UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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March 23, 2009

James R. Douet, Vice President of Operations
Entergy Operations, Inc.
Grand Gulf Nuclear Station
P.O. Box 756
Port Gibson, MS 39150

SUBJECT: GRAND GULF NUCLEAR STATION - NRC INSPECTION PROCEDURE 95001 SUPPLEMENTAL INSPECTION REPORT 05000416/2009007

Dear Mr. Douet

On February 12, 2009, the NRC completed a supplemental inspection at your Grand Gulf Nuclear Station pursuant to Inspection Procedure 95001. The enclosed inspection report documents the inspection results, which were discussed at the exit meeting on February 12, 2009, with Mr. J. Browning and other members of your staff.

As required by the NRC Reactor Oversight Process Action Matrix, this supplemental inspection was performed in accordance with Inspection Procedure 95001. The purpose of the inspection was to examine the causes for and actions taken related to the performance indicator for unplanned scrams per 7000 critical hours crossing the threshold from Green (very low risk significance) to White (low to moderate risk significance) in the 4th quarter of 2008.

This supplemental inspection was conducted to provide assurance that: (1) the root causes and contributing causes for the risk significant issues were understood; (2) the extent of condition and extent of causes of the issues were identified; and to provide assurance that the corrective actions for risk significant performance issues are sufficient to address the root causes and contributing causes and to prevent recurrence. The inspections examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspection consisted of examination of selected documents and interviews with personnel.

The inspection concluded that the root causes of the unplanned reactor scrams were adequately defined and understood and the corrective actions resulting from the evaluations appropriately addressed the identified causes.

The attached report documents three self revealing findings having very low safety significance (Green). The findings were determined not to involve violations of NRC requirements. Since the findings do not violate NRC requirements, enforcement does not apply. The findings had cross-cutting aspects in the area of human performance.

If you contest the subject or significance of the findings, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with

copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 612 E. Lamar Blvd, Suite 400, Arlington, Texas, 76011-4125; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the Grand Gulf Nuclear Station facility.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).
Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

/RA/

Geoffrey B. Miller, Chief
Project Branch C
Division of Reactor Projects

Docket: 50-416
License: NPF-29

Enclosure:
NRC Inspection Report 05000416/2009007
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	50-416
License:	NPF-29
Report:	05000416/2009007
Licensee:	Entergy Operations, Inc.
Facility:	Grand Gulf Nuclear Station
Location:	Waterloo Road, Port Gibson, MS 39150
Dates:	February 9-12, 2009
Inspectors:	J. Bashore, Resident Inspector
Approved By:	G. Miller, Project Branch C Division of Reactor Projects

SUMMARY OF FINDINGS

IR 05000416/2009007; 02/09/2009 -02/12/2009; Entergy Operations, Inc.; Grand Gulf Nuclear Station; Supplemental Inspection for one White Performance Indicator, "Unplanned Scrams per 7000 Critical Hours," in the Initiating Events Cornerstone

The U.S. Nuclear Regulatory Commission performed this supplemental inspection to assess the licensee's evaluations associated with four unplanned reactor scrams that occurred between January 12, 2008, and October 26, 2008. The cumulative effect of these trips was that the performance indicator for unplanned scrams per 7000 critical hours crossed the threshold from Green (very low risk significance) to White (low to moderate risk significance) for the fourth quarter of calendar year 2008. The licensee performed individual root cause evaluations for each of the four reactor scrams. In addition, the licensee performed a common cause analysis to identify any performance and process issues that led to the White performance indicator. During this supplemental inspection, performed in accordance with Inspection Procedure 95001, the inspector determined that for each scram the licensee performed a comprehensive and thorough evaluation in which specific problems were identified, an adequate root cause evaluation including extent of condition and extent of cause was performed, and corrective actions were taken or planned to prevent recurrence.

NRC-Identified and Self Revealing Findings

Cornerstone: Initiating Events

- Green. A Green self revealing finding was identified for the failure to implement maintenance procedure requirements. Specifically, in June 2007, an incorrect preventive maintenance template was applied to the main transformer auxiliary power transfer switch resulting in a less than optimal preventive maintenance strategy. This was subsequently determined to be a contributing cause to the January 12th reactor scram. This issue is entered in the corrective action program as condition Report 2008-0174.

  The performance deficiency associated with this finding is the failure of maintenance and engineering personnel to implement the requirements of Procedure EN-DC-335, "PM Basis Template," Section 5.2, "PM Basis Template Development." The finding is more than minor because it is associated with the equipment performance attribute of the initiating events cornerstone and affects the cornerstone objective to limit those events that upset plant stability. Using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the finding is determined to have very low safety significance because it did not result in exceeding the technical specification limit for identified reactor coolant system leakage, did not affect mitigation systems, did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions will not be available; and did not increase the likelihood of a fire or internal/external flood. The finding has a cross cutting aspect in the area of human performance associated with work practices, in that the supervisory and management oversight of work activities were not employed such that nuclear safety was supported [H.4.(c)] (Section 4OA4).

- Green. A Green self revealing finding was identified for the failure of engineering and maintenance personnel to implement procurement engineering procedure requirements. Specifically, in January, 2007 a procurement engineering evaluation determined that a difference in part numbers provided by a vendor was an administrative part number

change. Consequently, a current transformer with a slightly different form, fit, and operating characteristic was installed in the generator/unit differential trip circuitry. This' combined with other unknown circuit deficiencies and grid reactive load anomalies, resulted in a generator trip and reactor scram on March 21, 2008. The finding is entered in the corrective action program as Condition Report 2008-01476.

The performance deficiency associated with this finding is the failure of procurement engineering personnel to implement the requirements of Procedure EN-DC-313, "Procurement Engineering Process," Section 5.6, "Administrative Part Number Changes," resulting in a less than optimal replacement part for a current transformer in the Unit/Generator differential trip circuitry. The finding is more than minor because it is associated with the equipment performance attribute of the initiating events cornerstone and affects the cornerstone objective to limit those events that upset plant stability. Using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the finding is determined to have very low safety significance because it did not result in exceeding the technical specification limit for identified reactor coolant system leakage, did not affect mitigation systems, did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions will not be available; and did not increase the likelihood of a fire or internal/external flood. The finding has a cross cutting aspect in the area of human performance associated with decision making in that procurement engineering did not use conservative assumptions and adopt a requirement to demonstrate a proposed action is safe to proceed rather than to demonstrate that an action is unsafe to disprove the action [H.1.(b)] (Section 4OA4).

