Nuclear Operating Company
South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

January 15, 2024
NOC-AE-24004005
10 CFR 50.73
STI: 35545952

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

South Texas Project
Unit 2
Docket No. STN 50-499
Licensee Event Report 2023-001-00
Two Essential Chilled Water Trains Inoperable Resulting in a Condition That Could Have Prevented Fulfillment of a Safety Function

Pursuant to reporting requirements in 10 CFR 50.73(a)(2)(v)(D), STP Nuclear Operating Company (STPNOC) hereby submits the attached South Texas Project Unit 2 Licensee Event Report 2023-001-00 for an event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

The event did not have an adverse effect on the health and safety of the public.

There are no commitments in this submittal.

If there are any questions regarding this submittal, please contact Chris Warren at (361) 972-7293 or me at (361) 972-4778.

Kimberly A. Harshaw
Executive Vice President and
Chief Nuclear Officer

Attachments: Unit 2 LER 2023-001-00, Two Essential Chilled Water Trains Inoperable Resulting in a Condition That Could Have Prevented Fulfillment of a Safety Function

cc:
Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
1600 E. Lamar Boulevard
Arlington, TX 76011-4511

Attachment

Unit 2 LER 23-001-00

Two Essential Chilled Water Trains Inoperable Resulting in a Condition That Could Have Prevented Fulfillment of a Safety Function

NRC FORM 366 (10-01-2023) | U.S. NUCLEAR REGULATORY COMMISSION | APPROVED BY OMB: NO. 3150-0104 | EXPIRES: 03/31/2024

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/)

1. Facility Name		2. Docket Number	3. Page
South Texas Unit 2	■ 050 ☐ 052	00499	1 OF 5

4. Title
Two Essential Chilled Water Trains Inoperable Resulting in a Condition That Could Have Prevented Fulfillment of a Safety Function

5. Event Date			6. LER Number			7. Report Date			8. Other Facilities Involved		
Month	Day	Year	Year	Sequential Number	Revision No.	Month	Day	Year	Facility Name	☐ 050	Docket Number
11	16	2023	2023	- 001 -	00	01	15	2024	N/A		N/A
									Facility Name: N/A	☐ 052	Docket Number: N/A

9. Operating Mode	10. Power Level
1	100

11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: *(Check all that apply)*

10 CFR Part 20	☐ 20.2203(a)(2)(vi)	**10 CFR Part 50**	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)	☐ 73.1200(a)
☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)	☐ 73.1200(b)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)	☐ 73.1200(c)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)	☐ 73.1200(d)
☐ 20.2203(a)(2)(i)	**10 CFR Part 21**	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(A)	**10 CFR Part 73**	☐ 73.1200(e)
☐ 20.2203(a)(2)(ii)	☐ 21.2(c)	☐ 50.69(g)	☐ 50.73(a)(2)(v)(B)	☐ 73.77(a)(1)	☐ 73.1200(f)
☐ 20.2203(a)(2)(iii)		☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(2)(i)	☐ 73.1200(g)
☐ 20.2203(a)(2)(iv)		☐ 50.73(a)(2)(i)(B)	☑ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(ii)	☐ 73.1200(h)
☐ 20.2203(a)(2)(v)		☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)		

☐ **OTHER** (Specify here, in abstract, or NRC 366A).

12. Licensee Contact for this LER

Licensee Contact	Phone Number (Include area code)
Chris Warren, Licensing Engineer	361-972-7293

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

Cause	System	Component	Manufacturer	Reportable to IRIS	Cause	System	Component	Manufacturer	Reportable to IRIS
B	CH	RLY	P297	Yes	N/A	N/A	N/A	N/A	N/A

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

16. Abstract (Limit to 1326 spaces, i.e., approximately 13 single-spaced typewritten lines)

On November 5, 2023, at 2200 hours, Train B Essential Chilled Water System was declared INOPERABLE for planned maintenance. On November 16, 2023, at 1541, Train C Essential Chilled Water System was declared INOPERABLE due to an unexpected material condition causing Train C Essential Chiller to trip. This condition resulted in the inoperability of two of three safety trains (B and C) required for accident mitigating function including: High Head Safety Injection (HHSI), Low Head Safety Injection (LHSI), Containment Spray, Control Room Envelope (CRE) HVAC, and Essential Chilled Water. Train A Essential Chilled Water System remained operable and in-service for the duration of the event.

