NMC
Committed to Nuclear Excellence

Palisades Nuclear Plant
Operated by Nuclear Management Company, LLC

June 12, 2006

10 CFR 50.55a

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Palisades Nuclear Power Plant
Dockets 50-255
License No. DPR-20

4th Interval Inservice Inspection Plan

Pursuant to 10 CFR 50.55a, Nuclear Management Company, LLC (NMC) is submitting the 4th interval inservice inspection (ISI) plan for the Palisades Nuclear Plant (PNP). The relief requests included in the plan are being submitted for Nuclear Regulatory Commission (NRC) review and approval.

The 4th interval ISI program has been developed to the American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, Section XI, 2001 Edition with 2003 Addenda. The 4th interval officially begins on December 13, 2006 for PNP. Enclosure 1 provides the 4th interval ISI plan for PNP.

Summary of Commitments

This letter contains no new commitments and no revisions to existing commitments.

Paul A. Harden
Site Vice President, Palisades Nuclear Plant
Nuclear Management Company, LLC

Enclosure (1)

cc: Administrator, Region III, USNRC
Project Manager, Palisades, USNRC
Resident Inspector, Palisades, USNRC

A047

27780 Blue Star Memorial Highway • Covert, Michigan 49043-9530
Telephone: 269.764.2000

ENCLOSURE 1

4TH INTERVAL INSERVICE INSPECTION PLAN

PALISADES NUCLEAR PLANT

96 PAGES FOLLOW

PALISADES NUCLEAR PLANT
4TH INTERVAL INSERVICE INSPECTION PLAN

INSERVICE INSPECTION PROGRAM
FOR

Palisades Nuclear Plant
Commercial Service Date: December 31, 1971
(Docket no. 50-255)
27780 Blue Star Memorial Highway
Covert, Michigan 49043

INSERVICE INSPECTION PROGRAM PREPARATION AND APPROVAL

Prepared By: _____ Date: 6-7-2006
Inservice Inspection Program Owner

Reviewed By: _____ Date: 6-7-2006
Peer, Engineering Programs

Reviewed By: _____ Date: 6/7/06
Supervisor, Engineering Programs

Approved By: _____ Date: 6/8/06
Manager, Engineering Programs

1.0 PURPOSE

1.1 This document establishes the implementation controls and schedule for the Inservice Inspection (ISI) Program plan for the fourth ten-year inspection interval at Consumers Energy Palisades Nuclear Plant (PNP), Unit 1. The Nuclear Management Company (NMC) operates the plant and is the Owner as defined by IWA-9000.

1.2 This ISI Program Plan details the requirements for the examination of ASME Class 1, 2 and 3 components and component supports and the Risk Informed (RI) piping welds at the Palisades Nuclear Plant required to be examined in accordance with the 2001 Edition through 2003 Addenda of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI within the limitations and modifications required by Title 10 of the Code of Federal Regulations, Part 50.55a, Codes and Standards.

2.0 REFERENCES

2.1 Code of Federal Regulations, Title 10, Part 50, Paragraph 50.55a, "Codes and Standards"

2.2 ASME Boiler and Pressure Vessel Code, Section XI, Division 1, "Inservice Inspection of Nuclear Power Plant Components", 2001 Edition through 2003 Addenda.

2.3 Regulatory Guide 1.26, Revision 3, "Quality Group Classification and Standards for Water, Steam and Radioactive Waste Containing Components of Nuclear Power Plants"

2.4 Regulatory Guide 1.147, Revision 14, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1"

2.5 Palisades Technical Specifications

2.6 NMC Corporate Directive 5.6, Inservice Inspection Standard

2.7 Westinghouse Owners Group WCAP-14572, Revision 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report" and WCAP-14572, Revision 1-NP-A, Supplement 1, "Westinghouse Structural Reliability and Risk Assessment (SRRA) Model for Piping Risk-Informed Inservice Inspection"

2.8 Westinghouse Owners Group WCAP-14572, Revision 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report" and WCAP-14572, Revision 1-NP-A, Supplement 2, "Westinghouse Structural Reliability and Risk Assessment (SRRA) Model for Piping Risk-Informed Inservice Inspection"

2.9 ASME Section XI, Appendix VIII, 2001 Edition

3.0 DISCUSSION

3.1 The Inservice Inspection (ISI) Program implements the pre-service and in-service inspection and pressure testing requirements mandated by the Code of Federal Regulations (CFR) in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI.

3.2 Per 10CFR50.55a, licensees are required to update their ISI Programs for each ten-year interval of the facility operating license. The first ten-year interval begins at the date of commercial operation. The program must be updated to the inspection, testing and examination requirements of the Edition and Addenda of the ASME Codes approved for use in paragraph (b) of these regulations 12 months prior to the start of the new ten-year interval. The fourth ten-year interval at Palisades Unit 1 begins on December 13, 2006.

3.3 The Palisades nuclear power plant was built in the late 60's and was placed into commercial operation on December 31, 1971. During the first 40-month life of the plant, in order to comply with paragraphs 4.3 and 4.12 of the previous technical specifications (dated September 1, 1972) of the operating license DPR-20 for the Palisades nuclear plant, which discusses ISI requirements of class 1 components and systems, the nondestructive examinations were performed to satisfy the requirements of the ASME Section XI Code, 1971 edition including the winter 1972 addenda. In February 1976, the NRC amended paragraph 55a(g) of 10 CFR 50 to require nuclear plants to upgrade their technical specifications in the area of the ISI requirements and the functional testing of pumps and valves. By amending paragraph 55a(g) and by invoking Regulatory Guide 1.26, the NRC required nuclear plants to upgrade their systems to include not only class 1 systems, but also class 2 and class 3 systems in their ISI programs.

3.4 Palisades has implemented a Risk Informed Inservice Inspection (RI-ISI) Program using the Westinghouse Owners Group WCAP-14572, revision 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report" and WCAP-14572, revision 1-NP-A, supplement 1, "Westinghouse Structural Reliability and Risk Assessment (SRRA) Model for Piping Risk-Informed Inservice Inspection"

4.0 REQUIREMENTS

4.1 ASME Section XI Code and Regulatory Requirements

The ASME Section XI Code and Regulatory requirements in this ISI Program shall, as a minimum, comply with the following:

- Code of Federal Regulations, Title 10, Part 50.55a
- ASME Boiler and Pressure Vessel Code, Section XI, 2001 Edition through 2003 Addenda
- Palisades Relief Requests for the fourth ten-year interval

The Inservice Inspection Program and any major revisions shall be submitted to the NRC as required. In addition, requests for specific relief shall be forwarded to the NRC for authorization prior to implementation. The program elements and the required documentation must be maintained on site for audit.

4.2 ISI Requirements

The general requirements for ISI are contained in the ASME B&PV Code, Section XI, Article IWA. Article IWA includes requirements for examination methods, personnel qualification, flaw evaluation, repair/replacement, hydrostatic and system pressure tests, and records and reports.

ISI requirements for examination and pressure testing vary depending on whether the components are ASME Code Class 1, 2, or 3. Section XI Code Cases contain alternative rules, which may be voluntarily adopted. A complete list of ISI Code Cases adopted, or considered for future use, at Palisades are contained in Appendix A.

4.3 Section XI Requirements for ASME Code Class 1 Components

The components within the ASME Code Class 1 boundary are subject to the volumetric, surface and visual examination requirements and pressure test requirements of Article IWB-2500 and Table IWB-2500-1. Component supports must meet the examination requirements of IWF-2500 and Table IWF-2500-1. The examination categories of table IWB-2500-1 are as follows:

Examination Category	Examination Area
B-A	Pressure retaining welds in the reactor vessel.
B-B	Pressure retaining welds in vessels other than the reactor vessel.
B-D	Full penetration welded nozzles in vessels.
B-F*	Pressure retaining dissimilar metal welds in vessel nozzles.
B-G-1	Pressure retaining bolting greater than 2 inches in diameter.
B-G-2	Pressure retaining bolting 2 inches or less in diameter.
B-J*	Pressure retaining welds in piping.
B-K	Welded attachments for vessels, piping, pumps and valves.
B-L-1	Pressure retaining welds in pump casings.
B-L-2	Pump casings.
B-M-1	Pressure retaining welds in valve bodies.
B-M-2	Valve bodies.
B-N-1	Interior of the reactor vessel.
B-N-2	Welded core support structures and interior attachments to the reactor vessel.
B-N-3	Removable core support structures.
B-O	Pressure retaining welds in control rod housings.
B-P	All pressure retaining components.
B-Q	Steam Generator tubing.

Note: *B-F and B-J welds are included in the Risk-Informed Inspection Plan

4.4 Section XI Exemptions for ASME Code Class 1 Components

The following components or parts of components are exempt from the volumetric and surface examination requirements of IWB-2500:

- Components that are connected to the reactor coolant system and part of the reactor coolant pressure boundary, and that are of such a size and shape so that upon postulated rupture the resulting flow of coolant from the reactor coolant system under normal plant operating conditions is within the capacity of makeup systems that are operable from on-site emergency power.
- Piping of NPS 1, except for steam generator tubing.
- Components and their connections in piping of NPS 1 and smaller
- Reactor vessel head connections and associated piping NPS 2 and smaller, made inaccessible by control rod drive penetrations.

- Supports are exempt from the examination requirements of IWF-2000 are those connected to piping and other items exempted from volumetric, surface, VT-1, or VT-3 as outlined above.

4.5 Section XI Requirements for ASME Code Class 2 Components

The components within the ASME Code Class 2 boundary are subject to the volumetric, surface, and visual examination requirements and pressure test requirements of Article IWC-2500 and Table IWC-2500-1. Component supports must meet the examination requirements of IWF-2500 and Table IWF-2500-1. The examination categories of Table IWC-2500-1 are as follows:

Examination Category	Examination Area
C-A	Pressure retaining welds in the pressure vessels.
C-B	Pressure retaining nozzle welds in vessels.
C-C	Welded attachments for vessels, piping, pumps, and valves.
C-D	Pressure retaining bolting greater than 2 inches in diameter.
C-F-1*	Pressure retaining welds in austenitic stainless steel or high alloy steel piping.
C-F-2*	Pressure retaining welds in carbon or low alloy steel piping.
C-G	Pressure retaining welds in pumps and valves.
C-H	All pressure retaining components.

Note: *C-F-1 and C-F-2 Welds are included in the Risk-Informed Inspection Plan

4.6 Section XI Exemptions for ASME Code Class 2 Components

The following components or parts of components are exempt from the volumetric and surface examination requirements of IWC-2500:

- Components within Residual Heat Removal (RHR), Emergency Core Cooling (ECC), and Containment Heat Removal (CHR) or portions of systems

    1. Piping NPS 4 and smaller and associated vessels, pumps, and valves and their connections, for all systems with the exemption of the high pressure safety injection system.

    2. Piping NPS 1 ½ and smaller and associated vessels, pumps, and valves and their connections in high pressure safety injection systems.

3. Vessels, piping, pumps, valves and other components and component connections of any size in statically pressurized, passive (i.e., no pumps) safety injection systems.

4. Piping and components of any size beyond the last shutoff valve in open-ended portions of systems that do not contain water during normal plant operating conditions.

- Components within systems or portions of systems other than RHR, ECC, and CHR systems

    1. Piping NPS 4 and smaller, for all systems with the exception of auxiliary feedwater system.

    2. Piping NPS 1 ½ and smaller in the auxiliary feedwater system.

    3. Vessels, pumps, and valves and their connections in piping NPS 4 and smaller, for all systems except auxiliary feedwater system.

    4. Vessels, pumps, and valves and their connections in piping NPS 1 ½ and smaller in the auxiliary feedwater system.

    5. Vessels, piping, pumps, valve, other components, and component connections of any size in systems or portions of systems that operate (when the system function is required) at a pressure equal to or less than 275 psig and at a temperature equal to or less than 200ºF.

    6. Piping and components of any size beyond the last shutoff valve in open-ended portions of systems that do not contain water during normal plant operating conditions.

- Welds or portions of welds that are inaccessible due to being encased in concrete, buried underground, located inside a penetration, or encapsulated by guard pipe.

4.7 Section XI Requirements for ASME Code Class 3 Components

The components within the ASME Code Class 3 boundary are subject to the visual examination and pressure test requirements of Article IWD-2500 and Table IWD-2500-1. Component supports must meet the examination requirements of IWF-2500 and Table IWF-2500-1. The examination categories of Table IWD-2500-1 are as follows:

Examination Category	Examination Area
D-A	Welded attachments for vessels, piping, pumps and valves.
D-B	All pressure retaining components.

4.8 Section XI Exemptions for ASME Code Class 3 Components

The following components or parts of components are exempt from the VT-1 visual examination requirements of IWD-2500:

- Integral attachments of supports and restraints to piping, vessels, pumps and valves and their connections in piping NPS 4 and smaller.
- Integral attachments of supports and restraints to components that operate at a pressure of 275 psig or less and at a temperature of 200°F or less, in systems (or portions of systems) whose function is not required in support of reactor residual heat removal, containment heat removal, and emergency core cooling.
- Welds or portions of welds that are inaccessible due to being encased in concrete, buried underground, located inside a penetration, or encapsulated by guard pipe.

4.9 Risk-Informed Examination Requirements

Palisades has implemented a Risk Informed Inservice Inspection (RI-ISI) Program using the Westinghouse Owners Group WCAP-14572, revision 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report" and WCAP-14572, revision 1-NP-A, supplement 1, "Westinghouse Structural Reliability and Risk Assessment (SRRA) Model for Piping Risk-Informed Inservice and WCAP-14572, Supplement 2, Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection topical Report Clarifications."

Piping Structural elements that fall under RI-ISI Category R-A are risk ranked in accordance with WCAP-14572, Rev.1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical report.

The RI-ISI Program element examinations are performed in accordance with Relief Request RR 4-10

4.10 Inspection Schedule

Palisades will follow the inspection schedule of IWB/C/D-2412 and IWF-2410, Inspection Program B for the fourth ten-year interval. The inspection interval shall include three inspection periods.

Per IWA-2430(d) an inspection period may be decreased or extended by as much as one year to enable examinations to coincide with a plant outage provided the adjustment does not cause successive intervals to be altered by more than one (1) year from the original pattern of intervals.

Inspection Interval	Period	Minimum Examinations Completed, %	Maximum Examinations Completed, %
4th	1	16	50
	2	50[1]	75
	3	100	100

Note: (1) If the first period completion percentage for any examination category exceeds 34%, at least 16% of the required examinations shall be performed in the second period.

5.0 INSERVICE INSPECTION PROGRAM SUMMARY TABLES

The following Tables in this section provide a summary of the Section XI component, component support, and system pressure testing examinations and tests for the fourth inservice inspection interval at the Palisades Nuclear Plant.

The format of the Inservice Inspection Summary Tables is shown below with an explanation for each column. The detailed examination schedule for components is contained in the Fourth Interval Master Inservice Inspection Plan.

Examination Category	Item Number	Description	Exam Method	Required Exams	Deferral to End	Total Number	Number Req.	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)

(1) Examination Category

Provides the examination category and description as identified in ASME Section XI, Tables IWB-2500-1, IWC-2500-1, IWD-2500-1, IWF-2500-1 and Table 4.1-1 for Risk-Informed Examinations.

(2) Item Number

Provides the Item number as identified in ASME Section XI, Tables IWB-2500-1, IWC-2500-1, IWD-2500-1, IWF-2500-1 and Table 4.1-1 for Risk-Informed Examinations.

(3) Item Number Description

Provides the description as identified in ASME Section XI, Tables IWB-2500-1, IWC-2500-1, IWD-2500-1, IWF-2500-1 and Table 4.1-1 for Risk-Informed Examinations.

(4) Examination Method

Provides the examination method(s), i.e., volumetric, surface, visual, required by ASME Section XI, Tables IWB-2500-1, IWC-2500-1, IWD-2500-1, IWF-2500-1 and Table 4.1-1 for Risk-Informed Examinations.

(5) Required Exams

Provides for the examinations required by ASME Section XI, Tables IWB-2500-1, IWC-2500-1, IWD-2500-1, IWF-2500-1 and Table 4.1-1 for Risk-Informed Examinations.

(6) Deferral to End

Provides for whether a deferral of examination requirement required by ASME section XI, Table IWB-2500-1 is permissible.

(7) Total Number

Provides the number of components within an item Number.

(8) Number Required

Provides the number of components required by ASME Section XI, Tables IWB-2500-1, IWC-2500-1, IWD-2500-1, IWF-2500-1 and Table 4.1-1 for Risk-Informed Examinations.

(9) Number 1st Period

Provides the number of components selected for examination during the first period of the fourth inspection interval.

(10) Number 2nd Period

Provides the number of components selected for examination during the second period of the fourth inspection interval.

(11) Number 3rd Period

Provides the number of components selected for examination during the third period of the fourth inspection interval.

(12) Relief Request/Code Case

Provides a listing of relief request and/or code cases applicable to the Section XI Item Number. If a relief request or code case is identified, see Appendix A or Appendix B as applicable.

Class 1 Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
B-A Pressure Retaining Welds in Reactor Vessel	B1.11	Circumferential-Shell Welds	Volumetric	All Welds	Yes	3	3	-	-	3	-
	B1.12	Longitudinal- Shell Welds	Volumetric	All Welds	Yes	9	9	-	-	9	-
	B1.21	Circumferential-Head Welds	Volumetric	Acces. Length All Welds	Yes	1	1	-	-	1	
	B1.22	Meridional- Head Welds	Volumetric	Acces. Length All Welds	Yes	6	6	-	-	6	RR 4-1
	B1.30	Shell-to-Flange Weld	Volumetric	Weld	Yes	1	1	-	-	1	-

Note: Welds for the reactor vessel closure head (1-B1.21, 6-B1.22 and 1-B1.40 welds) are not included in the above table since Palisades plans on replacing the reactor vessel closure head prior to these examinations being required. The new reactor vessel closure head will not contain these welds.

Class 1 Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
B-B Pressure Retaining Welds in Vessels Other Than Reactor Vessels		**Pressurizer (Shell-to Head Welds)**									
	B2.11	Circumferential	Volumetric	All Welds	No	2	2	1	1	-	
	B2.12	Longitudinal	Volumetric	1ft of one weld intersecting B2.11 welds	No	4	2	1	1	-	-
		Pressurizer (Head Welds)									
	B2.21	Circumferential- Head Welds	Volumetric	One Weld per Head	No	2	1	-	1	-	RR 4-2
	B2.22	Meridional- Head Welds	Volumetric	One Weld per Head	No	8	8	4	4		RR 4-2
		Steam Generators (Primary Side)									
	B2.31	Circumferential- Head Welds	Volumetric	One Weld per Head	No	4	1	-	-	1	-
	B2.32	Meridional- Head Welds	Volumetric	One Weld per Head	No	10	1	1	-	-	-
	B2.40	Tube Sheet-to-Head Weld	Volumetric	Weld	No	2	1	-	-	1	-
		Heat Exchangers (Primary Side)									
	B2.51	Circumferential- Head Welds	Volumetric	One Weld per Head	No	2	1	-	-	1	-
	B2.80	Tubesheet-to-Shell Welds	Volumetric	Welds at Each End	No	2	1	-	-	1	-

Class 1 Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
B-D Full Penetration Welds of Nozzles in Vessels-Inspection Program B		**Reactor Vessel**									
	B3.90	Nozzle-to-Vessel Welds	Volumetric	All Nozzles	Yes	6	6	-	-	6	
	B3.100	Nozzle Inside Radius Section	Volumetric	All Nozzles	Yes	6	6	-	-	6	
		Pressurizer									
	B3.110	Nozzle-to-Vessel Welds	Volumetric	All Nozzles	No	6	6	2	2	2	RR 4-2
	B3.120	Nozzle Inside Radius Section	Volumetric	All Nozzles	No	6	6	2	2	2	
		Steam Generators (Primary Side)									
	B3.130	Nozzle-to-Vessel Welds	Volumetric	All Nozzles	No	6	6	2	1	3	RR 4-3
	B3.140	Nozzle Inside Radius Section	Volumetric	All Nozzles	No	6	6	2	1	3	-
		Heat Exchanger (Primary Side)									
	B3.150	Nozzle-to-Vessel Welds	Volumetric	All Nozzles	No	4	4	2	1	1	RR 4-4
	B3.160	Nozzle Inside Radius Section	Volumetric	All Nozzles	No	2	2	1	-	1	RR 4-4

Class 1 Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
B-G-1 Pressure Retaining Bolting, Greater Than 2in. in Diameter		**Reactor Vessel**									
	B6.10	Closure Head Nuts	Visual, VT-1	All Nuts >2"	Yes	54	54	-	-	54	-
	B6.20	Closure Studs	Volumetric	All Studs > 2"	Yes	54	54	-	-	54	-
	B6.40	Threads in Flange	Volumetric	All Stud Holes > 2"	Yes	1	1	-	-	1	-
	B6.50	Closure Washers, Bushings	Visual, VT-1	All Washers >2"	Yes	54	54	-	-	54	-
		Pumps									
	B6.180	Bolts and Studs	Volumetric	All Bolts and Studs >2"	Yes	4	1	-	-	1	-
	B6.190	Flange Surfaces, when connection is disassembled	Visual, VT-1	When Disassembled	Yes	4	-	-	-	-	-
	B6.200	Nuts, Bushings and Washers	Visual, VT-1	All Nuts, Bushings and Washers >2"	Yes	4	1	-	-	1	-

Class 1 Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
B-G-2 Pressure Retaining Bolting, 2in And Less in Diameter		**Reactor Vessel**									
	B7.10	Bolts, Studs and Nuts	Visual, VT-1	All <=2"	No	16	16	5	5	6	-
		Pressurizer									
	B7.20	Bolts, Studs and Nuts	Visual, VT-1	All <=2"	No	2	2	1	-	1	-
		Steam Generator									
	B7.30	Bolts, Studs and Nuts	Visual, VT-1	All <=2"	No	4	4	1	2	1	-
		Piping									
	B7.50	Bolts, Studs and Nuts	Visual, VT-1	All <=2"	No	5	5	2	2	1	-
		Pumps									
	B7.60	Bolts, Studs and Nuts	Visual, VT-1	All <=2"	No	8	8	3	3	2	-
		Valves									
	B7.70	Bolts, Studs and Nuts	Visual, VT-1	All <=2"	No	27	27	9	9	9	-
		CRD Housings									
	B7.80	Bolts, Studs and Nuts	Visual, VT-1	All <=2"	No	90	90	30	30	30	-

Class 1 Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
B-K Welded Attachments For Vessels, Piping, Pumps and Valves		**Pressure Vessels**									
	B10.10	Welded Attachments	Surface	1 of each similar vessel	No	3	-	-	-	-	-
		Piping									
	B10.20	Welded Attachments	Surface	10%	No	4	1	1	-	-	-
		Pumps									
	B10.30	Welded Attachments	Surface	1 of each similar pump	No	16	4	4	-	-	-

PALISADES NUCLEAR PLANT
4TH INTERVAL INSERVICE INSPECTION PLAN

Class 1 Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
B-L-1 Pressure Retaining Welds in Pump Casings	B12.10	Pump Casing Welds	Visual, VT-1	All Welds 1 Pump each Group	Yes	4	1	-	-	1	-
B-L-2 Pump Casings	B12.20	Pump Casing Internal Surfaces	Visual, VT-3	Internal Surfaces if Disassembled	Yes	4	-	-	-	-	-
B-M-2 Valve Bodies	B12.50	Valve Internal Surfaces, Exceeding NPS 4	Visual, VT-3	Internal Surfaces if Disassembled	Yes	14	-	-	-	-	-

Class 1 Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
B-N-1 Interior of Reactor Vessel	B13.10	Vessel Interior	Visual, VT-3	Accessible Areas During Each Inspection Period	No	1	1	1	1	1	-
B-N-2 Welded Core Support Structures and Interior Attachments to Reactor Vessel	B13.50	Interior Attachments Within Beltline Region in Reactor Vessel	Visual, VT-1	Accessible Welds	Yes	1	1	-	-	1	-
B-N-2 Welded Core Support Structures and Interior Attachments to Reactor Vessel	B13.60	Interior Attachments Beyond Beltline Region in Reactor Vessel	Visual, VT-3	Accessible Welds	Yes	1	1	-	-	1	-
B-N-3 Removable Core Support Structure	B13.70	Core Support Structure in Reactor Vessel	Visual, VT-3	Accessible Surfaces	Yes	1	1	-	-	1	-

Class 1 Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
B-O Pressure Retaining Welds in Control Rod Housings	B14.10	Welds in CRD Housing	Volumetric or Surface	10% Peripheral Housings	Yes	143	4	-	-	4	-
B-P Pressure Retaining Components	B15.10	All Pressure Retaining Components	Visual, VT-2	All Each Refueling Outage	No	-	-	System Leakage test required each refueling outage			RR 4-5
B-Q Steam Generator Tubing	B16.20	Steam Generator Tubing in U-Tube Design	Volumetric*	-	-	-	-	-	-	-	-
* Steam Generator Tubing will be inspected in accordance with Palisades Technical Specifications 5.5.8											

Class 2 Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
C-A Pressure Retaining Welds in Pressure Vessels	C1.10	Shell Circumferential Welds	Volumetric	At Gross Structural Discontinuities	N/A	8	4	1	2	1	RR 4-6 & RR 4-7
	C1.20	Head Circumferential Welds	Volumetric	Head-to-Shell Weld	N/A	6	3	1	1	1	-
	C1.30	Tubesheet-to-Shell Weld	Volumetric	Tube-to-Shell Weld	N/A	4	2	1	-	1	RR 4-7

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
C-B Pressure Retaining Nozzle Welds In Vessels	C2.21	Nozzle-to-Shell (Nozzle-to-Head or Nozzle-to-Nozzle) Weld without Reinforcing Plate, >1/2" Nominal Thickness	Surface and Volumetric	All Nozzles Under C-F	N/A	16	6	2	2	2	RR 4-7
	C2.22	Nozzle Inside Radius Section	Volumetric	All Nozzles Under C-F	N/A	6	3	1	1	1	CC N-311

Class 2 Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
C-C Welded Attachments for Vessels, Piping, Pumps and Valves	C3.10	Welded Attachments to Pressure Vessels	Surface	100% of required area of each attachment	N/A	12	6	-	-	6	-
	C3.20	Welded Attachments to Piping	Surface	100% of required area of each attachment	N/A	52	6	2	2	2	-

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
C-H All Pressure Retaining Components	C7.10	Pressure Retaining Components - System Leakage Test	Visual, VT-2	System Leakage Test each Period	No	-	-	System Leakage test required each inspection period			-

Class 3 Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
D-A Welded Attachments for Vessels, Piping, Pumps and Valves	D1.20	Welded Attachments - Piping	Visual, VT-1	100% of required area for each attachment	N/A	49	6	2	2	2	-

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
D-B All Pressure Retaining Components	D2.10	Pressure Retaining Components	Visual, VT-2	System Leakage Test each Period	No	-	-	System Leakage test required each inspection period			-

Support Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
F-A Supports	F1.10A	Class 1 Piping Supports (One Direction Support)	Visual, VT-3	25%	N/A	100	25	9	8	8	-
	F1.10B	Class 1 Piping Supports (Multi Directional Supports)	Visual, VT-3	25%	N/A	23	6	2	2	2	-
	F1.10C	Class 1 Piping Supports (Spring Can Supports and Snubbers)	Visual, VT-3	25%	N/A	26	7	3	2	2	-
F-A Supports	F1.20A	Class 2 Piping Supports (One Direction Support)	Visual, VT-3	15%	N/A	141	22	8	7	7	-
	F1.20B	Class 2 Piping Supports (Multi Directional Supports)	Visual, VT-3	15%	N/A	95	15	5	5	5	-
	F1.20C	Class 2 Piping Supports (Spring Can Supports and Snubbers)	Visual, VT-3	15%	N/A	129	20	7	7	6	-
F-A Supports	F1.30A	Class 3 Piping Supports (One Direction Support)	Visual, VT-3	10%	N/A	141	15	5	5	5	-
	F1.30B	Class 3 Piping Supports (Multi Directional Supports)	Visual, VT-3	10%	N/A	97	10	4	3	3	-
	F1.30C	Class 3 Piping Supports (Spring Can Supports and Snubbers)	Visual, VT-3	10%	N/A	36	4	2	1	1	-
F-A Supports	F1.40A	Supports Other Than Piping Supports (Class 1, 2,3 and MC)	Visual, VT-3	100% (One of Multiple)	N/A	20	11	2	3	6	-
	F1.40B	Supports Other Than Piping Supports (Class 1, 2,3 and MC)	Visual, VT-3	100% (One of Multiple)	N/A	12	6			6	-

Risk-Informed Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
R-A Risk Informed Piping Examinations	R1.11	Elements Subject to Thermal Fatigue	Volumetric	Per Relief Request RR-10 Submittal	No	2958	126	42	42	42	RR 4-8
	R1.12	Elements Subject to High Cycle Fatigue	Visual, VT-2	Per Relief Request RR-10 Submittal	No	401	*	All socket welds are VT-2 inspected on a refueling outage frequency			-
	R1.15	Elements Subject to Primary Water Stress Corrosion Cracking (PWSCC)	Volumetric	Per Relief Request RR-10 Submittal	No	11	7	3	2	2	RR 4-8
	R1.16	Elements Subject to Intergranular or Transgranular Stress Corrosion Cracking (IGSCC or TGSCC)	Volumetric	Per Relief Request RR-10 Submittal	No	101	17	6	6	5	-
	R1.17	Elements Subject to localized Microbiologically Influenced Corrosion (MIC) or Pitting	Volumetric	Per Relief Request RR-10 Submittal	No	424	Exams performed in accordance with Palisades MIC Program				
	R1.18	Elements Subject to Flow Accelerated Corrosion (FAC)	Volumetric	Per Relief Request RR-10 Submittal	No	11103	Exams performed in accordance with Palisades FAC Program				

6.0 AUGMENTED AND OWNER ELECTED EXAMINATIONS

This section identifies augmented and owner elected inspection programs mandated within the ISI Program.

Augmented examinations are not required by ASME Section XI. However, due to the nature of the augmented requirements, these programs have been referenced within the ISI Program for tracking purposes. These augmented programs satisfy NRC requirements and other applicable site commitments.

Owner elected examinations are not required by ASME and are not regulatory commitments. These examinations have been determined to be good practice due to operating experience, engineering judgment, etc., and may be an internal site commitment.

Each of these Augmented or Owner elected inspections are scheduled within the ISI Program Master schedule of examinations.

Augmented and owner program revisions or deviations shall be governed by the referenced documents and without need to submit a revised program plan to the regulator.

6.1 Technical Specification Required Augmented Examinations

a. Technical Specification 5.5.6 Reactor Coolant Pump Flywheels

   Technical Specification Section 5.5.6 requires an inspection program that provides for a 100% volumetric inspection of the upper flywheels each 10 years.

b. Operating Requirements Manual Section 4.12 Augmented Inservice *Inspection Program for High Energy Lines Outside of Containment*

   The program applies to welds in piping systems or portions of systems located outside containment where protection from the consequences of postulated ruptures is not provided by a system of pipe whip restraints, jet impingement barriers, protective enclosures and/or other measures designed specifically to cope with such ruptures.

   For the Palisades Plant, this specification applies to welds in the Main Steam and Main Feedwater lines located inside the Main Steam and Feedwater Penetration Rooms.

   OBJECTIVE

   To provide assurance of the continued integrity of the piping systems over the service lifetime.

SPECIFICATION

4.12.1 For welds identified in the Operating Requirements Manual, Figure 4.12.A, (Main Steam Lines) and Figure 4.12.B, (Feedwater Lines)

a. The inspection at each weld shall be performed in accordance with the requirements of ASME Section XI Code, with the following schedule.

Fourth Inspection Interval

Volumetric inspection of 1/3 of the welds at the expiration of each period of the inspection interval with a cumulative 100 percent coverage of all welds.

Note: The welds selected during each inspection period shall be distributed among the total number to be examined to provide a representative sampling of the condition of all welds.

A. Examinations that reveal unacceptable structural defects in a weld shall be extended to require inspection of an additional 1/3 of the welds. If further unacceptable defects are detected in this additional sampling, the remainder of the welds shall be examined.

B. In the event repairs of any weld is required following the examinations performed during successive inspection intervals, the inspection schedule for the repaired weld(s) shall revert back to the first inspection interval schedule.

4.12.2 For other welds (excluding those identified in figure 4.12.A and 4.12.B)

A. Welds in the Main Steam lines including the safety valve attachment welds and in the Feedwater lines shall be examined in accordance with the requirements of Subsections ISC-100 through 600 of the 1972 Winter Addendum of ASME Section XI Code.

4.12.3 For welds in the Main Steam and Main Feedwater lines located inside the Main Steam and Feedwater Penetration rooms.

A. A visual inspection on the surfaces of the insulation at the weld locations shall be performed on a weekly basis for detection of leaks. Any detected leaks shall be investigated and evaluated. If leakage is caused by a through wall flaw, either the plant shall be shut down or the leaking piping isolated. Repairs shall be performed prior to returning the line to service.

B. Repairs, re-examination and piping pressure tests shall be conducted in accordance with the rules of ASME Section XI Code.

Basis:

Under normal plant operating conditions, the piping materials operate under ductile conditions and within the stress limits considerably below the ultimate strength properties of the materials. Flaws, which could grow under such conditions, are generally associated with cyclic loads that fatigue the material, and lead to leakage cracks. The examinations and the frequency of inspection will provide a means for timely detection even before the flaw penetrates the wall of the piping.

6.2 Miscellaneous Augmented Examinations

a. DEFENSE IN DEPTH

The Primary Coolant System (PCS) piping will continue to receive a system pressure test and Visual VT-2 examination as currently required by the Code. In addition, the welds connecting the PCS hot and cold leg loop piping to the Reactor Vessel nozzles will continue to be inspected as part of the ASME Section XI vessel inspection program. This includes twelve PCS loop welds, two per nozzle.

b. ALLOY 600

Palisades Alloy 600 Inspection Program is based on the following documents and commitments:

The reactor vessel head will be inspected in accordance with NRC Order EA-03-009,"Issuance of First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurizer Water Reactors".

Alloy 600 butt welds are categorized and inspected in accordance with MRP-139 "Material Reliability Program: Primary System Piping Butt Weld Inspection and Evaluation Guideline".

The Pressurizer Heater sleeve penetrations will be inspected in accordance with NRC Bulletin 2004-01"

Other Alloy 600 penetrations (hot and cold leg penetrations) that are not covered by the above requirements shall receive a bare metal examination using the following schedule:
For pressurizer and hot leg penetrations perform a bare metal visual examination each refueling outage.
For cold leg penetrations perform a bare metal visual examination once every three refueling outages.

c. Weld Overlays

In 1994 Palisades installed two weld overlays for repair of the containment sump check valves. Palisades will perform a surface and a volumetric examination of one overlay during the fourth interval with guidance taken from EPRI TR-11932 for Category E.

d. ALLOY 600 COMMITMENTS

Commitments from letter to NRC dated June 7, 1995

Complete inspections for PWSCC of the areas to which the mechanical stress improvement process (MSIP) is applied every other refueling outage.

The six affected welds are:
PCS-12-PSL-1H1-1
PCS-12-PSL-1H1-2
PCS-12-PSL-1H1-7
PCS-12-PSL-1H1-8
PCS-12-SCS-2H1-1
PCS-12-SCS-2H1-2

Perform a PWSCC ultrasonic examination of the Pressurizer Spray Nozzle welds at the Pressurizer on a frequency of every other refueling outage. The two affected welds are PCS-4-PSS-1P1-21 and PCS-4-PSS-1P1-20.

6.3 Owner Elected Examinations

a. Structural Integrity of Auxiliary Feedwater System Piping

Palisades plan for examination for the structural integrity of the Auxiliary Feedwater System Piping associated with the Steam Generators, "reference letters RJB 34-88, dated May 18, 1988, BVV 88-032, dated July 14, 1988 and THF 88-001, dated January 28, 1988, which shows evidence of examinations already performed. (See revision 7 of the Master Plan for referenced letters).

A synopsis of those letters mentioned above consists of the examinations listed below:

1. Pipe to Elbow – Perform volumetric examinations
2. Elbow to Pipe – Perform volumetric examinations
3. Pipe to Nozzle – Perform volumetric examinations
4. Perform ultrasonic wall thinning examinations beginning at the Elbow to Pipe weld downstream of the Steam Generators. Beginning refueling outage number 14 (1999 Outage), these examinations will be

performed under the plants Flow Accelerated Corrosion (FAC) program.

5. Perform visual examinations of the internal knuckle region, provided the Steam Generators are open for secondary side inspections.

The above examinations are to be performed once each 3 1/3 years (equivalent to once each ISI period). These examinations are to apply to both Steam Generators and are included in this plan.

Augmented Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
Augmented	D-I-D	Defense-In-Depth examinations for the PCS welds connecting the hot and cold leg loop piping to the reactor vessel nozzles	UT-M	All Nozzles	Yes	12	12	-	-	12	-
	88-08	NRC Bulletin 88-08 Thermal Stresses in Piping Connected to Reactor Coolant System	Volumetric	Every 5-years	No	1	1	1		1	-
	AF-SI	Structural Integrity of the Aux Feedwater piping associated with the Steam Generators	Volumetric	Each Inspection Period	No	8	8	8	8	8	-
	ORM4.12	Main Steam and Feedwater Lines located inside the Main Steam and Feedwater Penetration Rooms.	Volumetric	1/3 of Exams Each Period	No	24	24	8	8	8	-
	Overlay	Weld Overlay Repairs on Containment Sump Check Valves	Volumetric	25% per Interval	No	2	1	-	1	-	RR 4-9
	RG 1.14	*Primary Coolant Pump Flywheel Examination	Volumetric	Each Inspection interval	Yes	4	4	1	1	2	-
	* Examination required by Palisades Technical Specification 5.5.6										

Augmented Alloy 600 Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
Augmented Alloy 600	MRP-139A	Resistant Materials	Volumetric	Each Inspection Interval	Yes	2	2	-	-	2	-
	MRP-139C	Non-Resistant material Mitigated by Stress Improvement	Volumetric	Each Inspection Interval	No	6	6	2	2	2	-
	MRP-139D	Non-Resistant Material Pressurizer and Hot Leg >=4'	Volumetric	Each Inspection Period	No	2	2	2	2	2	-
	MRP-139E	Non-Resistant Material Pressurizer and Cold Leg >=4'	Volumetric	100% Every 6 Years	No	8	8	4	4	2	-
	MRP-139H	Non-Resistant Material Pressurizer and Hot Leg <4'	Volumetric if possible	Each Inspection Period	No	3	3	3	3	3	-
	MRP-139J	Non-Resistant Material Pressurizer and Hot Leg	BMV	Each Refueling in which Volumetric is not performed	No	22	22	22	22	22	-
	MRP-139K	Non-Resistant Material Pressurizer and Cold Leg	BMV	Once Every Three Refuelings	No	24	16	10	10	12	-

Augmented Alloy 600 Exams
Inservice Inspection Summary Table

Exam Category	Item Number	Description	Exam Method	Required Exams	Exams Deferral to End	Total Active	Number Required	Number 1st Period	Number 2nd Period	Number 3rd Period	RR No/ Code Case
Augmented Alloy 600	BL-2004-01	Alloy 600 Pressurizer Heater Penetrations	BMV	Every Refueling Outage	No	120	120	120	120	120	-
	AL-600	¾" Hot Leg Penetrations	BMV	Every Refueling Outage	No	20	20	20	20	20	-
	AL-600	¾" Cold Leg Penetrations	BMV	Once Every Three Refuelings	No	16	16	16	16	16	-
	AL-600	Alloy 600 Hot Leg J-Welds	BMV	Every Refueling Outage	No	10	10	10	10	10	-
	AL-600	Alloy 600 Cold Leg J-Welds	BMV	Once Every Three Refuelings	No	12	12	12	12	12	-
	AL-600	Pressurizer Temperature Elements	BMV	Every Refueling Outage	No	2	2	2	2	2	-
	AL-600	Steam Generator Bowl Plugs	BMV	Once Every Three Refuelings	No	4	4	4	4	4	-

7.0 CODE CASES

Several Code Cases may be used during the fourth inservice inspection interval. Those Code Cases which have been approved for use by the NRC by inclusion in Revision 14 of Regulatory Guide 1.147 and are planned to be used by Palisades during the fourth inspection interval are listed in Appendix A.

8.0 RELIEF REQUESTS

Many of the requirements of ASME Section XI Subsections IWA, B, C, D, and F cannot be practically implemented. 10CFR50.55a allows exemption to the requirements of the ASME Section XI Code on a case-by-case basis with the approval from the Director of the Office of Nuclear Reactor Regulation. The applicant for the exemption must demonstrate that:

- The proposed alternatives would provide an acceptable level of quality and safety, or
- Compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Many relief requests have been previously discussed pertaining to the specific section of the code they affect. All relief requests are listed in Appendix B.

9.0 Drawings

During the development of the ISI Program Plan many drawings and sketches are used to aid the process and provide an easy means by which to locate individual components, items, welds and supports. The following is a list of those drawings and sketches used in the preparation of the ISI Program Plan and schedule.

Class 1 Drawings

COMPONENT IDENTIFICATION	DRAWING NUMBER (S)
Reactor Pressure Vessel	A-1
Pressurizer T-72	A-2
Steam Generator E-50A	A-3
Steam Generator E-50B	A-3
Reactor Coolant Loops	A-4
Regenerative Heat Exchanger E-56A	A-34
Regenerative Heat Exchanger E-56B	A-34
Primary Coolant Pump P-50A	A-32
Primary Coolant Pump P-50B	A-32
Primary Coolant Pump P-50C	A-32
Primary Coolant Pump P-50D	A-32
Group 1 Valve Internals	M107 Sh 2199, 2236, 2235 and 2371
Group 2 Valve Internals	M107 Sh 2371, 2372, 2373 and 2374
Group 3 Valve Internals and Valve Body Welds	M107 Sh 2244
Group 1 Valve Bolting	M107 Sh 2199, 2236, 2235 and 2371
Group 2 Valve Bolting	M107 Sh 2371, 2372, 2373 and 2374
Group 3 Valve Bolting	M107 Sh 2244
Group 4 Valve Bolting	M107 Sh 2350, 2349, 2348 M110 Sh 121, 1165, 997, 996, 998 and 1434
PCS-12-PSL-1H1	M107 Sh 2057
PCS-12-SCS-2H1	M107 Sh 2244
PCS-4-PRS-1P1	M107 Sh 2154
PCS-4-PRS-1P2	M107 Sh 2154
PCS-4-PRS-1P3	M107 Sh 2154
PCS-4-PSS-1P1	M107 Sh 2347 and 2348
PCS-3-PSS-1B1	M107 Sh 2350
PCS-3-PSS-2A1	M107 Sh 2348 and 2349
PCS-2-DRL-1A1	M110 Sh 113
PCS-2-LDL-2B1	M110 Sh 130
ESS-6-ISI-1A1	M107 Sh 2373
ESS-6-SIS-1B1	M107 Sh 2374
ESS-6-SIS-2A1	M107 Sh 2372
ESS-6-SIS-2B1	M107 Sh 2371
ESS-2-SIS-1A1	M110 Sh 243
ESS-2-SIS-1B1	M110 Sh 243
ESS-2-SIS-2A1	M110 Sh 243

COMPONENT IDENTIFICATION	DRAWING NUMBER (S)
ESS-2-SIS-2B1	M110 Sh 243
ESS-2-LTC-1B	M107 Sh 2454
CVC-2-CHL-1A1	M110 Sh 997
CVC-2-CHL-1A2	M110 Sh 997
CVC-2-CHL-2A1	M110 Sh 998
CVC-2-LDL-2B1	M110 Sh 121
CVC-2-LDL-2B2	M110 Sh 1665 and 1434
CVC-2-PSS-1P1	M110 Sh 856, 857 and 858
PCS-6-PRS-1A1	M107 Sh 2153
PCS-6-PRS-1B1	M107 Sh 2158
PCS-6-PRS-1C1	M107 Sh 2157
PCS-4-PRS-1P2	M107 Sh 2154
PCS-4-PRS-1P3	M107 Sh 2154

Class 2 Drawings

COMPONENT IDENTIFICATION	DRAWING NUMBER (S)
Concentrated Boric Acid Tank	B-3
SIRW Tank	B-146
Iodine Removal NaOH Tank	B-148
Iodine Removal NaOH Make-Up Tank	B-148
Safety Injection Tanks	B-5
Boric Acid Filter	B-6
Steam Generator E-50A	B-8
Steam Generator E-50B	B-8
Regenerative Heat Exchanger E-56A	B-9
Regenerative Heat Exchanger E-56B	B-9
Shutdown Cooling Heat Exchanger E-60A	B-11
Shutdown Cooling Heat Exchanger E-60B	B-11
Containment Spray Pumps	B-131
Charging Pumps	B-131
Concentrated Boric Acid Pumps	B-133
High Pressure Safety Injection Pumps	B-133
Low Pressure Safety Injection Pumps	B-133
SIRW Recirculation Pump	B-149
MSS-36-MSL-1S1	M101 Sh 2764 and 3021
MSS-36-MSL-2S1	M101 Sh 2763 and 3019
MSS-8-MSV-1S1	M101 Sh 3218
MSS-8-MSV-1S2	M101 Sh 3219
MSS-8-MSV-2S1	M101 Sh 3216
MSS-8-MSV-2S2	M101 Sh 3217
FWS-18-FWL-1S1	M101 Sh 2734
FWS-18-FWL-2S1	M101 Sh 2732
FWS-6-AWS-1S1	M101 Sh 2785
FWS-6-AWS-2S1	M101 Sh 2785
ESS-24-SIS-SH1	M107 Sh 2278
ESS-18-SIS-SH1	M107 Sh 2278
ESS-24-SIS-SH2	M107 Sh 2281
ESS-18-SIS-SH2	M107 Sh 2281
ESS-14-CSS-1PA	M107 Sh 2279
ESS-8-CSS-1PA	M107 Sh 2170
ESS-14-CSS-1PB	M107 Sh 2282
ESS-8-CSS-1PB	M107 Sh 2170
ESS-10-CSS-1PB	M107 Sh 2170
ESS-14-CSS-1PC	M107 Sh 2282
ESS-8-CSS-1PC	M107 Sh 2170
ESS-14-SDC-LPC	M107 Sh 2280
ESS-14-SDC-LPD	M107 Sh 2280
ESS-14-SIS-HPA	M107 Sh 2279
ESS-6-SIS-HPA	M107 Sh 2279
ESS-14-SIS-LPA	M107 Sh 2280

COMPONENT IDENTIFICATION	DRAWING NUMBER (S)
ESS-10-SIS-LPA	M107 Sh 2171
ESS-14-SIS-LPB	M107 Sh 2280
ESS-10-SIS-LPB	M107 Sh 2171
ESS-8-SIS-1A6	M107 Sh 2370
ESS-6-SIS-1A6	M107 Sh 2370
ESS-8-SIS-1B6	M107 Sh 2370
ESS-14-SCS-2H1	M107 Sh 2280 and 2244
ESS-12-SDC-XCO	M107 Sh 2172
ESS-10-SDC-XCO	M107 Sh 2172
ESS-12-SIS-SDC	M107 Sh 2170
ESS-12-SIS-1A5	M107 Sh 2199
ESS-12-SIS-1B5	M107 Sh 2236
ESS-12-SIS-1C5	M107 Sh 2233
ESS-12-SIS-1D5	M107 Sh 2071
ESS-12-SIS-1A1	M107 Sh 2199
ESS-12-SIS-1B1	M107 Sh 2236
ESS-12-SIS-2A1	M107 Sh 2235
ESS-12-SIS-2B1	M107 Sh 2071
ESS-6-SIS-1A1	M107 Sh 2373
ESS-6-SIS-1B1	M107 Sh 2374
ESS-6-SIS-2A1	M107 Sh 2372
ESS-6-SIS-2B1	M107 Sh 2371
ESS-12-SIS-1LP	M107 Sh 2171, 2172 and 2370
ESS-10-SDC-X1B	M107 Sh 2170
ESS-10-CSS-SLA	M107 Sh 2172
ESS-8-CSS-SLA	M107 Sh 2172
ESS-6-CSS-SLA	M107 Sh 2172
ESS-8-CSS-SLA	M107 Sh 2456 and 2457
ESS-8-CSS-SLB	M107 Sh 2173
ESS-6-CSS-SLB	M107 Sh 2173
ESS-8-CSS-SLB	M107 Sh 2375 and 2376
ESS-10-CSS-1P3	M107 Sh 2170
ESS-10-SDC-X1A	M107 Sh 2170
ESS-10-SDC-XOA	M107 Sh 2172
ESS-12-SDC-XOA	M107 Sh 2172
ESS-6-SDC-RE1	M107 Sh 2201
ESS-8-SIS-HPB	M107 Sh 2283
ESS-6-SIS-HPB	M107 Sh 2283
ESS-6-SIS-HPC	M107 Sh 2283
ESS-6-SIS-1HP	M107 Sh 2245 and 2065
ESS-6-SIS-2HP	M107 Sh 2072 and 2246
ESS-6-SIS-CRH	M107 Sh 2200 and 2201
ESS-6-LTC-1A	M107 Sh 2455
ESS-6-LTC-1B	M107 Sh 2454
ESS-3-SIS-HPA	M107 Sh 2245
ESS-3-SIS-HPB	M107 Sh 2245
ESS-2-SIS-HRA	M107 Sh 2248

COMPONENT IDENTIFICATION	DRAWING NUMBER (S)
ESS-2-SIS-HRB	M107 Sh 2247
ESS-4-SIS-2HP	M107 Sh 2246
ESS-3-SIS-3HP	M107 Sh 2246
ESS-4-SIS-CRH	M107 Sh 2200
ESS-4-SIS-HPB	M107 Sh 2245
ESS-3-SIS-LRA	M107 Sh 2200
ESS-6-BL-CRH	M107 Sh 2204
SFP-8-CPL-DL1	M107 Sh 2560 and 2023
SFP-6-CPL-SL1	M107 Sh 2667 and 2465
SFP-6-SRT-RL1	M107 Sh 2204
SFP-6-SRT-SL1	M107 Sh 2021
SWS-16-CRS-RH1	M101 Sh 2745
VAS-8-CPU-RL2	B-120
VAS-8-CPU-RL1	B-120

Class 3 Drawings

COMPONENT IDENTIFICATION	DRAWING NUMBER (S)
FWS-6-AWS-OLA	M101 Sh 2716
FWS-6-AWS-OLB	M101 Sh 2716
FWS-6-AWS-SLA	M101 Sh 2761
FWS-6-AWS-1S1	M101 Sh 2939
FWS-6-AWS-SLC	M101 Sh 2978
FWS-6-AWS-OLC	M101 Sh 2983
FWS-4-AWS-2S3	M101 Sh 2977- 1 and 2
FWS-4-AWS-1S3	M101 Sh 2977- 1 and 3
FWS-2-AWS-OLC	M110 Sh 1758- 1,2 and 3
FWS-1.5-AWS-OLA	C-16
FWS-1.5-AWS-OLB	C-16
FWS-6-CMU-SH1	C-237
FWS-12-CMU-SH3	C-236
SWS-24-CCS-RLH	M101 Sh 2744
SWS-24-CSW-HCL	M101 Sh 3028
SWS-24-CSW-SH1	M101 Sh 3027, 3028 and 2810
SWS-24-CSW-SH2	M101 Sh 3029 and 2811
SWS-16-CRS-RH1	M101 Sh 2784
SWS-16-CRS-SH1	M101 Sh 3028 and 2797
SWS-16-SWP-OLA	M101 Sh 2810
SWS-16-SWP-OLC	M101 Sh 2811
SWS-12-CRS-SH1	M101 Sh 2790
SWS-12-CRS-SH2	M101 Sh 2797
SWS-10-CRS-SL1	M101 Sh 2795
SWS-24-SWP-CDL	M101 Sh 2811
SWS-10-CRS-SL3	M101 Sh 2790
SWS-10-CRS-SL4	M101 Sh 2797
SWS-12-CRS-RH2	M101 Sh 2784
SWS-10-CRS-RL1	M101 Sh 2781 and 2782
SWS-10-CRS-RL3	M101 Sh 2779
SWS-10-CRS-RL4	M101 Sh 2784
SWS-6-CRS-1R1	M101 Sh 2782
SWS-8-CRS-RL2	M101 Sh 2777
SWS-6-CRS-2R2	M101 Sh 2778
SWS-6-CRS-3R1	M101 Sh 2780
SWS-6-CRS-3R2	M101 Sh 2776

COMPONENT IDENTIFICATION	DRAWING NUMBER (S)
SWS-6-CRS-4R1	M101 Sh 2783
SWS-6-CRS-4R2	M101 Sh 2721
SWS-6-CRS-1S1	M101 Sh 2796
SWS-6-CRS-2S1	M101 Sh 2792
SWS-6-CRS-2S2	M101 Sh 2792 and 2793
SWS-6-CRS-3S1	M101 Sh 2767
SWS-6-CRS-4S1	M101 Sh 2791
SWS-6-CRS-4S2	M101 Sh 2774
SWS-6-EPS-RLA	M101 Sh 3035
SWS-6-EPS-RLB	M101 Sh 3033 and 3032
SWS-6-EPS-SLA	M101 Sh 3030 and 3031
SWS-6-EPS-SLB	M101 Sh 3038 and 3039
SWS-6-RE-BL	M101 Sh 6331
CCS-24-CPU-1PA	M101 Sh 2842
CCS-20-CHX-1P1	M101 Sh 2740
CCS-20-CHX-RLB	M101 Sh 3226
CCS-20-CPU-1PA	M101 Sh 2842
CCS-16-CPU-1PA	M101 Sh 2740
CCS-20-CPU-1PB	M101 Sh 2843
CCS-16-CPU-1PB	M101 Sh 2740
CCS-20-CPU-1PC	M101 Sh 2843
CCS-16-CPU-1PC	M101 Sh 2740
CCS-20-SCH-1P1	M101 Sh 3226
CCS-20-SCH-1P2	M101 Sh 3226
CCS-20-CHX-1PC	M101 Sh 2740
CCS-18-RHC-1P1	M101 Sh 2842
CCS-12-SDC-RLA	M101 Sh 2842
CCS-14-ARH-1P1	M101 Sh 2844
CCS-14-ASH-1P1	M101 Sh 3226 and 3227
CCS-10-ASH-1P1	M101 Sh 3227
CCS-10-ARH-1P1	M101 Sh 2844
CCS-10-RWS-1P1	M101 Sh 3227
CCS-10-RWS-1P2	M101 Sh 2844
CCS-10-CSH-1P1	M101 Sh 3226
CCS-10-CSH-1P3	C-58
CCS-10-CSH-1P4	M101 Sh 2843
SFP-14-FPF-RL1	M107 Sh 2020
SFP-10-FPP-1PA	M107 Sh 2020

