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November 3, 1998

U.S. Nuclear Regulatory Commission
Mail Station P1-37
Washington, D.C. 20555

Attention: Document Control Desk

Subject: Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29
Core Shroud Inspection Tool Theta Drive Ring Became Partially Disconnected From Its Strongback (LER 98-003).

GNRO-98/00075

Gentlemen:

Attached is Licensee Event Report (LER) 98-003 which is a final report.

Yours truly,

William A Eaton

WAE/JEO/jeo
attachment: Licensee Event Report 98-003-00
cc: (See Next Page)

1/1

IE22

cc: Ms. J. L. Dixon-Herrity, GGNS Senior Resident (w/a)
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NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

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TITLE (4)
Core Shroud Inspection Tool Theta Drive Ring Became Partially Disconnected From Its Strongback

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 NAME	DOCKET NUMBER
									N/A	05000
05	07	98	98	003	00	11	03	98	FACILITY NAME: N/A	DOCKET NUMBER: 05000

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)	0%		20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
			20.2203(a)(2)(i)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.405(a)(1)(ii)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)	X	OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		Voluntary

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
James E. Owens, Senior Licensing Specialist	(601) 437-6483

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 15 single-spaced typewritten lines) (16)

During the ninth refueling outage (RF09) at Grand Gulf Nuclear Station (GGNS) core shroud examinations were conducted using a special ring tool. On May 7, 1998, during removal of the shroud inspection tool Theta Drive and ring from the reactor vessel, air bubbles were vented into the vessel due to valve restorations following Local Leak Rate Testing and maintenance. The air bubbles caused the ring to tilt and oscillate resulting in the ring becoming released from its strongback at two of four suspension points.

This event does not meet any mandatory reporting requirements, however, GGNS recognizes that this event is of interest to the rest of the industry. Therefore, this submittal is made as a voluntary report.

Upon discovery that the Theta Drive and ring had become separated at 2 of 4 latch points, actions were taken to immediately secure the ring temporarily with ropes while a recovery plan was developed. GGNS Design Engineering developed a tool recovery plan which provided engineering instructions for removal of the ring and strongback. The recovery plan was implemented. The tool was removed from the vessel and placed in its temporary storage area for decontamination/visual inspection prior to disassembly and shipment back to the contractor's facility.

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TEXT *(If more space is required, use additional copies of NRC Form 366A) (17)*

A. Reportable Occurrence

During the ninth refueling outage (RF09) at Grand Gulf Nuclear Station (GGNS) core shroud examinations were conducted using a special ring tool provided by Wesdyne International (a subsidiary of Westinghouse Electric Corporation). On May 07, 1998, during removal of the shroud inspection tool Theta Drive and ring from the reactor vessel air bubbles were vented into the vessel due to valve restorations following Local Leak Rate Testing (LLRT) and maintenance. The air bubbles caused the ring to tilt and oscillate resulting in the ring becoming released from its strongback at two of four suspension points. At the time of the occurrence, the Theta Drive and ring position was several feet above the vessel flange. The vessel flange protector and vessel stud covers protected this area. However, impact to some fuel could have occurred if the ring had fallen positioned vertically.

This event does not meet any mandatory reporting requirements, however, GGNS recognizes that this event is of interest to NRC and the rest of the industry, therefore, this submittal is made as a voluntary report.

B. Initial Conditions

At the time of the event the reactor was shutdown in refueling mode 5.

C. Description of Occurrence

During RF09 at GGNS core shroud examinations were conducted using a special ring tool provided by Wesdyne International (a subsidiary of Westinghouse Electric Corporation). During removal of the shroud inspection tool Theta Drive and ring from the reactor vessel air bubbles were vented into the vessel due to valve restorations following LLRT and maintenance. The air bubbles caused the ring to tilt and oscillate resulting in the ring becoming released from its strongback at two of four suspension points.

Upon discovery that the Theta and Drive ring had become separated at 2 of 4 points, actions were taken to immediately secure the ring temporarily with ropes while a recovery plan was developed. GGNS Design Engineering developed a tool recovery plan, which provided engineering instructions for removing the ring and strongback from its location above the reactor. The tool was removed from the vessel and placed in its temporary storage area for decontamination/visual inspection prior to disassembly and shipment back to the contractor's facility.

D. Apparent Cause

It was concluded that the root cause of the partial ring separation from its strongback could be attributed to two primary causes. However, there were several important issues associated with this event. The following describes the primary factors for this event, followed by other important issues.

Root Cause

1. Valve manipulations performed during the lifting of the shroud inspection tool permitted air to be vented into the reactor vessel during the core shroud inspection ring lift. No formal controls were present to ensure venting of the type experienced during this refueling outage (i.e. LLRT valve

restorations/maintenance) does not occur during lifts of this type.

