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March 12, 2002

United States Nuclear Regulatory Commission
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Washington, DC 20555

Operating Licenses DPR-74
Docket Nos. 50-316

Document Control Manager:

In accordance with the criteria established by 10 CFR 50.73 entitled Licensee Event Report (LER) System, the following report is being submitted:

LER 316/2001-003-01: "Degraded ESW Flow Renders Both Unit 2 Emergency Diesel Generators Inoperable"

The revision to this LER is being made to correct the previous reporting criteria. A vertical line in the right hand margin annotates the revised sections of the LER.

No new commitments are identified in this submittal.

Should you have any questions regarding this correspondence, please contact Mr. Gordon P. Arent , Manager, Regulatory Affairs, at 616/697-5553.

Sincerely,

Joseph E. Pollock
Site Vice President

RM/pae

Attachment

IE22

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NRC Form 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Donald C. Cook Nuclear Plant Unit 2	05000-316	1 of 5

4. TITLE

Degraded ESW Flow Renders Both Unit 2 Emergency Diesel Generators Inoperable

5. EVENT DATE			6. LER NUMBER				7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER		REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										Unit 1	05000-315
08	29	2001	2001	--	003	-- 01	03	12	2002	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)							
10. POWER LEVEL	100		20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
			20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
			20.2203(a)(1)		50.36(c)(1)(i)(A)		50.73(a)(2)(iv)(A)		73.71(a)(4)
			20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
			20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		
			20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
			20.2203(a)(2)(v)		50.73(a)(2)(i)(B)	X	50.73(a)(2)(vii)		
			20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
			20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Richard A. Meister, Regulatory Compliance	616-465-5901 x1707

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	BI	STR	N/A	N/A					

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
	YES (If Yes, complete EXPECTED SUBMISSION DATE).	X	NO				

16. Abstract (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

This supplemental LER was issued to identify the correct the reporting requirement for submittal of the LER. No other changes were made. On August 29, 2001, Donald C. Cook Nuclear Plant (CNP) Unit 1 was in MODE 5 for a planned maintenance outage and Unit 2 was in MODE 1. Unit 2 Operations personnel were performing a routine surveillance test of the Essential Service Water (ESW) system in accordance with approved plant procedures. At approximately 2255 hours, Unit 2 Operations personnel noted low ESW flow to both of the Unit 2 Emergency Diesel Generator (EDG) heat exchangers. The Unit 1 ESW flows were also checked and it was determined that ESW flow to both Unit 1 EDG heat exchangers was low. All four EDGs were declared inoperable. Unit 2 entered Technical Specification (TS) 3.0.3, and Unit 1 entered TS 3.8.1.2. After flushing the ESW side of the associated heat exchangers both Unit 2 EDGs were declared OPERABLE at 2350 hours. Based on conservative decision making, Unit 2 was shut down on August 30, 2001, to facilitate the identification and correction of the causes for the low ESW flow conditions. The U.S. Nuclear Regulatory Commission was notified of the decision to commence a Unit 2 shutdown. A common mode failure of the EDGs was reported in accordance with 10 CFR 50.72(b)(3)(v), "Non-Emergency Events – 8-Hour Reports." The cause of the low flow conditions was pre-existing material failure of the Unit 1 East ESW strainer basket, which created a bypass flow path around the strainer. The bypass flow path allowed large debris to enter the ESW system. The cause of the EDG common mode failure was the station design and operational practices that allowed aligning the ESW supplies to each EDG from both ESW headers on the associated unit. Corrective actions included inspection and replacement of all baskets, revision of the applicable maintenance procedures which detail installation requirements, and modification to the design and operating procedures to maintain the alternate ESW valves to the EDGs normally shut during normal and accident conditions.