- Green. A Green self revealing finding was identified for the failure of to implement maintenance procedure requirements. Specifically, between 2002 and 2008, neither the preventive maintenance optimization program, nor the turbine 10-year plan prescribed a preventive maintenance strategy for the thyristor voltage regulator control portion of the main generator voltage regulating system. Consequently, on October 26, 2008, an under-excitation condition existed in the main generator following transfer from automatic to manual voltage regulator control, resulting in a generator and turbine trip and a reactor scram. The finding is entered in the corrective action program as Condition Report 2008-6241.

  The performance deficiency associated with this finding is the failure of maintenance and engineering personnel to implement the requirements of Procedure EN-DC-324, "Preventive Maintenance Programs," Section 5.2, "Process Overview," and Procedure EN-DC-335, "PM Basis Template," Section 5.2, "PM Basis Template Development." The finding is more than minor because it is associated with the equipment performance attribute of the initiating events cornerstone and affects the cornerstone objective to limit those events that upset plant stability. Using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the finding is determined to have very low safety significance because it did not result in exceeding the technical specification limit for identified reactor coolant system leakage, did not affect mitigation systems, did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions will not be available; and did not increase the likelihood of a fire or internal/external flood. The finding has a cross cutting aspect in the area of human performance associated with decision making, in that a systematic process was not employed for risk significant decision making and that roles and authority for decision making was not formally defined [H.1.(a)] (Section 4OA4).

REPORT DETAILS

4. OTHER ACTIVITIES

4OA4 Supplemental Inspection (95001)

.01 Inspection Scope

The U.S. Nuclear Regulatory Commission performed this supplemental inspection in accordance with Inspection Procedure 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area." The purpose of this inspection was to assess the licensee's evaluation associated with the White performance indicator for "Unplanned Scrams per 7000 Critical Hours" which affected the initiating events cornerstone in the reactor safety strategic performance area. The objectives of this inspection were to provide assurance that:

- for risk significant performance issues; the root and contributing causes were understood;
- the extent of condition and extent of cause were identified; and
- corrective actions are sufficient to address the root and contributing causes and to prevent recurrence.

This performance indicator crossed the threshold from Green to White following four unplanned reactor scrams that occurred between January 12, 2008, and October 26, 2008. The four unplanned scram events are listed below.

- January 12, 2008, manual reactor scram due to loss of main transformer cooling
- March 21, 2008, automatic reactor scram on turbine control valve fast closure following a main generator trip
- October 23, 2008, automatic reactor scram on decreasing reactor coolant level
- October 26, 2008, automatic reactor scram on turbine control valve fast closure following a main generator trip

Grand Gulf Nuclear Station entered the Regulatory Response Column of the NRC's Action Matrix in the fourth quarter of 2008 as a result of the performance indicator of low to moderate safety significance (White).

In preparation for this inspection, the licensee performed root cause analyses for each of the scram events referenced above to identify weaknesses that existed in various organizations and determine the organizational attributes that may have resulted in the White performance indicator. Grand Gulf Nuclear Station staff also compiled safety culture assessments and performed a common cause analysis that included each of the four scram events.

The inspector reviewed the licensee's root cause analyses in addition to other evaluations and assessments conducted in support and as a result of the root cause analyses. The inspector reviewed corrective actions that were taken or planned to

address the identified causes. The inspector also held discussions with licensee personnel to ensure that the root and contributing causes and the contribution of safety culture components were understood and corrective actions taken or planned were appropriate to address the causes and preclude repetition.

.02 Evaluation of Inspection Requirements

02.01 Problem Identification

a. Determine who identified the issue and under what conditions

The Performance Indicator crossed the threshold from Green to White during the fourth quarter of 2008 as a result of an unplanned scram on October 26, 2008. Prior plant trips had occurred on October 23, 2008, March 21, 2008, and January 12, 2008. A brief description of each trip from the associated licensee event report and condition report is given below. For each scram the event was self-revealing.

On February 6, 2009, the licensee completed a common cause analysis as directed by condition report CR GGN-2008-0316, to address the negative trend in plant performance indicated in part by the unplanned reactor trips and the resulting white performance indicator. The root causes and corrective actions developed in this condition report are discussed in Sections 02.02 and 02.03, respectively.

.1 January 12, 2008, "Manual Reactor Scram Due to Loss of Main Electrical Output Transformer Cooling" (LER 50-416/2008-001-00, CR-GGN-2008-0174)

Description. On January 12, 2008, at approximately 3:58 pm, the control room received trouble alarms for the main transformers. Local observations determined that power to some transformer cooling fans and pumps had been lost. In addition, a slight burnt smell was noted from a local panel for main Transformer A, and light smoke was observed from a Phase B auxiliary power contactor. Operators initiated a manual reactor scram when it became apparent that main transformer cooling was lost and would not be able to be restored. The loss of cooling to the main transformers was due to a loss of auxiliary power to the main transformer cooling system components.

Cause. The licensee's root cause analysis identified the following root cause for this event:

- Inadequate or weak original design installed for the auxiliary power transfer switch. Mechanical compression connectors were installed instead of crimp type connectors. These connectors had been in place since plant startup. Over time, differential expansion between the copper conductors and aluminum lugs allowed the joint to loosen, creating a high resistance connection.

The following item was identified as a root cause contributor:

- An incorrect preventive maintenance template was applied to the auxiliary power transfer switch resulting in a less than adequate preventive maintenance strategy being implemented. The inadequate preventive maintenance strategy eliminated the possibility to detect the degrading connection prior to its failure.

.2 March 21, 2008, "Reactor Scram Due to Main Generator Trip Caused by Unit Differential Lockout" (LER 50-416/2008-002-00, CR-GGN-2008-01476)

Description. While operating at 100 percent power on March 21, 2008, Grand Gulf Nuclear Station experienced an actuation of the reactor protection system resulting in an automatic reactor scram. The scram was due to a main turbine control valve fast closure following a main generator trip. Unit differential lockout relays were found tripped. A protective relay flag indication was found on Phase C.

Cause. The licensee's root cause analysis identified the following probable root cause for this event:

- Manufacturer fabrication and construction of a replacement main generator neutral bushing current transformer was less than adequate. The inadequate replacement part was not recognized by procurement engineering prior to its installation in the circuit.

The following items were identified as root cause contributors:

- A relay tap setting error resulted in the unit differential relay having an imbalance voltage higher than the recommended mismatch limits of the vendor manual. The tap setting error was determined to be a latent issue that had been in place since 1990. The mismatch expected due to this tap setting error caused a reduced margin within the unit differential trip circuit. However, the mismatch expected due to this error difference alone would not cause the unit to trip.

