 EVALUATION CRITERIA

11.1 Recording of Indications

11.1.1 For straight beam examinations of base metal for laminations, all areas giving indications equal to or greater than the remaining back reflection shall be recorded on the appropriate data sheet prior to angle beam examination of the weld and heat-affected zone.

(1) Each recorded area shall be identified as to distance from surface, length and position relative to the weld datum point.

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter (width).

11.1.2 For straight beam and angle beam examinations of weld and heat-affected zone, all indications showing a signal amplitude response equal to or greater than 20% of the reference response shall be recorded on the appropriate data sheet at the time of weld examination and prior to removing equipment.

(1) Each recorded indication shall be identified as to depth (as percent of thickness), distance from surface, length, signal amplitude and location relative to the weld datum point.

(2) Recorded data shall be taken on each parallel scan pass at increments not to exceed that permitted by the 25% overlap of transducer element diameter (width).

11.1.3 Indications from all welds shall be reported in inches upstream or downstream of the weld centerline and in inches CW or CCW from the weld datum point when looking with direction of flow.

11.2 Evaluation of Indications

11.2.1 Evaluation of all indications shall be made at the reference sensitivity and in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWB-3000.

Results of this evaluation shall be reported to the Plant Owner or his Agent in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI-IWA-6000. Disposition of evaluation results shall be made in accordance with the Owner's Plant Procedures.

12.0 EXAMINATION RECORDS

12.1 Certification of Records

12.1.1 The examiner shall complete and sign the appropriate Weld Scan Data Sheet(s) immediately upon the completion of each weld examination.

12.2 Filing of Records

12.2.1 The examiner shall be responsible for submitting to the Plant Owner, or his Agent, a completely documented set of examination records including certification of personnel qualifications with a current eye test report in accordance with SNT-TC-1A.

13.0 EXAMINER'S CRITIQUE

13.1 Procedure Corrections and Additions

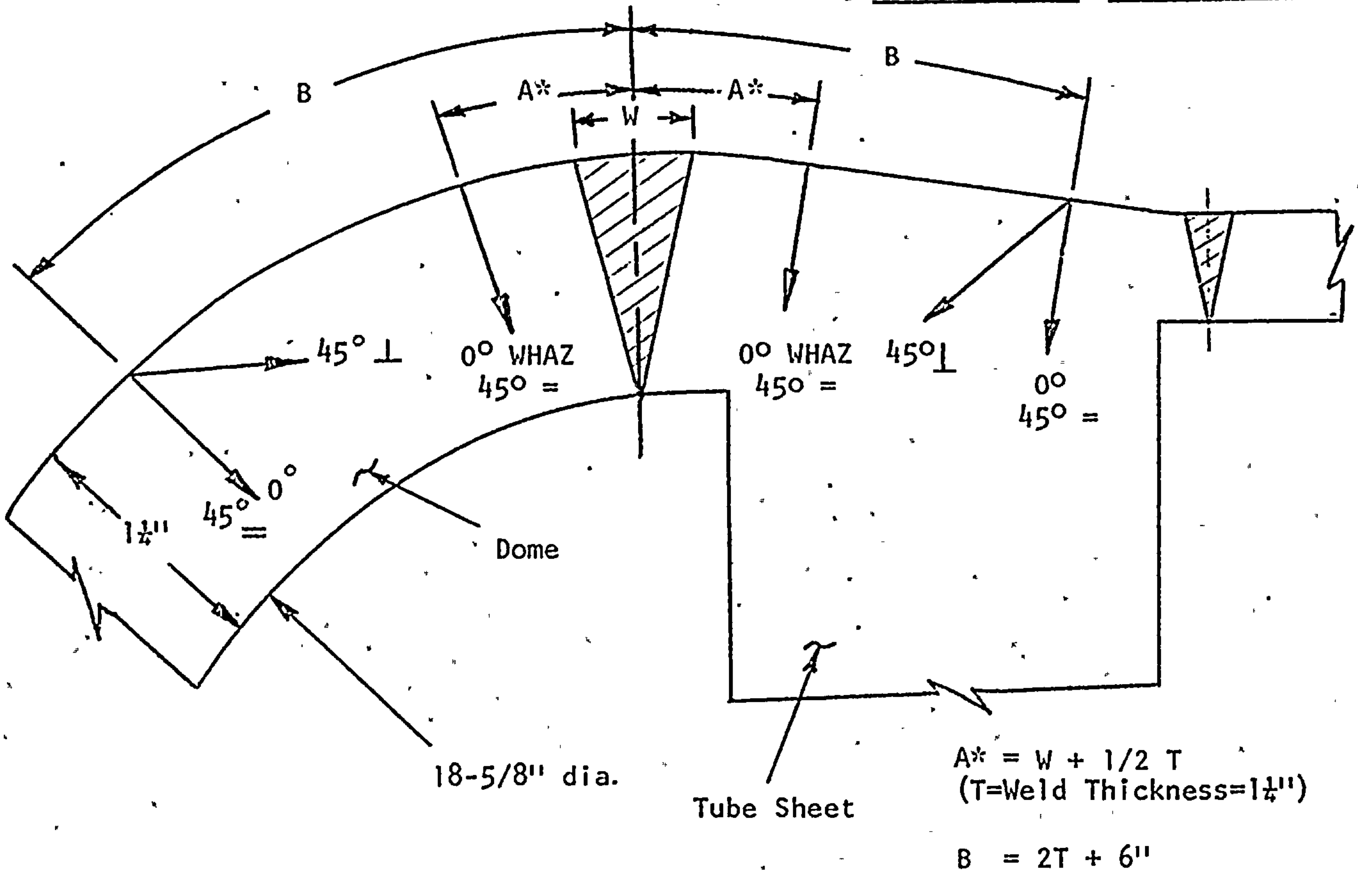
13.1.1 All procedure corrections and/or additions required during the inservice examinations shall be made in accordance with requirements of NES QA Plan # NES 81A 0402 and documented in the record of revisions section of this procedure.

13.2 Critique Report

Upon completion of the examination of all welds specified in this procedure, the examiner shall submit a written report to the Plant Owner or his Agent listing pertinent information for future examinations such as procedure additions, corrections and revisions or unique problems or actions to be taken.

13.3 Additional Examinations

When indications exceeding allowable standards are found, additional examinations shall be performed as stipulated in Section XI, paragraph IWC-2430.



SCAN PATH LEGEND

⊥ - Perpendicular to Weld

= - Parallel to Weld

* - 0° Base Metal

0° WHAZ - Weld and Heat Affected Zone

Figure 1. Ultrasonic Examination of Emergency Condenser Dome Welds.

