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

Report Nos.: 50-424/95-19 and 50-425/95-19

Licensee: Georgia Power Company
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Vogtle Electric Generating Plant
P. O. Box 1295
Birmingham, AL 35201

Docket Nos.: 50-424 and 50-425 License Nos.: NPF-68 and NPF-81

Facility Name: Vogtle Electric Generating Plant

Inspection Conducted: August 14-18 And August 28-September 1, 1995

Inspector: H. Whitener 9-30-95
H. Whitener Date Signed

Accompanying Personnel: M. Miller
G. Wiseman

Approved by: M B Shymlock 9-30-95
M. B. Shymlock, Acting Chief Date Signed
Test Programs Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, announced inspection was conducted in the areas of design changes and plant modifications, engineering support activities, and followup inspection of previously identified diesel generator problems.

Results:

In the areas inspected, two Violations associated with the diesel generators were identified:

VIO 50-424,425/95-19-01: Failure to identify a malfunction of diesel generator voltage regulator and take prompt corrective action. (Section 4.0)

VIO 50-424,425/95-19-02: Failure to control defective voltage regulator in warehouse stock which was later installed in diesel generator 1A. (Section 4.0)

The inspection resulted in the following assessments:

- The licensee had implemented a process for reviewing, prioritizing and scheduling needed design changes which considered plant safety, reliability and cost benefits. Documented justifications for canceled Design Change Requests were adequate.

- The inspectors reviewed selected administrative procedures relative to the design changes and modifications to determine the adequacy of the controls governing the design change process. The inspectors concluded that adequate controls and reviews were in place for effective implementation of design changes.

- The inspectors reviewed the engineering workload associated with engineering backlogs and determined that the engineering workload associated with engineering backlogs in this SALP period has been reduced.

- The open DCP backlog has been reduced from 260 in 12/93 to 155 in 8/95. Data indicates that a controlled work off of the backlog and advanced planning for design changes by the licensee's management is occurring.

- A sample of 9 Design Change packages, including both major (DCP) and minor (MDC) packages and 5 temporary modifications (TMs), were reviewed. The packages were reviewed for a clear statement of the problem, thorough 50.59 safety evaluations, analysis of impact on other plant systems, adequate design input, appropriate post modification testing, and configuration control (updating documents). The packages reviewed were considered technically adequate and effectively addressed plant problems.

- The Design Change Packages were sufficiently documented to verify closure including drawing and procedure revisions; and, FSAR and vendor manual updates. Drawing changes reviewed were clear and accurate.

- The completed modifications reviewed were considered adequately implemented. Field inspections of selected modifications verified that the modifications were installed in accordance with the requirements specified in the applicable modification package.

- The various engineering groups were involved in the resolution of problems in the support of reliable plant operation. It was determined that over 50% of identified deficiencies were resolved by Engineering. Process time for both Deficiencies and Request for Engineering Review was reduced from the previous report period.

- The inspectors concluded that the Deficiency Card System was an effective tool to identify plant deficiencies and track the resolution. The inspectors considered the determination of operability and reportability by the licensee were correct.

- Safety Audit Engineering Review (SAER) group had performed audits of engineering activities and although some recommendations were made no adverse findings were made.

- Review of plant records and discussions with plant personnel showed that engineering was involved in supporting plant operation and improving plant reliability. For instance:

  Maintenance Engineers were using Diagnostics as a tool to identify problems before equipment failure occurs.

  System Engineers were involved in design changes and problem resolution to support plant reliable and safe operation as well as the reduction of engineering backlogs.

  The Independent Safety Engineering Group (ISEG) had completed thorough analysis of industry events and their applicability to Vogtle.

REPORT DETAILS

1.0 Persons Contacted

Licensee Employees

*J. Beasley, General Manager Nuclear Plant
*W. Burmeister, Manager, Engineering Support
P. Burwinkel, Engineering Supervisor, Engineering Support
*C. Christiansen, Supervisor, Safety Audit and Engineering Review (SAER)
W. Gabbard, Nuclear Specialist I, Nuclear Safety and Compliance (NSAC)
J. Gasser, Manager, Operations
M. Griffis, Manager, Plant Modifications and Maintenance Support (PMMS)
*K. Holmes, Maintenance Manager
*W. Kitchens, Assistant General Manager
*P. Kochery, Engineering Supervisor, PMMS
*R. LeGrand, Manager, Health Physics/Chemistry
*P. Ruston, Unit Superintendent
*M. Sheibani, Supervisor, Nuclear Safety and Compliance
*M. Slivka, Supervisor, Independent Engineering Safety Group
*C. Tippins Jr., Nuclear Specialist, NSAC

