

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.: 50-458
License Nos.: NPF-47
Report No.: 50-458/98-17
Licensee: Entergy Operations, Inc.
Facility: River Bend Station
Location: 5485 U.S. Highway 61
St. Francisville, Louisiana
Dates: August 9 through September 19, 1998
Inspectors: G. D. Replogle, Senior Resident Inspector
N. P. Garrett, Resident Inspector
K. D. Weaver, Resident Inspector, Arkansas Nuclear One
Approved by: C. S. Marschall, Chief, Project Branch C
Division of Reactor Projects
ATTACHMENT: Supplemental Information

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EXECUTIVE SUMMARY

River Bend Station
NRC Inspection Report 50-458/98-17

Operations

- The conduct of operations was generally professional and safety-conscious (Section O1.1).
- Operator awareness of most plant problems was considered good, but in one instance operators did not demonstrate a proper understanding of the potential plant response to a failed -22 Vdc electrohydraulic controls bus. The bus was degraded at the time. Bus failure, absent operator action, would have resulted in closure of the main steam isolation valves. Main steam isolation valve closure would have significantly complicated any subsequent operator response. Similar operator knowledge observations were made in NRC Inspection Report 50-458/98-05. As documented in that report, Operations personnel did not understand the basis for operability when questioned about reactor core isolation cooling, plant stack monitor, and hydraulic control unit problems (Section O4.1).

Maintenance

- The performance of maintenance was generally professional and thorough. Eight maintenance and surveillance activities were observed (Section M1.1).
- Plant material condition was generally good with some significant deficiencies. Material condition concerns included: (1) degraded Divisions I and II diesel generator control air systems, requiring the use of operator actions and nonsafety-related equipment to maintain the diesels operable; (2) a fuel leak; and (3) an erratic emergency response information system real time computer. Conversely, the degraded -22 Vdc electrohydraulic controls power supply was repaired during this inspection period (Section M2.1).

Engineering

- Engineering and Instrument and Controls staff provided excellent support of operations, in troubleshooting and repairing a degraded -22 Vdc EHC power source. The performance of troubleshooting and preparation of work documents using a system mockup helped to preclude the risk of perturbations on the plant. The resultant work documents provided very clear direction. Maintenance was conducted in an effective and well controlled manner (Section E2.1).

Plant Support

- Security facilities, equipment, isolation zones, and illumination levels were properly maintained (Section S2.1).

- Emergency response facilities were properly maintained and staffing was consistent with Emergency Plan requirements (Section P2.1).

Report Details

Summary of Plant Status

The plant was in Operational Mode 1 at 100 percent reactor power for most of the inspection period. On September 5 and 10 power was reduced to approximately 80 percent for a few hours to support planned reactor feedwater pump maintenance.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

The inspectors used Inspection Procedure 71707 to conduct frequent reviews of ongoing plant operations. The conduct of operations was generally professional and safety conscious.

O2 Operational Status of Facilities and Equipment

O2.1 Engineered Safety Feature System Walkdowns (71707, 71750)

The inspectors walked down accessible portions of the following safety-related systems:

- High Pressure Core Spray
- Residual Heat Removal, Trains A, B, and C
- Reactor Core Isolation Cooling
- Division I, II, and III Switchgear and Battery Rooms
- Standby Gas Treatment, Trains A and B.
- Standby Liquid Control
- Division I, II, and III Diesel Generators (DGs)

The systems were properly aligned and most systems were in good material condition. Material condition issues are documented in Section M2.1.

O4 Operator Knowledge and Performance

O4.1 Operator Knowledge of Plant Problems

a. Inspection Scope (71707)

The inspector conducted periodic interviews with on-shift Operations personnel to assess their knowledge of plant problems.

b. Observations and Findings

While operator awareness of most plant problems was considered good, in one instance, operators did not demonstrate a high level of knowledge regarding a known degraded plant condition. Specifically, operators were aware, since July 30, 1998, that the -22 Vdc electrohydraulic controls (EHC) bus was degraded but, as late as August 10, 1998, operations personnel did not properly understand the consequences of losing the EHC bus. At the time, operators did not know the cause of the bus problem or if further degradation might cause the complete loss of the bus.

If the EHC bus had failed, without intervening operator action, the turbine control valves would have failed full open and the main steam isolation valves (MSIVs) would have automatically closed on decreasing reactor pressure (approximately 840 psig). The plant would have scrammed due to the MSIV closure signal. This scenario is of concern because the required operator response becomes substantially more demanding when dealing with an MSIV closure event. Action by the operators to trip the plant prior to MSIV closure would considerably simplify subsequent operator actions and would minimize the risk associated with this type of event. Since the operators did not expect it, they did not prepare for a possible MSIV closure.

On August 13, engineering completed troubleshooting and repairs to the EHC power supply and determined that the problem, failed power supply capacitors in one of two power supplies, would not have likely resulted in failure of the entire EHC bus. However, this information was not determined until after the inspectors determined that operators did not understand the possible consequences of the degraded bus.