COMPONENT IDENTIFICATION	DRAWING NUMBER (S)
SFP-10-FPP-1PB	M107 Sh 2020
SFP-8-FPP-1PA	M107 Sh 2671
SFP-8-CPL-DL1	M107 Sh 2022 and 2023
SFP-6-SRT-SL1	M107 Sh 2022
SFP-12-SFX-SL1	M107 Sh 2671
SFP-8-FPP-1PB	M107 Sh 2671
SFP-6-SRT-RL1	M107 Sh 2669
SFP-12-SFX-RL1	M107 Sh 2665
DMW-6-CST-AFS	M101 Sh 2761 M107 Sh 2364
DMW-6-CST-AWS	C-190, 192 and 193
DMW-16-CST-AWS	C-236

Risk-Informed Drawings

SEGMENT IDENTIFICATION	DRAWING NUMBER (S)
Auxiliary Feedwater	
AFW-006B	C-16A
AFW-010	C-196
AFW-011	C-196A
AFW-012	M101 Sh. 2983, 2939
AFW-016	M101 Sh. 2938
AFW-018	M101 Sh. 2937
Blowdown	
BLD-003	M101 Sh. 6419
BLD-004	M101 Sh. 6420
BLD-005A	M101 Sh. 6419
BLD-006A	M101 Sh. 6420
Condensate	
CDS-013	M101 Sh. 6369, 6381, 84, 6371, 243, 240
CDS-014	M101 Sh. 6369
Concentrated Boric Acid	
CBA-012	M107 Sh. 2409, 2415
Critical Service Water	
CSW-004	M101 Sh. 2811
CSW-005A	M101 Sh. 2810, 3027, 2811
CSW-005B	M101 Sh. 3027
CSW-006A	M101 Sh. 2811, 2812, 3029
CSW-006B	M101 Sh. 3029
CSW-007	M101 Sh. 3028
CSW-008	M101 Sh. 3028
CSW-009	M101 Sh. 3028
CSW-013	M101 Sh. 3035
CSW-016	M101 Sh. 2744
CSW-017	M101 Sh. 2744
CSW-021	M101 Sh. 3038
Extraction Steam Heaters and Drains	
HED-001	M101 Sh. 6376
HED-002	M101 Sh. 6376
HED-003	M101 Sh. 1359, 6391
HED-005	M101 Sh. 1361, 6392
HED-006	M101 Sh. 6389

SEGMENT IDENTIFICATION	DRAWING NUMBER (S)
HED-007	M101 Sh. 6390
Non-Critical Service Water	
NSW-001	M101 Sh. 2816, 321
NSW-004	M110 Sh. 3545, M101 Sh. 1244, 1247
NSW-005	M101 Sh. 1847, 3683, 3688
NSW-010A	M101 Sh. 2746, 2774, 2775
NSW-010B	M101 Sh. 2747
NSW-010C	M101 Sh. 3035
Circulating Water	
CWS-011 (Dilution Pump P-40B)	M653 Sh. 3 (C-1)
CWS-012 (Dilution Pump P-40A)	M653 Sh. 3 (C-2)
Main Steam	
MSS-027	M101 Sh. 6375, M3.08
MSS-028	M3.08
MSS-036	M3.08
MSS-037	M3.08
MSS-041	M101 Sh. 322
MSS-046	M101 Sh. 6405
MSS-047	M101 Sh. 6401
MSS-048	M101 Sh. 6404, 3302
MSS-049	M101 Sh. 6406, 3301
MSS-051	M101 Sh. 6405
MSS-052	M101 Sh. 6402
MSS-059	M101 Sh. 6407, 3303
MSS-060	M101 Sh. 6408, 3304
MSS-065	M101 Sh. 6413
MSS-066	M101 Sh. 6414
MSS-067	M101 Sh. 6413
MSS-069	M101 Sh. 6414
MSS-071	M101 Sh. 6375
MSS-072	M101 Sh. 6400
MSS-073	M101 Sh. 6404
MSS-074	M101 Sh. 6402
MSS-075	M101 Sh. 6401
MSS-076	M101 Sh. 6403
Low Pressure Safety Injection	
LPI-001	M107 Sh. 2199
LPI-001A	M107 Sh. 2373

SEGMENT IDENTIFICATION	DRAWING NUMBER (S)
LPI-002	M107 Sh. 2235
LPI-002A	M107 Sh. 2372
LPI-003	M107 Sh. 2236
LPI-003A	M107 Sh. 2374
LPI-004	M107 Sh. 2371
LPI-004A	M107 Sh. 2371
Pressurizer	
PZR-001	M107 Sh. 2057
PZR-002	M1-LA Sh. 985
PZR-003	M1-LA Sh. 985
PZR-004	M1-LA Sh. 985
PZR-005	M1-LA Sh. 985
PZR-006	M107 Sh. 2157
PZR-007	M107 Sh. 2158
PZR-008	M107 Sh. 2153
PZR-009	M107 Sh. 2154
PZR-010	M107 Sh. 2154
PZR-014A	M110 Sh. 1806
PZR-015	M107 Sh. 2348, 2347
PZR-016	M107 Sh. 2350
PZR-017	M107 Sh. 2348, 2349
PZR-018	M201 Sh. 1 (B-6)
PZR-019	M110 Sh. 856
PZR-020	M201 Sh. 2
Primary Coolant	
PCS-011	M110 Sh. 3493, 3694, 3692, 3658
PCS-012	M110 Sh. 3693, 3694 M201 Sh. 1(D-1) M201 Sh. 1(B-1)
PCS-013	M110 Sh. 3495, 3696 M201 Sh. 1(D-7) M201 Sh. 1(E-7)
PCS-014	M110 Sh. 3496, 3695, 3659 M201 Sh. 1(D-7)
PCS-015	M110 Sh. 113
PCS-016	M110 Sh. 113
PCS-017	M110 Sh. 130
PCS-018	M110 Sh. 130

SEGMENT IDENTIFICATION	DRAWING NUMBER (S)
PCS-019A	M110 Sh. 3497 Typical
PCS-019B	M110 Sh. 3497 Typical
PCS-020A	M110 Sh. 3497 Typical
PCS-020B	M110 Sh. 3497 Typical
PCS-021A	M110 Sh. 3497 Typical
PCS-021B	M110 Sh. 3497 typical
PCS-022A	M110 Sh. 3497 Typical
PCS-022B	M110 Sh. 3497 typical
PCS-023	M110 Sh. 113
PCS-026	PCS Book
PCS-027	PCS Book
PCS-034A	M110 Sh. 1806
PCS-035	M107 Sh. 2199
PCS-036	M107 Sh. 2071
PCS-037	M107 Sh. 2236
PCS-038	M107 Sh. 2235
PCS-039	M107 Sh. 2244
PCS-040	M110 Sh. 997
PCS-041	M110 Sh. 998
PCS-042	M201 Sh. 1
PCS-043	M201 Sh. 1
SIRW and Containment Sump Suction	
SSS-001	M107 Sh. 2281
SSS-001A	M204 Sh. 1B (D-6)
SSS-001B	M107 Sh. 2281
SSS-002	M107 Sh. 2278
SSS-002A	M204 Sh. 1B (B-3)
SSS-002B	M107 Sh. 2278
SSS-002C	M107 Sh. 2278
SSS-002D	M107 Sh. 2278
SSS-003G	M107 Sh. 2282
SSS-005	M107 Sh. 2281
SSS-005A	M107 Sh. 2281
SSS-006	M107 Sh. 2278
SSS-006A	M107 Sh. 2278
SSS-007	M107 Sh. 2107, 2105, 2106, 2021
SSS-008	M107 Sh. 2410, 2411, 2413
SSS-008A	M107 Sh. 2411

SEGMENT IDENTIFICATION	DRAWING NUMBER (S)
SSS-009	M110 Sh. 381
SSS-010	M107 Sh. 5083, 2064
Shutdown Cooling	
SDC-002B1	M107 Sh. 2280
SDC-002B2	M107 Sh. 2280
SDC-002B3	M107 Sh. 2280
SDC-005	M107 Sh. 2171, 2200
SDC-006	M107 Sh. 2171, 2200
SDC-007A2	M107 Sh. 2171
SDC-009	M107 Sh. 2170
SDC-011A1	M107 Sh. 2172
SDC-011A2	M107 Sh. 2172, M110 Sh. 391
SDC-011A3	M107 Sh. 2172
SDC-012A1	M107 Sh. 2173
SDC-012A2	M107 Sh. 2173, M110 Sh. 391
SDC-012A3	M107 Sh. 2172, 2173
SDC-020	M107 Sh. 2280
Fire Protection	
FPS-012A	M101 Sh. 1870
FPS-012C	M101 Sh. 2870
FPS-014	M101 Sh. 2761
FPS-021	M101 Sh. 1870
FPS-022	M101 Sh. 1870

Defense in Depth Drawings

COMPONENT IDENTIFICATION	DRAWING NUMBER (S)
PCS-42-RCL-1H	A-4
PCS-42-RCL-2H	A-4
PCS-30-RCL-1A	A-4
PCS-30-RCL-1B	A-4
PCS-30-RCL-2A	A-4
PCS-30-RCL-2B	A-4

Augmented Drawings

COMPONENT IDENTIFICATION	DRAWING NUMBER (S)
PCS-12-PSL-1H1	M107 Sh 2057
PCS-4-PSS-1P1	M107 Sh 2347
PCS-12-SCS-2H1	M107 Sh 2244
PCS-4-PRS-1P1	M107 Sh 2154
ESS-6-SIS-1A1	M107 Sh 2373
ESS-6-SIS-2A1	M107 Sh 2372
ESS-6-SIS-1B1	M107 Sh 2374
ESS-6-SIS-2B1	M107 Sh 2371
PCS-2-PSS-1P1	M110 Sh. 856
MSS-36-MSL-1S1	M101 Sh 3021
MSS-36-MSL-2S1	M101 Sh 3019
MSS-8-MSV-1S1	M101 Sh 3218
MSS-6-RVR-1S4	M101 Sh 3021
MSS-6-RVR-2S1	M101 Sh 3019
MSS-6-RVR-2S4	M101 Sh 3019
MSS-6-RVR-2S6	M101 Sh 3019
FWS-18-FWL-1S1	M101 Sh 2912 and 2734
FWS-18-FWL-2S1	M101 Sh 2914 and 2732
FWS-4-AWS-1S1	M101 Sh 2940
FWS-3-AWS-1S1	M101 Sh 2940
FWS-4-AWS-2S1	M101 Sh 2941
FWS-3-AWS-2S1	M101 Sh 2941
ESS-24-SIS-SH1	M107 Sh 2278
ESS-24-SIS-SH2	M107 Sh 2281
Primary Coolant Pump P-50A	A-32
Primary Coolant Pump P-50B	A-32
Primary Coolant Pump P-50C	A-32
Primary Coolant Pump P-50D	A-32

10.0 CALIBRATION BLOCKS

The following table identifies the calibration blocks that are used for ultrasonic examination of components at the Palisades Nuclear Plant.

Block Number	Drawing Number	Material	PO Number	Drawing Number
10.75-SS-X-.937-1-PAL	C-2249-033	A376, TP316	59459	950Y198*M1Y-38
6-CS-89-WOL-X-2-PAL	CPC009	SAE102	26834	CPC009
5-CSCL-3-PAL	C-2249-034	SA508,CL2	59459	950Y198*M1Y-6
4.75-5.8-CS-4-PAL	D-2249-035	A540, Gr. B24	87321	950Y198*M1Y-21
12X12-CSCL-6-PAL	C-2249-037	SA508, CL2	59459	950Y198*M1Y-3
IR-CSCL-7-PAL	C-2249-038	SA508, CL2	59459	950Y198*M1Y-5
6-SS-120-.562-8-PAL	C-2249-047	SA-312, TP304	59459	950Y198*M1Y-4
14SS-10-.250-9-PAL	D-2249-057	SA-312, TP304	98538	950Y198*M1Y-8
8-SS-10S-.148-10-PAL	D-2249-058	SA-312, TP304	98538	950Y198*M1Y-9
6-SS-10S-.134-11-PAL	D-2249-059	SA-312, TP304	98538	950Y198*M1Y-10
10-SS-20-.250-12-PAL	D-2249-060	SA376, TP304	98538	950Y198*M1Y-11
12-SS-20-.250-13-PAL	D-2249-061	SA376, TP304	98538	950Y198*M1Y-12
12-SS-140-1.125-14A-PAL	D-2249-053	SA182, TP304	93300	950Y198*M1Y-13
4-SS-120-.438-15-PAL	D-2249-054	SA376, TP316	93300	950Y198*M1Y-14
3-SS-160-.438-16-PAL	D-2249-052	SA376, TP316	93300	950Y198*M1Y-15
2.5-SS-160-.375-17-PAL	D-2249-056	SA376, TP316	93300	950Y198*M1Y-16
2-SS-160-.344-18-PAL	D-2249-055	SA376, TP316	93300	950Y198*M1Y-17
30ID-CSCL-3.0-19-PAL	D-2249-088	SA264	93300	950Y198*M1Y-18
42ID-CSCL-X-4.0-20-PAL	D-2249-089	SA264	93300	950Y198*M1Y-19
6-SS-120-.562-21-PAL	D-2249-086	SA376, TP316	98538	950Y198*M1Y-20

Block Number	Drawing Number	Material	PO Number	Drawing Number
4.344-CSCL-22-PAL	D-2249-085	SA533, Gr.B	98538	950Y198*M1Y-22
30ID-CSS-3.0-23-PAL	D-2249-090	SA351, CF8M	98538	950Y198*M1Y-23
4-IN-X-.594-24-PAL	D-2249-087	SB166	98538	950Y198*M1Y-24
IR-CSCL-25-PAL	D-2249-091	SA508, CL2	98538	950Y198*M1Y-42
IR-CSCL-26-PAL	D-2249-048	SA508, CL2	1001-3663	950Y198*M1Y-25
18-CS-60-.750-27-PAL	D-2249-049	SA106, Gr.B	18277	950Y198*M1Y-26
2.4-SS-XX-.552-28A-PAL	D-2249-094	SA376, TP316	18277	950Y198*M1Y-27
8-SS-40S-.322-29-PAL	D-2249-095	SA312, TP304	18277	950Y198*M1Y-28
6-CS-40-.280-30-PAL	D-2249-093	SA106, Gr.B	18277	950Y198*M1Y-29
6-SS-80S-.432-31-PAL	D-2249-092	SA376, TP304	18277	950Y198*M1Y-30
6-IN-1.719-32-PAL	D-2249-082	SB166	18277	950Y198*M1Y-31
PL-CS-2.5-33-PAL	D-2249-081	SA533, Gr.B	19277	950Y198*M1Y-32
7-CSCL-35-PAL	D-2249-096	SA533, Gr.B	1001-3915	950Y198*M1Y-33
5-CSCL-36-PAL	D-2249-097	SA533, Gr.B	19277	950Y198*M1Y-34
3-SS-80S-.300-37-PAL	D-2249-098	SA376, TP304	18277	950Y198*M1Y-35
3-SS-10S-.120-38-PAL	D-2249-099	SA376, TP304	18277	D-2249-099
4-SS-10S-.120-39-PAL	D-2249-101	SA312, TP304	18277	950Y198*M1Y-36
4-SS-80-.377-40-PAL	D-2249-233	SA376, TP304	18277	950Y198*M1Y-37
18-CS-X-1.0-41-PAL	D-2249-224	SA106, Gr.B	47642	950Y198*M1Y-43
18-CS-X-1.0-42-PAL	D-2249-255	SA106, Gr.B	47642	950Y198*M1Y-44
11-CSCL-43-PAL	D-2249-230	SA533, Gr.B	CP10-1332	950Y198*M1Y-46
9-CSCL-44-PAL	D-2249-231	SA533, Gr.B	CP10-1332	950Y198*M1Y-47
N/S-CSCL-45-PAL	D-2249-228	SA508, CL2	CP10-1332	950Y198*M1Y-45
PL-CSCL-1.0-48-PAL	950-Y-198-M1-Y	SA515, Gr.70	CP111455Q	950Y198*M1Y-50

Block Number	Drawing Number	Material	PO Number	Drawing Number
7-1.125-8-CS-49-PAL*	950-Y-198-M1-Y	SA540,Gr.B24,CL3	LP08-7492	950Y198*M1Y-51
36-CS-1.250-50-PAL	950Y198*M1Y-56	A106, Gr.B	CP11-3365	950Y198*M1Y-56
6-SS-160-.719-PAL**	950Y198*M1Y-54	SA312, TP316	CP11-3365	950Y198*M1Y-54
256-203	70277-296-002	SA516, Gr.70		M1-FAA-166
296-204	70277-296-002	SA516, Gr.70		M1-FAA-166
296-202	70277-296-002	SA516, Gr.70		M1-FAA-166
296-201	70277-296-002	SA516, GR.70		M1-FAA-166
296-101	70277-296-001	SA533, Gr.B, CL1		M1-FAA-165
296-102	70277-296-001	SA516, Gr.70		M1-FAA-165
296-103	70277-296-001	SA516, Gr.70		M1-FAA-165
296-104	70277-296-001	SA533, Gr.B		M1-FAA-165
296-106	70277-296-001	SA508		M1-FAA-165
51-PAL (Overlay Block)				
52-PAL (RPVCH Stud)				
53-PAL (PCP Stud)				
54-PAL	1243008C	IN600		
55-PAL	1243010C	IN600		
56-PAL	1243011C	IN600		
57-PAL	1243017E	IN600		
58-PAL	1243013D	IN600		
59-PAL (ET Std.)	1243009E	IN600	C0013583	
60-PAL	1243014C	IN600	C0013583	
61-PAL (ET Std.)	1243015C	IN600	C0013583	

PALISADES NUCLEAR PLANT
4TH INTERVAL INSERVICE INSPECTION PLAN

Block Number	Drawing Number	Material	PO Number	Drawing Number
62-PAL				
8-CS-40-.322-63-PAL	M1Y-Sh. 60	A106, Gr.B	G217724	950Y198*M1Y-60
Alternative Calibration Blocks				
4647	CB0282R0	A516, Gr.70	G0364407	
4648	CB0283R0	TP304	G0364407	
4649	CB0284R0	TP316	G0364407	
Mock Up Blocks				
NZL-MKP-52-PAL				
Main Coolant Pump	6446 E87	A508, SA516		
CSCL-53-PAL				
Cracked Test Specimen		SA533 Clad		
Pressurizer Spray Nozzle (986-01)				
Charging Inlet Nozzle (676-01)				
Shutdown Cooling Outlet Nozzle (675-06)				
Pressure & Meas. Sampling Nozzle (675-13)				
*Replacement for 7-1.125-8-CS-46-PAL				
**Replacement for 6-SS-160-.791-47-PAL				

11.0 RECORDS

An ISI Summary Report including Form NIS-1 is required to be filed with the regulator and jurisdictional authorities within 90 calander days following refueling outage completion. This is considered to be closure of the generator output breaker. Items to be attached to the ISI Summary Report shall include:

- Interval, period and refueling outage number (when applicable)
- A complete list of examined items and components and component supports during the cycle;
- An abstract of examination results;
- Extent of condition noted;
- A description of the type and estimated extent of degradation, and conditions that led to the degradation;
- An evaluation of each area, and the results of the evaluation, and;
- A description of necessary corrective actions;
- The number of additional examinations performed and the results if any;
- Form NIS-1, Owner's Report for Inservice Inspection.
- Form NIS-2, Owner's Report for Repair/Replacement Activities.
- A coversheet providing the following:
    1. Date of document completion,
    2. Name and address of owner,
    3. Name and address of plant,
    4. Name and number designation of the unit,
    5. Commercial service date for the unit.

Appendix A Palisades Nuclear Plant Code Cases

Code Case Number	Code Case Title	Approved By
N-311	Alternative Examination of Outlet Nozzle on Secondary Side of Steam Generators, Section XI, Division 1	Reg. Guide 1.147, Rev 14
N-432-1	Repair Welding Using Automatic or Machine Gas Tungsten-Arc Welding (GTAW) Temper Bead Technique	Reg. Guide 1.147, Rev 14
N-460	Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 and 3 piping Section XI, Division 1	Reg. Guide 1.147, Rev 14
N-513-2	Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 and 3 piping Section XI, Division 1	Relief Request RR-4-12
N-526	Alternative Requirements for Successive Inspections of Class 1 and 2 Vessels	Conditionally Acceptable per Reg. Guide 1.147, Rev 14
N-545	Alternative Requirements for Conduct of Performance Demonstration Detection Test of reactor Vessel	Reg. Guide 1.147, Rev 14
N-552	Alternative Methods – Qualification for Nozzle Inside Radius Section from the Outside Surface	Conditionally Acceptable per Reg. Guide 1.147, Rev 14
N-566-2	Corrective Action for Leakage Identified at Bolted Connections	Reg. Guide 1.147, Rev 14
N-586	Alternative Additional Examination Requirements for Class 1, 2, and 3 Piping, Components, and Supports	Conditionally Acceptable per Reg. Guide 1.147, Rev 14
N-593	Alternative Examination Requirements for Steam Generator Nozzle-to-Vessel Welds	Conditionally Acceptable per Reg. Guide 1.147, Rev 14
N-597-1	Requirements for Analytical Evaluation of Pipe Wall Thinning	Conditionally Acceptable per Reg. Guide 1.147, Rev 14
N-613-1	Ultrasonic Examination of Full Penetration Nozzles in Vessels, Examination Category B-D, Item No's. B3.10 and B3.90, reactor Nozzle-to-Vessel Welds, Fig. IWB-2500-7(a), (b), and (c)	Reg. Guide 1.147, Rev 14
N-624	Successive Inspections	Reg. Guide 1.147, Rev 14
N-629	Use of Fracture Toughness Test Data to Establish Reference Temperature for Pressure Retaining Materials	Reg. Guide 1.147, Rev 14
N-638-1	Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique	Conditionally Acceptable per Reg. Guide 1.147, Rev 14
N-639	Alternative Calibration Block Material	Conditionally Acceptable per Reg. Guide 1.147, Rev 14
N-641	Alternative Pressure-Temperature Relationship and Low Temperature Overpressure Protection System Requirements	Reg. Guide 1.147, Rev 14
N-643	Fatigue Crack Growth Rate Curves for Ferritic Steels in PWR Water Environment	Reg. Guide 1.147, Rev 14

Code Case Number	Code Case Title	Approved By
N-648-1	Alternative Requirements for Inner Radius Examinations of Class 1 Reactor Vessel Nozzles	Conditionally Acceptable per Reg. Guide 1.147, Rev 14
N-661	Alternative Requirements for Wall Thickness Restoration of Classes 2 and 3 Carbon Steel Piping for Raw Water Service section XI, Division 1	Conditionally Acceptable per Reg. Guide 1.147, Rev 14
N-663	Alternative Requirements for Classes 1 and 2 Surface Examinations	Reg. Guide 1.147, Rev 14
N-695	Qualification requirements for Dissimilar Metal Piping Welds	Reg. Guide 1.147, Rev 14

Appendix B Palisades Nuclear Plant Relief Requests

This Appendix contains relief request written pursuant to the requirements of 10CFR50.55a for situations where applicable ASME Section XI requirements cannot be met.

The following guidance was employed to determine the correct 10CFR50.55a paragraph cited for Palisades Nuclear Plant relief requests.

10CFR50.55a(a)(3)(i): Cited in relief requests when alternatives to the Section XI requirements, which provide an acceptable level of quality and safety, are proposed. Examples are relief requests that propose alternative NDE methods and/or examination frequency.

10CFR50.55a(a)(3)(ii): Cited in relief requests when compliance with the Section XI requirements is deemed to be a hardship or unusual difficulty without a compensating increase in the level of quality and safety. Examples of hardship and/or unusual difficulty include, but are not limited to, excessive radiation exposure, disassembly of components solely to provide access for examinations, and development of sophisticated tooling that would result in only minimal increases in examination coverage.

10CFR50.55a(g)(6)(i): Cited in relief requests when conformance with Section XI requirements is deemed impractical. Examples of impractical requirements are situations where the component would have to be redesigned or replaced to enable the required inspection to be performed.

Appendix B Palisades Nuclear Plant Relief Requests

The relief request contained in the following table are subject to change throughout the inspection interval.

ISI PROGRAM RELIEF REQUEST INDEX

Relief Request	Summary	Revision	Status
RR 4-1	Reactor Vessel Lower Head Meridional Welds	0	Submitted
RR 4-2	Pressurizer Head, Shell and Nozzle Welds	0	Submitted
RR 4-3	Steam Generator Nozzle to Shell Welds	0	Submitted
RR 4-4	Regenerative Heat Exchanger Welds	0	Submitted
RR 4-5	Reactor Vessel Pressure Test	0	Submitted
RR 4-6	Steam Generator Upper Shell to Shell Cone Welds	0	Submitted
RR 4-7	Shutdown Heat Exchanger Welds	0	Submitted
RR 4-8	Pressurizer Nozzle to Flange Welds	0	Submitted
RR 4-9	Appendix VIII, Supplement 11	0	Submitted
RR 4-10	Risk-Informed ISI	0	Submitted
RR 4-11	IWA-2600 Weld Reference System	0	Submitted
RR 4-12	Code Case N-513-2	0	Submitted

RELIEF REQUEST NUMBER – RR 4-1

COMPONENT IDENTIFICATION

Code Class	1
Code Reference	IWB-2500 Table IWB-2500-1
Examination Category	B-A
Item Number	B1.22
Component Description	Reactor Vessel Lower Head Meridional Welds: 1-113A at 0°,1-113B at 60°, 1-113C at 120°,1-113D at 180°, 1-113E at 240° and 1-113F at 300°
Reference Drawings	Combustion Engineering Drawing 232-113 and Sketch NDT-MNA-DSD9515 Sheet 17 of 43 (See Attachment 1)

In accordance with 10 CFR 50.55a(a)(3)(ii), Nuclear Management Company, LLC (NMC) requests authorization to implement examination on the accessible volumes as identified below in lieu of the 100% volumetric requirements at Palisades Nuclear Plant.

CODE REQUIREMENT

Table IWB-2500-1, Category B-A. Item B 1.12 requires a volumetric examination of the accessible length of all welds. This is clarified in footnote 2 to examine essentially 100% of the weld length.

BASIS FOR RELIEF

The six (6) lower head meridional welds in the reactor vessel are not fully accessible, such that. 100% of the entire length of the weld volumes can not be achieved during an ultrasonic examination from inside of the reactor vessel using remotely operated examination equipment. The limitation on the exam is caused by an internally installed flow ring, a permanent 360° attachment in the upper part of the lower head. The flow ring covers up to the top half of the meridional welds and prevents direct access for scanning. Following are the coverage's which were achieved during the past examination:

1. Meridional Weld 1-113A at 0° - 47%
2. Meridional Weld 1-113B at 60° - 53%
3. Meridional Weld 1-113C at 120° - 53%

4. Meridional Weld 1-113D at 180° - 47%
5. Meridional Weld 1-113E at 240° - 53%
6. Meridional Weld 1-113F at 300° - 53%

Two drawings are provided to support this relief request. the first drawing (232-113) is a copy from the vendor file and is the best available drawing to show the reactor vessel bottom head forming and welding.

The second drawing (Sketch NTD-MNA-DSD9515. Sheet 17 of 43) is taken from the Westinghouse final report to Palisades for the June 1995 reactor vessel examination. This cross sectional drawing details the limitation created by the flow ring and the transducers which were used for the examination of these lower head welds.

Manual ultrasonic examination from the exterior of the vessel would not be feasible due to the large amount of dose required to set-up lighting, prep the examination areas, ultrasonically examine the portions of the weld which were inaccessible from the ID, and demobilize from the area. The contact dose on the lower head is 2.5R and the general dose levels in the room range from 1.5 to 2R. The expected dose expended to complete this scope of work could easily exceed 20R. The expected benefit of obtaining this data does not outweigh the consequences of exposing personnel to this cumulative dose.

Additionally, there were no indications in the portions of the weld which were examined from the ID using the mechanized tool.

PROPOSED ALTERNATIVE EXAMINATION

The accessible weld volumes of each of the 6 identified meridional welds will be ultrasonically examined from the ID using remotely operated mechanized equipment during the performance of the reactor vessel examination.

IMPLEMENTATION SCHEDULE

The proposed alternative is requested for the 4th ten year interval of the Inservice Inspection Program for Palisades Nuclear Plant.

REFERENCE

By letter dated January 9, 1997, the NRC Staff previously authorized this relief to Palisades, Docket No 50-255 [TAC NO. M93628] for the 3rd ten year inspection interval (Previously RR-11). Note: The previous relief request was revised by letters from the NRC on October 14,1998 and February 14, 2000 [TAC NO.93628].

RELIEF REQUEST NUMBER - RR 4-2

COMPONENT IDENTIFICATION

Code Class	1
Code Reference	IWB-2500 Table IWB-2500-1
Examination Category	B-B and B-D
Item Numbers	B2.11,B2.21,B2.22 and B3.110
Component Description	Pressurizer Upper Shell to Upper Head Weld 5-988 Lower Shell to Lower Head Weld 3-982 Lower Head Circumferential Weld 2-984 Meridional Head Welds: Lower Head 1-984A through D Nozzle to Shell Welds 1-986, 3-985, 8-986, 8-986A through C
Reference Drawings	Combustion Engineering Drawings M1-L-A Sh. 982, M1-L-A Sh. 983, M1-L-A Sh. 985, M1-L-A Sh. 986, M1-L-A Sh. 987 (See Attachment 1)

In accordance with 10 CFR 50.55a(a)(3)(ii), Nuclear Management Company, LLC (NMC) requests authorization to implement examination on the accessible volumes as identified below in lieu of the 100% volumetric requirements at Palisades Nuclear Plant.

CODE REQUIREMENT

Table IWB-2500-1 requires all of the listed welds to be volumetrically examined during each inspection interval.

BASIS FOR RELIEF FOR WELDS 5-988 & 3-982

Volumetric examination of Welds 5-988 and 3-982 as required to satisfy the examination region E-F-G-H (as referenced in Figure 1WB-2500-1(b) will be limited due to the transition slope from the shell to the heads. Scanning distances are limited by the insulation support rings located on the shell side 7 inches from the centerline of the welds.

Percentage of the volumetric examination of the region E-F-G-H as referenced in IWB-2500-1 (B) will be as follows:

1 0° scanning of region E-F-G-H will examine approximately 62% of the required volume.

2 Axial angle beam examinations with the beam direction from the head towards the shell will examine approximately 81% of the required volume

3. Axial angle beam examinations with the beam direction from the shell towards the head will examine approximately 68% of the required volume.

4. The transverse scans with two angle beam directions in both the clockwise and the counter clockwise directions will obtain approximately 92% of the required examination volume E-F-G-H.

BASIS FOR RELIEF FOR WELD 2-984

Due to the component design configuration with relation to the pressurizer heater penetrations in the lower head, weld 2-984 is totally inaccessible for any type of a volumetric or surface examination. This weld is located inside the lower support skirt and lies between the second and third rows of heater penetrations.

The location of the support skirt which is welded to the head near the edge of weld 2-984 does not allow access from the upper side of the weld. Due to the spacing of the heater penetrations, at approximately four inches apart, and the angle of each penetration through the lower head, examination from the bottom of the weld towards the upper side is not possible. Therefore, no examinations are planned for this weld other than VT-2 system leakage tests.

BASIS FOR RELIEF FOR WELDS 1-984A through D

Approximately 75% of the lower head meridional welds 1-984A through D are totally inaccessible due to the support skirt, the skirt bracket assembly and the heater penetrations.

Approximately nine to ten inches of the lower head meridional welds are accessible from the centerline of the lower shell to the lower head weld (3-982) down to the welded support skirt. This accessible area represents 25% of the total weld length for each weld.

Of this accessible 25% of total weld length, the total volumetric examination of region E-F-G-H as referenced in Figure IWB-2500-3 will be 100% for all required scans. Therefore this volume on all four lower meridional welds will be examined in lieu of the code required 100% examination of one weld length.

BASIS FOR RELIEF FOR WELD 1-986

Weld 1-986, is the 4 inch spray line nozzle to upper head weld. Based on previous examination data and a thorough review of the design drawings, it has been determined that examination of this weld is limited. The limitation is due to nozzle 7-986 in the scanning area from the head side. This limitation will result in a loss of accessible examination length of 8.7 inches or approximately 24% of the total length of the weld.

Approximately 84% of the total required examination volumes for the regions outlined in Figure IWB-2500-7(a) can be achieved with angle beam direction from the head side towards the nozzle. This takes into account the volumes that can be examined within the 8.7 inch limitation area.

Total required examination volumes that can be obtained with the 0° scan will equal approximately 54% due to the configuration of the weld and the nozzle.

Transverse scan of the total required exam volumes with two angle beams in both the clockwise and the counter clockwise directions will equal approximately 81% of the required volume.

Due to the configuration, no examinations can be performed from the nozzle side towards the head.

BASIS FOR RELIEF FOR WELD 3-985

Weld 3-985, is the 12 inch surge line nozzle to lower head weld. Based on previous examination data and a thorough review of the design drawings, it has been determined that examination of this weld is limited. The limitation is due to the design configuration and the inability to scan three locations of the weld due to insulation studs welded at the toe of the weld.

The insulation studs result in a loss of approximately 7% of the scanning surface when scanning from the head side towards the nozzle. The 93% of the accessible examination area will be volumetrically examined from the head side towards the nozzle and will result in 100% examination of regions C-D-E-F and B-C-F-G and 84% of region A-B-G-H-I as referenced in Figure IWB-2500-7(a).

The volumetric examination of region A-B-G-H-I from the nozzle side will examine approximately 34%, approximately 5% of region B-C-F-G will be examined in this direction and approximately 25% of exam volume C-D-E-F will be examined in this direction.

The total required examination volume of regions referenced in Figure IWB-2500-7(a) with the transverse scan of weld 3-985 will equal 84% with two angle beams in both the clockwise and counter clockwise directions.

BASIS FOR RELIEF FOR WELDS 8-986. 8-986A. 8-986B and 8-986C

Weld 8-986 is the PORV outlet nozzle to upper head weld, weld 8-986A, B, C are the code safety nozzles to head welds. Volumetric examination of these welds will be limited due the design configuration of the head and other limitations described below. The following discussion is applicable to all four welds.

The 0° scan is limited to 10% of the total required examination volume in the attachment weld region (B-C-F-G) and the nozzle cylinder region (A-B-G-H-I). In the adjoining region (C-D-E-F) the required examination volume for the 0° scan will be 81% due to the limitations produced by insulation studs welded in the area of interest and by the interference of the adjacent nozzles.

Based on a review of the drawings and past examination data, the angle beam scans from the head side towards the nozzle will allow examination of 81% of the examination regions identified on Figure IWB-2500-7(a). This takes into account the configuration and scanning limitations caused by the insulation studs and the proximity of the other nozzles.

Transverse scans with two angle scanning in both the clockwise and counter clockwise directions will examine 81 % of the required volume in the regions referenced in Figure IWB-2500-7(a).

Volumetric examination from the nozzle side is limited in all cases and results in examination of 10% of the required volumes.

PROPOSED ALTERNATIVE EXAMINATIONS

The accessible volumes as identified above will be examined in lieu of the 100% volumetric requirements.

IMPLEMENTATION SCHEDULE

The proposed alternative is requested for the 4th ten year interval of the Inservice Inspection Program for Palisades Nuclear Plant.

REFERENCE

By letter dated January 9, 1997, the NRC Staff previously authorized this relief to Palisades, Docket No 50-255 [TAC NO. M93628] for the 3rd ten year inspection interval (Previously RR-6).

RELIEF REQUEST NUMBER – RR 4-3

COMPONENT IDENTIFICATION

Code Class	1
Code Reference	IWB-2500 Table IWB-2500-1
Examination Category	B-D
Item Number	B3.130
Component Description	Steam Generator Nozzle to Shell Welds, 1-104-251, 1-102-251A, 1-102-251B, 2-104-351 2-102-351A, 2-102-351B
Reference Drawings	M1-FAA Sh. 44 and M1-F-AA Sh. 40 Figure IWB-2500-7(A) (See Attachment 1)

In accordance with 10 CFR 50.55a(a)(3)(ii), Nuclear Management Company, LLC (NMC) requests approval to implement examination on the accessible volumes as identified below in lieu of the 100% volumetric requirements at Palisades Nuclear Plant.

CODE REQUIREMENT

Section XI, Table IWB-2500-1 requires all nozzle to vessel welds to be volumetrically examined once during each inspection interval.

BASIS FOR RELIEF

For purposes of discussion, Figure 1WB-2500-7(a) (attached) will be used to describe the 4 required weld volumes. With the exception of the nozzle inner radius section, this figure is the closest configuration to our actual nozzles.

Palisades working with EPRI have developed the attached package (See Attachment 2). The attached information is an excerpt from the EPRI report and is intended to identify the exam volumes within the areas of limitations. The final EPRI report will identify exam volumes within the area of limitations (attached information), exam volumes where no limitations exist and the composite exam volumes. The final composite exam volumes will be slightly higher since this will include the areas where no limitations exist. However, the code required exam volume will not be achieved and this relief request is necessary.

The attached package includes:

1) Figure defining exam volumes.

2) Inlet nozzle inner radius coverage table followed by supporting figure.

3) Inlet nozzle-to-shell weld exam volume.
4) Axial scan coverage table for inlet nozzle-to-shell weld followed by supporting figures.

5) Transverse scan (no probe skewing) coverage table for inlet nozzle-to-shell weld followed by supporting figures.

6) Transverse scan (+/-20° probe skewing) coverage table for inlet nozzle-to-shell weld followed by supporting figures.

7) Outlet nozzle inner radius coverage table followed by supporting figure.

8) Outlet nozzle-to-shell weld exam volume.

9) Axial scan coverage table for outlet nozzle-to-shell weld followed by supporting figures.

10) Transverse scan (no probe skewing) coverage table for outlet nozzle-to-shell weld followed by supporting figures.

11) Transverse scan (+/-20° probe skewing) coverage table for outlet nozzle-to-shell weld followed by supporting figures.

There are 2 acronyms used in the EPRI report for identification, they are Consumers Power - Steam Generator Project Inlet Nozzle (CP-SGPIN) and Consumers Power - Steam Generator Project Outlet Nozzles (CP-SGPON).

The computer based modeling was performed on one steam generator and this is intended to address all primary head nozzle welds in both steam generators. The steam generators are identical in design.

The probe skew angle for the axial exams are identified as 0° and 180° within the coverage tables. The probe skew angle for the transverse exams were modeled using a 90° and then offset using a 70° and 110° skew to increase exam volume coverages.

In summary, the examination volumes are limited and the maximum achievable volumes within the areas of limitations are accurately identified. A relief request from the code required examination volumes is necessary. The final EPRI report is on file at Palisades.

PROPOSED ALTERNATIVE EXAMINATION

All accessible weld volumes will be examined once per interval in lieu of the 100% volumetric examination requirements.

IMPLEMENTATION SCHEDULE

The proposed alternative is requested for the 4th ten year interval of the Inservice Inspection Program for Palisades Nuclear Plant.

REFERENCE

By letter dated March 20,1998, the NRC Staff previously authorized this relief to Palisades, Docket No 50-255 [TAC NO. M98925] for the 3rd ten year inspection interval (Previously RR-4).

RELIEF REQUEST NUMBER – RR 4-4

COMPONENT IDENTIFICATION

Code Class	1
Code Reference	IWB-2500 Table IWB-2500-1
Examination Category	B-D
Item Numbers	B3.150 and B3.160
Component Description	Regenerative Heat Exchangers E -56A and E-56B Nozzle to Shell Welds: E-56A Welds 05 and 07 E-56B, Welds 05 and 07
Reference Drawings	M1-HF Sh. 354 and M1-HF Sh. 355 (See Attachment 1)

In accordance with 10 CFR 50.55a(a)(3)(ii), Nuclear Management Company, LLC (NMC) requests approval to implement examination on the accessible volumes as identified below in lieu of the 100% volumetric requirements at Palisades Nuclear Plant.

CODE REQUIREMENT

Table IWB-2500-1 requires all to vessel welds to be volumetrically examined during each inspection interval.

BASIS FOR RELIEF FOR WELDS E-56A-05 AND E-56B-05

Note: Welds E-56A-05 and E-56B-05 are identical in configuration and the same limitations apply to both welds.

The Regenerative Heat Exchangers are vertically mounted and Weld #05 is located in the lower head. The accessible area of the circumference for Weld #05 is limited to four inches of the circumference. The remainder of the weld is covered by the support pads which make it inaccessible to any kind of surface or volumetric examination.

The four inches (18% of the circumference) that is accessible can be examined as summarized below:

1. 65% of the four required volumes using a 45° angle beam from the shell side towards the nozzle.

2. 56% of the four required volumes using a 60° angle beam from the shell side towards the nozzle.

3. 47% of the 4 required volumes using a 45° angle beam from the nozzle side towards the shell.

4. 35% of the 4 required volumes using a 60° angle beam from the nozzle side towards the shell.

5. 61% of the total required volumes can be examined with a 0° scan.

6. 69% of the total required examination volumes can be covered with transverse scans in clockwise and counter clockwise scanning directions using 2 angle beams.

PROPOSED ALTERNATIVE EXAMINATION

The accessible volumes as identified above will be examined in lieu of the 100% volumetric requirements.

BASIS FOR RELIEF FOR WELDS E-56A-07 AND E-56B-07

Note: Welds E-56A-07 and E-56B-07 are identical in design and the same limitations apply to both welds.

Upon thorough review of the referenced drawings and a review of previous examination data it has been determined that the required examination volumes for the examination regions referenced in IWB-2550-7(a) are limited due to the configuration of the nozzle and the shell.

1. It is not possible to scan the required examination regions from the nozzle side due to the limited scanning surface available. Therefore, 0% of the required examination volumes will be obtained from the nozzle side with the beam direction towards the shell for any of the required volumes listed on Figure IWA-2500-7(a).

2. Approximately 17% of the required exam volumes of the examination regions referenced in Figure 1WB-2500-7(a) can be examined using two angle beams with direction going from the shell side towards the nozzle.

3. Approximately13% of the required exam volumes can be examined with the 0° scan. No examinations can be performed on the nozzle or the weld due to the design configuration.

4. Approximately 50% of the total required examination volumes can be examined with the transverse angle beam examinations in clockwise and counter clockwise scanning directions.

PROPOSED ALTERNATIVE EXAMINATIONS

The accessible volumes as identified above will be examined in lieu of the 100% volumetric requirements.

IMPLEMENTATION SCHEDULE

The proposed alternative is requested for the 4th ten year interval of the Inservice Inspection Program for Palisades Nuclear Plant.

REFERENCE

By letter dated January 9, 1997, the NRC Staff previously authorized this relief to Palisades, Docket No 50-255 [TAC NO. M93628] for the 3rd ten year inspection interval (Previously RR-5).

RELIEF REQUEST NUMBER – RR 4-5

COMPONENT IDENTIFICATION

Code Class	1
Code Reference	IWB-2500 Table IWB-2500-1
Examination Category	B-P
Item Number	B15.10
Component Description	Alternative Testing for Components Under the Reactor Vessel

CODE REQUIREMENT

Table IWB-2500-1, Examination Category B-P, requires a system leakage test of IWB-5220 shall be conducted prior to plant startup following a reactor refueling outage.

BASIS FOR RELIEF

Pursuant to 10CFR50.55a(a)(3)(ii), relief is requested on the basis that the specified requirements above would result in hardship and unusual difficulty without a compensating increase in the level of quality and safety. Also, per 10CFR50.55a(a)(3)(i), the proposed alternate examination will provide an acceptable level of quality and safety.

The area under the reactor vessel is extremely hazardous when the plant is at Hot Shutdown Conditions for system leakage testing. Radiation levels are expected to be greater than 5-10 rem/hr (on contact), which is the maximum measured during cold shutdown. Assuming 2 persons at one hour per person in this area a total dose of 10 to 20 rem of dose would be received.

In addition to radiation concerns, access to the area under the reactor vessel posses various industrial hazards. Of primary concern is confined space and heat stress. Ambient air temperatures with the Primary Coolant System at full pressure and temperature are expected to be approximately 300 degrees. Access under these conditions would require significant ventilation for cooling. The access tube to this area is only 30 inches in diameter. This size limits the amount of ventilation possible while allowing personnel access.

PROPOSED ALTERNATE EXAMINATION

Palisades Nuclear Plant shall determine leakage from piping and components in the area under the reactor vessel in accordance with paragraph IWA-5244 "Buried Components" of ASME Section XI 2001 Edition, 2003 Addenda. This requirement will be satisfied by the conducting of Palisades System Operating Procedure SPO-1, "Primary Coolant System (PCS)", which completes the PCS leak rate calculation. Plant Technical Specification 3.1.5 states, "If the primary coolant system leakage exceeds 1 gpm and the source of the leakage is not identified, reduce unidentified leakage to less than 1 gpm within 6 hours, or place the reactor in hot shutdown within the following 6 hours and in cold shutdown within the following 24 hours." Technical Specification 3.1.5d places a more restrictive leakage limit of 0.6 gpm during startups. Technical Specification Table 4.2.2, Item 7 requires this leak rate determination on a daily basis. These limits are approved as documented in Palisades Facility Operating License DPR-20, through Amendment No 161 and are applicable at all times when the Primary Coolant System is greater than cold shutdown conditions.

Additionally, Palisades will perform a remote visual examination of the area under the reactor vessel once per refueling outage. This examination will document active leakage or evidence of leakage which may have occurred during the previous power cycle.

IMPLEMENTATION SCHEDULE

The proposed alternative is requested for the 4th ten year interval of the Inservice Inspection Program for Palisades Nuclear Plant.

REFERENCE

By letter dated June 28, 1996, the NRC Staff previously authorized this relief to Palisades, Docket No 50-255 [TAG NO. M95051] for the 3rd ten year inspection interval (Previously PR-02).

RELIEF REQUEST NUMBER – RR 4-6

COMPONENT IDENTIFICATION

Code Class	2
Code Reference	IWC-2500 Table IWC-2500-1
Examination Category	C-A
Item Number	C1.10
Component Description	Steam Generator Upper Shell to Shell Cone Welds, 1-101-221 and 2-101-221
Reference Drawings	M1-F-AA Sh. 104 and M1-F-AA Sh. 74 (See Attachment 1)

In accordance with 10 CFR 50.55a(a)(3)(ii), Nuclear Management Company, LLC (NMC) requests approval to implement examination on the accessible volumes as identified below in lieu of the 100% volumetric requirements at Palisades Nuclear Plant.

CODE REQUIREMENT

Table IWC-2500-1 requires a volumetric examination of welds at gross structural discontinuities which includes essentially 100% of the weld length.

BASIS FOR RELIEF

Based on examination data obtained during the preservice ultrasonic examinations which were performed on the new steam generators in 1990, there are approximately 171 inches of documented limitations on the upper shell. These limitations are caused by welded patches, snubber attachments and the 18 inch feedwater nozzles. The limitations are shown on drawings M1-F-AA Sh. 104 and M1-F-AA Sh. 74.

The axial angle beam scan from shell cone with the beam direction towards the upper shell will allow approximately 77% of the required volume E-F-G-H as noted on Figure IWC-2500-1. Also, there is a 2% loss of coverage area in the required volume due to the configuration of the shell cone. This configuration causes an abrupt transition to exist in the examination area which results in a loss of contact as the exit point of the transducer travels across this point. This condition exists for the entire circumference of the weld. The 2% loss of exam volume of area E-F-G-H exists from either the shell side or the cone side. The

total examination volume of area E-F-G-H, when scanning from the shell cone side is approximately 75%.

The examination volume with the angle beam direction going from the upper shell towards the shell cone is equal to 98% of the required volume E-F-G-H as referenced in Figure IWC-2500-1. The transverse scans of the weld are not limited.
The total examination volume of region E-F-G-H, with axial crossing beams is limited to approximately 75%.

PROPOSED ALTERNATIVE EXAMINATION

The accessible weld volumes as identified above will be examined in lieu of the 100% volumetric examination requirements.

IMPLEMENTATION SCHEDULE

The proposed alternative is requested for the 4th ten year interval of the Inservice Inspection Program for Palisades Nuclear Plant.

REFERENCE

By letter dated January 9, 1997, the NRC Staff previously authorized this relief to Palisades, Docket No 50-255 [TAC NO. 93628] for the 3rd ten year inspection interval (Previously RR-3).

RELIEF REQUEST NUMBER – RR 4-7

COMPONENT IDENTIFICATION

Code Class	2
Code Reference	IWC-2500 Table IWC-2500-1
Examination Category	C-A, C-B
Item Numbers	C1.10, C1.30 and C2.21
Component Description	Shutdown Cooling Heat Exchanger E-60B Shell to Flange Weld E-60B-01 Tubesheet to Shell Weld E-60B-02 Nozzle to Shell Welds E-60B-03 & 04
Reference Drawings	M1-GD Sh. 8 (See Attachment 1)

In accordance with 10 CFR 50.55a(a)(3)(ii), Nuclear Management Company, LLC (NMC) requests approval to implement examination on the accessible volumes as identified below in lieu of the 100% volumetric requirements at Palisades Nuclear Plant.

CODE REQUIREMENT

Table IWC-2500-1 requires all Category C-A welds to be volumetrically examined during each inspection interval and Category C-B, Item Number C2.21 welds to be examined by surface and volumetric techniques each inspection interval.

BASIS FOR RELIEF

Weld E-60B-01 is a flange to primary shell weld and is a Category C-A, Item Number C 1.10. Volumetric examination of exam volume A-B-C-D as referenced in Figure IWC-2500-1(a) is limited due to configuration and scanning limitations created by the flange bolting being in the area of interest and by the flange to weld distance.

Upon review of the referenced drawings and previous examination data, the following examination volumes can be achieved:

1. The 45 ° angle beam examination from the vessel side towards the flange will allow examination of approximately 91% of the required volume

A-B-C-D. The 45 ° angle beam examination from the flange side towards the vessel will allow examination of approximately 60% of the required volume.

2 The 60° angle beam from the vessel side towards the flange will allow examination of approximately 95% of the required volume A-B-C-D. The 60° angle beam scanning from the flange side towards the vessel will examine approximately 43% of the required volume.

3 The transverse scans with two angle beam directions in both the clockwise and the counter clockwise directions will obtain 94% of the required examination volume A-B-C-D.

4 The 0° scan of the required examination volume will obtain 96% of the required examination volume A-B-C-D.

BASIS FOR RELIEF

Weld E-60B-02 is the primary shell to tubesheet weld and is a Category C-A, Item Number C1.30. Volumetric examination of exam volume E-F-G-H as referenced in Figure IWC-2500-2 is limited due to the design configuration.

Upon review of the referenced drawings and previous examination data, the following examination volumes can be achieved:

1 The 60 ° angle beam examination from the shell side towards the tubesheet will allow examination of approximately 96% of the required volume E-F-G-H. The 60° angle beam examination from the tubesheet towards the shell will allow examination of approximately 61% of the required volume.

2 The 45° angle beam from the shell side towards the tubesheet will allow examination of approximately 92% of the required volume E-F-G-H. The 45° angle beam scanning from the tubesheet side towards the shell will examine approximately 32% of the required volume.

3 The transverse scans with two angle beam directions in both the clockwise and the counter clockwise directions will obtain 92% of the required examination volume E-F-G-H.

4. The 0° scan of the required examination volume will obtain 96% of the required examination volume E-F-G-H.

BASIS FOR RELIEF

Welds E-60B-03 and E-60B-04 are the primary shell inlet and outlet nozzle to shell welds and are Category C-B, Item Number C2.21. Volumetric examination

of exam volume C-D-E-F as referenced in Figure IWC-2500-4(b), is limited due to the design configuration. Upon review of the referenced drawings and previous examination data, the following examination volumes can be achieved:

1. The 45° angle beam examination from the shell side towards the nozzle will allow examination of approximately 98% of the required volume C-D-E-F. The 45°angle beam examination from the nozzle towards the shell can not be performed due to the design configuration.

2. The 60° angle beam from the shell side towards the nozzle will allow examination of 100% of the required volume C-D-E-F. The 60° angle beam examination from the nozzle towards the shell can not be performed due to the design configuration.

3. The transverse scans with two angle beam directions in both the clockwise and the counter clockwise directions will obtain 60% of the required examination volume C-D-E-F.

4. The 0° scan of the required examination volume will obtain 33% of the required examination volume C-D-E-F.

PROPOSED ALTERNATIVE EXAMINATIONS

The accessible volumes as identified above will be examined in lieu of the 100% volumetric requirements.

IMPLEMENTATION SCHEDULE

The proposed alternative is requested for the 4th ten year interval of the Inservice Inspection Program for Palisades Nuclear Plant.

REFERENCE

By letter dated January 9, 1997, the NRC Staff previously authorized this relief to Palisades, Docket No 50-255 [TAC NO. M93628] for the 3rd ten year inspection interval (Previously RR-7).

RELIEF REQUEST NUMBER – RR 4-8

In accordance with 10 CFR 50.55a(a)(3)(i), Nuclear Management Company, LLC (NMC) requests approval to implement inside and outside diameter surface examination on the identified welds in lieu of the 100% volumetric requirements at Palisades Nuclear Plant.

