

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-219/84-07

Docket No. 50-219

License No. DPR-16 Priority -- Category C

Licensee: GPU Nuclear Corporation

P.O. Box 388

Forked River, New Jersey 08731

Facility Name: Oyster Creek Nuclear Generating Station

Inspection At: Parsippany, New Jersey - Corporate Offices

Inspection Conducted: March 8, 1984

Inspectors: *J. H. Raval*
for J. H. Raval
Reactor Engineer

5/1/84
date

C. J. Cowgill
for C. J. Cowgill
Senior Resident Inspector

5/2/84
date

Approved by: *J. P. Durr*
for J. P. Durr, Chief
Materials and Processes Section

5/1/84
date

Inspection Summary:

Inspection on March 8, 1984 (Report No. 50-219/84-07)

Areas Inspected: Special announced inspection of activities associated with torus shell thickness. The inspection involved 14 hours off site by one regional based inspector and one senior resident inspector at the corporate office of GPU.

Results: No violations were identified.

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DETAILS

1. Persons Contacted

GPU Nuclear Corporation

- *R. F. Wilson, Vice President, Technical Functions
- *R. W. Keaten, Director, Engineering Projects
- *J. Thorpe, Director, Licensing and Regulatory Affairs
- *M. Laggart, Manager, Licensing QC
- *R. Lorenzo, Manager, Oyster Creek Projects
- *J. J. Higuera, Project Engineer
- *Attendees at Exit Meeting

2. FSAR Commitments for Vent System of Pressure Absorption Chamber (Torus)

The following principal design parameters were identified per FSAR and its associated amendments:

Design Code:

ASME B&PV Code Section VIII and Nuclear case interpretations 1270N-5, 1272N-5 and other applicable case interpretations.

Metal Material: SA212GRB to A300

Vent Pipes

Number	10
Internal diameter	6 ft 6 in.
Break area/vent pipe area	0.0194

Downcomer pipes

Number	120
Internal Diameter	1 ft 11-1/2 in.
Submergency below absorption pool water level	4 ft

Design Conditions:

Design internal pressure and temperature	62 psig @ 175° F 35 psig @ 281° F
Design external pressure and temperature	2 psig @ 150° F to 205° F

Normal internal pressure and temperature	atm. pressure up to 150° F
Calculated peak blowdown pressure & Temp.	33 psig @ 275° F
Calculated equilibrium pressure & temp.	20 psig @ 250° F
Design leakage rate	0.5%/day at 35 psig
Downcomer vent pressure loss factor	6.1
<u>Pre-Operational Testing Pressures</u>	
Pressure proof test on drywell, vents, and penetrations	62 psig
Pressure proof test on combined system of drywell and absorption chamber	35 psig
Leakage rate test of combined system	20 psig
<u>Pressure Absorption Chamber</u>	
Water volume	83,400 ft. ³
Free air volume	127,000 ft. ³
Chamber inner diameter	30 ft
Torus major diameter	101 ft
<u>Design Conditions</u>	
Design internal pressure & temperature	35 psig & 150°F
Design external pressure & temperature	1 psig @ 150° F
Normal internal pressure & temperature	atm. pressure @ 50°F to 100°F
Normal water temperature	50°F to 100°F
Normal water level (above bottom of chamber)	11 ft 11-5/16 in. to 12 ft 3-5/16 in.
Corrosion Allowance:	Not stated

3. LICENSEE'S DESIGN DOCUMENTS REVIEW

The following licensee's design documents were audited to ascertain that the design requirements as described in paragraphs 2 were met:

- a. S-2299-4 Reactor Drywell And Suppression Chamber Containment Vessels - Burnis & Roe
- b. 9-0971 Structural Design Of The Pressure Suppression Containment Vessels - CB&I
- c. Form U-1 Manufacturer's Data Report For Unfired Pressure Vessels.

Upon auditing the above documents, it was concluded that the design requirements were adequate and the following additional design information was available:

Nominal Torus Shell Thickness: Top half - 0.328" (Vapor phase)
Bottom half - 0.385" (Submergence phase)

Nominal Down Comer Pipe Thickness: 1/2" to 1/4"

Nominal Vent Header Thickness: 1/4"

Nominal Ring Girder Thickness: 1"

Original surface preparation and priming for torus and vent pipes: 3SPC-SP3 and one coat of primer conforming to TT-P-86C Type 1 or 2 or approved equal (Red lead primer).

No violations were identified.

