



GE Nuclear Energy

25A5669 SH NO. 1
REV. 2

REVISION STATUS SHEET

DOC TITLE REACTOR PRESSURE VESSEL

LEGEND OR DESCRIPTION OF GROUPS

TYPE: CODE DESIGN SPECIFICATION

FMF: QUAD CITIES 1 AND 2

MPL NO: PRODUCT SUMMARY SEC. 7

THIS ITEM IS OR CONTAINS A SAFETY RELATED ITEM YES ☒ NO ☐ EQUIP CLASS CODE P

REVISION				C
0	RM-01586	OCT 31 1994		
1	JL TROVATO	RJA		
	CN01849			
	CHK BY: JL TROVATO			
	ER MOHTASHEMI			
2	JL TROVATO	JAN 07 1995	RJA	
	CN02047			
	CHK BY: JL TROVATO			
	ER MOHTASHEMI			
PRINTS TO				
MADE BY		APPROVALS		GENERAL ELECTRIC COMPANY
A. FORTIN 10/18/94		E.R. MOHTASHEMI 10/18/94		175 CURTNER AVENUE
CHK BY		ISSUED		SAN JOSE, CALIFORNIA 95125
A. FORTIN 10/18/94		OCT 31 1994		
		R.J. AHMANN		CONT ON SHEET 2

MS-WORD

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PDR ADOCK 05000254
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1. SCOPE

1.1 This document defines the ASME Code design requirements for the reactor pressure vessel stress analysis for the new loads applied to the vessel as a result of the installation of the shroud stabilizers which function to replace the horizontal girth welds H1 through H7 in the shroud. In addition, the circumferential jet pump support plate H8 weld is cracked completely through and 360 degrees around.

2. APPLICABLE DOCUMENTS

2.1 General Electric Documents. The following documents form a part of this specification to the extent specified herein.

2.1.1 Supporting Documents

- | | |
|--|-------------------|
| a. Reactor Pressure Vessel Data Sheet | 21A1113AB Rev. 19 |
| b. Reactor Pressure Vessel, Purchase Specification | 21A1113 Rev. 1 |
| c. Reactor Vessel, Purchase Part | 886D485 P1 Rev. 4 |

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| d. Reactor Thermal Cycles | 921D265 Rev. 1 |
| e. Nozzle Thermal Cycles | 158B7279 |

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| f. Vessel Flange Bolting | 885D911 Rev.2 |
| g. Nozzle End Preparation | 107C5305 Rev.2 |



- h. Standard Requirements For Core Structure 21A3319Rev.5
- i. GENE-771-71-1094, Rev. 1; "Quad Cities Units 1&2 Shroud Repair Seismic Analysis".
- j. GENE-771-67-1094, Rev. 1; "Quad Cities, Units 1&2 Shroud Repair Program - Backup Calculations for RPV Stress Report No. 25A5672.

2.1.2 Supplemental Documents. Documents under the following identities are to be used with this specification:

- a. Shroud Stabilizer Hardware Design Specification 25A5668 Rev. 2

2.2 Codes and Standards. The following documents of the specified issue form a part of the specification to the extent specified herein.

2.2.1 American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code

- a. Section III, 1965 Edition with Addenda through Summer 1965
- b. Section XI, Rules for Inservice Inspection, 1989 Edition with no Addenda

2.2.2 Other Documents

- a. UFSAR, Quad Cities 1 and 2
- b. Shroud Support VPF 1744-139-6
- c. Certified Design Documents for Quad Cities 1 and 2 VPF 1744-211-2
(Stress Report)
- d. ComEd Technical Requirements Document for Dresden/Quad Cities Core Shroud Repair, NEC-12-4056 Rev.0
- e. BWROG - VIP, Core Shroud Repair Design Criteria, latest revision.

3. GENERAL DEFINITION

3.1 The purpose of the shroud stabilizers is to structurally replace all of the horizontal welds (H1 through H7) in the shroud. These welds were required to both horizontally and vertically support the core top guide, core support plate, and shroud head, and to prevent core bypass flow to the downcomer region. Weld H8 is a circumferential inconel-to-inconel weld between the shroud support ring and jet pump support plate which provides horizontal support for the core shroud. The core top guide and core support plate horizontally support the fuel assemblies and maintain the correct fuel channel spacing to permit control rod insertion, as well as having other structural functions. New loads are applied to the reactor pressure vessel as a result of the installation of the shroud stabilizers.



3.2 All of the non ASME Code requirements for the shroud stabilizers are defined in the Document of Paragraph 2.1.2.a. The ASME Code requirements are defined herein.

