

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

Report Nos.: 50-424/91-01 and 50-425/91-01

Licensee: Georgia Power Company P. O. Box 1295 Birmingham, AL 35201

Docket Nos.: 50-424 and 50-425

Facility Name: Vootle 1 and 2

Inspection Conducted: January 14-24, 1991

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Approved by:

. Shymlock, Chief Plant Systems Section Engineering Branch Division of Reactor Safety

SUMMARY

Scope:

This special, announced inspection was conducted in the areas of the licensee's conformance to Regulatory Guide (RG), 1.97, Instrumentation for Light Water -Cooled Nuclear Plant Power Plants to Assess Plant and Environs Conditions during and Following an Accident.

Results:

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

The licensee has implemented a very good program of plant instrumention to meet the intent of RG 1.97, Revision 2; the SER; and their submittals.

### Strengths

The plant system monitoring system (PSMS) has exceptional capabilities for trending and displaying Category 1 variables and most of the Category 2 variables. This is further discussed in Paragraph 2.b.(3).

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License Nos.: NPF-68 and NPF-81

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### REPORT DETAILS

#### 1. Persons Contacted

Licensee Employees

\*H. Beacher, Senior Engineer \*J. B. Beasley, Manager Operations J. R. Binghams, Senior Engineer/Birmingham \*S. H. Chesnut, Manager Technical Support \*W. G. Copeland, Supervisor Material \*T. Greene, Assistant General Manager \*H. Handfings Manager Maintenance P. Herrmann, senior Engineer/Birmingham \*M. L. Hobbs, Superintendent I&C \*M. Horton, Manager Engineering \*S. Kitchen, Assistant General Manager Operations \*N. C. Moslev, Jr., Senior Engineer/Birmingham \*R. Odom, Supervisor Technical Support \*W. B. Shipman, General Manager \*M. Sheibani, Senior Engineer C. Stinespring, Manager Plant Administration A. Wehrenberg, Manager Nuclear Support/Birmingham

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

Other Organizations

A. DiPerica, Bechtel Power Corporation J. Haratyc, Bechtel Power Corporation \*E. Toupin, Oglethorpe Power Corporation

NRC Resident Inspectors

\*P. A. Balmain, RI \*B. R. Bonser, SRI \*R. D. Starkey, RI

\*Attended exit interview

Acronyms and initialisms used through this report are listed in Paragraph 5.

 Inspection of Licensee's Implementation of Multiplant Action Item 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 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.

The licensee responded to RG 1.97 (NUREG 0737, Supplement 1) in letters dated April 14, 1983; March 15, 1985; June 20, 1985; September 6, 1985; and January 21, 1986. The Safety Evaluation Report (SER) was issued as Appendix M of Supplement SSER 2 dated May 1986, Supplement SSER 5 dated January 1987; and Supplement SSER 7 dated January 1988 of NUREG 1137.

The SER concluded that the licensee either conforms to or is justified in deviating from the recommendations of k gulatory Guide 1.97, Revision 2.

The inspection assessed the licensee's RG 1.97 instrumentation system using (1) the design and qualification criteria described in Section 1.3 of RG 1.97, Revision 2; (2) the EG&G Technical Evaluation Report No. EGG-EA-6806, dated April 1986, Conformance to Regulatory Guide 1.97, Vogtle Electric Generating Flant, Unit Nos. 1 and 2; (3) the licensee's submittals as discussed previously; and (4) 10 CFR Part 50.

A random sample of 31 variables from the licensee's submittal were selected to evaluate the licensee's program. The variables selected were classified as Category 1 and 2 which have the most stringent design requirements of all RG 1.97 instruments. The instruments examined and the results achieved are discussed in the paragraphs and tables below.

a. Category 1 and 2 Instruments

The instrumentation listed in the following Tables was examined to verify that the design and qualification criteria for RG 1.97, the SER, and licensee commitments had been satisfied. The instrumentation was inspected by reviewing drawings; procedures, data sheets and other documentation; and performing walkdowns for visual observation of selected installed equipment including control room indicators and recorders. The following areas were inspected:

- Equipment Qualification The EQ Master Equipment List (EQR) Q-List, I&C list, seismic test reports, and instrument drawings were reviewed for confirmation that the licensee had addressed environmental qualification requirements and seismic qualification.
- (2) Redundancy Walkdowns were performed to verify by visual observation that selected instruments were installed as specified and that separation requirements were met. In

addition, wiring drawings for all listed Category 1 instrumentation were reviewed to verify redundancy and channel separation.