COMPONENT IDENTIFICATON

Code Class	1
Code Reference	Risk Informed
Examination Category	R-A
Item Number	R1.11 and R1.15
Component Description	Pressurizer Relief Valve Risk Informed Segment: PZR-006 Weld 1(RV-1041) – Nozzle/Safe End to Flange PZR-007 Weld 1(RV-1040) – Nozzle/Safe End to Flange PZR-008 Weld 1(RV-1039) – Nozzle/Safe End to Flange
Reference Drawing	M1-LA Sh. 986 (See Attachment 1)

CODE REQUIREMENT

In accordance with the Palisades Risk Informed Inservice Inspection Program, Volumetric examinations are required on 100% of the weld length as identified below:

A. Category R-A, Item R1.11 "Elements Subject to Thermal Fatigue" requires 100% volumetric examination.

B. Category R-A, Item R1.15 "Elements Subject to Primary Water Stress Corrosion Cracking (PWSCC)" requires 100% volumetric examination.

BASIS FOR RELIEF

The relief valve nozzle assembly (reference drawing M1-LA Sh. 986) is 3.0 inch inside diameter. The proximity of the flange to the weld centerline and the outside diameter contours of the nozzle will result in an extremely limited examination for all axial scanning (ability to detect circumferential flaws) with ultrasonic examination. The 45 degree search unit would examine approximately 80% of the required volume. The required volumes for a 60 and 70 degree refracted longitudinal search unit would not examine the weld root area.
Since we are primarily looking for inside diameter initiated cracking, guidance is taken from NRC Revised Order EA-03-009 which allows for dye penetrant testing of the entire wetted surface of the J-groove weld and a portion of the wetted surface of the RPV head penetration nozzle base material in lieu of performing ultrasonic testing. By examining the inside and outside diameter surfaces using the liquid penetrant method in lieu of the limited ultrasonic method there is greater assurance that indications associated with PWSCC and other cracking mechanisms will be revealed.

PROPOSED ALTERNATIVE EXAMINATION

The welds will be examined from the inside diameter with the Liquid Penetrant Technique (the inside diameter of these components was machined during fabrication) in lieu of the volumetric examination. Additionally, a liquid penetrant examination will be performed on the outside of the weld to ensure the quality of the weld. Performing a liquid penetrant examination of the inside and outside diameter of the weld will result in 100 percent coverage of the required area. The probability of detecting a flaw based on an expected flaw initiation at either the inside or outside diameter, this liquid penetrant examination will provide an acceptable level of quality and safety.

IMPLEMENTATION SCHEDULE

The proposed alternative is requested for the 4th ten year interval of the Inservice Inspection Program for Palisades Nuclear Plant.

REFERENCE

NRC Order EA-03-009 "Issuance of First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors"

RELIEF REQUEST NUMBER – RR 4-9

In accordance with 10 CFR 50.55a(a)(3)(i), Nuclear Management Company, LLC (NMC) requests approval to implement the EPRI / PDI Supplement 11 Program requirements at Palisades Nuclear Plant.

COMPONENT IDENTIFICATION

Austenitic piping welds having structural overlays subject to examination using procedures, personnel and equipment qualified to ASME Code Section XI, 2001 Edition, Appendix VIII, Supplement 11 "Qualification Requirements for Full Structural Overlaid Wrought Austenitic Piping Welds"

CODE REQUIREMENT

The Code requirements for which relief is requested are all contained within Appendix VIII, Supplement 11. This relief is specific to the paragraphs identified below:

• Paragraph 1.1(b) The specimen set shall consist of at least three specimens having different nominal pipe diameters and overlay thicknesses. They shall include the minimum and maximum nominal pipe diameters for which the examination procedure is applicable. Pipe diameters within a range of 0.9 to 1.5 times a nominal diameter shall be considered equivalent. If the procedure is applicable to pipe diameters of 24 in. or larger, the specimen set must include at least one specimen 24 in. or larger but need not include the maximum diameter. The specimen set must include at least one specimen with overlay thickness within -0.1 in. to +0.25 in. of the maximum nominal overlay thickness for which the procedure is applicable.

• Paragraph 1.1(d)(1) Base metal flaws. All flaws must be cracks in or near the butt weld heat-affected zone, open to the inside surface, and extending at least 75 percent through the base metal wall. Flaws may extend 100 percent through the base metal and into the overlay material; in this case, intentional overlay fabrication flaws shall not interfere with the ultrasonic detection or characterization of the cracking. Specimens containing intergranular stress corrosion cracking (IGSCC) shall be used when available.

• Paragraph 1.1(e)(1) At least 20 percent but less than 40 percent of the flaws shall be oriented within ±20 deg. of the pipe axial direction. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access. The rules of IWA-3300 shall be used to determine whether closely spaced flaws should be treated as single or multiple flaws.

• Paragraph 1.1(e)(2) Specimens shall be divided into base and overlay grading units. Each specimen shall contain one or both types of grading units.

• Paragraph 1.1(e)(2)(a)(1) A base grading unit shall include at least 3 in. of the length of the overlaid weld. The base grading unit includes the outer 25 percent of the overlaid weld and base metal on both sides. The base grading unit shall not include the inner 75 percent of the overlaid weld and base metal overlay material, or base metal-to-overlay interference.

• Paragraph 1.1(e)(2)(a)(2) When base metal cracking penetrates into the overlay material, the base grading unit shall include the overlay metal within 1 in. of the crack location. This portion of the overlay material shall not be used as part of any overlay grading unit.

• Paragraph 1.1(e)(2)(a)(3) When a base grading unit is designed to be unflawed, at least 1 in. of unflawed overlaid weld and base metal shall exist on either side of the base grading unit. The segment of weld length used in one base grading unit shall not be used in another base grading unit. Base grading units need not be uniformly spaced around the specimen.

• Paragraph 1.1(e)(2)(b)(1) An overlay grading unit shall include the overlay material and the base metal-to-overlay interference of at least 6 sq. in. The overlay grading unit shall be rectangular, with minimum dimensions of 2 in.

• Paragraph 1.1(e)(2)(b)(2) An overlay grading unit designed to be unflawed shall be surrounded by unflawed overlay material and unflawed base metal-to-overlay interface for at least 1 in. around its entire perimeter. The specific area used in one overlay grading unit shall not be used in another overlay grading unit. Overlay grading units need not be spaced uniformly about the specimen.

• Paragraph 1.1(e)(2)(b)(3) Detection sets shall be selected from Table VIII-S2-1. The minimum detection sample set is five flawed base grading units, ten unflawed base grading units, and ten unflawed overlay grading units. For each type of grading unit, the set shall contain at least twice as many unflawed as flawed grading units.

• Paragraph 1.1(f)(1) The minimum number of flaws shall be ten. At least 30 percent of the flaws shall be overlay fabrication flaws. At least 40 percent of the flaws shall be cracks open to the inside surface.

• Paragraph 1.1(f)(3) Base metal cracking used for length sizing demonstrations shall be oriented circumferentially.

• Paragraph 1.1(f)(4) Depth sizing specimen sets shall include at least two distinct locations where cracking in the base metal extends into the overlay material by at least 0.1 in. in the through-wall direction.

• Paragraph 2.2(d) For flaws in base grading units, the candidate shall estimate the length of that part of the flaw that is in the outer 25 percent of the base wall thickness.

• Paragraph 2.3 For the depth sizing test, 80 percent of the flaws shall be sized at a specific location on the surface of the specimen identified to the candidate. For the remaining flaws, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.

• Paragraph 3.1 Examination procedures, equipment, and personnel are qualified for detection when the results of the performance demonstration satisfy the acceptance criteria of Table VIII-S2-1 for both detection and false calls. The criteria shall be satisfied separately by the demonstration results for base grading units and for overlay grading units.

• Paragraph 3.2(b) All extensions of base metal cracking into the overlay material by at least 0.1 in. are reported as being intrusions into the overlay material.

Pursuant to 10 CFR 50.55a(a)(3)(i) relief is requested to use the Electric Power Research Institute (EPRI) Performance Demonstration Initiative (PDI) Program for implementation of Appendix VIII, Supplement 11 requirements.

BASIS FOR RELIEF

Paragraph 1.1(b) of Supplement 11 states limitations to the maximum thickness for which a procedure may be qualified. The Code states that "The specimen set must include at least one specimen with overlay thickness within minus 0.10-inch to plus 0.25-inch of the maximum nominal overlay thickness for which the procedure is applicable." The Code requirement addresses the specimen thickness tolerance for a single specimen set, but is confusing when multiple specimen sets are used. The PDI proposed alternative states that "the specimen set shall include specimens with overlay not thicker than 0.10-inch more than the minimum thickness, nor thinner than 0.25-inch of the maximum nominal overlay thickness for which the examination procedure is applicable." The proposed alternative provides clarification on the application of the tolerance. The tolerance is unchanged for a single specimen set however, it clarifies the tolerance for multiple specimen sets by providing tolerances for both the minimum and maximum thicknesses. The proposed wording eliminates confusion while maintaining the intent of the overlay thickness tolerance.

Paragraph 1.1(d)(1) requires that all base metal flaws be cracks. PDI determined that certain Supplement 11 requirements pertaining to location and size of cracks would be extremely difficult to achieve. For example, flaw implantation requires excavating a volume of base material to allow a pre-cracked coupon to be welded into this area. This process would add weld material to an area of the specimens that typically consists of only base material, and could potentially make ultrasonic examination more difficult and not representative of actual field conditions. In an effort to satisfy the requirements, PDI developed a process for fabricating flaws that exhibit crack like reflective characteristics. Instead of all flaws being cracks as required by Paragraph 1.1(d)(1), the PDI weld overlay performance demonstrations contain at least 70 percent cracks with the remainder being fabricated flaws exhibiting cracklike reflective characteristics. The fabricated flaws are semi-elliptical with tip widths of less than 0.002-inches. The PDI Program alternative to clarify when real cracks, as opposed to fabricated flaws, will be used; "Flaws shall be limited to the cases where implantation of cracks produces spurious reflectors that are uncharacteristic of actual flaws."

Paragraph 1.1(e)(1) requires that at least 20 percent but not less than 40 percent of the flaws shall be oriented within ±20 degrees of the axial direction of the piping test specimen. Flaws contained in the original base metal heat-affected zone satisfy this requirement however, PDI excludes axial fabrication flaws in the weld overlay material. PDI has concluded that axial flaws in the overlay material are improbable because the overlay filler material is applied in the circumferential direction (parallel to the girth weld), therefore fabrication anomalies would also be expected to have major dimensions in the circumferential direction.

Paragraph 1.1(e)(1) also requires that the rules of IWA-3300 shall be used to determine whether closely spaced flaws should be treated as single or multiple flaws. PDI treats each flaw as an individual flaw and not as part of a system of closely spaced flaws. PDI controls the flaws going into a test specimen set such that the flaws are free of interfering reflections from adjacent flaws. In some cases, this permits flaws to be spaced closer than what is allowed for classification as a multiple set of flaws by IWA-3300, thus, potentially making the performance demonstration more challenging.

Paragraph 1.1(e)(2) requires that specimens be divided into base metal and overlay grading units. The PDI program adds clarification with the addition of the word fabrication and ensures flaw identification by ensuring all flaws will not be masked by other flaws with the addition of "Flaws shall not interfere with ultrasonic detection or characterization of other flaws."

Paragraph 1.1(e)(2)(a)(1) requires that a base grading unit shall include at least 3-inches of the length of the overlaid weld, and the base grading unit includes the outer 25 percent of the overlaid weld and base metal on both sides. The PDI program reduced the criteria to 1-inch of the length of the overlaid weld and eliminated from the grading unit the need to include both sides of the weld. The proposed change permits the PDI program to continue using test specimens from the existing weld overlay program which have flaws on both sides of the welds. These test specimens have been used successfully for testing the proficiency of personnel for over 16 years. The weld overlay qualification is designed to be a near-side (relative to the weld) examination, and it is improbable that a candidate would detect a flaw on the opposite side of the weld due to the sound attenuation and re-direction caused by the weld microstructure. However, the presence of flaws on both sides of the original weld (outside the PDI grading unit) may actually provide a more challenging examination, as candidates must determine the relevancy of these flaws, if detected.

Paragraph 1.1(e)(2)(a)(2) requires when base metal cracking penetrates into the overlay material a portion of the base grading unit shall not be used as part of the overlay grading unit. The PDI program adjusts for the changes in Paragraph 1.1(e)(2)(a)(2) and conservatively states that when base metal flaws penetrate into the overlay material no portion of it shall be used as part of the overlay fabrication grading unit. The PDI program also provided clarification by the addition of the term flaws for cracks and the addition of fabrication to overlay grading unit.

Paragraph 1.1(e)(2)(a)(3) requires that for unflawed base grading units, at least 1-inch of unflawed overlaid weld and base metal shall exist on either side of the base grading unit. This is to minimize the number of false identifications of extraneous reflectors. The PDI program stipulates that unflawed overlaid weld and base metal exists on all sides of the grading unit and flawed grading units must be free of interfering reflections from adjacent flaws which addresses the same concerns as Code.

Paragraph 1.1(e)(2)(b)(1) requires that an overlay grading unit shall include the overlay material and the base metal-to-overlay interface of at least 6 square inches. The overlay grading unit shall be rectangular, with minimum dimensions of 2-inch. The PDI program reduces the base metal-to-overlay interface to at least 1-inch (in lieu of a minimum of 2-inches) and eliminates the minimum rectangular dimension. This criterion is necessary to allow use of existing examination specimens that were fabricated in order to meet NRC Generic Letter 88-01 (Triparty Agreement, July 1984). This criterion may be more challenging than Code because of the variability associated with the shape of the grading unit.

Paragraph 1.1(e)(2)(b)(2) requires that unflawed overlay grading units should be surrounded by unflawed material for 1-inch around its entire perimeter. The PDI program redefines the area by noting unflawed overlay fabrication grading units shall be separated by at least 1-inch of unflawed material at both ends and sufficient area on both sides to preclude interfering reflections from adjacent flaws. The relaxation in required area on the sides of the specimens, while still ensuring no interfering reflections, may be more challenging than Code because of the possibility for having a parallel flaw on the opposite side of the weld.

Paragraph 1.1(e)(2)(b)(3) requirements are contained in the PDI program. In addition, the PDI program requires that initial procedure qualification contain three times the number of flaws required for a personal qualification. To qualify new values of essential variables, the equivalent of at least one personal qualification set is required.

.

Paragraph 1.1(f)(1) requirements are contained in the PDI program, with the clarification change of the term "flaws" for "cracks." In addition, the PDI program includes the requirements that sizing sets shall contain a distribution of flaw dimensions to verify sizing capabilities. The PDI program also requires that initial procedure qualification contain three times the number of flaws required for a personal qualification. To qualify new values of essential variables the equivalent of at least one personal qualification set is required.

Paragraphs 1.1(f)(3) and 1.1(f)(4) were clarified by the PDI program by replacing the term "cracking" with "flaws" because of the use of alternative flaw mechanisms.

Paragraph 2.2(d) was clarified by the PDI program by the addition of the terms "metal" and "fabrication." The terms provide acceptable classification of the terms they are enhancing.

Paragraph 2.3 states that, for depth sizing tests, 80 percent of the flaws shall be sized at a specific location on the surface of the specimen to the candidate. This requires detection and sizing tests to be separate. PDI revised the weld overlay program to allow sizing to be conducted either in conjunction with, or separately from, the flaw detection test. If performed in conjunction with detection, and the detected flaws do not meet the Supplement 11 range criteria, additional specimens will be presented to the candidate with the regions containing flaws identified. Each candidate will be required to determine the maximum depth of flaw in each region. For separate sizing tests, the regions of interest will also be identified and the maximum depth and length of each flaw in the region will similarly be determined. In addition, PDI stated that grading units are not applicable to sizing tests, and that each sizing region will be large enough to contain the target flaw, but small enough such that candidates will not attempt to size a different flaw. The above clarification provides a basis for implementing sizing tests in a systematic, consistent manner that meets the intent of Supplement 11.

Paragraph 3.1 of Supplement 11 state that procedures, equipment and personnel (as a complete ultrasonic system) are qualified for detection or sizing of flaws, as applicable, when certain criteria are met. The PDI program allows procedure qualification to be performed separately from personnel and equipment qualification. Historical data indicate that, if ultrasonic detection or sizing procedures are thoroughly tested, personnel and equipment using those procedures have a higher probability of successfully passing a qualification test. In an effort to increase this passing rate, PDI has elected to perform procedure qualifications separately in order to assess and modify essential variables that may affect overall system capabilities. For a procedure to be qualified, the PDI program requires three times as many flaws to be detected (or sized) as shown in Supplement 11 for the entire ultrasonic system. The personnel and equipment are still required to meet Supplement 11 therefore, the PDI program exceeds ASME requirements for personnel, procedures, and equipment qualification.

Paragraph 3.2(b) requires that all extensions of base metal cracking into the overlay material by at least 0.10-inch are reported as being intrusions into the overlay material. The PDI program omits this criterion because of the difficulty in actually fabricating a flaw with a 0.10-inch minimum extension into the overlay, while still knowing the true state of the flaw dimensions.
However, the PDI program requires that cracks be depth-sized to the tolerance specified in Code which is 0.125-inches. Since the Code tolerance is close to the 0.10-inch value of Paragraph 3.2(b), any crack extending beyond 0.10-inch into the overlay material would be identified as such from the characterized dimensions. The reporting of an extension in the overlay material is redundant for performance demonstration testing because of the flaw sizing tolerance.

PROPOSED ALTERNATIVE EXAMINATION

Palisades will utilize the PDI program for weld overlay qualifications, in lieu of Supplement 11 to Appendix VIII of the Section XI Code.

IMPLEMENTATION SCHEDULE

The proposed alternative is requested for the 4th ten year interval of the Inservice Inspection Program for Palisades Nuclear Plant.

REFERENCE

By letter dated September 14, 2004, the NRC Staff previously authorized this relief to Palisades, Docket No 50-255 [TAC Nos. MC0809] for the 3rd ten year inspection interval.

RELIEF REQUEST NUMBER – RR 4-10

COMPONENT IDENTIFICATION

Code Class: 1 and 2

Code References: Table IWB-2500-1, Examination Category B-F and B-J
Table IWC-2500-1, Examination Category C-F-1 and C-F-2

Description: ASME Class 1 and 2 Pressure Retaining Welds

Systems: Various

CODE REQUIREMENT

ASME Code Section XI 2001 Edition with addenda through 2003 currently contain the requirements for non-destructive examination of Category B-F, B-J, C-F-1 and C-F-2 piping components.

BASIS FOR RELIEF

Nuclear Management Company (NMC) has completed the development of a full scope Risk Informed Inservice Inspection (RI-ISI) Program for Palisades Nuclear Power Plant, using Westinghouse Topical Report, WCAP-14572, Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report," Revision I-NP-A, WCAP-14572, Supplement 1, "Westinghouse Structural Reliability and Risk Assessment (SRRA) Model for Piping Risk-Informed Inservice Inspection, Revision 1-NP-A and WCAP-14572, Supplement 2, Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection topical Report Clarifications."

This program was approved by the NRC on May 19, 2003, "Palisades Plant: Risk-Informed Inservice Inspection Program" for the remainder of the third inspection interval. This approval included four deviations from the WCAP Methodology. One deviation is to perform visual VT-2 examinations as an alternative to volumetric or surface exams for those high safety significant ASME Code Class 1 and 2 socket welds of two-inch diameter of less identified in the RI-ISI Program. The second deviation involves crediting leak detection for some pipe segments that are not reactor coolant system (RCS) piping segments. The third deviation involves determining the number of inspections for some piping segments based on the ASME percentage criteria instead of the structural sampling methodology. The fourth deviation involved the method of calculating the failure frequency of containing piping with multiple sizes.

PROPOSED ALTERNATE EXAMINATION

The previously approved RI-ISI Program will be substituted for Class 1 and 2 piping (Examination Categories B-F, B-J, C-F-1 and C-F-2) in accordance with 10CFR50.55a(a)(3)(i) by alternatively providing an acceptable level of quality and safety, other non-related portions of ASME Section XI Code will be unaffected. With the NRC approval of WCAP-14572, Supplement 2, Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection topical Report Clarifications" the deviation for calculating the failure frequency of piping containing multiple sizes is no longer required as Palisades original treatment of piping with multiple sizes is in conformance with Supplement 2 of the WCAP.

This relief request is to align the RI-ISI Interval and the Code Year for the 4th Interval ISI Program. 100% of the RI-ISI program weld examinations will be completed in the 4th Inspection Interval.

IMPLEMENTATION SCHEDULE

The proposed alternative is requested for the 4th ten year interval of the Inservice Inspection Program for Palisades Unit 1

REFERENCE

By letter dated May 19,2003, the NRC Staff previously authorized this relief to Palisades, Docket No 50-255 [TAC NO. MB4420] for the 3rd ten year inspection interval.

RELIEF REQUEST NUMBER – RR 4-11

COMPONENT IDENTIFICATION

ISI examination of piping, vessel and component welds

In accordance with 10 CFR 50.55a(a)(3)(i), Nuclear Management Company, LLC (NMC) requests authorization from the Weld Reference System marking requirements at Palisades Nuclear Plant.

CODE REQUIREMENT

Section XI of the ASME Boiler and Pressure Vessel Code, 2001 Edition with Addenda through 2003, IWA-2600 "Weld Reference System"

BASIS FOR RELIEF

The original construction code used at Palisades did not require that a weld reference system be established. Establishment of a weld reference system cannot be practically attained within the scope and schedule of existing outages. Significant effort would be expended to achieve compliance with the requirements of IWA-2600. Based on this, use of the alternative reference system identified below provides an acceptable level of quality and safety.

PROPOSED ALTERNATIVE

Palisades uses isometric drawings to provide a detailed identification and location of each weld requiring examination. In addition, the following will be performed:

Surface Examinations – Where surface examination is specified, Section XI requires that 100% of the selected weld or area be examined. Unlike the performance of volumetric examination, there is no need to indicate the direction of examination to assure uniformity in reporting results. In these cases, no marks will be placed on the weld or area. The location of any accepted surface indications will be documented by the use of a map or photograph that permits accurate identification of areas on the examination surface.

Volumetric Examinations (Manual) – If a weld is accepted for continued service that contain volumetric indications accepted under the criteria IWX-3500 or IWX-3600 shall be identified to ensure the relocation of the indication, using appropriate reference marks. These reference marks may be permanently fixed on the welds or by documentation on a map or photograph of the weld or surface that permits accurate identification of areas on the examination surface (e.g., reference points, orientation and/or proximity to other welds) to positively identify

the weld or area in question and the examination starting point. The starting point is determined from the instructions provided for determining the location of the zero reference point.

Volumetric Examination (Automated Vessel) – The automated vessel tool establishes its reference point using an existing zero reference point on the reactor vessel. This point allows the device to repeat examination locations without the necessity of any other reference system. The tool determines its location by the use of an electronic encoder system which provides for sufficient repeatability.

IMPLEMENTATION SCHEDULE

The proposed alternative is requested for the 4th ten year interval of the Inservice Inspection Program for Palisades Nuclear Plant.

REFERENCE

None

RELIEF REQUEST NUMBER – RR 4-12

COMPONENT IDENTIFICATION

ASME Section XI, Moderate Energy Class 2 and Class 3 Piping

CODE REQUIREMENT

ASME Section XI 2001 Edition with Addenda through 2003.
Flaws that exceed the acceptance criteria of the above code are required to be accepted by either a repair/replacement activity or an analytical evaluation.

The applicable code requirements are as follows:

CLASS 3

IWD-3000 states, "This Article is in course of preparation. The rules of IWB-3000 may be used."

IWB-3132 provides three ways in which an Inservice Volumetric or Surface Examination may be accepted.

1. IWB-3132.1, "Acceptance by Volumetric or Surface Examination",
2. IWB-3132.2, "Acceptance by Repair/Replacement Activity", or
3. IWB-3132.3, "Acceptance by Analytical Evaluation".

IWB-3132.2 states, "A component whose volumetric or surface examination detects flaws that exceed the acceptance standards of Table IWB-3410-1 is unacceptable for continued service until the additional examination requirements of IWB-2430 are satisfied and the component is corrected by a repair/replacement activity to the extent necessary to meet the acceptance standards of IWB-3000."

IWB-3142 provides four ways in which an inservice visual examination may be accepted.

1. IWB-3142.1 "Acceptance by Visual Examination"
2. IWB-3142.2 "Acceptance by Supplemental Examination"
3. IWB-3142.3 "Acceptance by Corrective Measures or Repair/Replacement Activity"
4. IWB-3142.4 "Acceptance by Analytical Evaluation"

IWB-3142.3 states, "A component containing relevant conditions is acceptable for continued service if the relevant conditions are corrected by a repair/replacement activity or by corrective measure to the extent necessary to meet the acceptance standards of Table IWB-3410-1."

CLASS 2

IWC-3122 provides three ways in which an Inservice Volumetric and Surface Examinations may be accepted.

1. IWC-3122.1, "Acceptance by Examination"
2. IWC-3122.2, "Acceptance by Repair/Replacement Activity"
3. IWC-3122.3, "Acceptance by Analytical Evaluation"

IWC-3122.2 states, "A component whose examination detects flaws that exceed the acceptance standards of Table IWC-3410-1 is unacceptable for continued service until the additional examination requirements of IWC-2430 are satisfied and the component is corrected by a repair/replacement activity to the extent necessary to meet the acceptance standards of IWC-3000."

IWC-3132 provides four ways in which an inservice visual examination may be accepted.

1. IWC-3132, "Acceptance"
2. IWC-3132.1, "Acceptance by Supplemental Examination"
3. IWC-3132.2, "Acceptance by Corrective Measures or Repair/Replacement Activity"
4. IWC-3132.3, "Acceptance by Analytical Evaluation"

IWC-3132.2 states, "A component containing relevant conditions is acceptable for continued service if the relevant conditions are corrected by a repair/replacement activity or by corrective measures to the extent necessary to meet the acceptance standards of Table IWC-3410-1."

BASIS FOR RELIEF

Relief is requested from replacement or internal weld repair of wall thinning conditions resulting from various wall thinning degradation mechanisms such as erosion, corrosion, cavitation, and pitting in moderate energy Class 2 and 3 piping systems in accordance with the design specification and the original construction code. The use of Code Case N-513-2 will provide an acceptable method to evaluate flaws on a temporary basis until the next scheduled outage.

PROPOSED ALTERNATIVE

The Nuclear Regulatory Commission in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability," Revision 14, has accepted Code Case N-513-1 with the following limitations:

1- Specific safety factors in paragraph 4.0 must be satisfied.
2- Code Case N-513 may not be applied to:
   i. Components other than pipe and tube.
   ii. Leakage through a gasket
   iii. Threaded connections employing nonstructural seal welds for leakage prevention (through seal weld leakage is not a structural flaw; thread integrity must be maintained).
   iv. Degraded socket welds

Code Case N-513-1 permits flaws in Class 2 and 3 moderate energy piping on a temporary basis until the next outage if it can be demonstrated that adequate pipe integrity and leakage containment are maintained. The Code Case is currently applicable to part-through and through wall planar flaws and part-through nonplanar flaws. Service experience has shown that some piping can suffer degradation from nonplanar flaws, such as pitting and microbiological attack, where local inconsequential leakage can occur.

The Code Case can be used for nonplanar through-wall flaws but in a restrictive situation where nonplanar geometry is dominant in one plane. Some plants have used the intent of N-513 for nonplanar leaking flaws; however, relief requests from code requirements are still required because of the stated limited scope of N-513 in section 3.0 of the Code Case. The Code Case was revised (N-513-2) to extend the application to cover all types of nonplanar flaws. The analysis procedures were expanded to address the general case of through-wall degradation. Code Case N-513-2 has broader applications and therefore has a real direct benefit for operating plants.

Code Case N-513-2 includes the incorporation of the improved flaw evaluation procedures for piping that are provided in the new Appendix C of Section XI in the 2002 Addenda.

Code Case N-513-2 addresses the limitations posed in Regulatory Guide 1.147 as follows:

1. Paragraph 4.0 was revised to incorporate references to Appendix C for acceptance and eliminated the provision that lower safety factors may be used.
2. 1.0(a) was revised to limit the application of the code case as specified in the limitation applied in Regulatory Guide 1.147.

NMC considers the proposed alternative of using Code Case N-513-2 to provide an acceptable level of quality and safety in accordance with 10 CFR 50.55a(3)(i).

IMPLEMENTATION SCHEDULE

The proposed alternative is requested for the 4th ten year interval of the Inservice Inspection Program for Palisades Nuclear Plant.

REFERENCE

By letter dated December 12, 2005 NMC submitted this relief to the NRC as a fleet relief request (L-HU-05-24) for the 3rd ten year inspection interval.

PALISADES NUCLEAR PLANT
4TH INTERVAL INSERVICE INSPECTION PLAN

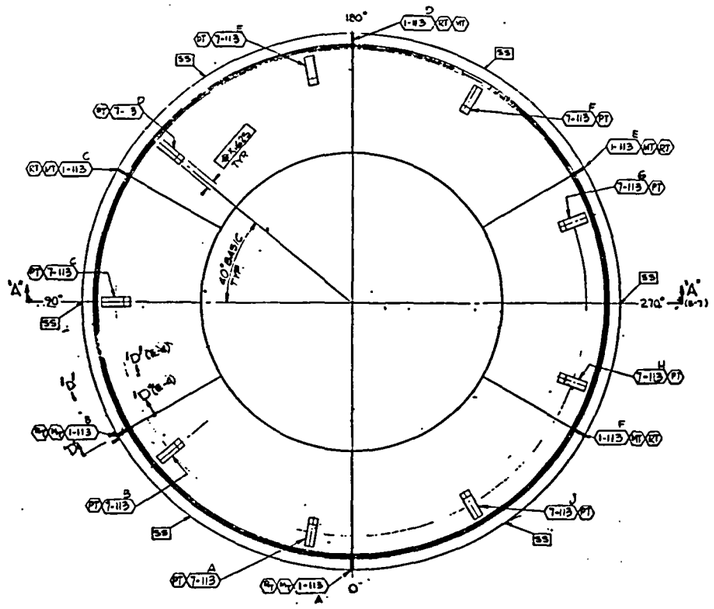
ATTACHMENT 1

RELIEF REQUEST DRAWINGS

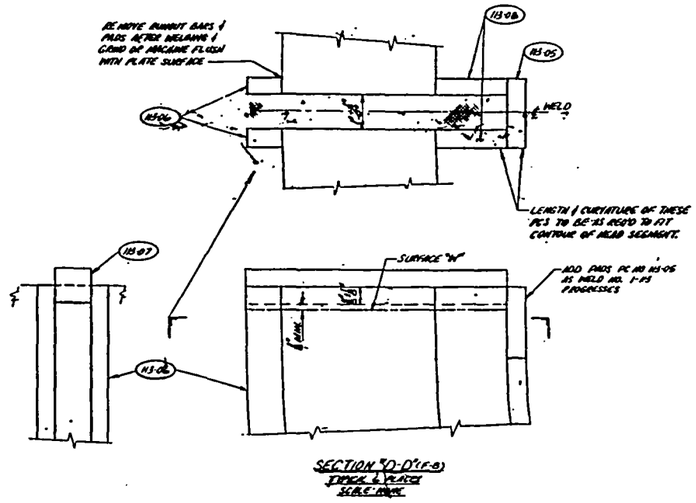
REFERENCE DRAWINGS

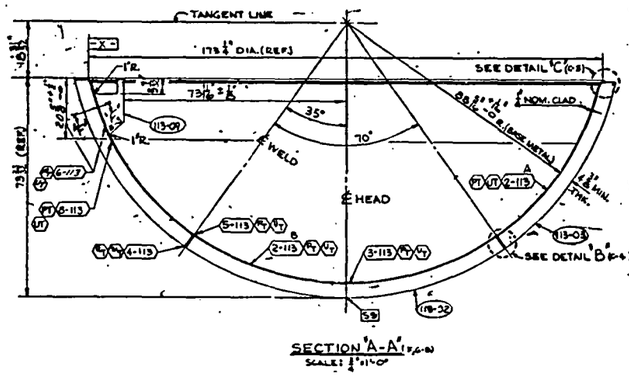
RELIEF REQUEST RR 4-1

E-232-113

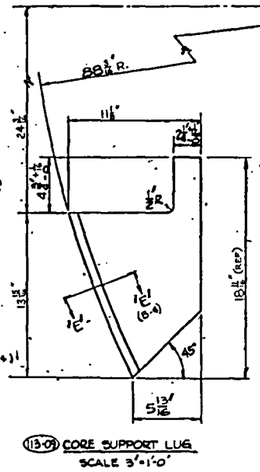


(113-01) BOTTOM HEAD ASSEMBLY
SCALE 1-3/4" = 1'-0"

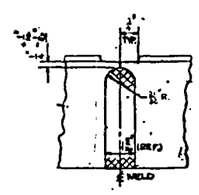




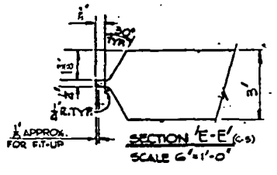
SECTION 'A-A' (F-G)
SCALE 1/4" = 1'-0"



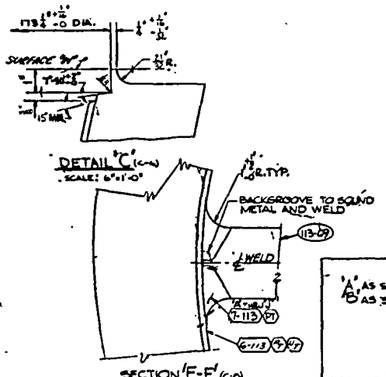
(113-03) CORE SUPPORT LUG
SCALE 3"=1'-0"



DETAIL 'B' (C-D)
SCALE 6"=1'-0"



SECTION 'E-E' (C-S)
SCALE 6"=1'-0"



DETAIL 'C' (C-D)
SCALE 6"=1'-0"

SECTION 'F-F' (C-D)
SCALE 6"=1'-0"

REVISIONS					
SYM	ZONE	DESCRIPTION	DATE	APPRO	
1	L.H.	PC NO. 113-06 = MATL. SPEC. COMM. WAS A151-11030	3-1-66	J.S.	
	GBL	ADDED (V)			
2	C-E	ADDED SECTION "D-D"	6-1-66	GBL	
	D-I	ADDED SURFACE "M"			
3	C-S	DELETED DETAIL "M"	6-1-66	GBL	
	L.H.	DELETED PC NO. 113-04			
4	S-S	ADDED PC # 113-09	6-1-66		
		ADDED WELD "G-113 & 7-113			
5	A-S	DELETED WELD "G-113, ADDED WELD "S-113	6-1-66		
	L.H.	CHANGED INSIDE CLAD FROM 9 LOCAL SPOTS TO FULL CIRCUMFERENCE AT THE WELDING BEVEL			
6	G.C.M.	REVISED NUMBERING OF WELDS FOR BOTTOM HEAD CLADDING.	6-1-66	J.G.M. 2-1-67	

m1-B-A
Sh. 113

MATERIAL NOTES,

'A' AS SUPPLEMENTED BY C.E. PURCHASE SPECIFICATION P3 F 12(A);
'B' AS SUPPLEMENTED BY C.E. PURCHASE SPECIFICATION P43 F3 (C)

113-09	9	CORE SUPPORT LUG 3" X 11 3/4" X 18 3/16"				
A2-85	12	RUNOUT BAR 3/4" X 1" AS REQUIRED				
A3-91	6	END BAR (CHANGE PREVIOUS)				
A3-84	12	RUNOUT BAR 3/4" X 1 1/2" AS REQUIRED				
A3-93	AR	ADD 3/4" X 1 1/2" BAR				
113-03	6	PEDESTAL SEGMENT MAKE FROM 3 1/2" THK. PL.	ALLOY STEEL	SA-302-B	"A"	
113-02	1	DOME SECTION MAKE FROM 3 1/2" THK. PL.	ALLOY STEEL	SA-302-B	"A"	
113-01	1	BOTTOM HEAD ASSY. CONSISTING OF:				
ASSY NO	PC NO	NO REQD	NOMENCLATURE	MATERIAL	MATERIAL SPEC	MATERIAL NOTE

LIST OF MATERIAL - QUANTITIES FOR ONE (1) UNIT

GEOMETRIC TOLERANCES FOR MACHINED SURFACES UNLESS SPECIFIED ON FACE OF DRAWING			
SYM	GEOMETRY	TOL.
—	FLAT. & STRAIGHT	.001/IN.
⊥	PERPENDICULARITY	.001 IN.
//	PARALLELISM	.001 IN.
○	ROUNDNESS	OUT OF RD.
⌭	CYLINDRICITY	.002 CYLIN.
⌖	TRUE POSITION	.002 DIAM.
◎	CONCENTRICITY	.010 TIR
○	ROUNDNESS	.005 TOL.

GENERAL NOTES

1. FOR STANDARD NOTES, SEE REF. DWG. NO 2.
2. REFERENCE (REF.) DIMENSIONS ARE FOR INFORMATION ONLY, DO NOT USE FOR FABRICATION.
3. DOUBLE ARROW INDICATES DIMENSION TO GIVEN REFERENCE LINE.
4. SIZES IN I/M ARE FINISHED SIZES. NO ALLOWANCE MADE FOR FABRICATION OR WELD SHRINKAGE, UNLESS NOTED.
5. ALL CLADDING TO BE AS DEPOSITED FINISH UNLESS NOTED, WITH A MIN THICKNESS OF 1/8".
6. ALL FABRICATION SHALL BE IN ACCORDANCE WITH ASME BOILER CODE SECTION III.

REFERENCE DRAWING

NO.	TITLE	DWG. NO.
1.	PRESSURE VESSEL FORMING & WELDING	E-232-112
2.	STANDARD NOTES	A-230-538

WELD TABULATION

WELD NO.	DETAIL	WELD PROC.
1-113 A-F	WA	A-2966A-113
2-113 A, B	WB	A-2966A-113
S-113	WC	A-2966A-113
A-113	WD	A-2966A-113
S-113	WE	A-2966A-113
6-113	WF	A-2966A-113
7-113 A-J	WG	A-2966A-113
8-113	WH	A-2966A-113

ALL DIMENSIONS APPLY AT REFERENCE TEMP. OF 68° F. - SEE NOTE #1
FINISH / UNLESS NOTED
TOLERANCE ON:
FRACTIONS ± 1/64
DECIMALS ± .010"
ANGLES 30'-00" UNLESS NOTED

CONTRACT 2966A

COMBUSTION ENGINEERING, INC.
CHATTANOOGA DIVISION

DWN. BY J.H.S. DATE 3-23-66
CHK'D BY E.L.C. DATE 5-25-66
APPVD. BY [illegible] DATE 5-18-66
STRESS ENG. W.B.P. DATE 5-1-66

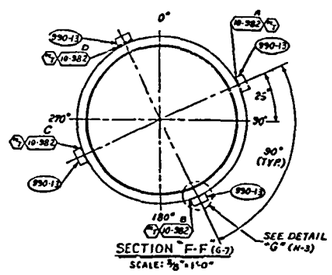
BOTTOM HEAD FORMING AND WELDING
FOR CONSUMERS POWER
112" I.D. PWR

CODE REPT. NO. E-232-113-6
APPROVED DATE
SCALE 1/4" = 1'-0" WEIGHT 9 [illegible] LBS.

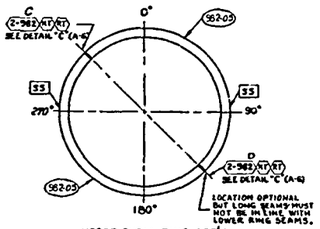
950Y197 * MI-B-A SH. 113

REFERENCE DRAWINGS

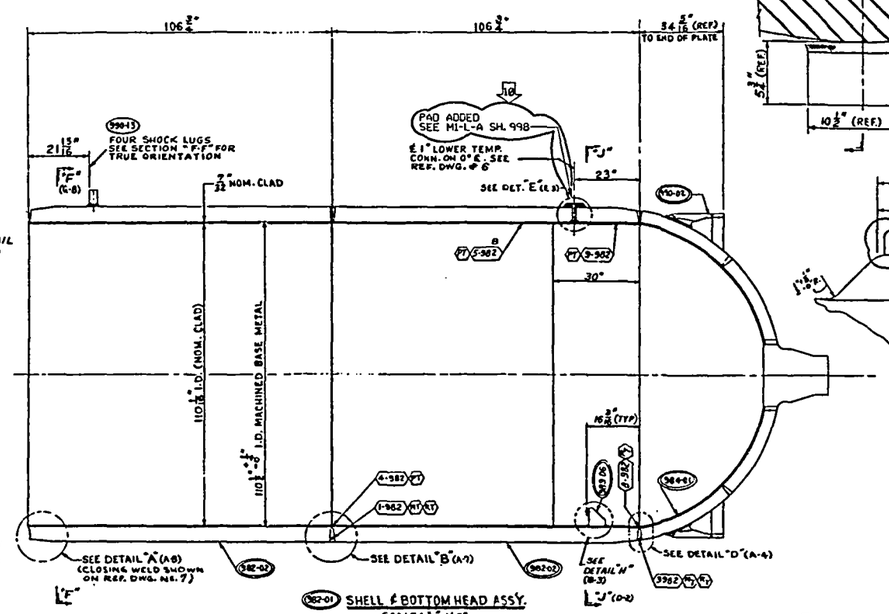
RELIEF REQUEST RR 4-2



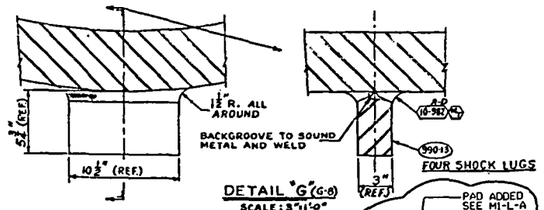
SECTION "F-F" (G-7)
SCALE: 3/8"=1'-0"



UPPER SHELL RING ASS'Y.
SCALE 3/8"=1'-0"

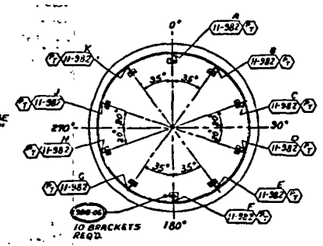


982-01 SHELL & BOTTOM HEAD ASS'Y.
SCALE: 3/8"=1'-0"

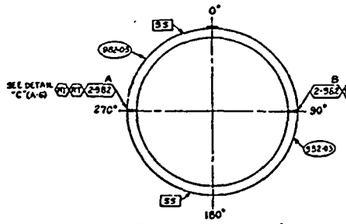


DETAIL "G" (G-8)
SCALE: 3"=1'-0"

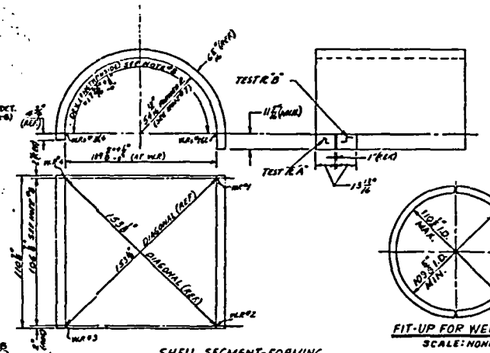
DETAIL "E" (G-5)
SCALE: 1"=1"



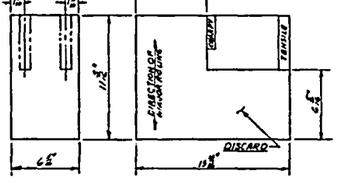
SECTION "J-J" (E-6)
SCALE: 3/8"=1'-0"



LOWER SHELL RING ASS'Y.
SCALE 3/8"=1'-0"

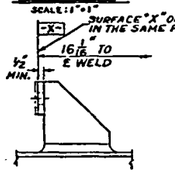


FIT-UP FOR WELDING
SCALE: NONE



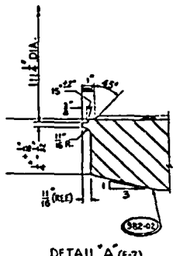
TEST PLATE (CODE NO. D-5240)
SCALE: NONE
SEE GEN. NOTES #9 THRU #15

TEST REQD (EACH A)		
TYPE	QTY.	TEST TEMP.
TENSILE	2	70° OR GREATER
CHARPY	3	+10°F (USE NOTCH #2)

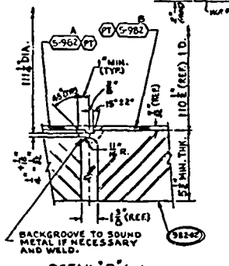


STEP #2 MACHINING

MATERIAL NOTES:
"A": AS SUPPLEMENTED BY C.E. PURCHASE SPECIFICATION P3F12(b)

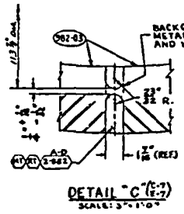


DETAIL "A" (E-7)
SCALE: 3"=1'-0"

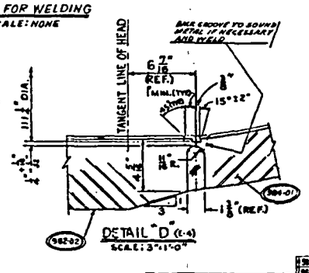


DETAIL "B" (E-5)
SCALE: 3"=1'-0"

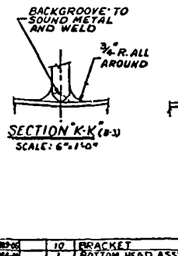
SHELL SEGMENT-FORMING
SCALE: 3/8"=1'-0"
SEE GENERAL NOTES #8 & THRU 15



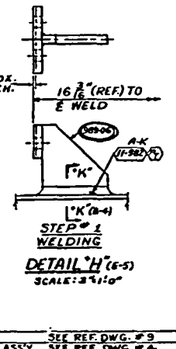
DETAIL "C" (E-7)
SCALE: 3"=1'-0"



DETAIL "D" (E-6)
SCALE: 3"=1'-0"



SECTION "K-K" (E-3)
SCALE: 6"=1'-0"



STEP #1 WELDING

DETAIL "H" (E-5)
SCALE: 3"=1'-0"

982-05	10	BRACKET	SEE REF. DWG. # 9			
984-01	1	BOTTOM HEAD ASS'Y.	SEE REF. DWG. # 4			
1	982-03	2	SHELL SEGMENT 106 3/4" x 182 1/16" x 6 5/16" E	ALLOY STL. A533 GR. B CL. 1		"A"
982-04		2	SHELL RING ASSEMBLY EACH CONSISTING OF:			
982-01		1	SHELL & BOTTOM HEAD ASS'Y. CONSISTING OF:			
ASSY. NO.	PIC. NO.	NO. REQD.	NOMENCLATURE	MATERIAL	MATERIAL SPEC.	MAT'L NOTE

LIST OF MATERIAL - QUANTITIES FOR ONE (1) UNIT, ONE (1) UNIT ON CONTRACT

SYM.	ABSORPTIVITY	TOL.
	FLAT & STRAIGHT	.005"/IN.
	PERPENDICULARITY	.005"/IN.
	PARALLELISM	.005"/IN.
	CONCENTRICITY	SEE SYM.
	TRUE POSITION	SEE SYM.
	CONCENTRICITY	SEE SYM.
	SYMMETRY	SEE SYM.

REFERENCE DRAWINGS			
NO.	TITLE	DWG. NO.	WELD NO.
1	PRESSURIZER OUTLINE	E-231-980	1-982
2	GENERAL ARRANGEMENT	E-231-981	2-982 A-D
3	STANDARD NOTES	A-250-S-6	3-982
4	BOTTOM HEAD FORMING & WELDING	E-231-984	4-982
5	NOZZLE DETAILS	E-231-985	5-982 A-L
6	NOZZLE DETAILS	E-231-986	6-982
7	VESSEL ASS'Y. & FINAL MACHINING	E-231-988	7-982
8	MISCELLANEOUS DETAILS	E-231-990	8-982
9	INTERNAL DETAILS	E-231-983	9-982 A-D

WELD TABLE		
NO.	C.E. WELD PROC.	
1-982	WA-2966C-982	
2-982 A-D	WB-2966C-982	
3-982	WA-2966C-982	
4-982	WC-2966C-982	
5-982 A-L	WD-2966C-982	
6-982	WE-2966C-982	
7-982	WF-2966C-982	
8-982	WG-2966C-982	
9-982 A-D	WH-2966C-982	

ALL DIMENSIONS APPLY AT REFERENCE TEMP. OF 68° F. — SEE NOTE 1 FINISH √ UNLESS NOTED
TOLERANCE ON: FRACTIONS ± 1/16, DECIMALS ± .010", ANGLES ± 0°30' UNLESS NOTED
CONTRACT 29660

DWN. BY	B.E. Cammack	
DATE	12-6-62	
CKD. BY	C. [illegible]	
DATE	2-12-63	
APPD. BY	W.H. Rasch	
DATE	2/14/63	
STRESS & MFC. ENGR.	J.D. [illegible]	
DATE	2-20-63	

COMBUSTION ENGINEERING, INC.
CHATTANOOGA DIVISION
VESSEL FORMING AND WELDING
FOR CONSUMERS POWER
PRESSURIZER
CODE IDENT. NO. 80129
SIZE E
231-982-
SCALE 1/4"
WEIGHT
SHEET

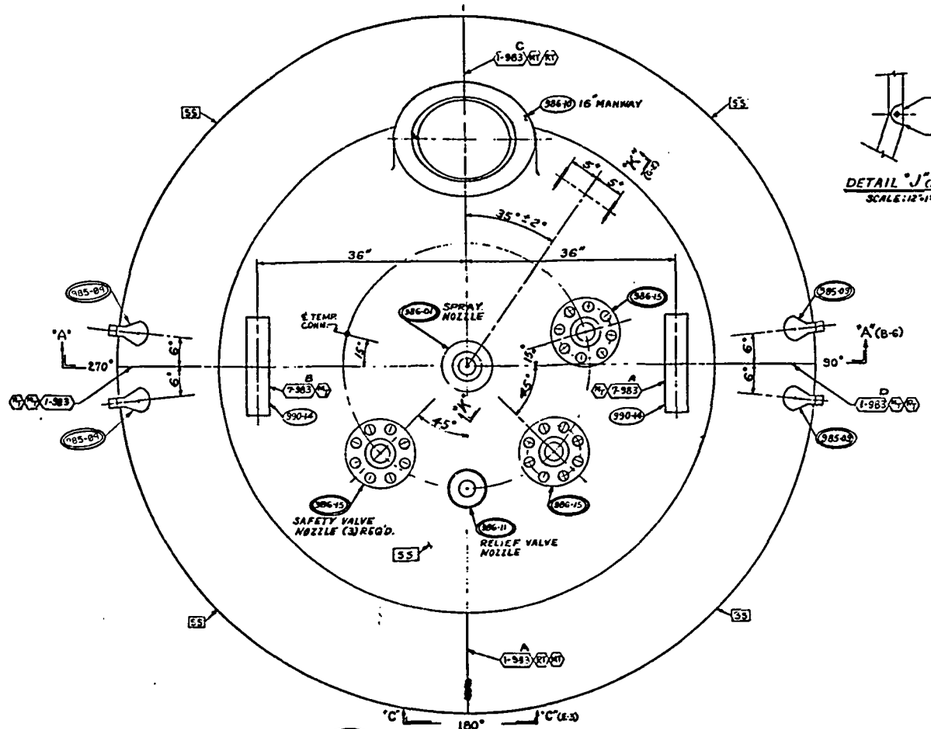
APPROVED DATE

GENERAL NOTES
1. FOR STANDARD NOTES, SEE REF. DWG. NO. 3.
2. DOUBLE ARROW INDICATES DIMENSION TO A GIVEN REFERENCE LINE.
3. SIZES IN 1/64 ARE FINISHED SIZES. NO ALLOWANCE MADE FOR FABRICATION OR WELD SHRINKAGE, UNLESS NOTED.
4. REFERENCE (REF.) DIMENSIONS ARE FOR INFORMATION ONLY, DO NOT USE FOR FABRICATION.
5. ALL CLADDING IS AS DEPOSITED FINISH UNLESS NOTED AND A MINIMUM THICKNESS OF .322".
6. ALL FABRICATION SHALL BE IN ACCORDANCE WITH ASME BOILER CODE SECTION III.

2. FORMED RADIUS MAY BE 3/8" LOWER IN LOCAL AREAS PROVIDED DEVIATION AND CHORD DIM'S. ARE MAINTAINED.
4. 3/8" INCLUDED FOR WELD SHRINKAGE.
9. STEEL PLATE FABRICATION WORK IN ACCORD WITH MFR SPEC 2960, EXCEPTIONS 2966C-988
10. TEST PLATES TO BE CUT AFTER HOT FORMING, QUENCHING & TEMPERING.
11. BEFORE CUTTING, STEEL STAMP ALL TEST PLATES WITH CODE NO., HEAT NO., SLAB NO., VOID NO., & DIRECTION OF ROLLING.
12. ALL TEST PLATES TO BE REMOVED BY GAS CUTTING.
13. TEST "A" & "B" NOT TO BE CUT OUT & SHIPPED UNTIL UT READING IS COMPLETE.
14. TEST PLATE TO BE GIVEN SIMULATED POST WELD HEAT TREATMENT AT 1050°F ± 25°F FOR 40 HRS. FURNACE COOL TO 600°F.
15. SEND TEST "A" TO MFR. LAB., ATTN: MR. S.R. LEWIS.

