UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064

March 2, 2000

EA 00-044

Randal K. Edington, Vice President - Operations
River Bend Station
Entergy Operations, Inc.
P.O. Box 220
St. Francisville, Louisiana 70775

SUBJECT: NRC REACTIVE INSPECTION REPORT NO. 50-458/00-03

Dear Mr. Edington:

This refers to the inspection conducted on January 24 to 27, 2000, at the River Bend Station facility. Additional inoffice inspection continued until February 24, 2000. The purpose of this inspection was to followup on previously identified inspection items and events. The enclosed report presents the results of this inspection.

Based on the results of this inspection, the NRC has determined that a Severity Level IV violation of NRC requirements occurred. This violation is being treated as a noncited violation, consistent with Section VII.B.1.a of the Enforcement Policy. The noncited violation is described in the subject inspection report. If you contest the violation or severity level of the noncited violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region IV; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the River Bend Station facility.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

original signed by

Dr. Dale A. Powers, Chief
Engineering and Maintenance Branch
Division of Reactor Safety

Enclosure:
NRC Inspection Report No.
50-458/00-03

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	50-458
License No.:	NPF-47
Report No.:	50-458/00-03
Licensee:	Entergy Operations, Inc.
Facility:	River Bend Station
Location:	5485 U.S. Highway 61 St. Francisville, Louisiana
Dates:	January 24 to 27, with additional inoffice inspection continuing until February 24, 2000
Inspector:	J. E. Whittemore, Senior Reactor Inspector Engineering and Maintenance Branch
Approved By:	Dr. Dale A. Powers, Chief Engineering and Maintenance Branch Division of Reactor Safety

ATTACHMENT: Supplemental Information

EXECUTIVE SUMMARY

River Bend Station
NRC Inspection Report No. 50-458/00-03

This inspection was performed by one region-based inspector during a 1-week period onsite to conduct followup of previously identified items, primarily related to the licensee's Maintenance Rule program, and events.

Maintenance

- Licensee personnel failed to identify any of three safety-related room cooler heat exchanger capacity test failures, which occurred within 16 months prior to the implementation of the Maintenance Rule, as Maintenance Rule functional failures. As a result, licensee personnel did not establish a basis for monitoring the auxiliary building heating, ventilation, and cooling system under 10 CFR 50.65 (a)(2) when the rule became effective. Proper identification of the functional failures would have required an evaluation to determine if the failures were maintenance related or preventable. The failure to identify the functional failures effectively prevented the program from performing as intended by the regulation. While monitoring performance as described in paragraph (a)(2), the licensee failed to demonstrate that the performance or condition of the auxiliary building heating, ventilation, and cooling system was effectively controlled through the performance of appropriate preventive maintenance. The subsequent failure to set goals and monitor performance is a violation of 10 CFR 50.65(a)(1). This Severity Level IV violation (EA 00-044) is being treated as a noncited violation, consistent with Section VII.B.1.a of the NRC Enforcement Policy. The condition identified by this violation is in the licensee's corrective action program as Condition Report 2000-0154 (50-458/0003-01) (Section M8.1).

Report Details

Summary of Plant Status

The unit was operating at or near full power during the inspection.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Maintenance Rule Program and Fuel Failures

a. Inspection Scope (92902)

The inspector assessed the licensee's Maintenance Rule program with respect to its coverage of systems involved in maintaining the purity of the reactor coolant. The purity of the reactor coolant could have been related to the fuel cladding failures experienced during the prior cycle of operation. This assessment included a review of the program coverage of the condensate makeup, storage, and transfer system; the reactor water cleanup system; the reactor feed system; and the condensate demineralizer system.

b. Observations and Findings

Although not absolutely sure, licensee personnel, in conjunction with other industry members and groups, were confident that the recent fuel failures had resulted from, or had been accelerated by, conductivity and high concentrations of insoluble metal oxides (copper and iron) in the reactor coolant system. Licensee personnel had identified excursions of these contaminants in the feed and condensate stream during some plant conditions and evolutions. The inspector noted that the chemistry group sampled the water from the reactor vessel, several points in the feed and condensate, and the makeup source on a daily basis.