- Grid activity resulted in reactive load swings on the unit generator from leading to lagging in short periods of time. The grid is maintained at Grand Gulf Nuclear Station in accordance with the transmission interface agreements. The plant is designed to tolerate grid disturbances when all components are set correctly. Although all three phases had relay tap setting errors, Phase C had an inadequate current transformer installed. The grid activity did not cause a trip in Phase A or Phase B. The reactive load swings by themselves would not have caused a unit differential trip.

.3 October 23, 2008, "Automatic Reactor Scram on Decreasing Coolant Level Due to Inadvertent Reactor Feed Pump Steam Supply Valve Closure" (LER 50-416/2008-004-00, CR-GGN-2008-6195)

Description. During a reactor startup, an automatic reactor scram from approximately 10 percent power occurred due to reactor coolant level decreasing to the reactor protection system Level 3 set point. The decreasing coolant level resulted from the closure of the reactor feed Pump A turbine high pressure steam inlet valve. Train A was the only reactor feed pump operating at that time. The low pressure steam supply valve does not supply steam to the feed pump turbine at this low power. The steam admission valve was inadvertently closed by a non-licensed operator in the field during restoration from the reactor feed Pump B turbine overspeed test. This led to a loss of feedwater flow to the reactor vessel.

Cause. The licensee's investigation identified the following root causes for this event:

- A lack of commitment by operations leadership to error prevention program implantation has resulted in inconsistent use of error prevention techniques. The non-licensed operator did not effectively implement error prevention techniques resulting in the incorrect manipulation of the Train A drain valves vice the Train B drain valves during the Train B overspeed test restoration. The initial error did not cause the loss of feed transient, however while attempting to recover from this initial mistake, the operator committed another switch manipulation error which resulted in the loss of feedwater and subsequent reactor scram.

The following items were identified as root cause contributors:

- There was an inconsistent program implementation regarding managing defenses against human errors. Although many operations personnel considered the control panel in the field to be poorly human factored and error-likely, no actions were taken to address this situation as required by Procedure EN-HU-105, "Managed Defenses."

- Management expectations were not understood due to a breakdown in crew supervision maintaining control of plant evolutions. Consequently, pre-job briefing and peer check requirements were not adequately defined by shift supervision prior to the evolution being performed.

- There was inadequate human performance program monitoring and management. Due to multiple personnel assignment changes, the Operations HU Coordinator functions have been inconsistently implemented. As a result, discovery of trends related to a lack of commitment to error prevention program implementation (identified root cause) was delayed.

- Policy guidance and management expectations regarding action following discovery of an error were not understood throughout the Operations department. The non-licensed operator did not stop and communicate the initial switch manipulation error prior to attempting recovery. The resulting sense of urgency created additional haste and stress for the non-licensed operator.

.4 October 26, 2008, "Automatic Reactor Scram Due to Turbine Control Valve Fast Closure Caused by an Electrical Generator Trip," (LER 50-416/2008-005-00 CR-GGN-2008-6241)

Description. On October 26, 2008, while operating at approximately 50 percent power, an automatic reactor scram was initiated by the reactor protection system due to a turbine control valve fast closure. The cause of the event was a failure in the main generator voltage regulation system, resulting in a main generator trip. The main generator thyristor voltage regulator had transferred from automatic to manual control. Following the transfer, the main generator experienced an unexpected under-excited condition, causing the main generator trip. The thyristor voltage regulator circuit had a defective motor operated potentiometer in the manual reference setter. Consequently, the manual reference setter was not tracking the automatic reference setter, resulting in an under excited condition on the main generator field upon transfer from automatic to manual voltage regulation.

Cause. The licensee's root cause investigation identified the following root cause to this event:

- A preventive maintenance strategy for the thyristor voltage regulator control system was not developed and implemented to ensure reliability of the voltage control circuits.

The following items were identified as a root cause contributors:

- A lack of knowledge and understanding of the main generator and exciter control room indications. Operations personnel noted that the manual reference setter indication read approximately 20 percent at the time of the trip, and that it had been at this value since reactor startup. This indicator should read approximately 40 percent with no load excitation, and approximately 73 percent at 100 percent power.

- A lack of guidance to monitor specific points related to the generator and excitation systems. Control room rounds do not log exciter parameters. System and integrated operating procedures do not identify parameters to verify proper system operation.

b. Determination of how long the issue existed and prior opportunities for identification

The PI crossed the threshold from Green to White during the fourth quarter of 2008 as a result of an unplanned trip on October 26, 2008. For the individual scrams, the prior opportunities for identification are discussed below.

.1 January 12, 2008, "Manual Reactor Scram Due to Loss of Main Electrical Output Transformer Cooling"

The licensee's investigation indicated that the failure was due to a loss of transformer auxiliary power due to a short at the wiring termination for the Phase B power cables. A high resistance connection developed over a long period of time. An inadequate or weak original design resulted in mechanical compression connectors being installed instead of crimp type connectors during initial construction. Over time, differential expansion between the copper conductors and aluminum lugs allowed the joint to loosen, creating a high resistance connection. It is possible that thermography, if performed, would have detected the degrading connections prior to catastrophic failure. However, since an incorrect preventive maintenance strategy was employed, the opportunity to discover the degrading connection was lost.

The inspector determined that the licensee's evaluation was adequate with respect to identifying how long the issue existed and prior opportunities for identification.

.2 March 21, 2008, "Reactor Scram Due to Main Generator Trip Caused by Unit Differential Lockout"

The licensee's investigation indicated that the failure was due to manufacturer fabrication and construction of a replacement main generator neutral bushing current transformer was less than adequate. The inadequate replacement part was not recognized by procurement engineering prior to its installation in the circuit during refueling outage RF15.

The inspector determined that the licensee's evaluation was adequate with respect to identifying how long the issue existed and prior opportunities for identification.

.3 October 23, 2008, "Automatic Reactor Scram on Decreasing Coolant Level Due to Inadvertent Reactor Feed Pump Steam Supply Valve Closure"

The licensee's investigation determined that the decreasing coolant level resulted from the closure of the reactor feed Pump A turbine high pressure steam inlet valve. The steam admission valve was inadvertently closed by a non-licensed operator in the field during restoration from the reactor feed Pump B turbine overspeed test. The licensee's investigation further identified that a lack of commitment by operations leadership to error prevention program implementation has resulted in inconsistent use of error prevention techniques. The non-licensed operator did not effectively implement error prevention techniques resulting in the incorrect manipulation. Similar operator errors were identified in August 2008; however insufficient time had elapsed to facilitate corrective action implementation. In addition, the control panel containing these switches was previously identified to have poor human factor engineering, creating an error likely operating environment. However corrective actions to address the human factor engineering concern had not yet been implemented.