- (3) Power Sources Wiring drawings were reviewed to verify the instrumentation is energized from a safety-related power source if applicable.
- (4) Display and Recording Walkdowns were performed to verify by visual observation that the specified display and recording instruments were installed. Wiring drawings were reviewed to verify there was at least one recorder in a redundant channel and two indicators, one per division (channel) for each measured variable.
- (5) Range Walkdowns were performed to verify the actual range of the indicator/recorders was as specified in RG 1.97 or as stated in the licensee's submittal. Review of calibration procedures verified sensitivity and overlapping requirements of RG 1.97 for instruments measuring the same variable.
- (6) Interfaces The wiring drawings, I&C list, and Q-list were reviewed to verify that safety-related isolation devices were used when required to isolate the circuits from non-safety systems.
- (7) Direct Measurement Wiring drawings were reviewed to verify that the parameters are directly measured by the sensors.
- (8) Service, Testing, and Calibration The maintenance program for performing calibrations and surveillances was reviewed and discussed with the licensee. Calibration and surveillance procedures and the latest data sheets for each instrument were reviewed to verify the instruments have a valid calibration.
- (9) Equipment Identification Walkdowns performed to verify that types A, B and C instruments designated as Categories 1 and 2 were specifically identified with a common designation on the control panels.

### TABLE 1

#### CATEGORY 1 INSTRUMENT

#### Variable

RCS Pressure Wide Range PT-408 PI-408 PT-418 PI-418 PT-428 PT-428 PI-428

Instrument Number

Variable	Instrument Number
(cont'd)	PT-438 PI+438 PR-428 PSMS Computer
RCS Hot Leg Temperature	TE-413A TI-413A TR-413A TE-423A TI-423A TE-433A TI-433A TE-443A TI-443A PSMS Computer
RCS Cold Leg Temperature	TE-413B TI-413B TR-413B TE-423B TI-423B TE-433B TE-433B TE-443B TI-443B TI-443B PSMS Computer
Containment Pressure	PT-934 PI-934 PR-934 PT-935 PI-935 PT-936 PI-936 PT-937 PI-937 PSMS Computer
Refueling Water Storage Tank Level	LT-990 LI-990 LR-990 LT-991 LI-991 LT-992 LI-992

Variable (cont'd)	Instrument Num
	LT-993 LI-993 PSMS Computer
Containment Water Level Narrow Range	LT-7777 LR-7777 LT-7789 PSMS Computer
Containment Water Level Wide Range	LT=764 LI=764 LR=764 LT=765 LI=765 PSMS Computer
RCS Subcooling	PSMS Computer
Auxiliary Feedwater Flow	FT-5150 FI-5150A FT-5151 FI-5151A FT-5152 FI-5152A FT-5153 FI-5153A FT-15150 FT-15150 FT-15152 FT-15153 PSMS Computer
Pressurizer Level	LT-459 LI-459 LR-459 LT-460 LI-460 LT-461 LI-461 PSMS Computer

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Variable (cont'd)	Instrument Number
Containment Pressure Wide Range	PT+10942 PT-10943 PSMS Computer
Hydrogen Concentration	1513-P5-HMA 1513-Q5-HMA A1-12979 AR-12979 1513-P5-HMB 1513-Q5-HMB A1-12980 AR-12981 PSMS Computer
Condensate Storage Tank Level	LT-5101 LI-5104 LI-5104 LT-5111 LI-5111 LT-5116 LI-5116 PSMS Computer
Core Exit Temperature	TE-1001 T 10050 PSMS
Neutron Flux	RE-13135A P5-NF-A RE-13135B P5-NF-B PSMS Computer
Steam Generator Level Wide Range	LT-501 LI-501 LR-502 LI-502 LI-503 LI-503 LR-503 LT-504 LI-504 PSMS Computer

(ariable cont'd)	Instrument Number
ontainment Isolation alve Status	HV-3026 A&B PV-3020 HV-13008 A&B HV-3036 A&B PV-3030 HV-9001 A&B HV-15198 HV-15197 HV-5195 HV-15199 HV-5197
team Generator Level Arrow Range	LT-517 LI-518 LI-518 LI-519 LI-519 LI-527 LI-527 LI-528 LI-528 LI-528 LI-529 LI-529 LI-529 LI-537 LT-538 LI-538 LI-538 LI-538 LI-538 LI-539 LI-539 LI-547 LI-547 LI-548 LI-548 LI-548 LI-548 LI-548 LI-548 LI-554 PSMS Computer
Steam Line Pressure	PT-514 PI=514 PR-514 PT-515 PI=515 PT-516

