



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

Report No.: 50-416/88-11

Licensee: System Energy Resources, Inc.  
Jackson, MS 39205

Docket No.: 50-416

License No.: NPF-29

Facility Name: Grand Gulf

Inspection Conducted: June 6-10, 1988

Inspector: *J E Gordon* for  
M. Hunt, Team Leader

6-30-88  
Date Signed

Team Members:

P. Fillion  
M. Miller

Approved by: *J E Gordon*  
T. Conlon, Chief, Plant Systems Section  
Engineering Branch  
Division of Reactor Safety

6-30-88  
Date Signed

SUMMARY

Scope: This routine, announced inspection was conducted in the areas of engineering design, plant modifications, and calibration for instrumentation systems to comply with Regulatory Guide 1.97. Follow-up of open items from previous inspections involved engineering, operations and maintenance of electrical equipment.

Results: In the areas inspected, violations or deviations were not identified.

However, an unresolved matter was identified involving instrumentation for the drywell pressure (Paragraph 2). In general, the licensee's organization performed quite effectively in carrying out analysis and implementing modifications to comply with the comprehensive set of requirements contained in Regulatory Guide 1.97.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*G. Cesare, Site Director (Acting)
- \*S. Bennett, Supervisor, Nuclear Licensing
- \*D. Berryhill, Instrumentation and Control Engineer
- \*M. Withrow, Supervisor, Instrumentation and Control Engineers

Other licensee employees contacted during this inspection included engineers, operators, and administrative personnel.

#### NRC Resident Inspectors

- \*R. Butcher, Senior Resident Inspector
- \*J. Mathis, Resident Inspector

\*Attended exit interview

### 2. Inspection of Licensee's Implementation of Multiplant Action A-17: Instrumentation for Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident (Regulatory Guide 1.97) (25587)

Criterion 13, "Instrumentation and Control", of Appendix A to 10 CFR Part 50 includes a requirement that instrumentation be provided to monitor variables and systems over their anticipated ranges for accident conditions as appropriate to ensure adequate safety. Regulatory Guide 1.97 (RG 1.97) describes a method acceptable to the NRC staff for complying with the Commission's regulations to provide instrumentation to monitor plant variables and systems during and following an accident. Conformance to RG 1.97 Revision 2 is required by the Grand Gulf Nuclear Station Operating License (condition 2.C.(36)). Instrumentation covered by RG 1.97 is classified into three categories of design and qualification criteria. Also, instruments are classified as belonging to one or more of five types according to function.

Following the NRC guidance for conducting this inspection, the inspectors selected an audit sample of parameters from RG 1.97.

Table A itemizes the parameters selected for this inspection and the corresponding plant specific identification.

TABLE A

<u>Parameter</u>	<u>Cat-Type</u>	<u>Transmitter No.</u>
Reactor Pressure Vessel Level	I-A&B	B21-LT-N091A&B* B21-LT-N044C&D* B21-LT-N027A&B*
Reactor Pressure Vessel Pressure	I-A, B&C	B21-PT-N062A&B*
Drywell Pressure	I-A, B, C, &D	M71-PDT-N001-A&B*
Drywell Temperature	I-A, D	M71-TE-N008A, B, C&D M71-TE-N013A, B, C&D
Primary Containment Pressure	I-A, B, C	M71-PDT-N002A&B* M71-PDT-N027A&B*
Primary Containment Temperature	I-A	M71-TE-N007A, B, C, &D*
Suppression Pool Level	I-A, C&D	E30-TE-N003A, B, C, &D*
Containment H <sub>2</sub> Concentration	I-A, C	E61-AITS-K002A&B*
Drywell H <sub>2</sub> Concentration	I-A, C	E61-AITS-K001A&B*
Group I Isolation	I-A, B	B21-ZS-N101A1, B1, C1&D1 B21-ZS-N102A1, B1, C1&D1 B21-ZS-N104A1, B1, C1&D1 B21-ZS-N116&N117
Primary Containment Isolation Valve Position	I-A, B	Listed in submittal
Containment Spray Flow	II-D	E12-FT-N015A&B* plus valve lineup
RHR System Flow	II-D	E12-FT-N015A&B plus valve lineup

\*Indicates at least one of the transmitters was visually inspected.

<u>Parameter</u> (Continued)	<u>Cat-Type</u>	<u>Transmitter No.</u>
RHR Heat Exchanger Outlet Temperature	II-D	E12-TE-N027A&B*
Cooling Water Temperature	II-D	P41-TE-N011A&B*
Cooling Water Flow	II-D	P41-FI-N016A,B,&C*
AC Power Status	II-D	Listed in FSAh
DC Power Status	II-D	Listed in FSAh

\*Indicates at least one of the transmitters was visually inspected.