The inspector determined that the licensee's evaluation was adequate with respect to identifying how long the issue existed and prior opportunities for identification.

.4 October 26, 2008, "Automatic Reactor Scram Due to Turbine Control Valve Fast Closure Caused by an Electrical Generator Trip"

The licensee determined that the cause of the scram was a turbine control valve fast closure due to a failure in the main generator voltage regulation system. The main generator thyristor voltage regulator transferred from automatic to manual control. Following the transfer, the main generator experienced an unexpected under-excited condition, causing a main generator trip. The thyristor voltage regulator circuit had a defective motor operated potentiometer in the manual reference setter. Consequently, the manual reference setter was not tracking the automatic reference setter, resulting in the under-excited condition on the main generator field upon transfer from automatic to manual voltage regulation. The licensee's root cause investigation identified the root cause to be an inadequate preventive maintenance strategy for the thyristor voltage regulator control.

The inspector determined that the licensee's evaluation was adequate with respect to identifying how long the issue existed and prior opportunities for identification.

c. Determination of the plant-specific risk consequences and compliance concerns associated with the issue

.1 January 12, 2008, "Manual Reactor Scram Due to Loss of Main Electrical Output Transformer Cooling"

The licensee determined that all control rods fully inserted and the plant responded as designed to the manual scram. After the scram, reactor pressure vessel level decreased to the Level 2 set point, resulting in a reactor core isolation cooling system initiation. Group 2 and Group 3 containment isolations occurred as expected. The

normal heat sink remained available and no safety relief valves lifted. This event was of minimal safety significance.

The NRC determined that there was a green finding associated with this issue, as documented in Section 02.01(d)(1) of this inspection report. The inspector concluded that the licensee appropriately documented the risk consequence and compliance concerns associated with the issue.

.2 March 21, 2008, "Reactor Scram Due to Main Generator Trip Caused by Unit Differential Lockout"

The licensee determined that all control rods fully inserted and the plant responded as designed to the automatic scram. No emergency core cooling system initiations occurred. All control rods fully inserted and the normal heat sink remained available. Six safety relief valves momentarily lifted and then closed at the onset of the transient. After the safety relief valves closed, reactor pressure was controlled with main turbine bypass valves. Reactor water level was controlled with normal condensate and feedwater. This event was of minimal safety significance.

The NRC determined that there was a green finding associated with this issue, as documented in Section 02.01(d)(2) of this inspection report. The inspector concluded that the licensee appropriately documented the risk consequence and compliance concerns associated with the issue.

.3 October 23, 2008, "Automatic Reactor Scram on Decreasing Coolant Level Due to Inadvertent Reactor Feed Pump Steam Supply Valve Closure"

The licensee determined that all control rods fully inserted and the plant responded as designed to the automatic scram. Operators manually initiated the reactor core isolation cooling system to restore and maintain reactor pressure vessel level. No emergency core cooling system initiation set point was reached. The normal heat sink remained available and no safety relief valves lifted. The licensee documented that although this particular event was not safety significant; the event did represent a challenge to safety systems and did affect the primary source of feedwater to maintain reactor pressure vessel level. This event was of minimal safety significance.

The NRC determined that there were two green findings associated with this issue, as documented in NRC Inspection Report 05000416/2008005 (ML090400243). The inspector concluded that the licensee appropriately documented the risk consequence and compliance concerns associated with the issue.

.4 October 26, 2008, "Automatic Reactor Scram Due to Turbine Control Valve Fast Closure Caused by an Electrical Generator Trip"

The licensee determined that all control rods fully inserted and the plant responded as designed to the automatic scram. No emergency core cooling system initiation set point was reached. The normal heat sink remained available and no safety relief valves lifted. Reactor water level was controlled with normal condensate and feedwater. This event was of minimal safety significance.

The NRC determined that there was a green finding associated with this issue, as documented in Section 02.01(d)(3) of this inspection report. The inspector concluded that the licensee appropriately documented the risk consequence and compliance concerns associated with the issue.

d. Findings

.1 Introduction. A Green self revealing finding was identified for the failure of maintenance and engineering personnel to adequately implement the requirements of maintenance Procedure EN-DC-335, "PM Basis Template," Section 5.2, "PM Basis Template Development." Specifically, in June 2007, an incorrect preventive maintenance template was applied to the main transformer auxiliary power transfer switch resulting in a less than optimal preventive maintenance strategy. This was subsequently determined to be a contributing cause to the January 12th reactor scram.

Description. On January 12, 2008, at approximately 3:58 pm, the control room received trouble alarms for the main transformers. Local observations determined that power to some transformer cooling fans and pumps had been lost. In addition, a slight burnt smell was noted from a local panel for the main Transformer A, and light smoke was observed from a Phase B auxiliary power contactor. Operators initiated a manual reactor scram when it became apparent that main transformer cooling was lost and would not be able to be restored. The loss of cooling to the main transformers was due to a loss of auxiliary power to the main transformer cooling system components.

In April 2007, Condition Report 2007-6287 documented a change in the classification of the main transformer auxiliary power transfer switch from "run to failure" to "High Critical/ Single Point Vulnerability". An action request was generated to change the preventive maintenance template and consequently the preventive maintenance strategy. In June 2007, a new preventive maintenance template was applied resulting in a new preventive maintenance strategy. The I&C Miscellaneous Instrumentation / Device template was applied to the auxiliary power transfer switch. This template should be applied to low current instrument applications. The auxiliary power transfer switch carries approximately 720 amperes, depending on main transformer cooling requirements. A more appropriate template for this application would have been the Switchgear- Low Voltage template.

Procedure EN-DC-335, "PM Basis Template," Section 5.2, "PM Basis Template Development," directs critical components be evaluated and have a preventive maintenance template developed. Template development subsequently results in prescribing a preventive maintenance strategy. The procedure requires a component failure analysis and a determination of degradation mechanisms. The procedure also requires that for each degradation mechanism, the degradation influence be determined. The preventive maintenance strategy should be designed to defend against component type weaknesses and failure mechanisms. Contrary to these requirements, the selected template and resulting strategy did not adequately address component failure mechanisms and their potential influence. The improper template application resulted in the development of an inadequate preventive maintenance strategy. The correct preventive maintenance strategy would have directed periodic thermography on the mechanical compression connections in the auxiliary power transfer switch. Thermography, if performed, would likely have detected the degraded mechanical compression connection prior to their catastrophic failure.