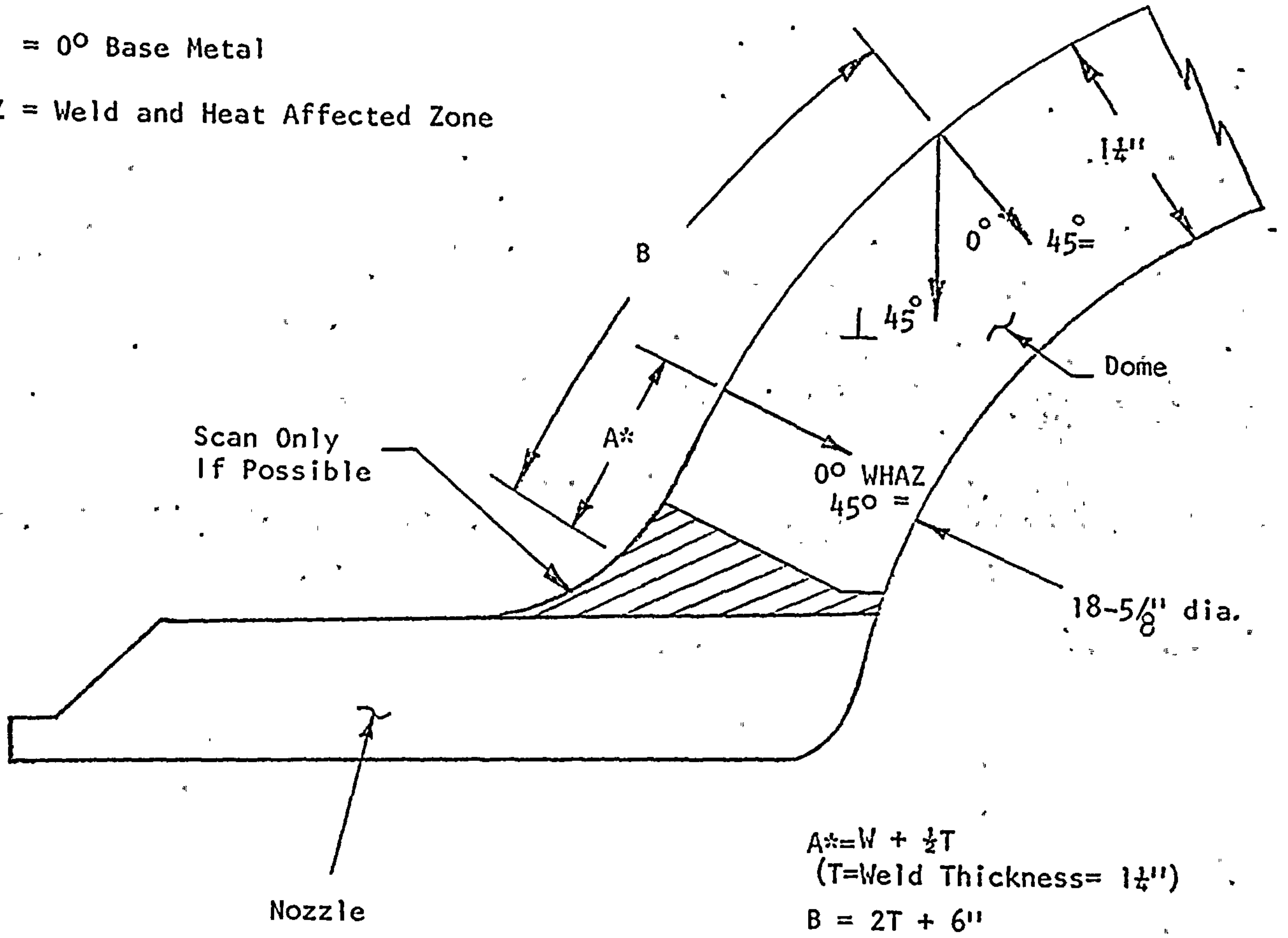
SCAN PATH LEGEND

⊥ = Perpendicular to Weld

═ = Parallel to Weld

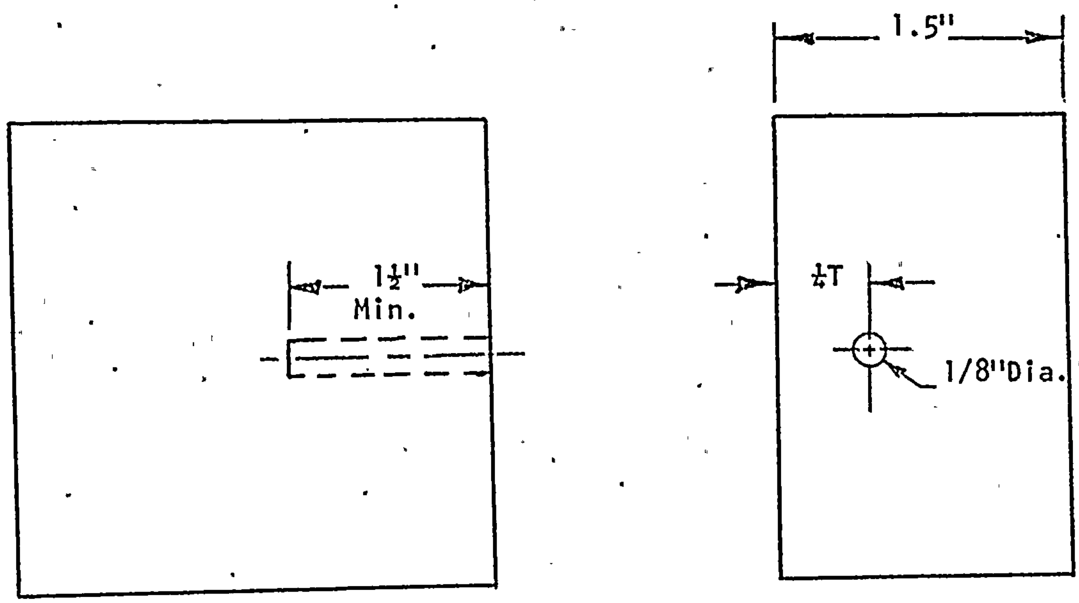
* = 0° Base Metal

0° WHAZ = Weld and Heat Affected Zone



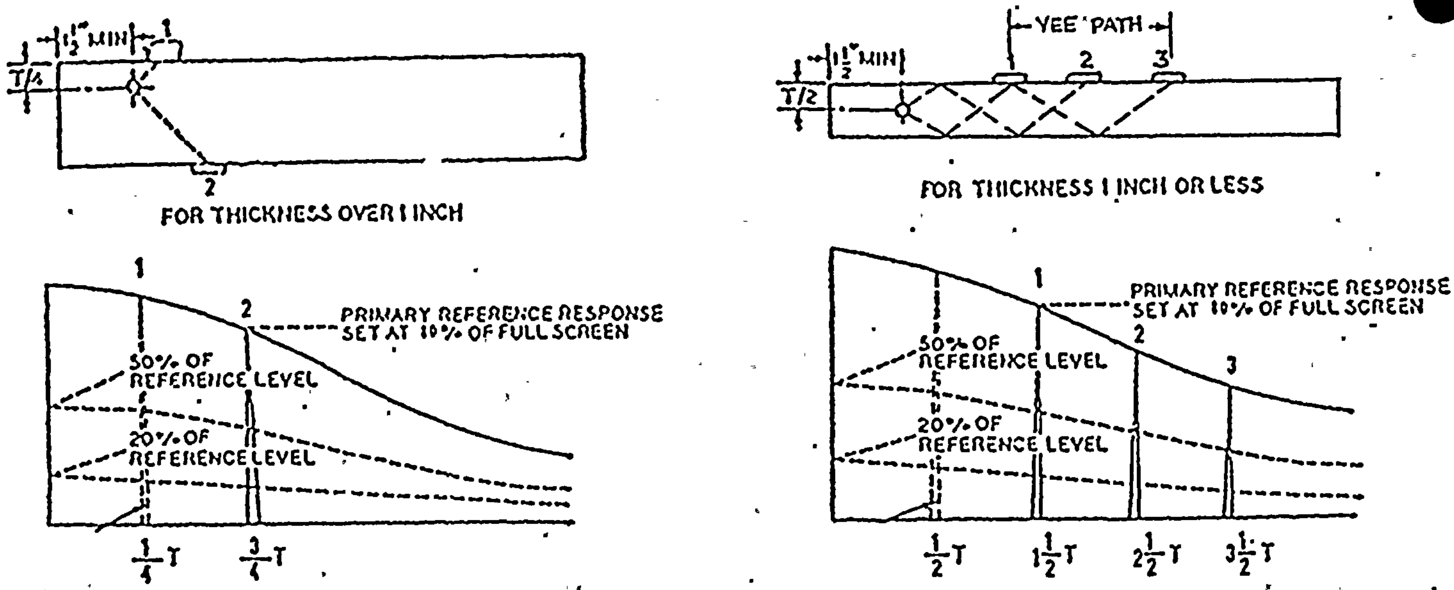
A*=W + $\frac{1}{2}$T
(T=Weld Thickness= $1\frac{1}{4}$")
B = 2T + 6"

Figure 2. Ultrasonic Examination of Emergency Condenser Supply and Return Nozzle Welds

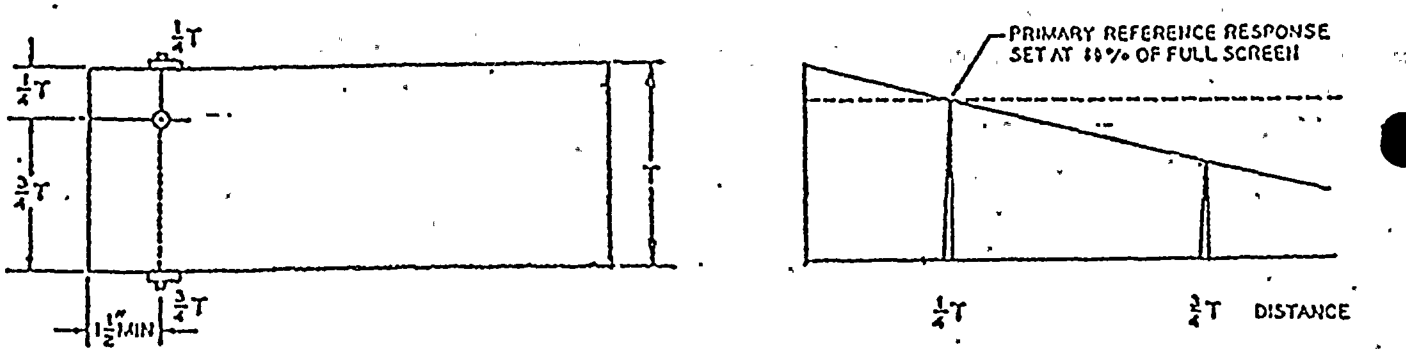


Ref. Std. No.	O.D.	Wall Thickness	Hole Dia.	Hole Depth	Hole Length	Pipe O.D. Range
P8F-1.5-1	Flat	1.5"	1/8"	1/4T	1½" Min	Greater than 20.00"

Figure 3. Ultrasonic Reference Standard (P8F-1.5-1) for Emergency Condenser Dome and Nozzle Welds



Search Unit Locations & DAC Curves for Angle Beam Calibration



Search Unit Locations & DAC Curve for Straight Beam Calibration

NOTE: For straight beam calibration on welds under 1" thick, use 1/2T hole only, no DAC required.

Step 1 - Adjust sweep controls so that the entire examination area is displayed on CRT screen.

Step 2 - Adjust sensitivity to provide 80% FSH indication from hole giving maximum response - mark position on screen.

Step 3 - Position search unit for maximum response from remaining holes - mark position on screen.

Step 4 - Plot DAC by connecting points marked on screen with line extended to cover entire examination range.

Step 5 - Record all sweep and sensitivity control settings on respective data sheets.

FIGURE 4 . REFERENCE SENSITIVITY AND DAC CALIBRATION PROCEDURES FOR ULTRASONIC EXAMINATION OF WELDS.

