



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report No.: 50-416/94-08

Licensee: Entergy Operations, Inc.
Jackson, MS 39205

Docket No.: 50-416

License No.: NPF-29

Facility Name: Grand Gulf Nuclear Station

Inspection Conducted: February 27, 1994 through March 26, 1994

Inspectors: <u>FOR R. W. Wright</u>	<u>4/8/94</u>
R. H. Bernhard, Senior Resident Inspector	Date Signed
<u>FOR R. W. Wright</u>	<u>4/8/94</u>
C. A. Hughey, Resident Inspector	Date Signed

Accompanying personnel: C. E. Skinner, Resident Inspector, River Bend
(week of February 28 through March 3, 1994)

Approved by: <u>Floyd S. Cantrell</u>	<u>4/8/94</u>
F. S. Cantrell, Chief	Date Signed
Reactor Projects Section 1B	
Division of Reactor Projects	

SUMMARY

Scope:

The resident inspectors conducted a routine inspection in the following areas: operational safety verification, maintenance observation, surveillance observation, actions on previous inspection findings, and licensee self assessment. The inspectors conducted backshift inspections on March 5,7,8,10,11,15, and 21, 1994.

Results:

Problems with the standby service water pumps were conservatively addressed (paragraph 3.b and 4.). To facilitate repairs on the "B" pump, enforcement discretion was requested. The request was well prepared and compensatory actions were thorough (paragraph 3.b.). One noncited violation for poor controls on torquing during pump reassembly was identified.

Painting has begun in the reactor core isolation cooling pump room, and the area's cleanliness has improved (paragraph 3.). Good command and control was demonstrated by operations during plant evolutions (paragraph 3.c.). Quality program audits continue to be a strength (paragraph 7.). Closeout actions for one unresolved item and one violation were reviewed and the items closed (paragraph 6).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- D. Bost, Director, Nuclear Plant Engineering
- *C. Bottemiller, Superintendent, Plant Licensing
- *L. Daughtery, Technical Coordinator, Nuclear Safety and Regulatory Affairs
- W. Deck, Superintendent, Security
- M. Dietrich, Manager, Training
- J. Dimette, Manager, Performance and System Engineering
- *C. Dugger, Manager, Plant Operations
- C. Ellsaesser, Technical Coordinator
- C. Hayes, Director, Quality Assurance
- *C. Hicks, Superintendent, Operations
- *C. Hutchinson, Vice President, Nuclear Operations
- *M. Meisner, Director, Nuclear Safety and Regulatory Affairs
- D. Pace, General Manager, Operations
- R. Ruffin, Plant Licensing Specialist
- S. Saunders, Superintendent, System Engineering

Other licensee employees contacted included superintendents, supervisors, technicians, operators, security force members, and office personnel.

*Attended exit interview

Acronyms and initialisms used throughout this report are listed in the last paragraph.

2. Plant Status

The plant operated at or near full power for the entire inspection period. Problems with standby service water pump "B" vibration on March 3, 1994, led to the request for discretionary enforcement (see paragraph 3). It was granted and the plant avoided an unnecessary shutdown while pump repairs were made. Subsequent repairs were made to the "A" pump. At the end of the period the plant had been on line for 112 continuous days.

Site tours and discussions with plant personnel were made the week of March 7, 1994, by: J. W. Roe, Director, Division of Reactor Projects - III, IV, V, NRR; E. G. Adensam, Assistant Director for Region IV and V Reactors, NRR; W. D. Beckner, Director, Project Directorate IV-1, NRR; and D. M. Verrelli, Chief, Reactor Projects Branch 1, RII.

F. S. Cantrell visited the site March 25, 1994, to hold discussions with the resident staff, and to perform a resident certification walkdown with M. Sykes, NRC Intern.

F. L. Young, Safeguards Branch, accompanied by D. T. Nebuda, D. H. Nelson, and J. M. Watt of the Army Corps of Engineers, visited the site March 16, 1994, to discuss security plans.

W. J. Tobin, Security Inspector, DRSS, RII, conducted an inspection in the area of physical security during the week of March 14 through 19, 1994. The results are documented in inspection report 50-416/94-09.