4. PREVIOUS TORUS MODIFICATION HISTORY

In 1977, the torus shell was emptied out to perform torus shell welding repair for pitted and corroded areas in the submergence phase. The licensee stated that no indication of corrosion in the vapor phase was found and also emphasized that to date there is no metal loss in the vapor phase of the torus shell.

The inspector reviewed the several photographs taken in 1977 prior to and after the weld repair for pittings and corrosion inside the submergence phase of torus. The licensee made UT thickness measurements and mapped the pits for the inside of the torus shell (submergence phase only). The inspector audited the specification #125-75-10, "Torus Shell Welding Repair", which described the following acceptable weld repair methods:

- a. Weld Buildup - Buildup of thinned area by deposit of weld metal to 0.385 inch minimum original torus shell thickness.
- b. Internal Patch - Full fillet weld all around with patch having 0.385 inch minimum thickness (thinned area was 6 inches in diameter).
- c. Butt Weld Patch - Full penetration butt weld, all around replacement patch having 0.385 inch minimum thickness.

The Licensee stated that several paint failure areas were again surface prepared and a fresh coat of lead primer was applied. The inspector concurred with the licensee's methods based on the photographs of the affected areas.

The licensee stated that UT thickness measurements taken in 1977 did not show any metal loss below required minimum thickness of 0.385 inch and these documents are on site and readily available for SRI review. This issue is considered unresolved pending the availability and NRC review of documentation regarding this matter (219/84-07-01).

5. 1983/1984 Torus Modifications:

The inspector solicited information on present day modifications being performed on the torus shell. The licensee responded that the vent system and torus shell are being repaired for corrosion and pittings and they are to be recoated with an approved paint after surface prep (sand blasting to bare white metal).

The inspector audited a mapping of one bay area for pitting. There are a total of 20 bay areas on the vent system and torus shell. The deepest pit in the vent system was 55 mils deep and in the torus shell was 90 mils deep.

Licensee's consultant, MPR Associates, Inc., has developed an acceptance criteria for permissible average wall thickness reduction in vent system components and in the torus shell based on Mark I program stresses and actual material properties. The inspector audited the acceptance criteria and based on code compliance requirements found it acceptable. The following parameters for available margins were used in any combinations, against largest average metal loss occurring in pitted and/or corroded areas to derive the acceptable thicknesses of the vent system and torus shell:

- APT - Actual plate thickness margin over nominal thickness

- SM - Stress margin per Mark I program stresses
- MPM - Material property margin based on higher-than-minimum tensile strength
- PMT - Permitted mill tolerance

Based on above criteria, bay 1 deepest pits in the vent system of 55 mils and in the torus shell of 90 mils were justified to be in the acceptable range for minimum thickness requirements. The same criteria was applied to all remaining 19 bays to justify the largest metal loss due to the pitting and/or corrosion.

The licensee acknowledged that they did not have any metal loss of 100 mils or above for any torus components. The inspector made overall cursory audit of the remaining bays and found it in agreement with the licensee's finding.

No violations were identified.

6. Torus Shell Thickness Document Review

The inspector audited the thickness profiles of the two affected areas in torus shell (submergence phase) which indicated the average thickness in excess of minimum requirements. These two areas were considered most probable areas of reduced thickness from the 1977 UT results.

The licensee agreed to perform UT for two more areas in the vapor phase of the torus shell to prove their compliance with the minimum thickness requirements. These results will be available on site for SRI audit.

The licensee concluded the status of the repairs, in square feet, as follows for 1983/1984 torus modifications:

- a. Vent System - 250 sq. ft. approx.
- b. Torus Shell - 10 sq. ft. approx.

The vapor phase of the torus shell UT measurements issue is considered unresolved pending NRC review of documentation regarding this matter (219/84-07-02).

7. Repair Criteria For Pits

The licensee's consultant, MPR Associates, Inc., provided the following repair criteria for pits prior to coating:

1. Vent System - weld repair if 80 mil or greater
2. Torus Shell - Weld repair if 100 mil or greater

However, the licensee stated that they would perform weld repair for 40 mil or greater pits and thin vertical wall pits will be filled with epoxy.

No violations were identified.

8. Unresolved Items

Unresolved items are matters about which more information is required to ascertain whether they are acceptable items, violations or deviations. Unresolved items are discussed in paragraph 4 and 6 of this report.

9. Exit Interview

The inspector met with licensee representatives (denoted in paragraph 1) at the corporate office of GPU, at the conclusion of the inspection on March 8, 1984. The inspector summarized the scope and findings of the inspection. At no time during this inspection was written material provided to the licensee by the inspectors.