Analysis. The performance deficiency associated with this finding is the failure of maintenance and engineering personnel to implement the requirements of Procedure EN-DC-335, "PM Basis Template," Section 5.2, "PM Basis Template Development." The finding is more than minor because it is associated with the equipment performance attribute of the initiating events cornerstone and affects the cornerstone objective to limit those events that upset plant stability. Using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the finding is determined to have very low safety significance because it did not result in exceeding the technical specification limit for identified reactor coolant system leakage, did not affect mitigation systems, did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions will not be available; and did not increase the likelihood of a fire or internal/external flood. The finding has a cross cutting aspect in the area of human performance associated with work practices, in that the supervisory and management oversight of work activities were not employed such that nuclear safety was supported [H.4.(c)].

Enforcement. Enforcement action does not apply because the performance deficiency did not involve a violation of regulatory requirements. The finding is of very low safety significance and the issue was addressed in the corrective action program as condition report CR-GGN-2008-0174: FIN 05000416/2009007-01, "Failure to Implement Procedure Requirements for Preventive Maintenance Strategy Development."

.2 Introduction. A Green self revealing finding was identified for the failure of procurement engineering personnel to adequately implement Procedure EN-DC-313, "Procurement Engineering Process," Section 5.6, "Administrative Part Number Changes" requirements. Specifically, in January 2007, a procurement engineering evaluation incorrectly determined that a difference between part numbers requested by Grand Gulf and vendor drawings was an administrative part number change. This was subsequently determined to be the probable root cause for the March 21, 2008 reactor scram.

Description. While operating at 100 percent power on March 21, 2008, Grand Gulf Nuclear Station experienced an actuation of the reactor protection system resulting in an automatic reactor scram. The scram was due to a main turbine control valve fast closure following a main generator trip. Unit differential lockout relays were found tripped. A protective relay flag indication was found for Phase C. The current transformer on the Phase C generator neutral bushing had been replaced during refueling outage RF15.

The main generator is protected by two sets of differential schemes, the unit differential and generator differential relays. There is a relay scheme for each phase of the main generator. The unit differential relay compares a current signal, from a current transformer on the generator neutral bushing to a current signal from a current transformer on each of the two 500 kilovolt output breaker bushings. Similarly, the generator differential compares generator line side current to its associated neutral bushing. The March 21st scram was due to a unit differential lockout on Phase C, causing a main generator and turbine trip. A reactor scram was automatically initiated in response to the turbine control valves fast closure.

The Phase C generator neutral bushing current transformer had been replaced during refueling outage RF15. Procurement engineering purchased a replacement current transformer based upon name plate data from the installed components. A procurement engineering evaluation performed in 2007 noted that the part numbers and drawing

numbers had been changed by the manufacturer. However, the procurement engineering evaluation concluded that the changes were administrative since the vendor had bought the design from General Electric and the current transformer had the same basic part number in cross reference to the original General Electric Design. Consequently, no request was made to the vendor for transformer characteristic curves since the item was considered to be the same as the original equipment and the existing curves would still apply.

While attempting to install the new current transformer during the RF15 refueling outage, it was found to be slightly thicker than the installed current transformer. The new current transformer did not exactly fit into the original location. When the dimension difference was noted, a change was initiated to relocate the new current transformer. No evaluation was deemed necessary for the current transformer at this point since the ratio was the same and the part number was the same. Testing performed after the scram event determined that significant differences existed between the replacement current transformer and the original current transformer. Form, fit, and response curves were different on the replacement current transformer. These differences, coupled with an unknown relay tap setting error and grid reactive load anomalies, caused the Phase C unit differential relay to actuate. It was determined that the manufacturer fabrication and construction of the replacement current transformer was less than adequate. The inadequate replacement part was not recognized or evaluated by procurement engineering prior to its installation in the circuit.

Analysis. The performance deficiency associated with this finding is the failure of procurement engineering personnel to implement the requirements of Procedure EN-DC-313, “Procurement Engineering Process,” Section 5.6, “Administrative Part Number Changes,” resulting in a less than optimal replacement part for a current transformer in the Unit/Generator differential trip circuitry. The finding is more than minor because it is associated with the equipment performance attribute of the initiating events cornerstone and affects the cornerstone objective to limit those events that upset plant stability. Using Manual Chapter 0609.04, “Phase 1 – Initial Screening and Characterization of Findings,” the finding is determined to have very low safety significance because it did not result in exceeding the technical specification limit for identified reactor coolant system leakage, did not affect mitigation systems, did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions will not be available; and did not increase the likelihood of a fire or internal/external flood. The finding has a cross cutting aspect in the area of human performance associated with decision making in that procurement engineering did not use conservative assumptions and adopt a requirement to demonstrate a proposed action is safe to proceed rather than to demonstrate that an action is unsafe to disprove the action [H.1.(b)].

Enforcement. Enforcement action does not apply because the performance deficiency did not involve a violation of regulatory requirements. The finding is of very low safety significance and the issue was addressed in the corrective action program as condition report CR-GGN-2008-01476: FIN 05000416/2009007-02, "Failure to Implement Procurement Engineering Procedure Requirements."

.3 Introduction. A Green self revealing finding was identified for the failure of maintenance and engineering personnel to adequately implement the requirements of Procedure EN-DC-324, “Preventive Maintenance Programs,” Section 5.2, “Process Overview,” and Procedure EN-DC-335, “PM Basis Template,” Section 5.2, “PM Basis Template Development.” Specifically, between 2002 and 2008, neither the preventive

maintenance optimization program, nor the turbine 10-year plan prescribed a preventive maintenance strategy for the thyristor voltage regulator control portion of the main generator voltage regulating system. Consequently, on October 26, 2008, an under-excitation condition existed in the main generator following transfer from automatic to manual voltage regulator control, resulting in a generator and turbine trip and a reactor scram.

Description. On October 26, 2008, while operating at approximately 50 percent power, an automatic reactor scram was initiated by the reactor protection system. The cause of the scram was a turbine control valve fast closure. The cause of the event was due to a failure in the main generator voltage regulation system, resulting in a main generator trip. The main generator thyristor voltage regulator transferred from automatic to manual control. Following the transfer, the main generator experienced an unexpected under-excited condition, causing a main generator trip. The thyristor voltage regulator circuit had a defective motor operated potentiometer in the manual reference setter. Consequently, the manual reference setter was not tracking the automatic reference setter, resulting in an under excited condition on the main generator field upon transfer from automatic to manual voltage regulation.