The inspector observed that the condensate makeup, storage, and transfer system and the reactor water cleanup system were in the scope of the licensee's Maintenance Rule program. The Maintenance Rule functions were identified and monitored at the appropriate level based on risk significance determination. Both systems were being monitored under paragraph (a)(2) of 10 CFR 50.56 and the preventive maintenance program was controlling the condition or performance of the systems. The reactor feed and condensate systems were also in the scope of the licensee's program and monitored appropriately.

The inspector noted that the condensate demineralizer system was not in the scope of the licensee's program. The condensate demineralizer system was a full-flow system consisting of ten 145-cubic foot demineralizer beds containing various types of cation and anion resin for purifying condensate exiting the main condenser. The system was operated in accordance with Procedure SOP-0093, "Condensate Demineralizer System," Revision 10, which required eight beds to be in service for power operation.

However, the licensee's operating staff actually required nine beds to be in service during power operation. Purification of the condensate was obtained by filtration and ion exchange processes. Three of the demineralizers contained resin beds that were mixed and designed to be more efficient than the other beds at removing insoluble metal oxides. All of the demineralizer beds could be transferred, one at a time, to a holding tank and ultrasonically cleaned. According to the licensee's representative, this cleaning process normally provided a maximum reduction of about 30-35 percent of the insoluble metal oxides in a bed.

Guidelines provided by an industry group suggested that reactor vessel coolant concentrations of iron and copper be maintained less than 5.0 and 0.5 ppb, respectively. Licensee personnel had adopted these values as administrative limits and attempted to maintain the concentrations as low as possible. The licensee's staff stated that although the measured values had exceeded the administrative limits during periods of contaminant excursion, average concentration of iron and copper for the current cycle during Mode 1 operation was 3.6 and 0.2 ppb, respectively. Technical Requirements Manual, Section 3.4.13, required that during Mode 1 operation, reactor vessel coolant chemistry values be maintained in accordance with the following limits:

Chloride---------- Less than 0.2 ppm
Conductivity---------- Less than 1.0 μmhos/cm
pH---------- 5.6-8.6

These values were more limiting than the design basis values described in the Updated Safety Analysis Report.

To achieve this reactor vessel coolant chemistry, licensee personnel had adopted condensate stream limits on conductivity of 0.1 μmhos/cm, no detectable turbidity, and dissolved oxygen less than 200 ppb. According to licensee personnel, reducing these values would require an improved design beyond the current state of the technology for removing impurities from water.

The licensee's staff had determined that excursions of condensate stream conductivity and insoluble metal concentration occurred at two specific times in the previous cycle of operation. High values for the above parameters occurred during startup of the balance of plant following an outage, and when restoring flow through a demineralizer following bed cleaning.

According to licensee representatives, corrective action was currently occurring in response to the excursions. The licensee's staff was attempting to improve the lay-up condition of plant systems by establishing flooded or inert conditions to minimize the formation of metal oxides during outage conditions. Also, prestartup cleanup and flushing of systems were being initiated to reduce the existing inventory of metal oxides in the idle systems. Prior to the recent revision of Procedure SOP-0093, demineralizers had been returned to service with the immediate initiation of full flow, which caused the release of previously removed contaminants. The current revision required a gradual initiation of flow to minimize the release of metal oxides and other impurities that remained in the bed after cleaning.

The facility operating license (technical specifications) provides considerable margin by requiring the facility to be shut down prior to the occurrence of any significant number of the fuel cladding failures. Furthermore, the nuclear fuel was in the program scope and had been placed in monitoring, as prescribed by Maintenance Rule paragraph (a)(1). Additionally, the corrective action system was functioning as intended to identify operational methods to reduce or eliminate the feed and condensate system contaminant excursions.

c. Conclusions

The inspector concluded that the licensee's implementation of the Maintenance Rule program as it related to the condensate demineralizer system and specifically in regard to the fuel cladding failures experienced by the facility was appropriate.