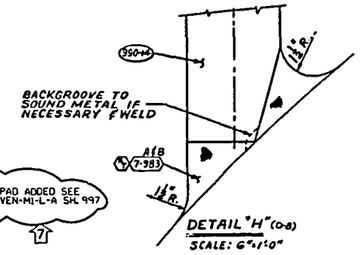
REV.	DATE	DESCRIPTION	BY	CK	APP.
10	11-21-95	ADDED PAD & BRACKET ON CAD PER SC-94-8746 & DCR-95-1818	JGD	MLB	

CONSUMERS POWER COMPANY
PALISADES NUCLEAR PLANT
COVERT, MICHIGAN
VESSEL FORMING AND WELDING
FOR PRESSURIZER
DRAWING NUMBER: VEN-M1-L-A
SHEET NO. 982 10

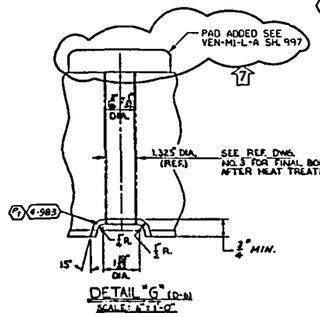


TOP HEAD ASSEMBLY (503-01)
SCALE: 1½"=1'-0"

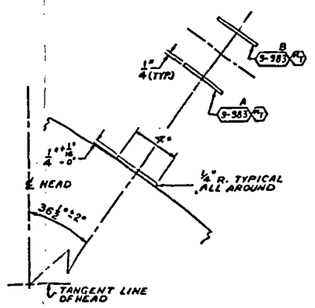
DETAIL "J" (D-7)
SCALE: 12"=1'-0"



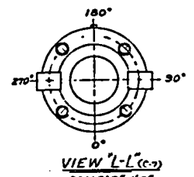
DETAIL "H" (D-8)
SCALE: 6"=1'-0"



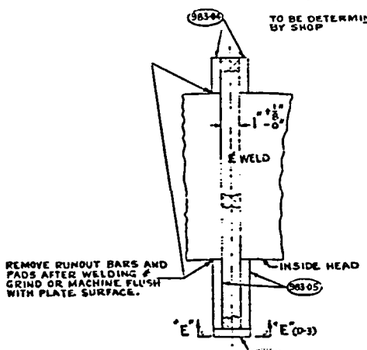
DETAIL "G" (D-8)
SCALE: 6"=1'-0"



SECTION "K-K" (G-6)
SCALE: 3"=1'-0"

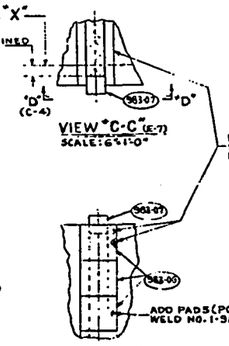


VIEW "L-L" (C-7)
SCALE: 3"=1'-0"



VIEW "D-D" (E-3)
SCALE: 6"=1'-0"

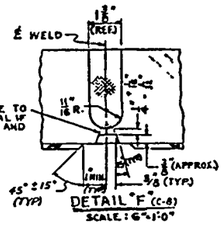
REMOVE RUNOUT BARS AND PADS AFTER WELDING & GRIND OR MACHINE FLUSH WITH PLATE SURFACE.



VIEW "C-C" (E-7)
SCALE: 6"=1'-0"

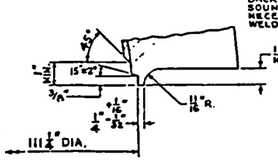
LENGTH & CURVATURE OF PC. NO. 983-04 & 983-05 TO BE AS REQ'D. TO FIT CONTOUR OF HEAD SEGMENT.

ADD PADS (PC. NO. 983-06) AS WELD NO. 1-983 PROGRESSES.

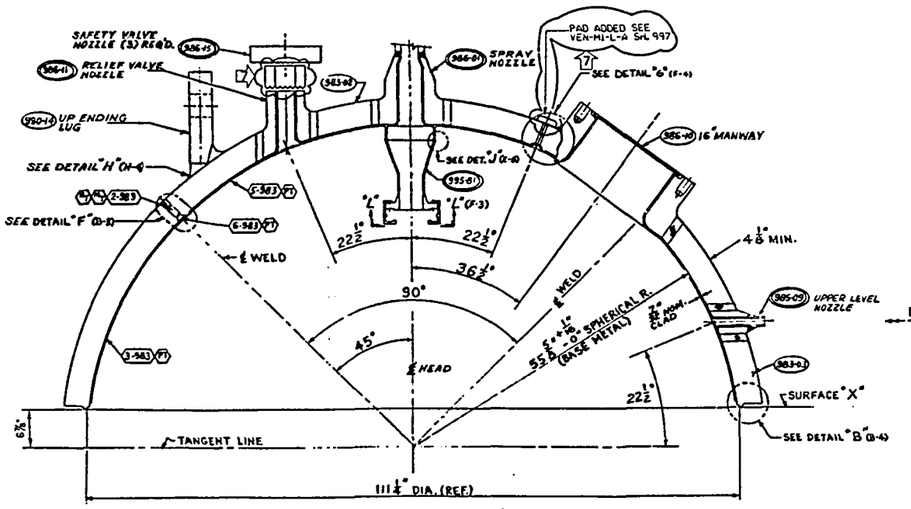


VIEW "E-E" (D-4)
SCALE: 6"=1'-0"

DETAIL "F" (C-8)
SCALE: 6"=1'-0"



DETAIL "B" (B-5)
SCALE: 6"=1'-0"



SECTION "A-A" (G-5,8)
SCALE: 1½"=1'-0"

NOTE
NOZZLES AND MANWAY ROTATED INTO SECTION

GENERAL NOTES:

1. FOR STANDARD NOTES, SEE REF. DWG. NO. 5.
2. DOUBLE ARROW INDICATES DIMENSIONS TO A GIVEN REFERENCE LINE.
3. SIZES IN ( ) ARE FINISHED SIZES. NO ALLOWANCE MADE FOR FABRICATION OR WELD SHRINKAGE, UNLESS NOTED.
4. REFERENCE (REF.) DIMENSIONS ARE FOR INFORMATION ONLY. DO NOT USE FOR FABRICATION.
5. ALL CLADDING IS AS DEPOSITED FINISH UNLESS NOTED AND A MINIMUM THICKNESS OF ⅛".
6. ALL FABRICATION SHALL BE IN ACCORDANCE WITH ASME BOILER CODE SECTION III.

MATERIAL NOTES:

"A" AS SUPPLEMENTED BY C.E. PURCHASE SPECIFICATION P3F12(b)

595-01		1	REDUCER ASSEMBLY			
	590-14	2	UP ENDING LUG (SEE REF. DWG. #6.)			
306-15		3	SAFETY VALVE NOZZLE ASSY. (SEE REF. DWG. #3)			
306-11		1	RELIEF VALVE NOZZLE ASSY. (SEE REF. DWG. #3)			
	306-10	1	MANWAY (SEE REF. DWG. #3.)			
306-01		1	SPRAY NOZZLE ASSY. (SEE REF. DWG. #3)			
305-09		4	UPPER LEVEL NOZZLES ASSY. (SEE REF. DWG. #2)			
	583-09	4	END BAR ¾"±1" × 3⅛" LG.			
	583-04 AS REQ'D		PAD ⅜" THK. × 1½" × 1¾" LG.			
	583-05	8	RUNOUT BAR ⅜" THK. × 3" AS REQ'D.			
	583-04	8	RUNOUT BAR ⅜" THK. × 1½" AS REQ'D.	CARBON ST.	1	"A"
	583-03	4	PEEL SEGMENT MAKE FROM 3⅛" THK. ℄	ALLOY ST.	1	"A"
	583-02	1	DOME SEGMENT MAKE FROM 5⅛" THK. PL.	ALLOY ST.	SA 533 Gr 6 Cl 1	"A"
503-01		1	TOP HEAD ASSEMBLY CONSISTING OF:			
ASSY NO.	PC. NO.	NO. REQD.	NOMENCLATURE	MATERIAL	MATERIAL SPEC.	MAT'L NOTE

LIST OF MATERIAL — QUANTITIES FOR ONE (1) UNIT ONE (1) UNIT ON CONTRACT

REFERENCE DRAWINGS		
NO.	TITLE	DWG. NO.
1	GENERAL ARRANGEMENT	E-231-981
2	NOZZLE DETAILS	E-231-985
3	NOZZLE DETAILS	E-231-986
4	VESSEL ASSY. & FINAL MACHINING	E-231-988
5	STANDARD NOTES	A-230-F44
6	MISCELLANEOUS DETAILS	E-231-990
7	INTERNAL DETAILS	E-231-995

WELD TABULATION		
WELD NO.	DETAIL	WELD PROC
5-983 A-D	DIA-2966C-983	
2-983	MD-2966C-983	
1-983	MC-2966C-983	
11-983	MD-2966C-989	
3-983	WC-2966C-983	
4-983	WE-2966C-983	
7-983 A&B	WF-2966C-983	
8-983	WC-2966C-983	
9-983 A&B	WH-2966C-983	

ALL DIMENSIONS APPLY AT REFERENCE TEMP. OF 68° F. — SEE NOTE (6) UNLESS NOTED

FINISH √ UNLESS NOTED

TOLERANCE ON: FRACTIONS ±1/16, DECIMALS ±.010", ANGLES ±0°30' UNLESS NOTED

CONTRACT 2966C

DWN. BY	D.C. Cummins	COMBUSTION ENGINEERING, INC. CHATTANOOGA DIVISION	
DATE	2-21-69		
CKD. BY	J. Fox		
DATE	2-27-69		
APPD. BY	W. Gehl		
DATE	3-4-69		
STRESS ENG.	J. Fox		
DATE	3-4-69		
APPROVED	DATE	SCALE AS NOTED	DRAWING E 231-983-6
		WEIGHT	SHEET

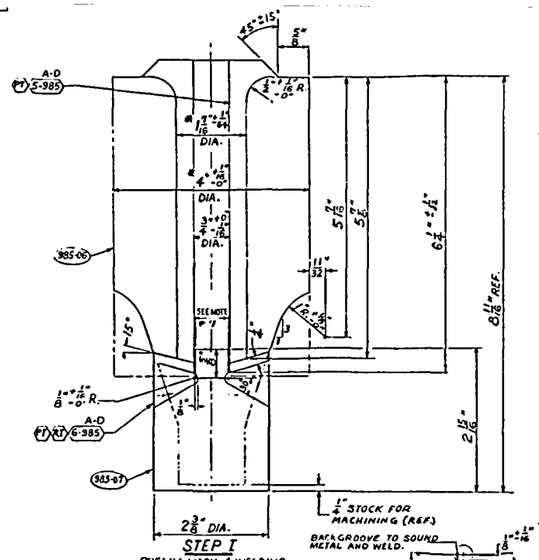
REV.	DATE	DESCRIPTION	BY	CK	APP
7	11-22-95	ADDED PAD & REDRAWN ON CAD PER SC-94-696 & DCR-95-1818.	JGO	ALS	

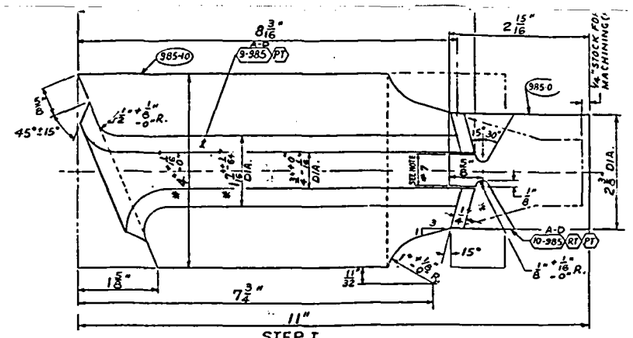
11818765

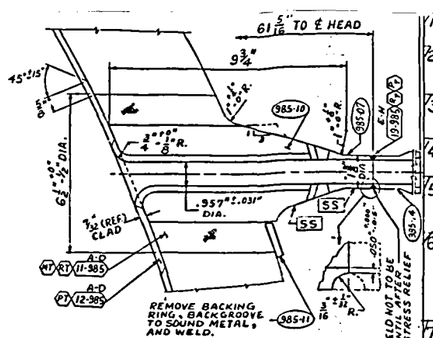
CONSUMERS POWER COMPANY
PALISADES NUCLEAR PLANT
COVERT, MICHIGAN

TOP HEAD FORMING & WELDING FOR PRESSURIZER

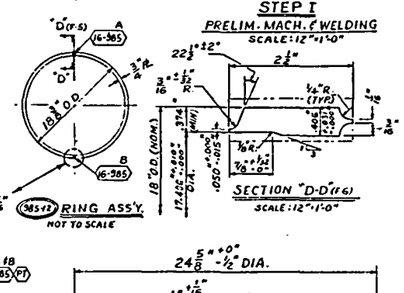
VEN-MI-L-A | 983 | 7

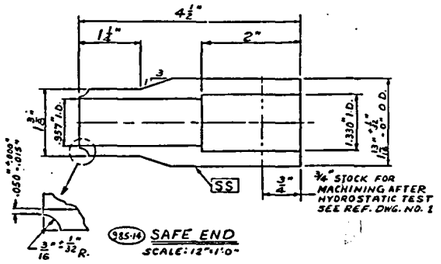


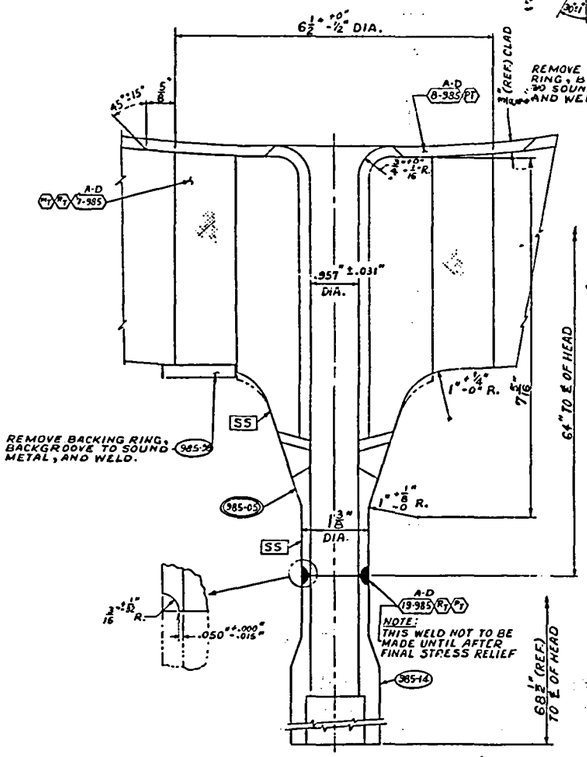


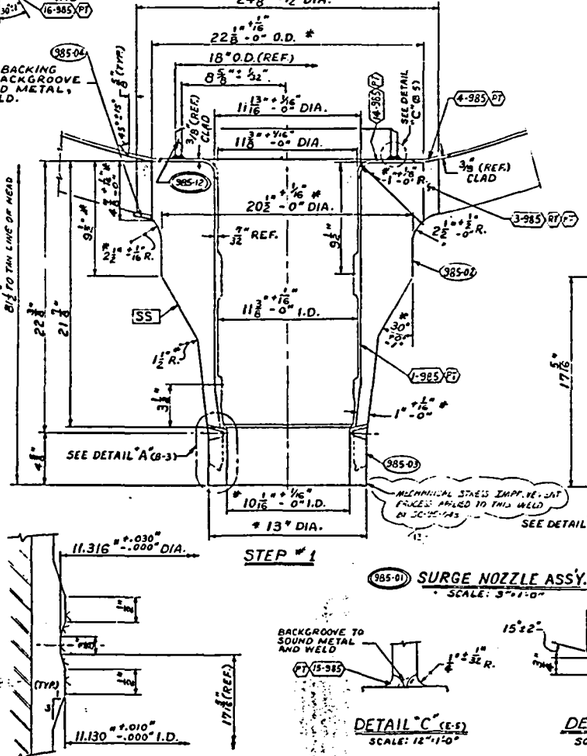


1	GEN.	GENERAL REVISION.		6/19/67
2	E-M	NO. REQ'D. WAS (2) FOR ASS'Y. 985-05 & 985-09		
	F-S	REVISED SECTION "D-D"		
	GEN.	ADDED A-D TO WELDS 5 THRU 12 AND 17 & 18.		
3	E-M G-S E-M	NO. REQ'D. WAS (4) FOR PC. NO. 985-14. 11 3/8" ±.005" DIA. WAS 11 3/16" ±.005" DIA. MAT'L. SPEC. WAS SA-240 F-316 FOR PC. NO. 985-14.		
4	GEN	ADDED INSPECTION SYMBOLS TO WELDS.		
	E-3	2" DIMENSION WAS 1 1/8"		
	D-6	ADDED 8 1/2" DIMENSION @ STEP #1.		
5	B-6	1/2" WAS .500" AT TWO PLACES		
	G-6	11 3/16" ±.005" DIA. WAS 11 3/16" ±.002" DIA.		
	E-5	9 1/2" DIM. WAS TO INSIDE OF CLAD		
	ASS'Y	DELETED WELD NOS. 13-985, 17-985 A-D		
	GEN	& 18-985 A-D		
6	E-8	3/8" (REF.) CLAD WAS 7/32" (REF.) CLAD.		
	E-M	ADDED 3/16" (REF.) CLAD AT TWO PLACES.		
	H-5	1/2" ±.005" R. WAS 1/2" ±1/16" R.		
	H-3	3/16" ±.05" R. WAS 1/4" ±.05" R.		
	G-S	ADDED 11/32" DIMENSION LOCATING 1'-0" RADIUS		
	G-7	REMOVED 1 1/8" DIM. ADDED 7 5/8 DIM.		
	C-7	REMOVED 1 1/8" DIM. ADDED 3 1/4" DIM.		
	H-2			
7	G-5	11" DIMENSION WAS 10 5/8"		
8	E-8	WELDED PC. 985-14 TO ASS'YS. NO. 985-05 & 09.		
	GEN.	ADDED WELD NO. 13-985 A-N.		
9	F-S	REVISED WELD PREP. FOR PC. # 985-12.		
	E-8	REVISED WELD NO. 7-985 A-D.		
	E-M	PC. NO. 985-08 WAS 7 1/2 O.D. x 4 I.D. x 1/4 THK.		
10	B-4	ADDED DETAIL "E"		
	E-8	REVISED WELD NO. 7-985 A-D		
	E-M	PC. NO. 985-08 WAS 7 O.D. x 3 1/2 I.D. x 1/4 THK.		
11	H-2	5 1/16" DIMENSION WAS 9 1/4"		
	F-S	.406" +.010" -.000" DIM. WAS .406" +.005" -.001"		
12	GEN	RESTORED DWG. BY E.A.C.		
13	G-5	ADD SHEET NOTE PER 2-95043 & ECR-92-733		









MATERIAL NOTES

NOTE "A"
MATERIAL TO BE SUPPLEMENTED BY C.E. PURCHASE SPEC. P3C9(d).

NOTE "B"
MATERIAL TO BE PER C.E. PURCHASE SPEC. P43C1(C).

NOTE "C"
MATERIAL TO BE PER C.E. PURCHASE SPEC. P8C3(C).

			NOMENCLATURE	MATERIAL	MATERIAL SPEC.	MAT'L NOTE
	985-49	1	SAFE END			
	985-41	1	BACKING RING 7 1/2" O.D. x 4" I.D. x 1/4" THK.	CARB. ST'L	COMM.	
	985-07	1	NOZZLE END			
	985-10	1	NOZZLE FORGING (SEE DETAIL)	ALLOY ST'L	A-508 64 Cl. 2	"A"
985-09		4	UPPER LEVEL NOZZLE ASS'Y. - EACH CONSISTING OF:			
	985-14	1	SAFE END MAKE FROM 2" O.D. x 5" LG. BAR (SEE DET.)	STAINLESS	SA-182 F316	"C"
	985-08	1	BACKING RING 7 1/2" O.D. x 4" I.D. x 1/4" THK.	CARB. ST'L	COMM.	
	985-07	1	NOZZLE END - MAKE FROM 2 3/4" O.D. BAR 2 5/8" LG. (SEE DET.)	HI-CR-FE	SB-166	"B"
	985-06	1	NOZZLE FORGING (SEE DETAIL)	ALLOY STL	A-508 64 Cl. 2	"A"
985-05		4	LOWER LEVEL NOZZLE ASS'Y. - EACH CONSISTING OF:			
	985-18	2	RING SEGMENTS 8 1/2" x 3/4" THK. x 27 5/16" DEV. LGTH.	HI-CR-FE	B-168	
985-42		1	RING ASS'Y. - CONSISTING OF:			
	985-44	1	BACKING RING 25 5/8" O.D. x 22 1/8" I.D. x 1/8" THK.	CARB. ST'L	COMM.	
	985-03	1	SAFE END 13" O.D. x 10 11/16" I.D. x 4 3/4"	HI-CR-FE	SB-166	"B"
	985-02	1	NOZZLE FORGING (SEE DETAIL)	ALLOY STL	A-508 64 Cl. 2	"A"
985-01		1	SURGE NOZZLE ASS'Y. - CONSISTING OF:			

ASSY. NO. | PC. NO. | NO. REQD.

LIST OF MATERIAL - QUANTITIES FOR ONE (1) UNIT - ONE (1) UNIT ON CONTRACT

GEOMETRIC TOLERANCES FOR MACHINED SURFACES UNLESS SPECIFIED ON FACE OF DRAWING

SYM.	GEOMETRY	TOL.
	FLAT. & STRAIGHT.	.001"/IN.
⊥	PERPENDICULARITY	.001"/IN.
//	PARALLELISM	.001"/IN.
∠	ANGULARITY	SEE DWG.
○	STRAIGHT	SEE DWG.
⊕	TRUE POSITION	SEE DWG.
◎	CONCENTRICITY	.010 TIR
⌓	ROUNDNESS	SIZE TOL.

ALL DIMENSIONS APPLY AT REFERENCE TEMP. OF 68° F. See NOTE #1
FINISH ✓ UNLESS NOTED
TOLERANCE ON: FRACTIONS ± 1/64" DECIMALS: ± .010" ANGLES: ± 0° 30' UNLESS NOTED

CONTRACT 29666

DWN. BY E.C. Gammage DATE 6-10-67
CKD. BY — DATE 6-13-67
APPD. BY W.W. Wolf DATE 6-13-67
STRESS ENG. B. STONE DATE —
APPROVED DATE

COMBUSTION ENGINEERING, INC. CHATTANOOGA DIVISION

NOZZLE DETAILS FOR CONSUMERS POWER PRESSURIZER

P 2 0 3 3 5 5

CODE IDENT. NO. | SIZE E | 231-985-
SCALE 3/4"=1'-0" | WEIGHT | SHEET —

GENERAL NOTES:

1. FOR STANDARD NOTES SEE REFERENCE DWG. # 3.
2. DOUBLE ARROW INDICATES DIMENSIONS TO A GIVEN REFERENCE LINE.
3. SIZES IN 1/64 ARE FINISHED SIZES. NO ALLOWANCE MADE FOR FABRICATION OR WELD SHRINKAGE UNLESS NOTED.
4. REFERENCE (REF.) DIMENSIONS ARE FOR INFORMATION ONLY. DO NOT USE FOR FABRICATION.
5. ALL FABRICATION SHALL BE IN ACCORDANCE WITH ASME BOILER CODE SECTION III.
6. ALL CLADDING IS AS DEPOSITED FINISH UNLESS OTHERWISE NOTED AND A MINIMUM THICKNESS OF 1/32".
7. DIAMETERS NOTED TO BE MACHINED SO THAT MAXIMUM DIAMETRAL CLEARANCE IN MATING PART IS .010".
8. * ASTERISK DENOTES AS ORDERED DIMENSIONS.

REFERENCE DRAWINGS

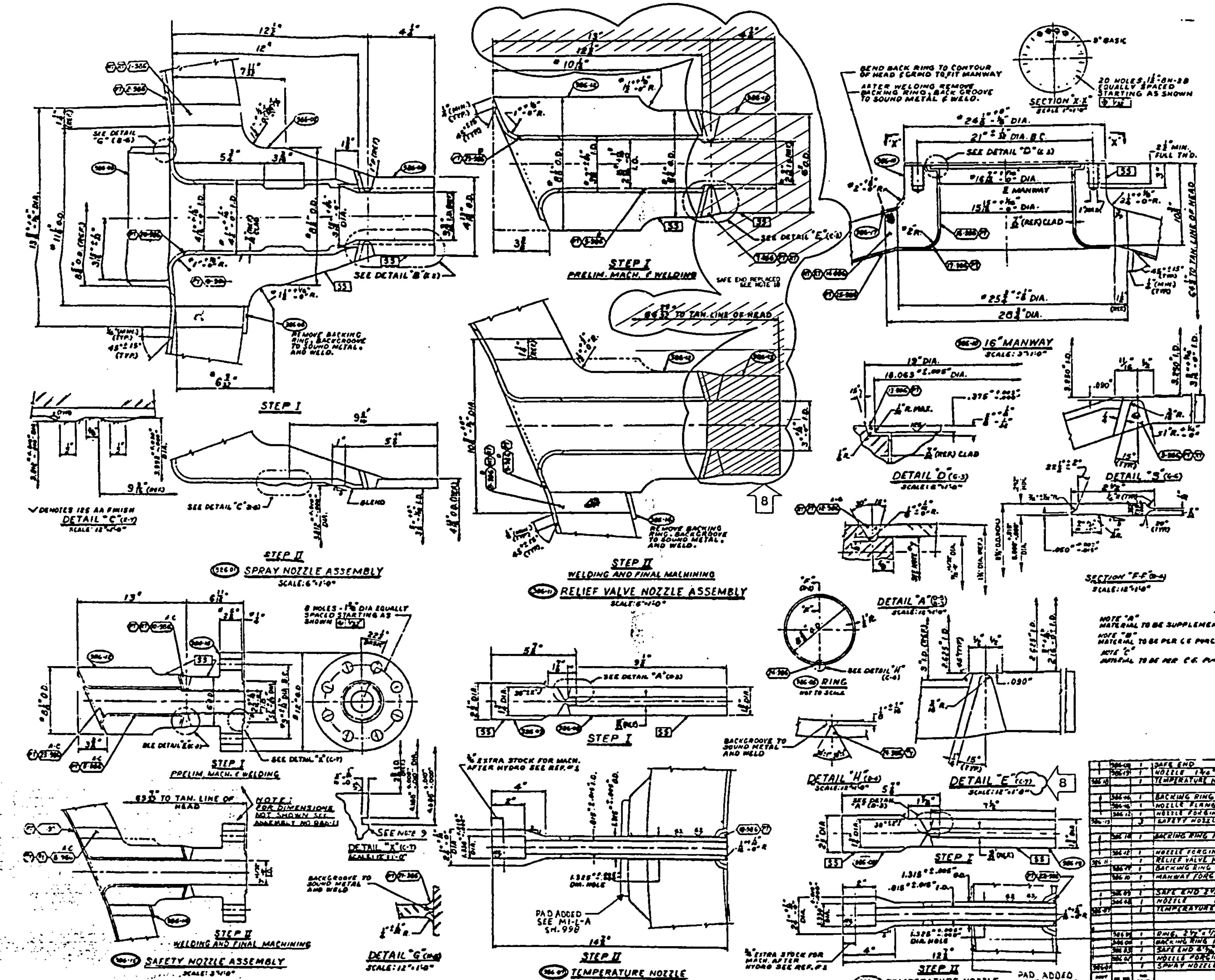
NO.	TITLE	DWG. NO.
1.	PRESSURIZER OUTLINE	E-231-980
2.	GENERAL ARRANGEMENT	E-231-981
3.	STANDARD NOTES	A-230-044
4.	TOP HEAD FORMING AND WELDING	E-231-983
5.	BOTTOM HEAD FORMING & WELDING	E-231-984

WELD TABULATION

11-985 A-D	WC-2966C-985	
12-985 A-D	WG-2966C-985	
14-985	WJ-2966C-985	
15-985	WK-2966C-985	
16-985 A-B	WL-2966C-985	
19-985 A-N	WM-2966-985	

WELD TABULATION

WELD NO.	C.E. WELD PROC.
1-985	WB-2966C-985
2-985	WB-2966C-985
3-985	WC-2966C-985
4-985	WD-2966C-985
5-985 A-D	WE-2966C-985
6-985 A-D	WF-2966C-985
7-985 A-D	WC-2966C-985
8-985 A-D	WD-2966C-985
9-985 A-D	WC-2966C-985
10-985 A-D	WF-2966C-985



MATERIAL NOTES

NOTE "A"
MATERIAL TO BE SUPPLEMENTED BY C.E. PURCHASE SPEC. P3C3(C).

NOTE "B"
MATERIAL TO BE PER C.E. PURCHASE SPEC. P43C1(C).

NOTE "C"
MATERIAL TO BE PER C.E. PURCHASE SPEC. P3C3(C)

ASSY NO.	PC NO.	NO. REQD.	NOMENCLATURE	MATERIAL	MATERIAL SPEC.	MAT'L NOTE
	986-08	1	SAFE END			
	986-19	1	NOZZLE 1⅝" O.D. x 1⁹⁄₃₂" I.D. x 7½" LG.	NI-CR-FE	SB 166	"A"
986-18		1	TEMPERATURE NOZZLE ASS'Y - CONSISTING OF:			
	986-16	1	BACKING RING			
	986-15	1	NOZZLE FLANGE (SEE DETAIL)	NI-CR-FE	SB-166	"B"
	986-12	1	NOZZLE FORGING			
986-13		3	SAFETY NOZZLE ASS'Y - CONSISTING OF:			
	986-14	1	BACKING RING 11⅝" O.D. x 8⅜" I.D. x ¼" THK.	CARB STL	COMM.	
	986-12	1	NOZZLE FORGING (SEE DETAIL)	ALLOY STL	A 508-64	"A"
986-11		1	RELIEF VALVE NOZZLE ASS'Y - CONSISTING OF:			
	986-17	1	BACKING RING 25⅝" O.D. x 23⅝" I.D. x ¼" THK	CARB STL	COMM.	
	986-10	1	MANWAY FORGING (SEE DETAIL)	ALLOY STL	A 508-64	"A"
	986-09	1	SAFE END 2½" O.D. x 3⅝" LG.	STN STL		"C"
	986-08	1	NOZZLE 1⅝" O.D. x 1⁹⁄₃₂" I.D. x 3½" LG.	NI-CR-FE	SB-166	"B"
986-07		1	TEMPERATURE NOZZLE ASS'Y - CONSISTING OF:			
	986-06	1	RING, 2½" x ½" x 25 ⁵⁄₁₆" DEV. L'GTH	NI-CR-FE	B-168	
	986-05	1	BACKING RING 14⅛" O.D. x 11⅝" I.D. x ¼" THK.	CARB STL	COMM.	
	986-03	1	SAFE END 6⅛" O.D. x 3⅝" I.D. x 4½" LG.	NI-CR-FE	SB-166	"B"
	986-02	1	NOZZLE FORGING (SEE DETAIL)	ALLOY STL	A 508-64	"A"
986-01		1	SPRAY NOZZLE ASS'Y - CONSISTING OF:			

LIST OF MATERIAL QUANTITIES FOR ONE (1) UNIT ON CONTRACT

6. ALL CLADDING IS AS DEPOSITED FINISH UNLESS OTHERWISE NOTED AND A MINIMUM THICKNESS OF ⅛".
7. DIAMETERS NOTED TO BE MACHINED SO THAT MAXIMUM DIAMETRAL CLEARANCE IN MATING PART IS .010".
8. # ASTERISK DENOTES AS ORDERED DIMENSIONS.
9. MINOR MATERIAL REMOVED FROM RV-1091 FLANGE GASKET SEATING SURFACE TO REMOVE SCRATCH. SPECIFIED DIMENSION FOR RV 1041 IS .205" ± .003 PER FES-93-265
12. SAFE END REPLACED PER SC-94-096 SEE DWG. MI-LA SH. 2 FOR NEW DETAIL.

GENERAL NOTES:

1. FOR STANDARD NOTES SEE REFERENCE DWG. # 3.
2. DOUBLE ARROW INDICATES DIMENSIONS TO A GIVEN REFERENCE LINE.
3. SIZES IN L/M ARE FINISHED SIZES. NO ALLOWANCE MADE FOR FABRICATION OR WELD SHRINKAGE UNLESS NOTED.
4. REFERENCE (REF) DIMENSIONS ARE FOR INFORMATION ONLY, DO NOT USE FOR FABRICATION.
5. ALL FABRICATION SHALL BE IN ACCORDANCE WITH A.S.M.E. BOILER CODE SECTION III.

REFERENCE DRAWINGS

NO	TITLE	DWG. NO
1.	PRESSURIZER OUTLINE	E-231-980
2.	GENERAL ARRANGEMENT	E-231-981
3.	STANDARD NOTES	E-230-644
4.	TOP HEAD FORMING & WELDING	E-231-985
5.		

WELD TABULATION

WELD NO.	C.E. WELD PROC.
1-986	MA-2366C-986
2-986	MA-2366C-986
3-986	MC-2366C-986
5-986 A-D	MC-2366C-986
7-986	MC-2366C-986
8-986 A-D	MA-2366C-986
9-986 A-D	MB-2366C-986
10-986 A-C	MC-2366C-986
12-986 A-D	MF-2366C-986
13-986	MB-2366C-986
14-986	MA-2366C-986
15-986	MB-2366C-986
16-986	MJ-2366C-986
17-986	MA-2366C-986
18-986	ML-2366C-986
19-986	MC-2366C-986
20-986	MM-2366C-986
21-986	MK-2366C-986
22-986	ML-2366C-986
23-986 A-D	MB-2366C-986
24-986	MF-2366C-986

ALL DIMENSIONS APPLY AT REFERENCE TEMP. OF 68° F. SEE NOTE #1
TOLERANCE ON: FRACTIONS ± 1/16" DECIMALS ± .010" ANGLES ± 0°-30'

COMBUSTION ENGINEERING, INC.

CONTRACT 2366C

PROJECT REFERENCE COPY

E 231-986-7

8	11-10-95	REPLACED SAFE END & REDRAWN ON CAD PER SC-94-096 & DCR-95-1010.	JCD		
REV.	DATE	DESCRIPTION	BY	CK	APP

CONSUMERS POWER COMPANY
PALISADES NUCLEAR PLANT
COVERT, MICHIGAN

NOZZLE DETAILS

PRESSURIZER

VEN-M1-LA | 986 | 8

E-231-987

Q2.

NOTE:
ALL COORDINATE DIMENSIONS ARE BASIC. HOLES TO BE ⊕ .010" DIA.

MD NEEDLE ABOVE

38.184"
33.941"
29.699"
25.456"
21.213"
16.971"
12.728"
8.485"
4.243"

46.956"
42.713"
38.471"
34.228"
29.985"
25.743"
21.500"
17.257"
13.015"

"A" (B-6)

0° 90° 180° 270°

SYMMETRICAL ABOUT ℄S

120 SLEEVE ASSY. SEE DETAIL "B" (F-3)

TOP VIEW

BOTTOM HEAD PENETRATIONS
SCALE: 1½"=1'-0"

SECTION "A-A" (G-8)
SCALE: 1½"=1'-0"

382-01

120 SLEEVE ASSY. SEE DETAIL "B" (F-3)

STEP 1

1.158" +.002" -.000" DIA.
DIM. "A" (SEE TABLE)
15°
3/16" R.
1.168" +.010" -.000" DIA.
SPOT FACE

STEP 2

3/16" MIN. (TYP.)
F7 1-987
NOTE: MAINTAIN SLEEVE I.D. OF .905" ± .010" AFTER WELDING, REAM IF NECESSARY.
SLEEVE ASSY.

DETAIL "B" (F-7) (E-6)
SCALE: 24"=1'-0"

TABLE		
ASSY NO.	PENET. NO.	"A"
995-05	A_1 - A_4	.491"
995-08	B_1 - B_4	.492"
995-10	C_1 & C_4	.494"
995-12	D_1 - D_4	.538"
995-14	E_1 - E_4	.626"
995-16	F_1 - F_4	.665"
995-18	G_1 - G_4	.687"
995-20	H_1 - H_4	.705"
995-22	J_1 - J_4	.711"
995-24	K_1 & K_2	.754"
995-26	L_1 - L_4	.798"
995-28	M_1 - M_4	.883"
995-30	N_1 - N_4	.884"
995-32	P_1 - P_4	.926"
995-34	Q_1 - Q_4	.929"
995-36	R_1 - R_4	.934"
995-38	S_1 - S_4	1.020"
995-40	T_1 - T_4	1.029"
995-42	U_1 & U_2	1.134"
995-44	V_1 - V_4	1.182"
995-46	W_1 - W_4	1.185"
995-48	X_1 - X_4	1.188"
995-50	Y_1 - Y_4	1.238"
995-52	Z_1 - Z_4	1.243"
995-54	AA_1 - AA_4	1.359"
995-56	BB_1 - BB_4	1.370"
995-58	CC_1 - CC_4	1.442"
995-60	DD_1 - DD_4	1.576"
995-62	EE_1 - EE_4	1.595"
995-64	FF_1 - FF_4	1.673"
995-66	GG_1 - GG_4	1.675"
995-68	HH_1 (HH_2	1.881"

382-01
2-987
SEAL WELD
995-01
SLEEVE ASSY.
987-02
987-03

ASSEMBLY OF HEATER
SCALE: NONE

ITEM	ZONE		DATE	APPROVED
1	1/H	PCS. 987-02 & 987-03 WERE S.S. TP. 316 Mat'l.	6-5-67	
2	F-2	ADDED NOTE.	7-3-67	
3	F-2	.905" ± .010" WAS .905" ± .007"	9-26-68	

ITEM NO.	PC. NO.	REQD.	NOMENCLATURE	MATERIAL	MATERIAL SPEC.	MAT'L NOTE
	987-03	120	HEX SOCKET FLAT POINT SET SCREW ⅛"-20 UNC-2A 5/16 LG	SST Tp. 304	SA-193 Gr. B8	
	987-04	120	⅛"-20 UNC-2B HEXAGON JAM NUT	SST Tp. 304	SA-194 Gr. 8	
995-68		2				
995-66		4				
995-64		4				
995-62		4				
995-60		4				
995-58		4				
995-56		4				
995-54		4				
995-52		4				
995-50		4				
995-48		4				
995-46		4				
995-44		4				
995-42		2				
995-40		4				
995-38		4				
995-36		4				
995-34		4				
995-32		4				M-L-A
995-30		4				SL 987
995-28		4				
995-26		4				
995-24		2				
995-22		4				
995-20		4				
995-18		4				
995-16		4				
995-14		4				
995-12		4				
995-10		2				
995-08		4				
995-05		4	SLEEVE ASSEMBLY			
995-01		120	HEATER ASSEMBLY			
382-01		1	SHELL & BOTTOM HEAD ASSEMBLY			
987-01		1	ASSY. OF SLEEVES & HEATERS WITH SHELL TO BOTTOM HEAD ASSY. CONSISTING OF:			

LIST OF MATERIAL — QUANTITIES FOR ONE (1) UNIT - ONE (1) UNIT ON CONTRACT

GENERAL NOTES

1. FOR STANDARD NOTES SEE REF. DWG. # 1.
2. ALL FABRICATION SHALL BE IN ACCORDANCE WITH ASME BOILER CODE SECTION VIII.
3. REFERENCE (REF.) DIMENSIONS ARE FOR INFORMATION ONLY. DO NOT USE FOR FABRICATION.
4. DOUBLE ARROW INDICATES DIMENSION TO GIVEN REFERENCE LINE.
5. SIZES IN ( ) ARE FINISHED SIZES. NO ALLOWANCE MADE FOR FABRICATION OR WELD SHRINKAGE UNLESS NOTED.

REFERENCE DRAWINGS

NO.	TITLE	DWG. NO.
1.	STANDARD NOTES	A-230-546
2.	BOTTOM HEAD FORMING & WELDING	E-231-986
3.	VESSEL FORMING & WELDING	E-231-982
4.	INTERNAL DETAILS	E-231-989
5.	INTERNAL DETAILS	E-231-995

WELD TABULATION

WELD NO.	DETAIL WELD PROC.
1-987	WA -2966C-987
2-987	WB -2966C-987

GEOMETRIC TOLERANCES FOR MACHINED SURFACES UNLESS SPECIFIED ON FACE OF DRAWING

SYM.	GEOMETRY	TOL.
—	FLAT & STRAIGHT	.001"/IN.
⊥	PERPENDICULARITY	.001"/IN.
//	PARALLELISM	.001"/IN.
∠	ANGULARITY	SEE DWG.
⌯	SYMMETRY	SEE DWG.
⌖	TRUE POSITION	SEE DWG.
◎	CONCENTRICITY	.010 TIR
○	ROUNDNESS	SIZE TOL.

ALL DIMENSIONS APPLY AT REFERENCE TEMP. OF 68° F. SEE NOTE 2 UNLESS NOTED
FINISH √
TOLERANCE ON: FRACTIONS ± 1/16 DECIMALS ± .010" ANGLES ± 0°30' UNLESS NOTED

CONTRACT 2966C

DWN. BY B.C. Cummins DATE 10-19-67
CKD. BY E.D.A. DATE 11-3-67
APPD. BY H.W. Leach DATE 3/1/68
STRESS ENGR. L.M. Stone DATE 2/15/68
APPROVED DATE

COMBUSTION ENGINEERING, INC. CHATTANOOGA DIVISION

HEATER ARRANGEMENT & DETAIL FOR CONSUMERS POWER PRESSURIZER

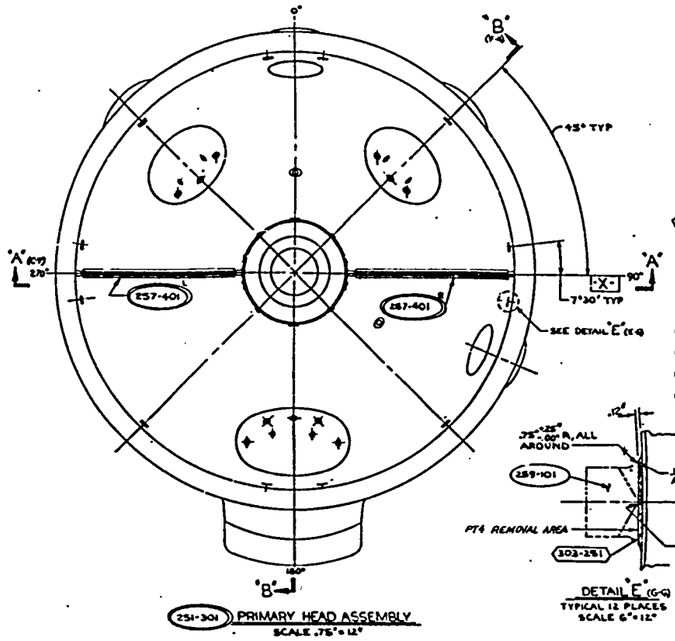
CODE IDENT. NO. 03230 SIZE E DWG. NO. 231-987-3
SCALE AS NOTED WEIGHT SHEET

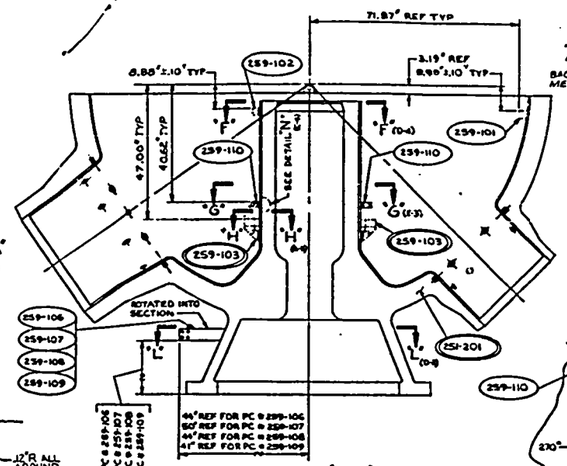
REFERENCE DRAWINGS

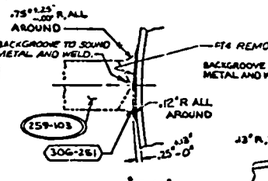
RELIEF REQUEST RR 4-3

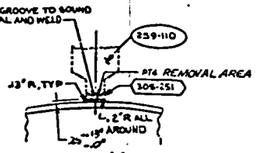
E-RSG90-C251-003

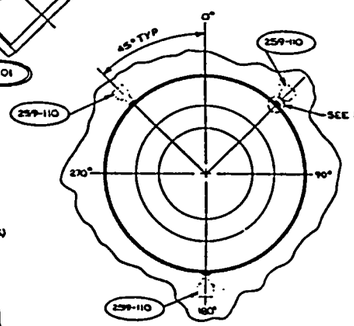
REVISIONS				
ZONE	DESCRIPTION	DATE	APPROVED	
DA	ISSUED NEW DWG PER 950-99-794 (JKW)	2/4/99	JD	

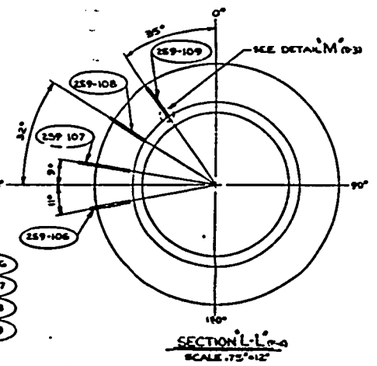


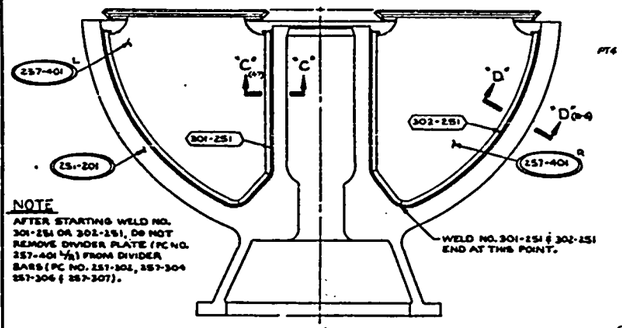


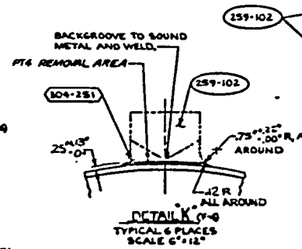


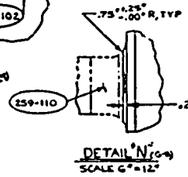


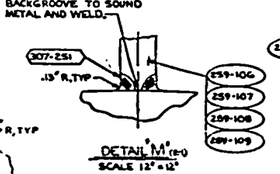


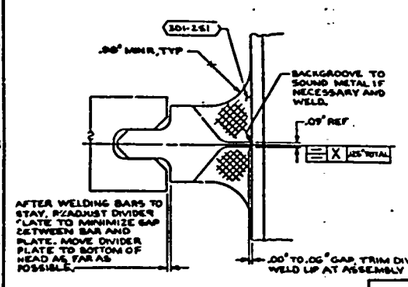


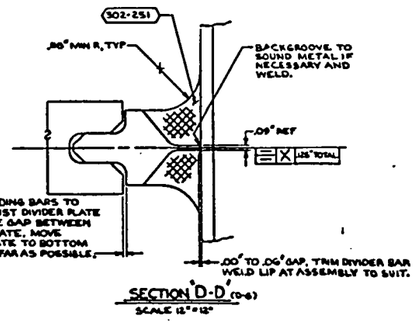












WELD NUMBER	W.P.S. NUMBER	NO.	PENET.	NO.	PENET.	NO.	PENET.	NO.	PENET.	NO.	PENET.	QTY. OF CHANGE
		QTY		QTY		QTY		QTY		QTY		
307-251	W-DWPS-SMM-1.3-105					2	BC,FF					
306-251	W-DWPS-GTA-SMM-8.43-101	4	BC,FF									
305-251	W-DWPS-GTA-SMM-8.43-101	4	BC,FF									
304-251	W-DWPS-GTA-SMM-8.43-101	4	BC,FF									
303-251	W-DWPS-GTA-SMM-8.43-101	4	BC,FF									
302-251	W-DWPS-GTA-SMM-8.43-101	4	BC,FF									
301-251	W-DWPS-GTA-SMM-8.43-101	4	BC,FF									

WELD TABLE

ITEM	PART NO.	NO. REQ'D	NOMENCLATURE	MATERIAL SPEC.	MATERIAL GRADE	MATERIAL NOTES
	259-110	3	LUG			
	259-109	1	LUG			
	259-108	1	LUG			
	259-107	1	LUG			
	259-106	1	LUG			
259-103		2	SUPPORT RING ASSEMBLY			
	259-102	6	LUG			
	259-101	12	LUG			
251-301		1	PRIMARY HEAD ASSEMBLY			
257-401L		1	DIVIDER PLATE ASSEMBLY			
257-401L		1	DIVIDER PLATE ASSEMBLY			
251-301		1	PRIMARY HEAD ASSEMBLY, CONSISTING OF:			

LIST OF MATERIAL - QUANTITIES FOR ONE (1) UNIT. UNIT #1 ONLY

ITEM	QUANTITY	TYP.
1	OUTLINE	SEE DWG
2	STAY PLATE	SEE DWG
3	DIVIDER PLATE	SEE DWG
4	PERIPHERY PIPE	SEE DWG
5	PERIPHERY PIPE CAP	SEE DWG
6	PERIPHERY PIPE SUPPORT	SEE DWG
7	TRANSITION	SEE DWG
8	TRANSITION SUPPORT	SEE DWG
9	CONNECTION	SEE DWG
10	CONNECTION	SEE DWG
11	CONNECTION	SEE DWG

GENERAL NOTES

1. ALL WELDS, WHERE TWO OR MORE ARE REQUIRED HAVING THE SAME NUMBER, WILL BE IDENTIFIED WITH SUFFIX A, B, C, ETC STARTING AT THE 0° AXIS AND GOING CLOCKWISE.
2. OBJECTS IN PHANTOM ARE TO BE REMOVED BY FIELD PERSONNEL.

REFERENCE DRAWINGS

NO.	TITLE	DRAWING NO.
1	PROCESS SPECIFICATIONS	S-70239-124-004
2	PRIMARY HEAD ASSEMBLY - UNIT # 1	E-RSG90-C251-001
3	PRIMARY HEAD ASSEMBLY - UNIT # 1	E-70279-251-006
4	PRIMARY HEAD ASSEMBLY - UNIT # 1	E-70279-251-[illegible]
5	DIVIDER PLATE ASSEMBLY	D-70279-2[illegible]
6	PRIMARY HEAD ATTACHMENTS	E-70279-259-001

UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS & TOLERANCES TO USAS Y14.5 - 1982.
2. ALL DIMENSIONS APPLY AT REFERENCE TEMP. OF 68°F.
3. REF. DIMENSIONS ARE FOR INFORMATION ONLY. DO NOT USE FOR FABRICATION.
4. MACHINE BY HAND TYPICAL TOOL LEAD-IN 3 STEPS AT AMP .06" MAX DEPTH.
5. BREAK ALL SHARP EDGES WITH APPROX. .03" RADIUS OR CHAMFER.
6. MACHINED SURFACES INTERNAL = 250AA OR BETTER, EXTERNAL = 500AA OR BETTER
7. SIZES IN LAS ARE FINISHED SIZES - NO ALLOWANCE MADE FOR FABRICATION OR WELD SHRINKAGE.
8. TOLERANCE ON .X"=±.1", .XX"=±.03", .XXX"=±.010 ± TYP.
9. SEE DWG. [illegible] FOR ITEMS NOT ITEM NO. IN WELD TABLE & NOT CALL-OUT ON DWG.
10. SEE DWG. [illegible] FOR APPLICABLE EQUIPMENT SPECIFICATIONS.
11. DOUBLE ARROW INDICATES DIMENSION TO GIVEN REFERENCE LINE.
12. DEVELOPED LENGTH OF LAS IS GIVEN ON MEAN CENTERLINE.