Between 2002 and 2006 a preventive maintenance optimization project was implemented in an effort to prescribe the most effective preventive maintenance strategy for various equipment and components. During this effort an assumption was made that turbine generator preventive maintenance strategies would be developed under the "turbine 10-year plan." However, the turbine 10-year plan did not include a maintenance strategy for the thyristor voltage regulator control system. As a result, no preventive maintenance strategy was developed or implemented. Because no preventive maintenance strategy was developed to ensure reliability of the main generator voltage regulation circuits, a deficiency in the motor operated potentiometer for the manual reference setter went undetected. This resulted in the manual reference setter not tracking the automatic reference setter.

Procedure EN-DC-324, "Preventive Maintenance Programs," Section 5.2, "Process Overview," and Procedure EN-DC-335, "PM Basis Template," Section 5.2, "PM Basis Template Development," require that critical components be evaluated and have a template developed. These procedures also require a review of the developed template against operating experience. Template development subsequently results in prescribing a preventive maintenance strategy that should be designed to defend against component type weaknesses and failure mechanisms. Prior to the voltage regulator system failure on October 26, the system had operated reliably, and the vendor had not specifically identified preventive maintenance recommendations for the thyristor voltage regulator control system. However, operating experience from another commercial nuclear facility that used the same voltage regulation system was available. The experience indicated that periodic preventive maintenance on this system should be performed.

Analysis. The performance deficiency associated with this finding is the failure of maintenance and engineering personnel to implement the requirements of Procedure EN-DC-324, "Preventive Maintenance Programs," Section 5.2, "Process Overview," and Procedure EN-DC-335, "PM Basis Template," Section 5.2, "PM Basis Template Development." The finding is more than minor because it is associated with the equipment performance attribute of the initiating events cornerstone and affects the cornerstone objective to limit those events that upset plant stability. Using Manual

Chapter 0609.04, “Phase 1 – Initial Screening and Characterization of Findings,” the finding is determined to have very low safety significance because it did not result in exceeding the technical specification limit for identified reactor coolant system leakage, did not affect mitigation systems, did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions will not be available; and did not increase the likelihood of a fire or internal/external flood. The finding has a cross cutting aspect in the area of human performance associated with decision making, in that a systematic process was not employed for risk significant decision making and that roles and authority for decision making was not formally defined [H.1.(a)].

Enforcement. Enforcement action does not apply because the performance deficiency did not involve a violation of regulatory requirements. The finding is of very low safety significance and the issue was addressed in the corrective action program as condition report CR-GGN-2008-6241: FIN 05000416/2009007-03, "Failure to Implement Preventive Maintenance Procedure Requirements."

02.02 Root Cause, Extent of Condition and Extent of Cause Evaluation

a. Evaluation of systematic methods used to identify root cause(s) and contributing cause(s)

For the four reactor scram events, the licensee utilized different methods for identifying the root cause, including Performance Mapping, Event and Causal Factor Charting, Kepner-Tregoe Problem Analysis, Behavioral Factor Analysis, Human Performance Cultural Survey, WHY Staircase Analysis, and Error Culpability Flow Chart. In addition, the licensee performed field walkdowns, documented reviews, and conducted personnel interviews. The inspector concluded that the licensee effectively utilized accepted root cause determination methods and adequately identified the root and contributing causes for each of the four reactor scram events.

For the Common Cause Analysis, the licensee evaluated the four scrams from January 2008 through October 2008 for analysis. The licensee evaluated the common causes for these events. The licensee included three additional down powers in the common cause analysis, thereby expanding the evaluation period from April 2007 through December 2008. The inspector concluded that the licensee used appropriate methods to identify the root and contributing causes for these events.

b. Level of detail of the root cause evaluation

The licensee’s root cause evaluations included an extensive timeline of events and employed various techniques to analyze those events, as discussed in the previous section. The licensee’s root cause evaluations were thorough and identified the primary root causes for three of the four events. A probable root cause was identified for the March 21 unit differential lockout event. For each of the events, the root cause analysis included a sufficient level of detail to determine the actual or probable root cause, as well as contributing causes. The inspector concluded that the root cause evaluations were conducted to a level of detail commensurate with the significance of the events.

c. Consideration of prior occurrences of the problem and knowledge of prior OE

1. January 12, 2008, "Manual Reactor Scram Due to Loss of Main Electrical Output Transformer Cooling"

The licensee reviewed their corrective action program and industry operating experience, and identified five events which were similar to this event. Each of the events reviewed were relevant and included a discussion of how the event applied to the licensee. Although each of the operating experience events involved different circumstances, general conclusions were drawn from their similarities. Corrective actions, such as improving circuit design to reduce single point vulnerabilities and improving preventive maintenance, for the licensee's event were influenced by corrective actions in the operating experience.

The inspector concluded that overall the licensee took adequate consideration to prior occurrences and knowledge of prior operating experience.

.2 March 21, 2008, "Reactor Scram Due to Main Generator Trip Caused by Unit Differential Lockout"

The licensee reviewed their corrective action program and external operating experience data bases. The internal search revealed that a unit differential trip due to intermittent failure of a current transformer had occurred at Grand Gulf Nuclear Station in July, 2006. The current transformer was returned to the manufacturer for testing. The manufacturer found no specific problems with the current transformer. The root cause for that intermittent current transformer failure was not determined. The search of industry operating experience found multiple examples of protective relaying problems at other stations. Most of these examples involved frayed or fretted wiring resulting in intermittent grounds. The licensee included a review of INPO Significant Operating Experience Reports.

The inspector concluded that overall the licensee took adequate consideration to prior occurrences and knowledge of prior operating experience.

.3 October 23, 2008, "Automatic Reactor Scram on Decreasing Coolant Level Due to Inadvertent Reactor Feed Pump Steam Supply Valve Closure"

The licensee reviewed their corrective action program and external operating experience data bases. The search revealed eleven relevant operating experience events and three relevant INPO Significant Operating Experience Reports. The licensee concluded that the corrective action recommendations of one of the eleven operating experience events may have been beneficial if implemented at Grand Gulf Nuclear Station. In addition, the licensee concluded that one of the Significant Operating Experience Reports "Lessons Learned" may have beneficial. Corrective actions from the October 23, 2008 event include these recommendations.

