



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

June 19, 2024
NOC-AE-24004048
10 CFR 50.73
STI: 35610159
File No. G26

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

South Texas Project
Unit 1
Docket No. STN 50-498
Licensee Event Report 2023-003-01
Supplement to Two Essential Chilled Water Trains Inoperable Resulting in a Condition That
Could Have Prevented Fulfillment of a Safety Function

Reference: Letter; J. Tomlinson (STP) to Document Control Desk (NRC); "Licensee Event Report 2023-003-00 Two Essential Chilled Water Trains Inoperable Resulting in a Condition That Could Have Prevented Fulfillment of a Safety Function;" January 09, 2024; (NOC-AE-24004007)(ML24009A282)

Pursuant to reporting requirements of 10 CFR 50.73(a)(2)(v)(D), STP Nuclear Operating Company (STPNOC) hereby submits the supplemented South Texas Project (STP) Unit 1 Licensee Event Report 2023-003-01.

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

There are no commitments in this letter.

If there are any questions on this submittal, please contact Derrick Johnson at 361-972-7088 or me at 361-972-8945.

A handwritten signature in black ink, appearing to read "J. Tomlinson", is written over a horizontal line.

Jason Tomlinson
Site Vice President

Attachment: Licensee Event Report 2023-003-01, 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

Licensee Event Report 2023-003-01

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

NRC FORM 366 (04-02-2024)		U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB: NO. 3150-0104		EXPIRES: 04/30/2027				
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 15%;"> </div> <div style="width: 60%; text-align: center;"> 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/) </div> <div style="width: 25%; font-size: 0.8em;"> 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 FOIA, Library, and Information Collections Branch (T-6 A10M), U. S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by email to Infocollections.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street NW, Washington, DC 20503. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number. </div> </div>											
1. Facility Name South Texas Unit 1					<input checked="" type="checkbox"/> 050 <input type="checkbox"/> 052		2. Docket Number 00498		3. Page 1 OF 7		
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	<input type="checkbox"/> 050 <input type="checkbox"/> 052	Docket Number
11	10	2023	2023	- 003 -	01	06	19	2024	Facility Name	<input type="checkbox"/> 050 <input type="checkbox"/> 052	Docket Number
9. Operating Mode Mode 1						10. Power Level 100%					
11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)											
10 CFR Part 20		<input type="checkbox"/> 20.2203(a)(2)(vi)		10 CFR Part 50		<input type="checkbox"/> 50.73(a)(2)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(viii)(A)		<input type="checkbox"/> 73.1200(a)	
<input type="checkbox"/> 20.2201(b)		<input type="checkbox"/> 20.2203(a)(3)(i)		<input type="checkbox"/> 50.36(c)(1)(i)(A)		<input type="checkbox"/> 50.73(a)(2)(ii)(B)		<input type="checkbox"/> 50.73(a)(2)(viii)(B)		<input type="checkbox"/> 73.1200(b)	
<input type="checkbox"/> 20.2201(d)		<input type="checkbox"/> 20.2203(a)(3)(ii)		<input type="checkbox"/> 50.36(c)(1)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(iii)		<input type="checkbox"/> 50.73(a)(2)(ix)(A)		<input type="checkbox"/> 73.1200(c)	
<input type="checkbox"/> 20.2203(a)(1)		<input type="checkbox"/> 20.2203(a)(4)		<input type="checkbox"/> 50.36(c)(2)		<input type="checkbox"/> 50.73(a)(2)(iv)(A)		<input type="checkbox"/> 50.73(a)(2)(x)		<input type="checkbox"/> 73.1200(d)	
<input type="checkbox"/> 20.2203(a)(2)(i)		10 CFR Part 21		<input type="checkbox"/> 50.46(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(v)(A)		10 CFR Part 73		<input type="checkbox"/> 73.1200(e)	
<input type="checkbox"/> 20.2203(a)(2)(ii)		<input type="checkbox"/> 21.2(c)		<input type="checkbox"/> 50.69(g)		<input type="checkbox"/> 50.73(a)(2)(v)(B)		<input type="checkbox"/> 73.77(a)(1)		<input type="checkbox"/> 73.1200(f)	
<input type="checkbox"/> 20.2203(a)(2)(iii)				<input type="checkbox"/> 50.73(a)(2)(i)(A)		<input type="checkbox"/> 50.73(a)(2)(v)(C)		<input type="checkbox"/> 73.77(a)(2)(i)		<input type="checkbox"/> 73.1200(g)	
<input type="checkbox"/> 20.2203(a)(2)(iv)				<input type="checkbox"/> 50.73(a)(2)(i)(B)		<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)		<input type="checkbox"/> 73.77(a)(2)(ii)		<input type="checkbox"/> 73.1200(h)	
<input type="checkbox"/> 20.2203(a)(2)(v)				<input type="checkbox"/> 50.73(a)(2)(i)(C)		<input type="checkbox"/> 50.73(a)(2)(vii)					
<input type="checkbox"/> OTHER (Specify here, in abstract, or NRC 366A).											
12. Licensee Contact for this LER											
Licensee Contact Derrick Johnson / Licensing Specialist									Phone Number (Include area code) 361-972-7088		
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	KM	SEAL		Y	X	KM	TCV	B066	Y		
14. Supplemental Report Expected					15. Expected Submission Date			Month	Day	Year	
<input checked="" type="checkbox"/> No					<input type="checkbox"/> Yes (If yes, complete 15. Expected Submission Date)						
16. Abstract (Limit to 1326 spaces, i.e., approximately 13 single-spaced typewritten lines) On 11/10/23 at 0642 Essential Chilled Water 'B' train and cascading equipment was declared inoperable due to chill water temperature exceeding limits. On 11/10/23 at 1413 Essential Chilled Water 'C' train and cascading equipment was declared inoperable due to discharge pressure exceeding limits. This condition resulted in an inoperable condition on two out of the three safety trains for the accident mitigating function. This condition was determined to be reportable as required by 10 CFR 50.73(a)(2)(v)(D). Essential Chilled Water 'C' train inoperability was due to the Essential Chiller's compressor shaft mechanical seal becoming degraded to the point of losing seal integrity. Essential Chilled Water 'B' train inoperability cause was indeterminate. Corrective actions include a Performance Assessment to evaluate proper flatness check and the proper installation of the compressor main shaft mechanical seal, evaluate materials needed to clean shaft seal parts during reassembly, and revise chiller maintenance procedure to include cleaning guidance material.											