## Variable (cont'd)

Instrument Number

PI-516 PT-524 P1-524 PT-525 PI-525 PT-526 PI-526 PT-534 PI-534 PT-535 PI-535 PR-535 PT-536 PI-536 PT-544 P1-544 PT-545 PI-545 PR-545 PT-546 PI-546 PSMS Computer

## TABLE 2

# CATEGORY 2

# Variable

# Instrument Number

Pressurizer Pressure	PT-455 PI-455A PT-456 PI-456 PT-457 PI-457 PT-458 PI-458 ERF Computer
Pressurizer Fower Operated Relief Valve (PORV) Status	ZSC-455A ZSO-455A ZSC-456A ZSO-456A ERF Computer

Variable (cont'd)	Instrument Number
Pressurizer Safety Valve	ZSCA(B)-8010A ZSOA(B)-8010A ZSCA(B)-8010B ZSOA(B)-8010B ZSCA(B)-8010C ZSOA(B)-8010C PSMS ERF Computer
Pressurizer Heater Current Status [Current Transducers]	NB0105 NB1005 ERF Computer
Charging System Flow	FT-121 FI-121A ERF Computer
Emergency Charging Flow	FT-138 F1-138 PSMS Computer
Low Head Safety Injection Flow	FT-918 FI-918 FT-922 FI-922 PSMS Computer
High Head Safety Injection Flow	FT-917 FI-917A PSMS Computer
Residual Heat Removal (RHR) Flow	FT-618 FI-618A FT-619 FI-619A ERF Computer
Residual Heat Removal Discharge Temperature	TE-604 TR-612 TE-605 TR-613 ERF Computer
Containment Spray Flow	FT-930 FI-930 PSMS ERF Computer

Variable (cont'd)	Instrument Number
Closed Cooling Water Flow to Engineered Safety Features Components [CCW Flow to ESF]	FT-1876 FI-1876 FT-1877 FI-1877 PSMS ERF Computer

b. Discussion and Conclusion

The licensee was well prepared for this announced inspection and extremely cooperative in providing assistance to the inspector. All documentation, drawings, and calibration data sheets were pulled and immediately available. In addition, the licensee had completed "checklist" data sheets for all the variables. Knowledgeable engineers were assigned to provide assistance, answer questions, and assist in plant walkdowns.

The inspector concluded that Vogtle has implemented a very good program to meet the intent of RG 1.97, the SERs, and their submittals. The inspector did not identify any concerns or weaknesses with the RG 1.97 program or instruments. However, a very minor concern with taping spare electrical wires was identified as a potential problem. A brief discussion of the areas reviewed and the results are summarized below.

(1) Documentation

The licensee completed "checklist" data sheets for all the variables. The checklist data sheets included complete information for the RG 1.97 instruments in the following areas:

- Equipment Qualification
  Qualification Assumance Requirements
  Display and Recording
  Ranne
  Interfaces
  Reference Drawings (Numbers)
  Comments/Notes
- <sup>o</sup> Equipment Power

### (2) Calibration

The inspector reviewed the collibration data sheets to verify each RG 1.97 instrument had a valid calibration. The inspector also reviewed the calibration procedures and calibration program for the associated loops and instruments listed in Tables 1 and 2. Overall, the inspector considered that the licensee has a very good calibration program and I&C group.

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(3) Plant Safety Monitoring System (PSMS) Compute.

The licensee has installed in each unit a unique Class 1E computer system with a plasma display in each control rorm. This PSMS monitors, trends, and displays the plant status for all the Category 1 variables and most of the Category 2 variables. The inspector determined the PSMS provided exceptional backup capabilities for RG 1.97 instrumentation. In addition the licensee also uses a plant computer and a emergency response facility [ERF] computer to monitor RG 1.97 variables in each unit.

(4) Electrical Spare Wires

During the walkdown of instrumentation cabinets, the inspector noted that spare wires were capped with electrical black tape. In several cases the black tape was folded over once. The inspector had a minor concern whether this folded over black tape would last for the life of the plant and brought it to the licensee's attention. The licensee's determined that although no problem now existed with the spare wires some type of long term corrective action would be needed to prevent a potential problem in this area. The inspector agreed with the licensee's position that the capping of spare wires did not need to be addressed immediately; but long term corrective action should be taken.