1. FACILITY NAME	2. DOCKET NUMBER	6. LER NUMBER					3. PAGE
		YEAR	SEQUENTIAL NUMBER			REVISION NUMBER	
Donald C. Cook Nuclear Plant Unit 2	05000-316	2001	--	003	--	01	2 of 5

17. TEXT *(If more space is required, use additional copies of NRC Form (366A)*

Conditions Prior to Event

Unit 1 was in MODE 5

Unit 2 was in MODE 1 at 100% power

Description of Event

On August 29, 2001, Donald C. Cook Nuclear Plant (CNP) Unit 1 was in MODE 5 for a planned maintenance outage and Unit 2 was in MODE 1. Unit 2 Operations personnel were performing a routine surveillance test of the Essential Service Water (ESW) system in accordance with approved plant procedures. At approximately 2255 hours, Unit 2 Operations personnel noted low ESW flow to both Unit 2 Emergency Diesel Generator (EDG) heat exchangers. Unit 1 ESW flows were also checked and it was determined that ESW flow to both Unit 1 EDG heat exchangers was low. All four EDGs were declared inoperable. Unit 2 entered Technical Specification (TS) 3.0.3 (subsequently, it was identified that the entry into TS 3.0.3 was incorrect and that TS 3.8.1.1 should have been entered) and Unit 1 entered TS 3.8.1.2. After flushing the ESW side of the associated heat exchangers, both Unit 2 EDGs were declared OPERABLE at 2350 hours. The Unit 1 EDGs were declared OPERABLE on August 30, 2001 at 0345 hours, following valve manipulations and flushing. In addition, on August 30, 2001 at 0215 hours, the Unit 2 West Component Cooling Water (CCW) heat exchanger was noted to have low flow and the Unit 2 West CCW train was declared inoperable. The Unit 1 East CCW heat exchanger flow was low, but was not the CCW heat exchanger aligned to Residual Heat Removal (RHR); therefore, there was no impact to core cooling. Unit 2 was shut down on August 30, 2001, to facilitate the identification and correction of the ESW flow conditions. The U.S. Nuclear Regulatory Commission was notified of the decision to commence a Unit 2 shutdown and the common mode failure of both Unit 2 trains of emergency power supply (EDGs), in accordance with 10 CFR 50.72(b)(3)(v), "Non-Emergency Events – 8-Hour Reports."

This supplemental LER was issued to identify the correct the reporting requirement for submittal of the LER. Revision 0 of this LER was submitted under 10 CFR 50.73(a)(2)(v)(A) and 10 CFR 50.73(a)(2)(v)(B). Revision 1 of this LER is being submitted under 10 CFR 50.73(a)(2)(vii). No other changes were made.

Cause of Event

The cause of the low flow conditions in the heat exchangers was a pre-existing failure of the Unit 1 East ESW strainer basket which created a bypass flow path around the strainer basket. The bypass flow path allowed large debris (greater than the design 1/8" mesh size) to enter the ESW system.

The cause of the ESW strainer basket failure was inadequate installation and fabrication practices. Specifically, a strainer basket with a pre-existing weld flaw was installed within the strainer housing. Further, inadequate installation instructions allowed the incorrect seating and alignment of the strainer basket within the strainer housing and the exertion of excessive compressive force on the basket. The compressive force bent the support bracket and caused the weld to fail. The displaced bracket allowed the basket to move under hydraulic forces and allowed a bypass to occur.

The cause of the EDG common mode failure was the station design (the normal and alternate EDG ESW supply valves receive an auto open signal on a diesel start) coupled with operational practices that allowed alternate ESW and normal ESW valves to be open at the same time to both EDGs. The opposite unit was affected due to the design use of the unit crossties, which connect the Unit 1 East and Unit 2 West ESW headers.

1. FACILITY NAME	2. DOCKET NUMBER	6. LER NUMBER					3. PAGE
		YEAR	SEQUENTIAL NUMBER			REVISION NUMBER	
Donald C. Cook Nuclear Plant Unit 2	05000-316	2001	--	003	--	01	3 of 5

17. TEXT *(If more space is required, use additional copies of NRC Form (366A)*

Analysis of Event

On August 29, 2001, with Unit 1 in MODE 5 and Unit 2 in MODE 1, ESW flow to multiple components in both units was found below minimum design values. As a result of low ESW flow, the Unit 2 West CCW heat exchanger and all four EDGs (two per unit) were declared inoperable. The Unit 1 East CCW heat exchanger, Unit 1 East Motor Driven Auxiliary Feedwater Pump (MDAFP) room cooler, and the West ESW supply to the Unit 2 Turbine Driven Auxiliary Feedwater Pump (TDAFP) room cooler had reduced ESW flows, but, due to plant conditions or the current operating mode, these did not cause inoperability of the equipment or require the declaration of inoperability.

During normal plant operations, ESW supplies continuous cooling water flow to the CCW heat exchangers, Auxiliary Feedwater Pump room coolers, and the Control Room Ventilation systems. The ESW system also supplies cooling to the Containment Spray system heat exchangers, the EDG heat exchangers when the EDGs are operating, and serves as a back-up source of water for the Auxiliary Feedwater system. The ESW system was designed to provide defense in depth, by allowing the Unit 1 East and Unit 2 West ESW trains and the Unit 1 West and Unit 2 East ESW trains to be crosstied (See Figure on Page 5). Additionally, each ESW train may be aligned to supply ESW to both EDGs on the associated unit (the normal supply for the one EDG and the alternate supply for the other). CNP routinely operated with the ESW supply header normal and alternate supply valves to the EDG heat exchangers in the open position. During a diesel start, both normal and alternate ESW supply valves also receive an auto-open signal. The ESW system includes a strainer system that is designed to remove debris prior to the cooling water entering the system piping. The ESW strainer system is a duplex-type system with one basket in service at all times.

Prior to the event, the Unit 1 West ESW pump was in service supporting Unit 1 shutdown cooling and the Unit 1 East ESW pump was in service supporting normal cooling loads in both units. Additionally, Unit 2 was in MODE 1 with the Unit 2 West ESW pump in standby and the Unit 2 East ESW pump in service to facilitate routine surveillance testing.

As part of the Unit 1 shutdown, the Unit 1 Circulating Water (CW) pumps were being secured. This action caused a change in flow patterns within the CW screenhouse, resulting in previously deposited sand/silt and debris being swept up and carried in the direction of the ESW pumps. The suspended debris entered the ESW system through a pre-existing failure of the Unit 1 East strainer basket. The strainer had a 3-inch bypass around the basket, which was created by manufacturing deficiencies, deficient installation practices, and hydraulic forces which displaced the basket. The debris was large enough and of sufficient quantity to partially obstruct the ESW flow through the heat exchangers for all four EDGs, as well as the Unit 1 East and the Unit 2 West CCW heat exchangers, the Unit 1 East MDAFP room cooler, and the West supply to the Unit 2 TDAFP room cooler. The obstructions resulted in reduced flow through the affected heat exchangers and in some cases, elevated temperatures within the associated components/areas. The total amount of suspended sand/silt and debris was within the design capabilities of the ESW strainer system and would not have resulted in significant flow anomalies if the Unit 1 East strainer was properly functioning. However, with the Unit 1 East ESW Pump East strainer basket misaligned, a significant quantity of debris was able to bypass the strainer system.

CNP Operations personnel restored flow to the EDGs by cycling the motor operated ESW supply valves to provide for local flushing. Subsequently, the flushing activities resulted in improved ESW flow through the CCW heat exchangers.

On August 30, 2001, CNP commenced a shutdown of Unit 2 to facilitate the identification and resolution of the ESW flow anomalies.

1. FACILITY NAME	2. DOCKET NUMBER	6. LER NUMBER					3. PAGE
		YEAR	SEQUENTIAL NUMBER			REVISION NUMBER	
Donald C. Cook Nuclear Plant Unit 2	05000-316	2001	--	003	--	01	4 of 5

17. TEXT *(If more space is required, use additional copies of NRC Form (366A)*

CNP's investigation determined that the Unit 1 East ESW Pump East strainer basket was mechanically damaged. This damage caused the opening between the strainer basket and strainer housing to enlarge. The enlarged opening between the strainer basket and strainer housing allowed larger-than-designed for pieces of debris to pass through the strainer. This material was deposited in a number of heat exchangers in both units.

In April 1989, the Unit 1 East ESW strainer baskets were removed from the strainer housing for inspection. New baskets were installed in the strainer. The basket installation work order did not provide adequate fit-up instructions. The inadequate work instructions resulted in an incorrect height adjustment on the basket that exerted excessive force on the basket, resulting in failure of a weld. The weld that failed was on the bottom of a support bracket and was made between the bracket and the basket mesh ligaments instead of the basket structural member. The failure mechanism of the weld was a low speed fracture, which supports compression instead of impact failure. Subsequent system hydraulic events resulted in additional damage and basket displacement. This resulted in an opening large enough to allow excessive amounts of silt/sand and debris to enter the ESW system. This particular basket (as part of the duplex assembly) was in service at the time of the event.

Safety Significance:

Due to the limited time the EDGs were inoperable on Unit 2; and the minimal operator actions required to return the Unit 2 EDGs to available status, CNP has determined that the safety significance of this event is low. Within a short period of time following identification of the low flow condition, the cycling of MOVs from the control room complex restored the Unit 2 EDGs to an available state. The Unit 2 EDGs would have been able to complete their design functions for the existing plant conditions.

Unit 1 was in MODE 5 at the time and although the EDGs were not available for a short period of time, the safety significance was not impacted. After cycling the ESW MOVs to the EDG heat exchangers and venting them, acceptable flows were obtained to support the loads required for a shutdown plant in MODE 5 for the current heat sink conditions.

Corrective Actions

All of the Unit 1 and Unit 2 strainers were inspected and their associated baskets were replaced with baskets having stronger bracket support welds.

Non-destructive examinations of the replacement baskets were performed to ensure critical parameters and welds were satisfactory.

The ESW maintenance procedure for the ESW strainers was revised to ensure the strainers are properly assembled and installed.

Additional revisions to the ESW maintenance procedure for the ESW strainers will be implemented to ensure the proper critical parameters are monitored during subsequent disassembly and to ensure proper repair criteria are in place. This action will be completed by November 27, 2001.

Commercial grade dedication and/or receipt inspection practices will be upgraded to ensure the critical basket design attributes are inspected. This action will be completed by December 1, 2001.

1. FACILITY NAME	2. DOCKET NUMBER	6. LER NUMBER					3. PAGE
		YEAR	SEQUENTIAL NUMBER			REVISION NUMBER	
Donald C. Cook Nuclear Plant Unit 2	05000-316	2001	--	003	--	01	5 of 5

17. TEXT *(If more space is required, use additional copies of NRC Form (366A)*

Operating practices were enhanced to provide for periodic monitoring of ESW system parameters.

A preventative maintenance program for the ESW strainer baskets has been established.

Susceptible heat exchangers and piping were inspected for fouling and were cleaned and/or flushed, and system flow to the applicable components was determined to be adequate.

Operation of the EDG ESW normal and alternate supply valves has been modified. The alternate supply valve has been closed and will remain closed unless system-operating parameters deem otherwise. A temporary modification was implemented to prevent the auto-open function of the alternate ESW supply valves on an EDG start. A permanent change to the design of the plant will be performed. This eliminates the common mode failure potential associated with failure of one ESW strainer (i.e., failure of one strainer will no longer affect both EDGs on one unit). The practice of using the crosstie between units was evaluated as acceptable and within CNP licensing basis; therefore, no changes were made. This action will be completed by December 31, 2001.

Previous Similar Events

None.