CALIBRATION DATA SHEET NO. 564-1
MANUAL EXAMINATION

EXAMINATION AREA ______

TRANSDUCER IDENTIFICATION

STYLE OR TYPE NO. ______
SIZE ______
FREQUENCY ______
SERIAL NO. ______
ANGLE & MODE ______
BEAM DIRECTION (= or ⊥ to weld) ______
SCAN FIXTURE ______

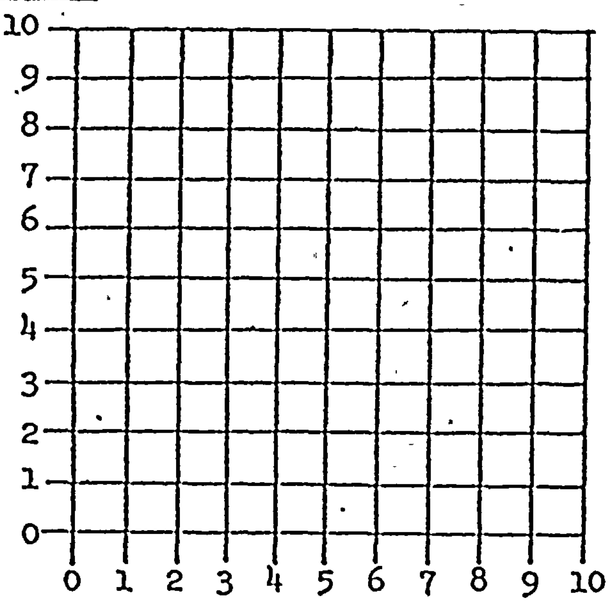
CALIBRATION BLOCK

ID NO. ______
SIZE ______
EXAMINATION SURFACE ______

Hole IDENT	Depth IN.	Amp. %	Atten. dB

TEMPERATURE = Ref. Std. ______
Component ______

DAC PLOT



ULTRASONIC INSTRUMENT

MODEL NO. ______
SERIAL NO. ______

CONTROL SETTINGS

PULSE LENGTH ______
FREQUENCY ______
dB GAIN ______
SWEEP LENGTH ______
SWEEP DELAY ______
VIDEO FILTER ______
REJECT ______
COUPLANT ______

INSTRUMENT LINEARITY CALIBRATION

Amplitude High	Low	High	Low
1.		5.	
2.		6.	
3.		7.	
4.		8.	

AMPLITUDE CONTROL LINEARITY

Initial	Δ dB	Result	Limit
80	-6		32% - 48%
80	-12		16% - 24%
40.	+6		64% - 96%
20	+12		64% - 96%

EXAMINER(S) (Signature Required)

1. ______ SNT-TC-1A Level
2. ______ SNT-TC-1A Level

DATE: ______ TIME: ______

Reviewed by: ______

Figure 5

WELD SCAN DATA SHEET

1. Calibration Data Sheet No. ____________
2. Examination Angle ____________
3. Area of Examination ____________
4. Examination Surface ____________

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Weld, Item or Scan No.	Scan Completion				No Reportable Indications	Reportable Indications	Supplement Attached	Comments: Reason for Incompleted Scans
	0° Base Metal	0° WHAZ	Normal to Weld Centerline	Parallel to Weld Centerline				

Calibration Checks			
Instrument		Examination System	
Time	Date	Time	Date

Additional Sheets Attached:

Continuation ______ Supplements ______

Examiner(s):

1. ____________ SNT-TC-1A Level ______
2. ____________ SNT-TC-1A Level ______

Date: ____________

NUCLEAR ENERGY SERVICES, INC.

Figure 6

WELD SCAN DATA SHEET

SUPPLEMENT A

(BASE METAL)

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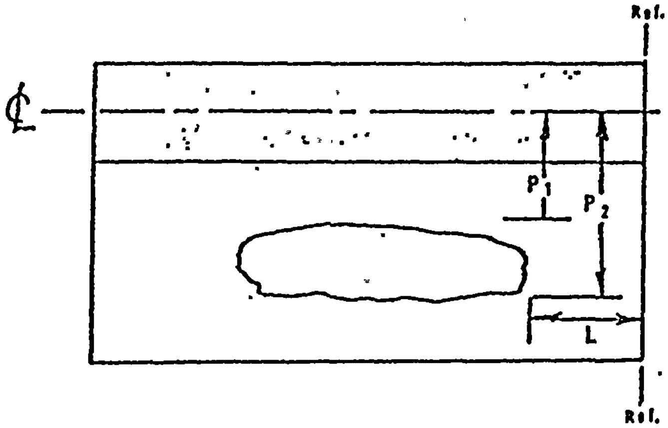
Weld No. ______________________ Sheet ________ of ________

Calibration Data Sheet No. ______________ Back Echo Amplitude ______________



Note: Location increments are not to exceed allowable scan increments.

Indication No.	Depth	L(inches)	P1	P2	Echo(% FSH)	Back(% FSH)

Examiner(s):

1. ______________________ SNT-TC-1A Level __________

2. ______________________ SNT-TC-1A Level __________

Date: ______________

Figure 6 A

NUCLEAR ENERGY SERVICES, INC.

WELD SCAN DATA SHEET

SUPPLEMENT B

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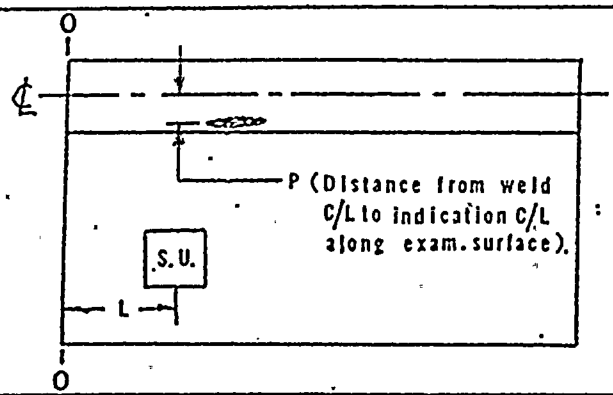
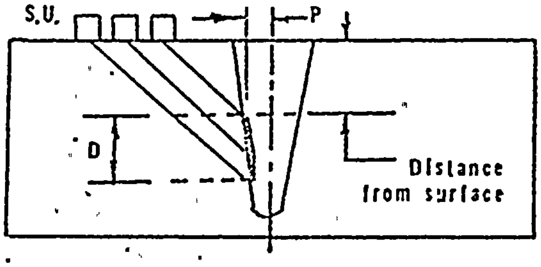
Weld No. ____________________ Sheet ________ of ________

Calibration Data Sheet No. ____________ EXAM. ANGLE ____________





Note: Location increments are not to exceed allowable scan increments.

Ind. No.	BEAM DIR.	L Location	Max % DAC	Dist. From Surface	P	50% Forward Dist. From Surface	50% Forward P	50% Back Dist. From Surface	50% Back P	Depth (D) Inches	Depth (D) % T

NOTE:
End points of L are the smaller of 50% DAC or 50% Max.

Examiner(s):

1. ____________________ SNT-TC-1A Level ________

2. ____________________ SNT-TC-1A Level ________

Date: ____________

FIGURE 6B.

NUCLEAR ENERGY SERVICES, INC.

TABLE I

WELD IDENTIFICATION

NUCLEAR COMPONENTS

Weld No.	Description	Ref. Block	Reference Figures	Notes
HX-39-121SH-w	Emergency Condenser Dome Weld	P8F-1.5-1	1,3	5.0" Length
HX-39-122RH-w	Emergency Condenser Dome Weld			
HX-39-111SH-w	Emergency Condenser Dome Weld			
HX-39-121RN-w	Emergency Condenser Nozzle Weld		2,3	12.0" Length
HX-39-112SN-w	Emergency Condenser Nozzle Weld			14.0" Length
HX-39-111RN-w	Emergency Condenser Nozzle Weld			12.0" Length

APPENDIX I

UT CALIBRATION BLOCKS

APPENDIX I

UT Calibration Blocks

NES has reviewed the calibration block requirements for the ten-year in-service inspection program for Niagara Mohawk Power Corporation's Nine Mile Point Unit 1.

The ultrasonic examination calibration block design and material selection will be in accordance with the ASME Boiler and Pressure Vessel Code, Section XI (up to and including the Summer 1974 Addenda), Appendix I, (Article I-3000), to the extent possible. Where Appendix I is not applicable, the provisions of Article 5 of Section V of the ASME Code shall apply, as recommended by Paragraph IWA-2232 of Section XI.

A complete list of the calibration blocks to be used during the ten-year in-service inspection interval is given in Table I-1. Included in the table are the block designation, availability("yes" if already in existence, "no" if to be fabricated), reference drawing numbers, brief description of the block (material, thickness, etc. as applicable) and the examination area intended for. To the extent applicable, Niagara Mohawk's own calibration blocks have been utilized as they exist or have been modified to meet current criteria. In cases where no appropriate calibration blocks were available, NES has prepared detail drawings complete with instructions to permit fabrication. The calibration block drawings are also part of Appendix I.

All calibration blocks are to be retained on site at Nine Mile Point Unit 1 plant in accordance with Appendix I (I-3150) of Section XI of the ASME Code.

TABLE I-1 UT CALIBRATION BLOCKS

Designation	Availability	Ref. Drwg.	Description Mat.	OD, in.	Wall t., in.	Examination Area
P8R-.3-1	Yes*	80C0528	SS	3.5	0.3	Piping Welds, 3.15" < OD < 5.25", t < 1"
P8R-.75-1	Yes	NISCO	SS	3.5	0.75	Piping Welds, 3.15" < OD < 5.25", t < 1"
P8R-.75-2	Yes	NISCO	SS	10.0	0.75	Piping Welds, 9.0" < OD < 15.0", t < 1"
P8R-.75-3	Yes	NISCO	SS	6.25	0.75	Piping Welds, 5.51" < OD < 9.19", t < 1.0"
P8R-1.5-1	Yes	NISCO	SS	9.5	1.5	Piping Welds, 8.55" < OD < 14.25", 1.0" < t < 2.0"
P8R-1.5-2	Yes	NISCO	SS	7.2	1.5	Piping Welds, 6.48" < OD < 10.8", 1.0" < t < 2.0"
P8R-1.5-3	Yes	NISCO	SS	5.0	1.5	Piping Welds, 4.5" < OD < 7.5", 1.0" < t < 2.0"
P8F-1.5-1	Yes	NISCO	SS	Flat	1.5	Piping Welds, OD > 20", 1.0" < t < 2.0"
P1R-.75-2	Yes*	80C0528	CS	10.0	.75	Piping Welds, 9.0" < OD < 15.0", t < 1.0"
P1R-1.5-1	Yes*	80C0531	CS	16.0	1.5	Piping Welds, 14.4" < OD < 24.0", 1.0" < t < 2.0"
P1F-1.5C	No	80C0527	CS	(Cladded)		Recirc. Inlet Nozzle & Safe-end Welds

