ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-416/95-18

License: NPF-29

Licensee: Entergy Operations, Inc.
P.O. Box 756
Port Gibson, MS 39150

Facility Name: Grand Gulf Nuclear Station

Inspection At: Port Gibson, Mississippi

Inspection Conducted: October 22 through December 2, 1995

Inspectors: J. Tedrow, Senior Resident Inspector
C. Hughey, Resident Inspector

Approved: Gregory A. Pick for 1-2-96
P. H. Harrell, Acting Chief, Project Branch D — Date

Inspection Summary

Areas Inspected: Routine, announced inspection of onsite review of events, operational safety verification, maintenance and surveillance observations, onsite engineering, plant support activities, and review of Temporary Instruction 2515/128 - "Reactor Vessel Level Instrumentation."

Results:

Plant Operations

- The inspectors considered face-to-face communications and board walkdowns during control room shift turnovers to be very thorough. Minor distractions observed did not interfere with the communication of information to the operating crew (Section 3).

- Control room verbal communications generally consisted of repeat backs and acknowledgement of infrequent annunciators; however, this practice was not used as extensively for recurring annunciators (Section 3).

Maintenance

- A noncited violation was identified because a break down in the licensee's work control process allowed work activities to breach the control room envelope boundary without the knowledge of the operators. Specifically, on October 12, 1995, a work order failed to include an impact statement that identified that repair of the fan belt resulted in a breach in the control room envelope that exceeded the 590 cubic feet per minute in-leakage limit specified in License Condition 2.C(38).

- The inspectors identified that a noncited violation regarding inadequate control of work on an engineered safety feature switchgear room cooler was identified. The licensee attributed the root cause to poor work instructions for removing and reinstalling a missing support. Also, the licensee identified that the support member was most likely removed for implementation of a modification 8-9 years previously (Section 4.1).

- Poor housekeeping conditions remained following maintenance and modification activities, even though ample opportunity to identify the deficiencies existed (Section 4.1).

- The performance of a high risk evolution to replace a reactor vessel level transmitter was considered excellent for inclusion of thorough briefings, preparations, and postponement of conflicting evolutions (Section 4.3).

Engineering

- The testing associated with the replacement of feedwater control system control cards was well planned and executed by the system engineer (Section 4.4).

- The licensee's actions in response to NRC Bulletin 93-03, "Resolution of Issues Related to Reactor Vessel Water Level Instrumentation in BWRs," were considered very thorough (Section 6.3).

Plant Support

- Good progress was being made to implement the land vehicle bomb threat barrier modification (Section 7.1).

Summary of Inspection Findings:

New Items

- A noncited violation was identified (Section 2.1).

- A noncited violation was identified (Section 4.1).

Closed Items

- None

Attachment

- Persons Contacted and Exit Meeting

DETAILS

1 PLANT STATUS

The plant operated throughout the inspection period at essentially 100 percent power.

2 ONSITE REVIEW OF EVENTS (93702)

2.1 Control Room Envelope Boundary Breach

On November 2, 1995, the licensee reported that License Condition 2.C(38) had been exceeded during corrective maintenance that occurred on control room air conditioning Train B on October 12, 1995. This matter was initially identified on October 16, 1995, by licensee personnel during a review of a similar maintenance work package. A maintenance planner, who was reviewing a package associated with replacing a temperature sensor in the ductwork, questioned the system engineer as to whether the temperature sensor replacement would compromise the control boundary. This cued the system engineer to question whether the replacement of the fan belt 4 days earlier had breached the control room boundary. After analysis it was determined that the removal of the panel did violate License Condition 2.C(38).

License Condition 2.C(38) allows in-leakage into the control room envelope of up to 590 CFM that will maintain control room habitability. This leakage equates to an opening of approximately 20 square inches in the control room envelope. Maintenance personnel removed an access panel in the Train B control room air conditioning fan housing to replace a fan belt that created an opening of approximately 800 square inches.

The control room air conditioning ventilation system is part of the control room envelope. Since the control room air conditioning units are physically located in the control building but outside of the control room proper and provide air into the control room, opening of the panel constituted a breach of the control room envelope. Licensee personnel determined that the safety significance of this event was minimal based upon the small amount of time the panel was removed (approximately 12 hours) and the capability to restore the panel expeditiously under accident conditions. The licensee plans to submit Licensee Event Report 95-012 in accordance with 10 CFR 50.73.