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

NRC Resident Inspector
*C. Ogle, Senior Resident Inspector
M. Widmann, Resident Inspector

*Attended exit meeting

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

2.0 Design Changes and Plant Modifications (37550)

Criterion III of Appendix B to 10CFR50, Design Control, and the licensee's Quality Assurance program require that measures be established to control design changes and plant modifications. Procedure 00400-C, Revision 20, Plant Design Control, provided the instructions for initiating, controlling, documenting, implementing, and closing out design changes and plant modifications. This procedure, supported by lower tier departmental procedures, provided adequate controls for the implementation of design changes consistent with the requirements of 10CFR50, Appendix B, Criterion III.

The inspectors reviewed the methodology for determining the priority of a design change request (DCR). The DCR is reviewed by the appropriate system engineer. A cost benefit analysis is performed and a priority established in accordance with the guidance in a Desktop Instruction work list. The work list establishes weighting factors which emphasize

nuclear safety, public and plant personnel safety, regulatory requirements, plant reliability, and cost benefit. The DCR is forwarded through engineering supervision to the Manager of Engineering Support (MES). The MES compiles the outage work list of DCRs and sends this draft list to managers of all departments and affected groups for comment and input. A final work list draft is reviewed at a managers meeting and sent to the General Manager Nuclear Plant and the Vogtle Vice President for approval.

The inspectors reviewed a 1996 draft DCR work list issued December 1994 and a revised DCR work list for 1995 and 1996 isued April 1995. Although the prioritization process is not formally proceduralized, the inspectors concluded from this review that the DCRs appeared to be reasonably prioritized and scheduled to address plant safety and reliability issues.

2.1 Review Of Design Change Packages

Four DCR, and five minor design change (MDC) packages which were active or had been completed were selected for review. The inspectors reviewed the DCR and MDC completed packages listed below to: (1) determine the adequacy of the safety evaluation screening and the 10 CFR 50.59 safety evaluations; (2) verify that the modifications were reviewed and approved in accordance with applicable administrative controls; (3) verify the modifications were installed and had proper sign-offs; (4) verify that applicable design bases were included and that affected documents (drawings, vendor manuals, plant procedures, FSAR, etc.) were revised; (5) verify that the modifications were properly turned over to operations; and, (6) verify that both installation testing and post modification testing requirements were specified and that adequate testing was performed.

DCR/MDC No.	Title/Description of Work
DCR 91-V2N0220	Replace Manual Regulator with Automatic Regulator and Removal of Relays and Limiters on the Diesel Generator Voltage Regulation System to Improve Reliability.
DCR 93-V2N0062	Provide Underground Power Feed from Plant Wilson as a Backup Power Source to any of the Four Safety Buses on Unit 1 and Unit 2.
DCR 94-V1N0061	Eliminate the Plant Reliance on Thermo-Lag as a Rated Fire Barrier Except for Radiant Energy Shields Inside Containment.
DCR 94-VAN0024	Replace and Upgrade the Control Building Sump Pumps and Associated Piping to Improve Maintenance and Reliability.

MDC 93-VAM0025	Install a Mechanical Hard Stop on Elevator Track to Prevent Accidental Raising of the Spent Fuel Assembly Above Limits.
MDC 93-VAM0065	Install Grounding Straps to Radiation Monitor Equipment to Provide a Ground Path to Reduce Induced Signal Noise Interference.
MDC 94-VAM0041	Install "Patch" Extension Cables to Increase Length of Radiation Monitor Cables to Reduce Cable Connector Failures From Strain due to Short Cables.
MDC 94-VIM0133	Replace Obsolete Topaz Inverters and Switches With Single Unit Switch/Inverters on the Unit 1 Control Room Annunciator System.
MDC 94-VAM0018	Replace Obsolete Temperature Control Valves and Install Permanent Temperature Indicators on the Turbine Plant Sampling System Chiller Bath in the Secondary Sample Laboratory.

