Entergy

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William F. Maguire
Site Vice President

RBG-47871

June 7, 2018

Attn: Document Control Desk
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738

Subject: Licensee Event Report 50-458 / 2018-001-00

River Bend Station, Unit 1
Docket No. 50-458
License No. NPF-47

Dear Sir or Madam:

In accordance with 10 CFR 50.73, enclosed is the subject Licensee Event Report. This document contains no commitments. If you have any questions, please contact Mr. Tim Schenk at 225-381-4177.

Sincerely,

WFM/twf

Enclosure

cc: (with Enclosure)

U.S. Nuclear Regulatory Commission
Attn: Ms. Lisa M. Regner, Project Manager
09-D-14
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

U.S. Nuclear Regulatory Commission
Region IV
1600 East Lamar Blvd.
Arlington, TX 76011-4511

NRC Senior Resident Inspector
Attn: Mr. Jeff Sowa
5485 U.S. Highway 61, Suite 1
St. Francisville, LA 70775

Public Utility Commission of Texas
Attn: PUC Filing Clerk
1701 N. Congress Avenue
P. O. Box 13326
Austin, TX 78711-3326

INPO
(via ICES reporting)

RBF1-18-0108

NRC FORM 366
(04-2018)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 03/31/2020

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. Facility Name	2. Docket Number	3. Page
River Bend Station - Unit 1	05000 458	1 OF 3

4. Title

Potential Loss of Safety Function of Control Building HVAC due to Legacy Design Flaw

5. Event Date			6. LER Number			7. Report Date			8. Other Facilities Involved	
Month	Day	Year	Year	Sequential Number	Rev No.	Month	Day	Year	Facility Name	Docket Number
									NA	05000
04	10	2018	2018 -	001 -	00	06	07	18	Facility Name NA	Docket Number 05000

9. Operating Mode	11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☑ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
10. Power Level	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
100	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(1)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☑ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(i)
	☐ 20.2203(a)(2)(vi)	☑ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(ii)
		☐ 50.73(a)(2)(i)(C)	☐ Other (Specify in Abstract below or in NRC Form 366A)	

12. Licensee Contact for this LER

Licensee Contact	Telephone Number (Include Area Code)
Tim Schenk, Manager - Regulatory Assurance	225-381-4177

13. Complete One Line for each Component Failure Described in this Report

Cause	System	Component	Manufacturer	Reportable to ICES	Cause	System	Component	Manufacturer	Reportable to ICES
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

14. Supplemental Report Expected	15. Expected Submission Date	Month	Day	Year
☐ Yes (If yes, complete 15. Expected Submission Date) ☑ No		NA	NA	NA

Abstract (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)

On April 10, 2018, at 05:38 p.m. CDT, with the plant operating at 100 percent power, a design vulnerability in the Control Building Chill Water (HVK) logic was identified during a review of HVK Chiller and Chill Water Pump control logic. This design vulnerability could prevent the auto start of the HVK Chillers upon restoration of safety related power by emergency diesel generators following a Loss of Offsite Power. This HVK control logic vulnerability was introduced in error by a system modification in 1987. A compensatory measure was put in place to restore operability of the system until a modification can be installed to permanently remove the design vulnerability. Operators are prepared to take action in the event of a loss of Control Building Ventilation to restore the safety function in accordance with existing procedures. Therefore this condition was of minimal significance with respect to the health and safety of the public.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
River Bend Station - Unit 1	05000- 458	2018	- 001	- 00

NARRATIVE

BACKGROUND

Two 100-percent capacity Chillers provide cooling to each ventilation system sub-loop, each of which provides cooling, heating, ventilation, pressurization, and smoke removal for several areas within the building. The ventilation system comprises two independent, redundant trains of components and subsystems either of which supports the safety function of providing a controlled environment in the main control room and the environmental requirements of the safety-related electrical equipment in the building. Each control building ventilation subsystem is supported by the respective safety-related emergency diesel generator.

