UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
612 EAST LAMAR BLVD, SUITE 400
ARLINGTON, TEXAS 76011-4125

August 8, 2008

Michael Perito
Vice President, Operations
Entergy Operations, Inc.
River Bend Station
5485 US Highway 61N
St. Francisville, LA 70775

SUBJECT: RIVER BEND STATION - NRC SUPPLEMENTAL INSPECTION REPORT 05000458/2008009

Dear Mr. Perito

On June 27, 2008, the NRC completed a supplemental inspection at your River Bend Station. The enclosed report documents the inspection findings, which were discussed with you 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). This supplemental inspection was conducted to provide assurance that the root causes and contributing causes of the events resulting in the White performance indicator are understood, to independently assess the extent of condition, 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 inspection consisted of selected examination of representative records 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.

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/

Geoff Miller, Chief
Project Branch C
Division of Reactor Projects

Docket: 50-458
License: NPF-47

Enclosure:
NRC Inspection Report 05000458/2008009
w/attachment: Supplemental Information

cc w/enclosure:
Senior Vice President
Entergy Nuclear Operations
P.O. Box 31995
Jackson, MS 39286-1995

Vice President, Oversight
Entergy Operations, Inc.
P.O. Box 31995
Jackson, MS 39286-1995

Manager, Licensing
Entergy Operations, Inc.
River Bend Station
5485 US Highway 61N
St. Francisville, LA 70775

Louisiana Department of Environmental Quality
Office of Environmental Compliance
P.O. Box 4312
Baton Rouge, LA 70821-4312

Senior Vice President and COO
Entergy Operations, Inc.
P.O. Box 31995
Jackson, MS 39286-1995

Senior Manager, Nuclear Safety & Licensing
Entergy Nuclear Operations
P.O. Box 31995
Jackson, MS 39286-1995

Attorney General
State of Louisiana
P.O. Box 94095
Baton Rouge, LA 70804-9005

Associate General Counsel
Entergy Nuclear Operations
P.O. Box 31995
Jackson, MS 39286-1995

Ms. H. Anne Plettinger
3456 Villa Rose Drive
Baton Rouge, LA 70806

President of West Feliciana
Police Jury
P.O. Box 1921
St. Francisville, LA 70775

Mr. Richard Penrod, Senior Environmental
Scientist/State Liaison Officer
Office of Environmental Services
Northwestern State University
Russell Hall, Room 201
Natchitoches, LA 71497

Mr. Brian Almon
Public Utility Commission
William B. Travis Building
P.O. Box 13326
1701 North Congress Avenue
Austin, TX 78701-3326

Mr. Jim Calloway
Public Utility
Commission of Texas
1701 N. Congress Avenue
Austin, TX 78711-3326

Louisiana Department of Environmental
Quality
Office of Environmental Compliance
P.O. Box 4312
Baton Rouge, LA 70821-4312

Electronic distribution by RIV:
Regional Administrator (Elmo.Collins@nrc.gov)
DRP Director (Dwight.Chamberlain@nrc.gov)
DRP Deputy Director (Anton.Vegel@nrc.gov)
DRS Director (Roy.Caniano@nrc.gov)
DRS Deputy Director (Troy.Pruett@nrc.gov)
Senior Resident Inspector (Grant.Larkin@nrc.gov)
Resident Inspector (Andy.Barrett@nrc.gov)
Branch Chief, DRP/C (Geoffrey.Miller@nrc.gov)
Senior Project Engineer, DRP/C (Wayne.Walker@nrc.gov)
Public Affairs Officer (Victor.Dricks@nrc.gov)
Team Leader, DRP/TSS (Chuck.Paulk@nrc.gov)
RITS Coordinator (Marisa.Herrera@nrc.gov)

Only inspection reports to the following:
DRS STA (Dale.Powers@nrc.gov)
Mark Cox, OEDO RIV Coordinator (Mark.Cox@nrc.gov)
ROPreports
RBS Site Secretary (Lisa.Day@nrc.gov)

SUNSI Review Completed: GBM ADAMS: ☒ Yes □ No Initials: GBM
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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	50-458
License:	NPF-47
Report:	05000458/2008009
Licensee:	Entergy Operations, Inc.
Facility:	River Bend Station
Location:	5485 US Highway 61N St. Francisville, LA 70775
Dates:	June 23-27, 2008
Inspectors:	J. Melfi, Resident Inspector
Approved By:	G. Miller, Project Branch C Division of Reactor Projects

SUMMARY OF FINDINGS

IR 05000458/2008009; 06/23/2008 -06/27/2008; Entergy Operations, Inc.; River Bend Station; Supplemental Inspection for one White Performance Indicator, “Unplanned Scrams per 7000 Critical Hours,” in the Initiating Events Cornerstone

Cornerstone: Initiating Events

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 May 4, 2007, and March 5, 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 first quarter of calendar year 2008. The licensee performed individual root cause evaluations for all of the four reactor scrams. In addition to the individual trip evaluations, 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.