4. REQUIREMENTS

NOTE(S):

- 1) The shroud stabilizer hardware will be designed and constructed to the requirements of GE Specifications 25A5668 and 25A5670, respectively.
- 2) The core shroud was not supplied as an ASME Code Component. However, Section XI requires Inservice Inspection (ISI) of the core support structures.
- 3) The required Replacement Program is different than most Replacement Programs, because the stabilizers are not a direct replacement. Instead, the structural functions of the shroud horizontal welds are replaced by new components. Any defects found in the horizontal welds are acceptable after the installation of the stabilizers.

4.1 The shroud stabilizers change the points of application of the forces applied to the reactor pressure vessel from the core shroud. These new forces shall be analyzed in accordance with the original Code of Construction (document in Paragraph 2.2.1.a).

4.2 The new forces and their points of application are defined in Figure 1, and in Table 1. The values given in Table 1 shall be combined with the forces defined in the Design Specification (documents of Paragraphs 2.1.1.a through 2.1.1.e).

4.3 The original purchase specification for the reactor pressure vessel (document of Paragraph 2.1.1.b) specified that the boundary of jurisdiction of Section III of the ASME Code (document of Paragraph 2.2.1.a) shall include all attachments to the pressure boundary parts, but does not include the components that are welded to the attachments. Thus, the jurisdiction of the original Code of Construction included all weld build up pads used to attach internal components to the reactor pressure vessel, but did not include the shroud support within the boundary of Code jurisdiction. The boundary of ASME Code jurisdiction is shown in Figure 2.

4.4 The analysis required by this Design Specification shall be Certified, to the ASME Boiler and Pressure Vessel Code Section III, 1965 Edition with Addenda through Summer 1965.



5.0 PROFESSIONAL ENGINEER CERTIFICATION

To the best of my knowledge and belief, this Design Specification satisfies the requirements of the ASME Boiler and Pressure Vessel Code 1965 Edition with Addenda through Summer 1965.

Signature: Edward H. Montashemi

Date: 1/7/95

License Number: _____



State: California



ADDITIONAL DESIGN MECHANICAL LOADS

<u>DBE</u>			
<u>FORCE</u>	<u>OBE</u>	<u>EMERGENCY</u>	<u>FAULTED</u>
F ₁	79,500 lb.	159,000 lbs	158,500 lb.
F ₂	16,500 lb.	33,3000 lb.	33,300 lb.
F ₃	47,700 lb.	95,400 lb.	94,600 lb.
F ₄	205,000 lb.	416,000 lb.	416,000 lb.

F₁, F₂, F₃ and F₄ are discrete loads applied over a small area. At any one point in time, F₁, F₂ and F₃ are each applied to one location. At any one point in time, F₄ is applied to 4 locations 90° apart for the installation of four shroud stabilizer assemblies. DBE is a Design Basis Earthquake.

F₁, F₂ & F₃ loads are from document of Paragraph 2.1.1.i.

F₄ loads are from document of Paragraph 2.1.1.j.

For an Emergency Condition with faulted pressures and no seismic loads, F₄ = 226,000 lbs. (Ref. 2.1.1.j).

For an Upset Transient Condition (ΔP + Thermal) and no seismic loads, F₄ = 269,000 lbs. (Ref. 2.1.1.j).

The stress intensities shall meet the stress allowables of the ASME Code, Section III, for the load combinations defined by the Quad Cities UFSAR. The original Code of Construction did not include Faulted load combinations. Faulted load combinations shall meet the stress allowables as defined by the Quad Cities UFSAR for the reactor pressure vessel.