For the above DCRs and MDCs, the inspectors verified that: applicable design input information such as seismic requirements, environmental qualification, industry codes, etc., were addressed; the modifications contained a work instruction package; the packages contained additional information such as the design basis; and, affected plant documentation such as "As Built" drawings were revised within the time specified by procedure. This review also verified that affected instrument set point index drawings, vendor manuals, fire brigade pre-fire plans, computer equipment data base (NUCLEIS), procedures, and FSAR tables and figures had been updated to accurately reflect the modifications.

The inspectors performed field inspections for the modifications involving the control building sump pumps, temperature control valves and temperature indicators on the turbine plant sampling system in the secondary sample laboratory, and the underground power feed from Plant Wilson. The inspectors verified that the modifications were installed in accordance with the requirements specified in the applicable modification package and "as-built" drawings. Interviews with chemistry laboratory and maintenance personnel indicated that these specific plant modifications had improved system operation, reliability, and had simplified maintenance activitites. The inspectors concluded that the plant modifications had effectively accomplished their design intent.

The inspectors noted that the licensee computer (NUCLEIS) equipment data base had not been consistently updated to reflect a change in model number for replacement obsolete temperature control valves and new permanent temperature indicators on the Turbine Plant Sampling System Chiller Bath in the Secondary Sample Laboratory. The NUCLEIS system was

not considered part of the licensee's configuration control program but could be used as a source of information for site personnel including some maintenance activities. The inspectors questioned licensee personnel concerning the update of the computer database and found that licensee personnel had not requested the appropriate updates during implementation of the MDC. The inspectors considered the discrepancy as having minimal safety significance because even though not listed in the data base, the correct vendor information was available in the document controlled modification package. The licensee indicated that they intended to perform a broadness review for this process and track corrective actions. The NRC will follow-up on the corrective actions for the DC during a future inspection.

2.2 Temporary Modifications

The inspectors reviewed the licensee's temporary modification (TM) process to determine its adequacy for controlling and tracking temporary changes to the plant's configuration. TMs were prepared by onsite engineers within the Engineering Department. Procedure 00307-C, Revision 14, "Temporary Modifications," provided requirements and controls for the preparation, installation, and removal of TMs. The TMs were examined to verify that: (1) adequate safety evaluations were performed; (2) testing was specified and performed where applicable; and (3) TMs installed greater than 90 days were controlled in accordance with procedure 00307-C. The following active TMs were reviewed:

TM 94-V1T017	Provide power to one train A and C battery charger while bus 1AA02 is out of service during the Unit 1 refuel 5 outage.
TM 94-V1T040	Isolate a coil leak by blind flange on one of nine cooling coil banks on train B containment air cooler.
TM 94-V2T001	Disconnect a failed unit on transformer 2NB515X and downsize the transformer rating to 15 KVA.
TM 95-V1T016	Repair the body to bonnet leak on main feedwater valve 1-1305-X4-962.
TM 95-V2T030	Repair the seal box to stem leak on main feedwater drain valve 2-1304-X4-591.

TM backlog trends were inspected. At the time of the inspection 15 TMs were in place. Of these, 8 were related to valve or component leak repairs. Since February 1995, no TMs were in place that were older than one refuel cycle. Trends indicated an overall decrease in TMs. The licensee was meeting their goal on TM disposition and maintaining the backlog at a minimum.

The inspectors determined from reviewing the above TM packages that the technical content and quality were good. The safety evaluations

provided sufficient detail for determining the safety impact of the TM on plant operations. The inspectors concluded that the licensee's process for the installation, control, and removal of TMs was adequate.

2.3 Drawing Control

Plant design control for drawings was established and maintained through methods found in two plant procedures. Methods for making plant design changes, including drawing control, were controlled by Procedure No. 00400-C, "Plant Design Control," This procedure defined critical drawings in the DCP process as all: Single-Line, Elementary, and Piping and Instrumentation diagrams. Methods used to control drawings were given in Procedure No. 00101-C, "Drawing Control," This procedure defined the methods used for receiving, processing, and issuing the latest approved vendor and domestic drawings and changes.

To verify that drawing changes were issued according to the methods in procedures 00400-C and 00101-C, the inspectors selected several DCPs and MDCs noted in section 2.1 above for review. Each DCP was reviewed to verify that drawing changes were accurately and clearly made. The inspectors concluded that the Design Changes were sufficiently documented to verify closure including drawing and procedure revisions. Drawing changes reviewed were clear and accurate. FSAR and drawings were maintained up-to-date.