REPORT DETAILS

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 performance indicator for "Unplanned Scrams for 7000 Critical Hours" located in the Initiating Events Cornerstone. This performance indicator crossed the threshold from Green to White following four unplanned reactor scrams that occurred between May 4, 2007, and March 5, 2008.

02 EVALUATION OF INSPECTION REQUIREMENTS

02.01 Problem Identification

a. Determine who identified the issue and under what conditions

The Performance Indicator (PI) crossed the threshold from Green to White during the first quarter of 2008 as a result of an unplanned scram on March 5, 2008. Prior plant trips had occurred on May 4, 2007, September 26, 2007, and November 7, 2007. A brief description of each trip from the associated licensee event report (LER) and condition report (CR) is given below. For each scram the event was self-revealing.

On April 7, 2008, the licensee initiated CR RBS-2008-02143 to perform a common cause analysis in response to the negative trend in plant performance indicated in part by the unplanned reactor trips and the resulting White PI. The root causes and corrective actions developed in this CR are discussed in Sections 02.02 and 02.03, respectively.

.1 May 4, 2007, "Unplanned Manual Reactor Scram Due to Loss of Cooling on No. 2 Main Transformer" (LER 50-458/07-002-00, CR-RBS-2007-01802)

Description. After an extended period of heavy rain showers, the licensee experienced a ground fault in the 480 Volt control cabinet that provides power to the fans that cool the main transformers. This ground fault resulted in a total loss of forced oil/air cooling for Main Transformer 2 (MTX-XM2). Operations personnel initially believed that this loss of power only affected one bank of cooling fans, and attempted to cross tie power supplies to restore cooling. Operations personnel eventually determined that both banks of cooling fans could not be readily restored and began to establish a temporary power source. In discussions with system engineering, operations was informed that the transformers are not rated for extended operation without cooling. The licensee initiated a manual reactor scram to protect the transformers and removed both of them from service. Subsequent inspection revealed a degradation of the sealing material on penetrations into the control cabinet that affected the power to both banks of transformer cooling fans.

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

- Inadequate preventive maintenance for replacement of external sealant. Over time and exposure to the elements, the external sealant material on the control panel degraded and became susceptible to water intrusion.

The following items were identified as a root cause contributors:

- The water intrusion, combined with a water susceptible terminal block insulating material led to a path to ground on the 480 Vac terminal block.

- An organizational and programmatic weakness was identified in the periodic maintenance inspection program. The control cabinet showed water streaks within it, but the criteria to inspect the cabinet was general in nature and failed to inspect for past signs of water intrusion.

.2 September 26, 2007, "Unplanned Reactor Scram During Surveillance Testing Due to Damaged Terminal Board" (LER 50-458/2007-005-00, CR-RBS-2007-04264)

Description. While performing a scheduled surveillance test on the average power range monitor, 36 Group 2 control rods inserted into the core during the portion of the test procedure where the Division 1 reactor protection system (RPS) trip circuitry was actuated. This 'half-scram' actuation should not have caused any actual rod motion since both Divisions 1 and 2 must be actuated to accomplish a reactor scram. To ensure that the RPS system was properly aligned for this test, the licensee verified, via status lights for the individual RPS channels, that no trip signals were present. However, a circuit failure in an RPS pilot scram solenoid circuit, downstream of the status lights, in effect caused an undetected Division 2 half-scram signal to the Group 2 rods. When the surveillance test inserted the half-scram signal on Division 1, the insertion logic for the Group 2 control rods was completed and the Group 2 rods inserted as designed. Following the decrease in reactor power that followed the insertion of the Group 2 control rods, a low water level condition occurred, resulting in a scram of the remaining rods.

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

- Due to damage to the terminal board for the scram pilot valve, the licensee was unable to distinguish among three causes, but believe that the most likely root cause for the degraded circuit was that the terminal board was not originally secured adequately and became loose over time.