THIS DRAWING REPLACES E 0277-251-003

CERTIFIED FOR CONSTRUCTION

PRIMARY HEAD ASSEMBLY-UNIT #1
CONSUMERS POWER CO
REPLACEMENT STEAM GENERATOR

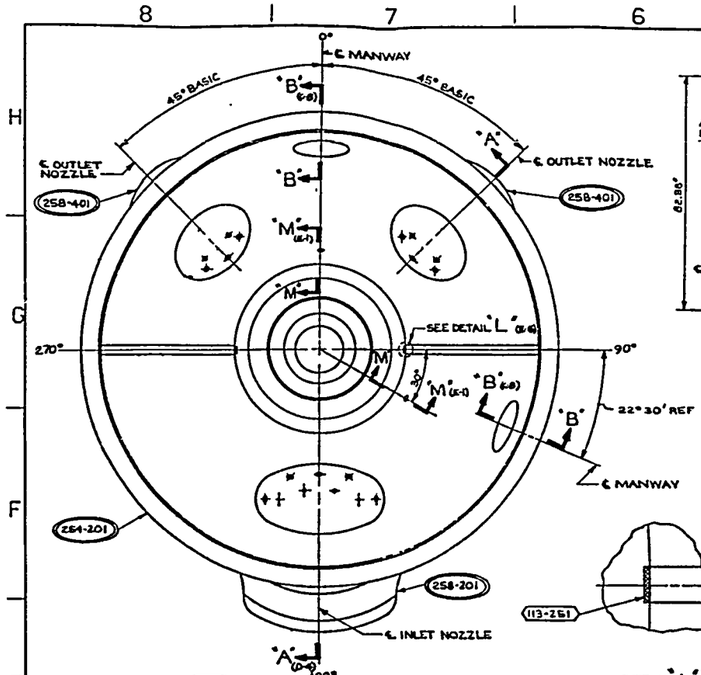
CPC SERIAL #

DRAWN	J.F. CARLIN	DATE	12-30-99
DESIGN BY	J.K. KLOOSTERMAN	DATE	12-22-99

E-RSG90-C 251-003-00

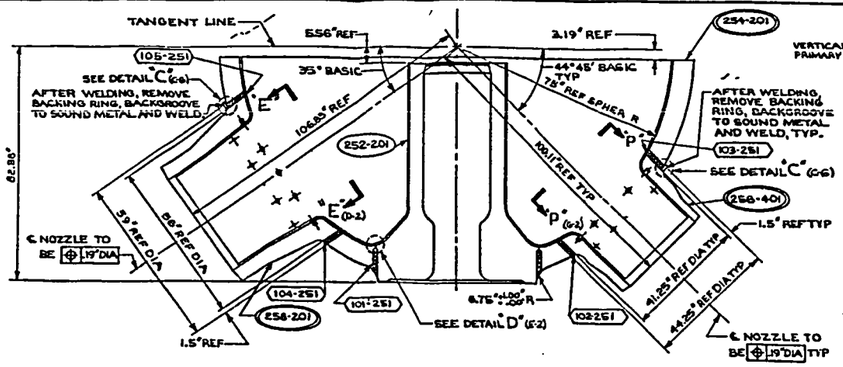
SCALE AS NOTED | TABLE NO. GOTTCO

VEN-M1-FAA-SH.44-REV.ØA

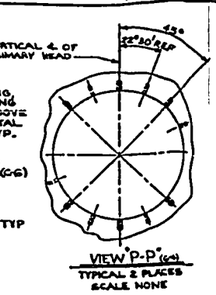


254-101 PRIMARY HEAD ASSEMBLY
SCALE .75"=12"

DETAIL "L" (G-7)
TYPICAL 2 PLACES
SCALE 3"=12"

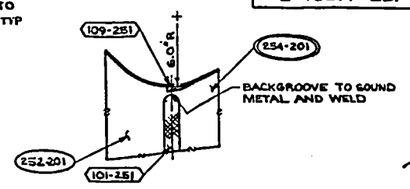


STEP 1

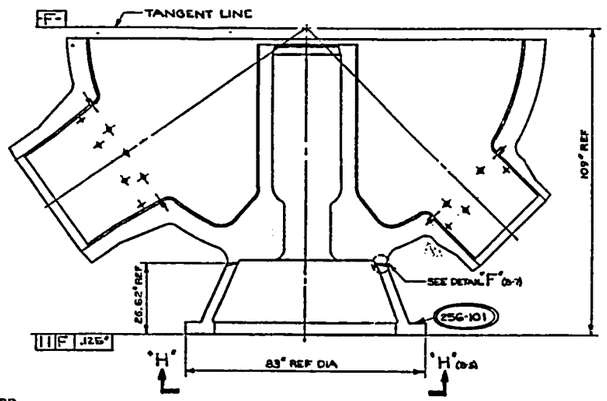


VIEW "P-P" (G-4)
TYPICAL 2 PLACES
SCALE NONE

THIS DRAWING REPLACES E-70277-251-001

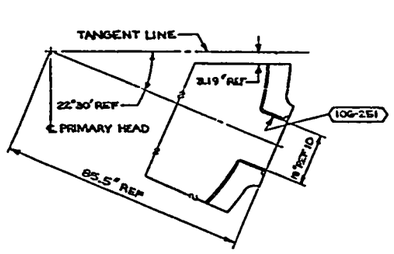


DETAIL "D" (G-4)
SCALE 3"=12"

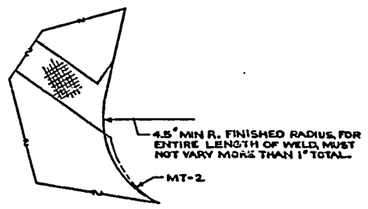


STEP 2

SECTION "A-A" (E-7)
SCALE .75"=12"

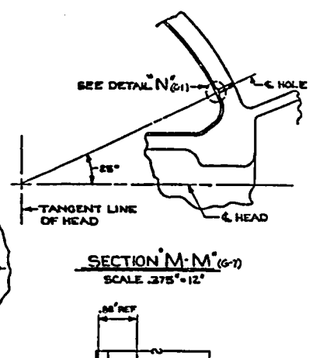


SECTION "B-B" (G-7)(H-7)
SCALE .75"=12"

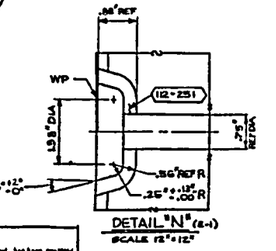


DETAIL "C" (H-6)(G-2)
TYPICAL 3 PLACES
SCALE 6"=12"

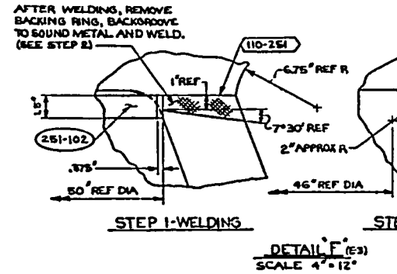
VIEW "E-E" (G-5)
SCALE NONE



SECTION "M-M" (G-7)
SCALE .375"=12"

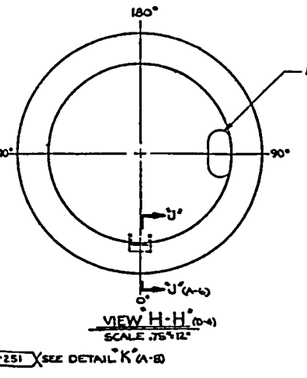


DETAIL "N" (G-1)
SCALE 12"=12"



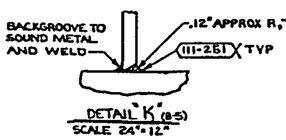
STEP 1-WELDING STEP 2-MACHINING

DETAIL "F" (E-3)
SCALE 4"=12"



VIEW "H-H" (D-4)
SCALE .75"=12"

SECTION "J-J" (B-8)
SCALE .719"=12"



DETAIL "K" (B-5)
SCALE 24"=12"

CERTIFIED FOR CONSTRUCTION

VERIFICATION STATION COMPLETE

The Safety-Related display below will be reviewed ____ and was verified to be correct by means of Design Review using Checklist No. ____ of SAS-101.

Signature ____ Date ____

Independent Reviewer

MATERIAL NOTES

"A" .30% MAXIMUM CARBON.

ZONE	ASSY NO	PD NO	NO REQ'D	NOMENCLATURE	MATERIAL	MATERIAL SPEC	MATERIAL NOTES
	254-105	1		NAMEPLATE BRACKET			
	251-102	1		BACKING RING .375" X 1.5" BAR X 185.90" DEV'LP'D	C STL	COMB.	
	253-801	1		STAY			
	258-401		2	PRIMARY OUTLET NOZZLE ASSEMBLY			
	256-201		1	PRIMARY INLET NOZZLE ASSEMBLY			
	256-101		1	SUPPORT SKIRT ASSEMBLY			
	254-201		1	TORUS ASSEMBLY			
E-8	251-101		1	PRIMARY HEAD ASSEMBLY, CONSISTING OF:			

LIST OF MATERIAL — QUANTITIES FOR ONE (1) UNIT, UNIT # 1 ONLY

WELD TABLE

UNLESS OTHERWISE SPECIFIED

WELD NUMBER	S.W.P. NUMBER	NO.	PASS.	NO.	PASS.	NO.	PASS.	NO.	PASS.	∠ CHAR.
		PT		UT		UT		UT		
113-251	N-DWPS-SMA 3.43-103	5	F							
112-251	N-DWPS-SMA 3.43-104	5	F							
111-251	N-DWPS-SMA 1.3-109			2	F					
110-251	N-DWPS-SAA SMA-3.3-118			2	BC,FF			26	∢F	
109-251	N-DWPS-SMA 3.8-101	5	F					10	F	26
109-251	N-DWPS-SMA 3.8-101	5	F					10	F	26
105-251	N-DWPS-SMA 3.8-101	5	F					10	F	26
104-251	N-DWPS-SAA SMA-3.3-117			2	BC,FF	1	F	30	∢F	
103-251	N-DWPS-SMA 3.8-101	5	F					10	F	26
102-251	N-DWPS-SAA SMA-3.3-117			2	BC,FF	1	F	30	∢F	
101-251	N-DWPS-SAA SMA-3.3-117			2	BC,FF	1	F	30	∢F	

1. DIMENSIONS & TOLERANCES TO USASI Y14.5 — 1966.
2. ALL DIMENSIONS APPLY AT REFERENCE TEMP. OF 70°F.
3. REF. DIMENSIONS ARE FOR INFORMATION ONLY. DO NOT USE FOR FABRICATION.
4. MARKING SYMBOLS STYLE/SIZE TOOL: LBM-LOW STRESS STAMP .03" MAX DEPTH.
5. BREAK ALL SHARP EDGES WITH APPROX. .03" RADIUS OR CHAMFER.
6. MACHINED SURFACES INTERNAL = 500AA OR BETTER EXTERNAL = 250AA OR BETTER
7. SIZES IN L/M ARE FINISHED SIZES — NO ALLOWANCE MADE FOR FABRICATION OR WELD SHRINKAGE.
8. TOLERANCE ON ∠'s ±1°, EXCEPT ANY ∠'s OF 30°, 45°, 60° ARE ±0°30'.
9. SEE REF. DRWG. NO. ____ FOR NDT ITEM NO. IN WELD TABLE & NDT CALL-OUT ON DWG.
10. SEE DWG. E-70277-001 FOR APPLICABLE EQUIPMENT SPECIFICATIONS.
11. DOUBLE ARROW INDICATES DIMENSION TO GIVEN REFERENCE LINE.
12. DEVELOPED LENGTH IN L/M IS GIVEN ON MEAN CENTERLINE.

GENERAL NOTES

1. ALL WELDS, WHERE TWO OR MORE ARE REQD HAVING THE SAME NUMBER, WILL BE IDENTIFIED WITH SUFFIX A, B, C ETC STARTING AT THE 0° AXIS AND GOING CLOCKWISE.
2. ALL CLADDING TO BE AS DEPOSITED FINISH UNLESS OTHERWISE NOTED AND A MINIMUM THICKNESS OF .125" UNLESS OTHERWISE NOTED.
3. WHEN PURCHASED PARTS ARE USED, INCLUDING STRUCTURAL SHAPES, PLATES, BARS, ETC, MILL TOLERANCES WILL APPLY UNLESS OTHERWISE SPECIFIED.

REFERENCE DRAWINGS

NO	TITLE	DRAWING NO.
1	PROCESS SPECIFICATIONS	B-70277-252-004
2	PRIMARY HEAD TORUS MACHINING-UNIT #1	E-70277-254-002
3	STAY MACHINING AND CLADDING	D-70277-253-003
4	PRIMARY HEAD ASSEMBLY-UNIT #1	E-70277-251-002
5	PRIMARY INLET NOZZLE ASSY-UNIT #1	D-RS690-C256-002
6	PRIMARY OUTLET NOZZLE ASSY	D-RS690-C258-004
7	SUPPORT SKIRT	E-70277-256-001

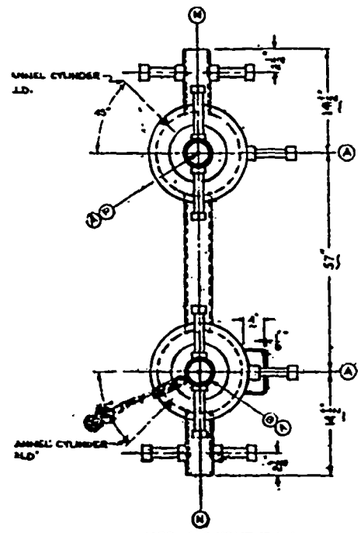
NO.	DATE	DESCRIPTION	BY	CHK	APP
1	2-11	ISSUED NEW DWG. PER DCN# 458-16-7941/70	PPC	CHB	JCE
0			JPH		

COMBUSTION ENGINEERING INC.

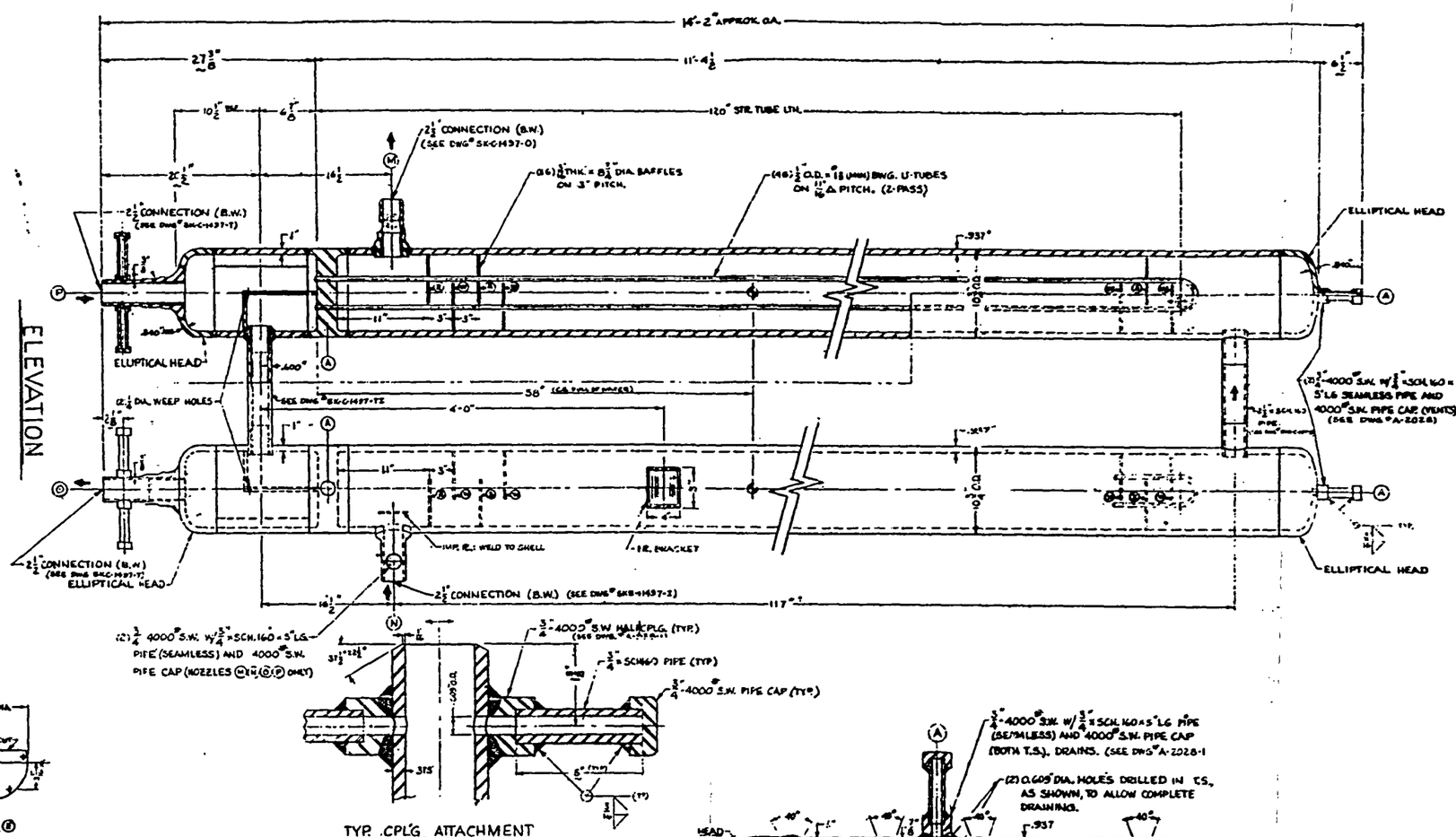
	E-RS690-C251-001-01	1	1
	CONSUMERS POWER COMPANY		
	PALISADES NUCLEAR PLANT		
	COVERT, MICHIGAN	NSP-AA-8,004	
	PRIMARY HEAD ASSEMBLY-UNIT #1 STEAM GENERATOR		
	VEN-MI-F-AA	48	1A

REFERENCE DRAWINGS

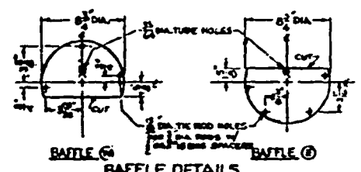
RELIEF REQUEST RR 4-4



TRUE NOZZLE ORIENTATION

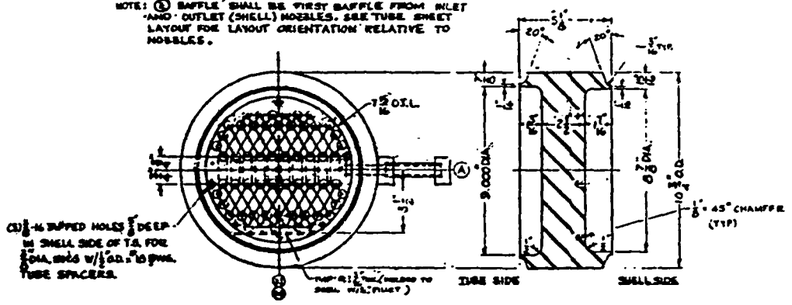


ELEVATION



BAFFLE DETAILS

NOTE: ① BAFFLE SHALL BE FIRST BAFFLE FROM INLET AND OUTLET (SHELL) NOZZLES. SEE TUBE SHEET LAYOUT FOR LAYOUT ORIENTATION RELATIVE TO NOZZLES.



TUBE SHEET LAYOUT & DETAILS

(466) ½" O.D. × 13 (MIN) BWG. U TUBES ON 1" Δ PITCH.

TYP. CPLG. ATTACHMENT

CONSTRUCTION DETAILS

"AS BUILT"

CP CO	7	UPDATED FROM MI-HF SH. 1289 F REVS. 4.5 FG OMITTED	PG	U_D	R_S	3/19/68
	6	OVER ALL OF INLET WAS 18" CENTER TO CENTER LINE WAS 22"			USC	8-24-67
	REV.				BY	DATE

REFERENCES:
C.E. SPEC." 70P-022
C.E. - " HO-70P-022
C.E. - " 70P-029
ATLAS DWG" D-1759-E
" " CT-1794-3

NOZZLE IDENTIFICATION

M	TO: PRIMARY LOOP
N	CHARGING INLET
O	TO LETDOWN HEAT EXCHANGER
P	LETDOWN INLET
A	SHELL VENT AND DRAIN

ASME MATERIAL SPECIFICATIONS

SHELLS				FACINGS				BONNETS CHANNELS			* NOZZLE NECKS	SS-316	SA-182 F...
* CASTING	CF8M	SA-351		EXPANSION JOINT				WELD CAPS			FITTINGS	SS-316	SA-182
ROLLED PLATE				IMP. PLATE	SS-316	SA-240		FORMED HEADS	SS-316	SA-240	COVERS, Drain		
BAFFLES	SS-316	SA-240		WELD CAPS				⊕ PIPE			TUBE SHEETS	SS-316	SA-182 F
TIE RODS	SS-316	SA-479		FORMED HEADS	SS-316	SA-240		PLATE	SS-316	SA-240	TUBES	SS-316	SA-213
SPACERS	SS-316	SA-249		UNIT FLANGES				UNIT FLANGES			TUBE PARTITION	SS-316	SA-240
NOZZLE FLG'S				FITTINGS,	SS-316	SA-182		NOZZLE FLG'S			NOZZLE SLEEVES	SS-304	SA-312 SMLS
NOZZLE NECKS	SS-316 H	SA-182 F		INTER. PIPE	SS-316	SA-312 SMLS		INTER. PIPE	SS-316	SA-312 SMLS			

STUDS
☐ SA-193 GR B7
☐ SA-193 GR
NUTS
☐ SA-194 GR 7M
☐ SA-194 GR 2

GASKETS
☐ COMPRESSED ASBESTOS
☐ DOUBLE JACKETED
☐
SEALING STRIPS
☐ DOE SS-16-6

NOTES

1. CONSTRUCTION TO COMPLY WITH ASME CODE SECTION III, CLASS "C", ~~AND CERTIFY~~ PARA. UW-2 (c) U-80, ~~PARA~~ E.
   FOR INSTALLATION IN STATE OF MICHIGAN
2. NAME PLATE STAMPING:

ATLAS INDUSTRIAL MFG. CO. CLIFTON, N. J.
NAT'L BD. 731
SERIAL 2-15
YEAR 1969
SHELL 2250 PSI AT 650 °F
TUBES 2485 PSI AT 650 °F
JACKET PSI AT °F
COMBUSTION ENGR. INC. P.O.# 980-1238
REGENERATIVE HEAT EXCHANGER
ITEM NO. E-56

3.

	SHELL SIDE	TUBE SIDE
TEST PRESSURE	4600 MIN. PSI	4545 MIN. PSI
CORROSION ALLOW. (INCHES)	0	0
	54 GALS.	30 GALS.

4. WEIGHTS:
   EMPTY ——— 3740 LBS.
   FULL OF WATER ——— 4423 LBS.
5. PAINT: NONE
   SANDBLAST: NONE
6. TUBE HOLES TO BE IN ACCORDANCE WITH ATLAS STD" 103 & SEAL WELDS QUALIFIED PER M-542 FOR CLASS "A" VESSELS.
7. STRESS RELIEVE: NONE
8. RADIOGRAPHY: 100% IN ACCORDANCE WITH SEC. III, CLASS "C"
9. SPECIAL TESTS: TEST WATER TO CONTAIN LESS THAN 10 P.P.M. TOTAL SOLIDS AND 1.0 P.P.M. HALOGENS. SHELL SIDE AIR TEST AT 90 PSIG FOR FIVE (5) HOURS DURATION WITH CHANNEL COVER REMOVED FOR OBSERVATION. THERE SHALL BE NO DETECTABLE LEAKAGE OR PRESSURE LOSS.
10. CUSTOMER'S INSPECTION: MINIMUM TO BE WITNESSED BY COMBUSTION ENGINEERING, INC., REPRESENTATIVE:
    (A) TUBE TO TUBE SHEET ROLLING AND WELDING.
    (B) COMPONENT CLEANLINESS PRIOR TO ASSEMBLY.
    (C) TUBE SIDE HYDROSTATIC TEST.
    (D) SHELL SIDE HYDROSTATIC TEST.
    (E) SHELL SIDE AIR TEST.
    (F) FINAL CLEANING AND INSPECTION.

    NOTIFICATION TIME: 72 HOURS.
11. BAFFLE HOLES NOT TO BE MORE THAN ½ LARGER THAN TUBE O.D.
12. ALL TUBING TO BE ULTRASONICALLY EXAMINED IN ACCORDANCE WITH PAR. N-324.3 OF ASME CODE, SEC. III, BEFORE BENDING.
13. NOZZLES M, N AND INTERCONNECTING PIPE SHALL BE INSTALLED AND INSPECTED BY ALL RADIOGRAPHY USING ACCEPTABLE TECHNIQUES.
14. ONE DESICCANT (NON-CHLORIDE) ATTACHED TO PROTECTIVE SHIPPING COVERS ON INLET & OUTLET NOZZLES ONLY AND SEALED IMMEDIATELY AFTER TESTING & CLEANING. TAG UNIT WITH EACH NOZZLE COVER THAT CONTAINS DESICCANT BAGS. CAUTION - REMOVE DESICCANT BAGS BEFORE USE.
15. CLEANING & WELD PREPARATION SHALL BE PERFORMED IN ACCORDANCE WITH ATLAS STD" 102.
16. PRIOR TO TUBE HOLE DRILLING, THE FACE OF THE TUBE SHEET IS TO BE EXAMINED IN ACCORDANCE WITH ATLAS STD" 701 LIQUID PENETRANT METHOD, INSPECTION AND ACCEPTANCE BY INTERNAL QUALITY CONTROL.

CUSTOMER: COMBUSTION ENGINEERING, INC
P.O. NO. 980-1238 CONTRACT" 2926
UNITS REQUIRED: ONE
ATLAS JOB NO. N-1497
C.E.I. CUSTOMER: CONSUMERS POWER COMPANY
PALISADES PLANT UNIT NO. 1

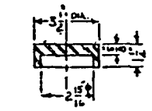
NO.	ADDED MINOR DETAILS & REFERENCES	A.J.M.	7-19-67
4	REV. UNIT FROM CLASS "A" TO CLASS "C" MISC.	A.J.M.	5-6-68
3	REV. PER CUST. CHANGE ORDER SUPP. #4 MISC.	A.J.M.	1-4-68
2	PER CUST. REQUEST MISC. DETAILS REV" NOZ. THICK. AND RELATED DIM.	A.J.M.	7-6-68
1	PER CE&PD RETURNED MARKED PRINT & MISC.	A.J.M.	4-26-68
REV.		BY	DATE

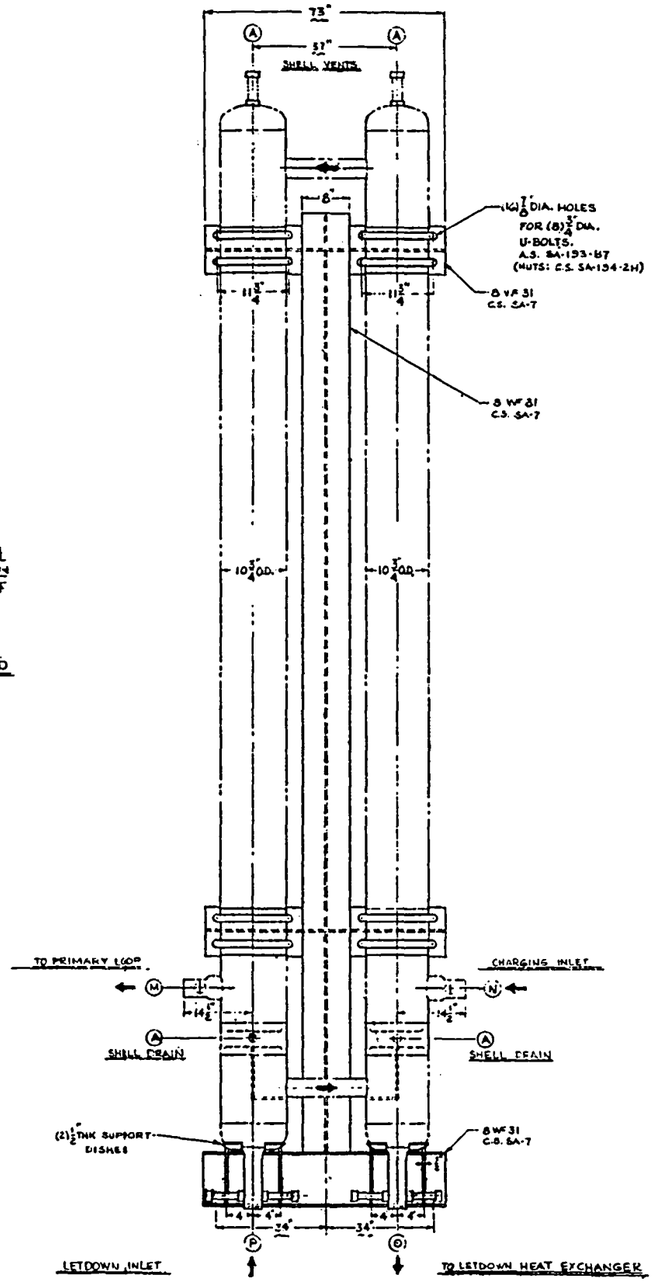
ATLAS INDUSTRIAL MANUFACTURING CO.
81 SOMERSET PLACE
CLIFTON, N. J.

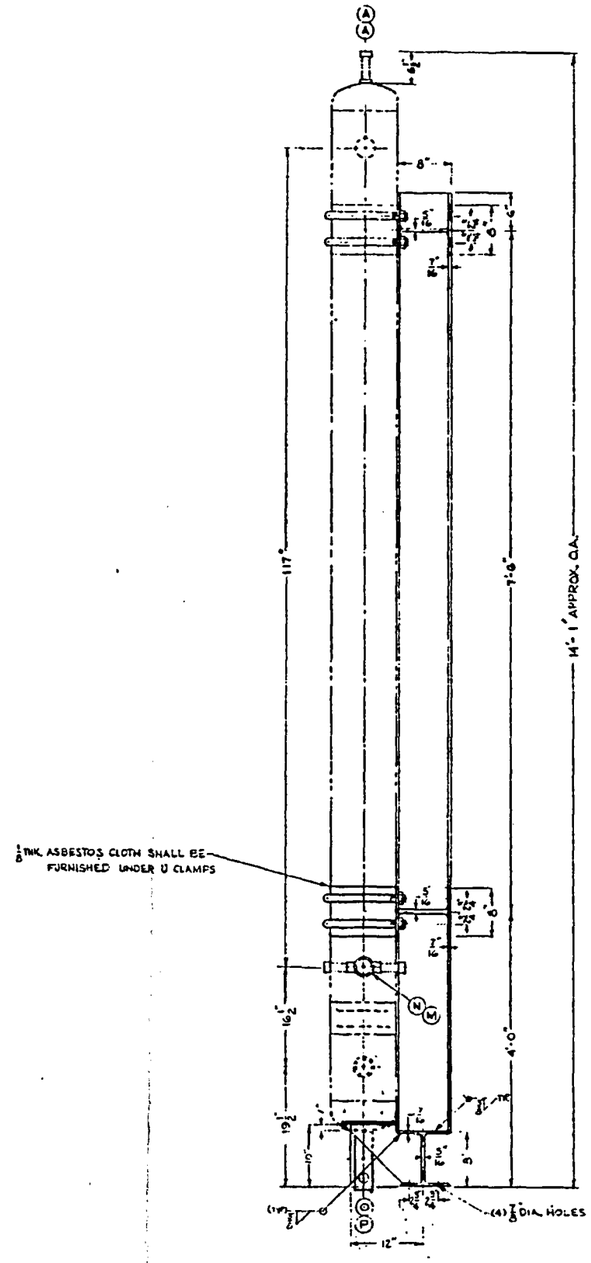
ITEM NO. E-56
REGENERATIVE HEAT EXCH.

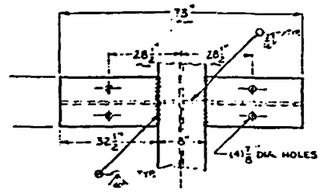
DRAWN	CHKD	DATE	CHKD	APPD	DRAWING NO.
6/5/64-0	A.J.M.	5-23-68			D-1733-6

950 MI-HF SH. 354 REV. 7









CUSTOMER: COMBUSTION ENG., INC
PO NO. 3801235 CONTRACT 2966
C.E.T. CUSTOMER: CONSUMERS POWER COMPANY
PALISADES PLANT UNIT NO. 1
ATLAS JOB NO. N-1497
REF. DWG. NO. D-1733-6 & CT-1794-3

"AS BUILT"

CP CO					
	5	UPDATED FROM M1-HF SH. 1283 & REVS. 3&4 OMITTED	PG	HD	R.S.	3/18/68
	4	S TO 6 OF UNITS WAS 42" ADDED TEST CAP SECT			P.S.C.	8-9-67
	3	(63) DIMS WERE 11 1/8" ERROR			P.S.L.	5-15-68
	2	REV TUBE & SHELL FLOW DIRECTIONS			A.J.M.	11-1-67
	1	PER CUST REQUEST, MISC. DETAILS			A.J.M.	9-6-67
	REV.				BY	DATE

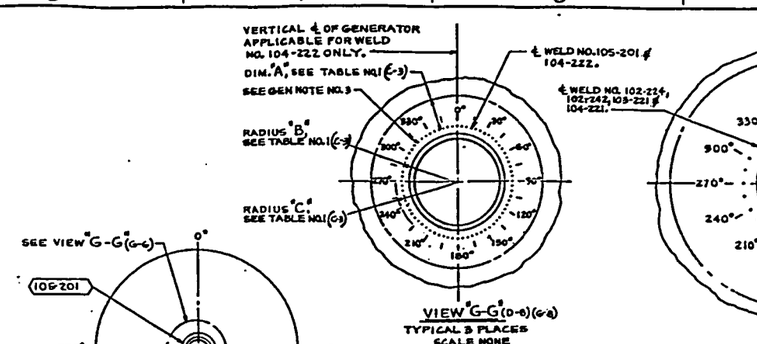
ATLAS INDUSTRIAL MANUFACTURING CO.
81 SOMERSET PLACE
CLIFTON, N. J.

ITEM NO: E-56
REGENERATIVE HEAT EXCHANGER
ERECTION DETAILS

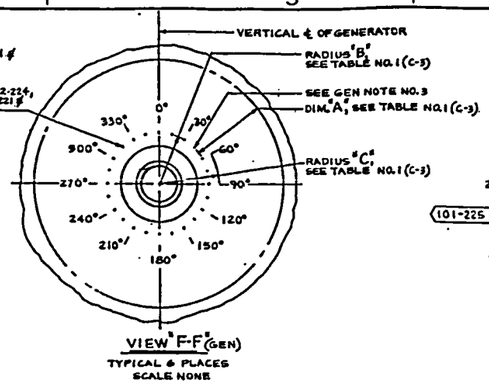
SCALE	MADE	DATE	CKD	APPD	DRAWING NO.
	A.J.M.	4-30-68			D-1759-4

REFERENCE DRAWINGS

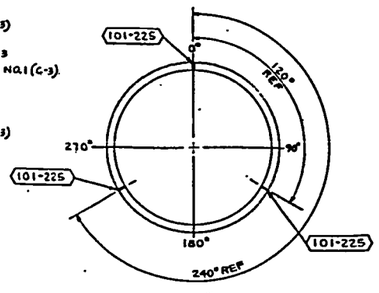
RELIEF REQUEST RR 4-6



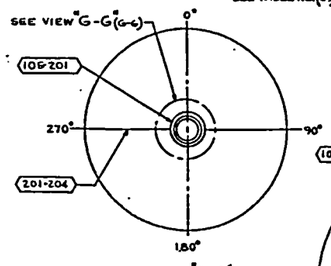
VIEW "G-G" (D-8) (G-4)
TYPICAL 3 PLACES
SCALE NONE



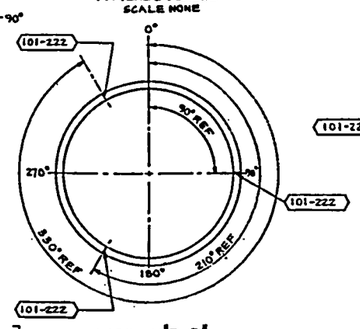
VIEW "F-F" (GEN)
TYPICAL 6 PLACES
SCALE NONE



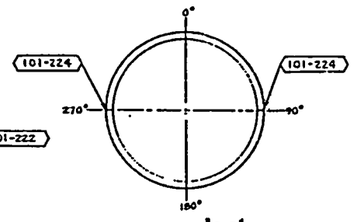
SECTION "E-E" (D-8)
SCALE NONE



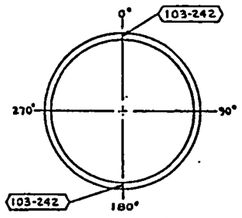
VIEW "A-A" (E-7)
SCALE NONE



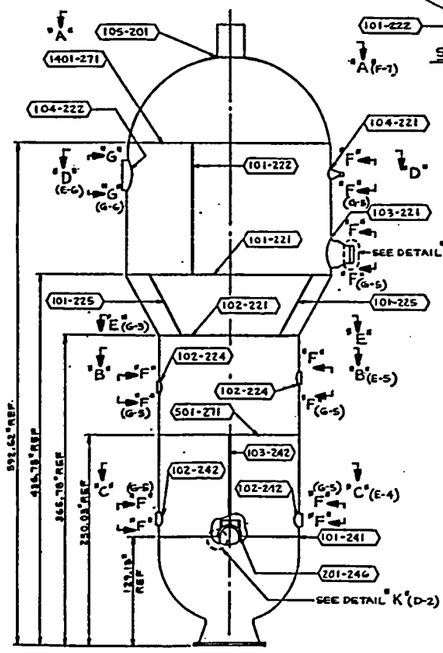
SECTION "D-D" (D-8)
SCALE NONE



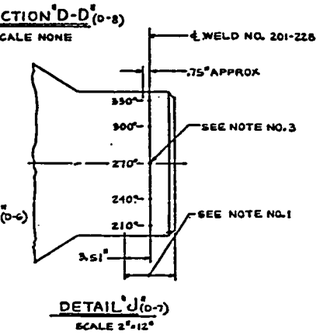
SECTION "B-B" (C-7)
SCALE NONE



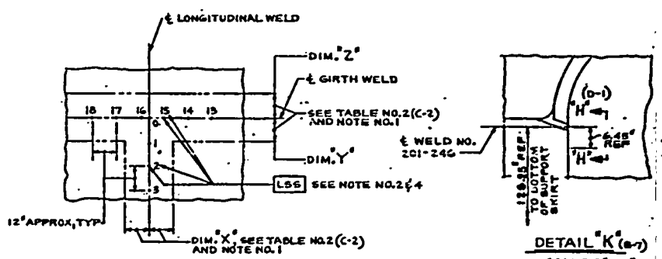
SECTION "C-C" (C-7)
SCALE NONE



ELEVATION-SECONDARY SIDE WELDS
NOZZLES ROTATED INTO SECTION
SCALE NONE

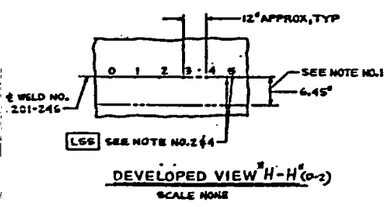


DETAIL "J" (D-7)
SCALE 2"=12"



TYPICAL LONGITUDINAL & GIRTH WELD MARKING
SCALE NONE

DETAIL "K" (D-7)
SCALE 2"=12"



DEVELOPED VIEW "H-H" (D-2)
SCALE NONE

TABLE NO.1				
NOZZLE	WELD NO.	DIM. "A"	RADIUS "B"	RADIUS "C"
STEAM OUTLET	105-201	9.81"	19.81"	22.00"
FEEDWATER	103-221	12.94"	15.35"	19.00"
SECONDARY MANWAY	104-222	12.94"	19.50"	23.00"
RECIRCULATION	104-221	12.82"	7.53"	10.00"
HANDHOLE	102-224	11.25"	8.63"	11.00"
HANDHOLE	102-242	11.25"	8.63"	11.00"

TABLE NO.2			
WELD NO.	DIM. "X"	DIM. "Y"	DIM. "Z"
201-204	10.01"	—	—
101-221	—	13.83"*	12.89"*
102-221	—	11.29"*	11.61"*
101-222	12.84"	—	—
101-224	11.25"	—	—
101-225	13.63"	—	—
101-241	—	12.75"	11.93"*
103-242	11.25"	—	—
501-271	—	11.29"	11.29"
1401-271	—	12.75"*	9.95"*

* MARKING AND SURFACE PREP APPLY ON ID & OD.

GENERAL NOTES

1. THIS DISTANCE WILL BE FREE OF WELD SPATTER AND ANY OTHER CONDITION THAT WILL INTERFERE WITH THE MOVEMENT OF AN ULTRASONIC TRANSDUCER.
2. ALL POINTS ON WELD CENTERLINE, EXCEPT NOZZLE WELDS, WILL BE IDENTIFIED BY NUMBERS 0,1,2 ETC. STARTING AT THE 0°AXIS AND GOING CLOCKWISE AS VIEWED FROM ABOVE FOR GIRTH WELDS, AND STARTING AT THE TOP OF LONGITUDINAL WELDS. WHEN THESE NUMBERS ARE OBSTRUCTED BY GEOGRAPHIC BARRIERS THE NUMBERS NEED NOT BE STAMPED. HOWEVER, THE CONTINUING NUMBERS SHALL REMAIN AS IF THE MISSING NUMBERS WERE STAMPED.
3. NOZZLE ATTACHMENT AND SAFE END WELDS SHALL BE MARKED USING A LSS, WITH EQUALLY SPACED CENTER PUNCH MARKS AND RADIAL 'DASH' MARKS AS SHOWN. ALSO EACH 30° INCREMENT WILL BE STAMPED WITH NUMBERS AS SHOWN. SAFE END WELD NUMBERING AND MARKING SHALL BE IN THE SAME RELATIONSHIP AS PARENT NOZZLE ATTACHMENT WELD NUMBERING.
4. CENTERLINE OF WELD SEAMS WILL BE PERMANENTLY MARKED BY CENTER PUNCHING USING A LSS.
5. ALL MARKING AND SURFACE PREPARATION TO BE DONE ON THE OD - SURFACE ONLY, UNLESS OTHERWISE SPECIFIED.

REFERENCE DRAWINGS

NO.	TITLE	DRAWING NO.
1	TOP HEAD WELDED ASSEMBLY	E-70277-201-001
2	TOP HEAD TORUS	E-70277-284-002
3	UPPER VESSEL ASSEMBLY	E-70271-221-001
4	UPPER SHELL	E-70277-222-001
5	INTERMEDIATE SHELL	E-70277-224-001
6	SHELL CONE	E-70277-225-001
7	FEEDWATER NOZZLE ASSEMBLY	E-70277-229-002
8	RECIRCULATION NOZZLE ASSEMBLY	E-70277-228-004
9	LOWER VESSEL ASSEMBLY	E-70277-241-001
10	LOWER SHELL DETAILS	E-70277-241-001
11	TUBE SHEET ASSEMBLY	E-70277-246-002
12	UPPER ASSY TO LOWER ASSEMBLY	E-70277-278-005
13	STEAM GENERATOR WELDED ASSY-UNIT #1	E-70277-271-014
14	SURFACE PREPARATION AND WELD SEAM MARKING-UNIT #1	E-70277-271-022

WELD TABLE — LIST OF MATERIAL — QUANTITIES FOR

WELD NUMBER	B.W.P. NUMBER	NO.	FREQ.	NO.	FREQ.	NO.	FREQ.	NO.	FREQ.	NO.	FREQ.	A/F CHGL.	ZONE	ASS'Y NO.	PC. NO.	REF'S	NOMENCLATURE	MATERIAL	MATERIAL SPEC.	MATERIAL NOTES
		PT		MT		PT		MT		UT										

UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS & TOLERANCES TO USASI Y14.5 — 1966.
2. ALL DIMENSIONS APPLY AT REFERENCE TEMP. OF 68°F.
3. REF. DIMENSIONS ARE FOR INFORMATION ONLY. DO NOT USE FOR FABRICATION.
4. MARKING SYMBOLS VIBRO TOOL LSM-LOW STRESS STAMP .38" MAX DEPTH.
5. BREAK ALL SHARP EDGES WITH APPROX. .5" RADIUS OR CHAMFER.
6. MACHINED SURFACES: INTERNAL — 250AA OR BETTER; EXTERNAL — 500AA OR BETTER
7. SIZES IN L/M ARE FINISHED SIZES — NO ALLOWANCE MADE FOR FABRICATION OR WELD SHRINKAGE.
8. TOLERANCE ON DIMENSIONS ± .12", ANGLES ± 5°30".
9. SEE REF. DWG. NO. [illegible] FOR NOT ITEM NO. IN WELD TABLE & NOT CALL-OUT ON DWG.
10. SEE DWG. E-70277-271-001 FOR APPLICABLE EQUIPMENT SPECIFICATIONS.
11. DOUBLE ARROW INDICATES DIMENSION TO GIVEN REFERENCE LINE.
12. DEVELOPED LENGTH IN L/M IS GIVEN ON MEAN CENTERLINE.

GEOMETRIC TOLERANCES FOR MACHINED SURFACES UNLESS SPECIFIED ON DRAWING

SYM.	GEOMETRY	TOL.
⏥	FLATNESS	.001 IN
⌭	STRAIGHTNESS	.001 IN
○	ROUNDNESS	.001 (DIA)
⌭	CYLINDRICITY	.001 (DIA)
⌒	PROFILE OF LINE	.001 (DIA)
⌓	PROFILE OF SURFACE	.001 (DIA)
//	PARALLELISM	.001 / IN
⊥	PERPENDICULARITY	.001 / IN
∠	ANGULARITY	.001 (DIA)
⌖	RUNOUT	.001 (DIA)
⌖	TRUE POSITION	.001 (DIA)
◎	CONCENTRICITY	.001 (DIA)
⌯	SYMMETRY	.001 (DIA)

DRAWING OF RECORD
FOR CONTRACT 78277
APPROVED: G. MCCOLLUM 1/18/91

NO.	DATE	DESCRIPTION	BY	CK'D	APP'D
2A	3-12-91	ISSUED NEW ENG. PER DCN 1058-16-790JWH	PRC JWH	DHB	JGD

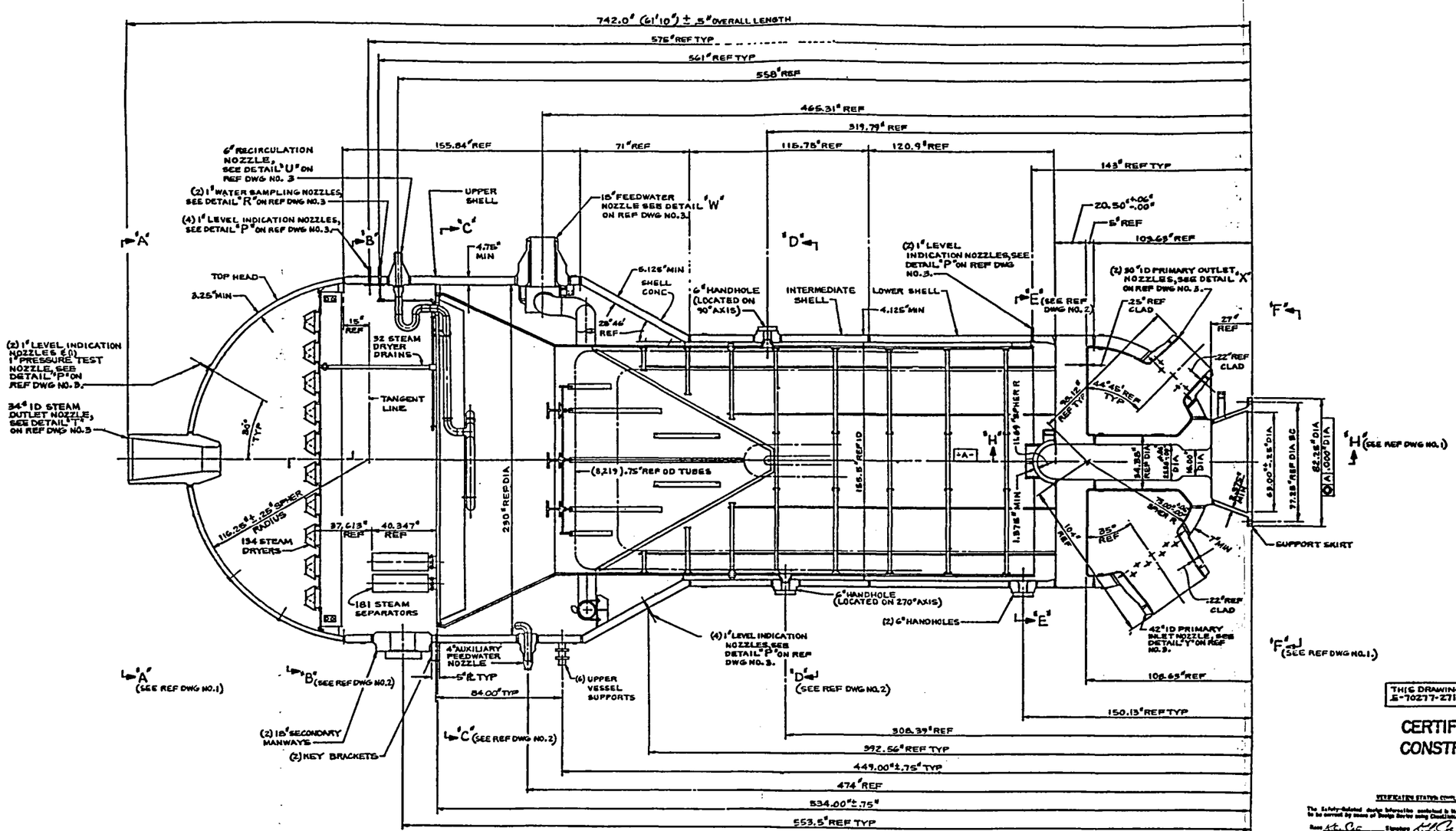
COMBUSTION ENGINEERING INC.

E-70277-271-021-02 — 21 | 2

CONSUMERS POWER COMPANY
PALISADES NUCLEAR PLANT
COVERT, MICHIGAN

SURFACE PREPARATION AND WELD SEAM MARKING-UNIT #1
STEAM GENERATOR

VEN-M1-F-AA — 184 | 2A



SECTIONAL ELEVATION

NOZZLES, LUGS, ETC ROTATED INTO SECTION

THIS DRAWING REPLACES E-70217-271-001

CERTIFIED FOR CONSTRUCTION

VERIFICATION STATUS COMPLETE

The Safety-Related design information contained in this document has been verified to be correct by means of Design Review using Checklist 3 of SAP-181.

Name A.L. Gee Signature [signature] Date 10/1/74

Independent Reviewer

GENERAL NOTES

1. THIS DRAWING IS FOR INFORMATION ONLY. DO NOT USE FOR FABRICATION.
2. DESIGN DATA (PRIMARY SIDE): DESIGN PRESSURE 2500 PSIA DESIGN TEMPERATURE 650°F
3. DESIGN DATA (SECONDARY SIDE): DESIGN PRESSURE 1000 PSIA DESIGN TEMPERATURE 550°F

REFERENCE DRAWINGS

NO.	TITLE	DRAWING NO.
1	GENERAL ARRANGEMENT-UNIT #1	E-RSG90-C271-002
2	GENERAL ARRANGEMENT-UNIT #1	E-70217-271-003
3	GENERAL ARRANGEMENT-UNIT #1	E-RS690-C271-804

WELD NUMBER	S W P NUMBER	NO.	PROC.	NO.	PROC.	NO.	PROC.	NO.	PROC.	NO.	PROC.	JT/ CONN.
			PT		MT		PT		UT			

WELD TABLE

UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS & TOLERANCES TO USASI Y14.5 — 1966.
2. ALL DIMENSIONS APPLY AT REFERENCE TEMP. OF 68°F.
3. REF. DIMENSIONS ARE FOR INFORMATION ONLY. DO NOT USE FOR FABRICATION.
4. MARKING SYMBOLS TO BE IBRO TOOL LINE-LOW STROKE STAMP .25" MAX DEPTH.
5. BREAK ALL SHARP EDGES WITH APPROX. .06" RADIUS OR CHAMFER.
6. MACHINED SURFACES INTERNAL — 250AA OR BETTER EXTERNAL — 500AA OR BETTER
7. SIZES IN L/M ARE FINISHED SIZES — NO ALLOWANCE MADE FOR FABRICATION OR WELD SHRINKAGE.
8. TOLERANCE ON .X"=±.1", .XX=±.06", .XXX=±.010" ANGLES ± 0°30'.
9. SEE REF. DWG. NO. _____ FOR NOTES NO. IN WELD TABLE & NOT CALL-OUT ON DWG.
10. SEE DWG. _____ FOR APPLICABLE EQUIPMENT SPECIFICATIONS.
11. DOUBLE ARROW INDICATES DIMENSION TO GIVEN REFERENCE LINE.
12. DEVELOPED LENGTH IN L/M IS GIVEN ON MEAN CENTERLINE.

SYM	GEOMETRY	TOL.
▱	FLATNESS	.001"/IN.
—	STRAIGHTNESS	.001"/IN.
○	ROUNDNESS	.002 DIAM.
⌭	CYLINDRICITY	.002 DIAM.
⌒	PROFILE OF LINE	.002 DIAM.
⌓	PROFILE OF SURFACE	.002 DIAM.
∥	PARALLELISM	.001"/IN.
⊥	PERPENDICULARITY	.001"/IN.
∠	ANGULARITY	.001 DIAM.
↗	RUNOUT	.002 DIAM.
⌖	TRUE POSITION	.010 DIAM.
⌯	CONCENTRICITY	.010 DIAM.
⌯	SYMMETRY	.010 DIAM.

GEOMETRIC TOLERANCES FOR MACHINED SURFACES UNLESS SPECIFIED ON DRAWING

ZONE	ASS'Y NO	PC NO	NO. REQ'D	NOMENCLATURE	MATERIAL	MATERIAL SPEC	MATERIAL NOTES

LIST OF MATERIAL — QUANTITIES FOR

NO.	DATE	DESCRIPTION	BY	CK'D	APP'D
1	9-11-74	ISSUED NEW DWG. PER DCR# 458-N-774JV1	PWC	DHB	JDD

COMBUSTION ENGINEERING INC.