The inspectors reviewed the control room ventilation drawings and toured the plant areas housing the control room air conditioning units. To affect control room habitability, pressure in the control room air conditioning equipment room has to become greater than the control room pressure that would force air through the idle fan unit opening, into the control room ventilation return ducts, and to the control room. The operable control room air conditioning unit would be circulating air during this scenario.

The licensee identified that work control program deficiencies contributed to this violation of License Condition 2.C(38). The mechanics used a repetitive task work instruction to replace the failed fan belt. No impact statement cautioned the mechanics that this work activity would breach the control room envelope; consequently, the mechanics did not inform operations that the control room envelope would be compromised. In addition, the work instructions did not address removal of the panel; hence, the operators did not recognize that the access panel would be removed to replace the fan belt and did not enter the appropriate Technical Specifications action statement.

The inspectors reviewed the Technical Specification 3.7.3 bases for the limiting condition for operation, reviewed Quality Deficiency Report 0171-93, Supplement 1, and interviewed plant personnel. From this evaluation the inspectors concluded that the removal of the hatch did compromise the boundary of the control room envelope and placed the operators in a 7-day shutdown action statement, which operators did not enter because they did not know that the boundary had been compromised. Further, the inspectors considered the condition significant because operators had no defined method or information available that would allow them to determine that they had compromised the control room envelope boundary had an accident occurred.

A previous, similar event occurred on July 23, 1993, during the performance of fire detector surveillance testing. The licensee likewise compromised the control room envelope. NRC issued a noncited violation in NRC Inspection Report 50-416/93-12, and the licensee documented this breach in the control room envelope and License Condition 2.C(38) violation in Licensee Event Report 93-007. The licensee's corrective action following that event included revising applicable surveillance procedures to include a statement on the impact the testing would have on the control room envelope and labeling the access panels for the associated equipment, identifying them as part of the boundary for the control room envelope. In addition, plant personnel were trained on these requirements.

Quality Deficiency Report 0171-93 remained open because some of the long-term corrective actions had not yet been completed. Corrective actions included confirming and updating the design basis of the control room heating, ventilation, and air conditioning systems. Since quality programs were in the final stage of corrective action verification when this event occurred, the licensee supplemented Quality Deficiency Report 0171-93 to encompass this most recent event instead of issuing a different quality deficiency report. The inspectors found that the licensee initiated another quality deficiency report to assure personnel address why there was a long period for resolution of this issue.

From review of Licensee Event Report 93-007 and the circumstances surrounding the current event, the inspectors concluded that the corrective actions previously implemented were narrowly focused. Consequently, inadequate corrective actions contributed to this event; however, the violation occurred more than 2 years previously and is considered nonrepetitive.

Following the October 12, 1995, event, the licensee reviewed all open work orders for the control building to ensure that additional work will not breach the control room envelope. The control room boundary was reviewed and components with access panels identified and labeled. The licensee plans to revise applicable repetitive tasks associated with the control room envelope to require special guidance about maintaining the control room envelope intact. Engineering personnel are developing guidance to further define the control room envelope and incorporating special requirements in the associated control room boundary component data bases used for planning work activities.

Procedure 01-S-07-1, "Control of Work on Plant Equipment and Facilities," Revision 29, Section 6.5.2, requires that an impact statement be provided to alert operators of work affecting the integrity of the control room envelope boundary. Failure to attach an appropriate impact statement for the effect on the control room envelope boundary is contrary to the requirements of Procedure 01-S-17-1 and resulted in a violation of Technical Specification 5.4.1.a. This licensee-identified and corrected violation is being treated as a noncited violation, consistent with Section VII.B.1 of the NRC Enforcement Policy. This violation is considered noncited because: (1) the violation was not willful, (2) the violation was nonrepetitive, (3) the licensee identified the violation, and (4) the corrective actions taken and proposed by the licensee should prevent recurrence.

2.2 Division III Standby Diesel Generator Automatic Start

On November 11, 1995, the feeder breaker for the Division III safety bus tripped open. Storms in the area resulted in a fault on grid transmission lines that caused a fluctuation in grid voltage sufficient to actuate the instantaneous undervoltage trip relay and to open the breaker. Upon receiving a low voltage signal, the Division III standby diesel generator started and connected to the bus as designed. The licensee reported this event to the NRC Operations center as required.