The following items were identified as root cause contributors:

- The original design of the circuit was inadequate. There are two lights per channel, and these lights represent the state of the RPS scram contactors. When the light is lit, there is no RPS trip signal, which the licensee uses to verify that no half-scram is present. However, as occurred during this event, this light will remain lit if the half-scram is caused by a downstream fault rather than an RPS actuation and there is no control room indication to verify that the pilot

scram solenoids are actually energized. This leaves the plant vulnerable to group and single control rod scrams.

- Previous industry experience and in-house operating experience (OE) was not effectively used to prevent the problem. Specifically, in 1989, the licensee determined that General Electric Safety Information Letter (SIL) 471, Supplement 1, "Prevention of Single Rod Scrams," was applicable to the plant. The licensee initiated a modification request which would have provided an alarm in the control room should RPS power be lost. This modification was cancelled to provide funding for higher priority enhancements.

- The licensee does not have a program in place to periodically check critical wire terminations that are susceptible to loosening from such things as environmental conditions, vibration, or tension. Other boiling water plants have programs that check the tightness of critical connections.

.3 November 7, 2007, "Unplanned Reactor Scram Due to Transformer Fault" (LER 50-458/2007006-00, CR-RBS-2007-04922)

Description. An automatic reactor scram from 75 percent power occurred due to the loss of the operating condensate pumps. The loss of the running condensate pumps caused a low suction to the reactor feedwater pumps and required a manual scram on lowering reactor level. The loss of the condensate pumps occurred due to a loss of the 13.8 kV bus Breaker NPS-SWG1A when the main feeder breaker to the bus tripped. A supply breaker from the bus, Breaker NPS-SWG1A ACB03, tripped open when a rodent inside a 13.8 kV to 480 V transformer caused arcing across the phases and to ground. However, the action of Circuit Breaker NPS-SWG1A ACB03 was slow, which caused the main feed breaker to open.

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

- An arc to ground occurred when a rodent entered the 13.8 kV to 480 V transformer. The rodent entered inside the 13.8 kV barrier due to a lack of a rodent abatement program at River Bend Station.

- The loss of the 13.8 kV bus occurred when Breaker ACB03 did not clear the fault for the 13.8 kV to 480 V Transformer NJS-X1J. This caused the Breaker ACB11 to open. Breaker ACB03 was slow to open due to hardened grease inside the breaker. The hardened grease was due to a lack of a preventive maintenance program to overhaul these breakers.

.4 March 5, 2008, "Automatic Reactor Scram Due to Malfunction of Main Turbine Control System," (LER 50-458/2008-002-00 CR-RBS-2008-02132)

Description. While the plant was operating at 60 percent power, an automatic reactor scram occurred due to high steam pressure in the reactor. The high reactor pressure was caused by main turbine control valve (TCV) closure due to a high speed error signal. The malfunction in the main turbine control system was from a loose, oil-contaminated electrical connector on the speed control loop. The primary speed sensor signal momentarily dropped off, and then returned to normal, causing a momentary

errant turbine speed error signal. This speed error signal caused a closure of the TCVs, and resulted in the high reactor steam pressure.

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

- The monitoring of the speed pickup and connector assembly is less than adequate. The speed pickup and connector assembly operating in a high temperature, high vibration and oil misted environment. There was no periodic inspection of the connectors to insure that oil incursion and/or corrosion would not cause a faulty connection.

The following items were identified as a root cause contributors:

- The Mark II electrohydraulic control (EHC) unit was not designed for the possibility of a sudden loss and subsequent return of the primary speed sensor signal. The momentary loss and sudden return of the primary speed sensor signal was seen by the speed control unit as a step change of acceleration of the turbine.

- Previous industry or in-house OE or needed changes were not approved or funded. The licensee has a planned digital upgrade to the Mark II EHC unit that was delayed that could have prevented the scram.

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

The PI crossed the threshold from Green to White during the first quarter of 2008 as a result of an unplanned trip on March 5, 2008. For the individual scrams, the prior opportunities for identification are discussed below.

- May 4, 2007, "Unplanned Manual Reactor Scram Due to Loss of Cooling on Main Transformer 2"

  The licensee's investigation indicated that the failure was due to rainwater intrusion into the control panel around a conduit penetration in the side of the cabinet. Rainwater went into the side of the control panel and shorted out the power to the fans. The issue developed over time due to degradation of the seal around the conduit going into the cabinet. This degradation, combined with a design deficiency on the terminal board, led to grounding on the cabinet.