M1.2 Followup on Reactor Scrams Related to the Performance of Maintenance

a. Inspection Scope (92902)

The inspector reviewed the implementation of the licensee's Maintenance Rule program as it related to two reactor scram events that were initiated as a result of, or by, maintenance activities.

b. Findings and Observations

Licensee Event Report 50-458/97-001 was issued on June 5, 1997, to report an unscheduled manual reactor scram that occurred when craft personnel breaching a turbine building floor penetration, as part of a planned modification, severed and shorted two conductors in the penetration. The resultant loss of power to electrical switchboards and feedwater pumps required the operators to manually scram the reactor.

Condition Report 1997-0632 was initiated and a significant event response team was formed to determine the root cause and recommend corrective actions. The team determined that the event was maintenance preventable and the causes were (a) poor task work standards, policy, and controls, (b) poor tool choice and technique used to perform the subject task, (c) poor work environment and training, and (d) untimely implementation of corrective action related to a previous similar event.

Licensee personnel did not identify any Maintenance Rule structure, system, or component performance measures that had been exceeded. However, the event was considered a maintenance preventable functional failure of the penetration breaching process. As a result of this determination, a new policy, standard procedure, and checklist were developed and implemented for the penetration breaching process. The effectiveness review for the 19 corrective actions required by the condition report was scheduled to be complete by February 26, 2000.

Separately, Licensee Event Report 50-458/97-005 was issued on September 22, 1997, to report an unscheduled shutdown that occurred on August 22, 1997, when a turbine stop and control valve closure caused an automatic reactor scram. The licensee

determined that the valve closure was caused by the turbine emergency trip system. Condition Report 1997-1255 was initiated and a significant event response team was formed to determine the root cause and recommend corrective actions for the automatic scram.

The root cause determination found that the inadvertent valve closure resulted from a shorted connector on the main turbine electrical trip solenoid valve. The event was identified as a maintenance preventable functional failure when additional review of maintenance history by the response team provided indication of a faulty work practice during replacement of the electrical trip solenoid valve in 1994. However, Maintenance Rule program performance measures were not exceeded. The root cause was determined to be due to the generic work instructions that did not provide specific instructions for the type of connector installed. The licensee's corrective action was to initiate extensive training of all personnel having potential involvement in the installation or change out of the particular connector.

c. Conclusions

The inspector concluded that the licensee's staff had adequately determined the root cause of the maintenance-induced or preventable failures that had resulted in the reactor scrams.

M8 Miscellaneous Maintenance Issues (92902)

M8.1 (Closed) Unresolved Item 50-458/9909-04: the licensee failed to address test failures of auxiliary building unit coolers within the Maintenance Rule program.

Background

The unresolved condition was identified when NRC inspectors, reviewing room cooler capacity test failures, questioned the adequacy of three auxiliary building room coolers to remove the required amount of heat during normal and accident conditions. During the course of addressing the problems with room cooler capacity, licensee personnel performed operability evaluations noted in Inspection Report 50-458/99-09 to assure that the affected coolers would perform the required safety functions under design basis accident conditions. The inspectors further questioned the licensee's implementation of its Maintenance Rule program in regard to the cooler test failures.

Inspection Followup

Auxiliary Building Heating, Ventilation, and Cooling (HVAC) System Unit Coolers UC-5, UC-6, and UC-9 had collectively failed capacity testing a total of seven times since 1995 as depicted by the following table:

AUXILIARY BUILDING ROOM COOLER TEST FAILURE DATES

UNIT COOLER UC-5	UNIT COOLER UC-6	UNIT COOLER UC-9
April 1995	March 1995	March 1995
November 1996	October 1996	January 1997
	February 1997	

The inspector reviewed the licensee's database and identified a Maintenance Rule program function that was linked to the performance of the auxiliary building HVAC unit coolers. The inspector found that Maintenance Rule Program Function F-409-010, "Auxiliary building ventilation is to control the building temperature and the movement of potential airborne radioactivity contaminants," would be directly impacted by the performance of the unit coolers. For this performance measure, the licensee's program established the performance criteria to be a minimum of 96.8 percent availability and less than or equal to one maintenance preventable functional failure per rolling 18-month period.