2.4 Conclusion

The inspectors concluded that Design Change Requests, Minor Design Changes, and Temporary Modifications were technically adequate with sufficiently detailed 10 CFR 50.59 safety evaluations. Pre-installation design reviews by interfacing disciplines were thorough, clear installation instructions were provided for design changes, adequate post modification test requirements were specified, and documentation was updated. The completed modifications reviewed were considered adequately implemented. The modifications had effectively accomplished their design intent.

3.0 Engineering Support Activity

The inspectors held discussions with licensee personnel and reviewed documentation of selected plant activities, procedures, and organization to evaluate the engineering involvement to support safe, reliable, day-to-day plant operations. In addition to monitoring system performance, this support included preparing minor design changes (MDCs), temporary modifications (TMs), reiview and implementation of major design change packages (DCPs), responding to deficiency cards, and performing engineering reviews, root cause analysis and safety evaluations.

3.1 Organization

Design changes and plant modifications are developed by both corporate and onsite engineering organizations. Major design change packages are, in general, developed by the Architect Engineer, Southern Company Services (SCS), who interfaces with the plant through the corporate organization, Southern Nuclear Operating Company (SNC). Minor design changes (MDCs) are normally developed on site by the Engineering Support Department (System Engineers). Design changes are coordinated and implemented by the Plant Modification and Maintenance Support group.

In early 1994, the licensee reorganized engineering and eliminated the Technical Support Department. Functions of the Technical Support Department had included Reactor Engineering, Performance Engineering, Nuclear Safety And Compliance and Quality Control functions. These functions were transferred to the Engineering Support Department with personnel retaining basically the same responsibilities.

During this inspection the licensee informed the inspectors of a major reorganization to be implemented in September 1995. The reorganization uses a concept of a number of functional teams which have the required expertise and diciplines to function individually and independently to monitor systems, resolve problems, perform maintenance, etc. in the teams assigned area. Functional teams have been formed for the Turbine Building, Electrical Systems, Functional Maintenance, Outside Areas, NSSS, I&C Systems, and Shift Team. In addition to the teams a manpower resource pool is maintained in the PMMS Department. A functional team is comprised of a team leader, work planners, QC technicians, engineers, mechanics, electricians, I&C technicians, procedure writers, chemical technicians, health physics technicians, and other duties as appropriate to the team assignment. The licensee stated that these concepts had been under study for two years and that they believe this structure will produce a safe but more efficient operation.

3.2 Engineering Performance

The inspectors reviewed various documentation of engineering activities on going is this SALP period including trending of management goals. A number of design changes were made to improve the plant reliability and safety. Typical examples are: 1) the upgrade of the SIGMA refueling machine and 2) installation of Individual Cell Equalizer (ICE) Devices. The SIGMA machine was unreliable and resulted in the loss of 2 days critical path time each outage. The ICE devices provide for stable battery cell float voltage to optimize cell performance for the plant batteries.

Also, management of engineering output produced positive results. Engineering was meeting, and in some cases exceeding, the management goals set for 1995 as indicated by reduction of engineering backlogs and support of plant needs. Some examples are as follows:

- DCP backlog reduced from 260 in December 1993 to 155 in August 1995.

- MDC backlog reduced from 146 in December 1993 to 103 in August 1995.

- Average turn around time to process DCs in 1995 reduced to 11 days.

- Average turn around time to complete Request for Engineering Reviews in 1995 reduced to 20 days.

While the inspectors could not review in detail all the plant programs there was objective evidence that engineering, supported by management, is actively and successfully involved in the developement and implementation of proactive engineering programs to improve plant performance, reliability and safety and to provide plant support.

3.3 DCR/DCP Cancellations

The inspectors reviewed a listing of DCR/DCP design change packages identified to be worked during the last Unit 2 refueling outage (2R4) and determined that nine DCR/DCP design packages identified to be worked had been cancelled. The inspectors reviewed five of the cancellations to evaluate the justification for cancellation.

The following DCR/DCP cancellations were reviewed:

- DCR 94-V1N0007: Replacement of vacuum pumps for CST and RMWST degasifier systems. This modification will be worked under a different design package (MDC 94-V1M099).

- DCR 93-V2N0047: Place polyethylene sleeves around neutron detectors to improve signal from a low leakage core. Low leakage core patterns were not developed and the modification was not needed.

- DCR 93-V2N0053: Remove the Gross Failed Fuel Detector (GFFD) since system has not been reliable and the letdown radiation monitor provides the same information. Management decision was to continue to operate the GFFD as long as parts are available. The modification was not needed.