  The licensee did not have a previous problem with this cabinet. There was no preventive maintenance activity to seal around the conduit, and no specific instructions to inspect for rainwater intrusion into cabinets. Further, maintenance activities on these transformers were performed by vendors, and there was no specific item to address streaking or to reseal conduit penetrations.

- September 26, 2007, "Unplanned Reactor Scram During Surveillance Testing Due to Damaged Terminal Board

  Following this event, the licensee determined that wiring and terminal board damage occurred due to a termination on the terminal board not being

adequately secured during original construction. This led to overheating over a long period and ultimately the reactor scram.

The licensee did not have an opportunity to identify this condition earlier since the termination point is inside an isolation can which prevented this condition from being visually identified. No work orders or surveillance activities were identified that would have lifted the leads on this termination.

The licensee identified a General Electric SIL from 1989 which discussed monitoring these circuits for failure. The licensee initiated a modification request which would have provided an alarm that this circuit had degraded. A modification was not implemented and was cancelled to allow funding of higher priority enhancements. Further, some boiling water reactors have a maintenance task to periodically check the tightness of certain critical connections, but this was not developed at River Bend.

- November 7, 2007, "Unplanned Reactor Scram Due to Transformer Fault"

  The licensee's investigation indicated that a rodent initiated the fault in the auxiliary boiler room switchgear. Feeder Breaker ACB03 to the auxiliary boiler room switchgear was slow to clear, which caused main feed Breaker ACB11 to open. The most probable cause for the slow fault clearing was hardened grease within the breaker.

  These breakers (GE Magneblast) have a well documented history of failure from hardened grease. Hardened grease is caused by age and contamination. Previously CR-RBS-2006-04478 documented the concern that these breakers are overdue to preventive maintenance overhauls. The licensee also identified that the rodent abatement program could also be improved.

- March 5, 2008, "Automatic Reactor Scram Due to Malfunction of Main Turbine Control System"

  The licensee determined that the malfunction in the main turbine EHC system was due to an intermittent failure of a probe that measures main turbine speed. Specifically, while the main turbine was at rated speed, a speed error signal developed due to a issue with the speed probe connection. The speed probe signal is believed to have initially dropped out, and then returned, which developed a large speed error signal. This lead to the main TCVs closing and a high reactor steam pressure causing a reactor scram.

  The licensee subsequently identified an LER from Palo Verde (LER 05000530/2004002) documenting a similar event. Previous experience at River Bend noted two scrams relating to a false overspeed signal in the EHC system, but these scrams do not appear to be related to a loose connector.

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

- May 4, 2007, “Unplanned Manual Reactor Scram Due to Loss of Cooling on Main Transformer 2”

  The plant responded as designed to the manual scram; and no actuations of emergency core cooling systems, reactor safety relief valves, or standby diesel generators were required. This event was of minimal safety significance.

- September 26, 2007, “Unplanned Reactor Scram During Surveillance Testing Due to Damaged Terminal Board"

  NRC Inspection Report 05000458/2007005 documented an inspection finding involving a failure to adequately implement work instructions when the terminal connections were installed onto the terminal board. This failure resulted in insertion of a group of rods and subsequent reactor scram on September 26, 2007.

  The finding was of very low safety significance because it did not contribute to both the likelihood of a reactor trip and that mitigating equipment or functions would not be available following a reactor trip, and did not increase the likelihood of a fire or a flood.

- November 7, 2007, “Unplanned Reactor Scram Due to Transformer Fault”

  NRC Inspection Report 05000458/2007005 documented an inspection finding involving a failure to incorporate internal or external industry experience to develop an adequate preventive maintenance program for known circuit breaker deficiencies. This failure resulted in a reactor scram on November 7, 2007.

  This finding required a Phase 2 analysis since it contributed to the likelihood of both the reactor trip and that mitigating equipment or functions were not available. A senior reactor analyst estimated the risk of the subject finding and determined that it was of very low safety significance.

- March 5, 2008, “Automatic Reactor Scram Due to Malfunction of Main Turbine Control System”

  The plant responded as designed to the manual scram; and no actuations of emergency core cooling systems, reactor safety relief valves, or standby diesel generators were required. This event was of minimal safety significance.

