NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Oyster Creek	0 5 0 0 0 2 1 9	1 OF 0 4

TITLE (4)
Torus Corrosion Pitting and Missing Structural Welds

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
			8 4	0 0 6	0 0	0 5	3 1	8 4		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	X OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	Voluntary Report
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Maurice Higuera	2 0 1 2 9 9 - 2 0 7 5

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

The Torus, or Pressure Suppression Chamber, is a large donut-shaped vessel situated beneath the Drywell. The Torus and Drywell constitute the Mark I BWR primary containment. In the event of a loss of coolant accident in the Drywell, steam is discharged to beneath the level of water in the Torus via vent lines, header and downcomers where it is condensed.

As a result of blast cleaning Torus structure components during the 1983 refueling/maintenance outage areas of corrosion pitting were uncovered, evaluated and repaired where necessary. In addition, missing fillet welds on two (2) of twenty (20) ring girders were found, as were missing fillet welds on ring girder flange to web reinforcing plates. All missing welds were repaired.

The report herein is considered a voluntary report. As such, event date is not considered applicable. Approximate time frames are discussed in the text. Failure data is not applicable to this report as no component failures occurred.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

TORUS CORROSION PITTING

Structural modifications to the Torus, in support of the Mark I program, required blast cleaning the outside bottom of the Torus shell. This work began during the Fall of 1981 and led up to positioning the large hoop straps to the Torus prior to Spring 1982. The plant shut down early in 1983 for a major refueling/maintenance outage and the Torus was hydrolayzed with processed, demineralized Torus water, and brush-off blast cleaned at locations where welding was to be performed.

The initial brush-off blast cleaning revealed no increased pitting of the Torus shell from that observed in the Summer 1978 and Spring 1980 draining operations. During the 1983 outage four (4) temporary openings provided access to the Vent System interior for the first time. No substantial corrosion pitting was observed; i.e., the corrosion pitting was less severe than what was left on the Torus shell after the 1978 Summer evaluation and repairs. On the interior and exterior surfaces of the Vent System, the area blast cleaned was limited to six inches around the downcomers. This was in support of installing the vent header to downcomer reinforcement. There was no indication at this time that the areas which would eventually require weld repair were pitted to the extent later revealed by blast cleaning with steel grit to white metal in preparation for coating application. The severity of corrosion in the Vent System became apparent for the first time during October-November 1983 when the Torus Vent System interior was blast cleaned in its entirety. The results of this blast revealed moderate corrosion pitting in the ten vent lines and vent header, and severe pitting concentrated along the plate miter welds in the vent header/vent line junctions. At this point a program was established to evaluate and repair these newly discovered pitted areas of the Torus.

Corrosion evaluation, i.e., mapping, began October 25, 1983. Vent header/vent line junction weld repair began on November 2, 1983. At this time, the repairs were directed at the vent line to vent header intersections to areas where pitting was in excess of .025 inches. Actual wall thickness measurements were not factored into the decision to start weld repairs to the Vent System at this time. Concurrent with the start of repair in the vent header/vent line junctions, mapping of corrosion area size and depth, actual plate thickness measurements, and stress margins were evaluated. Plate area specific repair criteria was established and the areas requiring repair were mapped for weld repair. The evaluation called for repair by welding all corrosion pitting that resulted in no margin when taking credit for actual plate thickness, stress margin and permitted mill tolerance on plate thickness. No credit was taken for size nor location of corrosion area in the Vent System. The evaluation for weld repair was carried out as if the entire plate where corrosion was present was missing wall thickness throughout its entire surface corresponding to the largest pitting depth measured.

Approximately 138 square feet of weld metal was deposited at the vent header/vent line junctions, 20.2 square feet on the downcomers and 24.2 square feet on vent header plates where corrosion was present.

For the Torus shell evaluation no credit was taken for actual wall thickness of the plate around the pitted areas. Factored into the evaluation was the size of the corroded area and the location of this area relative to structural attachments, i.e., ring girders or saddles. The criteria for repairs to the Torus shell was to maintain a .020 inch of a margin above the Mark I program stress results.