- 92-V2N0202: Provide more reliable containment isolation valves for penetration 15 that do not rely on body to bonnet joint as a pressure boundary. The diaphragm valve diaphragm support sheet was crumbling resulting in loss of torque in the body to bonnet bolts. This in turn results in leakage. The licensee learned from the vendor that the diaphragm support sheet is not needed for system pressure less than 300 psig. Since the system pressure for penetration 15 is 150 psig the support sheet can be removed

without loss of valve integrity. This will remove the cause for loss of bolt torque thus improving valve reliability and reducing maintenance costs without a costly modificatiom.

- DCR 92-V2N0181: Failure of multiple 7300 printed circuit cards occurred due to inverter voltage spikes. The design change was to install suppression devices in the 7300 cabinets. However an alternate solution recommended by Westinghouse is to replace specific capacitors within the inverter. Since this change does not require a plant modification, the DCP was cancelled.

Based on this review the inspectors concluded that engineering had performed adequate reviews and documented the technical justification for the DCR/DCP cancellations.

3.4 Independent Safety Engineering Group

The Independent Safety Engineering Group (ISEG) performs an investigative and oversight function for the plant. The Group reports to the Manager of SAER at corporate. A monthly report is generated for management which provides analysis of operating experience in the industry, IENs, Operation and Maintenance Reports, etc.. The inspectors reviewed three monthly reports to evaluate the activities of ISEG and concluded that the Group had performed thorough, comprehensive evaluations of the applicability of industry events to the Vogtle plant. The inspectors observed that in some cases the Group opened tracking items to track corrective actions identified in relation to some event which was considered to be applicable to Vogtle.

The inspectors considered that ISEG performed an important investigative and management oversight function supporting the safe and reliable operation of the plant.

The following reports were reviewed:

- Vogtle Monthly Report, March 16, 1995
- Vogtle Monthly Report, February 15, 1995
- Vogtle Monthly Report, December 14, 1994

3.5 Plant Problem Investigation and Resolution

Appendix B of 10 CFR 50 and the licensee's Quality Assurance Program require that the licensee develop measures to identify and correct plant problems. The inspectors interviewed engineering personnel and reviewed plant records to evaluate the process for the identification and resolution of plant problems, the determination of plant operability and reportability, and the extent of engineering involvement with day-to-day technical issues.

The process used by the licensee to identify and track routine plant problems was the Deficiency Card (DC) system. Procedure 00150-C, Deficiency Control, Revision 20, effective May 3, 1995, defines the responsibilities of management and various plant groups and the flow process for: preparing, processing, reviewing, dispositioning, and determining operability and reportability of identified deficiencies. A deficiency report may be initiated by anyone in the plant by submitting a written deficiency card to the Unit Shift Supervisor (USS) who performs the initial review for immediate reportability and effect on plant operability. The USS will take any necessary compensatory or corrective action to maintain safe plant conditions. The DC is forwarded to NSAC for evaluation of significance, reportability and the classification of the DC for disposition. Deficiencies designated as 3B or 3C are reviewed by the Plant Review Board for concurrence with the reportability determination and for detection of potential hazards to nuclear safety.

The inspectors reviewed a sample of the Deficiency Cards to evaluate the determination of operability, determination of reportability, and engineering involvement in Root Cause analysis and Event Reports.

Engineering active involvement in resolution of plant problems was evident in thorough Event Reports and comprehensive Root Cause Analysis. The licensees determination of plant operability and event reportability were considered acceptable. Additionally, Engineering was responsible for determining the resolution of 275 DCs out of the total of 507 DCs written in this SALP period, i.e. 54%. This indicates active involvement in support of maintenance and plant day-to-day operation.

3.6 Safety Audit And Engineering Review

The Safety Audit And Engineering Review (SAER) group performs routine audits of areas important to the safety of the plant. The inspectors reviewed the two most recent audits in the area of Design Change and Plant Modifications as follows: OP13-94/05, March 11, 1994 and OP13-94/38, February 2,1995. No program breakdown issues or DCR/DCP, MDC or TM package technical content issues were identified. The audit concluded that the Design Change and Plant Modification process is adequately performed.

3.7 Conclusion

The inspectors concluded that the Deficiency Card System was an effective tool to identify plant deficiencies and track the resolution. Engineering was actively and directly involved in the investigation and resolution of day-to-day technical issues.