The inspector concluded that overall the licensee took adequate consideration to prior occurrences and knowledge of prior operating experience.

.4 October 26, 2008, "Automatic Reactor Scram Due to Turbine Control Valve Fast Closure Caused by an Electrical Generator Trip"

The licensee reviewed their corrective action program and external operating experience data bases. The search revealed two INPO Topical Reports and two operating experience events were at least partially relevant to the October 26, 2008, scram. The licensee concluded that the Topical Reports identified the related issues of component aging and a loss of technical expertise. The licensee also concluded that these reports were not adequately evaluated by station personnel to ensure that actions were taken to address these issues. The licensee concluded that the corrective actions identified in one operating experience event may have been beneficial to Grand Gulf Nuclear Station and initiated a corrective action to evaluate and implement the action. The licensee also identified four internal events that were at least partially relevant to this event.

The inspector concluded that overall the licensee took adequate consideration to prior occurrences and knowledge of prior operating experience

d. Determine that the root cause evaluation addresses the extent of condition and the extent of cause of the problem

.1 January 12, 2008, "Manual Reactor Scram Due to Loss of Main Electrical Output Transformer Cooling"

The licensee's evaluation considered the extent of condition associated with the failure of the mechanical compression type connector. The licensee determined that additional inspections and thermography were warranted on two other electrical components using similar type connectors.

The licensee's evaluation considered the extent of both the root cause and contributing causes. The licensee determined that no latent issues were identified related to the root cause, other than those discussed above in the extent of condition. The licensee initiated corrective actions to review all templates assigned by the individual that misapplied the preventive maintenance template. A corrective action was also initiated to review all preventive maintenance optimization evaluations on single point vulnerability components

The inspector concluded that the licensee's root cause evaluations adequately addressed the extent of condition and extent of causes of this event.

.2 March 21, 2008, "Reactor Scram Due to Main Generator Trip Caused by Unit Differential Lockout"

The licensee's evaluation considered the extent of condition associated with the procurement of the inadequate current transformer. The licensee concluded that no other current transformers have been procured and installed that do not meet design requirements.

The licensee's evaluation considered the extent of both the probable root cause and contributing causes. Although no other specific procurement related errors were identified, corrective actions were initiated to enhance procurement engineering Procedure EN-DC-313, "Procurement Engineering Process." The licensee also

determined that the relay tap settings for the Phase A and Phase B were also incorrect. Corrective actions were accomplished to address this issue. The licensee determined that no other relay tap settings were affected by this issue.

The inspector concluded that the licensee's root cause evaluations adequately addressed the extent of condition and extent of causes of this event.

.3 October 23, 2008, "Automatic Reactor Scram on Decreasing Coolant Level Due to Inadvertent Reactor Feed Pump Steam Supply Valve Closure"

The licensee's evaluation considered the extent of condition associated with the lack of self checking resulting in incorrect manipulation of plant components. The licensee concluded that this condition could exist in other components manipulated by this individual; however no evidence was found that this had occurred.

The licensee's evaluation considered the extent of both the root cause and contributing causes. The licensee determined that the lack of commitment to error prevention program implementation could exist elsewhere within the department. The licensee recognized that the program relies on a combination of worker, supervisor, and manager commitment to be effective. Weakness at any level could cause the program to be ineffective. The licensee also identified other examples where human factor engineering of existing panels or controls is less than optimal. In addition, the licensee recognized that a lack of understanding of management expectations could exist in other personnel within the operations organization, as well as other departments. Corrective actions have been planned or implemented to address error prevention program vulnerabilities, human factor engineering of currently installed plant components, and to reinforce management expectations.

The inspector concluded that the licensee's root cause evaluations adequately addressed the extent of condition and extent of causes of this event.

.4 October 26, 2008, "Automatic Reactor Scram Due to Turbine Control Valve Fast Closure Caused by an Electrical Generator Trip"

The licensee's evaluation considered the extent of condition associated with thyristor voltage regulator component and system failures. The extent of condition considered other motor operated potentiometers, thyristor voltage regulator circuit cards, and turbine control circuit cards. In the short term, preventive maintenance strategies have been revised to address failures in the main generator voltage regulator system. Long term corrective actions are being initiated to evaluate the potential for upgrading the turbine control system.

The licensee's evaluation considered the extent of both the root cause and contributing causes. The licensee identified that the preventive maintenance optimization effort associated with cabinets resulted in a preventive maintenance strategy at the cabinet level, not at the component level. A corrective action was initiated to evaluate the need for, and implement where appropriate, preventive maintenance strategies at the component level.

The inspector concluded that the licensee's root cause evaluations adequately addressed the extent of condition and extent of causes of this event.

e. Determine that the root cause evaluation, extent of condition, and extent of cause appropriately considered the safety culture components

Safety culture is defined as an assembly of characteristics and attitudes within organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance. Each of the four events root cause evaluations were reviewed for safety culture component inclusion. The licensee identified weaknesses in human performance and error prevention program implementation. These weakness correlate to cross-cutting aspects in the area of Human Performance described in IMC 0305, dated 01/08/09. The licensee has initiated corrective actions to address each of these weaknesses. The inspector determined that the licensee's root cause evaluations included a proper consideration of whether a weakness in any safety culture component was a root or significant contributing cause.

02.03 Corrective Actions

a. Appropriateness of corrective actions

The inspector reviewed the licensee's immediate and long-term corrective actions for each of the four reactor scram events that caused the performance indicator for unplanned scrams per 7000 critical hours to cross the threshold from Green to White. The inspector determined that the licensee's proposed corrective actions were appropriate to address the root causes and contributing causes identified for each event, and to prevent recurrence. For corrective actions that had already been completed, the inspector performed a review of the licensee's efforts. No problems were identified.

The inspector also reviewed the licensee's immediate and long-term corrective actions developed as a result of their common cause analysis of the scrams and down powers for the period of April 2007 through December 2008. Corrective actions have been proposed or initiated that address weak life cycle management of aging components and equipment, procedure compliance and work instruction quality, weak maintenance practices in the are of foreign material exclusion, design vulnerabilities not yet identified or mitigated, and issues associated with the condensate and feedwater systems.

b. Prioritization of corrective actions

The inspector concluded that the corrective actions were appropriately prioritized in accordance with Procedure EN-LI-102, "Corrective Action Process." Actions of an immediate nature were given the highest priority and accomplished on an acceptable schedule. A schedule of actions to resolve program, training, and procedure weaknesses was established. A completion date and a responsible manager were assigned for each corrective action, and these were tracked through the corrective action system.

c. Establishment of schedule for implementing and completing the corrective actions

The licensee established due dates for the corrective actions in accordance with station Procedure EN-LI-102, "Corrective Action Process." Some of the due dates were captured in the root cause evaluations; however, all of the due dates were captured in the corrective action program. The licensee provided the inspector each corrective

action item and its corresponding completion date. The inspector determined that a schedule had been established for implementing and completing the corrective actions.

d. Establishment of quantitative or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence

The licensee's root cause analysis and recommended corrective actions were reviewed and approved by the Plant Review Committee. Each recommended corrective action was assigned a member of licensee management for responsibility and completion. These actions will be tracked and trended through the licensee's corrective action program.