2. The possibility of various upset conditions (including air/water introduction to vessel) was not considered as a design parameter by the vendor, nor were precautions or limitations of use identified. As a result, the latching mechanism used to attach the Theta Drive and ring to the lifting device was not designed to resist the rotational loads imposed during the period when the ring was observed to pitch and oscillate.

Additionally, during the review of this event several issues, besides the root cause of the event itself were raised that GGNS would consider to be of particular interest to the industry. Specific issues were Grand Gulf's compliance with NUREG-0612, and particularly ANSI N14.6 requirements, review of vendor procedures and seismic evaluation of the installed Theta Drive assembly. Each of these issues is addressed below.

1. NUREG-0612 and ANSI N14.6 Requirements

Prior to the event GGNS conducted a review of the vendor's NUREG-0612 lifting device analysis. The vendor's lifting device safety factors exceeded the requirements of NUREG-0612. Following the event the vendor provided additional documentation of compliance with NUREG-0612 and ANSI N14.6. The vendor's review concluded that the lift and tool design met all requirements of NUREG-0612 and ANSI N14.6 except for the requirement to perform a 150 percent load test. The vendor load tested the equipment to 125 percent. ANSI N14.6 requires special lifting devices be load tested to 150 percent. GGNS took exception to the 150 percent load test requirement in ANSI N14.6 in favor of a 125 percent load test. Due to the exception taken by GGNS, the 125 percent load test performed by the vendor met GGNS commitments. However, licensees should ensure that their specific requirements are met.

2. Procedure Review

GGNS procedure requires contractor's special process procedures used to perform examinations or inspections be reviewed and approved by the site organization responsible for performance of GGNS inspection activities. On March 23, 1998, vendor procedures for ultrasonic exam (NDE) of welds were formally transmitted to the NDE Supervisor for review and approval. Procedures related to equipment installation and removal (support procedures) were neither formally transmitted to nor requested by site personnel and were not signed for approval by site personnel. While procedures pertaining to the specific inspections were reviewed and approved, it was not well understood by GGNS staff that vendor support procedures should also be approved prior to use.

3. Seismic Qualification of the Installed Ring

Once the ring and Theta Drive are set on the shroud flange, the RZ Mast is mounted on the Theta Drive trolley, which permits the mast to be moved to various circumferential positions around the vessel. Neither the presence nor operation of the assembled device was evaluated for structural capability in a design basis earthquake. Failure effects under these conditions and evaluation of potential damage to the fuel were not considered in the design. GGNS Design Engineering review of this condition as documented in GGCR1998-0560-01 which indicates structural failure of the device under seismic loads would be unlikely. However, if tipping of the RZ Mast were to occur while the mast was not inserted in the annulus, due to its height, it would impact the side of the

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vessel. If the mast were to separate from the rest of the RZ assembly, the resulting mast drop is well within previously evaluated drops of light loads on the fuel.

E. Corrective Actions

Immediate:

Work was stopped and the tool and handling devices secured with temporary rigging pending engineering evaluation for recovery efforts. Shortly thereafter, the ring was lifted from the reactor vessel area.

Long Term Corrective Actions:

1. Operations will revise procedures ("Conduct of Operations" and "Refueling Operations") to provide for improved notification between the refuel floor and control room when performing critical lifts over the vessel with the overhead crane. Also, Operations will put in place administrative controls for performing evolutions which could result in potential inputs to the reactor vessel (air/water) as a result of valve alignments.
2. Design Engineering will establish specific design criteria for what (i.e. upset conditions, loading factors etc.) environment considerations are appropriate when evaluating lifting devices for compliance with heavy lift requirements. New criteria will be incorporated into design documentation procedures as appropriate.
3. GGNS will provide clarification of the process for review and approval of vendor procedures. An evaluation will be conducted to determine which vendor contracts should contain requirements for review and approval of vendor inspection/support procedures prior to use at GGNS

F. Safety Assessment

GGNS took the conservative approach of lifting the Theta Drive ring in accordance with NUREG-0612 as a heavy load. The vendor's safety factors for the lifting rig were reviewed and found to exceed NUREG-0612 requirements. While the lift was conducted as a heavy load, the weight of the Theta Drive ring did not exceed the 1140 pound GGNS threshold for a heavy load lift. Therefore, a bounding engineering judgement was provided which assured that 10CFR 100 limits were not exceeded. This judgement was provided by correlating the actual lift to the plant's procedure for handling light loads (less than 1140 pounds). This correlation took credit for actual decay time due to length of shutdown.

The offsite radiological consequences of dropping items weighing 1140 pounds or less are ensured to be well within the limits of 10CFR 100 via conservative load handling curves in plant procedures. Although this event occurred from an initial condition outside these curves, the associated 10CFR 100 radiological acceptance criteria would still have been satisfied if the tool had impacted the core considering the actual core decay time (25 days).

G. Additional Information

N/A