4.0 Inspector Followup (92903)

(Closed) Inspector Followup Item, IFI 50-424, 425/95-13-02, Follow-up to Diesel Generator Voltage Regulator Reliability Problems.

On June 28, 1995, during performance of surveillance procedure 14980-1, Diesel Generator Operability Test, for the DG1A, with the DG idling to stabilize engine temperatures, the low voltage annunciator alarmed. The output voltage had dropped to about 3000 volts. The operator manually raised the voltage to 4000 volts but could not raise it higher. After lowering and raising the voltage several times, the voltage regulator (VR) appeared to operate normally and the test was continued. The test was completed and signed off as satisfactory. Later in that afternoon with DG1A shutdown and in standby condition, the control room received a DG1A generator trouble alarm from the field ground detector. DG1A was declared inoperable.

During troubleshooting that evening, the licensee determined that a winding to winding short had occurred in a transformer (T3 transformer) in DG1A voltage regulator No. 2. Due to the nature of this failure and the repetitive problems with the voltage regulators, the licensee formed a critique team to evaluate all the recent voltage regulator problems. The DG1A voltage regulator problems were identified as IFI 95-13-02 listed above. This IFI was closed and is further addressed in, "Followup of Event Report 1-95-002, Failure of Diesel Generator 1A Voltage Regulator," discussed in the following paragraph.

Followup of Event Report 1-95-002, Failure of Diesel Generator 1A Voltage Regulator

The inspectors reviewed Event Report 1-95-002 including the referenced documentation to determine if the licensee identified the root cause of the event and implemented appropriate corrective action to ensure all the safety-related diesel generators were operable. The documentation reviewed included: 1) the signed completed surveillance test procedure 14980-1, Revision 38, "Diesel Generator Operability Test" for DG1A dated June 28, 1995; 2) Unit 1 Control Log for June 28 and 29, 1995; 3) Unit 1 Shift Supervisor Log dated June 28 and 29, 1995; 4) Unit 1 Diesel Generator DG1A Start Log dated June 28, 1995; 5) Deficiency Card Log DC-LOG3 for the diesel generators; 6) The voltage regulator Instruction Manual, Model 72 12500 100 by NEI-Peebles; 7) Technical Specification 3/4.8, Electrical Power Systems; 8) associated maintenance work orders (MWO); 9) completed monthly DG operability surveillance test procedures for all four DGs using both voltage regulators; 10) associated purchase orders for repair of voltage regulator No. 3271 and for the ordering of new replacement transformers; and 11) various procedures associated with material control, requisitions and receiving.

Completed DG training of operators, completed DG inspection MWOs, and completed diesel generator operability surveillance tests for all four DGs were reviewed to verify operability. These documents were examined to verify that the voltage regulator transformers were inspected by the

licensee and each DG was tested for operability. The DG training was reviewed to assure that operators would implement appropriate corrective action if further voltage fluctuations would occur. In addition, the inspector verified that operating instruction procedure 13145-1, "Diesel Generators" included instructions for transferring the diesel generator from one VR to the alternate VR.

Initially, for DG1B and DG2B, the T2 and T3 transformers voltage taps at 120V, 208V, 240V, 416V, 480V, and 600V were measured to verify the proper voltage and to determine if the transformers were defective. A defective transformer was identified in DG1B when the 600V tap read only 21.2 volts instead of 600V. Maintenance work orders MWO 19502130 for DG1B and MWO 29501937 for DG2B documented the T2 and T3 voltage tap measurements.

However, the inspector identified that only the 120V tap was measured as documented in MWO 19502044 for DG1A and MWO 2950911 for DG2A. As a result of the inspector's finding, the licensee initiated and implemented work orders MWO 19502497 for DG1A and MWO 29501937 for DG2A, both dated September 1, 1995, that required all T2 and T3 transformer voltage taps be measured for the proper voltage. The inspector verified that the voltage tap readings indicated the proper voltages for all taps in all the VRs in the four DGs.

The inspector concluded the DGs were operable since 1) all VR transformers T2 and T3 voltage taps had been tested for the required voltage, 2) DG operability surveillance tests had been performed without any voltage fluctuations, and 3) the operators were trained concerning DG voltage fluctuations and the transfer to the alternate VR. Engineering personnel stated new upgraded transformers will be ordered and installed in the VRs in the near future. However, the licensee has not completed the long term corrective action of replacing the T2 and T3 transformers.