The Division I and II standby diesel generator breakers did not actuate because of a 0.5 second time delay associated with the undervoltage relays. The inspectors reviewed fault recorder traces of the voltage transient and discussed the breaker and relay designs with system engineers. The components operated as designed. Although the standby diesel generators are not classified as engineered safety feature components, the licensee decided to voluntarily submit a written report. The inspectors discussed the necessity of the instantaneous undervoltage trip of the Division III feeder breaker with licensee personnel. Although this feature was incorporated into the original design of the switchgear, the licensee is evaluating whether it is cost effective to maintain because the feature provides no safety function.

2.3 Failure of Division III Standby Diesel Generator Output Breaker to Close

On November 17, 1995, the Division III standby diesel generator output breaker failed to close during a routine monthly surveillance test. After checking the switchgear for faults, operators unsuccessfully attempted to manually close the breaker a second time. Troubleshooting activities determined that the problem resulted from a failure of the synchronizing check relay. The relay was removed and bench tested satisfactorily. After personnel cleaned the relay edge connector contacts and reinstalled the relay, operators satisfactorily completed the standby diesel generator surveillance. The NRC inspectors questioned licensee personnel about the number of failures of this type that have occurred. The licensee responded that there have been no failures of this type since original startup of the facility. The synchronizing check relay circuit is only required for paralleling the standby diesel generator to an offsite power source during testing and is not necessary for the safety-related operation of the standby diesel generator to supply Division III loads when power is lost to the bus. See paragraph 4.2 for more discussion of the troubleshooting activities.

The licensee will issue Special Report 95-004 describing this event.

3 OPERATIONAL SAFETY VERIFICATION (71707)

On November 2, 1995, the inspectors observed the control room shift turnover. The face-to-face turnover and board walkdowns were considered to be very thorough. However, during the shift briefing, the inspectors observed that some side discussions and distractions (nonemergency phone calls) occurred. Although the inspectors considered the side discussions to be a hindrance, they did not adversely affect the turnover of information.

During this inspection period, the inspectors observed shift verbal communications on various occasions. Although the inspectors considered the announcement and acknowledgement of infrequent alarms among the board operators and the plant supervisor to be good, recurring frequent alarms did not receive the same level of formality.

The inspectors discussed these observations with licensee operations management. Licensee management had made similar observations and were already developing corrective actions to improve shift communications and the turnover process. Improvements were also planned for shift briefings, control room appearance, and personal appearances. These expectations were to be presented to the operations staff during the first quarter of 1996. A policy of "quiet time" during shift turnover and briefings had been implemented prior to the end of the inspection period.

4 MAINTENANCE OBSERVATIONS (62703)

During this inspection period, the inspectors observed portions of the maintenance activities listed below. The observations included a review of the following maintenance work orders (MWO):

- MWO 153763, Thermal performance test on engineered safety feature Train B switchgear room cooler in accordance with Procedure 17-S-06-23, "SSW B Performance."

- MWO 155011, Investigate problem with Division III standby diesel generator output breaker failure to close.

- MWO 153347, Replace Anticipated Transient Without Scram Reactor Vessel Level Transmitter 1B21N-099E in accordance with Procedure 07-S-33-5, "Replacement and Sealing of Rosemount 1151, 1152 and 1153 Transmitters," and retest in accordance with Procedure 06-IC-1B21-R-0015, "ATWS Reactor Vessel Level Calibration."

- MWO 19931025, Modify close torque switch bypass circuit for Drywell Pressure Instrument Isolation Valve 1M71-F591A in accordance with Modification Change Package 93/1025, motor operated valve limit switch modification.

- TSTI 1C34-95-002-0-N, Replacement and retest of feedwater control system cards.

4.1 Thermal Performance Test on Engineered Safety Feature Train B Switchgear Room Cooler

During observation of the thermal performance test on the engineered safety feature Train B switchgear room cooler on November 1, 1995, the inspectors noticed several deficiencies in the area:

- Three long pieces of angle iron lay on the platform on each side of the unit. One of the pieces was identified to be a diagonal support for the engineered safety feature Train B switchgear room cooler support structure. Also on the platform was an access cover to the unit cooler that had been removed and was not capable of being reinstalled because of interference.