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

(See NUREG-1022, R.3 for instruction and guidance for completing this form
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1. FACILITY NAME South Texas Unit 1	<input checked="checked" type="checkbox"/> 050	2. DOCKET NUMBER 00498	3. LER NUMBER		
	<input type="checkbox"/> 052		YEAR 2023	SEQUENTIAL NUMBER 003	REV NO. 01

NARRATIVE**I. Description of Event****A. Reportable Event Classification**

This event is reportable per 50.73(a)(2)(v)(D) as a condition that could have prevented fulfillment of a safety function of structures or systems that are needed to: (D) Mitigate the consequences of an accident. This event resulted in an inoperable condition on two out of the three safety trains for the accident mitigating function including 'B' and 'C' train High Head Safety Injection, Low Head Safety Injection, Containment Spray, Control Room Envelope HVAC, and Essential Chilled Water.

B. Plant Operating Conditions Prior To Event

Prior to the event on November 10, 2023, Unit 1 was in MODE 1 at 100% power.

C. Status Of Structures, Systems, and Components That Were Inoperable At the Start of the Event and That Contributed To the Event

There were no inoperable Structures, Systems, or Components at the start of the event that contributed to the event.

D. Narrative Summary of the Event

Timeline (Note: All times Are Central Standard Time)

11/10/23 (0642) - Essential Chilled Water 'B' train and cascading equipment were declared inoperable due to chill water temperature exceeding limits.

11/10/23 (1413) - Essential Chilled Water 'C' train declared inoperable due to exceeding the maximum compressor discharge pressure.

11/10/23 (2127) - Shift Manager determined that two inoperable Essential Chilled Water Trains resulted in a condition that could have prevented the fulfillment of a safety function.

11/10/23 (2152) - Event Notification # 56848 was made to the NRC Headquarters Operations Officer (HOO).