The licensee's position was that despite the cooler test failures, Performance Measure F-409-010 was being met because no temperatures had been logged in any of the rooms that were in excess of the limiting Updated Safety Analysis Report ambient temperature of 122 degrees F, and the operability evaluation of record stated that all equipment cooled by the marginal coolers was still operable. This determination did not consider the assumed conditions, such as environmental conditions and heat sink temperature, for the design capacity of the coolers. Additionally, the licensee's staff performed additional calculations and analysis to support a conclusion that a temperature of 132 degrees F in the affected rooms would not adversely impact the performance of safety-related structures, systems, and components located in the spaces cooled by the degraded unit coolers. The inspector did not disagree with this approach to satisfy the design or safety requirements for performance of the coolers. However, this new analytical value was not incorporated into an Updated Safety Analysis Report revision. Furthermore, the cooler test failures represented the identification of degraded system components, which were in the scope of the Maintenance Rule program, for which an evaluation should have been performed to assure the performance of the Maintenance Rule program identified functions.

The inspector noted that the licensee's Procedure EDG-PR-001, "Maintenance Rule Program." Revision 3, defined functional failure as "the failure of an SSC in the scope of the Maintenance Rule to perform its intended Maintenance Rule function." The inspector reviewed the corrective action program condition reports listed in the attachment that identified the cooler failures and observed that none of the test failures were identified as Maintenance Rule functional failures. The inspector determined that each unit cooler test failure had resulted in the failure of a Maintenance Rule function of the auxiliary building HVAC system. However, further evaluation under the licensee's program was precluded when the functional failures were not identified.

Since the Maintenance Rule became effective on July 10, 1996, the system was monitored as prescribed by paragraph (a)(2) of the Maintenance Rule. Monitoring of systems, structures, and components under paragraph (a)(2) is only allowed when the performance measures demonstrate that the normal preventive maintenance program is adequate to assure the satisfactory performance or condition of licensee-developed Maintenance Rule functions. Licensees were required to establish system, structure, and component monitoring under the appropriate rule paragraph (a)(1) or (a)(2) by the effective date of the Maintenance Rule in July 1996. An industry group provided guidance to accomplish this by requiring review of system, structure, and component performance over the 3 years or two fuel cycles prior to implementation. Then, a determination based on prior performance, was to be made on how the system, structure, and component functional performance would be monitored.

By failing to identify any of the three Maintenance Rule functional failures that occurred in the 16 months preceding July 10, 1996, the effective date of the rule, the licensee did not demonstrate an adequate basis for monitoring the system performance under Maintenance Rule paragraph 10 CFR 50.65(a)(2). The failure to identify the functional failures effectively prevented the program from performing as intended by the regulation, in that it was not demonstrated that the performance or condition of the Auxiliary Building HVAC system was effectively controlled through the performance of appropriate preventive maintenance.

Subsequently, the licensee failed to set goals and monitor the performance of the Auxiliary Building HVAC system when the licensee's demonstration failed to show that the performance of the system was being effectively controlled through the performance of appropriate preventive maintenance, as required by 10 CFR 50.65(a)(2), for a structure, system or component that the licensee chooses to remove from the requirements of monitoring under the provisions of 10 CFR 50.65(a)(1). Specifically, the licensee failed to identify and properly account for three auxiliary building room cooler capacity test failures as failures of a function described in the licensee's Maintenance Rule program. By failing to identify any of the three test failures, which occurred before the effective date of the Maintenance Rule, the licensee failed to demonstrate an adequate basis for placing the Auxiliary Building HVAC system under the provisions of 10 CFR 50.65(a)(2) before the rule became effective on July 10, 1996. Additionally, four subsequent cooler test failures occurred in October 1996, November 1996, January 1997, and February 1997, but the licensee continued to apply the provisions of 10 CFR 50.65(a)(2) to the system. Because the licensee had inappropriately placed the Auxiliary Building HVAC system under the provisions of 10 CFR 50.65(a)(2), and because the licensee did not establish goals and monitor the system performance against those goals as required by 10 CFR 50.65(a)(1), the licensee was in violation of 10 CFR 50.65(a)(1). This Severity Level IV violation is being treated as a noncited violation, consistent with Section VII.B.1.a of the NRC Enforcement Policy. The condition identified by this violation is in the licensee's corrective action program as Condition Report 2000-0154 (50-458/0003-01).