Each of the transmitters listed in Table A and associated display devices in the control room were inspected for attributes corresponding to the design and qualification criteria specified in the regulatory guide. Equipment qualification was verified by confirming that the equipment was on the licensee's Equipment Qualification Master List and Quality List. Seismic qualification was verified by checking the Seismic Qualification Central File Index. Redundancy, when required for a particular parameter, was verified to exist by checking P&ID drawings, schematics and loop diagrams. Proper ranges and appropriate identification were verified by visual inspection in the control room. Instrument and loop calibration procedures and data sheets were reviewed. In cases where plant modifications were proposed in the licensee's submittal to meet RG 1.97, the field devices were visually inspected.

Three questions were raised by the inspectors during the inspection which were answered in a formal manner by the licensee. First, the NRC pointed out that the licensee's submittal did not identify by unique identification the instruments which fulfill the RG 1.97 requirements. The submittal indicated an instrument identification number for each parameter which represented a family of instrument loops. To only specify a family of loops is ambiguous because, in some cases, all the loops within the designated family did not apply to RG 1.97. The licensee submitted a definitive list during the inspection, and committed to remove any ambiguities in identification numbers from Table 7.5-2, "Post-Accident Monitoring Instrumentation," in the UFSAR as part of their December 1988 UFSAR update submittal.

Second, the NRC inspector pointed out that RG 1.97 indicates that drywell pressure narrow range is a Type D, Category II parameter. However, the licensee's submittal, dated February 28, 1985, referenced the wide range instrument for this function, but they did not note this exception to the RG.

The NRC's rationale for including the drywell pressure narrow range parameter in RG 1.97 is monitoring of the Post-LOCA vacuum breakers and the Drywell Purge System. The plant does, in fact, have drywell/containment differential pressure instrumentation to control the Drywell Purge System. The differential pressure is available for call up on the plant computer. Following a LOCA, the ECCS will operate to condense the steam in the drywell and thus reduce the drywell pressure. As soon as the drywell pressure drops below the containment pressure, the drywell vacuum breakers open and noncondensable gases from the containment flow back into the drywell. This flow of containment gases to the drywell continues by means of the drywell purge compressors. When the drywell has been sufficiently pressurized, the noncondensibles (including hydrogen) will be forced into the containment through vents and the suppression pool. Hydrogen recombiners in containment control hydrogen concentration to less than four volume percent.

It is desirable that the operator has the ability to confirm the operation of the Drywell Purge System and the Post-LOCA Vacuum Relief System. Display of the drywell/containment differential pressure (1E61-PDT-NO13A-G and associated computer input) could provide this confirmation. The licensee is reviewing this equipment against the quality standards and other criteria in RG 1.97. This matter is identified as Unresolved Item 88-11-01, Review Adequacy of Drywell/Containment Differential Pressure Instrumentation.

Third, during inspection of the control room the NRC inspectors noted that the RG 1.97 instruments do not have unique labels. They have labels that read "Post-Accident Monitoring", but these labels are not considered unique because they are the same type, size and color as those used for non-RG 1.97 instruments. Discussions on this matter with the cognizant engineers disclosed the following information. In letter AECM-85/0059, dated February 28, 1985, the licensee committed to develop a philosophy regarding instrument channel identification as part of the overall Emergency Response Capability program, and it will be implemented as part of the GGNS Detailed Control Room Design Review. This action has been documented in Human Engineering Discrepancy (HED) No. 1122 which is designated as a Priority 2 action item. Priority 2 HEDs are scheduled for resolution before the end of the third refueling outage. Documentation for this previous commitment was reviewed. The commitment was acceptable to the NRC as resolving the matter of labelling of RG 1.97 instruments.

Except for the three areas described above, each parameter in the audit sample was found to be monitored by devices which meet the requirements of the regulatory guide. The inspectors therefore concluded that Grand Gulf Nuclear Station is in compliance with Regulatory Guide 1.97. Instrumentation has been installed which should provide the operator with complete and reliable information during and following any postulated accident. The operator will be able to identify degraded conditions and their

magnitude. The licensee's organization performed effectively in carrying out the RG 1.97 task. Human Engineering considerations are being addressed. The licensee was responsive to the NRC's identification of an unresolved item, and it is expected that this matter will be resolved in a timely manner.

a. Documents Reviewed

Letter from MP&L to NRC, dated February 28, 1985, on Regulatory Guide 1.97 (Rev. 2) Position Report on Accident Monitoring Instrumentation [AECM-85/0059]

Safety Evaluation Report, Conformance to Regulatory Guide 1.97, Revision 2, transmitted January 12, 1987

UFSAR Table 7.5-2, Post-Accident Monitoring Instrumentation; and proposed changes