11 /11 /23 (1330) - Essential Chilled Water 'B' train declared OPERABLE which also restored the safety trains relied on for the accident mitigation function.

E. Method of Discovery

The Chill Water exceeding temperature limits in Essential Chilled Water Train 'B' and the discharge pressure exceeding limits in Essential Chilled Water Train 'C' were self-revealing.

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NARRATIVE**II. Component Failures****A. Failure Mode, Mechanism, and Effects of Failed Component**

On 11/10/23 at 1448, Essential Chiller 12C compressor discharge pressure was reading higher than allowable due to the Essential Chiller's Compressor Shaft Mechanical Seal becoming degraded to the point of losing seal integrity. The Motor Shaft Compressor Mechanical Seal was a significant source of air in-leakage due to being in a vacuum condition whether the chiller is running or idle. The degradation to failure created a gap which allowed air in-leakage to occur and consequently raised compressor discharge pressure above the allowable limit.

The Essential Chiller 12B temperature control loop controls the Leaving Water Temperature. On 11/10/23 at 0045, at least one component in the Essential Chiller 12B temperature control loop failed to operate properly which resulted in the inability to maintain proper refrigerant pressure and flow to maintain the chilled water discharge/outlet temperature at the pre-established setting.

B. Cause of Component or System Failure**Essential Chilled Water Train 'C'**

The source of the air in-leakage that resulted in the high compressor discharge pressure was determined to be the compressor main shaft seal. After it was replaced, compressor discharge pressure was observed to be normal during post-maintenance testing. The shaft seal ring had recently been replaced on 7/19/2023, under Preventative Maintenance Work Order 659148. The PM activity is on a five-year replacement schedule. The shaft seal had been in service for four months when it was identified as the path of air in-leakage. Per PM Work Order 659148, the new seal face passed a required optical flatness check prior to installation. The shaft seal ring was replaced on 11/10/2023. The Maintenance technician that removed the seal under the Corrective Maintenance Work Order reported the as-found conditions during seal removal as no apparent evidence of installation issues or noticeable seal defects.

Post-event initial inspections of the removed shaft seal:

- The removed shaft seal ring did not pass the optical flatness when it was checked post-event several days later.
 - An Engineering inspection revealed a gouge on the spring seating location upon inspection by Engineering. It is indeterminate when the gouge occurred.
 - An Engineering inspection also revealed wear cracks and chipping on the leading edge of the shaft seal ring upon inspection by Engineering.
 - Enhanced visual inspection by a Materials Engineer found no indications of material defects.
 - The Pump Engineer reviewed the vibration data on Chiller 12C from July 22nd and November 19th and found no trends of concern.
 - The chiller Engineer identified purge counts increasing following July 19, 2023.
- The compressor shaft seal was sent to an off-site lab for failure analysis. The lab analyst report had concluded that the carbon stationary ring and iron rotating ring both exhibited circumferential scoring and wear on the sealing surface caused by silica contamination. The advanced wear and scoring on the sealing surfaces lead to elevated seal leakage.

Essential Chilled Water Train 'B'

Neither the Hot Gas Bypass Motor Operated Valve Motor nor the Temperature Current Module were bench tested; therefore, cause determination is indeterminate.



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NARRATIVE

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

Failure of the components in Essential Chilled Water 'B' and 'C' trains rendered the 'B' and 'C' trains of the following systems inoperable: High Head Safety Injection, Low Head Safety Injection, Containment Spray, Control Room Envelope HVAC, and Essential Chill Water.

D. Failed Component Information

System: Chilled Water System {KM}
Component: Compressor Shaft Seal {SEAL}
Manufacturer: Pure Carbon Company
Model:

System: Chilled Water System {KM}
Component: Temperature Current Limit Control {}
Manufacture: Borg-Warner {B350}
Model: UCI-TCM-1A

System: Chilled Water System {KM}
Component: Hot Gas Bypass Valve Motor Operated Valve{MO}
Manufacture: Barber-Colman{B066}
Model: MP-487-119-0-1

III. Analysis of Event

A. Safety System Responses that Occurred

No safety system responses occurred because of this event.