Additionally, the corrective action program requires that the licensee evaluate the effectiveness of the corrective actions that are identified as corrective actions to preclude recurrence. Each root cause analysis specifies an appropriate effectiveness review plan for any corrective actions identified as corrective actions to preclude recurrence. The effectiveness review plan specifies the method, attributes, success criteria, and timeliness for the review.

The inspector determined that quantitative and qualitative measures of success had been developed for determining the effectiveness of the corrective actions to preclude repetition.

40A6 Management Meetings

Exit Meeting Summary

The inspector presented the inspection results to Mr. J. Browning, General Manager Plant Operations, Grand Gulf Nuclear Station, and other members of licensee management at the conclusion of the inspection on February 12, 2008. The licensee acknowledged the information presented. The inspector verified that information received from the licensee was not proprietary or that all proprietary information had been returned. The licensee did not identify any proprietary information.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

Scott Cameron, Equipment Reliability Coordinator
Christina Perino, Manager, Licensing
James Owens, Employee Concerns Coordinator
Gerald Lantz, Supervisor, Design Engineering-Electrical
Steve Byrd, Systems Engineer
Robert Brinkman, Operations Shift Manager, Work Control Center
Doug Jones, Engineering

NRC

Richard Smith, Senior Resident Inspector
Andy Barrett, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Opened and Closed

05000416/2009007-01	FIN	Failure to Implement Procedure Requirements for Preventive Maintenance Strategy Development
05000416/2009007-02	FIN	Failure to Implement Procurement Engineering Procedure Requirements
05000416/2009007-03	FIN	Failure to Implement Preventive Maintenance Procedure Requirements

Discussed

None

LIST OF DOCUMENTS REVIEWED

CONDITION REPORTS

Number	Topic
CR-GGN-2008-0174	Loss of Cooling to the Main Transforms
CR-GGN-2008-0328	Infrared Survey of Main Transformer Phase "B"
CR-GGN-2008-0209	Main Transformer Phases "A" and "C" Oil Analysis
CR-GGN-2008-06734	Main Transformer Phase "A" Trouble Annunciator
CR-GGN-2008-01476	GGNS Scram due to Main Generator Trip
CR-GGN-2008-06195	Loss of Feedwater Results in Plant Scram
CR-GGN-2008-04344	Non-Licensed Operator Manipulates Incorrect Electrical Breaker
CR-GGN-2008-06241	Main Generator Trip

LICENSEE EVENT REPORTS (LERs)

LER 2008-001-00	Manual Reactor SCRAM Due to Loss of Main Electrical Output Transformer Cooling
LER 2008-002-00	Reactor SCRAM Due to Main Generator Trip Caused by Unit Differential Lockout
LER 2008-004-00	Automatic Reactor SCRAM on Decreasing Coolant Level Due to Inadvertent Reactor Feed Pump Steam Supply Valve Closure
LER 2008-005-00	Automatic Reactor SCRAM Due to Turbine Control Valve Fast Closure Caused by an Electrical Generator Trip

WORK ORDERS

51513709 00135342

PROCEDURES

EN-DC-313, Procurement Engineering Process, Revision 1

EN-DC-313, Procurement Engineering Process, Revision 2

02-S-01-27, Operation's Philosophy, Revision 15

EN-HU-103, Human Performance Error Reviews, Revision 1

03-1-01-3, Plant Shutdown, Revision 117

05-1-02-V-7, Off-Normal Event Procedure Feedwater System Malfunctions Safety Related, Revision 23

EN-LI-118, Root Cause Analysis Process, Revision 7

EN-LI-118, Root Cause Analysis Process, Revision 9

EN-LI-118-04, Task Analysis, Revision 0

EN-LI-118-05, Fault Tree Analysis, Revision 0

EN-LI-118-03, Barrier Analysis, Revision 0

EN-LI-118-02, Change Analysis, Revision 0

EN-LI-118-01, Event and Causal Factor Charting, Revision 0

En-LI-119, Apparent Cause Evaluation (ACE) Process, Revision 8

EN-DC-175, Single Point Failure Review Process, Revision 2

EN-LI-102, Corrective Action Process, Revision 13

EN-DC-324, Preventive Maintenance Program, Revision 5

EN-DC-153, Preventive Maintenance Component Classification, Revision 3

EN-DC-335, PM Basis Template, Revision 2

03-1-01-4, Scram Recovery, Revision 110

EN-OP-15, Conduct of Operations, Revision 6

En-HU-101, Human Performance Program, Revision 6

EN-HU-102, Human Performance Tools, Revision 4

EN-HU-105, Human Performance – Managed Defenses, Revision 5

MISCELLANEOUS

Safety Culture Review for Unplanned SCRAMS, February 3, 2009

Engineering Change Mark-Up for Engineering Standard ES-04

Root Cause Analysis Report, Loss of Cooling to the Main Transformers, Revision 1, 05/30/08

Control Room Logs, January 12, 2008

Procurement Engineering Evaluation 30322, January 17, 2007

Root Cause Analysis Report, Main Generator Trip, Revision 1, 02/06/09

GGNS 2009 'Focused Training' Course Description, Revision 0

2009 Focused Training Generic Schedule, Revision 1.24.09

Root Cause Analysis Report, Loss of Feedwater Results in Plant SCRAM, 11/24/08

RF16 Peer Checking Standards/Independent Verification Memo

Reactor Trip / Downpower Common Causes, Incorporates events from 04/15/2007 through 12/02/2008, Revision 2/6/2009

2009 Grand Gulf Nuclear Station Performance Improvement Plan

Root Cause Analysis Report, Main Generator Trip, 11/17/2008

STANDARD NO: ES-04, Installation Standard Electrical Terminations and Splices, Revision 4

Turbine Generator Ten Year Maintenance Plan