E-RSG90-C271-001-01	1	1

CONSUMERS POWER COMPANY
PALISADES NUCLEAR PLANT
COVERT, MICHIGAN

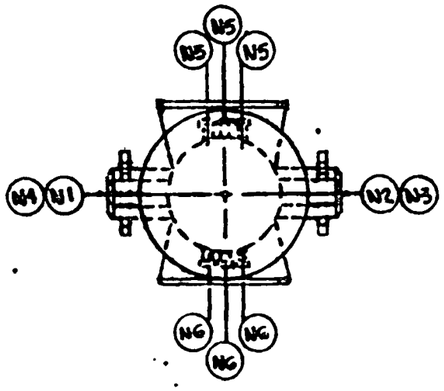
GENERAL ARRANGEMENT
UNIT #1
STEAM GENERATOR

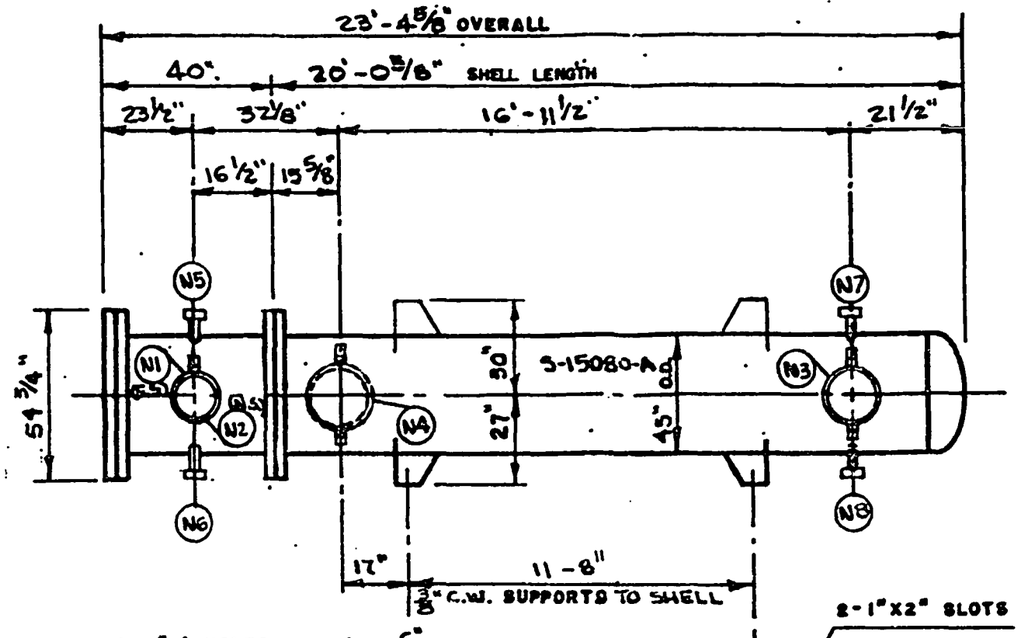
VEN-M1-F-AA	74	1A

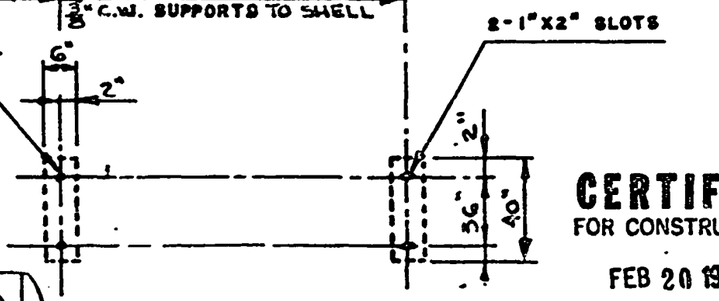
REFERENCE DRAWINGS

RELIEF REQUEST RR 4-7

S/O-15080

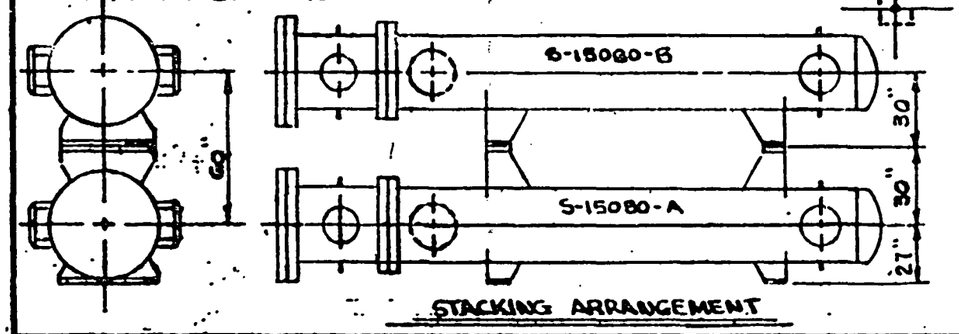






PAINT NOTE:

SANDBLAST & PAINT ONE COAT FORD PAINT & VARNISH CO. A53-E540 ZINC CROMATE METAL PRIMER 1 TO 1½ MILS DRY FILM THK. WHEN DRY APPLY ONE COAT FORD PAINT & VARNISH CO. L00 ALUMINUM 1½ TO 2 MILS DRY FILM THK. DO NOT PAINT 2" FROM EDGES OF NOZZLE WELD BEVELS. DO NOT PAINT CHAN. NOZ'S.



STACKING ARRANGEMENT

CE CONTRACT NO. 2966
CE CUSTOMER: CONSUMERS POWER CO.
PALISADES PLANT UNIT NO. 1

CERTIFIED
FOR CONSTRUCTION
FEB 20 1969
ENGINEERS & FABRICATORS
HOUSTON, TEXAS

WT. OF BUNDLE - 25,000 LBS.
WT. FULL H2O - 39,300 LBS.
WT. EMPTY - 33,500 LBS.

ESTIMATED WEIGHTS

MARK	SIZE	SERIES	SERVICE	PROJECTION
N8	1"	3000# S.W. COUP.	DRAIN	26"
N7	1"	3000# S.W. COUP	VENT	26"
N6	1"	3000# S.W. COUP.	DRAIN	26"
N5	1"	3000# S.W. COUP.	VENT	26"
N4	20"	0.500" WALL PIPE	OUTLET	31"
N3	20"	0.500" WALL PIPE	INLET	31"
N2	10"	0.843" WALL PIPE	OUTLET	31"
N1	10"	0.843" WALL PIPE	INLET	31"

CONNECTION SCHEDULE

SUPPLEMENTARY NOTES

EFCO SERIAL NO. 15080-A16

ALL NOZ PROJECTIONS ARE FROM ℄ TO FACE OF FLG. NOZ TO HAVE 2 - ¾" S.W. CONN. W/ PIPE NIPPLE & CAP AS SHOWN

DETAIL DRAWINGS

NP-15080
CEU-15080
CEU-B-15080
TL-15080
TB-15080
PCD-15080
G-15080
W-100 (REV "E")

GENERAL NOTES

SEE PAINT NOTE
PROTECT ALL OPENINGS FOR SHIPMENT.

DESIGN CONDITIONS

CODE: ASME SECT. III CL. C STAMP: YES PAR. N-413

	SHELL	TUBES	
DESIGN PRESS.	160	500	P.S.I.
TEST PRESS	225	750	P.S.I.
AIR TEST	90 PSI/5 HRS	-H	P.S.I.
DESIGN TEMP.	200	400	°F
NO. OF PASSES	ONE	2	
CORROSION ALLOW.	1/8"	NONE	IN.

2 REQ'D. AS SHOWN.

REVISIONS

VOID PREVIOUS PRINTS

A 1-4-68
B 2-16-68

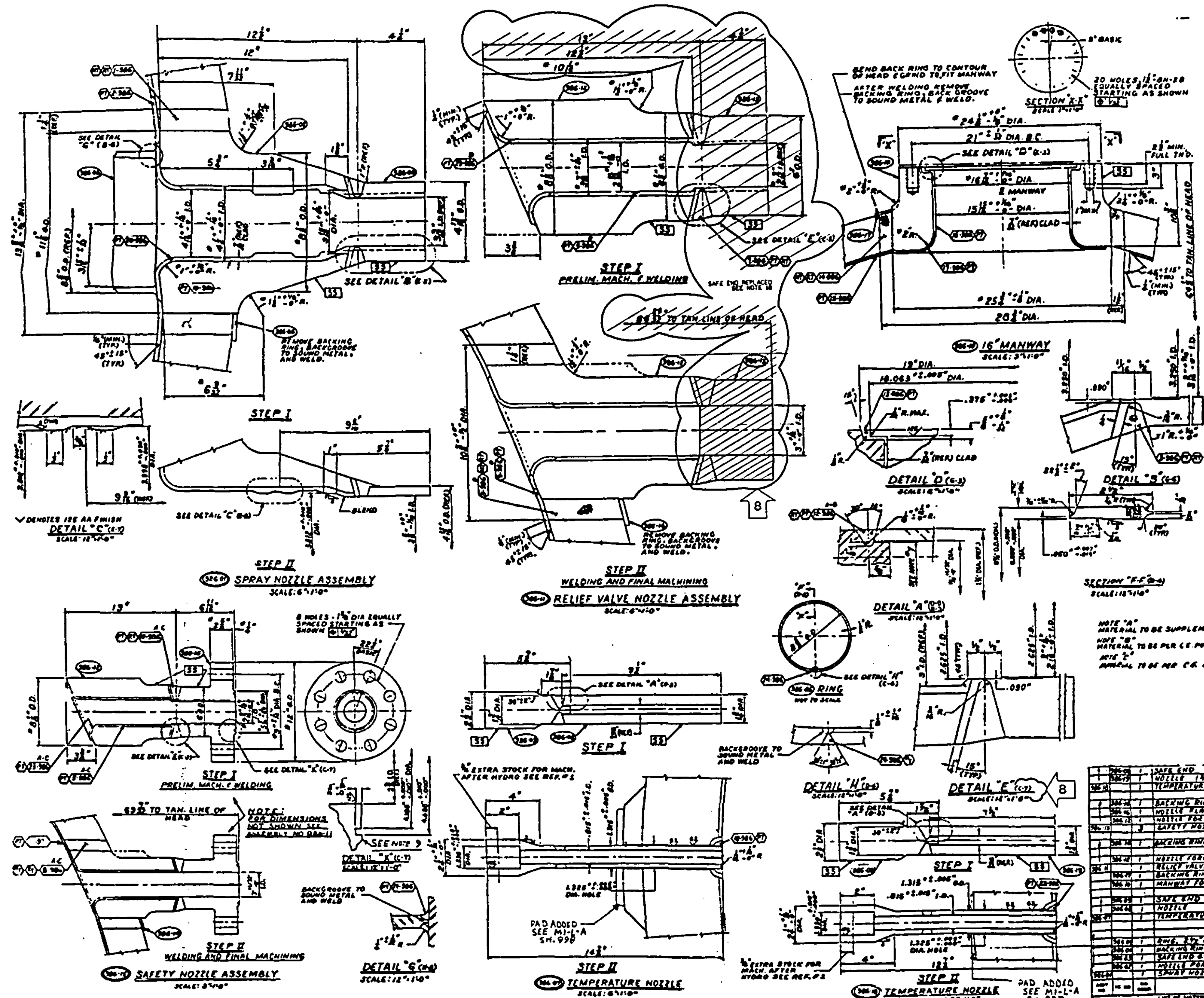
ENGINEERS & FABRICATORS INC.
HOUSTON, TEXAS

CUSTOMER: COMBUSTION ENGINEERING, INC.
NAME: SHUTDOWN COOLING HEAT EXCHANGER
SIZE: 44-16-5780 TYPE: CEU
CUST. P. O. NO. 1104122 ITEM ONE DATE: 12-5-67
JOB: 10457 DWG. NO. DD-15080

950 Y 279 * M-1-G D-SH 8-0

REFERENCE DRAWINGS

RELIEF REQUEST RR 4-8



MATERIAL NOTES

NOTE "A"
MATERIAL TO BE SUPPLEMENTED BY C.E. PURCHASE SPEC. P3C3(A).

NOTE "B"
MATERIAL TO BE PER C.E. PURCHASE SPEC. P43C1(C).

NOTE "C"
MATERIAL TO BE PER C.E. PURCHASE SPEC P3C3(C)

PART NO.		REQ'D	NOMENCLATURE	MATERIAL	MATERIAL SPEC	MAT'L NOTE
	306-08	1	SAFE END			
	306-19	1	NOZZLE 1¼" O.D. x 15/32" I.D. x 7½" LG.	NI-CR-FE	SB-166	"B"
306-18		1	TEMPERATURE NOZZLE ASS'Y CONSISTING OF:			
	306-16	1	BACKING RING			
	306-15	1	NOZZLE FLANGE (SEE DETAIL)	NI-CR-FE	SB-166	"B"
	306-14	1	NOZZLE FORGING			
306-13		3	SAFETY NOZZLE ASS'Y - CONSISTING OF:			
	306-12	1	BACKING RING 11 5/16" O.D. x 8 1/8" I.D. x 1/16" THK.	CARB STL	COMM.	
	306-12	1	NOZZLE FORGING (SEE DETAIL)	ALLOY STL	A-508-64	"A"
306-11		1	RELIEF VALVE NOZZLE ASS'Y CONSISTING OF:			
	306-17	1	BACKING RING 23¾" O.D. x 23 [illegible] I.D. x ¼" THK.	CARB STL	COMM.	
	306-10	1	MANWAY FORGING (SEE DETAIL)	ALLOY STL	A-508-64	"A"
	306-09	1	SAFE END 2½" O.D. x 3¾" LG	[illegible]	[illegible]	"C"
	306-08	1	NOZZLE 1 [illegible] O.D. x [illegible] I.D. x 5½" LG.	NI-CR-FE	SB-166	"B"
306-07		1	TEMPERATURE NOZZLE ASS'Y CONSISTING OF:			
	306-06	1	RING 2½" x ½" x 25 [illegible] DEV. LGTH	NI-CR-FE	B-168	
	306-05	1	BACKING RING [illegible] O.D. x [illegible] I.D. x ¼" THK.	CARB STL	COMM.	
	306-04	1	SAFE END 6 [illegible] O.D. x 3 [illegible] I.D. x 4½" LG	NI-CR-FE	SB-166	"B"
	306-03	1	NOZZLE FORGING (SEE DETAIL)	ALLOY STL	A-508-64	"A"
306-01		1	SPRAY NOZZLE ASS'Y - CONSISTING OF:			

LIST OF MATERIAL QUANTITIES FOR ONE UNIT ON CONTRACT

6. ALL CLADDING IS AS DEPOSITED FINISH UNLESS OTHERWISE NOTED AND A MINIMUM THICKNESS OF ⅛".
7. DIAMETERS NOTED TO BE MACHINED SO THAT MAXIMUM DIAMETRAL CLEARANCE IN MATING PART IS .010".
8. # ASTERISK DENOTES AS ORDERED DIMENSIONS.
9. MINOR MATERIAL REMOVED FROM RV-1091 FLANGE GASKET SEATING SURFACE TO REMOVE SCRATCH. SPECIFIED DIMENSION FOR RV 1041 IS 205 ± .002 REF FES-93-265
10. SAFE END REPLACED PER SC-94-096 SEE DWG. MI-LA SH. 2 FOR NEW DETAIL.

GENERAL NOTES:

1. FOR STANDARD NOTES SEE REFERENCE DWG. # 3.
2. DOUBLE ARROW INDICATES DIMENSIONS TO A GIVEN REFERENCE LINE.
3. SIZES IN LM ARE FINISHED SIZES. NO ALLOWANCE MADE FOR FABRICATION OR WELD SHRINKAGE UNLESS NOTED.
4. REFERENCE (REF.) DIMENSIONS ARE FOR INFORMATION ONLY, DO NOT USE FOR FABRICATION.
5. ALL FABRICATION SHALL BE IN ACCORDANCE WITH A.S.M.E. BOILER CODE SECTION III.

REFERENCE DRAWINGS

NO	TITLE	DWG. NO
1.	PRESSURIZER OUTLINE	E-231-980
2.	GENERAL ARRANGEMENT	E-231-981
3.	STANDARD NOTES	E-230-044
4.	TOP HEAD FORMING & WELDING	E-231-983
5.		

WELD TABULATION

WELD NO.	C.E. WELD PROC.
1-306	MA-2366C-306
2-306	MA-2366C-306
3-306	MC-2366C-306
5-306 A-D	MC-2366C-306
7-306	MC-2366C-306
8-306 A-D	MA-2366C-306
9-306 A-D	MA-2366C-306
10-306 A-D	MA-2366C-306
12-306 A-D	MA-2366C-306

CONTRACT 2966C

PROJECT REFERENCE COPY

COMBUSTION ENGINEERING, INC.

TOLERANCE ON: FRACTIONS ± 1/16; DECIMALS ± .010"; ANGLES ± 0°-30'

E 231-986-7

8	11-10-95	REPLACED SAFE END & REDRAWN ON CAD PER SC-94-096 & DCR-95-1010.	JGD	ALB	[illegible]
REV.	DATE	DESCRIPTION	BY	CK	APP

CONSUMERS POWER COMPANY
PALISADES NUCLEAR PLANT
COVERT, MICHIGAN

NOZZLE DETAILS

PRESSURIZER

VEN-M1-LA | 986 | 8

PALISADES NUCLEAR PLANT
4TH INTERVAL INSERVICE INSPECTION PLAN

ATTACHMENT 2

EPRI REPORT

Palisades Steam Generator
Inlet and Outlet Nozzle Coverage Calculations

EPRI NDE CENTER

Electric Power Research Institute
Nondestructive Evaluation Center

Leadership in Technology Transfer

September 16, 1996

Tom Fouty
Consumers Power
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

SUBJECT: Summary Report on Coverage Calculations

Dear Tom,

The attached summary report describes the coverage calculations performed by the EPRI NDE Center on the Palisades steam generator inlet and outlet nozzles. The type of coverage documented for these nozzles was restricted to calculating where the ultrasound beam interrogated the examination volume.

If you have any comments please call me at (704) 547-6130.

Sincerely,

Douglas E. MacDonald
Principal Engineer
EPRI NDE Center

DM/ks
Enc.

cc: Kim Kietzman
Larry Becker
Frank Ammirato
Judy Ford/CP

1300 Harris Boulevard • Charlotte, North Carolina 28262 • Telephone: (704) 547-6100
(P.O. Box 217097, Charlotte, North Carolina 28221) • FAX: (704) 547-6168

Palisades Steam Generator Inlet and Outlet Nozzle Coverage Calculations

Douglas E. MacDonald

September 5, 1996

Introduction

This report summarizes EPRI NDE Center activities to calculate the coverage obtained on the Palisades steam generator inlet and outlet nozzles using the Consumers Power Company procedure No. NDT-UT-12, Revision 4, Issued 11/21/95. The type of coverage documented for these nozzles was restricted to calculating where the ultrasound beam interrogated the ASME code examination volume.

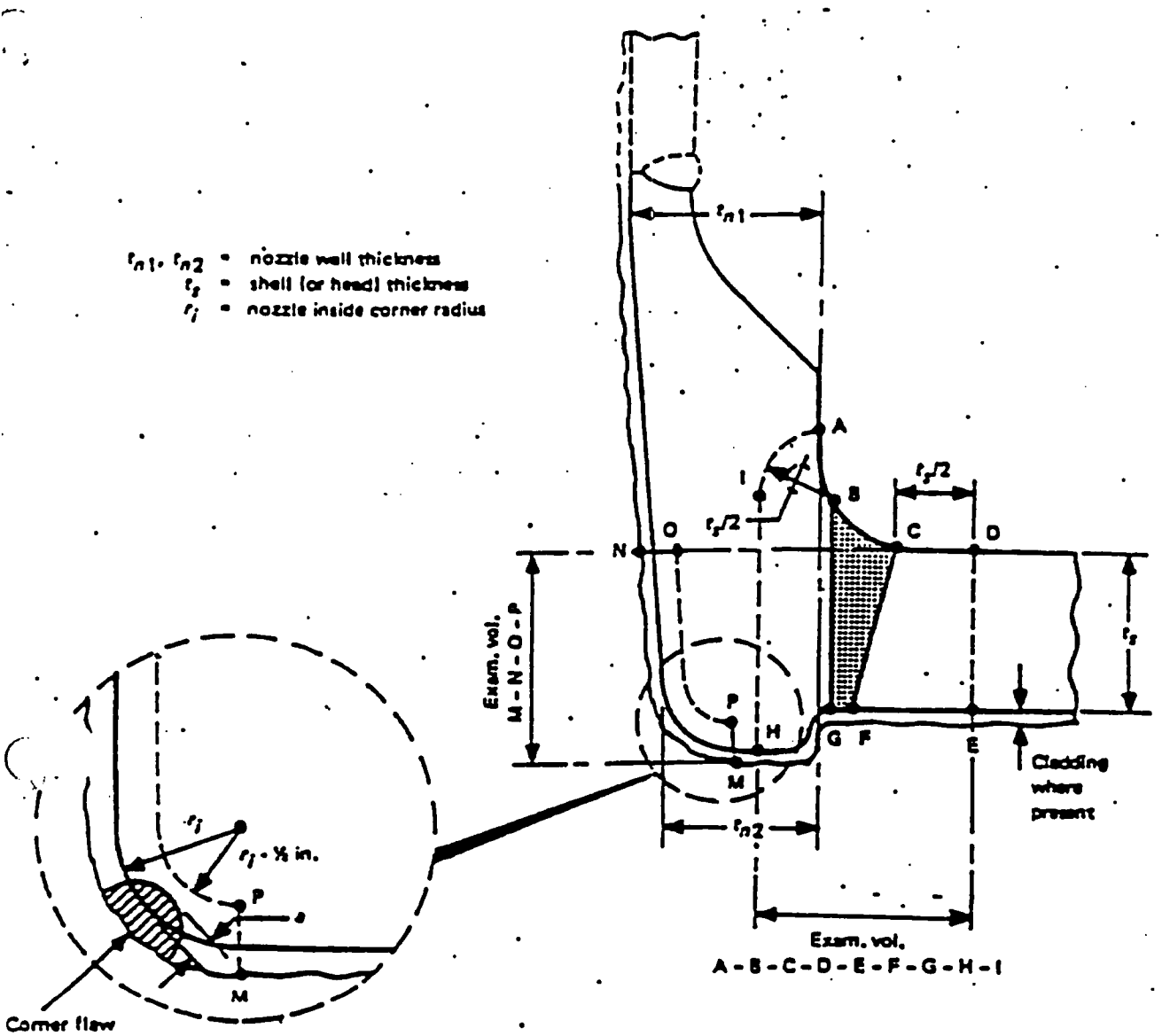
Figure 1 defines the ASME code examination volumes, both nozzle inner radius (M-N-O-P) and nozzle-to-head weld (A-B-C-D-E-F-G-H-I) for the Palisades steam generator inlet and outlet nozzles.

Palisades Steam Generator Inlet Nozzle

Nozzle Inside Corner Region

Table 1 shows the coverage calculated for a 35° probe, skewed 90° (35°/90°) and scanned on the outer blend radius. (The probe skew convention adopted here has 0° looking at the pipe, 90° looking circumferentially around the nozzle, and 180° looking at the vessel).

Figure 2 shows a cross section of the Palisades steam generator inlet nozzle upon which has been plotted the rays from the 35°/90° probe to the inside surface examination volume. As can be seen in Figure 2, the entire exam volume is covered by the 35°/90° probe scanned on the outer blend radius.



EXAMINATION REGION (Note (1))
Shell (or head) adjoining region
Attachment weld region
Nozzle cylinder region
Nozzle inside corner region

EXAMINATION VOLUME (Note (2))
C-D-E-F
B-C-F-G
A-B-G-H-I
M-N-O-P

NOTES:
(1) Examination regions are identified for the purpose of differentiating the acceptance standards in IWB-3512.
(2) Examination volumes may be determined either by direct measurements on the component or by measurements based on design drawings.

NOZZLE IN SHELL OR HEAD

1 Zones in Barrel Type Nozzles Joined by Full Penetration Corner Welds)

Figure 1

Table 1. Coverage Table: SG Inlet; 35°/90° (blend)

Probe Angle	35°
Probe Skew	90°
Probe Location	Blend*
Percentage of Examination Volume (M-N-O-P) Covered	100%

*Contoured Wedge

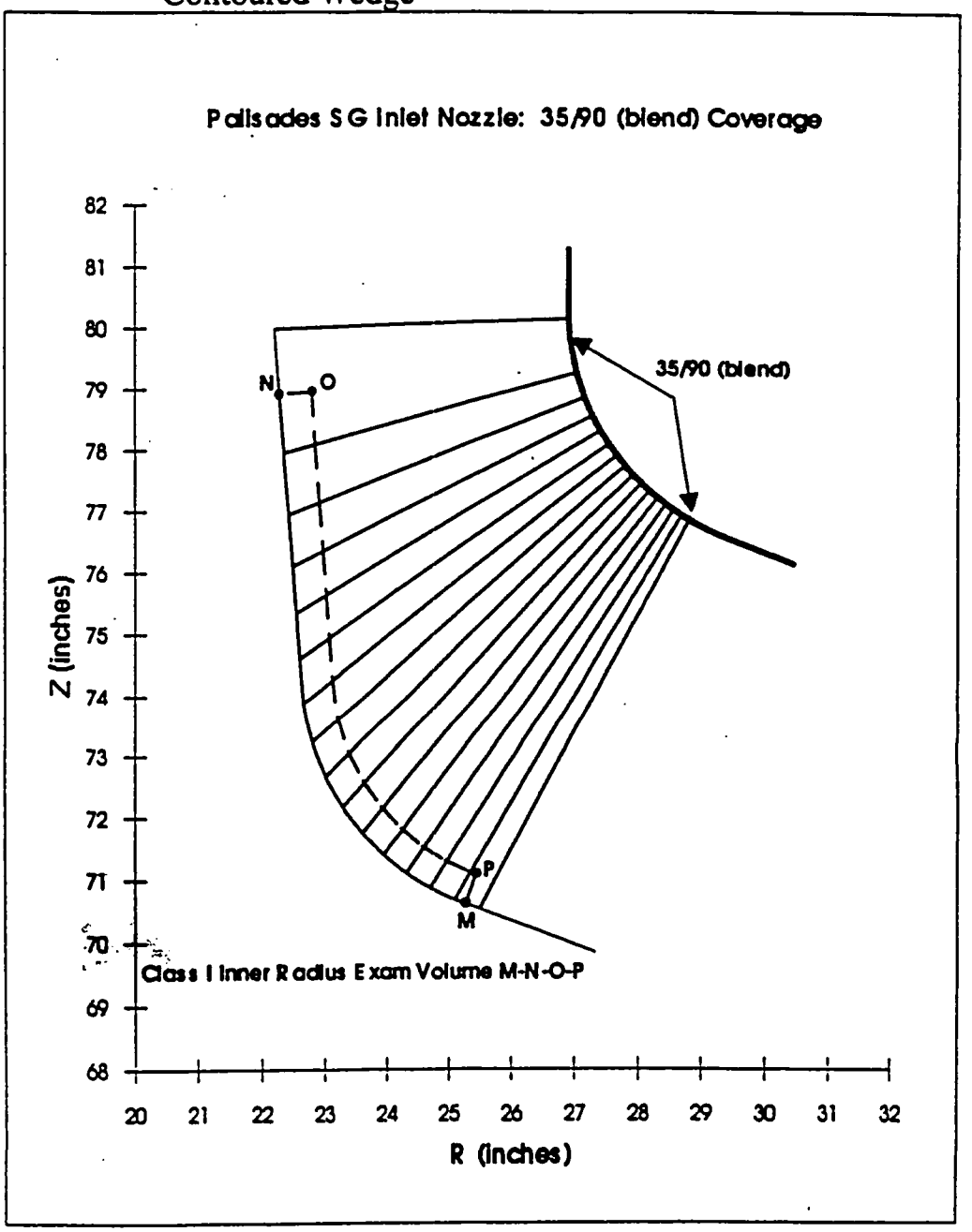


Figure 2. Palisades SG Inlet Nozzle: 35°/90° (blend) Coverage.

Figure 2 shows a cross section of the Palisades steam generator inlet nozzle upon which has been plotted the rays from the 35°/90° probe to the inside surface examination volume. As can be seen in Figure 2, the entire exam volume is covered by the 35°/90° probe scanned on the outer blend radius.

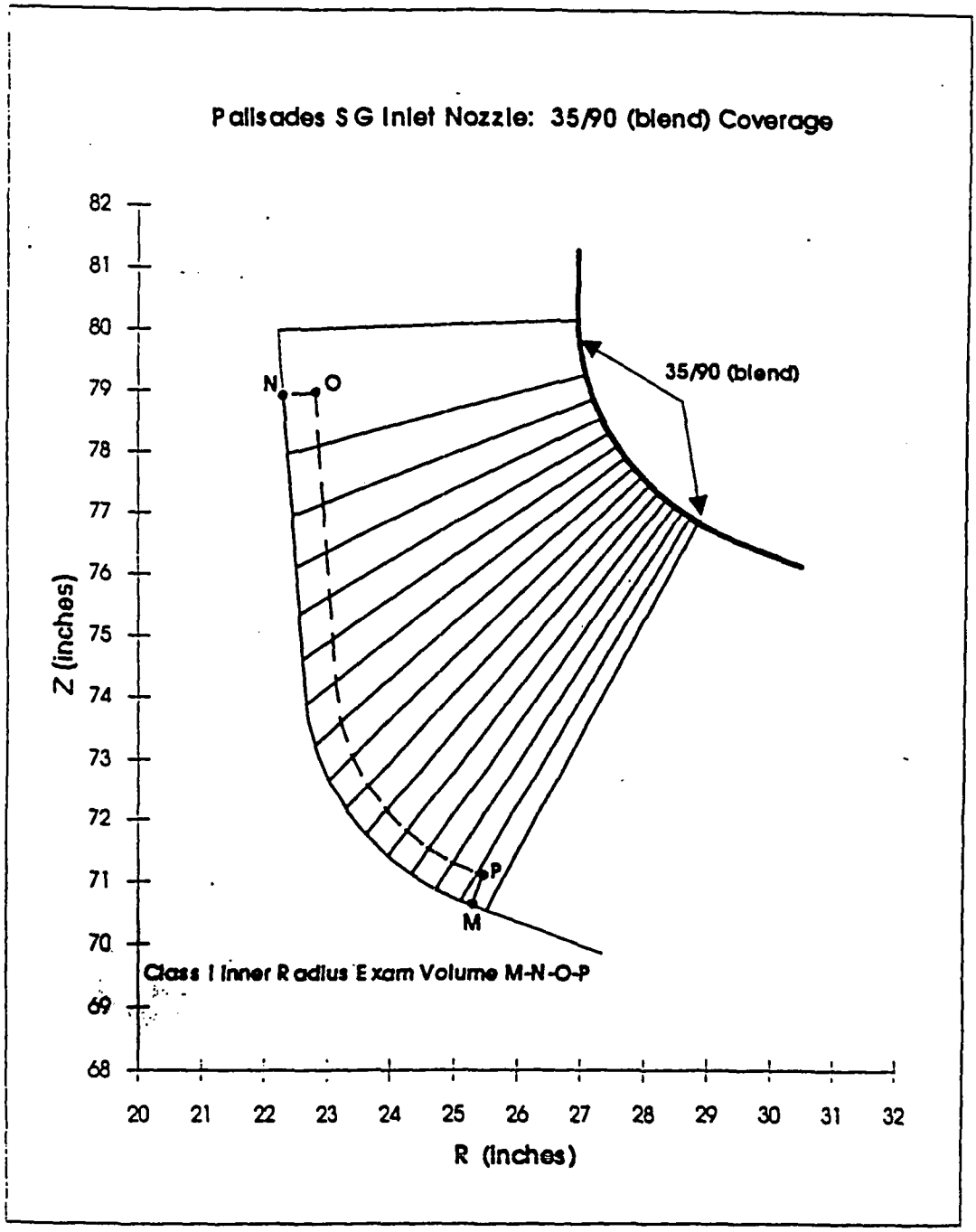


Figure 2. Palisades SG Inlet Nozzle: 35°/90° (blend) Coverage.

Nozzle-to-Head Weld Region

Figure 3 shows a cross section of the Palisades steam generator inlet nozzle which indicates the nozzle-to-head weld examination volume. Table 2 lists the coverage obtained from the axial scans of 45° and 60° probes scanned on the vessel head and nozzle boss. The percent coverage is listed for the the nozzle cylinder region A-B-G-H-I; as well as, the entire weld examination volume A-B-C-D-E-F-G-H-I (See Figures 1 and 3).

Table 2. Coverage Table: SG Inlet; 45°and 60° probes scanned axially on vessel head and nozzle boss.

Probe Angle	45°	45°	60°	60°
Probe Skew	0°	180°	0°	180°
Probe Location	Head	Boss	Head	Boss
% Exam Vol. (C-D-E-F) Covered	100%	0%	93%	0%
% Exam Vol. (B-C-F-G) Covered	87%	0%	90%	0%
% Exam Vol. (A-B-G-H-I) Covered	53%	0%	63%	12%
Percent Total Weld Exam Volume (A-B-C-D-E-F-G-H-I) Covered	79%	0%	81%	5%

Figures 4 through 7 support the calculated axial scan coverage listed in Table 2. Figure 4 shows a cross section of the Palisades steam generator inlet nozzle upon which has been plotted the rays of the axial scan of the 45°/0°(head scan) probe through the weld examination volume. Figure 5 shows the cross section with the rays of the axial scan of the 45°/180°(boss scan) probe. Figure 6 shows the cross section with the rays of the axial scan of the 60°/0° probe through the weld examination volume. Figure 7 shows the cross section with the rays of the axial scan of the 60°/180° probe. Figure 8 shows the combined coverage achieved by all the axial scans of the nozzle-to-head weld.

Table 3 lists the coverage obtained from the transverse scans (no probe skewing) of 45° and 60° probes scanned on the vessel head and nozzle boss. Figures 9 through 12 support the calculated transverse scan coverage listed in Table 3.

Examination Volume (CP-SGPIN)

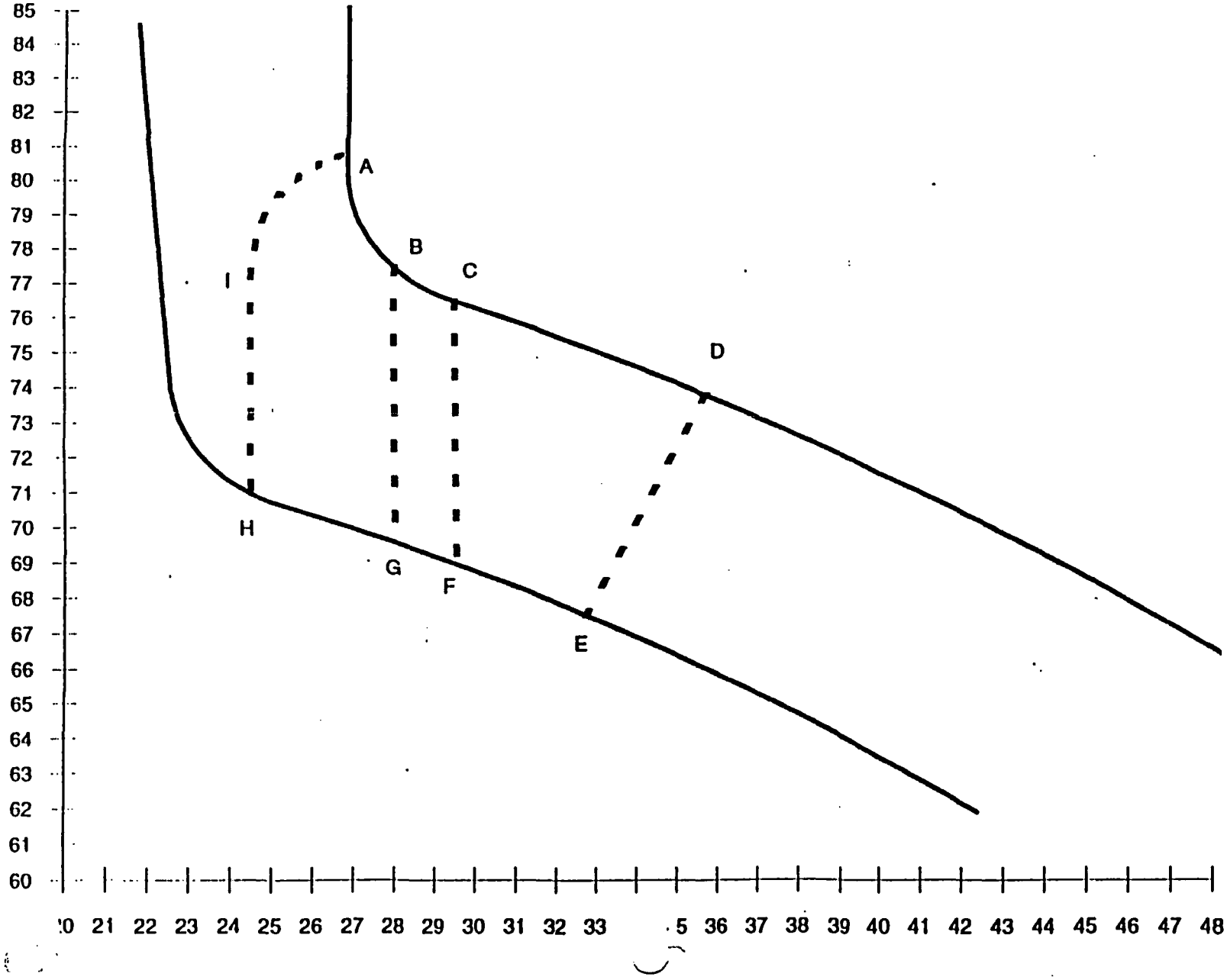


Figure 3

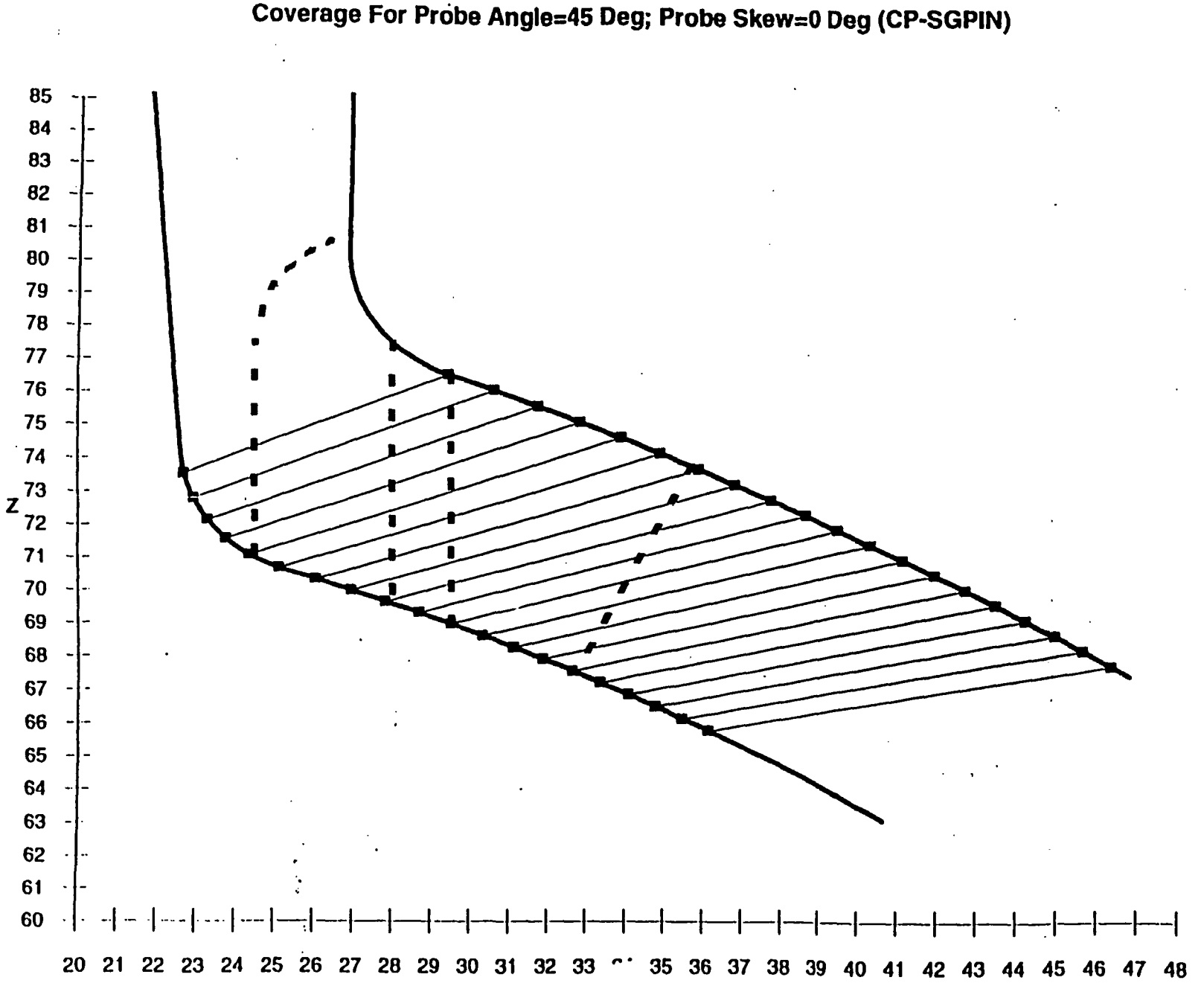

Coverage For Probe Angle=45 Deg; Probe Skew=0 Deg (CP-SGPIN)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
20 21 22 23 24 25 26 27 28 29 30 31 32 33 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 4

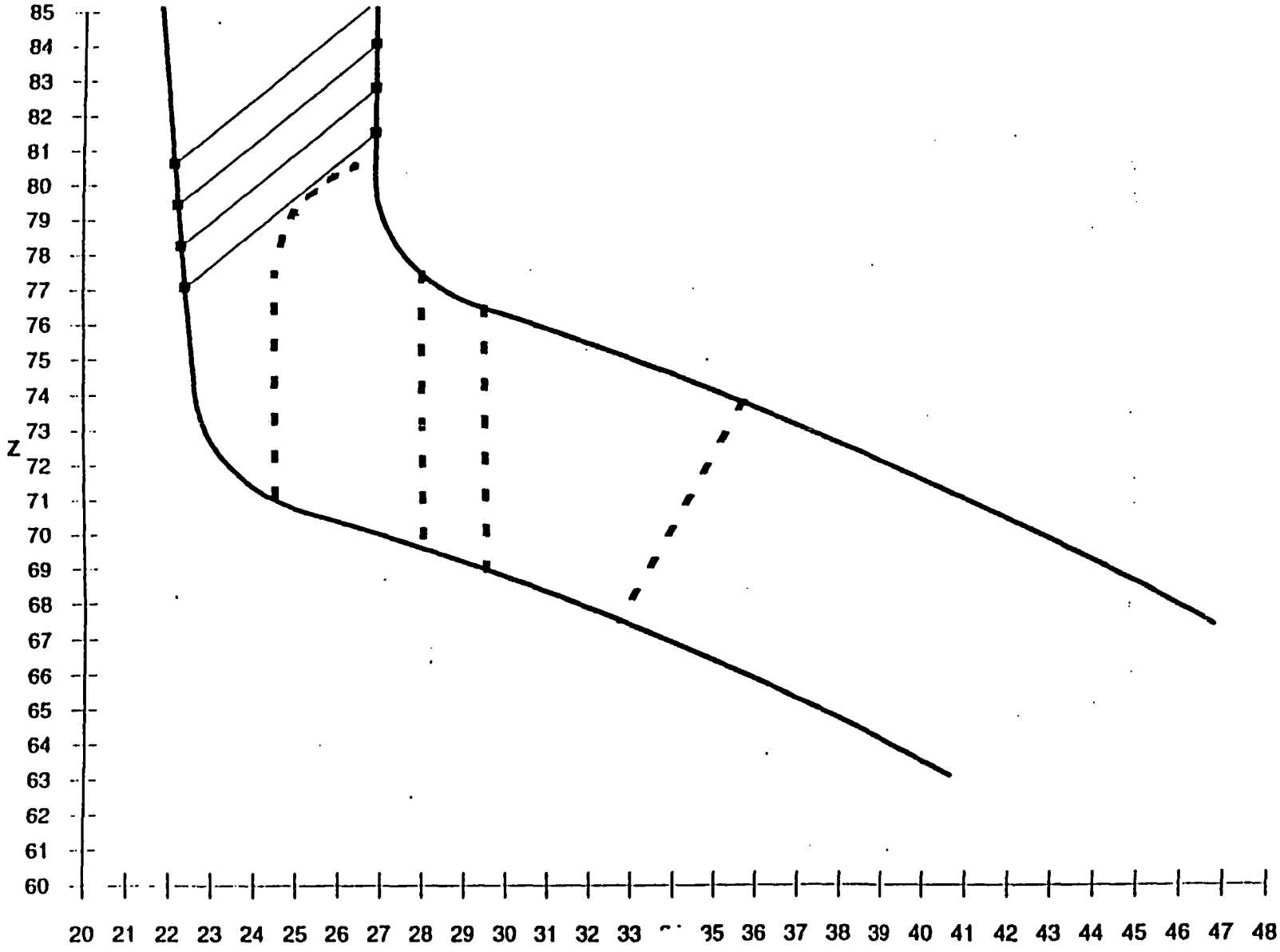

Coverage For Probe Angle=45 Deg; Probe Skew=180 Deg (CP-SGPIN)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
20 21 22 23 24 25 26 27 28 29 30 31 32 33 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 5

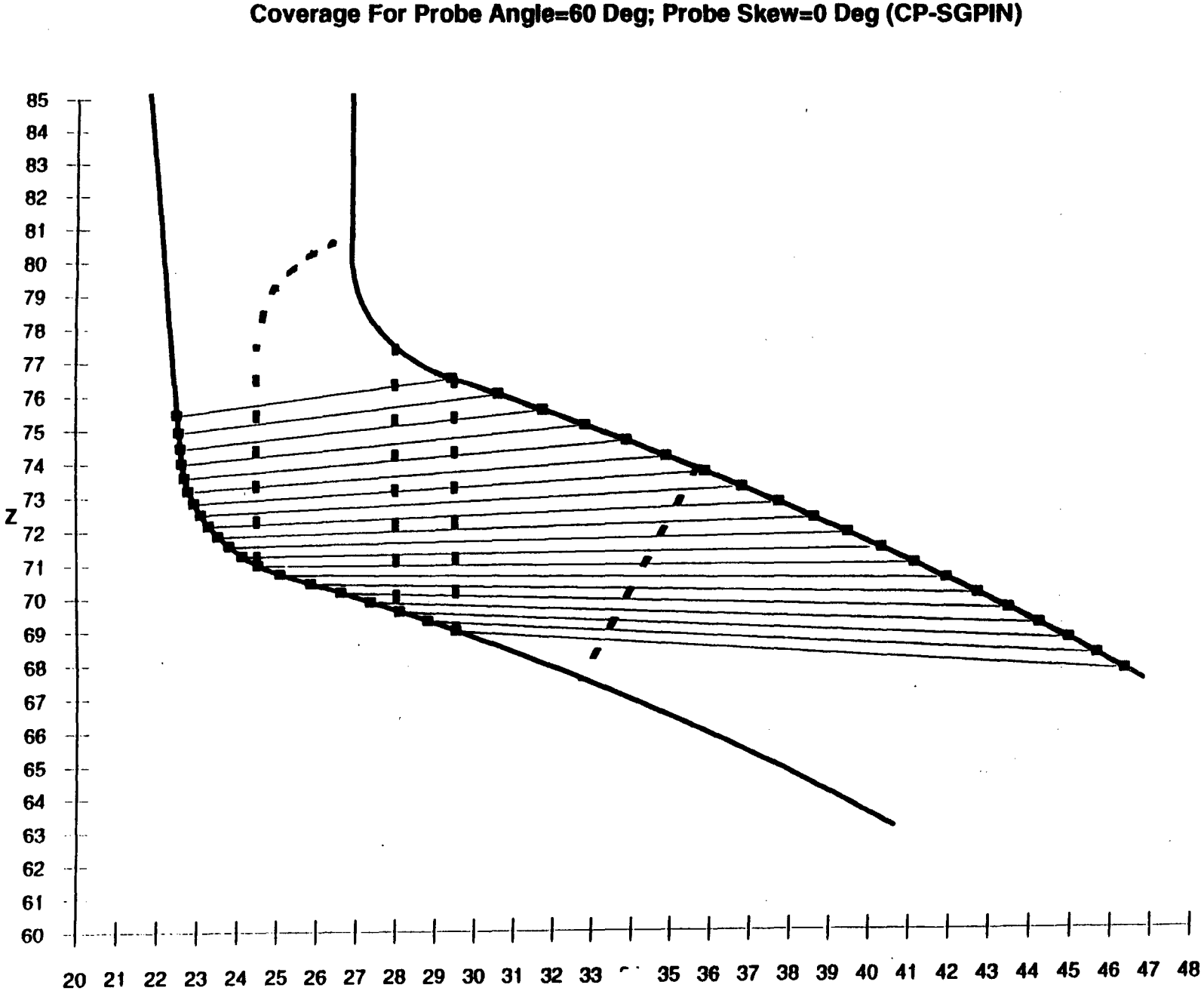

Coverage For Probe Angle=60 Deg; Probe Skew=0 Deg (CP-SGPIN)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
20 21 22 23 24 25 26 27 28 29 30 31 32 33 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 6

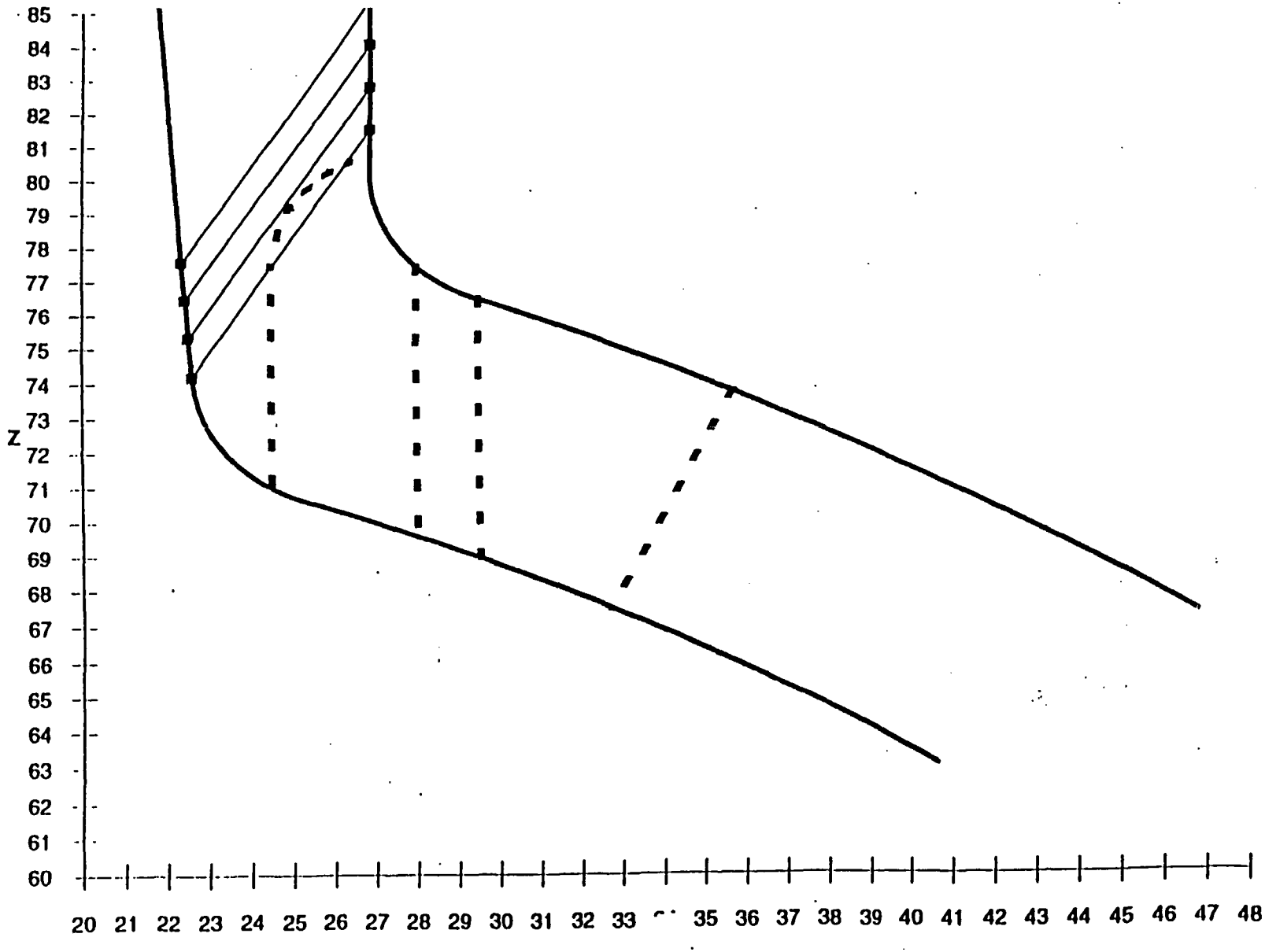

Coverage For Probe Angle=60 Deg; Probe Skew=180 Deg (CP-SGPIN)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
20 21 22 23 24 25 26 27 28 29 30 31 32 33 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 7

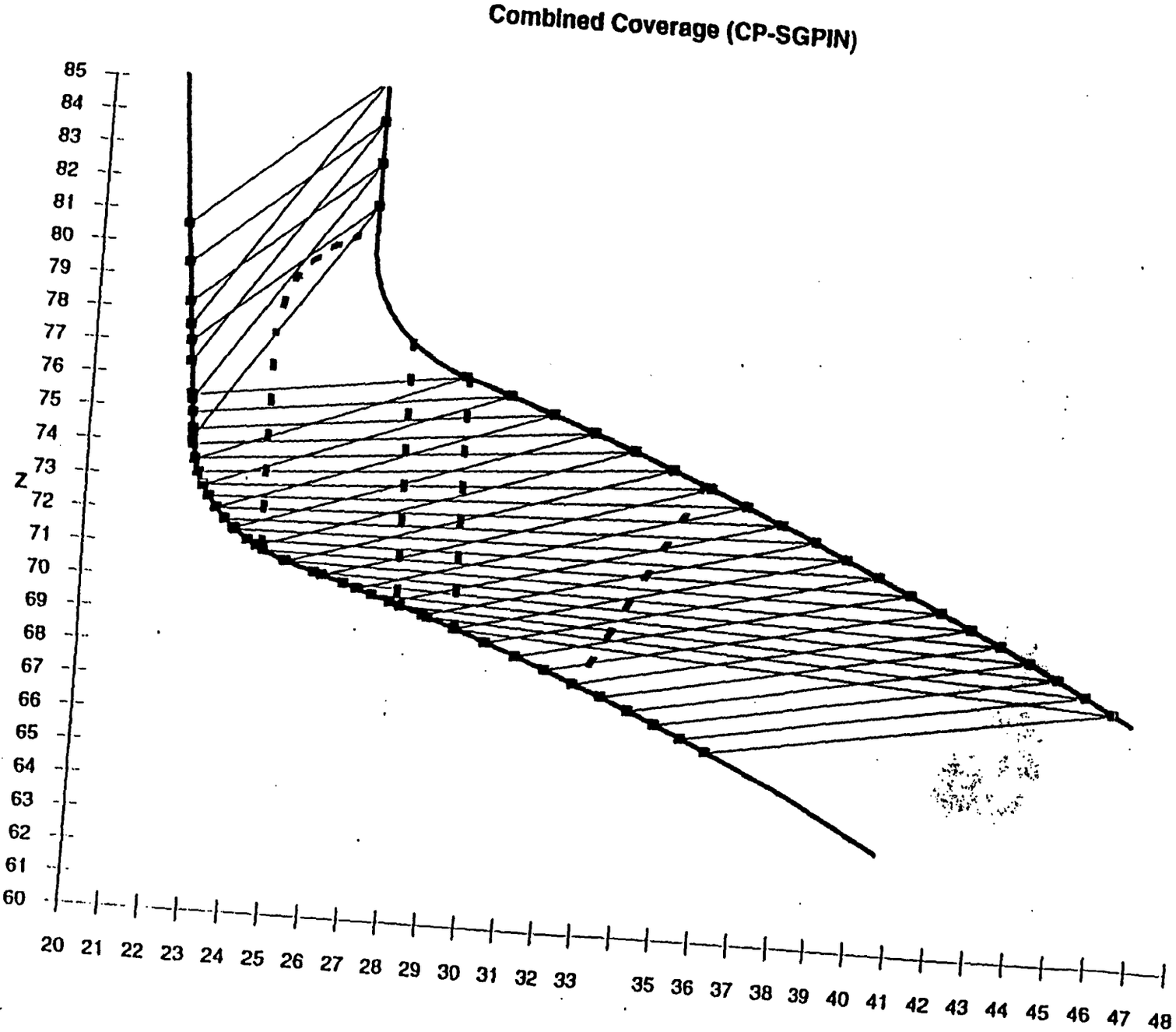

Combined Coverage (CP-SGPIN)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
20 21 22 23 24 25 26 27 28 29 30 31 32 33 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 8

Table 3. Coverage Table: SG Inlet; 45°and 60° probes scanned transversely on vessel head and nozzle boss (no probe skewing).