Unresolved item (50-458/9909-04) is closed.

M8.2 (Closed) Inspection Followup Item 50-458/9718-01: Review licensee evaluation to determine if pressure isolation valve identified in the USAR should be listed in the licensee's Technical Specification or Technical Requirements Manual.

Background

During inspection of the licensee's pump and valve inservice testing program, the inspectors observed that Check Valve RHS-V240, RHR Pump C Shutdown Cooling Inlet Check Valve, was identified in the USAR, Table 3.9A-15, "Pressure Isolation Valves Under ASME XI Inservice Testing Program." This check valve functioned as a thermal expansion relief valve and was configured in a parallel path to preclude pressure locking of 12MOVF008, "RHR Pump C Shutdown Cooling Inlet Valve." However, the valve was not identified in the Technical Specification or Technical Requirements Manual.

Followup Inspection

The inspector reviewed the actions that were identified in Condition Report 1997-2103, issued to address the apparent discrepancy resulting from the check valve not being identified in Technical Requirements Manual, Table 3.4.6-1, "Reactor Coolant System Pressure Isolation Valves." The inspector verified the valve had been placed in Table 3.4.6-1.

V. Management Meetings

X1 Exit Meeting Summary

The inspector presented the inspection results to members of licensee management at an onsite exit meeting on January 27, and a supplemental telephonic exit meeting on March 1, 2000. The licensee's representatives acknowledged the findings presented. No proprietary information was identified.

ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

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R. Frayer, Supervisor, System Engineering
T. Hildebrandt, Manager Maintenance
R. King, Director, Nuclear Safety Assurance
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A. Shahkarami, Manager, System Engineering

NRC

T. Pruett, Senior Resident Inspector
N. Garrett, Resident Inspector

INSPECTION PROCEDURES USED

92902	Followup - Maintenance
92903	Followup - Engineering

ITEMS OPENED

50-458/0003-01	NCV	Failure to Demonstrate Adequate Performance for Monitoring in (a)(2) (Section M8.1)

ITEMS CLOSED

50-458/0003-01	NCV	Failure to Demonstrate Adequate Performance for Monitoring in (a)(2) (Section M8.1)
50-458/9909-09	URI	Heat Exchanger Test Failures Not Addressed by Maintenance Rule Program (Section M8.1)
50-458/9816-02	IFI	Determine if Pressure Isolation Valve Should be in Technical Requirements Manual (Section M8.2)

CONDITION REPORTS

1995-0099	1996-1952	1997-1255	1999-0875
1995-0887	1997-0025	1997-2103	1999-0885
1996-1581	1997-0081	1998-0591	1999-0890
1996-1891	1997-0632	1998-0794	2000-0154

LICENSEE EVENT REPORTS

NUMBER	DESCRIPTION	REVISION
97-001	Manual Scram Due to Loss of 13.8 kV Switchboard Caused by Improper Breach of Penetration During Modification	0
97-005	Reactor Scram Due to Failed Electrical Connector that had Been Improperly Reworked	0

PROCEDURES

NUMBER	DESCRIPTION	REVISION
EDG-PR-001	Reliability Monitoring Program	2
EDG-PR-001	Maintenance Rule Program	3
PEP-0219	Reliability Monitoring Program	6
PEP-0219	Reliability Monitoring Program	7
PEP-0227	Performance Monitoring Program of Safety Related Auxiliary Building Unit Cooler 1HVR*UC5 (Div I)	2
PEP-0228	Performance Monitoring Program of Safety Related Auxiliary Building Unit Cooler 1HVR*UC6 (Div I)	4
PEP-0229	Performance Monitoring Program of Safety Related Auxiliary Building Unit Cooler 1HVR*UC9 (Div II)	1
SOP-0093	Condensate Demineralizer System	10