The condition was determined to be reportable per 10CFR50.73(a)(2)(v)(D) as a condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

A failed relay in a Train C Essential Chilled Water System control panel experienced infant mortality, causing the Train C Essential Chiller to trip and be declared INOPERABLE. Completed corrective actions include completion of Train B Essential Chilled Water System planned maintenance on November 17, 2023, and corrective maintenance to replace a failed relay and blown fuse on the Train C Essential Chiller local control panel.

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/)

1. FACILITY NAME		2. DOCKET NUMBER	3. LER NUMBER		
	■ 050		YEAR	SEQUENTIAL NUMBER	REV NO.
South Texas Unit 2	☐ 052	05000499	23	- 001	- 00

NARRATIVE

I. Description of Reportable Event

A. Reportable Event Classification

This event is reportable pursuant to 10CFR50.73(a)(2)(v)(D) because the South Texas Project (STP) Design Basis Document (DBD) for the Essential Chilled Water System states that the system provides cooling water to the safety-related Air Handler Unit (AHU) for the Control Room Envelope (CRE) during normal and accident conditions. The CRE HVAC system DBD states that two of the three essential chilled water system trains are needed to maintain the CRE HVAC safety function requirements in the event of a Safety Injection (SI) signal. With only one of three Essential Chilled Water system trains operable from 1541 on November 16, 2023, to 1702 on November 18, 2023, the CRE HVAC system may have not been able to meet all safety function requirements in the event of an accident.

B. Plant Operating Conditions Prior to Event

Prior to the event, STP Unit 2 was at 100% power in Mode 1.

C. Status of Structures, Systems, and Components That Were Inoperable at the Start of the Event and That Contributed to the Event

The Unit 2 Essential Chilled Water system Train B and cascading systems were INOPERABLE due to planned maintenance when the Train C Essential Chilled Water system was declared INOPERABLE due to a material condition. No other structures, systems, or components were inoperable at the start of the event or contributed to the event.

D. Narrative Summary of the Event

Timeline (Note: All times are Central Standard Time)

11/05/23 (2200) - Train B Essential Chilled Water system declared INOPERABLE and Non-Functional for planned maintenance. Entered TS 3.7.14, Action A for Essential Chilled Water Train B and TS 3.7.7 Action B for Train B Control Room Envelope (CRE) HVAC, requiring restoration within seven days or apply the requirements of the Configuration Risk Management Program (CRMP), or be in at least Hot Standby within the next six hours and in Cold Shutdown within the following 30 hours.

11/16/23 (1351) - Operations secured Train C Essential Chiller 22C and placed it in standby for weekly rotation.

11/16/23 (1401) - Operations started Train B Essential Chilled Water Pump 21B

11/16/23 (1403) - Operations received an alarm for the Train B Essential Chilled Water system. It was investigated and reported high refrigerant pressure and high chiller condenser pressure of approximately 17.5 psig.

11/16/23 (1403) - Train B Essential Chiller 22B was started for post-maintenance testing (PMT)

11/16/23 (1425) - Train B Essential Chiller 22B tripped (during testing while still in a maintenance state)

11/16/23 (1451) - Operations started Train C Essential Chilled Water Pump 21C

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11/16/23 (1455) - Operations started Train C Essential Chiller 22C

11/16/23 (1541) - Train C Essential Chiller tripped and Train C Essential Chilled Water system declared INOPERABLE and non-functional. Entered TS 3.7.14, Action B for Trains B and C Essential Chilled Water systems and TS 3.7.7, Action C for Trains B and C CRE HVAC. TS 3.7.7, Action C requires restoration of two control room makeup and cleanup filtration systems to OPERABLE status within 72 hours, or be in at least Hot Standby within the next six hours and in Cold Shutdown within the following 30 hours. TS 3.7.7 allowed completion time was 11/19/23 at 1541.

11/17/23 (0241) - Operations attempted to start Train C Essential Chiller 22C in support of troubleshooting maintenance. The breaker did not close, and locally at the chiller the oil pump did not start. No relays changed state.

11/18/23 (1010) - Operations started Train B Essential Chiller 22B for maintenance testing.

11/18/23 (1345) - Operations declared Train B Essential Chiller 22B Functional, placed in standby for breaker continuity testing.

11/18/23 (1702) - Operations declared Train B Essential Chiller 22B OPERABLE, exiting TS 3.7.7, Action C and TS 3.7.14, Action B. The equipment condition at this time, with Trains A and B Essential Chilled Water systems OPERABLE, ensured that CRE HVAC system would be able to meet all safety function requirements in the event of an accident, as described in the CRE HVAC Design Basis Document.