Similar operator knowledge observations were previously documented in NRC Inspection Report 50-458/98-05. As documented in that report, Operations personnel did not understand the basis for operability when questioned about reactor core isolation cooling, plant stack monitor, and hydraulic control unit problems.

c. Conclusions

Operator awareness of most plant problems was considered good, but in one instance operators did not demonstrate a proper understanding of the potential plant response to a failed -22 Vdc EHC bus. The bus was degraded at the time. Bus failure, absent operator action, would have resulted in closure of the MSIVs. MSIV closure would have significantly complicated any subsequent operator response. Similar operator knowledge observations were made in NRC Inspection Report 50-458/98-05. As documented in that report, Operations personnel did not understand the basis for operability when questioned about reactor core isolation cooling, plant stack monitor, and hydraulic control unit problems.

08 Miscellaneous Operational Issues (92901)

- 08.1 (Closed) Violation 50-458/9612-01, E 96-175-01014 (92901): drywell pressure instrument valve found closed. This item addressed an instance where instrument and control technicians found a drywell pressure transmitter isolation valve closed when it should have been open. This rendered the drywell pressure transmitter instrument channel inoperable in Mode 1 when Technical Specifications required the instrument channel to be operable. The licensee issued Licensee Event Report 50-458/96-008 and stated that the cause of this event was indeterminate, based on review of maintenance, testing and operational history, and interviews with plant personnel. The transmitter was restored and declared operable. The licensee's corrective actions included a walkdown and verification of the nuclear boiler instrumentation line-up, the high pressure core spray system instrumentation valve line-up, and other accessible safety-related instrumentation valves in accordance with system operating procedures. The inspectors considered the corrective actions acceptable.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope (61726, 62707)

The inspectors observed portions of the following maintenance and surveillance activities, except as noted below.

- MWO P597784, Change, Clean and Inspect Oil Filter on 'B' Hydraulic Power Unit
- MAI 319242, Replacement of C71-K14N Relay (Reactor Protection System (RPS) SCRAM Relay)
- STP-504-4201, "RPS/Control Rod Block Instrumentation-IRM [Intermediate Range Monitor] A Channel Calibration," Revision 11
- STP-504-4204, "RPS/Control Rod Block Instrumentation-IRM D Channel Calibration," Revision 9
- STP-309-0203, "Division III Diesel Generator Operability Test," Revision 20
- STP-606-4505, "Main Condenser Off Gas Post Treatment System Noble Gas Activity Monitor Channel Functional Test (D17-K601A), Revision 9
- STP-606-4506, "Main Condenser Off Gas Post Treatment System Noble Gas Activity Monitor Channel Functional Test (D17-K601B), Revision 9

- MAI 318400, EHC Power Supply Troubleshooting and Repairs

b. Observations and Findings

The performance of maintenance was thorough and professional in all observed activities.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Review of Material Condition During Plant Tours

a. Inspection Scope (62707)

During this inspection period, the inspectors conducted interviews and routine plant tours to evaluate plant material condition.

b. Observations and Findings

Overall plant material condition was acceptable. The following material condition problems were observed:

- **DG Control Air:** The NRC identified that the licensee inappropriately relied on operator action to install nonsafety-related pressurized air cylinders to maintain the Divisions I and II DG control air systems operable during design basis events. The operability of the control air system is vital to maintaining the DGs operable. This is a significant material condition concern. Details of this concern will be contained in NRC Inspection Report 50-458/98-13.
- **Fuel Element Failure:** On September 17, in response to increased off-gas pretreatment activity levels, the licensee identified a minor fuel element failure. While normal pretreatment effluent rates were approximately 4 mci/sec, the fuel failure resulted in rates as high as 22.5 mci/sec. The Technical Specification limit is 290 mci/sec. The off-gas system still reduced the off-gas effluent stream to less than detectable levels but, due to minor steam leaks in the turbine building, the plant effluent release rate increased from 17 μ ci/sec to 53 μ ci/sec, a small fraction of the regulatory limit. Minor dose rate increases were observed in areas of the plant that contained off-gas components. Work is not normally performed in those areas with the plant at power. The licensee planned to locate and insert control rods around the affected fuel bundle to prevent further degradation and to minimize releases. The inspectors considered the planned corrective measures acceptable.
- **Emergency Response Information System (ERIS):** The ERIS "Real Time Analysis and Display" computer was out of service for brief intervals during this reporting period and has, in recent history, been problematic. This computer provides real time information on a graphical display for selected plant

parameters during all modes of operation. The primary function is to display information during transient and accident conditions. A replacement computer was onsite, but was still being tested.

Material condition improvements included:

- **Degraded EHC Bus:** The -22 Vdc EHC bus was providing lower than specified voltage to EHC logic circuits. Plant staff replaced a faulty power supply during this inspection period.

c. Conclusions

Plant material condition was generally good with some significant deficiencies. Material condition concerns included: (1) degraded Divisions I and II DG control air systems, requiring the use of operator actions and nonsafety-related equipment to maintain the DGs operable; (2) a minor fuel element failure; and (3) an erratic ERIS real time computer. Conversely, the degraded -22 Vdc EHC power supply was repaired this inspection period.