- The cable tray top cover was removed and was left lying on top of another cable tray. Also, insulation wrapping material (Kaowool) for Division II Cable 1ABRMH71 had been pried up.

The inspectors discussed the cable tray wrapping material with licensee engineering personnel. The wrapping provided a barrier for cable separation criteria. The inspectors reviewed Regulatory Guide 1.75, Revision 1, 1975, "Physical Independence of Electrical Systems," and IEEE Standard 384-1977, "Standard Criteria for Independence of Class 1E Equipment and Circuits," for separation criteria. Other cables in the room included one from Division III, one from Division I, and one nonsafety-related. The other cables were completely enclosed in conduits. The inspectors concluded that the cable separation was still in accordance with Regulatory Guide 1.75 even with the deficiency observed because only one set of cables was unprotected while the others had adequate fire barrier protection. Licensee personnel researched maintenance history but were unable to determine when work was performed to cause this condition. A deficiency report and work request were initiated to restore the barriers to design conditions.

A deficiency report was also written to document a diagonal support missing from the engineered safety feature Train B switchgear room cooler support structure. The other two pieces from the Train B switchgear room cooler had been removed by Modification MWP 86/1188, which installed new cooling coils in October 1986. In accordance with this modification, the Train B switchgear room cooler was still analyzed to be seismically qualified without two of the pieces. However, the analysis of the support structure utilized the diagonal support in calculation of seismic capability. This piece was immediately reinstalled on November 7, 1995, following this determination. The licensee believes that the diagonal support was removed for ease of installation of the new cooling coils. However, no work directions provided for the removal or reinstallation of the support contrary to the requirements of Procedure 01-S-07-01.

A subsequent evaluation of the support structure determined that the missing diagonal support would not result in overstressing the adjacent support members during a seismic event. The inspectors reviewed Technical Specification 6.7.1 that required the Train B switchgear room cooler be operable. The Technical Specifications required an inoperable cooler to be restored to operable within 72 hours or, if not possible, create a schedule to restore the cooler.

The licensee had performed an evaluation that demonstrated that several engineered safety feature room coolers were not required to ensure equipment operability following an accident. These evaluations on room heat loads concluded that, with the cooler out of service, peak accident room temperatures would remain within equipment peak temperature limits. The engineered safety feature Train B switchgear room cooler was included in this analysis. The inspectors reviewed the analysis and concluded that the structural deficiencies observed did not affect the operability of the switchgear located in the engineered safety feature Train B switchgear room. Therefore, this work control deficiency constitutes a violation of minor significance and is being treated as a noncited violation, consistent with Section IV of the NRC Enforcement Policy.

Although operability of the room cooler was not in question, the inspectors considered the cleanup of the angle iron and restoration of the cable tray barriers following maintenance to be deficient. Even though this room cooler was located in a remote area, ample opportunities existed during testing to identify the poor housekeeping conditions and initiate actions to have them corrected.

4.2 Division III Standby Diesel Generator Output Breaker

The inspectors observed this work activity that included racking out the breaker for testing on the test stand, functional checks on the synchronizing check relay in accordance with Procedure 07-S-12-104, "Calibration Check of ITE Synchronizing Check Relays," and functional checks on the 125X auxiliary synchronizing check relay in accordance with Procedure 07-S-12-70, "Agastat Control Relay Test and Replacement Instructions." The checks produced satisfactory results for all components. The edge connector contacts for the synchronizing check relay were then cleaned and the components reinstalled into the switchgear cabinet. The breaker operated properly during a subsequent test of the Division III standby diesel generator. The inspectors noted that this work was performed properly in accordance with the written work instructions.

4.3 Replace Anticipated Transient Without Scram Level Transmitter

Because of the sensitivity of removing and reinstalling the anticipated transient without scram level transmitter into a common instrument reference leg, this high risk work was treated as an infrequently performed evolution and received special emphasis from licensee management. A test coordinator was assigned and performed briefings with operations, instrumentation and control, and health physics personnel. During these briefings the MWO instructions, Technical Specification limiting condition for operation, and station operating instruction directions were reviewed. The test coordinator emphasized the prerequisites and precautions needed for removing and reinstalling the transmitter to the instrument reference leg. To eliminate an inadvertent scram, associated transmitters connected to the reference leg were placed in test in accordance with Procedure 04-1-01-B21-1, "Nuclear Boiler System." Other scheduled work that could adversely affect plant operation was postponed until after the transmitter replacement.