B. Duration of Safety System Inoperability

Essential Chilled Water Trains 'B' and 'C' were INOPERABLE from 1413, November 10, 2023, to 1330, November 11, 2023, when Essential Chilled Water Train 'B' was declared OPERABLE. This was a total of 23 hours and 17 minutes.

C. Safety Consequences and Implications

The accumulated incremental risk during the time period with two trains inoperable for Incremental Core Damage Probability (ICDP) and Incremental Large Early Release Probability (ILERP) are within normal work controls, but compensatory Risk Management Actions were implemented per the requirements of the STP Configuration Risk Management Program to offset the risk impacts of the configuration.

The event did not result in any offsite release of radioactivity or increase of off-site dose rates, and 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.

(04-02-2024)

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NARRATIVE**IV. Cause of Event****Essential Chilled Water Train 'C'**

The lab report concluded that the primary mode of failure resulted from silica contamination. There are several methods in which this contamination could have occurred and the report stated Manufacturing, Handling on-site, or from the system.

1. Silica in oil system: Chemistry does not sample for silica in the essential chiller oil. System contamination is considered highly unlikely.

2. Handling on-site: Maintenance Personnel are instructed via the work instructions on how to handle the seals with latex gloves and avoid touching the seal face. Chemistry test the latex gloves for silica and has consistently had a negative reading. The glass used for the light band test is also cleaned prior to every use to ensure contaminants in the air are not being placed between the glass and the seal face.

3. Shipping: These boxes are not shipped with a silica based desiccant which would rule that out as a potential source. The seals are 100% receipt inspected by QC and again by the Chiller Technicians in the Maintenance Shop. The seal is carried to the job site inside its box and still wrapped in its original packaging, which could rule out environmental factors while traversing from the shop to the job site.

4. Manufacturing: STP cannot assess if manufacturing processes were a factor.

5. There was no need to perform any grinding, sanding, or lapping of the shaft area during replacement. Part of the shaft for installation of the seal green "Scotch Brite #96" is used to clean the area. The Safety Data Sheet for Scotch Brite, lists silica quartz in its make-up. Chemistry performed validation testing, while the concentration of silica was low, it was present. While Maintenance Personnel are extremely diligent with cleaning the area after the use of Scotch Brite to include cleaning the shaft area with alcohol and using chiller oil in a spray bottle to clean the cavity, this is the most probable source of contamination. A condition report action was written to evaluate the need for using an abrasive in area preparation. If it is determined that this is a necessary step, then Maintenance will look to use alternatives to Scotch Brite to mitigate the introduction of any contaminants that could result in premature failure of a seal.

Essential Chilled Water Train 'B'

The cause of Essential Chilled Water 'B' train inoperability was indeterminate.

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1. FACILITY NAME

South Texas Unit 1



050



052

2. DOCKET NUMBER

00498

3. LER NUMBER

YEAR

2023

SEQUENTIAL
NUMBER

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NO.

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NARRATIVE**V. Corrective Actions****Essential Chilled Water Train 'C'**

CR 23-10352-2 - On 11/20/23, chiller technicians replaced the Compressor Shaft Mechanical Seal and the Lube Oil Pump Mechanical Seal. Post Maintenance testing was successful.

CR 23-10352-14 - Performance Assessment on proper flatness check and proper installation of the compressor main shaft mechanical Seal.

CR 23-10352-13 - The compressor shaft seal was sent to an off-site vendor for failure analysis.

CR 23-10352-17 - Add monitoring points with alert and alarm setpoints for MOC.

CR 23-10352-19 - Evaluate materials needed to clean shaft seal parts during reassembly.

CR 23-10352-20 - Revise Chiller Maintenance procedure to include cleaning material guidance.

Essential Chilled Water Train 'B'

CR 23-10345-1 - On 11/11/13, Chiller technicians replaced the Hot Gas Bypass Valve MOV.

CR 23-6338-10 - On 11 /11 /13, Chiller technicians replaced the existing Temperature and Current Limiter Controller.

VI. Previous Similar Events

There have been no previous similar events with Essential Chiller Compressor Shaft Mechanical Seal leakage and chill water exceeding the maximum temperature operability limit simultaneously. However, the site has been experiencing recent issues with essential chillers exceeding the maximum temperature operability limit.