The HVK System provides chilled water to the cooling coils in three separate air handlers within each division. The air handling system (HVC) removes the heat generated within the main control room and electrical equipment rooms. Air handlers serve the main control room, standby switchgear rooms, battery / charger rooms, inverter rooms, and chiller rooms. Each air handler serves both trains of their assigned areas (e.g., both the Division 1 and 2 standby switchgear rooms cooling may be fully served by the air handler in either train).

REPORTED CONDITION

On April 10, 2018 at 05:38 p.m. CDT, with the plant operating at 100 percent power, Engineering determined that time delay relays [**RLY**] in the Division II Control Building Chilled Water System (HVK) (VI) could fail in a manner that challenges the design safety function of the HVK System during a Loss of Offsite Power (LOP) event. Additionally, because there is no time delay function in the Division I start logic, if a LOP occurs with Division I HVK Chillers [**CHU**] running both the Division I and Division II HVK Chilled Water Pumps [**P**] would start immediately after the LOP with no auto-start of either Division I or Division II Chillers.

The start logic of the Division II Chillers is configured such that if there is a LOP, when power is restored to the emergency buses by the diesel generators, the Division II Chilled Water Pump will restart immediately, while the Division I Chilled Water Pump is prevented from starting for 30 seconds by Division II time delay relays. This allows the Division II logic to complete, starting the Division II Chiller. Completion of the Division II Chiller start logic requires a low flow signal from the opposite Division, which would be present because the time delay relays are inhibiting start of the Division I Chilled Water Pump.

The HVK System conforms to the single failure criterion. Failure of either Division II time delay relay to provide the delay function could allow both the Division I and Division II Chilled Water Pumps to immediately restart after a LOP when power is restored to the emergency buses. With both Chilled Water Pumps running, there would be no low flow signal from either Division, and neither the Division I nor Division II Chiller would receive a start signal.

Additionally, if a LOP occurs with Division I HVK Chillers running and Division II Chillers in standby, neither Division I nor Division II chiller would auto start when power is restored to the emergency buses because the time delay function does not exist in the Division I control logic.

This event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B), 10 CFR 50.73(a)(2)(ii)(B) and 10 CFR 50.73(a)(2)(v)(D).

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
River Bend Station - Unit 1	05000- 458	2018	- 001	- 00

NARRATIVE

CAUSAL ANALYSIS

The control logic problem was traced to a latent deficiency in a 1987 modification, which rerated the chillers from 50% capacity to 100% capacity each, based on actual building loads being lower than those originally calculated. Accordingly, it would not be necessary for both chillers in either Division to be operable for the Division to be considered operable.

The modification established a level of redundancy that was not previously creditable. To do this, a redesign of the control logic for the multi-unit system was required, setting up a relationship between (pre-selected) lead and standby units, while still assuring the correct restart of the system following a LOP.

The 1987 modification inadvertently created the logic issue identified in this event.

The 1987 modification represents a legacy human performance related event. Further investigation into the 1987 modification is not possible, due to the passage of time and unavailability of personnel involved.

CORRECTIVE ACTION TO PREVENT RECURRENCE

Compensatory measures have been incorporated into procedures that direct operators to secure the Division I HVK Chilled Water Pump if both the Division I and Division II HVK Chilled Water Pumps are found running following a LOP.

An extent of condition was performed on all River Bend Station ventilation systems. No other occurrence of this design flaw was identified.

A permanent modification will be performed to eliminate the HVK control logic error and is being tracked by the Corrective Action Program.

PREVIOUS OCCURRENCE EVALUATION

No similar events have been reported by River Bend Station in the last three years.

SAFETY SIGNIFICANCE

In the unlikely event of a LOP coincident with a failure of the Division II HVK time delay relays, control room operators would have responded to the event with established procedures for a loss of Control Building Ventilation to restore the safety function. Operators would have responded similarly in the event of a LOP with Division I HVK running and Division II in standby. Thus, this event was of minimal significance to the health and safety of the public.

(NOTE: Energy Industry Identification System component function identifier and system name of each component or system referred to in the LER are annotated as (**XX**) and [XX], respectively.)