The inspectors observed the work activity in the field and observed the transmitter reference leg valve operation. This work was performed without incident in accordance with the procedures. The inspectors considered the control of this work to be very good.

4.4 Replacement of Feedwater Controller Card

The master level controller manual unit and logic unit cards were replaced in an ongoing effort to eliminate possible causes of spurious reactor vessel level oscillations of 2-3 inches. The inspectors observed the test on October 27, 1995, and noted excellent communications among the system engineer, operators, and instrumentation and control technicians. While replacing the logic cards, operators placed the feedwater control system in manual for approximately 40 minutes. A reactor operator was stationed at the feedwater control station to monitor and manually adjust feedwater flow to maintain vessel level during this time. The inspectors considered the test to be well planned and executed.

5 SURVEILLANCE OBSERVATIONS (61726)

The inspectors observed the performance of portions of the surveillance tests listed below:

- Procedure 06-EL-1R21-M-0001, "4.16 KV Degraded Voltage Functional Test and Calibration"

- Procedure 06-IC-1E61-Q-1004, "Containment and Drywell Hydrogen Analyzer (PAM) Calibration"

The inspectors concluded that the licensee safely performed these surveillance tests in accordance with established procedures. No significant strengths or weaknesses were observed by the inspectors.

6 ONSITE ENGINEERING (37551)

6.1 Steam Header Pressure Setpoint Change

Because the potentiometer that controlled turbine header pressure had problems maintaining the pressure at a constant value, licensee personnel changed the header setpoint from 950 to 955 psig to exercise a different position on the potentiometer, which remained 25 psig below the analyzed setpoint. The licensee's safety evaluation concluded that the planned setpoint change was acceptable and would not place the plant in an unanalyzed condition or result in operation beyond design limits. The inspectors reviewed the evaluation and temporary procedure change that implemented the setpoint change. In addition, the inspectors observed the implementation of the setpoint change from the control room. The evolution was well planned and was concluded without incident. The transient analysis for the current core allows a rated turbine inlet pressure of 980 psig with a corresponding reactor steam dome pressure of 1025 psig and an analyzed value of 995 psig and 1045 psig, respectively. The inspectors concluded that the pressure setpoint change was appropriate.

6.2 Riley Temperature Switches

On November 11, 1995, a spurious isolation of the reactor water cleanup system occurred because of a Division II main steam line pipe tunnel temperature signal. Operators implemented Procedure 05-S-01-EP-4, "Auxiliary Building and Radioactive Release Control," Revision 20. The actuation signal reset automatically. The Riley temperature switch was determined to be faulty and was replaced with a newer model. The licensee determined this event was not reportable.

Subsequently, the inspectors discussed the failure history of this type of temperature switch with licensee personnel. Similar failures of the Riley temperature switches have occurred at boiling water reactor power plants, causing inadvertent system isolations. Although a newer model switch is available from the vendor, the replacement switch has a poor reliability history. The licensee has 40 Riley temperature switches that perform an isolation function. Twenty-three of the temperature switches have been replaced with newer models. Of the remaining 17 temperature switches, 7 are installed in differential temperature applications that are the most susceptible to inadvertent trips.

The licensee has experienced four failures of the newer model temperature switches within 24 hours of being installed. Therefore, the licensee energizes the new temperature switches on a test bench for 3 days before installation to identify faulty switches. The requirement for differential temperature monitoring of the rooms is being evaluated to determine if it can be deleted from the technical requirements manual. The licensee would prefer to rely on ambient temperature or high flow signals to provide the system isolation. The inspectors considered the licensee's activities to be appropriate.