The Mark I stress results were converted to a stress margin value for nominal plate thickness and minimum ASME material properties. Sampling work done in 1978 showed that Torus shell plates were slightly thicker than nominal plate. No credit was taken for ASME/ASTM plate thickness undertolerance margin. A total of 11.2 square feet of weld metal was deposited on the Torus shell. Records of actual Torus vessel plate material properties indicate a ten (10) percent higher tensile strength than ASME Code minimum. No credit was taken for the higher strength Torus plate.

The weld repairs consisted of Shielded Metal Arc Welding (SMAW) using procedures qualified to ASME Section III, Division I, Subsection NE, 1977 Edition through Summer 1978 Addenda. The weld method utilized is commonly called "stringer bead". For vertical uphill welds and overhead welds a "weave" technique was employed. Prior to depositing weld metal in a designated area, the area in question was excavated by grinding to sound metal and inspecting the cavity to ensure complete removal of the nonconformity. The weld repair was ground smooth and the repaired surface left raised approximately 1/16 inch above the surrounding plate area. The repair was then inspected by the Magnetic Particle method. In addition, when the repair cavity exceeded 50 percent of wall thickness, radiographic examination of the repair was performed as permitted by 1962 ASME Section VIII, the original code for the Torus. A total of four (4) single pit repair areas exceeded 50 percent of wall thickness and were radiographed. This amounts to three (3) square inches of weld area for the entire Torus vessel.

TORUS MISSING STRUCTURAL WELDS

Two (2) of twenty (20) ring girders were found to have a section of fillet weld missing. The missing weld sections were ring girder to torus shell fillet welds. Each missing section was approximately 24 inches long. the ring girders are located inside the Torus and are sectional, circumferential reinforcements. In addition, various fillet welds were found missing at the

ring girder flange to Torus shell inner web reinforcing plates. At each ring girder flange there are four (4) inner web reinforcing plates at the inboard equator and four (4) inner web reinforcing plates at the outboard equator. On an average, each ring girder had 4.5 ring girder flange to web reinforcing plate fillet welds missing. Each ring girder had missing welds at the web reinforcement plate ranging in number from two (2) to seven (7). In areas where the gap between the web reinforcing plate and the ring girder flange exceeded 3/16 inch the web reinforcing plate was trimmed and a 1 1/2 inch thick plate inserted and welded all around. All missing welds were found as a result of blast cleaning in preparation for coating application.

All areas where Torus structural welds were missing were repaired to ASME B & PV Code, Section III, Subsection NF 1977 to Summer 1978 criteria.

CAUSE ASSESSMENT

Torus pitting due to corrosion was caused by local failures of the original coating. Missing structural welds were caused by a lapse in construction management overview during original construction.

CORRECTIVE ACTION and SAFETY IMPACT

Based on extensive efforts to characterize the extent and depth of corrosion pitting, and technical evaluations of the potential effects of the pitting during design basis conditions, roughly 200 square feet of weld metal was overlaid onto pitted Torus pressure boundary surfaces. The subject repair efforts have been determined to be adequate and there is no decrease in plant safety with the current repaired condition of the Torus versus a Torus with no corrosion pitting. The Torus is in the final stages of being recoated with an epoxy coating which is more durable than the previous red lead coating. This, together with the use of high quality demineralized water in the Torus, will minimize future corrosion.

The repaired missing welds have restored the Oyster Creek Torus equal to the original as-designed condition.

The determination of the repairs required, and the performance of the repairs, were done in a manner which satisfies all ASME Code requirements, and all other applicable requirements including Mark I Containment Program requirements.

The preceding discussion constitutes a voluntary LER. As such, an event date is not considered applicable. Failure data is not applicable to this report as no component failures occurred.

GPU Nuclear

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Writer's Direct Dial Number:

May 31, 1984

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Dear Sir:

Subject: Oyster Creek Nuclear Generating Station
Docket No. 50-219
Licensee Event Report

This letter forwards one (1) copy of Licensee Event Report (LER) No. 84-006. The attached LER is considered to be a voluntary report.

Very truly yours,

Peter B. Fiedler
Vice President and Director
Oyster Creek

PBF:dam
Enclosures

cc: Dr. Thomas E. Murley, Administrator
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NRC Resident Inspector
Oyster Creek Nuclear Generating Station
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