3. Operational Safety (71707 and 93702)

- a. Daily discussions were held with plant management and various members of the plant operating staff. The inspectors made frequent visits to the control room to review the status of equipment, alarms, effective LCOs, temporary alterations, instrument readings, and staffing. Discussions were held as appropriate to understand the significance of conditions observed.

Plant tours were routinely conducted and included portions of the control building, turbine building, auxiliary building, radwaste building and outside areas. These observations included safety related tagout verifications, shift turnovers, sampling programs, housekeeping and general plant conditions. Additionally, the inspectors observed the status of fire protection equipment, the control of activities in progress, the problem identification systems, and the readiness of the onsite emergency response facilities.

Painting of the RCIC room started this month. Improvements in cleanliness in the RCIC room were noted. On March 1, 1994, a security guard noticed strong fumes in the vicinity of the painting activities. Tests showed high levels of Xylene in the area. All work was stopped, and activities were not resumed until the painters had been trained in the use of instrumentation to detect the levels of fumes from their activities. This is an example of plant personnel being concerned with safety outside their normal area of work.

Safety related tagouts 940450 (HCU 12-33) and 940451 (HCU 12-57) were verified by the inspectors to be properly prepared and performed. Deficiencies were not identified.

b. Standby Service Water Pumps

On March 3, 1994, while performing vibration measurements on the standby service water pump "B", Grand Gulf personnel noted higher than baseline velocity readings for all monitored points. Additional readings showed a rapidly worsening trend. The pump was declared inoperable and disassembled for inspection.

Discretionary enforcement was granted in response to Grand Gulf's request for additional time to repair the pump prior to a required shutdown. The inspectors observed the Plant Safety Review

Committee's meetings preparing the request, and participated in discussions with plant personnel on the safety significance of an extension of allowable outage time. Technical Specifications 3.7.1.1 Action a.1. requires an inoperable SSW subsystem to be restored or the plant be taken to hot shutdown within 72 hours. Grand Gulf requested an extension of the pump outage time to seven days before initiation of a reactor shutdown. Quantification of risk provided by the licensee typified the total risk of a seven day SSW outage to be comparable to the risk currently allowed by TSs for a fourteen day RCIC outage. After approval of the discretionary enforcement, the inspectors verified that compensatory measures, including multiple offsite power sources and availability of ECCS equipment were in place. The enforcement discretion also included granting additional outage time for TSs 3.3.9, Turbine Overspeed Protection System, and 3.1.3.1, Control Rod Operability, in order to minimize the likelihood of plant perturbations during the repair period.

The SSW pumps are large vertical pumps with the impellers suspended approximately sixty feet below the motor. Six couplings are used to attach the pump shaft segments together. The pumps are located in the SSW cooling tower basins that contain chemically treated water to reduce biofouling. The pumps are run weekly for twenty four hours to permit addition and circulation of the chemicals. It was during one of these weekly runs that the system engineer, who had noted excess water near the pump base after the prior weekly run, asked the vibration engineer to run a predictive maintenance vibration reading. Successive vibration readings showed an increasing vibration trend.

Disassembly of the pump showed excessive corrosion in the carbon steel bolts and lockwashers used in the pump shaft couplings. Some lockwashers had been completely corroded away. The corrosion allowed each pump shaft section to increase its gap to the next section. This allowed the impellers to move downward, reducing the clearance to the bottom of the bowl. The "B" pump had been installed in October of 1985, and had not been disassembled since that time.

Pump "B" was found to have excessive damage to both the impellers and bowls. Estimates indicated over one inch of material had been removed from the impellers and bowls, making them unusable. New impellers from inventory, and old pump bowls from Unit 2 were used to reassemble the pump. The inspectors reviewed the post maintenance test data. Pump baseline measurements for the reassembled pump indicated the pump met its original performance goals for flow at several pressures, and for vibration. The pump was declared operable and the SSW subsystem returned to operable status well before the seven day deadline.

Based upon the condition of the "B" pump, the "A" pump was taken out of service to determine if changes in lift or total float (clearance) had occurred. The "A" pump had been installed in September, 1986. Baseline measurements for total float were determined through the use of assembly drawings, and of as built measurements of the "B" pump. Measurements indicated the "A" pump was within tolerance. Management decided to perform a tear down of the pump in spite of the encouraging measurements.