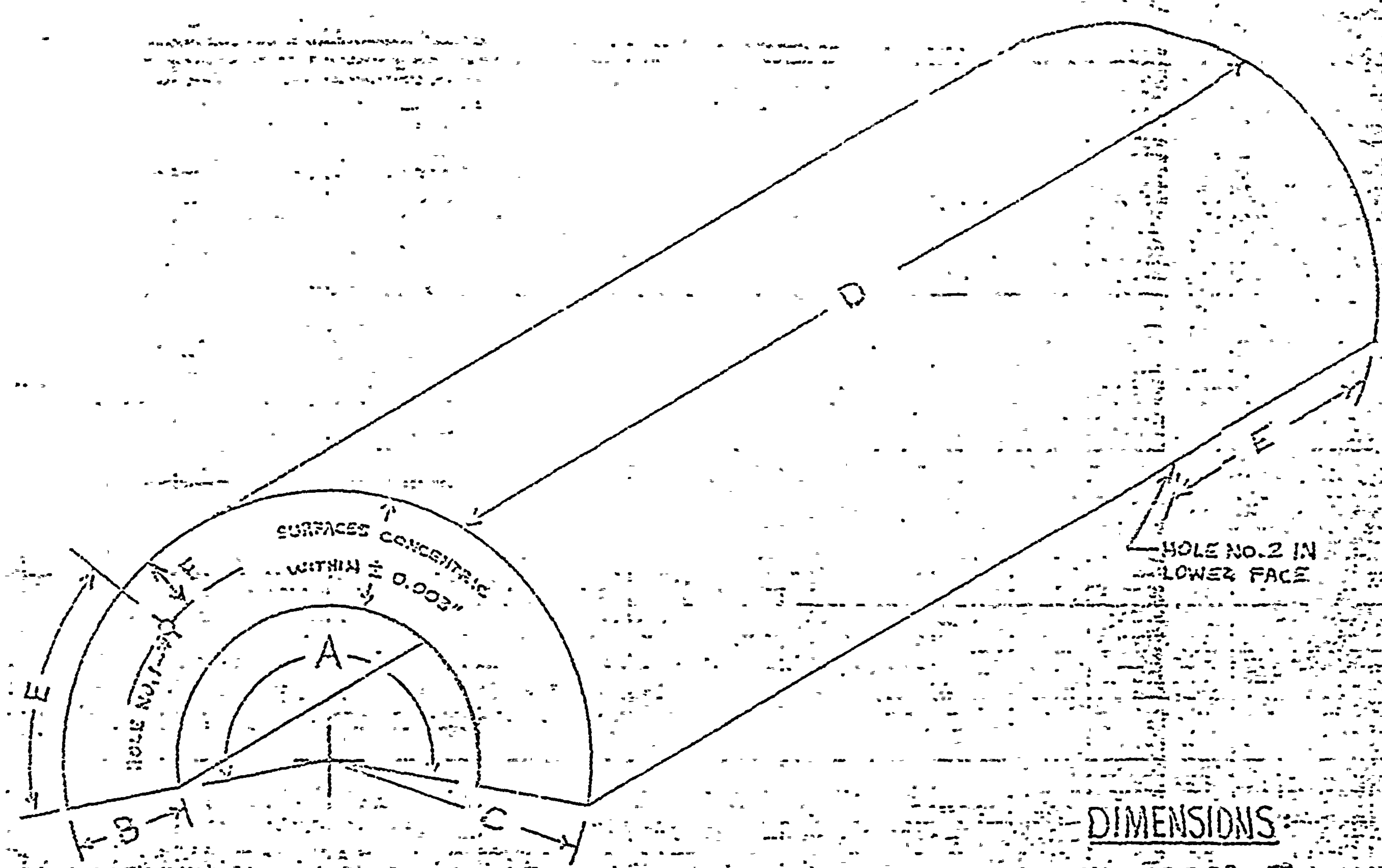
* Fabricated by NES prior to September, 1975 outage.

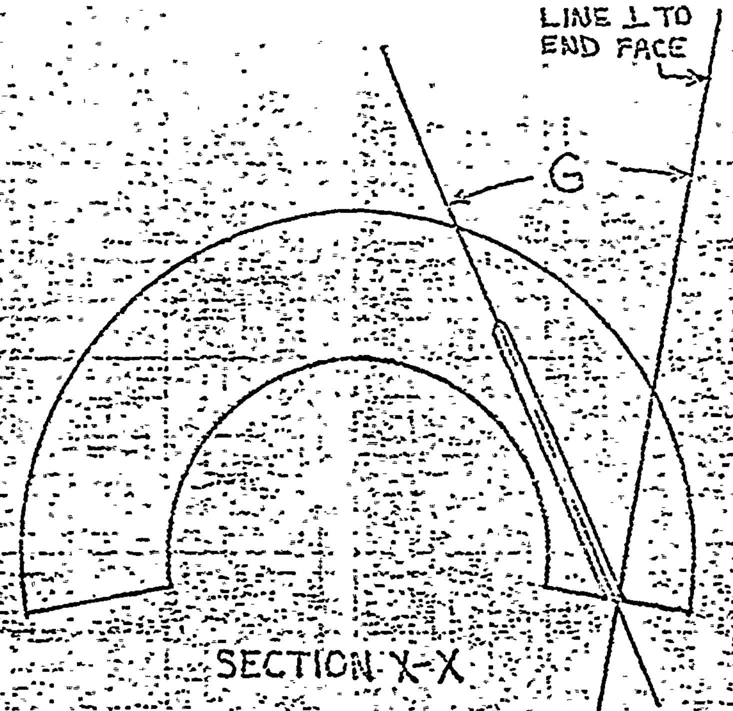
TABLE I-1 UT CALIBRATION BLOCKS (cont.)

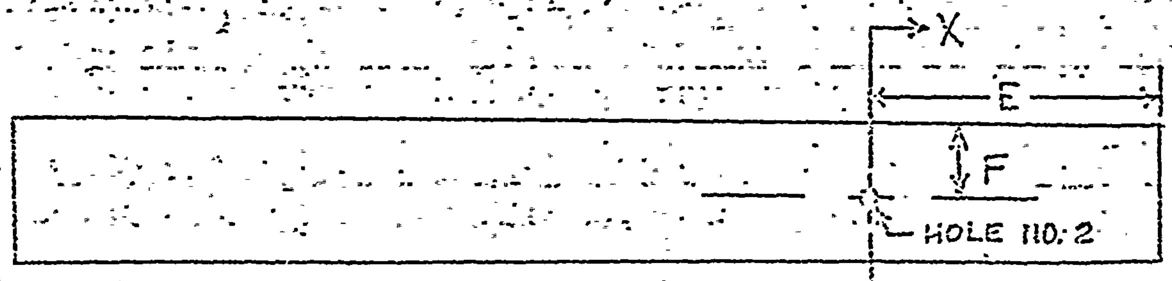
			Description			
Designation	Availability	Ref. Drwg.	Mat.	OD. in.	Wall t., in.	Examination Area
PIR-.75-1	Yes		CS	6.59	.75	Piping Welds, $5.93'' < OD < 9.88''$, $t < 1.0''$
PIF-1.5-1	Yes	NISCO	CS	Flat	1.5	Piping Welds, $OD > 20''$, $1.0'' < t < 2.0''$
PI-LF-1	No	80C0530	CS	-	-	Vessel-to-Flange Weld, Ligament
PIF-4.31C	No	80C0527	CS	(Cladded)		Closure Head Circ., Mer., Flange and Nozzle Welds
PIS-6.25	No	80B0831	CS	-	-	Closure Head Studs
PIN-6.25	No	80B0927	CS	-	-	Closure Head Nuts
PIS-2.5	No	80B0828	CS	-	-	Recirc. Pump Bolts
PIS-2.0	No	80B0830	CS	-	-	Recirc. Valves and Main Steam Isolation Valve Studs
PIN-2.0	No	80B0827	CS	-	-	Recirc. Valves and Main Steam Isolation Valve Nuts
		LATER				Nozzle Radii