- 3. Licensee Action on Previous Inspection Findings
  - a. [Closed] Violation 50-424/88-52-01, Improperly Installed Raychem Splice on Pressurizer Pressure Transmitter Cable No. 12COPS2AXS.

During a 10 CFR 50.49 NRC inspection conducted November 1-13, 1988; a incomplete Raychem cable splice for the pressurizer pressure transmitter PT-0456 was identified. As a result, the above violation was written. The licensee responded by letter dated February 6, 1989 to this violation acknowledging the cause; listing the corrective action taken; listing the corrective steps to prevent recurrence; and specifying that date when full compliance would be achieved. The inspector verified the licensee completed the appropriate corrective steps and was in full compliance by the date specified, January 21, 1989 by reviewing the completed maintenance work orders (MWO). MWO 18808276, an inspection work order was completed prior to the conclusion of the inspection on November 17, 1988. The deficient splice was reworked by MWO 18808265 and completed November 19, 1988. The final review and inspection to verify no other splices were deficient from the original construction change package, CCP F10135E. was completed January 21, 1989 by MWO 18808535. The root cause of the problem was the work instructions listed on CCP F10135E. This item is closed.

[Closed] Unresolved ""em, URI 50-424, 38- -02, The High Range Radiation Monitoring instrument Does No. Wet the Accuracy Requirement specified in RG 1.97 and an Exception Hos Not Been Granted by NRR to The Guide.

During a 10 CFR 50.49 NRC inspection conducted November 14-18, 1988, a review of the test report for the high range radiation monitor (HRRM) revealed that HRRM, Model No. 6092D96GP1 did not meet RG 1.97 accuracy requirements. The range is 1-10,000 R/hr. The RG 1.97 accuracy requirement is that it must be within a factor of two over the entire range. An environmental qualification test determined this accuracy could not be achieved for approximately the first five minutes of the test at the low end of the range [at or below 4R/hr]. The licensee considered the intent of RG 1.97 was met.

Several changes concerning the HRRM have taken place since November 1988. The high alarm setpoint has been changed from 3 R/hr to 100 R/hr in the Vogtle plant technical specifications. No operator action is required since the HRRM in only used as a precautionary alarm. The licensee had Westinghouse perform a nuclear safety evaluation, SEC-89-026 dated January 17, 1989 and review the environmental qualification of the HRRM. The HRRM was initially qualified by Westinghouse WCAP-8687, Suppl 1. 2-E-70A. The safety evaluation stated the HRRM did not meet RG 1.97 accuracy requirement for the first 4.5 minutes of a high energy line break [HELB] when the range was below 4 R/hr. The safety evaluation concluded the consequence of exceeding the accuracy requirement during the first 4.5 minutes of a HELB event will not impact the safety of the plant since; the setpoint has been changed from 3 R/hr to 100 R/hr; and the alert alarm is only used as a precautionary alarm and does not dictate any required operator action. This item is closed.

#### 4. Exit Interview

b.,

The inspection scope and results were summarized on January 24, 1991, with those persons indicated in paragraph 1. The inspector 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.

The inspector stated that the licensee's instrumentation program was in compliance with RG 1.97, Revision 2. In addition the inspector closed the two open items, Violation 50-424/88-52-01 and Unresolved Item 50-424/88-52-02, discussed in Paragraph 3.

The licensee stated appropriate corrective action would by taken for the potential problem with the taped ends of spare electrical wires. This corrective action will gradually be implemented as necessary. The inspector agreed that this action was acceptable.

5. Acronyms and Initialisms

A1	Hydrogen Indicator
AR	Hydrogen Recorder
ERF	Emergency Response Facility
FI	Flow Indicator
FR	Flow Recorder
FT	Flow Transmitter
HV	Hand Valve
LT .	Level Indicator
L.R.	Level Recorder
LT	Level Transmitter
NB	Current Transd.cer
NRC	Nuclear Reculatory Commission
PI	Pressure Indicator
PR	Pressure Recorder
PT	Pressure Transmitter
PSMS	Plant Safety Monitoring System
PV	Remote Control Valve
RE	Reactive Element
RG	Regulatory Guide
SER	Safety Evaluation Report
TE	Temperature Element
TI	Temperature Indicator
TR	Temperature Recorder
ZSU	Limit Switch Closed (Valve)
ZSO	Limit Switch Open (Valve)