Disassembly of the "A" pump showed very minor damage to the impellers and bowls, but showed excessive corrosion on the coupling fasteners. The pump was reassembled with a new wear ring in the first stage impeller, and with new bolting hardware. All work was performed within the allowed 72 hour TS outage time.

Neither pump indicated any drop in developed head or flow during testing performed prior to the discovery of the high vibration on pump "B". Vibration measurements were taken near the motor at a point fifty feet from the impellers and were not sensitive to the pump degradation.

The problems showed that current pump testing requirements did not identify, prior to damage occurring, mechanisms that could lengthen the pump shaft. Current manufacturer's recommendations did not require "as found" measurements of pump lift be taken whenever the pump is uncoupled from the motor, so changes could be evaluated. Grand Gulf has included this in their program. In addition, when the pumps were rebuilt, Grand Gulf took measurements of as found total float between the impellers and the bowls. This measurement was taken by lifting the shaft until the upper part of the impeller contacted the bowl, then measuring the change when the impeller was lowered and allowed to rest on the bottom of the bowl. This measurement was taken after installation of the pump and is planned to be used to evaluate measurements taken during the service life of the pump.

Dissimilar materials used in the coupling may have contributed to this event. The retainer bolts and lock washers were made of carbon steel, and the pump shafts, and the balance of the coupling were made of stainless steel. The replacement lock washers were made of stainless steel, but the vendor drawings specified carbon steel for the bolting material. Grand Gulf has committed to tearing down the pumps at the next refueling outage.

The inspectors found management's evaluations and decisions to be conservative, based upon the systems impact on plant safety. The request for discretionary enforcement was complete in its content, management was thorough in their evaluations prior to the request, and the plant staff was effective in implementation of the compensatory measures.

c. Reactor Downpower

On March 24, 1994, the inspectors observed control room activities during a reduction from 100% to 80% power as lightning moved through the area. The power reduction was accomplished solely with a reduction in recirculation loop flow via the flow control valves. Control rod manipulations were not required. As loop flow and power were reduced, the operators were aware as they moved toward (but never entered) prohibited areas of the Power to Flow Map. Good control room command and control, communications, and use of "repeat backs" were observed during the entire evolution. The calibration of APRM "B", which was in progress was suspended. The 15 minute evolution was conducted in accordance with IOI 03-1-01-2, Power Operations, Attachment VI, 10.0 Temporary Downpower, Rev. 35. There were recorded lightning strikes on site as the storm moved through the area with no apparent effect on the APRM indications.

4. Maintenance Observation (62703)

During the report period, the inspectors observed portions of the maintenance activities listed below. The observations included a review of the MWOs and other related documents for adequacy; adherence to procedure, proper tagouts, technical specifications, quality controls, and radiological controls; observation of work and/or retesting; and specified retest requirements.

MWODESCRIPTION

114702

Calibration of Division I standby gas treatment recirculation flow

During the performance of the MWO, the technicians utilized procedure number 07-S-53-T48-1, entitled, Standby Gas Treatment Enclosure Building Recirculation Flow, Revision 5. The technicians adhered to the procedure and maintained good radiological control practices. The inspectors verified that all M&TE was calibrated and the correct TS action statement was entered.

The licensee's work process delivered all work packages to the control room the night before they were scheduled to be completed. There is less activity on the night shift, giving the shift supervisor more time to conduct a detailed review of the work packages. The inspectors viewed this as a strength, because it limits the amount of distractions and confusion in the control room during the day shift. Another item observed to be a strength was the installation of jumper connectors that provide a suitable connection point for the each jumper, eliminating potential unplanned isolations due to jumpers becoming disconnected and causing a short.

<u>MWO</u>	<u>DESCRIPTION</u>
117780	Uncouple and inspect SSW pump A for proper lift. Rework as needed.
117590	Secure SSW pump B due to excessive vibration. Uncouple pump from motor and recouple.

The inspectors observed activities associated with the disassembly, evaluation, and rebuild of the SSW pumps. The jobs were well planned and system unavailabilities were kept at a minimum through the use of experienced personnel, and through management decisions to expedite parts deliver.