TABLE 1

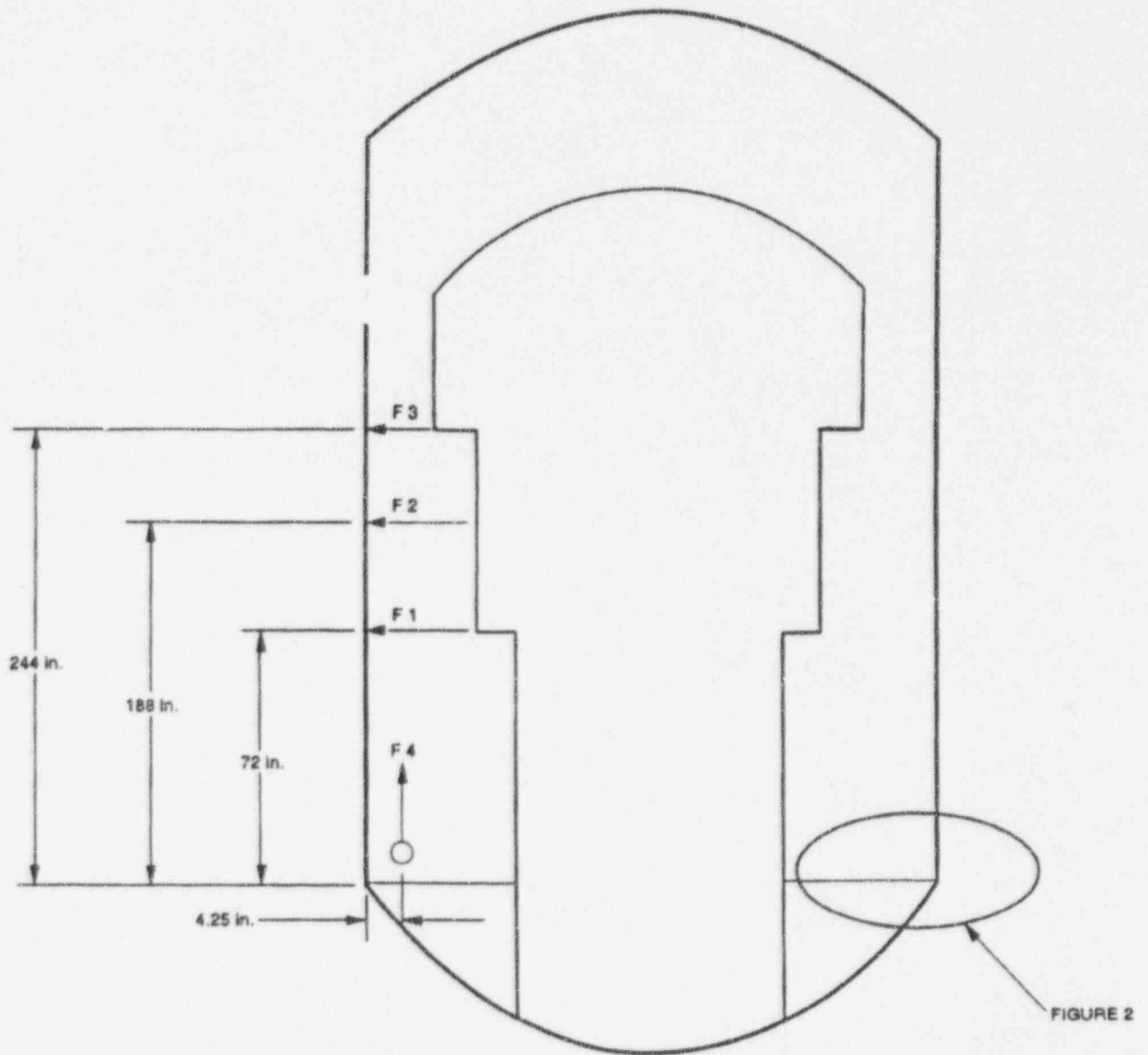


Figure 1. Application of Design Mechanical Loads

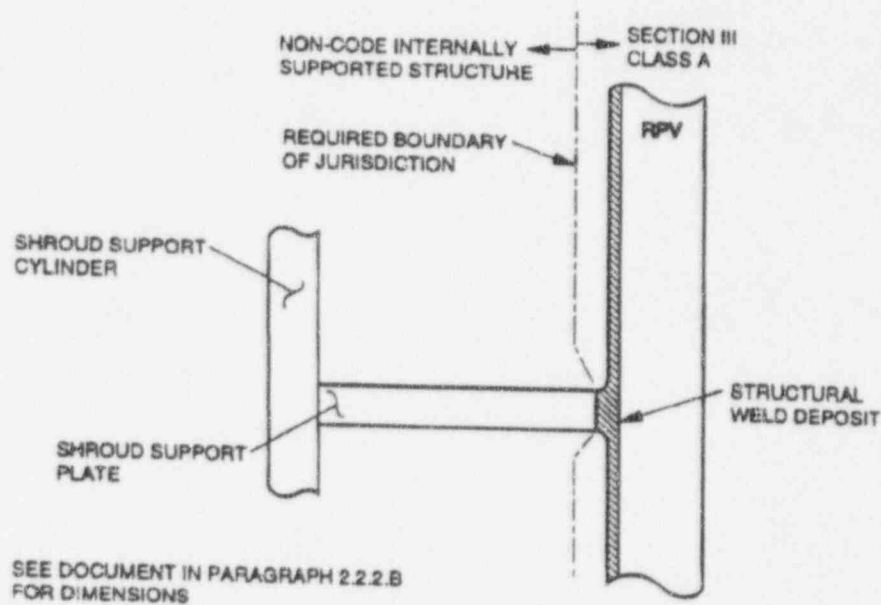


Figure 2. Boundary of ASME Code Jurisdiction

Enclosure 3
GENE Fabrication Specification, 25A5670, Revision 2
"Quad Cities Units 1 & 2 - Fabrication of Shroud Stabilizer"