  The inspector reviewed the licensee’s evaluations and assumptions and determined that the licensee’s results were valid.

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 Fault Tree Analysis, Event and Causal Factor Analysis, Kepner-Tregoe Problem Analysis, Failure Modes Analysis, Why Staircase, and Organizational and Programmatic Diagnostics. 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 May 2007 through March 2008 for analysis. The licensee evaluated the common causes for these events. 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 was thorough in their analysis of the equipment failures and human performance errors for each of the events and the overall common cause analysis.

Common Cause Analysis

For the Common Cause Analysis, the licensee evaluated the four scrams from May 2007 through March 2008. The following are the common causes that were identified as a result of this analysis:

CAUSE 1: Organization to Program Interface Weak - Management Monitoring/Assessment (Maintenance/Engineering/Management)

- Previous in-house/industry OE was not effectively used to prevent problems (failure to optimize learning from experience).

CAUSE 2: Organization to Program Interface

- Response to a known or repetitive problem was untimely. Corrective action for known or recurring problems was not performed at or within the proper time.

CAUSE 3: Maintenance Task Weak (Maintenance/Engineering/ Management)

- Preventive maintenance tasks were less than adequate. Established periodicity or method used to prevent or detect equipment degradation was not effective.

- Critical electrical connections were involved in two of the four events, which potentially indicated that this was an area warranting further action.

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

- May 4, 2007, “Unplanned Manual Reactor Scram Due to Loss of Cooling on Main Transformer 2”

  The licensee reviewed their corrective action program and industry OE, and identified three CRs which were similar to this event. None of the CRs were directly relevant to water entering a cabinet caused shorting; however, several events were identified that were caused by the failure of other transformer single failure vulnerability components.

  The licensee also reviewed OEs from several different events throughout the industry. The licensee identified six events which appeared to be similar; however, none appeared directly relevant to this event.

- September 26, 2007, “Unplanned Reactor Scram During Surveillance Testing Due to Damaged Terminal Board"

  The licensee reviewed their corrective action program and identified in CR-RBS-1990-01075 that documents a scram due to loss of power at a hydraulic control unit (HCU) junction box. The licensee found wiring going to a toggle switch was burned and loose. The root cause for the loose terminals was determined to be vibration. A modification was proposed to monitor power supplies to HCUs but that modification was not performed.

  The licensee identified 19 examples of similar industry OE. One event from Grand Gulf was similar to this event. Grand Gulf Incident Report 88-03-04 documented an insertion of 29 control rods due to a loose connection in a RPS junction box. However, the modification that would have resolved this problem was not performed. This issue was cited in the closure of LER 05000458/2007005 in NRC Inspection Report 05000458/2007005.

- November 7, 2007, “Unplanned Reactor Scram Due to Transformer Fault”

  The licensee reviewed plant CRs and OEs from throughout the industry. Earlier the licensee identified CR-RBS-2006-04478 that discussed hardened grease within GE Magneblast Breakers. The licensee determined that the corrective actions from this event were untimely.

  The licensee indentified several different examples of OE that documented issues with GE Magneblast breakers and the necessity of a preventive maintenance program for these breakers. This issue was cited in the closure of LER 05000458/2007006 in NRC Inspection Report 05000458/2007005. The licensee has refurbished these breakers during the last refueling outage.

- March 5, 2008, “Automatic Reactor Scram Due to Malfunction of Main Turbine Control System"

  The licensee reviewed their corrective action program and industry OE and identified two CRs which were similar to this event. However, none of the CRs

were directly relevant to the speed probe and connector assembly, but were related to damaged speed cables or arcing that was sensed by the speed probe.

The licensee also reviewed OEs from throughout the industry. The licensee identified one similar event from Palo Verde Nuclear Generating Station, LER 05000530/2004002. However, the licensee's OE program did not review LERs by themselves, and this LER was not captured by the licensee's OE process. The licensee is evaluating modifying their OE process to include LERs for OE review.

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

"Extent of condition" is defined as the extent to which the actual condition exists with other plant processes, equipment, or human performance.

- May 4, 2007, "Unplanned Manual Reactor Scram Due to Loss of Cooling on Main Transformer 2"

  The inspector verified that the licensee walked down the transformers and identified all other potential degraded conduit penetrations and instituted a preventive maintenance (PM) task to seal these penetrations. The licensee also provided more guidance to workers to be sensitive to signs of water intrusion.