After pump reassembly, the licensee determined that use of a powered wrench resulted in torquing bolting used in the "B" pump to values in excess of the manufacturers recommendations. This is identified as NCV 94-08-01, Improper control of torquing in assembly of SSW "B" pump. This licensee identified violation is not being cited because the criteria specified in Section VII.B of the NRC Enforcement Policy were satisfied. The inspectors reviewed the disposition of MNCR 0031-94 that documented the problem. An engineering evaluation performed to disposition the MNCR concluded that the bolt's physical properties were not exceeded. The evaluation was completed prior to returning the pump to operable status. Other techniques were employed during the reassembly of pump "A" to insure proper torque was used.

One Noncited Violation was identified. The results of the observations in this area indicated that maintenance activities were effective.

5. Surveillance Observation (61726)

The inspectors observed the performance of portions of the surveillances listed below. The observations included a review of the procedures for technical adequacy, conformance to the Technical Specifications and LCOs; verification of test instrument calibration; observation of all or part of the actual surveillance; removal and return to service of the system or component; and review of the data for acceptability based upon the acceptance criteria.

06-IC-1C51-SA-0001, Rev. 29

APRM Calibration, Channel B

No violations or deviations were identified. The observed surveillance tests were performed in a satisfactory manner and met the requirements of the Technical Specifications. Maintenance personnel were knowledgeable and performed the calibration in a satisfactory manner.

6. Action on Previous Inspection Findings (92701 and 92702)

- a. (Closed) Unresolved Item 50-416/93-23-01, Methane in waste resin shipment. On December 9, 1993, the licensee shipped a container of dewatered resins to the Barnwell, South Carolina burial

facility. Upon arrival it was determined that the container was in excess of the State of South Carolina's disposal site limits for explosive gases. NRC inspectors from Region II, Division of Radiation Safety and Safeguards, conducted an inspection of this activity during the week of February 14, 1994, (Inspection Report No. 50-416/94-06), and identified a violation of NRC requirements. Based on the results of this inspection, this item is closed.

- b. (Closed) Violation 50-416/93-14-01, Inadequate procedure resulting in RCIC injection. On September 14, 1993, an inadvertent RCIC injection was caused during the performance of a maintenance procedure for manually back filling the reference leg to a reactor level condensing pot. This procedure had not been adequately reviewed or validated prior to use. The inspectors reviewed the licensee's response to the violation dated December 2, 1993, and verified the corrective actions described in the response.

Actions included correcting the manual back filling procedure to be more specific about calibration settings. These changes were verified by the inspectors. In addition, engineering personnel were counseled and briefed on the incident and the responsibilities of procedure technical reviewers.

The completion of these items by the licensee are adequate to close this item.

7. Quality Programs Audit (40500)

The inspectors attended a Quality Programs audit exit conducted on March 3, 1994. Results from Audit QSA-94/0003 were presented and discussed. This audit was an indepth review of the document control process including control of procedures, instructions, drawings, QA records, vendor manuals, technical specifications and the updated final safety analysis review. The audit was conducted over a one month period. Audit findings included a wide range of positive and negative findings, and recommendations, and continued to demonstrate the high quality, depth and broad scope of the licensee's audits.

8. Exit Interview

The inspection scope and findings were summarized on March 31, 1994, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results listed below. Dissenting comments were not received from the licensee. Proprietary information is not contained in this report.

<u>Item No.</u>	<u>Type</u>	<u>Description</u>
50-416/94-08-01	NCV	Improper control of torquing in assembly of SSW "B" pump

9. Acronyms and Initialisms

APRM	-	Average Power Range Monitor
DRSS	-	Division of Radiation Safety and Safeguards
ECCS	-	Emergency Core Cooling System
HCU	-	Hydraulic Control Unit
IOI	-	Integrated Operating Instruction
LCO	-	Limiting Condition for Operation
LER	-	Licensee Event Report
MNCR	-	Material Nonconformance Report
MWO	-	Maintenance Work Order
M&TE	-	Maintenance and Test Equipment
NCV	-	Noncited Violation
NRC	-	Nuclear Regulatory Commission
NRR	-	Nuclear Reactor Regulation
RCIC	-	Reactor Core Isolation Cooling
SSW	-	Standby Service Water
TS	-	Technical Specification