6.3 Temporary Revisions to Plant Drawings

During the week of October 23, 1995, NRC Operator Licensing Examiners were on site to observe licensed operator requalification activities (NRC Inspection Report 50-416/95-17, paragraph 1.2). During the examinations, several operators failed to identify the proper position of a valve when they misread a recently revised piping and instrumentation diagram. The inspectors expressed concern regarding how the licensee updated revised drawings and provided training to operators for determining the latest system configuration prior to issuance of the final design drawings. As a result, the licensee issued Quality Deficiency Report 0217-95 to document potential concerns. The licensee's resulting corrective actions with the drawing amendment process included:

- Changing design control procedures to require the revision of drawings earlier in the design change process in order to minimize amendments attached to drawings.
- Evaluating current training programs in this area and making necessary changes by February 1, 1996.
- Accelerated updating of all drawings with attachments. Significant progress was made in this area by the end of the inspection period.

The inspectors considered the licensees' actions to improve the drawing amendment process to be appropriate.

7 PLANT SUPPORT ACTIVITIES (71750)

The inspectors periodically observed security practices to verify that security officers implemented the Security Plan in accordance with site procedures. Search equipment at the access control points was appropriately maintained, vital area portals were kept locked and alarmed, and personnel in the protected area were properly badged. The inspectors identified no deficiencies in this area.

On November 9, 1995, the inspectors toured the perimeter with the security manager and discussed the licensee's progress for installation of the land vehicle bomb threat barriers. Good progress was being made to implement this modification.

8 REACTOR VESSEL LEVEL INSTRUMENTATION (TI 2515/128)

The inspectors verified and evaluated the licensee's implementation of hardware modifications to the reactor vessel water level instrumentation to prevent dissolved gases from leaving solution in the reference legs during a rapid depressurization event. This system was installed to implement corrective actions contained in NRC Bulletin 93-03.

Installation and testing of the reference leg backfill modifications were completed in November 1993. Inspector Followup Item 416/9314-03 was opened to follow the implementation of the hardware modifications, including postmodification testing. This item was closed in NRC Inspection Report 50-416/93-16. The inspectors also reviewed the results of the full power testing activities, as mentioned in NRC inspection Report 50-416/93-23. The system was shown to be stable in all tested operated conditions.

In addition, a special inspection was conducted by NRC Region II personnel during November 1993 (NRC Inspection Report 50-416/93-21) in the area of design and testing of the modifications. In summary, the inspectors concluded that the modification was well planned, with appropriate levels of engineering and technical support, the scope of testing was adequate to ensure the system operated as designed, and appropriate installation/design instructions, codes, and standards were used. The procedures and operator round sheets developed to operate and monitor system performance were appropriate. The safety evaluation performed for the modification was thorough and addressed the applicable concerns.

To preclude concerns regarding the potential of inadvertent closure of the four reference leg manual isolation valves, the licensee pinned the valve stems in the open position and welded the pins.

Isolation between the systems and the control rod drive charging water header (the source of purge flow) is provided by two check valves in the each of the four backfill stations. The check valves (eight total) are not containment isolation valves. These check valves were, however, verified by the inspectors to be included in the inservice testing program, Procedure 06-OP-1B21-C-0005, "Reference Leg Purge Check Valve Test." The licensee's actions in response to the bulletin were considered to be thorough.

ATTACHMENT

1 PERSONS CONTACTED

Licensee Personnel

*D. Bost, Director, Nuclear Plant Engineering
C. Bottemiller, Superintendent, Plant Licensing
W. Deck, Security Superintendent
M. Dietrich, Manager, Training
*J. Dimmette, Manager, Operations
C. Dugger, Manager, Outage Maintenance and Work Control
*C. Ellsaesser, Manager, Performance and System Engineering
*C. Hayes, Director, Quality Assurance
*C. Hutchinson, Vice President, Nuclear Operations
A. Khanifar, Manager, Materials, Purchasing and Contracts
*M. McDowell, Operations Superintendent
*M. Meisner, Director, Nuclear Safety and Regulatory Affairs
*R. Moomaw, Manager, Plant Maintenance
A. Morgan, Manager, Emergency Preparedness
*D. Pace, General Manager, Plant Operations
E. Harris, System Engineering Superintendent (Acting)
T. Tankersley, Radiation Control Superintendent

The inspectors contacted other licensee personnel during this inspection.

*Denotes personnel who attended the exit interview

2 EXIT MEETING

The inspectors conducted an exit meeting on December 5, 1995. During this meeting, the inspectors reviewed the scope and findings of the report. The licensee did not express a position on the inspection findings documented in this inspection report. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspectors.