Nebraska Public Power District

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10 CFR 50.73

NLS2023042
June 29, 2023

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

Subject: Licensee Event Report No. 2022-002-01
Cooper Nuclear Station, Docket No. 50-298, DPR-46

Dear Sir or Madam:

The purpose of this correspondence is to forward Licensee Event Report (LER) 2022-002-01.

The supplement updates the causal factors, as well as corrective actions, of the event.

This letter does not contain regulatory commitments.

Sincerely,

for K. Dia

Billy L. Chapin

Khalil Dia
Site Vice President

/jo

Attachment: Licensee Event Report 2022-002-01

cc: Regional Administrator w/attachment
USNRC - Region IV

Cooper Project Manager w/attachment
USNRC - NRR Plant Licensing Branch IV

Senior Resident Inspector w/attachment
USNRC - CNS

SRAB Administrator w/attachment

NPG Distribution w/attachment

INPO Records Center w/attachment
via IRIS entry

SORC Chairman w/attachment

CNS Records w/attachment

NRC FORM 366 (08-2020) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

(See Page 3 for required number of digits/characters for each block)

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

1. Facility Name	2. Docket Number	3. Page
Cooper Nuclear Station	05000 298	1 OF 4

4. Title

Manual Core Spray Injection to Restore Skimmer Surge Tank Level

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
10	22	2022	2022	- 002	-01	06	29	2023	Facility Name	05000 / Docket Number 05000

9. Operating Mode	10. Power Level
5	000

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)	☐ 50.36(c)(2)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(A)	**10 CFR Part 73**
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.69(g)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(4)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(i)	**10 CFR Part 21**	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(1)(i)
☐ 20.2203(a)(2)(ii)	☐ 21.2(c)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(i)
☐ 20.2203(a)(2)(iii)	**10 CFR Part 50**	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)	☐ 73.77(a)(2)(ii)
☐ 20.2203(a)(2)(iv)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)	
☐ 20.2203(a)(2)(v)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)	

☐ **Other** (Specify here, in Abstract, or in NRC 366A).

12. Licensee Contact for this LER

Licensee Contact	Phone Number (Include Area Code)
Linda Dewhirst, Regulatory Affairs and Compliance Manager	(402) 825-5416

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
E	DA	V	M430	Y					

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

16. Abstract (Limit to 1560 spaces, i.e., approximately 15 single-spaced typewritten lines)

On October 22, 2022, during Refueling Outage 32, Operations personnel performed a pre-coat of the Fuel Pool Cooling (FPC) system B filter demineralizer. Following pre-coat, the FPC skimmer surge tank level began to rapidly decrease. This was due to valve FPC-AOV-AO18B failing to fully close, thus providing a drain path to the Radwaste Waste Precoat tank. An unsuccessful attempt was made to isolate the drain path by closing another FPC valve. Operations personnel then initiated Core Spray subsystem A injection to restore FPC skimmer surge tank level to normal. Concurrently, valve team personnel manually closed FPC-AOV-AO18B which isolated the drain path. After the event, the valve positioner for FPC-AOV-AO18B was replaced.

The direct cause of the event was the failure of FPC-AOV-AO18B to close following pre-coat operations of the FPC system B filter demineralizer. In addition, operating experience was not adequately incorporated to ensure system reliability, and risk was inadequately managed. Corrective actions include maintenance plans for periodic valve positioner replacement and procedure revisions to ensure appropriate risk mitigation strategies are in place.

There was no impact on nuclear safety, plant reliability, radiological safety, or industrial safety.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Cooper Nuclear Station	**05000-** 298	2022	- 002	- 01

NARRATIVE

PLANT STATUS

Cooper Nuclear Station was in Mode 5, Refueling, at 0 percent power at the time of the event on October 22, 2022. Residual Heat Removal (RHR) Shutdown Cooling (SDC) was not in service at the time of the event. Decay heat removal was provided by Fuel Pool Cooling (FPC) and Alternate Decay Heat Removal (ADHR) subsystem.

BACKGROUND

The FPC and Demineralizer system [EIIS: DA] removes decay heat released from the spent fuel assemblies and maintains a specified Spent Fuel Pool (SFP) water temperature, purity, water clarity, and water level. The system consists of the original FPC and Demineralizer system and additional cooling capability from the ADHR subsystem.

The original FPC system consists of two parallel trains each consisting of a circulating pump [EIIS: P], heat exchanger [EIIS: HX], filter-demineralizer, and the required piping, valves [EIIS: V], and instrumentation. The pumps circulate the pool water, taking suction from the skimmer surge tanks [EIIS: TK]. The ADHR subsystem includes a third FPC heat exchanger and two additional FPC pumps in parallel with the two existing parallel FPC trains. During refueling operations, the FPC system suction and discharge paths can be aligned to the reactor cavity.

In the event of low FPC skimmer surge tank level, the FPC pumps automatically trip which would result in a loss of decay heat removal from the SFP and Reactor Pressure Vessel cavity [EIIS: RPV].

Emergency Core Cooling System (ECCS) [EIIS: BJ, BM, BO] instrumentation initiates appropriate responses from the systems to ensure that the fuel is adequately cooled in the event of a design basis accident or transient. The ECCS is designed, in conjunction with Primary Containment [EIIS: NH] and Secondary Containment, to limit the release of radioactive materials to the environment following a Loss of Coolant Accident. On receipt of an initiation signal, ECCS pumps automatically start. Simultaneously, the system aligns, and the pumps inject water taken either from the Emergency Condensate [EIIS: SD] Storage Tanks or suppression pool into the Reactor Coolant System (RCS), and RCS pressure is overcome by the discharge pressure of the ECCS pumps.

The ECCS instrumentation actuates Core Spray (CS) [EIIS: BM]. The CS system may be initiated by either automatic or manual means and is composed of two independent subsystems. Each subsystem consists of motor-driven pumps, a spray sparger above the core, and piping and valves to transfer water from the suppression pool to the sparger. The CS system is designed to provide cooling to the reactor core when reactor pressure is low.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Cooper Nuclear Station	05000- 298	2022	- 002	- 01

EVENT DESCRIPTION

On October 22, 2022, during Refueling Outage 32, Operations personnel performed a pre-coat of the FPC system B filter demineralizer [EIIS: FDM] during restoration from Diesel Generator 2 (DG) [EIIS: EK] sequential load testing. Restoration of the FPC B filter demineralizer would allow placing a third FPC pump in service to provide additional margin for SFP decay heat removal, and to keep temperatures as low as possible for personnel working on the refuel floor. Station procedure requires that a FPC demineralizer be in service when three FPC pumps are in service.

At approximately 12:49, following B filter demineralizer pre-coat activities, the FPC skimmer surge tank level began to rapidly decrease. This was due to valve FPC-AOV-AO18B, filter demineralizer waste precoat return valve, failing to fully close, as required, thus providing a drain path from the FPC skimmer surge tank to the Radwaste Waste Precoat tank. An unsuccessful attempt was made to isolate the drain path by closing another FPC valve. Normal operating injection sources were not able to recover skimmer surge tank level.

At 12:56, with the FPC skimmer surge tank level continuing to lower, Operations personnel manually initiated CS subsystem A injection into the RPV to prevent tripping of the FPC pumps on low surge tank level. CS flow was established at approximately 3700 gallons per minute to restore FPC skimmer surge tank level and CS injection flow was secured at 12:59. Skimmer surge tank level had decreased to approximately 14.6% of tank inventory before normal level was restored. Concurrently, valve team personnel manually closed FPC-AOV-AO18B, which successfully isolated the drain path.

At the time of this event, decay heat removal was provided by FPC because RHR SDC was not in service following performance of DG-2 sequential load testing. Operations made the determination to not return SDC to service after completion of the DG sequential load test as a SDC maintenance window was scheduled immediately following recovery from the DG sequential load test.

After the event, the valve positioner for FPC-AOV-AO18B was replaced.

BASIS FOR REPORT

This event is reportable under 10 CFR 50.73(a)(2)(iv)(A) – Any event or condition that resulted in manual or automatic actuation of any of the systems listed in 10 CFR 50.73(a)(2)(iv)(B); specifically, (a)(2)(iv)(B)(4) – ECCS for boiling water reactors including high-pressure and low-pressure core spray systems, high-pressure coolant injection system, and low-pressure injection function of the residual heat removal system.

This event was also reported under Event Notification 56174 on October 22, 2022.

SAFETY SIGNIFICANCE

With the RPV water level flooded to the refuel floor, and fuel pool gates removed, water level would not have lowered below the FPC surge tank skimmers. Decay heat from the SFP and RPV was maintained throughout the skimmer surge tank level transient, and the A and D FPC pumps remained in service. Following the CS-A injection, FPC and Reactor Water Clean Up [EIIS: CE] filter demineralizers restored reactor vessel water clarity.

There was no impact on nuclear safety, plant reliability, radiological safety, or industrial safety.

CAUSE

The direct cause of this event was the failure of FPC-AOV-AO18B to close following pre-coat operations of the FPC system B filter demineralizer.

The causal factors were 1) CNS did not adequately consider internal and external operating experience with respect to ensuring that the FPC system is maintained and operated with the appropriate degree of reliability, and 2) CNS failed to establish adequate strategies and utilize conservative decision making to manage plant risk during refueling outage periods in which FPC was the primary means of decay heat removal.

CORRECTIVE ACTIONS

The valve positioner was replaced, and the top of the reactor core was inspected to verify no material from CS injection was present.

Maintenance Plans for periodic replacement of valve positioners FPC-CVP-AO18A and FPC-CVP-AO18B were created.

Risk elimination actions for single component failures introduced during different plant configurations, with respect to the FPC system, were evaluated. Results of this evaluation will be incorporated into appropriate plant procedures.

PREVIOUS EVENTS

There have been no Licensee Event Reports submitted within the past 10 years regarding a valid actuation of ECCS systems.