III. Engineering

Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 Degraded - 22 Vdc EHC Bus

a. Inspection Scope (37551)

On July 30, 1998, engineers identified that the -22 Vdc EHC bus, which feeds EHC valve control logic circuits, produced -21.3 Vdc, 0.7 volts less than normal. Further, both the primary and backup power supplies were feeding the bus, an abnormal condition. On August 9, 1998, turbine control Valve 3 failed to close during testing, due to the abnormal voltage. The inspectors observed the engineering response to address this condition.

b. Observations and Findings

The -22 Vdc EHC bus is provided with two power supplies, a primary and a backup. Normally, the primary supply feeds the bus while the backup supply remained energized and aligned to pick up load in the event of a primary power supply failure. By design, bus voltage should remain very close to -22 Vdc, even with one failed power supply. A small change in voltage affects the logic circuitry and could result in the malfunction of the turbine control valves. The -21.3 Vdc reading, with loads powered from both power supplies, was abnormal.

Plant engineers were concerned with the condition because failure of the -22 Vdc bus would, absent operator action, result in MSIV closure and a plant scram. In order to preclude perturbations on the system and the plant, engineers and instrument and controls technicians duplicated the observed problem in a circuit mockup. Through further evaluation of the mockup, engineers determined that failed capacitors likely caused the malfunction. The mockup was then utilized to validate troubleshooting and repair documents. The resultant work documents provided excellent controls that minimized the potential for perturbations to the plant. On August 13, plant staff completed troubleshooting and repair of the plant power supplies without event.

c. Conclusions

Engineering and Instrument and Controls staff provided excellent support of operations, in troubleshooting and repairing a degraded -22 Vdc EHC power source. The performance of troubleshooting and preparation of work documents using a system mockup helped to preclude the risk of perturbations on the plant. The resultant work documents provided very clear direction. Maintenance was conducted in an effective and well controlled manner.

IV. Plant Support

S2 Status of Security Facilities and Equipment

S2.1 General Comments (71750)

During routine tours, the inspector observed protected area illumination levels, maintenance of the isolation zones around protective area barriers, and the status of security secondary power supply equipment. No problems were observed.

P2 Status of Emergency Preparedness Facilities, Equipment, and Resources

P2.1 General Comments (71750)

The inspectors verified that emergency preparedness facilities were properly maintained and, during off-normal hours, periodically verified that the licensee maintained at least the minimum staffing requirements specified in the River Bend Emergency Plan. No problems were identified.

R8 Miscellaneous Radiation Protection Issues (92904)

R8.1 (Closed) Violation 50-468/9614-02 (92904): failure to enter radiological controlled area (RCA) with proper dosimetry. This item involved an individual who entered an RCA without an operable direct reading dosimeter (DRD) in accordance with Radiation Section Procedure RSP-0203, "Personnel Monitoring," Revision 13. He was wearing a DRD but it was not activated. The licensee stated that the primary cause for this violation was personnel error, in that the individual became distracted while processing

into the RCA. The licensee's immediate corrective action included escorting the individual out of the RCA, performing a dose assessment to determine the individual's exposure, and counseling the individual on RCA entry requirements. The licensee subsequently installed turnstiles that require the insertion of an activated DRD prior to RCA entry. Inspectors considered the licensee's corrective measures acceptable.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on September 24, 1998. The licensee acknowledged the findings 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

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. Edington, Vice President-Operations
B. Biggs, Licensing Engineer
P. Chapman, Superintendent, Chemistry
D. Dormady, Manager, Plant Engineering
J. Fowler, Acting Director, Quality Programs
T. Hiidebrandt, Manager, Maintenance
H. Hutchens, Superintendent, Plant Security
R. King, Director, Nuclear Safety and Regulatory Affairs
D. Lorfing, Supervisor, Licensing
D. Mims, General Manager, Plant Operations
W. O'Malley, Manager, Operations
D. Pace, Director, Design Engineering
A. Wells, Superintendent, Radiation Control

INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering
IP 61726: Surveillance Observations
IP 62707: Maintenance Observations
IP 71707: Plant Operations
IP 71750: Plant Support
IP 92901: Followup, Operations
IP 92904: Followup, Plant Support

ITEMS CLOSED

Closed

50-458/96-12-01, E 96-175-01014	VIO	Drywell pressure transmitter isolation valve found out of position
50-458/9614-02	VIO	Failure to enter radiological controlled area with proper dosimetry

LIST OF ACRONYMS USED

DG	diesel generator
DRD	direct reading dosimeter
EHC	electrohydraulic control
ERIS	emergency response information system
IRM	intermediate range monitor
MAI	maintenance action item
mci/sec	millicuries per second
MSIV	main steam isolation valve
MWO	maintenance work order
NRC	U.S. Nuclear Regulatory Commission
psig	pounds per square inch
RCA	radiological controlled area
RPS	reactor protection system
STP	surveillance test procedure
Vdc	volts, direct current
VIO	violation
μ ci/sec	microcuries per second