NINE MILE POINT UNIT NO. 1
ULTRASONIC REFERENCE STANDARD PER ASME
B&PV CODE, SECTION III, 1971 EDITION

IDENTIFICATION: P8R-.75-1
MATERIAL: TYPE 304 STAINLESS STEEL
SURFACE FINISH: 125 RMS MAXIMUM, ALL SURFACES





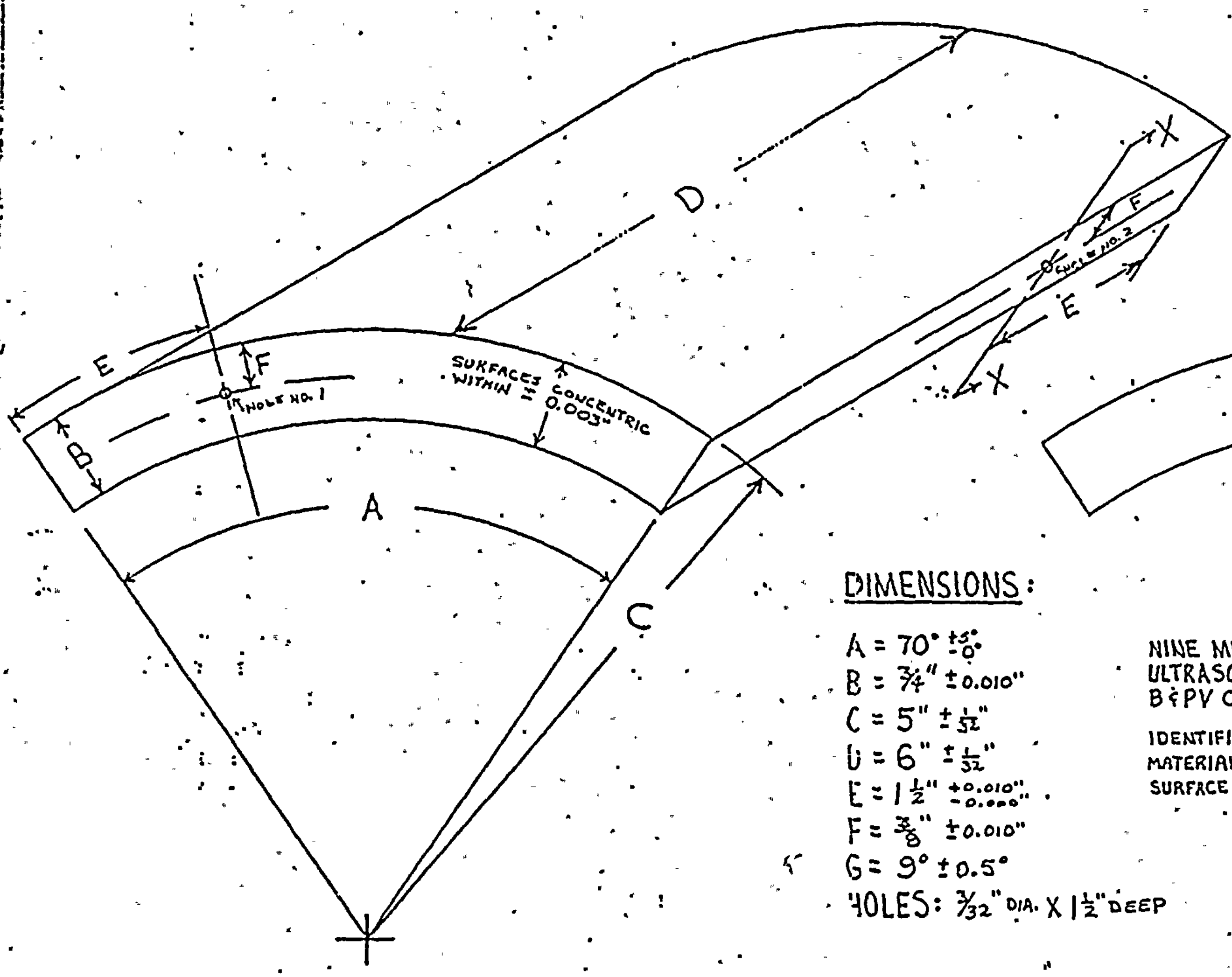


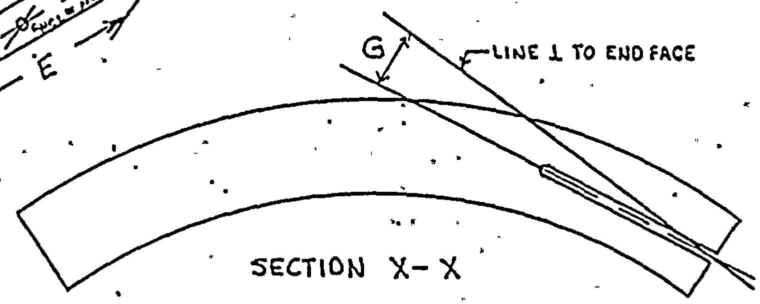
LOWER FACE

DIMENSIONS:

A = 20° +5° -0°
B = 3/4" ± 0.010"
C = 1 3/4" ± 1/32"
D = 6" ± 1/32"
E = 1 1/2" +0.010" -0.000"
F = 3/8" ± 0.010"
G = 33° ± 3°
HOLES: 7/32" DIA. X 1 1/2" DEEP

Nuclear Installation Services Company	ISSUED BY: [signature] Manager, Quality Services	PREPARED BY: W. B. Benoist	REVISION & ISSUE DATE A 5/18/72	NISCO Sketch P8R-.75-1 SHEET 1 OF 1
		Form No. NISCO-C6		





SECTION X-X

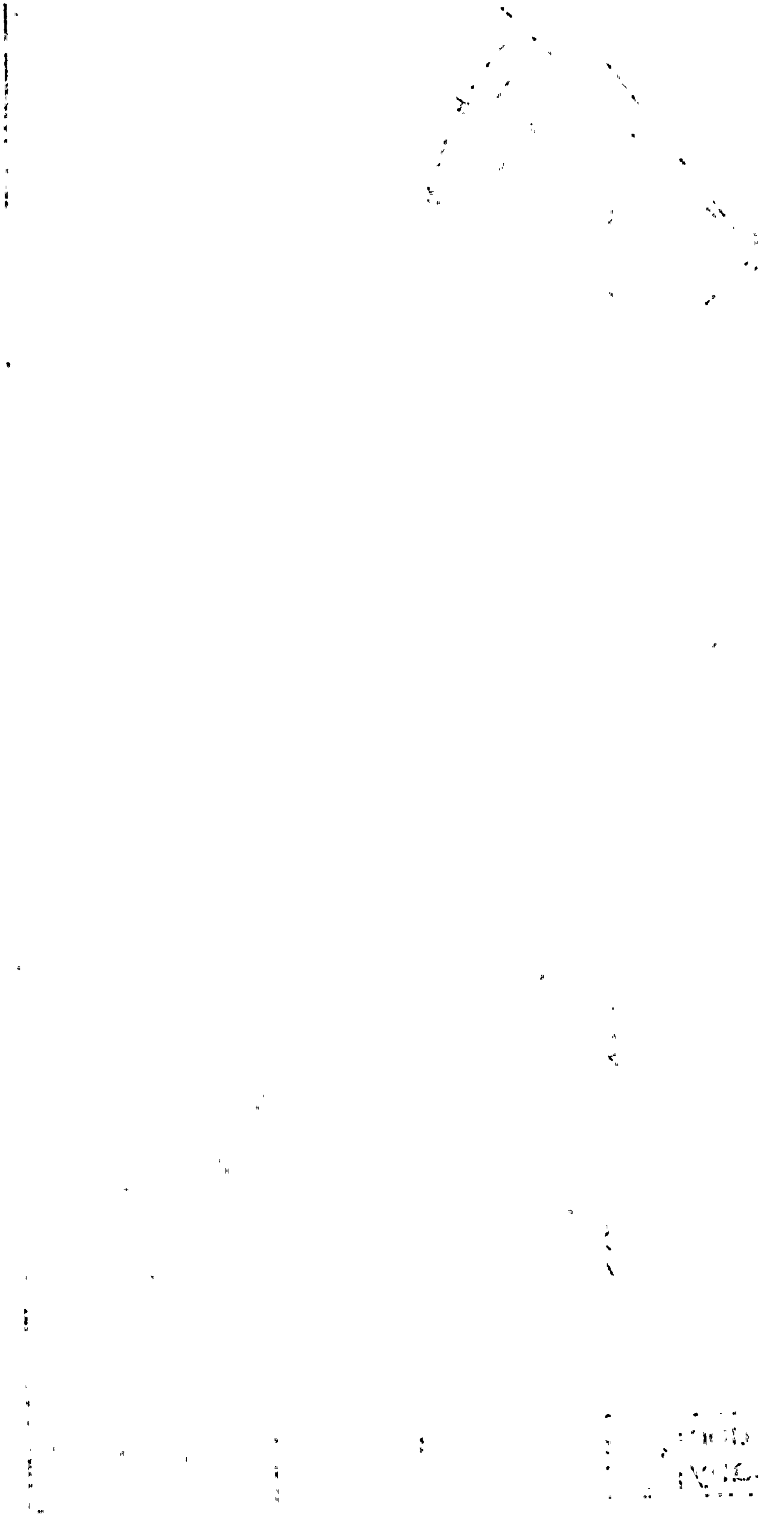
DIMENSIONS:

A = 70° $^{+5°}_{-0°}$
B = 3/4" ± 0.010"
C = 5" ± 1/32"
D = 6" ± 1/32"
E = 1 1/2" $^{+0.010"}_{-0.000"}$
F = 3/8" ± 0.010"
G = 9° ± 0.5°
HOLES: 3/32" DIA. X 1 1/2" DEEP

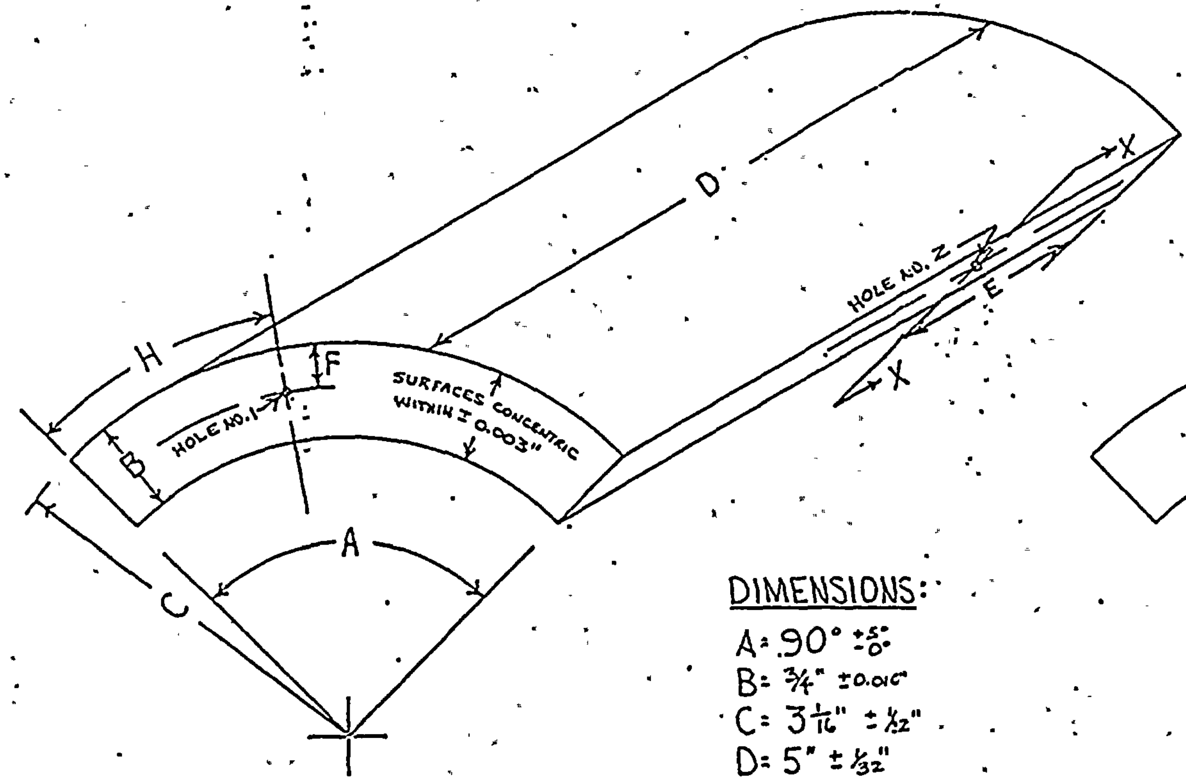
NINE MILE POINT UNIT NO. 1
ULTRASONIC REFERENCE STANDARD PER ASME B&PV CODE, SECTION III, 1971 EDITION