  The licensee also issued a River Bend Station (RBS) Operational Experience report concerning this event.

- September 26, 2007, "Unplanned Reactor Scram During Surveillance Testing Due to Damaged Terminal Board"

  The licensee inspected other potentially affected circuits, ensuring that all connections were tight. The licensee also performed a modification to the HCU power supplies, which will provide an alarm for a degraded circuit to the HCUs. The licensee also will re-review other General Electric SILS to insure that appropriate corrective actions have taken.

- November 7, 2007, "Unplanned Reactor Scram Due to Transformer Fault"

  The licensee identified that the lack of preventive maintenance for the GE Magneblast breakers contributed to this failure. The licensee refurbished the breakers and established a preventive maintenance program for these breakers.

  The licensee took actions to improve the rodent abatement program to preclude these animals from entering into electrical cabinets.

- March 5, 2008, "Automatic Reactor Scram Due to Malfunction of Main Turbine Control System"

  The licensee did not identify any other speed type sensors that could experience a similar condition. These six amphenol connectors are located in a harsh environment in the turbine front standard.

"Extent of cause" is defined as the extent to which the root causes of an identified problem have impacted other plant processes, equipment, or human performance.

- May 4, 2007, “Unplanned Manual Reactor Scram Due to Loss of Cooling on No. 2 Main Transformer”

  The licensee evaluated the extent of cause to be no preventive maintenance task for replacement of external sealant. The licensee has implemented a preventive maintenance task to periodically replace external sealants.

- September 26, 2007, “Unplanned Reactor Scram During Surveillance Testing Due to Damaged Terminal Board"

  The failure of the power to the HCUs due to the loose connection was generic, and the licensee inspected other affected HCU circuits to ensure that connections were tight.

- November 7, 2007, “Unplanned Reactor Scram Due to Transformer Fault”

  The licensee determined, from a maintenance standpoint, that preventive maintenance activities need to be enhanced at RBS. The licensee is currently evaluating the maintenance and adding preventive maintenance tasks for critical components.

- March 5, 2008, “Automatic Reactor Scram Due to Malfunction of Main Turbine Control System"

  The licensee determined that inadequate preventive maintenance of the speed probe sensors was part of the extent of cause for this trip. The licensee is in the process of revising and improving the preventive maintenance program.

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.

- May 4, 2007, “Unplanned Manual Reactor Scram Due to Loss of Cooling on No. 2 Main Transformer”:

  The cause of the failure was an inadequate preventive maintenance program and did not reflect an issue with the safety culture at RBS at the time of failure.

- September 26, 2007, “Unplanned Reactor Scram During Surveillance Testing Due to Damaged Terminal Board"

  The cause of the failure was installation workmanship and did not reflect an issue with the safety culture at RBS at the time of failure.

- November 7, 2007, "Unplanned Reactor Scram Due to Transformer Fault"

  The licensee's root cause evaluation for this scram did not identify safety culture weaknesses as a root or significant contributing cause for the event. The licensee instituted a range of corrective actions to ensure more timely and thorough reviews of preventive maintenance activities and site and industry OE. The inspector concluded the licensee's evaluation included a proper consideration of safety culture and the identified corrective actions were appropriate.

- March 5, 2008, "Automatic Reactor Scram Due to Malfunction of Main Turbine Control System"

  The cause of the failure was an inadequate preventive maintenance program and does not reflect an issue with the safety culture at RBS at the time of failure.

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 trip events that caused the PI 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 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 noted.

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 for the period of May 2007 through March 2008. These corrective actions are listed below:

- Develop expectations and an infrastructure for system and program engineers to periodically review OE. (CR-RBS-2008-02143-CA5)

- Establish clear expectations and responsibilities to increase the percentage of PM feedback by maintenance and ensure that engineering is incorporating this feedback into a PM. (CR-RBS-2008-2143-CA6)

- Evaluate precursor data concerning loose terminal connections and determine if any new actions to improve worker practices or processes are warranted. (CR-RBS-2008-2143-CA11)

- Inspect other cabinets that have the potential to cause a scram or downpower due to water intrusion. (CR-RBS-2008-2143-CA12)

b. Prioritization of corrective actions

The inspector concluded that the corrective actions were appropriately prioritized. 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 inspector determined that the licensee had completed most of the corrective actions for each of the CRs. The inspector reviewed a sample of the completed corrective actions and concluded that they had been implemented successfully. Some of the actions not yet completed included a review of previous General Electric SILs, which the licensee projects to be completed by November 30, 2008; and an effectiveness review of the licensee's plans to periodically review OE, and to improve the PM program is scheduled to be completed before August 30, 2008. The inspector determined the licensee had established appropriate schedules and had appropriately considered risk in the implementation and completion of 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 required that the licensee evaluate the effectiveness of the corrective actions described in the CRs. Most of the actions taken by the licensee were assessed as being effective. The effectiveness reviews of the licensee's corrective actions are scheduled to be completed by August 30, 2008.