On September 27, 1995, short term corrective action, as it relates to the continued use of T2 and T3 transformers, for the VRs was discussed with licensee engineering personnel per telecon. The licensee personnel stated their intentions were to implement appropriate short term corrective action to ensure the VRs were operable, but specific details were not available. The inspector considered this appropriate and stated a request for short term corrective action would be included with the inspection report.

Background The initial configuration for each DG regarding voltage regulators (VR) was that each DG had two installed VRs. One automatic VR for normal operation and one manual VR for maintenance purposes. The voltage regulator, "Instruction Manual - NEI Peebles," specifically stated that the manual VR should not be used when there are load changes or the DG was operated in parallel with the grid. The licensee determined the manual VRs were not used and could be replaced with automatic VRs used as installed spare VRs. Two installed automatic VRs would upgrade the reliability of the DGs. The inspectors verified that

both the automatic and manual VRs were essentially identical except the manual VR did not contain the sensing circuit (feedback) needed for automatic control.

Unit 1 DG1A and DG1B were modified with the replacement automatic VRs during the Fall 1994 refueling outage. Unit 2 DG2A and DG2B were modified with replacement automatic VRs during the Spring 1995 refueling outage. The inspector examined the completed VR modification package, DCP-91-V2N0220-0-1, for DG2B and concluded it was implemented in a satisfactory manner. However, during the Unit 2 post modification testing erratic voltage fluctuations were experienced with both Unit 2 DGs.

The engineering staff determined that the erratic voltage fluctuations were caused by the voltage regulator's motor driven potentiometer. Engineering stated that the manufacturer indicated corrosion on the potentiometer's winding and wiper could cause erratic behavior. Therefore, an engineering evaluation concluded that corrosion on the potentiometer winding caused the erratic voltage control that resulted in voltage fluctuation. As a precautionary measure, surveillance procedure 14980, Diesel Generator Operability Test, was revised to identify and minimize the potential for the corrosion buildup on the potentiometer. The revision added a "Note" identifying the potentiometer corrosion buildup and incorporated Step 5.1.20 that required raising and lowering the DG voltage through a range of 3900 to 4300 volts to obtain a smooth output voltage. The smooth output obtained during Step 5.1.20 was to provide assurance to the operator(s) that the potentiometer was not defective.

DG2B Defective Voltage Regulator S/N 3271

During the 1995 Spring Refueling Outage for Unit 2, on March 13, 1995, a defective voltage regulator (VR), S/N 3271 was removed from DG2B during post modification testing. Voltage regulator S/N 3271 along with VR S/N 2411 were returned to the vendor NEI Peebles for testing and inspection. Since NEI Peebles no longer had a 10 CFR 50 Appendix B quality assurance program, a Southern Nuclear Company Maintenance Engineer accompanied the VRs to monitor the inspection and testing. No repair work was to be performed by NEI Peebles. On May 2, 1995, testing indicated VR S/N 2411 was working properly. However, a defective T3 transformer was identified during testing of VR S/N 3271.

Since the Unit 2 diesel generators had experienced voltage fluctuations and the vendor had identified a defective T3 transformer in the VR; the licensee should have considered the possibility that the T2 and T3 transformers were the cause of the problem instead of corrosion in the potentiometers. The licensee failure to take prompt corrective action by not inspecting the other diesel generator voltage regulators for defective T3 transformers is identified as Violation 50-424, 425/95-19-01, Failure to Take Prompt Corrective Action for Voltage Regulators. Specifically: voltage regulator, S/N 3271, failed on March 13, 1995; the cause of the failure was determined on May 2, 1995 by the manufacturer;

the licensee failed to take prompt corrective actions to inspect the other diesel generators voltage regulators for defective T3 transformers.

The two VRs at NEI Peebles were returned to the Vogtle site with a note in the shipping package stating transformer T3 should be replaced in VR S/N 3271. On May 9, 1995, the package containing both VRs was received on site and the material control process was started. On May 26, 1995, VR S/N 3271 was returned to stock in location D-64-M in the warehouse without having the defective T3 transformer repaired. On June 29, 1995, VR S/N 3271 was issued to I&C to be installed on DG1A per MWO 19502044. During the testing of VR S/N 3271 in DG1A, transformer T3 was again found defective. The licensee failed to control a defective voltage regulator, S/N 3271, and it was inadvertently installed in DG1A. This is identified as Violation 50-424, 425/95-19-02, Control of Defective Voltage Regulator.