E. Method of Discovery

The inoperability of two of three Essential Chilled Water systems was self-revealing as it was discovered when Train B Essential Chiller was INOPERABLE for planned maintenance and Train C Essential Chiller 22C tripped when placed in service.

II. Component Failures

A. Failure Mode, Mechanism, and Effects of Failed Components

The failed component in this event was Relay 3R in the Train C Essential Chiller 22C Local Control Panel (C1CHZLP625). After Train C Essential Chiller 22C tripped, an operator investigating the trip noted an acrid oder in the vicinity of the chiller. The resistance reading across the failed 3R relay coil was 4.44E+6 ohms when typical measurements for relays should be approximately 50-200 ohms. Relay 3R has the function of energizing and de-energizing to automatically start and stop the chiller compressor. Failure of this relay resulted in failure to start the chiller compressor.

B. Cause of Component Failure

The cause of the component failure was a short circuit that caused an overcurrent. This increased ohmic heating of the relay, causing a blown fuse and the relay coil to open. The relay is replaced on a 780-week frequency and this particular relay failed within 15 months (less than 60 weeks) following installation. It was determined the relay experienced infant mortality.

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NARRATIVE

C. Systems or Secondary Functions That Were Affected by Failure of Components with Multiple Functions

The Essential Chilled Water System provides chilled water to the following safety-related AHUs:
-Main supply in Electrical Auxiliary Building (EAB)
-Control room envelope in the EAB
-Electrical penetration space emergency AHUs in the EAB
-Reactor makeup water pump cubicle in the Mechanical Auxiliary Building (MAB)
-Boric acid transfer pump cubicle in the MAB
-Essential chiller area in the MAB
-Chemical and volume control system valve cubicles in the MAB
-Spent fuel pool pump cubicle in the Fuel Handling Building (FHB)
-Containment sump isolation valve cubicle in the FHB
-Engineered safety features (ESF) pump cubicles in the FHB

D. Failed Component Information

System: Chilled Water System { CH }
Component: Relay { RLY }
Manufacturer: Potter and Brumfield { P297 }
Model: { MDR131-1 }

II. Analysis of Event

A. Safety System Responses that Occurred

No safety system responses occurred because of this event.

B. Duration of Safety System Inoperability

Trains B and C of the Essential Chilled Water System were INOPERABLE from 1541 on November 16, 2023, to 1702 on November 18, 2023, when Train B Essential Chilled Water System was declared OPERABLE. This was a total of 49 hours and 21 minutes.

C. Safety Consequences and Implications

The risk evaluation estimated the incremental core damage probability (ICDP) and the incremental large early release probability (ILERP) associated with this condition using RICTCal/RAsCal software. The calculated ICDP and ILERP are above the Non-Risk Significant Threshold but below the Potentially Risk Significant Threshold. The requirements of the Risk Managed Technical Specification (RMTS) program were met and documented.

The event did not result in any offsite release of radioactivity or increase in offsite dose rates. There were no personnel injuries or damage to any other safety-related equipment associated with this event.

Therefore, there was no adverse effect on the health and safety of the public.

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IV. Cause of the Event

The cause of the loss of safety function was determined to be failed relay 3R that prevented the Essential Chiller 22C compressor from starting.

V. Corrective Actions

Completed:

1. Train B planned maintenance was completed, restoring a second train of essential chilled water to OPERABLE status, restoring the safety function.

2. Failed relay 3R and the affected downstream fuse were replaced in the Train C essential chiller local control panel (C1CHZLP625), restoring the third train of essential chilled water to OPERABLE status.

Planned:

There are no additional planned corrective actions for this event.

VI. Previous Similar Events

The review of external Operating Experience (OE) did not identify any opportunities to identify this event prior to its occurrence.

The review of internal OE identified two similar conditions:

1. (Unit 2) Condition Report 21-9693 - While checking Essential Chiller "C" for system startup in accordance with POP02-CH-0005 an abnormal buzzing sound was heard coming from the area around relay 4R inside ZLP625 control panel.
2. (Unit 1) Condition Report 23-294 - 3V111ZLP623, Essential Chiller 12A local control panel. While starting Essential Chiller 12A, it was noted that AGASTAT 1TDR light did not flash or light. The other two AGASTAT flashed and lit as expected. All other indications are normal. Tested relay under Work Authorization Number 660218 and it was found out of tolerance.