The inspector concluded the effectiveness measures and reviews established by the licensee were appropriate.

04 OTHER ACTIVITIES

40A6 Management Meetings

Exit Meeting Summary

The inspectors presented the inspection results to Mr. M. Perito, Vice President, Operations, RBS, and other members of licensee management at the conclusion of the inspection on June 27, 2008. The licensee acknowledged the information presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee
J. Antoine, Coordinator, Equipment Reliability
K. Borneman, Technical Specialist, Engineering
C. Bailey, Technical Specialist, Engineering
M. Chase, Manager, Training and Development
F. Corley, Supervisor, Engineering
B. Heath, Superintendent, Chemistry
K. Higginbotham, Assistant Operations Manager – Shift
K. Huffstatler, Technical Specialist, Licensing
A. James, Manager, Security
J. Leavines, Manager, Emergency Preparedness
D. Lorfing, Manager, Licensing
R. McAdams, manager, System Engineering
G. Meliet, Superintendent, Electrical Maintenance
M. Perito, Vice President, Operations
J. Roberts, Director, Nuclear Safety Assurance
A, Spencer, Coordinator, Maintenance
D. Wiles, Director, Engineering

NRC
G. Larkin, Senior Residen Inspector, Palo Verde
J. Melfi, Resident Inspector - Palo Verde

LIST OF DOCUMENTS REVIEWED

CONDITION REPORTS

Number	Topic
CR-RBS-2008-02143	Common Cause Evaluation for exceeding the NRC Performance Indicator for Unplanned Scrams per 7000 hours critical
CR-RBS-2008-02132	Automatic Reactor Scram Due to Malfunction of Main Turbine Control System
CR-RBS-2007-05068	Indicators for Scrams and Unplanned Scrams with complications have exceeded 50% of their green band
CR-RBS-2007-04922	Unplanned Reactor Scram Due to Transformer Fault
CR-RBS-2007-04264	Unplanned Reactor Scram During Surveillance Testing Due to Damaged Terminal Board

Number	Topic
CR-RBS-2007-01802	Unplanned Manual Reactor Scram Due to Loss of Cooling on No. 2 Main Transformer
CR-RBS-2006-04478	INPO SOER 98-02, "Circuit Breaker Reliability"
CR-RBS-2005-00167	Exceeding the NRC Performance Indicator for Unplanned Scrams per 7000 Hours Critical
CR-RBS-2003-03203	Reactor Scram of 9/22/03
CR-RBS-2001-00523	Reactor Scram of 4/21/2001

MISCELLANEOUS

EN-LI-114, "NRC Performance Indicator Sheet," Revision 3
EN-LI-119, "Apparent Cause Evaluation (ACE) Process," Revision 7
EN-LI-121, "Entergy Trending Process," Revision 7

Daily Average Power Chart, January 2007-January 2008
Condenser Cleanliness factor graph, January 2004 – June 2007
Simplified EHC Functional Diagram
Maintenance Rule Functional Failure Determination for CR-RBS-2007-01802
Maintenance Rule Functional Failure Determination for CR-RBS-2007-04264
Maintenance Rule Functional Failure Determination for CR-RBS-2007-04922
Maintenance Rule Functional Failure Determination for CR-RBS-2008-02132
Preventive Maintenance Program Analysis, June 9, 2008
Projected Burn off Curve for review of General Electric SIL/TILs, March 2008 - December 2008
EN- LI-114, "NRC Performance Indicator Technique Sheet," Attachment 9.2, April 16, 2008

LIST OF ACRONYMS USED

CR	condition report
EHC	electrohydraulic control
HCU	hydraulic control unit
LER	licensee event report
OE	operating experience
PI	performance indicator
PM	preventative maintenance
RBS	River Bend Station
RPS	reactor protection system
SIL	safety information letter