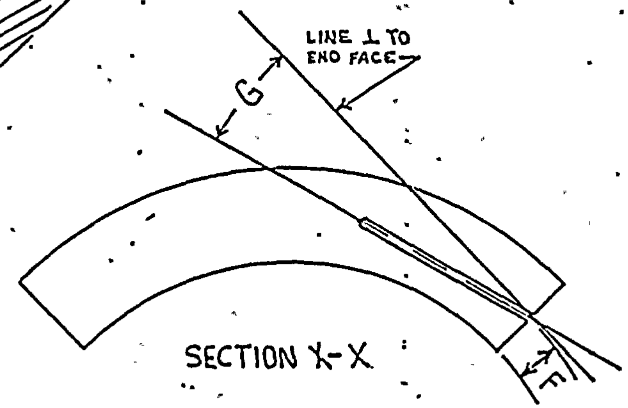
IDENTIFICATION: P8R-.75-2
MATERIAL: TYPE 304 STAINLESS STEEL
SURFACE FINISH: 125 RMS MAXIMUM, ALL SURFACES

Nuclear Installation Services Company	ISSUED BY: [signature] Manager, Quality Services	PREPARED BY: R. B. Benoist	REVISION & ISSUE DATE A 1/18/72	NISCO-
		Form No. NISCO-05		Check-R PPR-.75-2 SHEET 1 OF



NINE MILE POINT UNIT NO. 1
ULTRASONIC REFERENCE STANDARD PER ASME
B&PV CODE, SECTION III, 1971 EDITION
IDENTIFICATION: P8R-.75-3
MATERIAL: TYPE 304 STAINLESS STEEL
SURFACE FINISH: 125 RMS MAXIMUM, ALL SURFACES





SECTION X-X

DIMENSIONS:

A: 90° $^{+5°}_{-0°}$
B: 3/4" ±0.010"
C: 3 1/16" ± 1/32"
D: 5" ± 1/32"
E: 1 1/2" $^{+0.000"}_{-0.030"}$
F: 3/8" ±0.00"
G: 16 1/2° ±0.5°
H: 1 7/8" ± 1/16"
HOLES: 3/32" DIA. X 1 1/2" DEEP

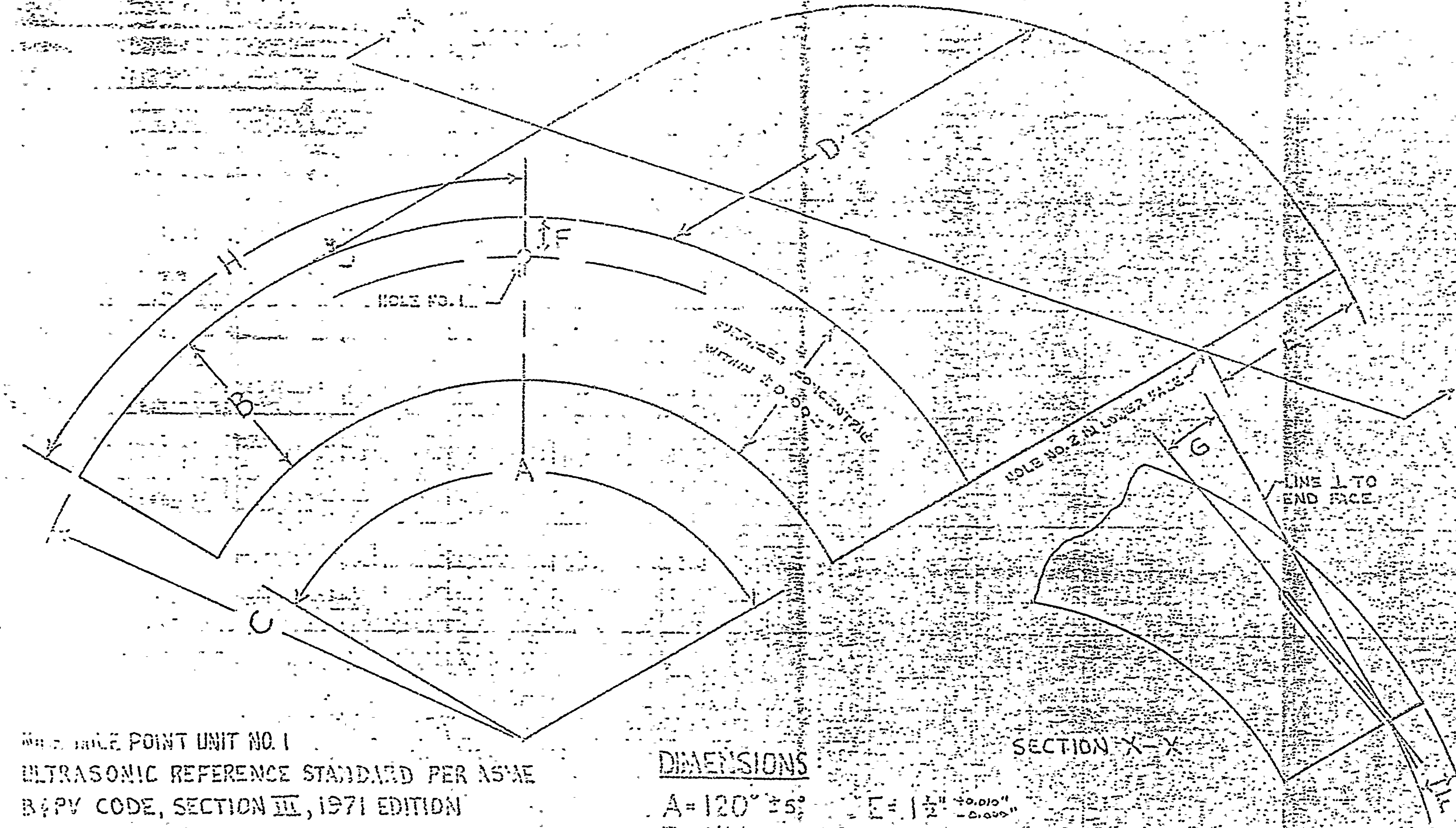
NISCO
[illegible]: P8R-.75-3
SHEET 1 OF

REVISION & ISSUE DATE
A
[illegible]/12/77

PREPARED BY:
W. P. Renoisi
Form No. NISCO-CG

ISSUED BY:
Manager, Quality Services

Nuclear Installation Services Company



... MILE POINT UNIT NO. 1
ULTRASONIC REFERENCE STANDARD PER ASME
B&PV CODE, SECTION III, 1971 EDITION
IDENTIFICATION: PSR-1.5-L
MATERIAL: TYPE 304 STAINLESS STEEL
SURFACE FINISH: 125 RMS MAXIMUM, ALL SURFACES