Probe Angle	45°	45°	60°	60°
Probe Skew	90°	90°	90°	90°
Probe Location	Head	Boss	Head	Boss
% Exam Vol. (C-D-E-F) Covered	100%	0%	92%	0%
% Exam Vol. (B-C-F-G) Covered	58%	0%	0%	0%
% Exam Vol. (A-B-G-H-I) Covered	0%	0%	0%	0%
Percent Total Weld Exam Volume (A-B-C-D-E-F-G-H-I) Covered	54%	0%	42%	0%

Figure 9 shows a cross section of the Palisades steam generator inlet nozzle upon which has been plotted the rays of the transverse scan of the 45° probe from the head through the weld examination volume with no probe skewing. Figure 10 shows the cross section with the rays of the transverse scan of the 45° probe from the boss. Figure 11 shows the cross section with the rays of the transverse scan of the 60° probe from the head through the weld examination volume. Figure 12 shows the cross section with the rays of the transverse scan of the 60° probe from the boss. Figure 13 shows the combined coverage achieved by all the transverse scans of the nozzle-to-head weld with no probe skewing.

Table 4 lists the coverage obtained from the transverse scans (+/-20° probe skewing) of 45° and 60° probes scanned on the vessel head and nozzle boss. Figures 14 through 17 support the calculated transverse scan coverage listed in Table 4. Figure 14 shows a cross section of the Palisades steam generator inlet nozzle upon which has been plotted the rays of the transverse scan of the 45° probe from the head through the weld examination volume with +/-20° probe skewing. Figure 15 shows the cross section with the rays of the transverse scan of the 45° probe from the boss. Figure 16 shows the cross section with the rays of the transverse scan of the 60° probe from the head through the weld examination volume. Figure 17 shows the cross section with the rays of the transverse scan of the 60° probe from the boss. Figure 18 shows the combined coverage achieved by all the transverse scans of the nozzle-to-head weld with +/-20° probe skewing.

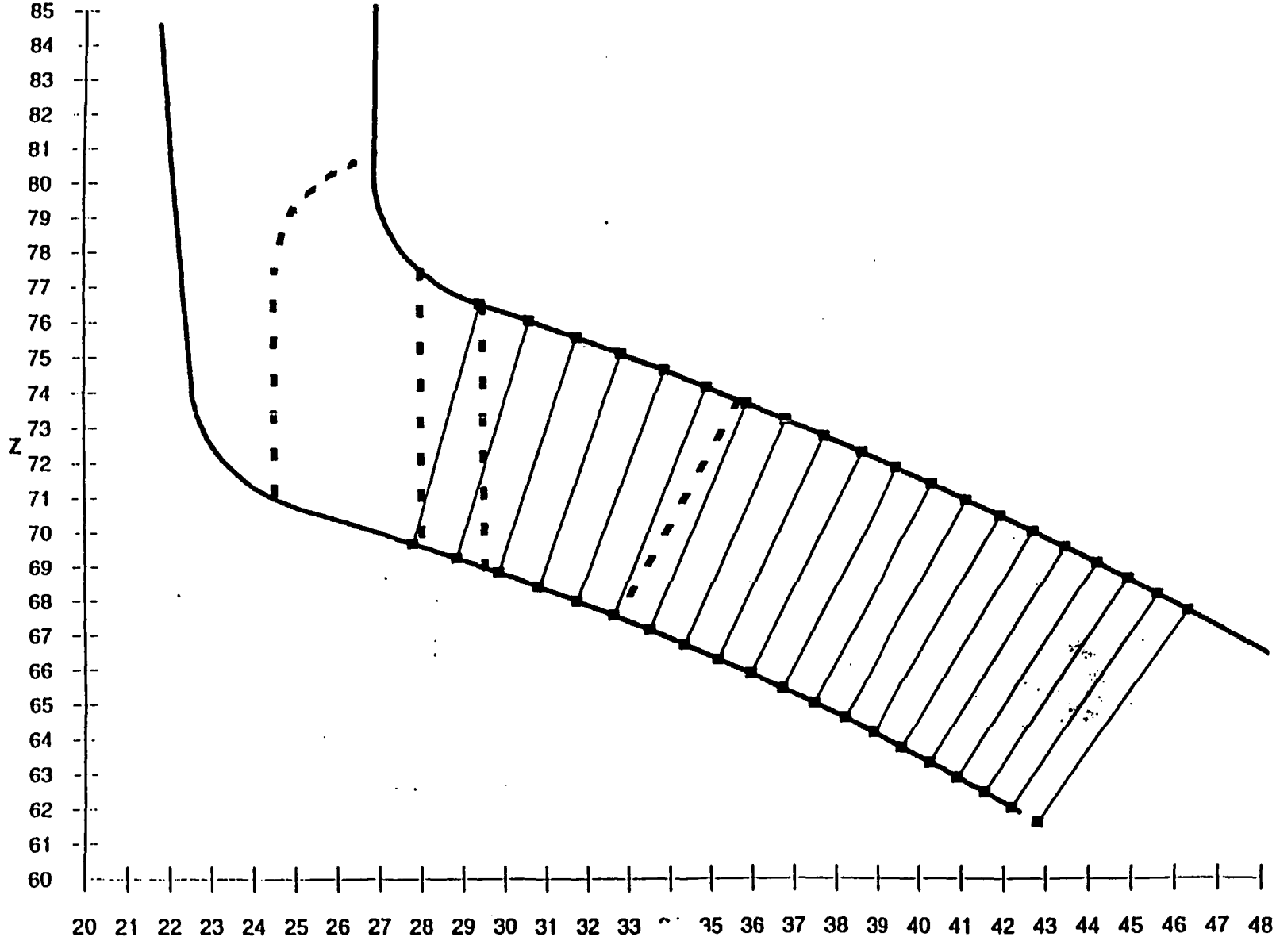

Coverage For Probe Angle=45 Deg; Probe Skew=90 Deg (CP-SGPIN)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
20 21 22 23 24 25 26 27 28 29 30 31 32 33 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 9

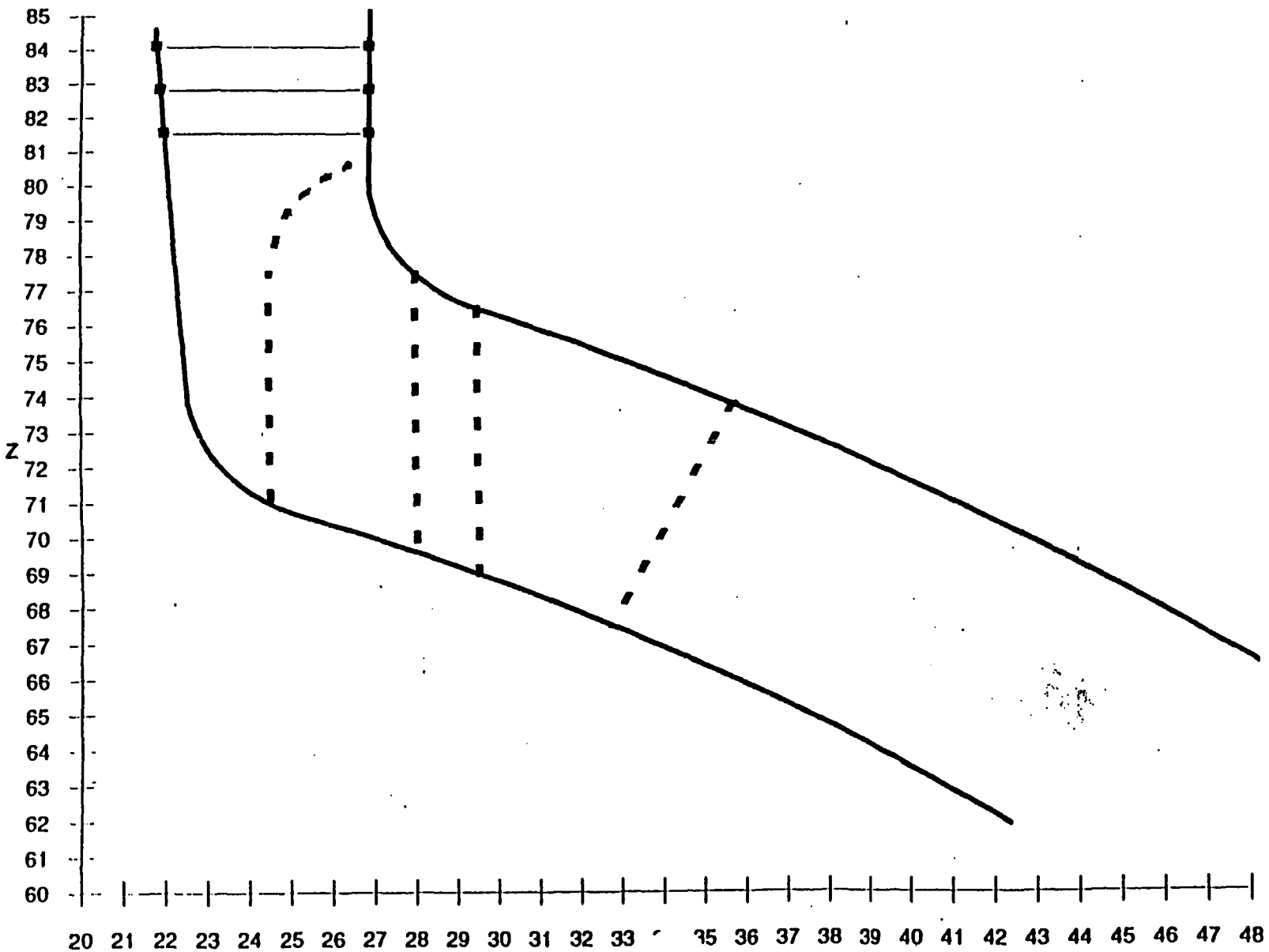

Coverage For Probe Angle=45 Deg; Probe Skew=90 Deg (CP-SGPIN)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
20 21 22 23 24 25 26 27 28 29 30 31 32 33 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 10

Coverage For Probe Angle=60 Deg; Probe Skew=90 Deg (CP-SGPIN)

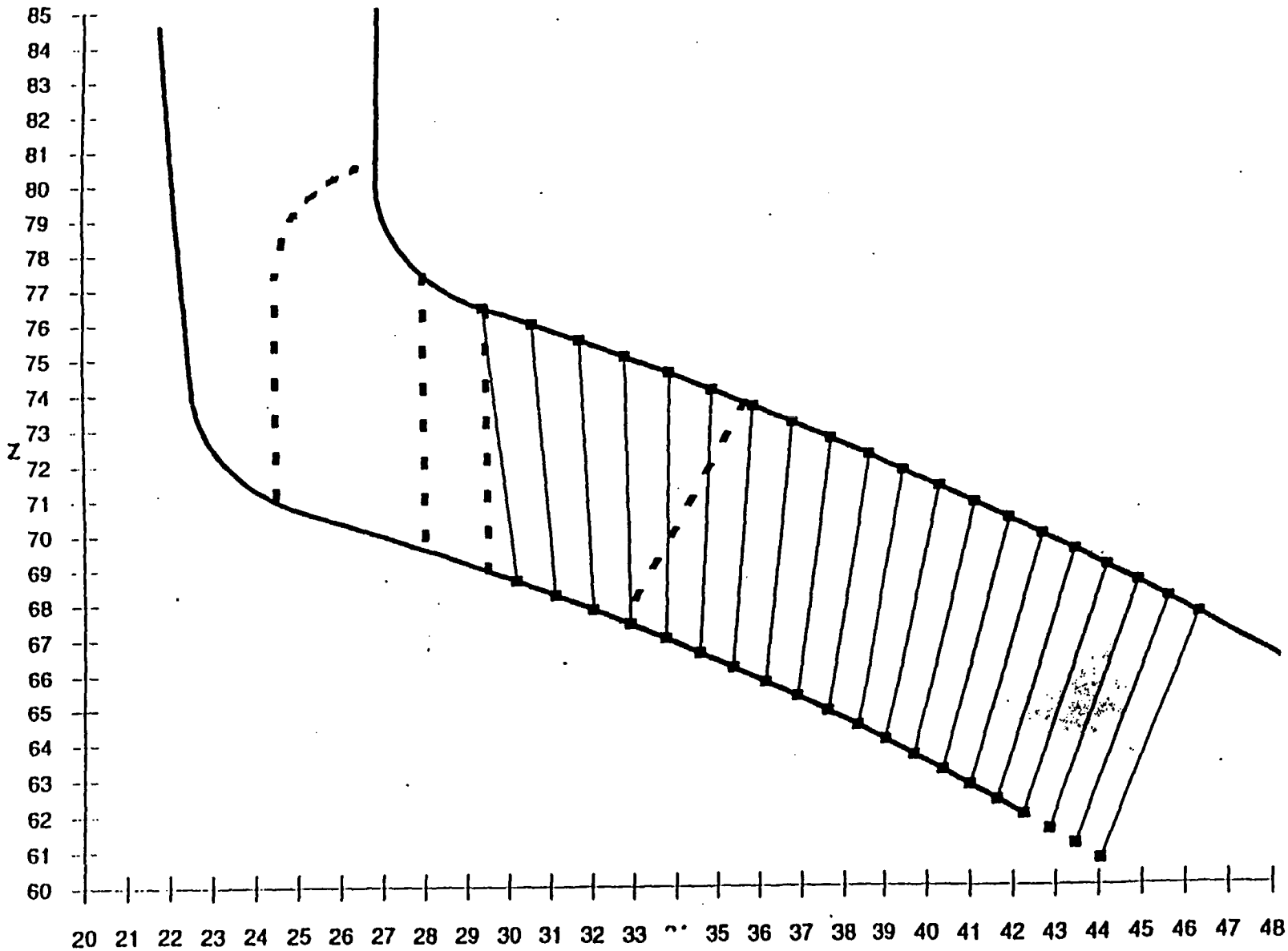


Figure 11

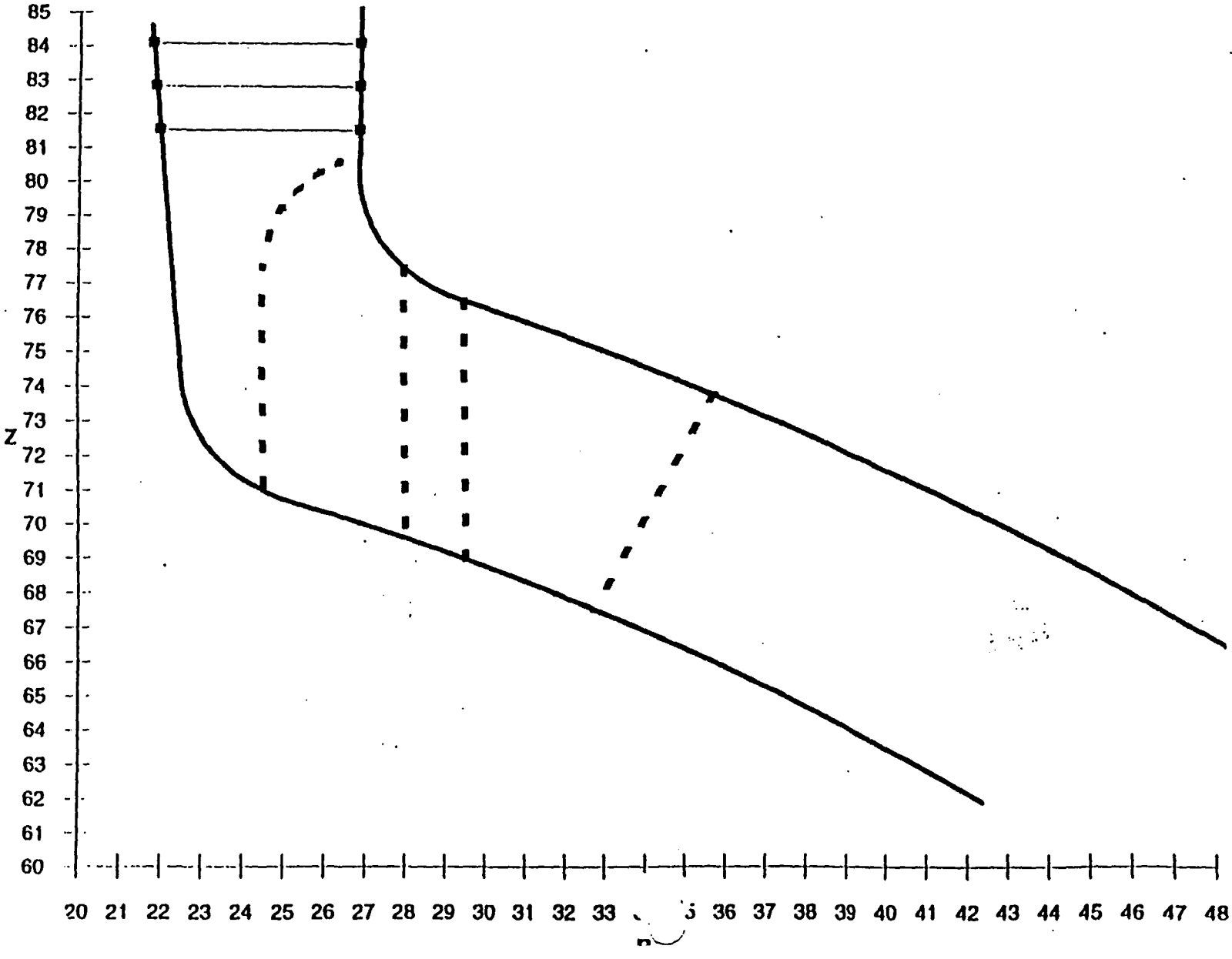

Coverage For Probe Angle=60 Deg; Probe Skew=90 Deg (CP-SGPIN)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
20 21 22 23 24 25 26 27 28 29 30 31 32 33 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 12

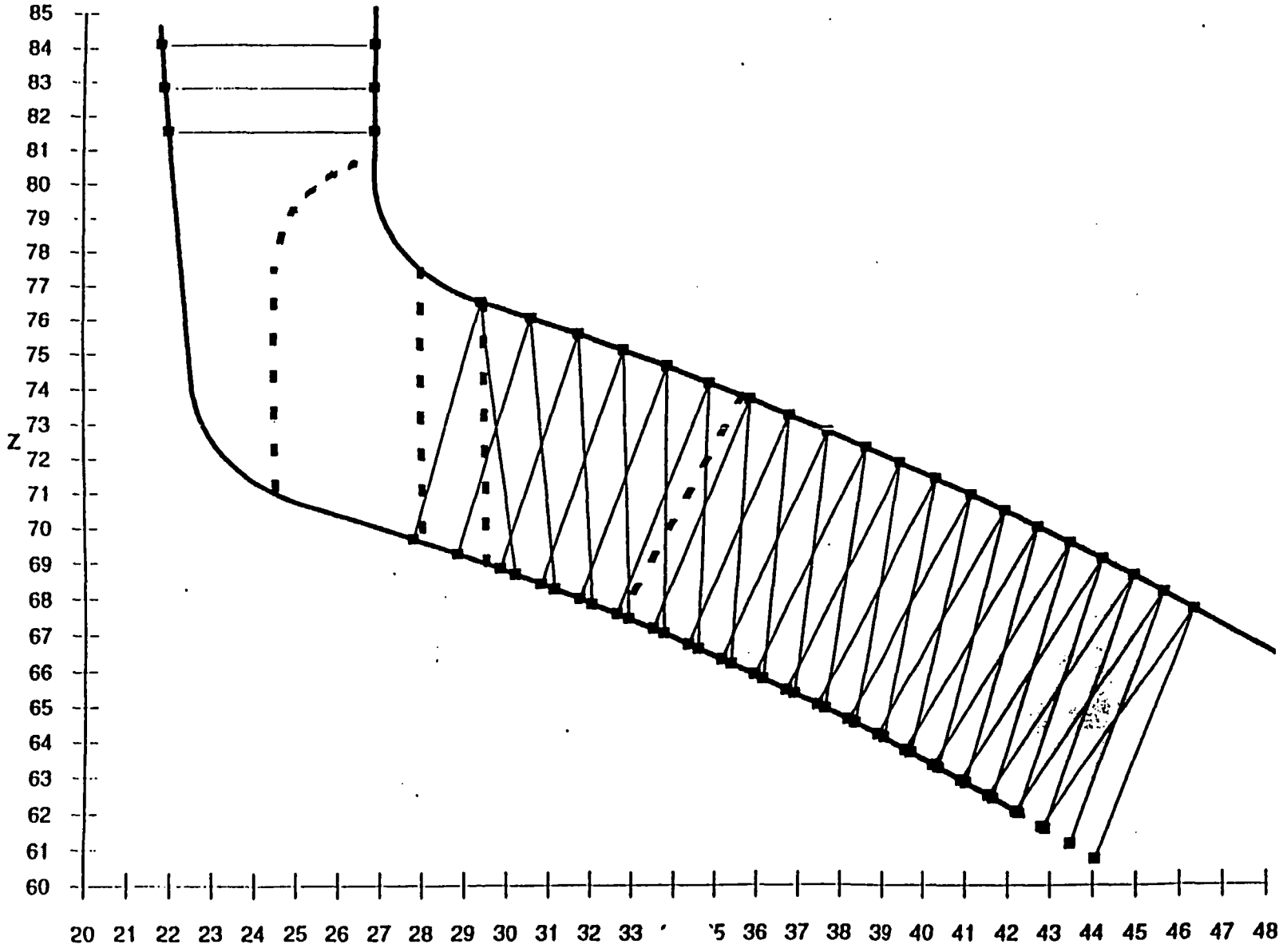

Combined Coverage (CP-SGPIN)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
20 21 22 23 24 25 26 27 28 29 30 31 32 33
36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 13

Table 4. Coverage Table: SG Inlet; 45°and 60° probes scanned transversely on vessel head and nozzle boss (+/-20° probe skewing).

Probe Angle	45°	45°	60°	60°
Probe Skew	70°	110°	70°	110°
Probe Location	Head	Boss	Head	Boss
% Exam Vol. (C-D-E-F) Covered	100%	0%	100%	0%
% Exam Vol. (B-C-F-G) Covered	78%	0%	76%	0%
% Exam Vol. (A-B-G-H-I) Covered	19%	0%	16%	0%
Percent Total Weld Exam Volume (A-B-C-D-E-F-G-H-I) Covered	64%	0%	63%	0%

Palisades Steam Generator Outlet Nozzle

Nozzle Inside Corner Region

Table 5 shows the coverage calculated for a 35° probe, skewed 90° (35/90) (looking circumferentially) and scanned on the outer blend radius.

Table 5. Coverage Table: SG Outlet; 35°/90° (blend)

Probe Angle	35°
Probe Skew	90°
Probe Location	Blend*
Percentage of Examination Volume (M-N-O-P) Covered	100%

*Contoured Wedge

Figure 19 shows a cross section of the Palisades steam generator outlet nozzle upon which has been plotted the rays from the 35°/90° probe to the inside surface examination volume. As can be seen in Figure 19, the entire exam volume is covered by the 35°/90° probe scanned on the outer blend radius.

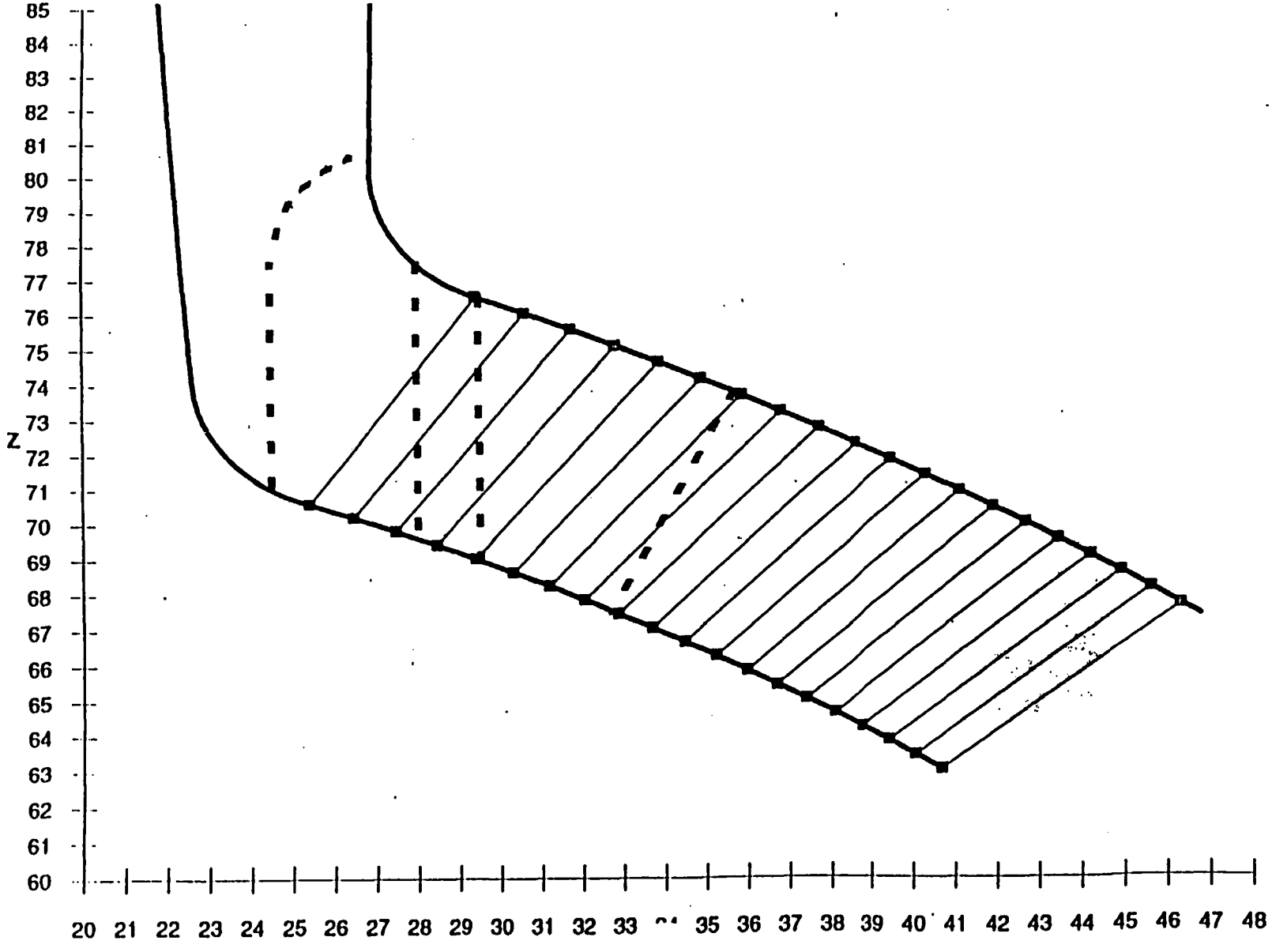

Coverage For Probe Angle=45 Deg; Probe Skew=70 Deg (CP-SGPIN)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
20 21 22 23 24 25 26 27 28 29 30 31 32 33 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 14

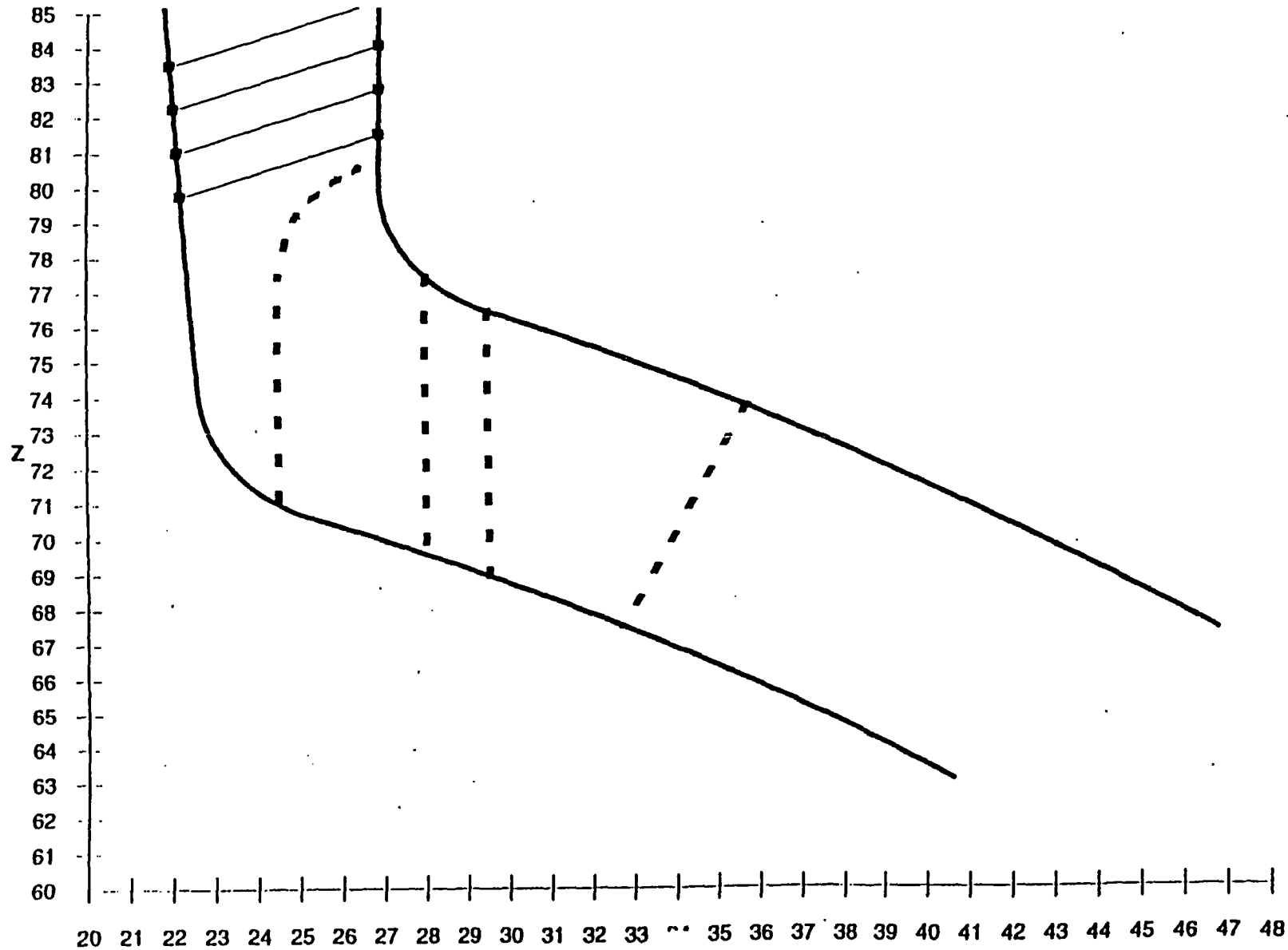

Coverage For Probe Angle=45 Deg; Probe Skew=110 Deg (CP-SGPIN)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
20 21 22 23 24 25 26 27 28 29 30 31 32 33 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 15

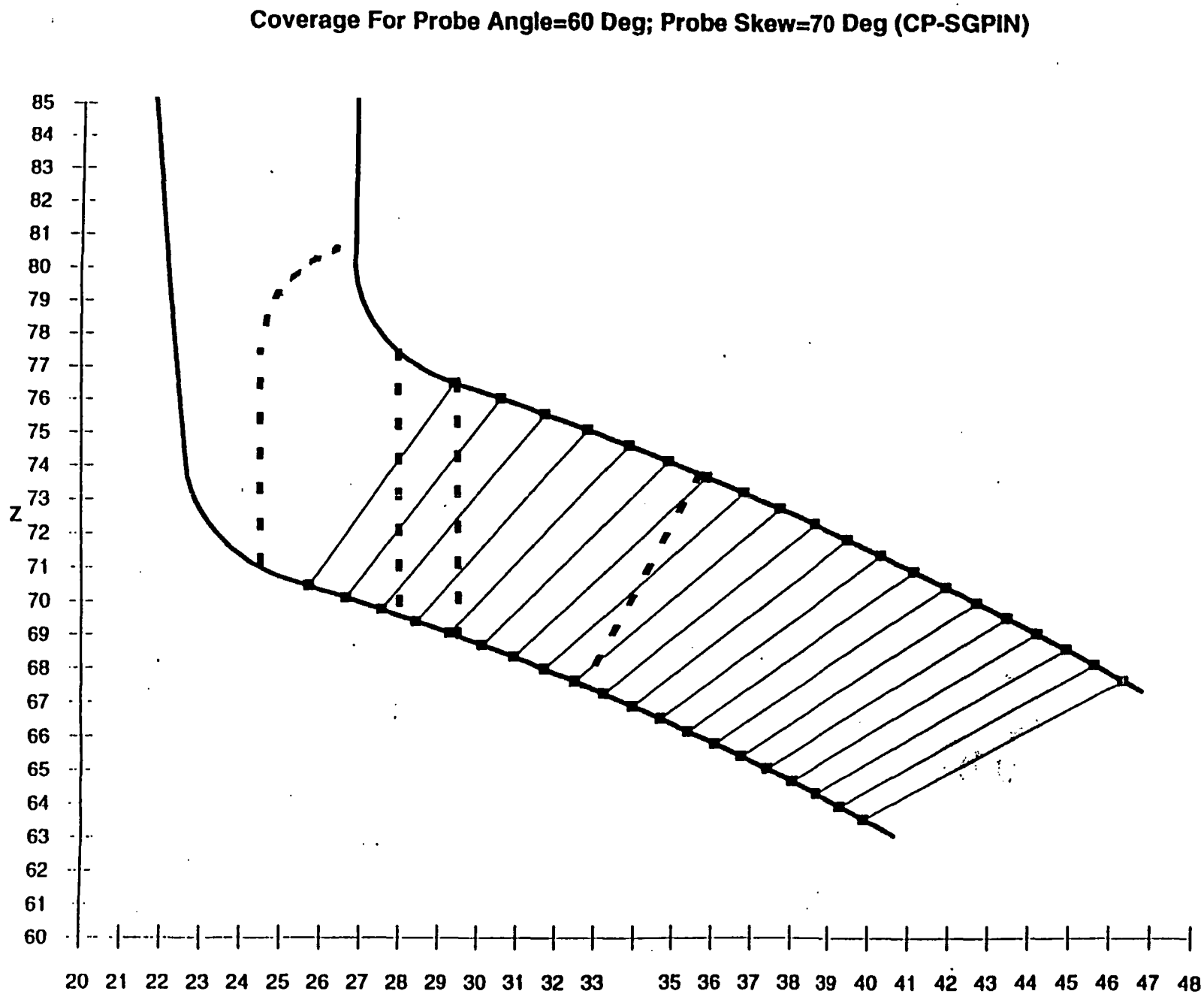

Coverage For Probe Angle=60 Deg; Probe Skew=70 Deg (CP-SGPIN)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
20 21 22 23 24 25 26 27 28 29 30 31 32 33 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 16

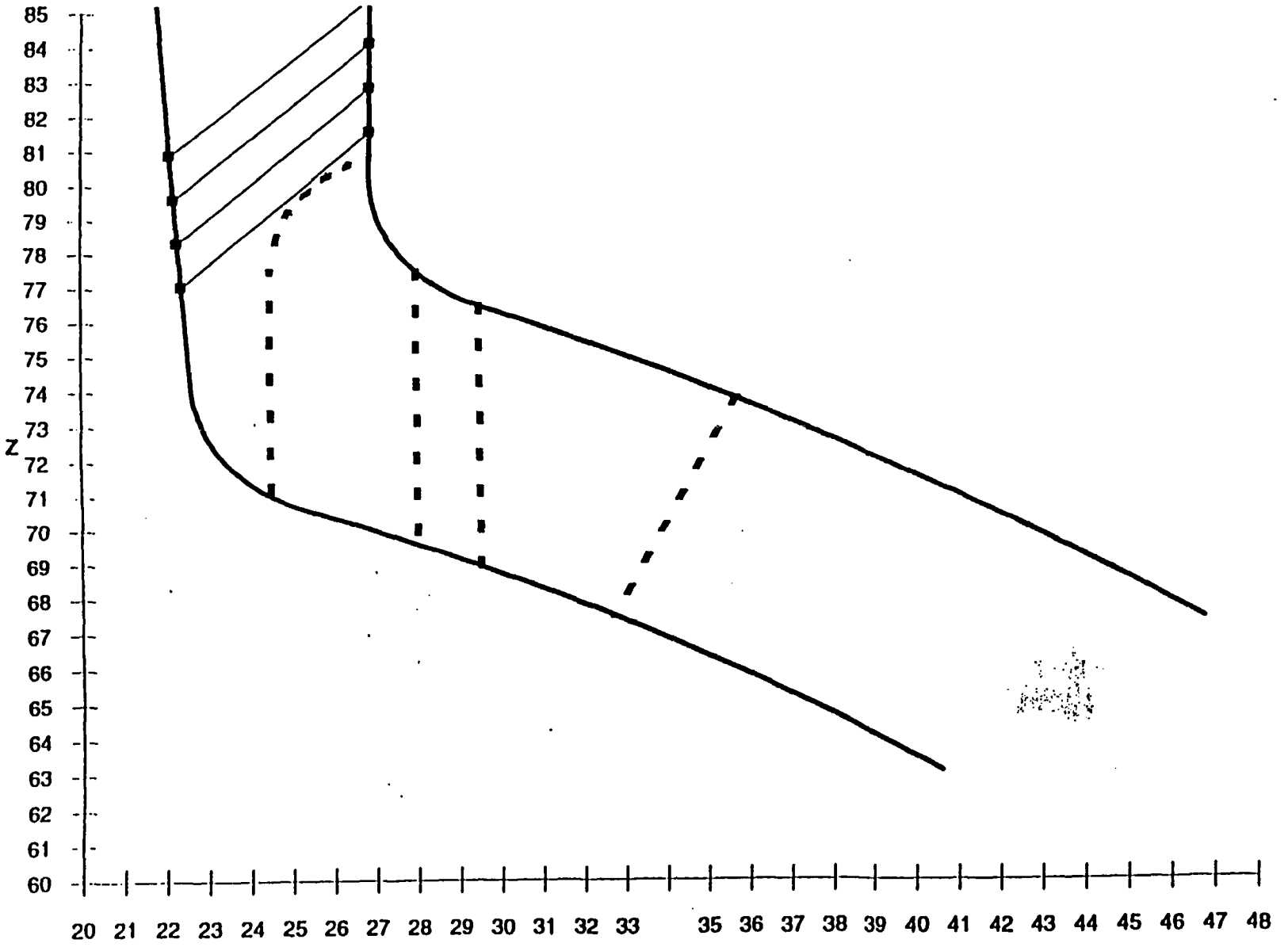

Coverage For Probe Angle=60 Deg; Probe Skew=110 Deg (CP-SGPIN)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
20 21 22 23 24 25 26 27 28 29 30 31 32 33 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 17

Examination Volume (CP-SGPON)

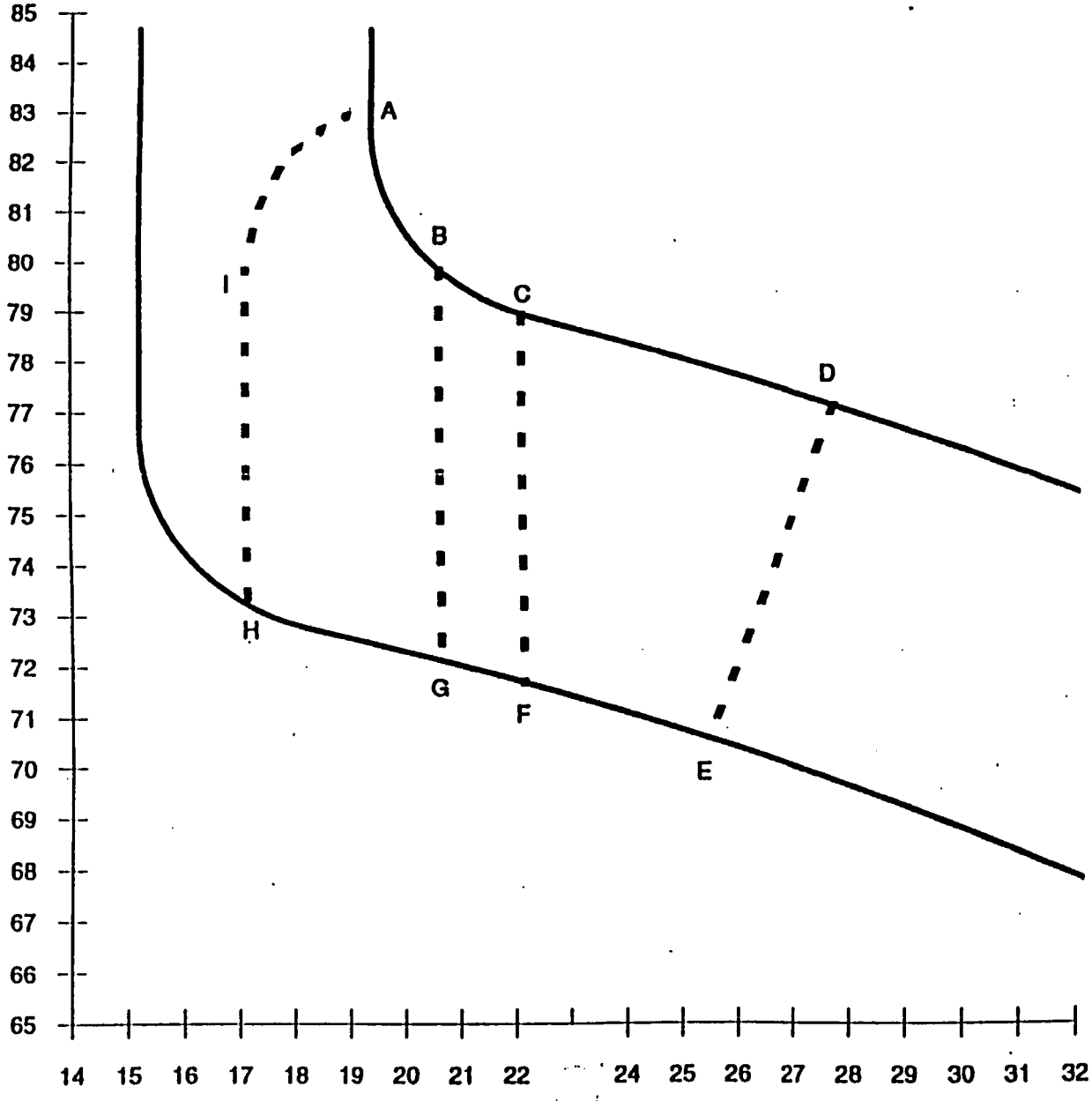


Figure 20

Table 6 lists the coverage obtained from the axial scans of 45° and 60° probes scanned on the vessel head and nozzle boss. The percent coverage is listed for the head adjoining region C-D-E-F, the attachment weld region B-C-F-G, and the nozzle cylinder region A-B-G-H-I; as well as, the entire weld examination volume A-B-C-D-E-F-G-H-I (See Figures 1 and 20).

Table 6. Coverage Table: SG Outlet; 45°and 60° probes scanned axially on vessel head and nozzle boss.

Probe Angle	45°	45°	60°	60°
Probe Skew	0°	180°	0°	180°
Probe Location	Head	Boss	Head	Boss
% Exam Vol. (C-D-E-F) Covered	100%	0%	100%	0%
% Exam Vol. (B-C-F-G) Covered	87%	0%	91%	0%
% Exam Vol. (A-B-G-H-I) Covered	48%	0%	60%	10%
Percent Total Weld Exam Volume (A-B-C-D-E-F-G-H-I) Covered	74%	0%	80%	5%

Figures 21 through 24 support the calculated axial scan coverage listed in Table 6. Figure 21 shows a cross section of the Palisades steam generator outlet nozzle upon which has been plotted the rays of the axial scan of the 45°/0°(head scan) probe through the weld examination volume. Figure 22 shows the cross section with the rays of the axial scan of the 45°/180°(boss scan) probe. Figure 23 shows the cross section with the rays of the axial scan of the 60°/0° probe through the weld examination volume. Figure 24 shows the cross section with the rays of the axial scan of the 60°/180° probe. Figure 25 shows the combined coverage achieved by all the axial scans of the nozzle-to-head weld.

Table 7 lists the coverage obtained from the transverse scans (no probe skewing) of 45° and 60° probes scanned on the vessel head and nozzle boss. Figures 26 through 29 support the calculated transverse scan coverage listed in Table 7. Figure 26 shows a cross section of the Palisades steam generator outlet nozzle upon which has been plotted the rays of the transverse scan of the 45° probe from the head through the weld examination volume with no probe skewing. Figure 27 shows the cross section with the rays of the transverse scan of the 45° probe from the boss. Figure 28 shows the cross

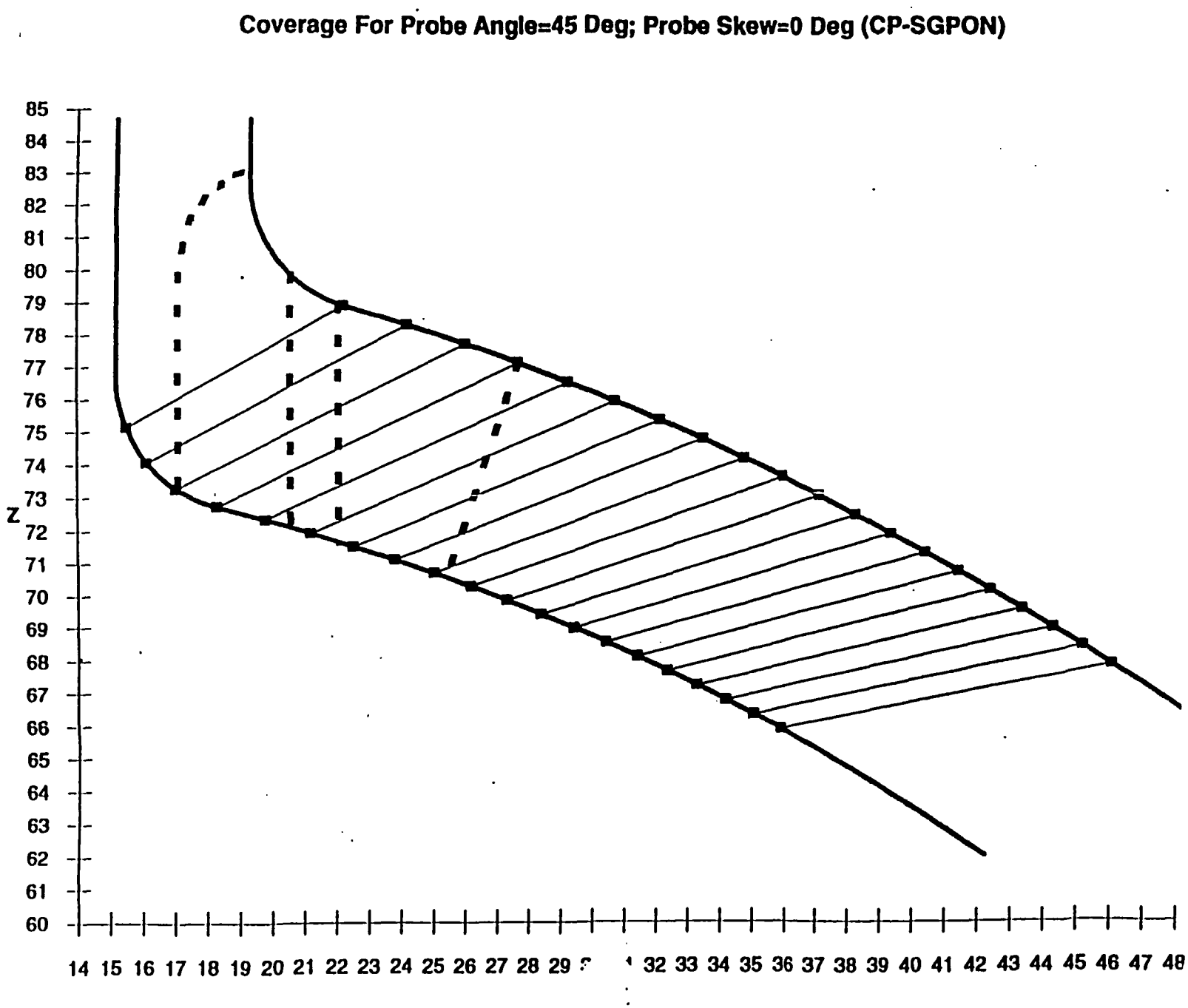

Coverage For Probe Angle=45 Deg; Probe Skew=0 Deg (CP-SGPON)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 21

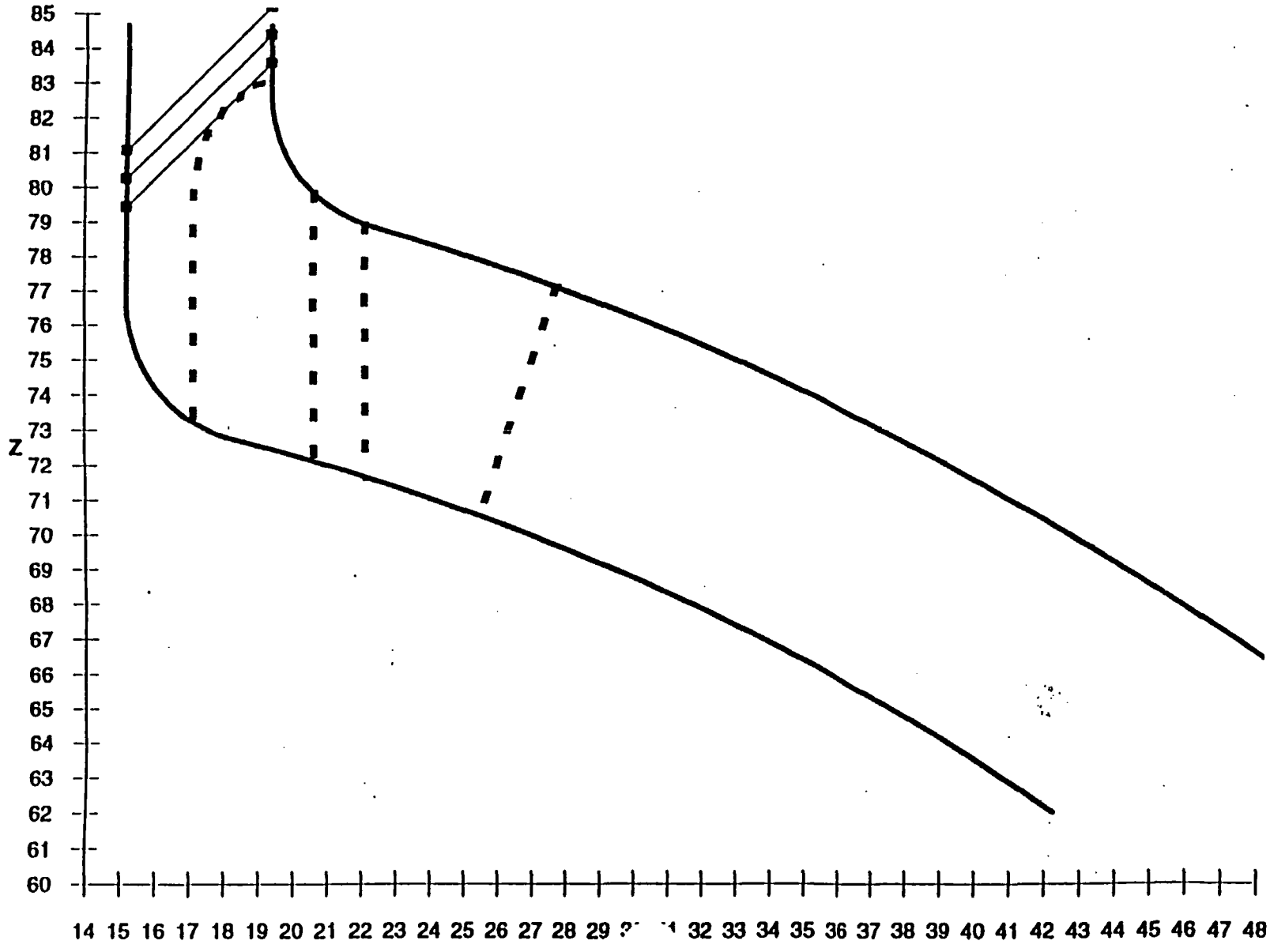

Coverage For Probe Angle=45 Deg; Probe Skew=180 Deg (CP-SGPON)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 22