Surveillance Procedure - Calibration

06-IC-1B21-R-0008	Rev. 26	Reactor Vessel Water Level
06-IC-1B21-R-0014	Rev. 22	Reactor Vessel Pressure (PAM)
06-IC-1B21-R-0044	Rev. 20	Reactor Vessel Water Level (PAM)
06-IC-1E30-R-0001	Rev. 23	Suppression Pool Level Wide Range
06-IC-1E61-M-1004	Rev. 26	Containment and Drywell Hydrogen Analyzer (PAM)
06-IC-1M71-R-0001	Rev. 23	Containment Pressure (PAM) and Drywell Pressure
06-IC-1M71-R-0003	Rev. 24	Suppression Pool Temperature Monitoring Instrumentation
06-IC-1M71-R-0004	Rev. 25	Containment and Drywell Temperature Calibration - Instruction
07-S-53-E12-8	Rev. 5	Residual Heat Removal System Water Temperature
07-S-53-38	Rev. 5	Rosemount 1151, 1152, and 1153 Pressure Transmitters
07-S-53-43	Rev. 2	General Electric Company 180 Series Indicators

3. Action on Previous Inspection Findings (92701)

Report 87-27, transmitted January 11, 1988, contains Inspector Followup Item 87-27-03, PRA inspection hardware availability observations followup. This item consists of a set of recommendations developed during the PRA based inspection. Licensee action on recommendations in the electrical area were addressed during this inspection. Each of these items is discussed below.

NRC RECOMMENDATION: During inspection tours, it was noted that the 4160 volt grounding switch was stored adjacent to the sequencer panel. This is not consistent with seismic design.

LICENSEE ACTION: The licensee stated that the grounding switch will be stored outside the Unit 1 area until an appropriate location can be found.

NRC RECOMMENDATION: Since the licensee did not have a study that documented the proper application of the surge arresters in the switchyard and the misapplication of surge arresters could be a possible source of common mode failure, the application of the surge arresters in the switchyard should be reviewed.

LICENSEE ACTION: The licensee stated that they intended to carry out a general review of the surge protection in the switchyard. The NRC intends to review any documents generated by this study.

NRC RECOMMENDATION: Serious consideration should be given to maintaining the switchyard batteries according to all the recommendations of IEEE Std. 450, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."

LICENSEE ACTION: Mississippi Power and Light Company (MP&L) has developed a procedure for test and surveillance of the switchyard batteries. This procedure is written to address IEEE-450 requirements. The first quarterly test using the new procedure was conducted in May 1988. MP&L and the plant staff are working out problems associated with providing a redundant power supply to allow performance of a load discharge test.

NRC RECOMMENDATION: Consideration should be given to factoring temperature differential into the 18-month battery service test in order to obtain the maximum trending information. Such information will be more important later in battery life, especially since the discharge capacity tests were performed using different procedures (i.e., acceptance test vs five-year test vs ten-year test).

LICENSEE ACTION: The licensee re-evaluated their position on this matter, but concluded that temperature correction for the 18-month battery service test was not beneficial because neither the IEEE standard nor the manufacturer provide guidance for this. The NRC later learned that the IEEE committee for Std. 450 deliberately omitted temperature correction for the service test. For the above reasons, the licensee does not plan to implement this recommendation.

NRC RECOMMENDATION: The balance-of-plant batteries are maintained according to all the recommendations in IEEE Std. 450. However, in light of the PRA results, the licensee may wish to consider using the safety-related surveillance procedures for any batteries that power the annunciators in the main control room or equipment important to dominant PRA sequences.

LICENSEE ACTION: The licensee's position on this matter is that the cost associated with performing seven-day surveillance on balance-of-plant battery pilot cells could not be justified, because it has not shown what benefit would result.

NRC RECOMMENDATION: Power for ESF transformer No. 11 X-winding to Div I buses flows through breaker 152-1901 in the normal alignment (used prior to the inspection). Since breaker 152-1901 is in the Div II room, it appears that alternative breaker alignments would provide better separation between Div I and II for normal operation.

LICENSEE ACTION: The licensee stated that they agree with the validity of this comment. Actual breaker lineups were not confirmed by the NRC inspector during this inspection.

Of the six items related to IFI-87-27-03 discussed in this section, five are considered closed by the NRC. The item related to surge protection in the switchyard remains open since the NRC intends to review any documents generated by the proposed study.

#### 4. Exit Interview

The inspection scope and results were summarized on June 10, 1988, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results listed below. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

<u>Item Number</u>	<u>Description and Reference</u>
416/88-11-01	URI - Review Adequacy of Drywell/Containment Differential Pressure Instrumentation

The licensee's management was informed as to which IFIs are considered closed.