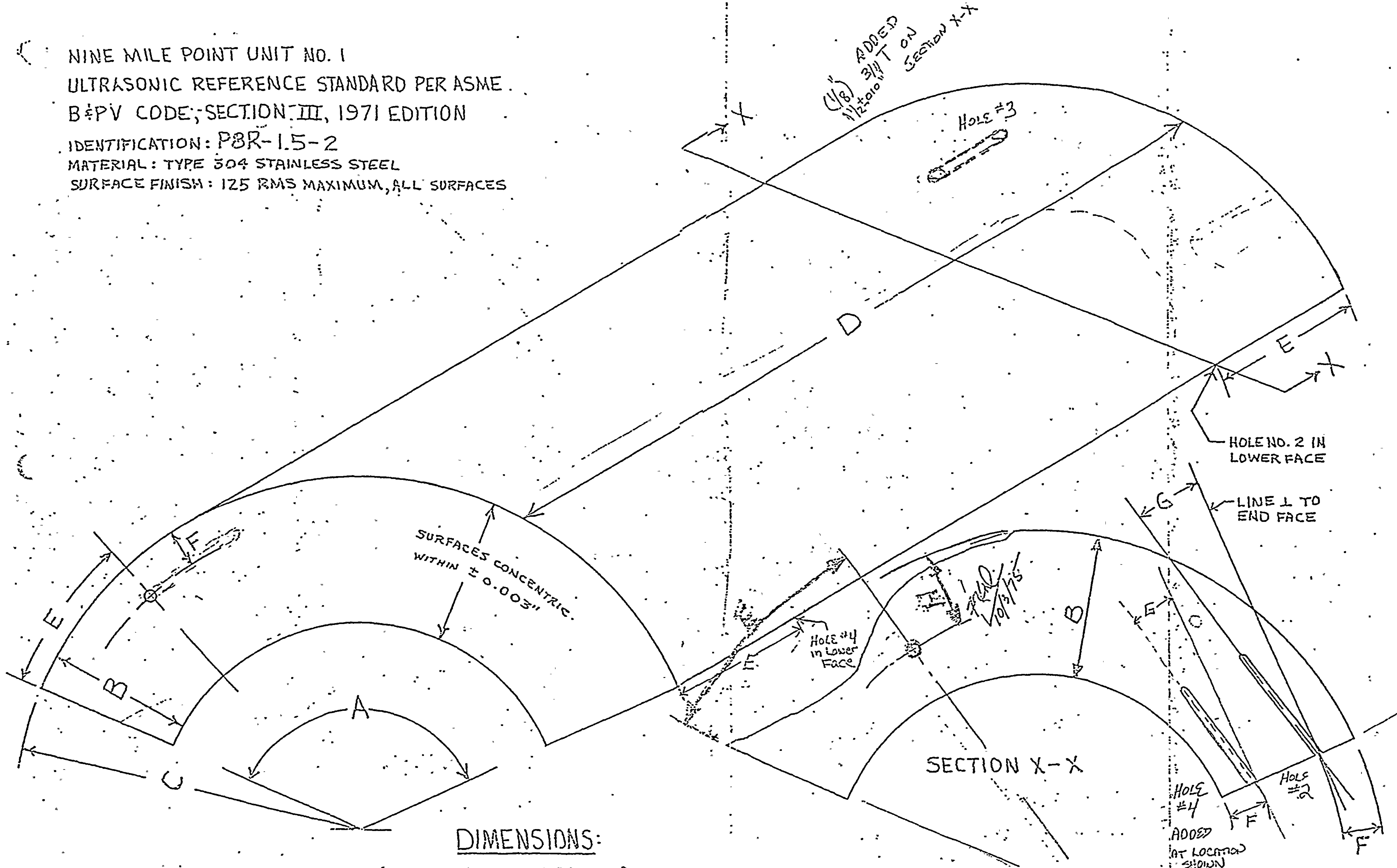
DIMENSIONS

A = 120° ±5°
B = 1½" ±0.010"
C = [illegible] ±½"
D = [illegible]
E = 1½" +0.010" −0.000"
F = ⅜" ±0.010"
G = 10° ±0.5°
H = [illegible]

HOLES: ⅛" DIA. X 1½" DEEP

Nuclear Installation Services Company	ISSUED BY: [signature] Manager, Quality Services	PREPARED BY: W. B. Benoist	REVISION & ISSUE DATE A 5/18/72	NISCO Sketch PSR-1.5-1 SHEET 1 OF 1
		Form No. NISCO-06		

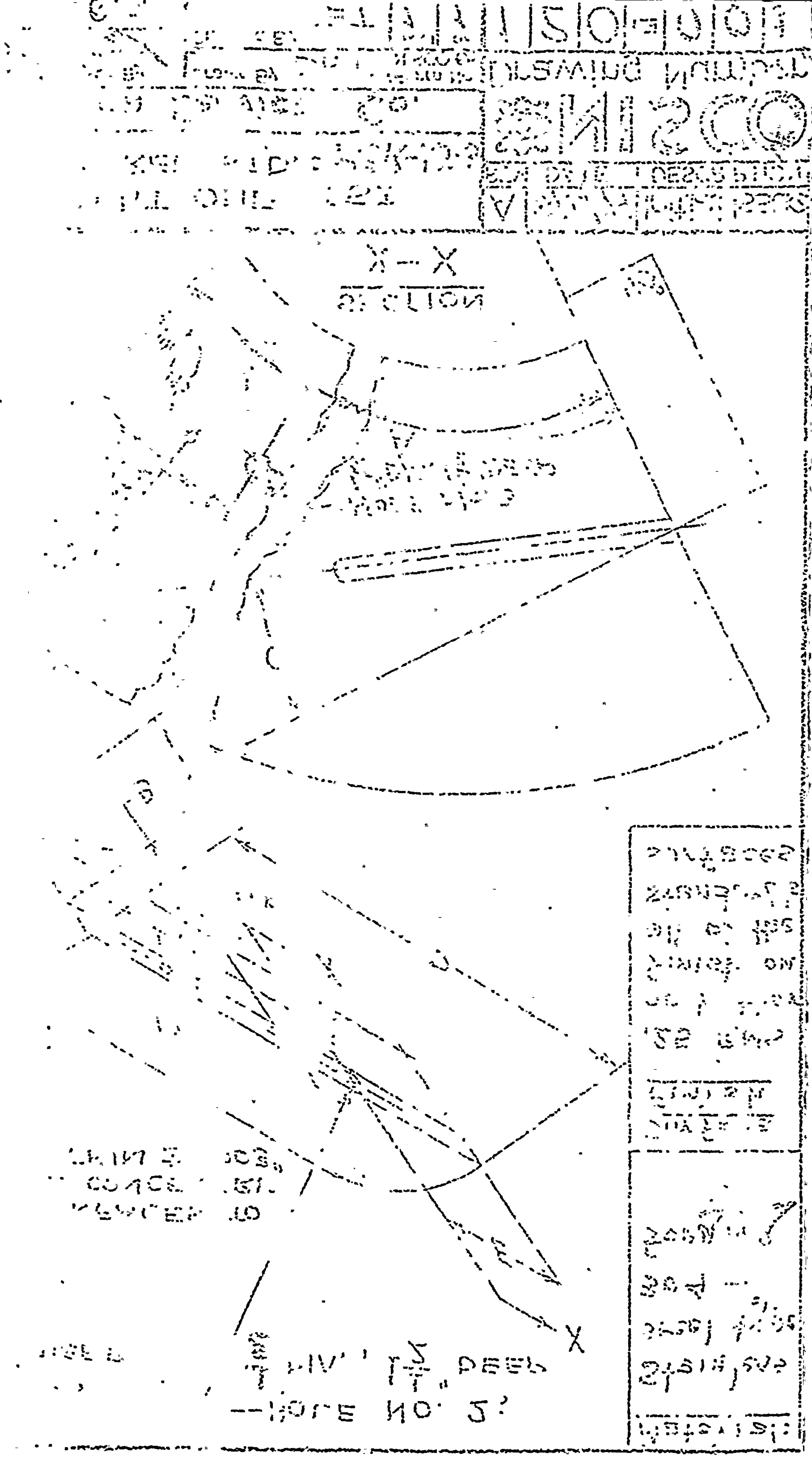
NINE MILE POINT UNIT NO. 1
ULTRASONIC REFERENCE STANDARD PER ASME
B&PV CODE, SECTION III, 1971 EDITION
IDENTIFICATION: P8R-1.5-2
MATERIAL: TYPE 304 STAINLESS STEEL
SURFACE FINISH: 125 RMS MAXIMUM, ALL SURFACES



DIMENSIONS:

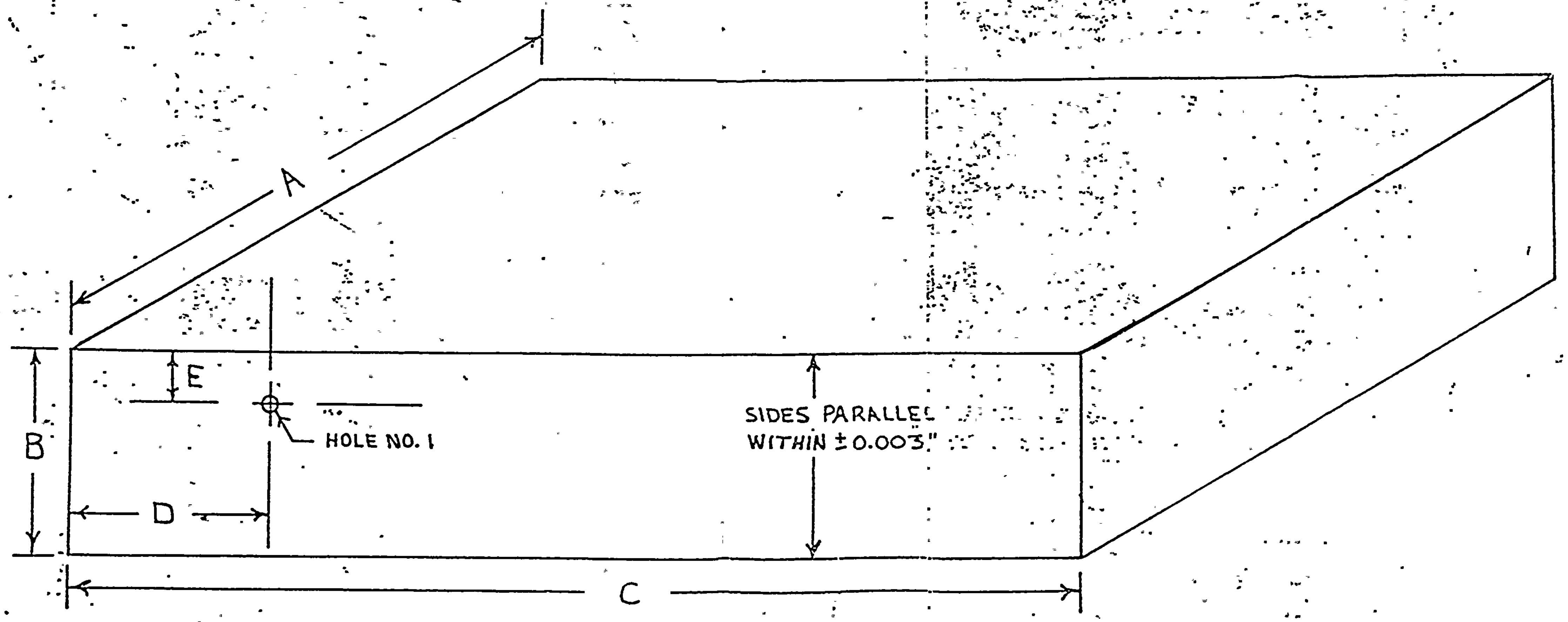
A = 132° ± 5° C = 3.600" ± 1/32" E = 1½" +0.010" -0.000" G = 13° ±0.5°
B = 1½" ±0.010" D = 8" ± 1/32" F = 3/8" ±0.010" HOLES: 1/8" DIA. X 1½" DEEP
H = 1 1/8" ± 0.010"