Coverage For Probe Angle=60 Deg; Probe Skew=0 Deg (CP-SGPON)

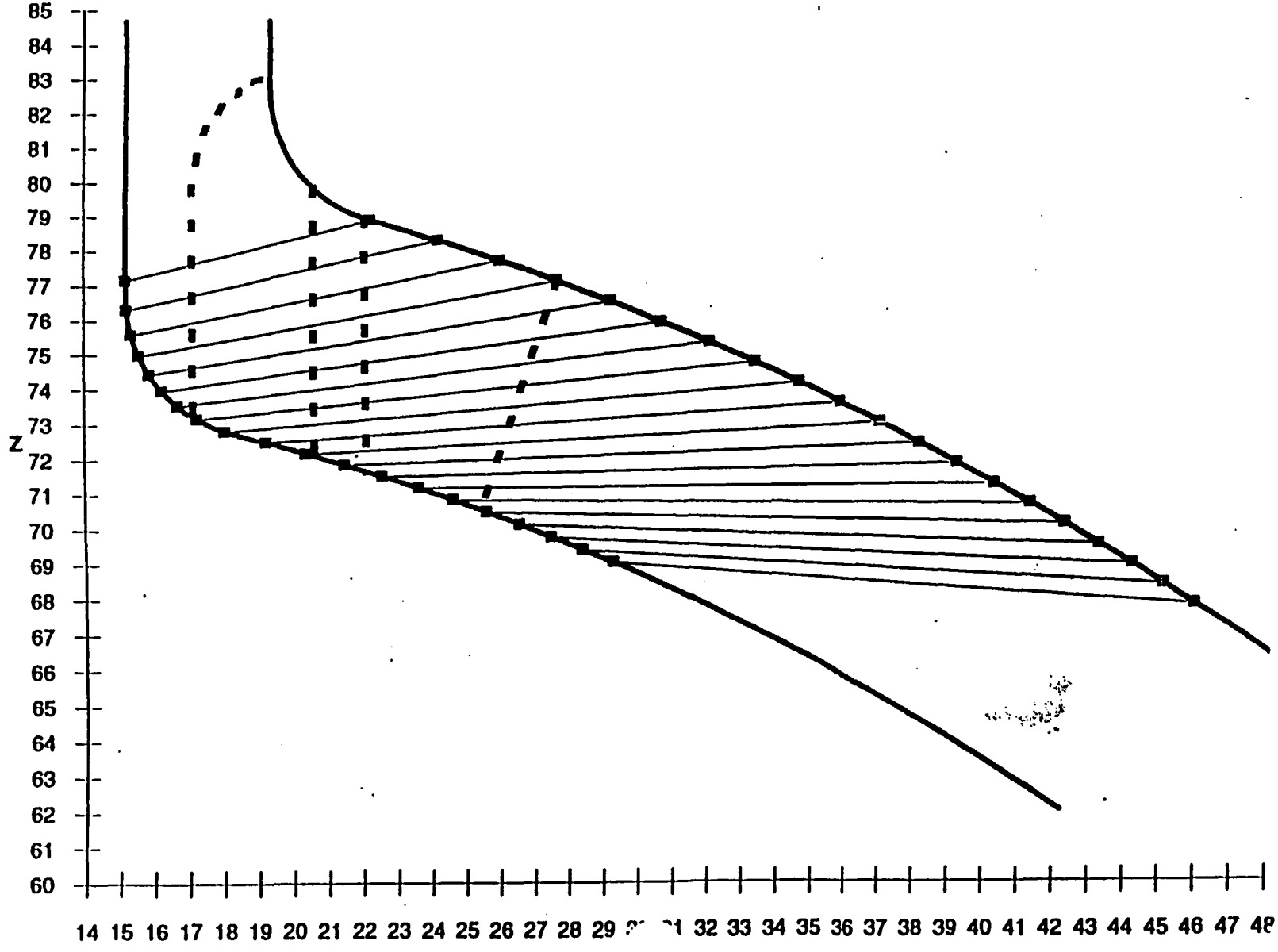


Figure 23

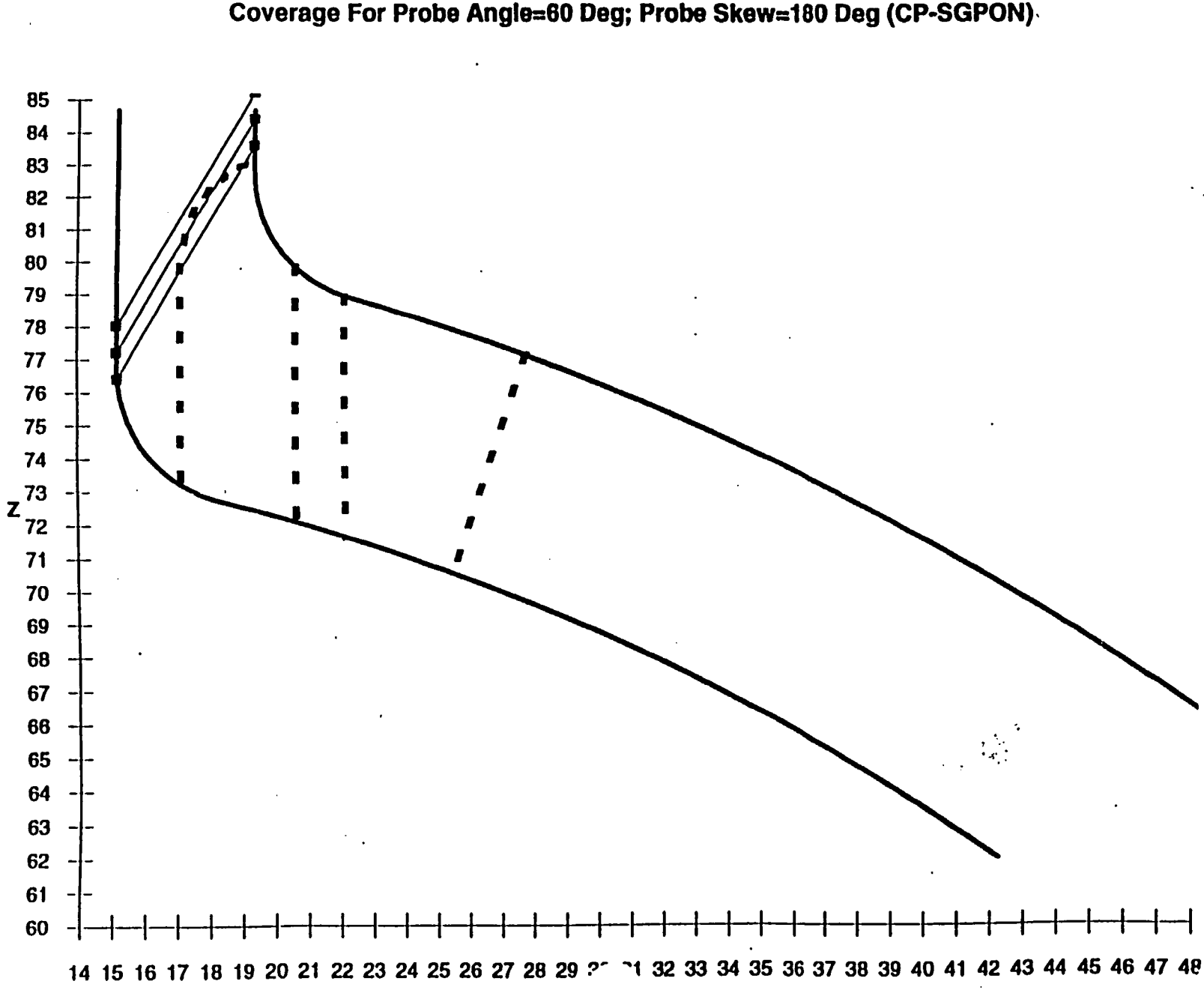

Coverage For Probe Angle=60 Deg; Probe Skew=180 Deg (CP-SGPON)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 24

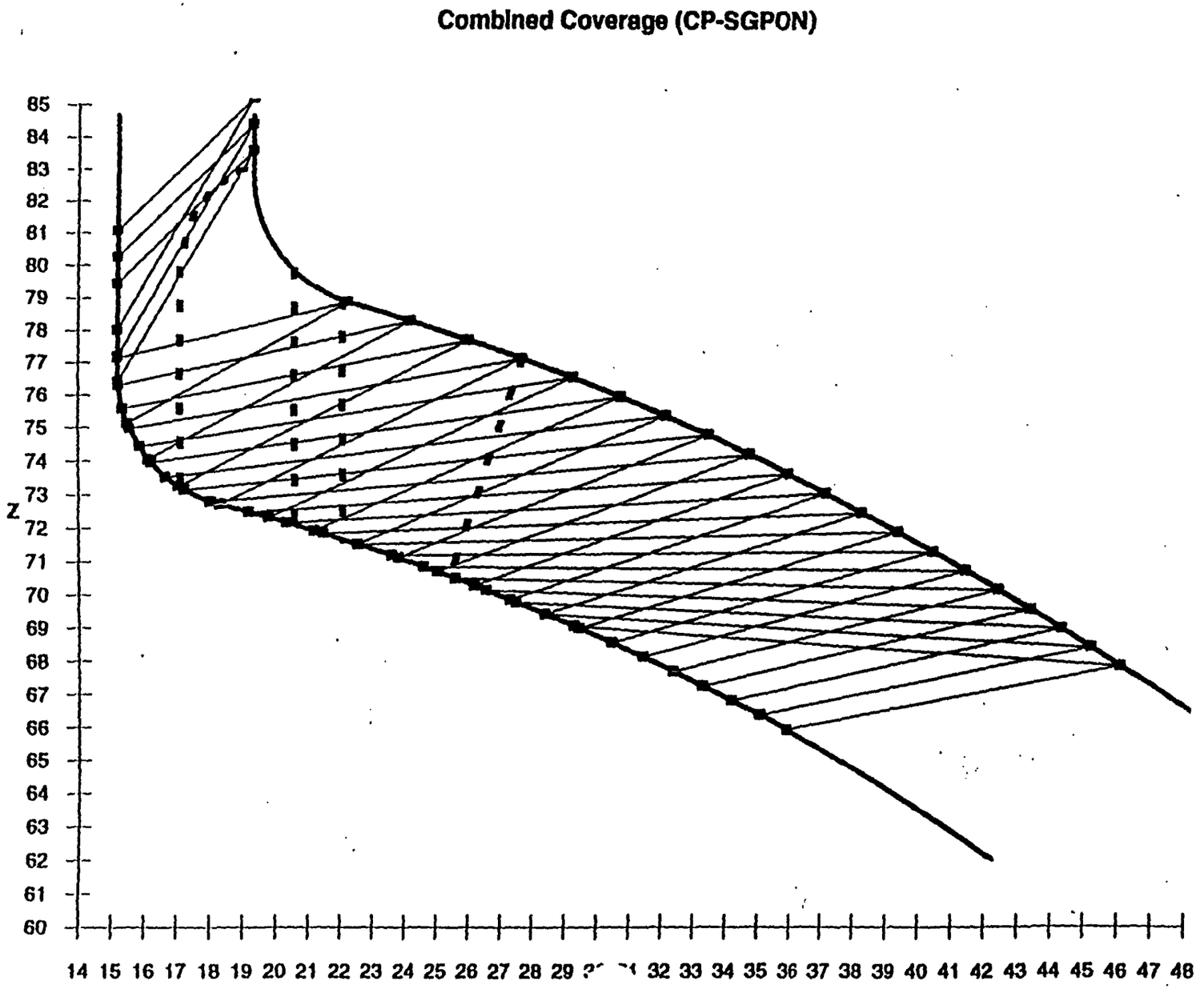

Combined Coverage (CP-SGPON)
Z
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Figure 25

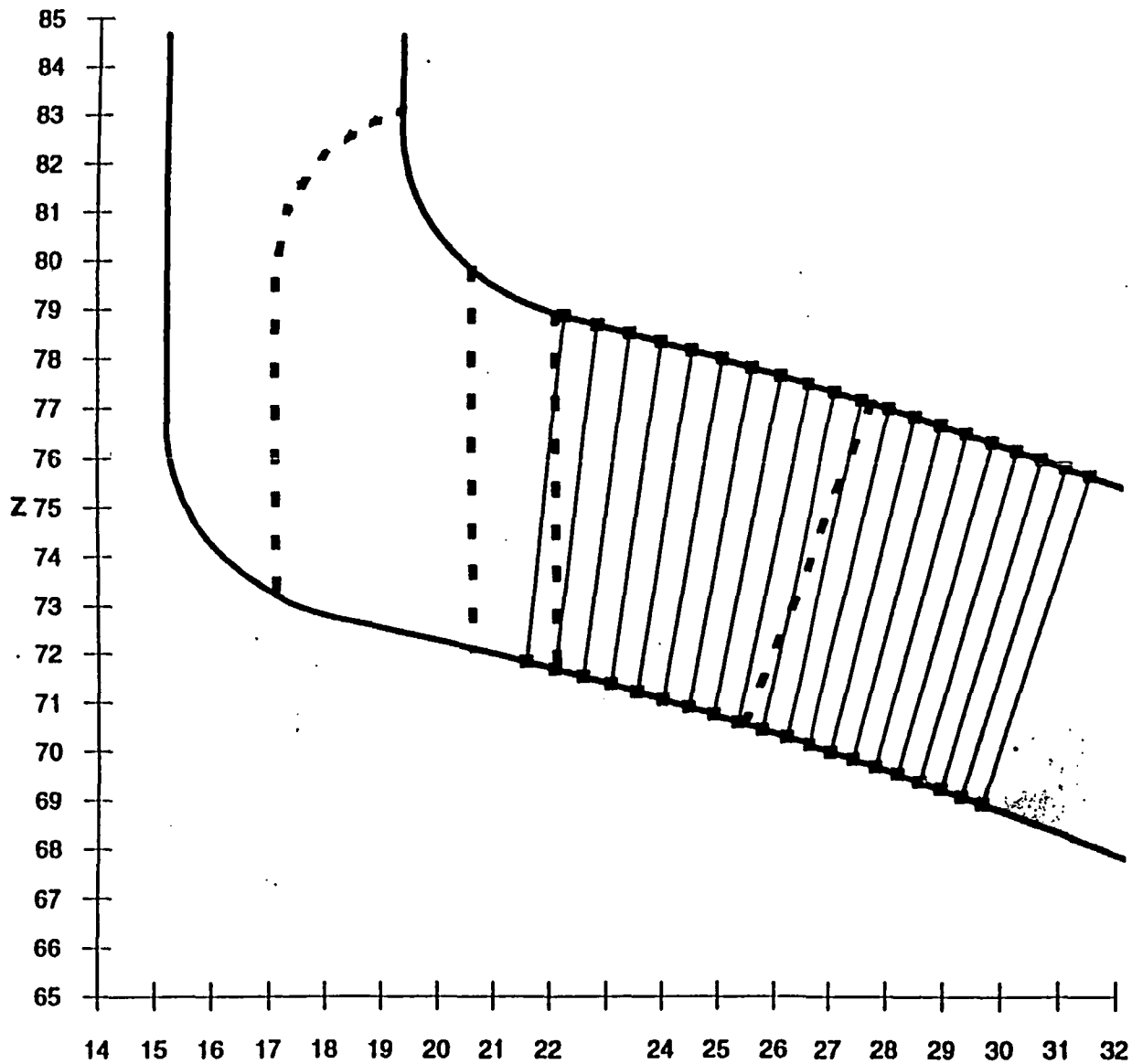
Table 7. Coverage Table: SG Outlet; 45°and 60° probes scanned transversely on vessel head and nozzle boss (no probe skewing).

Probe Angle	45°	45°	60°	60°
Probe Skew	90°	90°	90°	90°
Probe Location	Head	Boss	Head	Boss
% Exam Vol. (C-D-E-F) Covered	100%	0%	60%	0%
% Exam Vol. (B-C-F-G) Covered	14%	0%	0%	0%
% Exam Vol. (A-B-G-H-I) Covered	0%	0%	0%	0%
Percent Total Weld Exam Volume (A-B-C-D-E-F-G-H-I) Covered	39%	0%	22%	0%

section with the rays of the transverse scan of the 60° probe from the head through the weld examination volume. Figure 29 shows the cross section with the rays of the transverse scan of the 60° probe from the boss. Figure 30 shows the combined coverage achieved by all the transverse scans of the nozzle-to-head weld with no probe skewing.

Table 8 lists the coverage obtained from the transverse scans (+/-20° probe skewing) of 45° and 60° probes scanned on the vessel head and nozzle boss. Figures 31 through 34 support the calculated transverse scan coverage listed in Table 8. Figure 31 shows a cross section of the Palisades steam generator outlet nozzle upon which has been plotted the rays of the transverse scan of the 45° probe from the head through the weld examination volume with +/-20° probe skewing. Figure 32 shows the cross section with the rays of the transverse scan of the 45° probe from the boss. Figure 33 shows the cross section with the rays of the transverse scan of the 60° probe from the head through the weld examination volume. Figure 34 shows the cross section with the rays of the transverse scan of the 60° probe from the boss. Figure 35 shows the combined coverage achieved by all the transverse scans of the nozzle-to-head weld with +/-20° probe skewing.

Coverage For Probe Angle=45 Deg; Probe Skew=90 Deg (CP-SGPON)



Coverage For Probe Angle=45 Deg; Probe Skew=90 Deg (CP-SGPON)

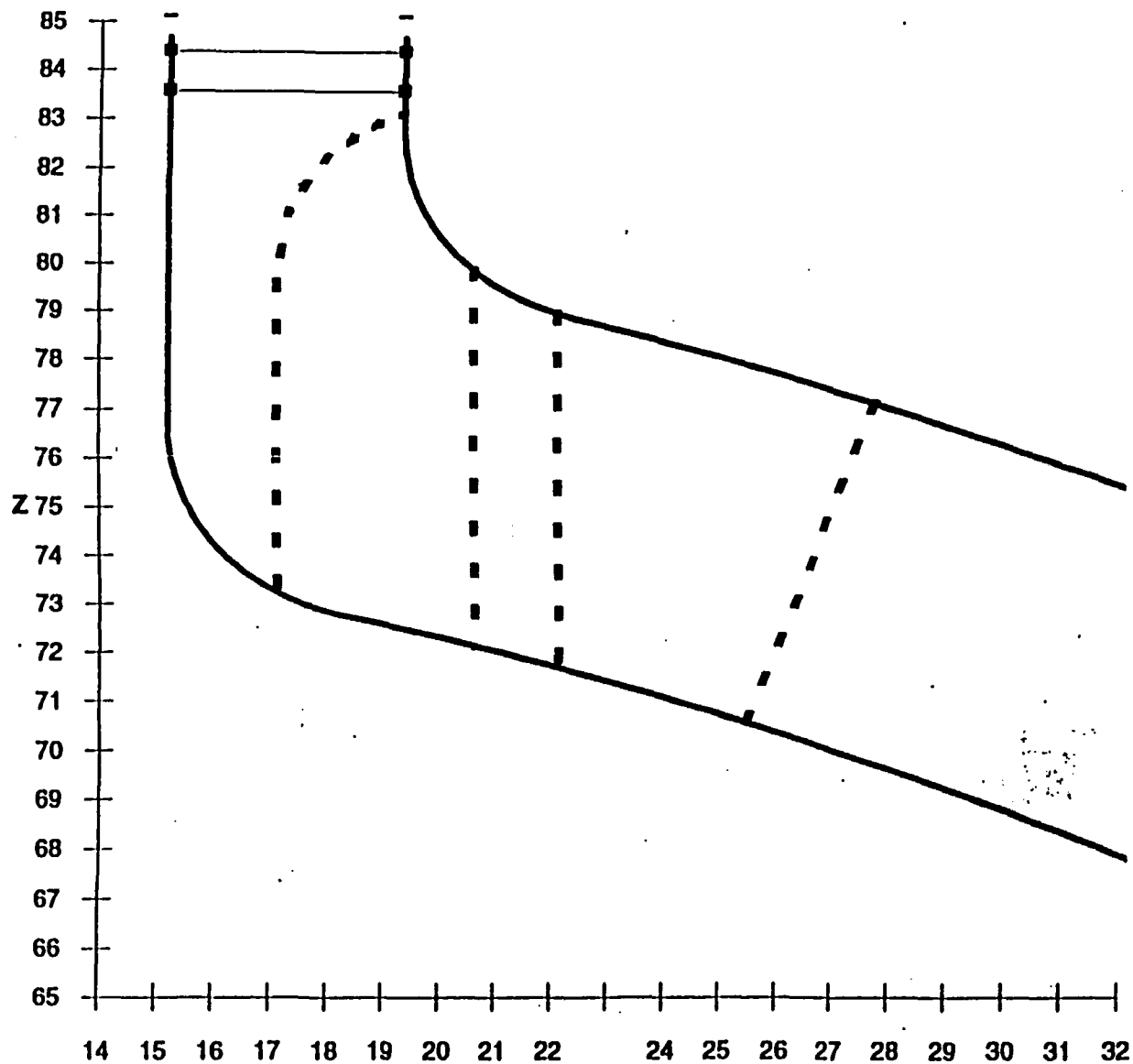
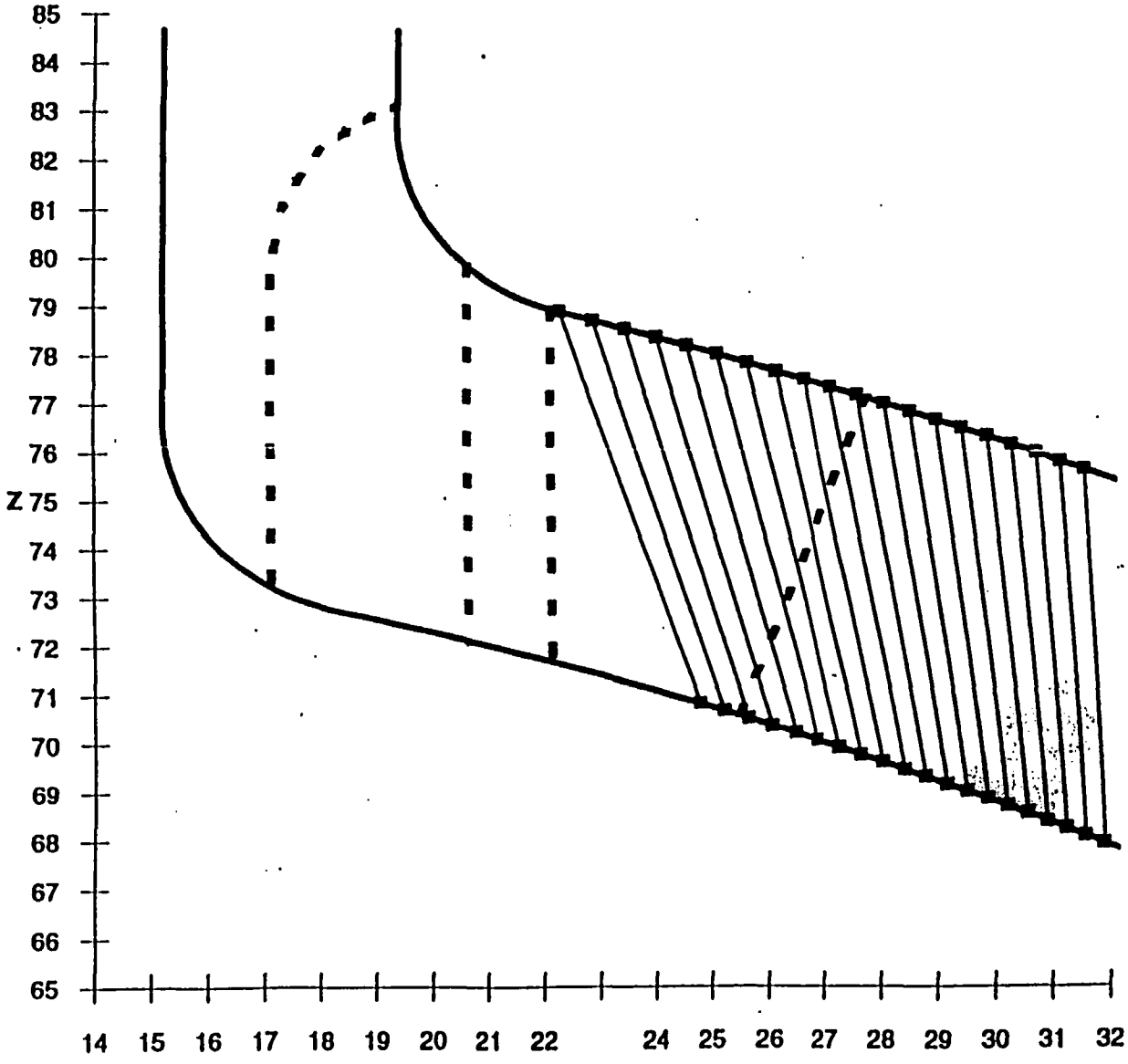


Figure 27

Coverage For Probe Angle=60 Deg; Probe Skew=90 Deg (CP-SGPON)



Coverage For Probe Angle=60 Deg; Probe Skew=90 Deg (CP-SGPON)

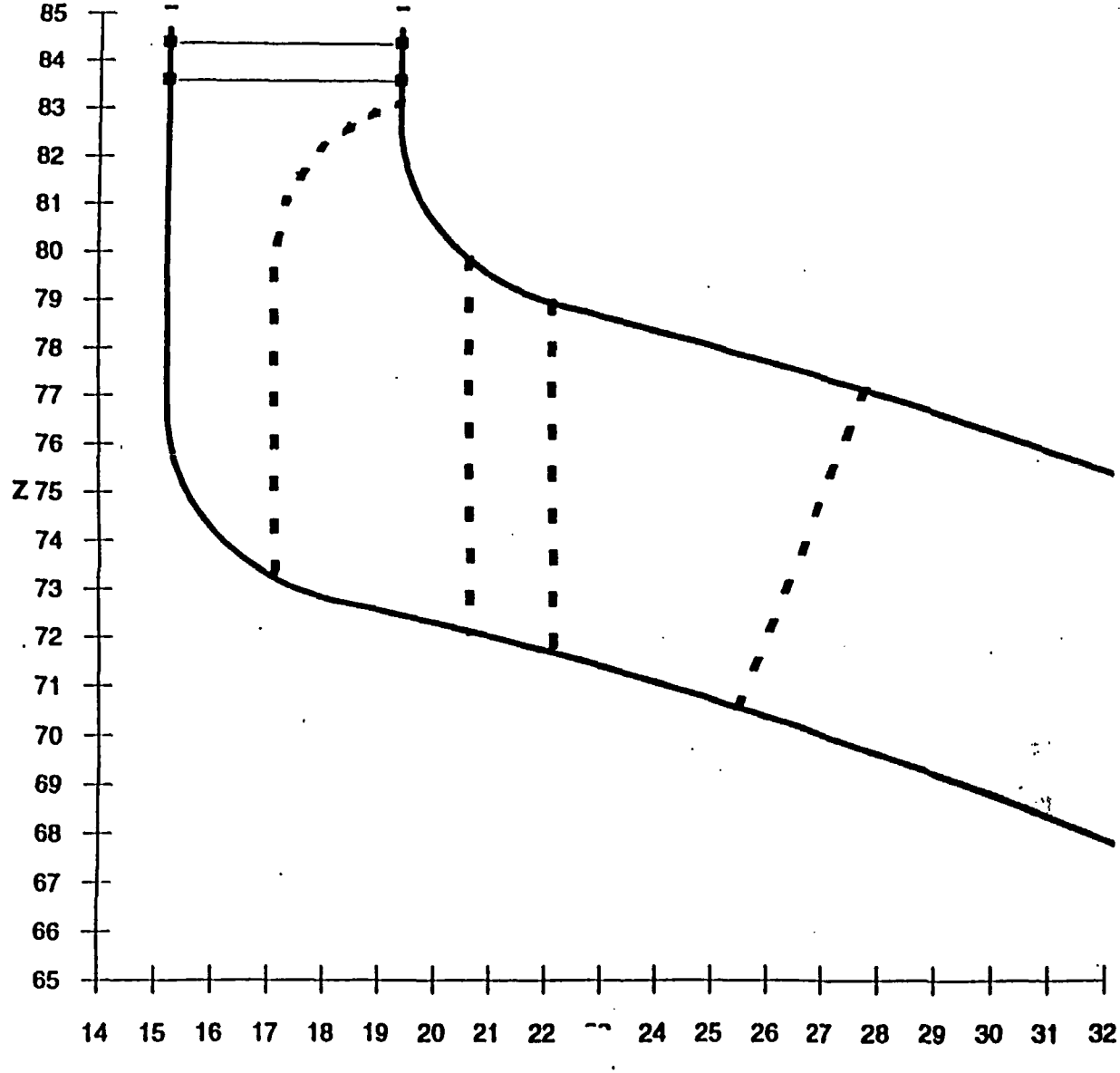


Figure 29

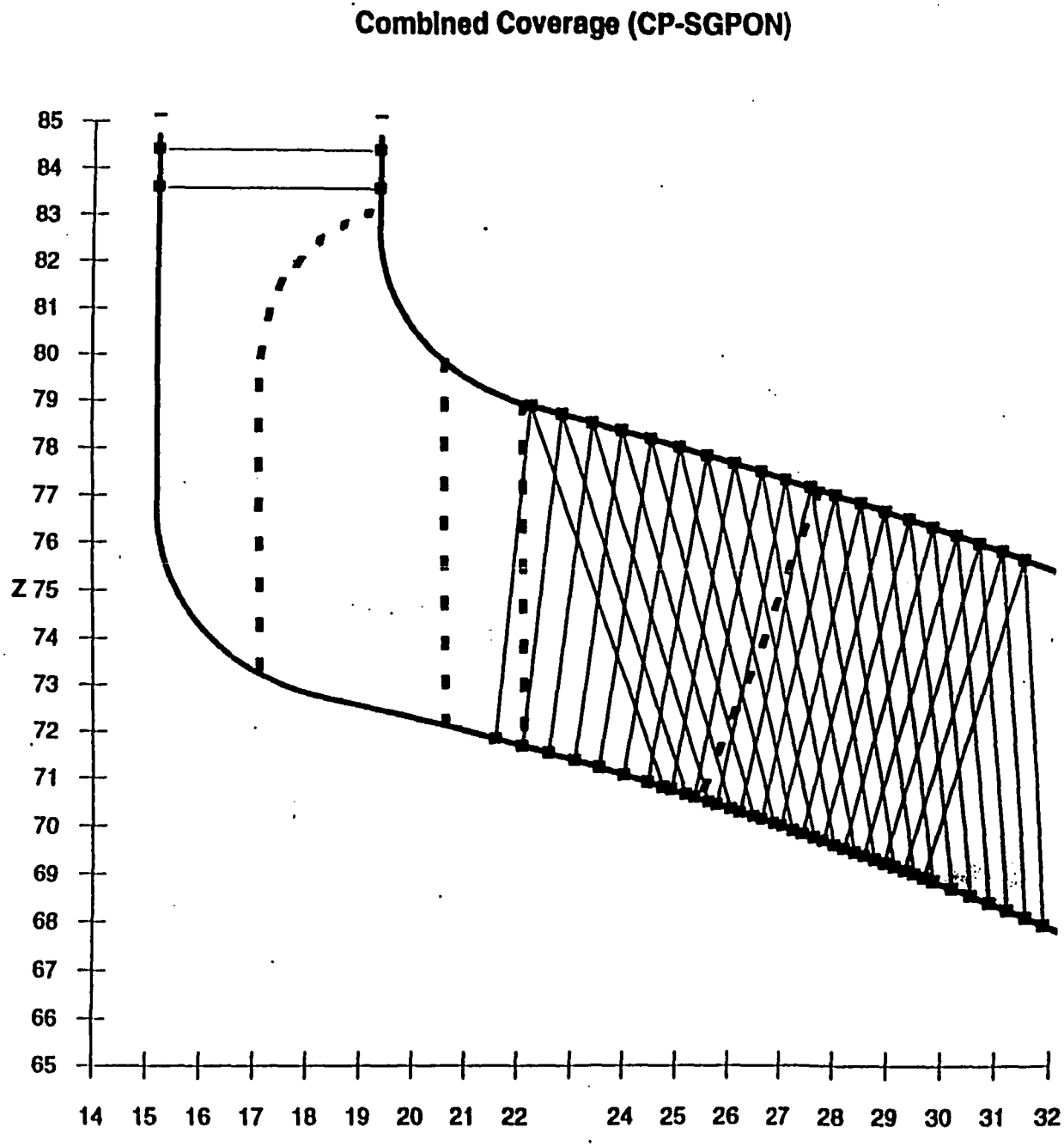

Combined Coverage (CP-SGPON)
85
84
83
82
81
80
79
78
77
76
Z 75
74
73
72
71
70
69
68
67
66
65
14
15
16
17
18
19
20
21
22
24
25
26
27
28
29
30
31
32

Figure 30

Table 8. Coverage Table: SG Outlet; 45°and 60° probes scanned transversely on vessel head and nozzle boss (+/-20° probe skewing).

Probe Angle	45°	45°	60°	60°
Probe Skew	70°	110°	70°	110°
Probe Location	Head	Boss	Head	Boss
% Exam Vol. (C-D-E-F) Covered	100%	0%	100%	0%
% Exam Vol. (B-C-F-G) Covered	80%	0%	59%	0%
% Exam Vol. (A-B-G-H-I) Covered	8%	0%	0%	0%
Percent Total Weld Exam Volume (A-B-C-D-E-F-G-H-I) Covered	54%	0%	47%	0%

Summary

The 35° contoured probe gives 100% coverage for the inner radius regions of both the SG inlet and outlet nozzles (See Tables 1 and 5). Table 9 summarizes the coverage of the nozzle-to-head weld for the SG inlet nozzle (See Tables 2 and 4).

Table 9. Summary Coverage Table: SG Inlet Nozzle-to-Head Weld.

Probe Angles	45° & 60°	45°& 60°	45° & 60°	45°& 60°
Probe Skew	0°	180°	70°	110°
Probe Location	Head	Boss	Head	Boss
Percent Coverage	79%	0%	63%	0%

Table 10 summarizes the coverage of the nozzle-to-head weld for the SG outlet nozzle (See Tables 6 and 8).

Table 10. Summary Coverage Table: SG Outlet Nozzle-to-Head Weld.

Probe Angles	45° & 60°	45°& 60°	45° & 60°	45°& 60°
Probe Skew	0°	180°	70°	110°
Probe Location	Head	Boss	Head	Boss
Percent Coverage	74%	0%	47%	0%

Coverage For Probe Angle=45 Deg; Probe Skew=70 Deg (CP-SGPON)

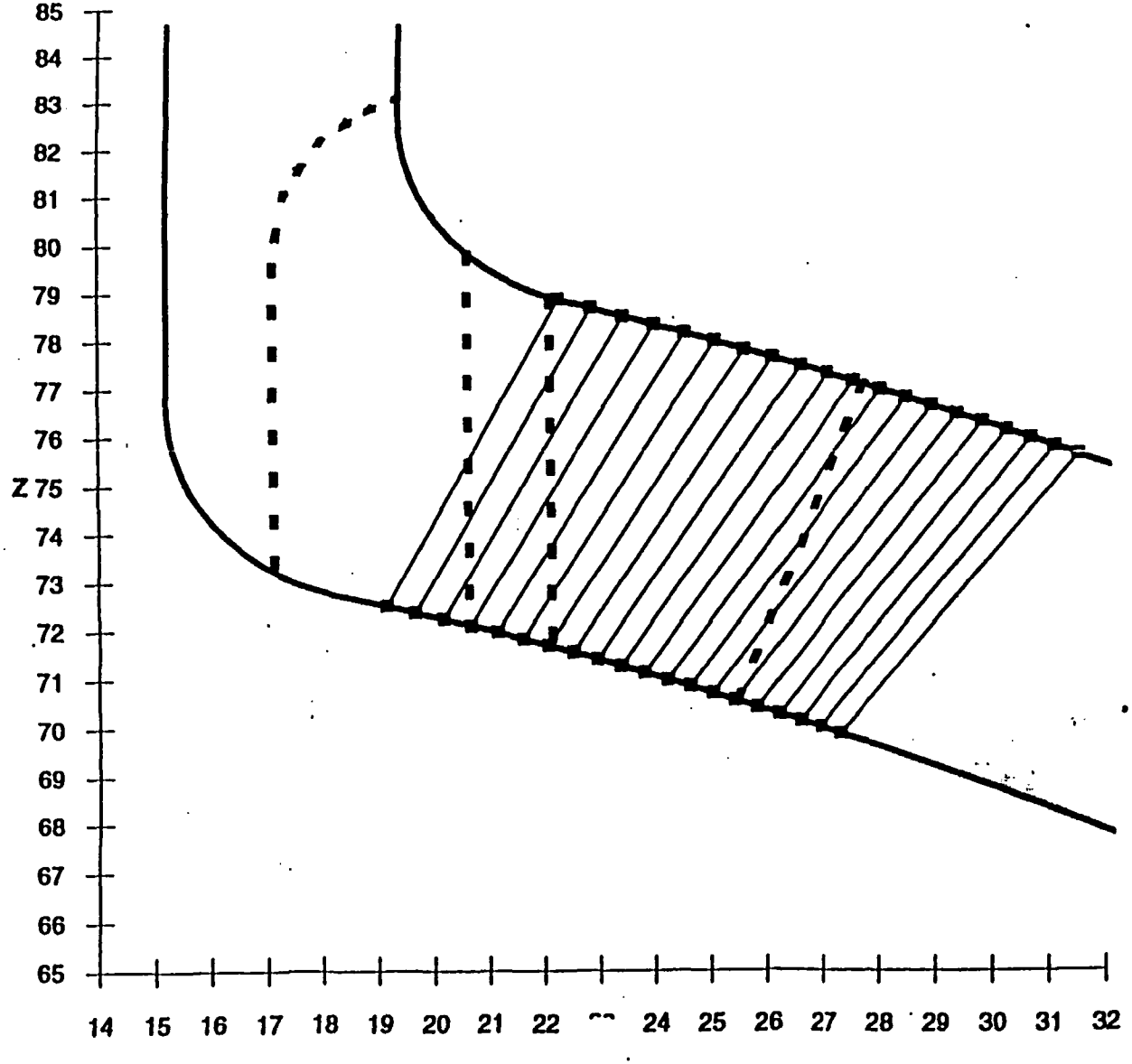


Figure 31

Coverage For Probe Angle=45 Deg; Probe Skew=110 Deg (CP-SGPON)

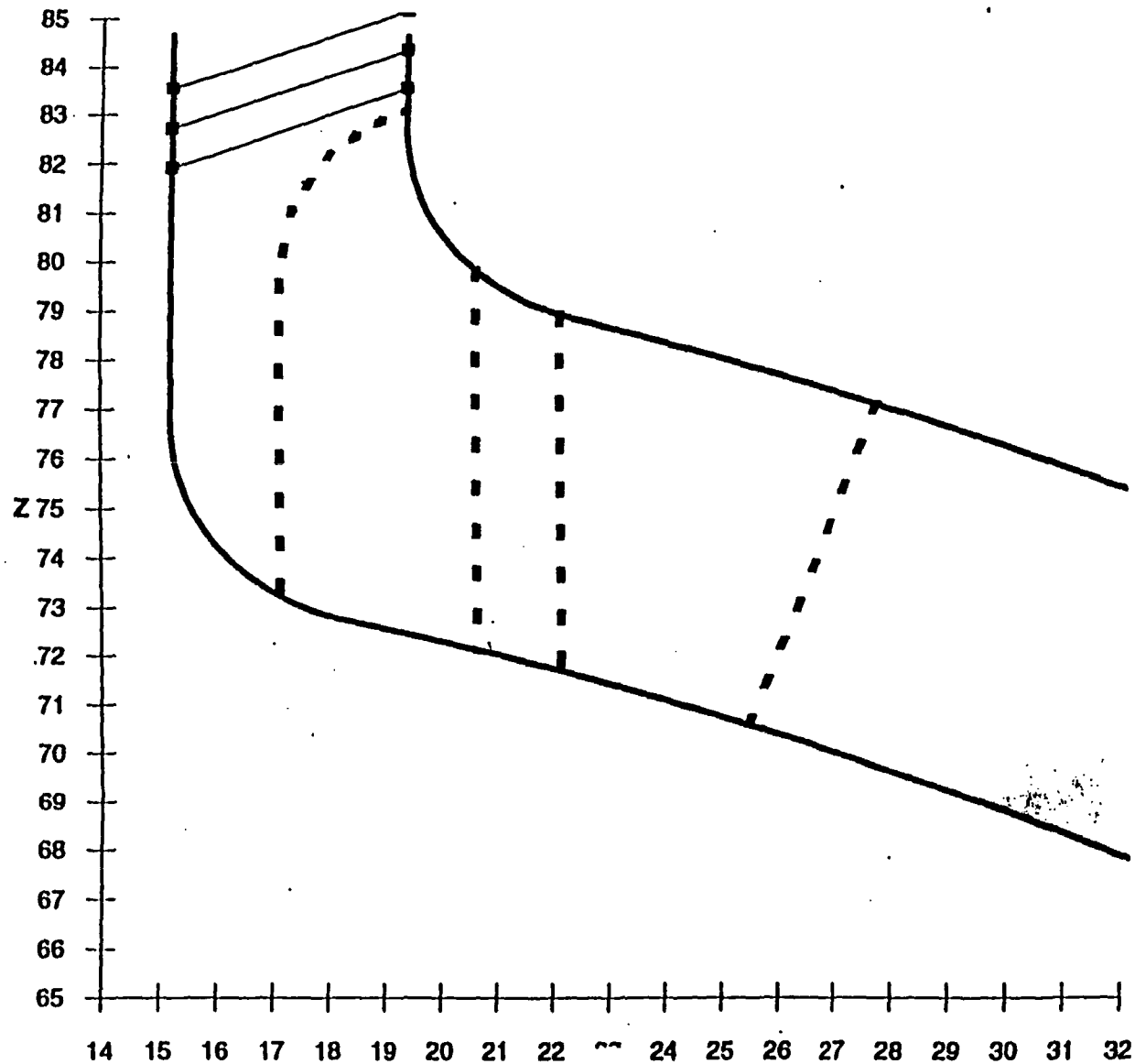


Figure 32

Coverage For Probe Angle=60 Deg; Probe Skew=70 Deg (CP-SGPON)

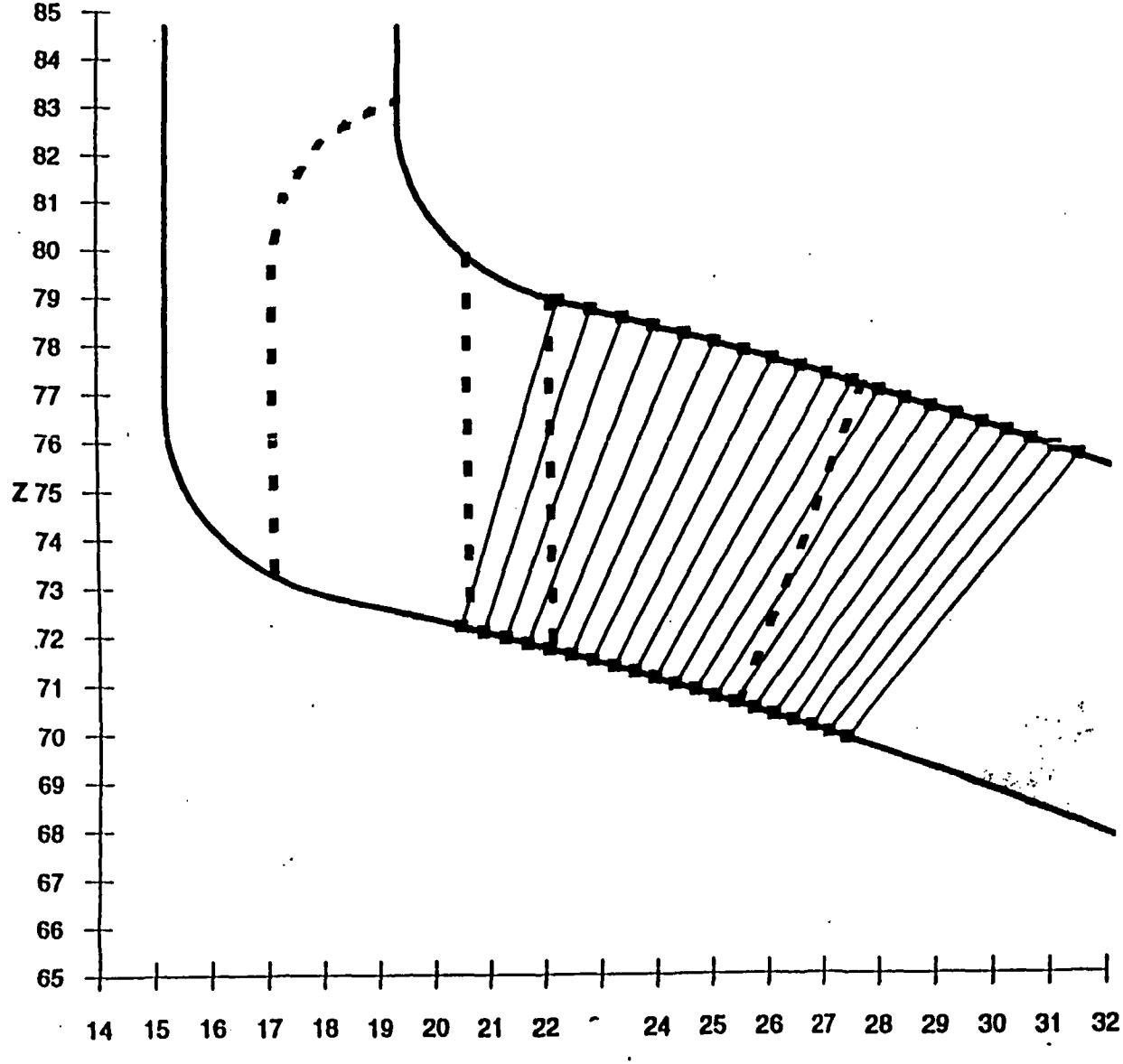


Figure 33

Coverage For Probe Angle=60 Deg; Probe Skew=110 Deg (CP-SGPON)

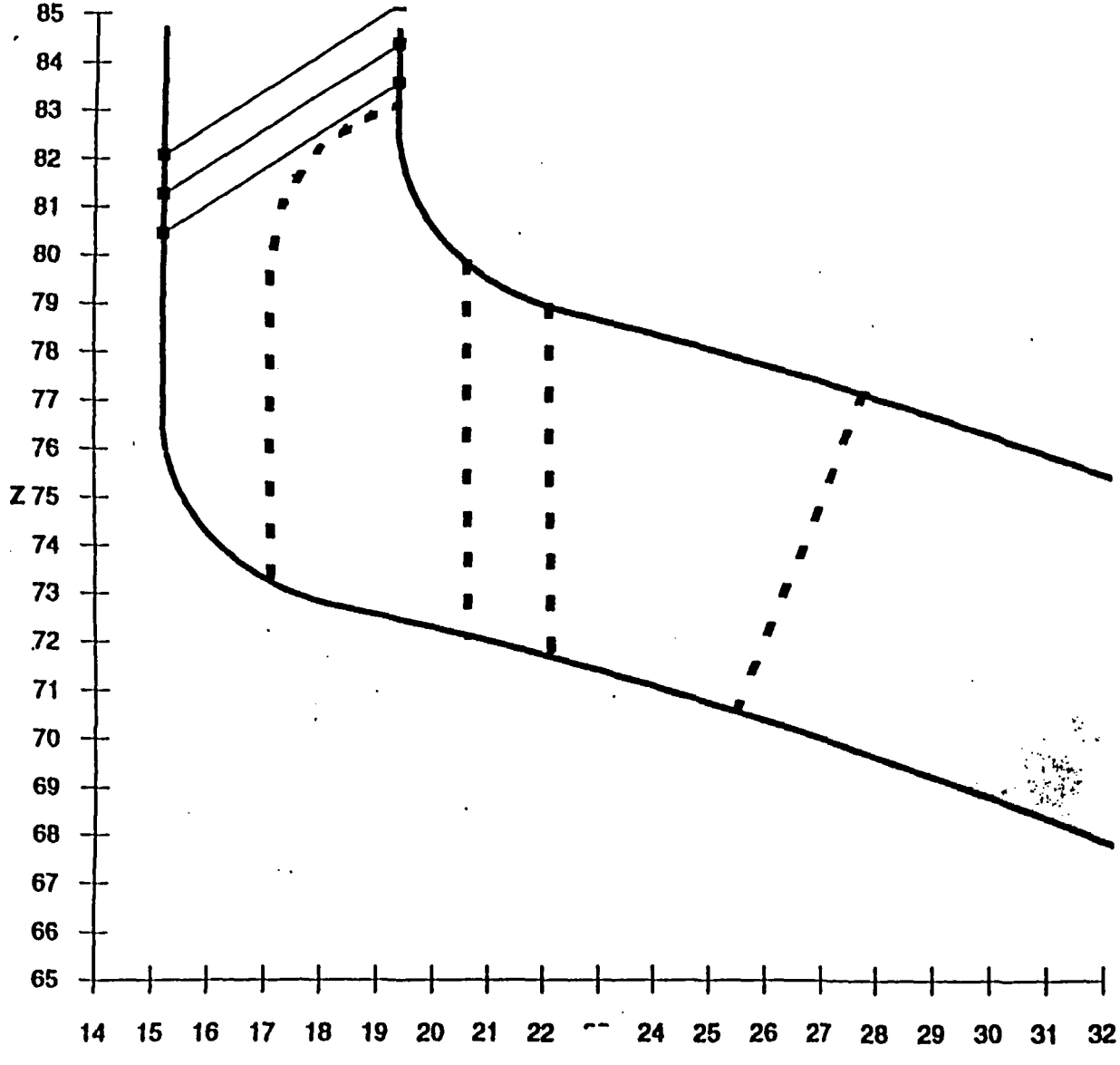


Figure 34

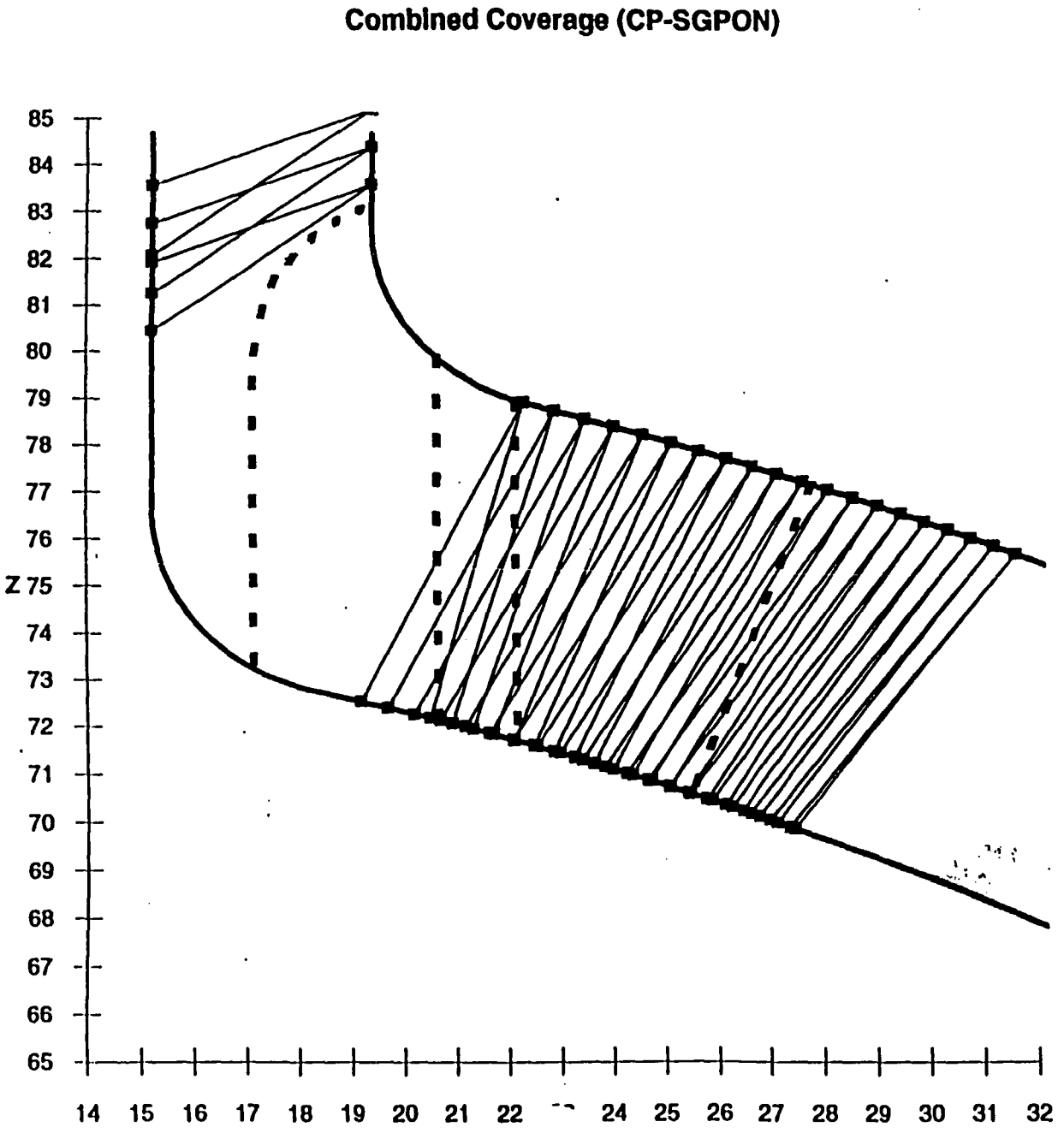

Combined Coverage (CP-SGPON)
85
84
83
82
81
80
79
78
77
76
Z 75
74
73
72
71
70
69
68
67
66
65
14 15 16 17 18 19 20 21 22 24 25 26 27 28 29 30 31 32

Figure 35