Diesel Generator DG 1A Voltage Regulator Failure

On June 28, 1995, during the performance of surveillance procedure 14980-1, "Diesel Generator Operability Test," for DG1A, with VR No. 2 selected, the DG experienced a voltage fluctuation. The output voltage dropped from 4150 volts to approximately 3000 volts while the DG was idling for the required 5 to 10 minutes to stabilize engine temperatures. (AT 3000 volts, the DG would not be able to power the bus and perform its intended safety function if called upon to do so). The "DG1A Low Voltage" alarm annunciated in the Control Room and the diesel operator attempted to raise the voltage using the DG "Raise" pushbuttom. The operator could not initially restore the voltage above 4000 volts. However, the operator subsequently lowered the voltage to approximately 3900 volts and then raised it to approximately 4300 volts. Again, without further operator action, the voltage instantly increased to 4500 volts. The operator manually restored the voltage. Then, the operator manually adjusted the voltage higher and lower several times with no problems. (The raising and lowering of the voltage between 3900 to 4300 volts was specified in the surveillance test procedure as stated above). The surveillance test was continued and completed at 1155 EDT. The surveillance test procedure was not signed off at that time. Operations, system engineering, and management personnel discussed the voltage fluctuations until 1616 EDT and then signed off the surveillance test as satisfactory. At 1634 EDT, the "Generator Trouble" alarm annunciated. DG1A "Generator Field Ground Relay" actuated. Attempts to reset the relay were unsuccessful and DG1A was declared inoperable and removed from service. Subsequent troubleshooting of DG1A VR No. 2 identified a malfunctioning T3 transformer.

During the performance of the DG1A surveillance operability test, severe voltage excursions were noted. Even though conditions adverse to quality were indicated, prompt corrective action was not taken to determine the cause of the voltage fluctuations. The surveillance was continued and completed as satisfactory. The licensee failed to identify and implement prompt corrective action for the severe voltage

fluctuation of DG1A. This is identified as the second example of Violation 50-424, 425/95-19-01, Failure to Take Prompt Corrective Action for Voltage Regulators. Specifically: during the performance of DG1A Operability Test per Procedure 14980-1 on June 28, 1995, severe voltage excursions were noted; conditions adverse to quality were indicated: prompt corrective actions were not taken to determine the cause of the voltage excursions; the surveillance was continued and signed off as satisfactory.

5.0 Exit Interview

The inspection scope and results were summarized on September 1, 1995, with those persons indicated in paragraph 1, and in a subsequent telephone call on September 27, 1995. The inspectors described the areas inspected and discussed in detail the inspection findings. Proprietary information is not contained in this report. No dissenting comments were received from the licensee. However, licensee Management indicated a desire that the inspectors interview the Unit Superintendent regarding the performance of the operability test and subsequent failure of DG1A. The inspectors remained on site and conducted this interview after the Exit Interview.

Item Number	Description and Reference
VIO 50-424, 425/95-19-01:	Failure to take prompt corrective action to resolve Diesel Generator voltage regulator transformer problem.
VIO 50-424, 425/95-19-02:	Failure to control non-conforming material in that a defective transformer was replaced in stock and subsequently issued to the field.
IFI 50-424, 425/95-13-02	Follow-up to Diesel Generator Voltage Regulator Reliability Problems, was closed.

6.0 Acronyms and Initialisms

CFR	Code of Federal Regulations
CST	Condensate Storage Tank
DC	Deficiency Card
DG	Diesel Generator
DCR	Design Change Request
DCP	Design Change Package
FSAR	Final Safety Analysis Report
ICE	Individual Cell Equalizer
IFI	Inspector Followup Item
IP	Inspection Procedure
MDC	Minor Design Change
MES	Manager Of Engineering Support
NSSS	Nuclear Steam System Supplier

PMMS	Plant Modification & Maintenance Support
QC	Quality Control
QA	Quality Assurance
RER	Request for Engineering Review
RMWST	Reactor Makeup Water Storage Tank
SAER	Safety Audit And Engineering Review
SALP	Systematic Assessment Of Licensee Performance
SCS	Southern Company Services
SL	Severity Level
SNC	Southern Nuclear Operating Company
TM	Temporary Modification
VIO	Violation
VR	Voltage Regulator