NISCO- Sketch P8R-1.5-2 SHEET 1 OF 1
REVISION & ISSUE DATE: A 5/18/72
PREPARED BY: W. B. Benoist
FORM NO. NISCO-06
ISSUED BY: Manager, Quality Services
Nuclear Installation Services Company



--HOLE NO. 2:
SECTION
X-X
Material:
Stainless
steel type
304
Drawing Number

NINE MILE POINT UNIT NO. 1
ULTRASONIC REFERENCE STANDARD PER ASME
B & PV CODE, SECTION III, 1971 EDITION
IDENTIFICATION: P8F-1.5-1
MATERIAL: TYPE 304 STAINLESS STEEL
SURFACE FINISH: 125 RMS MAXIMUM, ALL SURFACES

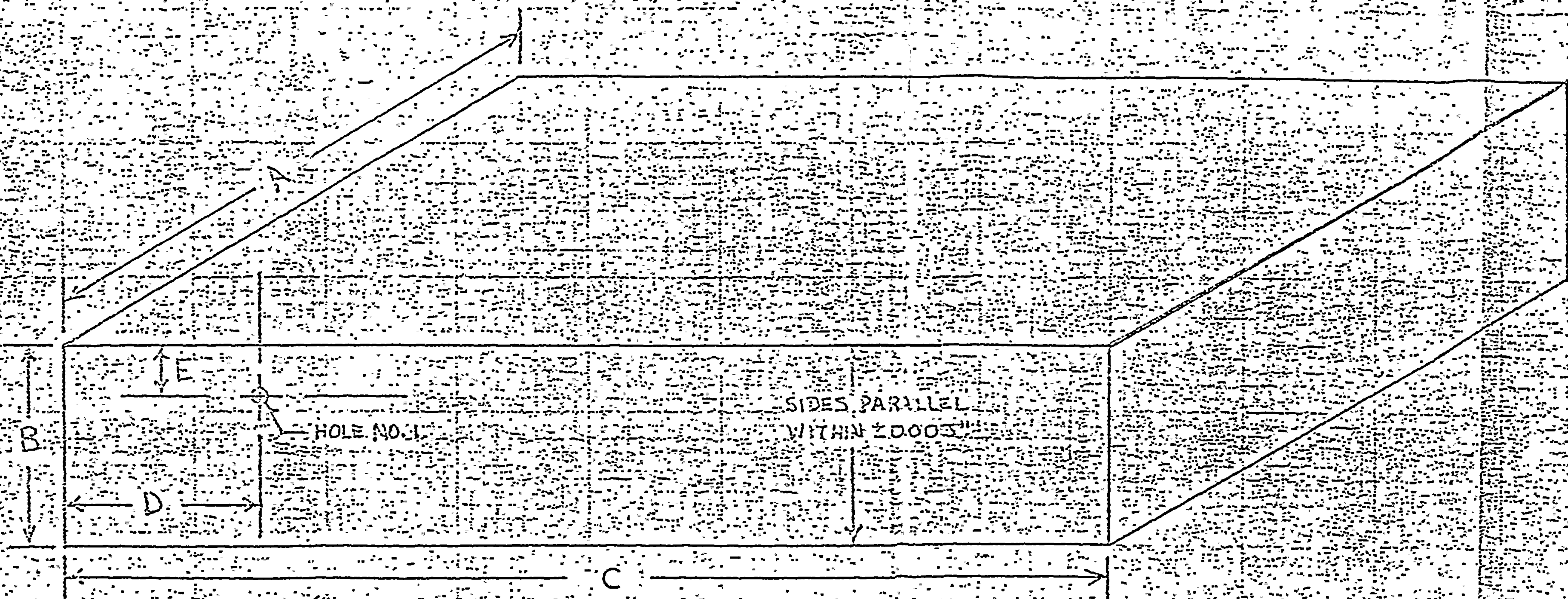


DIMENSIONS:

A = 4" $^{+1/32}_{-0}$"
B = 1½" ±0.010"
C = 8" ± 1/32"
D = 1½" $^{+0.010}_{-0.000}$"
E = 3/8" ±0.010"
HOLE: 1/8" DIA. × 1½" DEEP

NMPCO Sketch
REVISION & ISSUE DATE: A
PREPARED BY: W. R. Bencist
ISSUED BY:
Nuclear Installation

NINE MILE POINT UNIT NO. 1
ULTRASONIC REFERENCE STANDARD PER ASME
B&PV CODE, SECTION III, 1971 EDITION
IDENTIFICATION : PIF-1.5-1
MATERIAL : CARBON STEEL
SURFACE FINISH: 125 RMS MAXIMUM, ALL SURFACES



DIMENSIONS

A = 4" ± 1/32"
B = 1 1/2" ± 0.010"
C = 8" ± 1/32"
D = 1 1/2" +0.010" −0.000"
E = 3/8" ± 0.010"
HOLE : 1/8" DIA
X 1 1/2" DEEP

Nuclear Installation Services Company

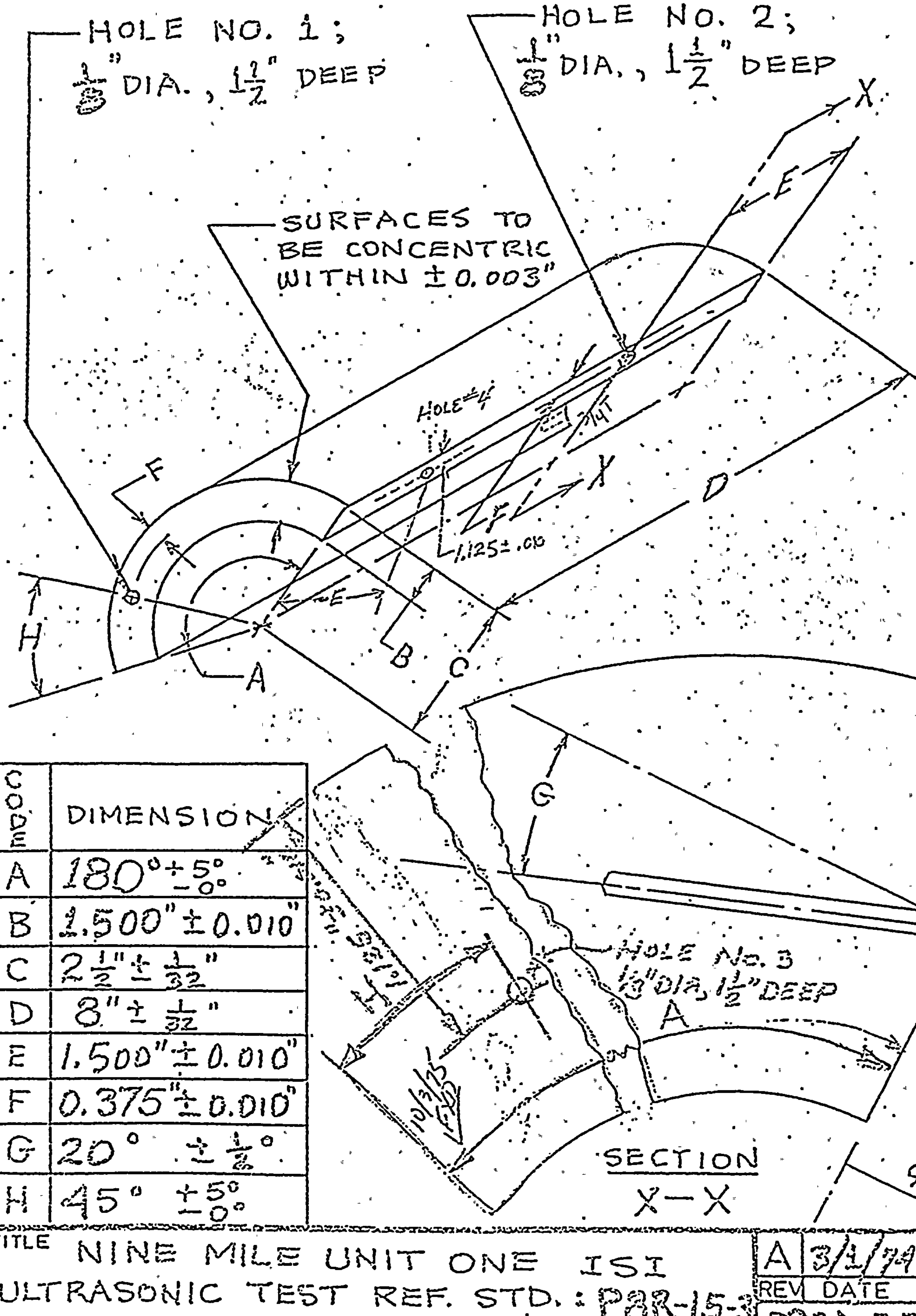
ISSUED BY: Manager, Quality Services

PREPARED BY: W. B. Benoist

Form No. NISCO-06

REVISION & ISSUE DATE: A 5/18/72

NISCO Sketch PIF-1.5-1 SHEET 1 OF 1



Material: Stainless steel type 304 – Forging

Surface Finish

125 RMS or better finish on all of the standard's surfaces

CODE	DIMENSION
A	$180° {}^{+5°}_{-0°}$
B	1.500" ± 0.010"
C	$2\frac{1}{2}" \pm \frac{1}{32}"$
D	$8" \pm \frac{1}{32}"$
E	1.500" ± 0.010"
F	0.375" ± 0.010"
G	$20° \pm \frac{1}{2}°$
H	$45° {}^{+5°}_{-0°}$

TITLE NINE MILE UNIT ONE ISI
ULTRASONIC TEST REF. STD.: P&R-15-3

REV	DATE	DESCRIPTION
A	3/1/74	Initial Issue

Nuclear Installation Services Co.

NISCO

Main Offices in Cherry Hill New Jersey | Approved & Issued By [signature] Title Mgr. QS | Drawn By DET | Checked By DET | Form No. NISCO-66 | Sheet 1 of 1

Drawing Number 120-001