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July 3, 2000

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Operating Licenses DPR-58 and DPR-74
Docket Nos. 50-315 and 50-316

Document Control Manager:

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

LER 315/2000-004-00, "Circuit Design Could Result in Failure of Emergency Diesel Generators to Load Properly after Loss of Offsite Power."

The following commitment was identified in this submittal:

- A design change has been initiated for Unit 1 to reconfigure the wiring for each of the affected pumps. The design change will be installed prior to Mode 4.

If you have any questions, please contact Mr. Robert C. Godley, Director, Regulatory Affairs, at 616/465-5901, extension 2698.

Sincerely,

M. W. Rencheck
Vice President – Nuclear Engineering

/mbd
Attachment

c: J. E. Dyer, Region III
R. C. Godley
D. Hahn
W. J. Kropp
R. P. Powers
R. Whale
NRC Resident Inspector
Records Center, INPO

IE22

NRC Form 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

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

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Donald C. Cook Nuclear Plant Unit 1	05000-315	1 of 3

TITLE (4)

Circuit Design Could Result in Failure of Emergency Diesel Generators to Load Properly after Loss of Offsite Power

EVENT DATE (5)			LER NUMBER (6)					REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER			REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
											Cook Plant Unit 2	05000-316
07	19	1999	2000	--	004	--	00	07	03	2000	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
			20.2201 (b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
POWER LEVEL (10)	00		20.2203(a)(1)		20.2203(a)(3)(i)	X	50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
M. B. Depuydt, Regulatory Affairs	616 / 465-5901, x1589

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

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

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

During the Expanded System Readiness Reviews a concern arose that a "sneak circuit" existed in the Safety Injection circuitry which could prevent proper sequencing of the Essential Service Water pumps, the Non-Essential Service Water pumps, the Component Cooling Water pumps and the Motor Driven Auxiliary Feedwater pumps onto the Emergency Diesel Generators (EDGs) during a Loss of Coolant Accident with a concurrent Loss of Offsite Power (LOCA/LOOP) event. The existence and effect of the circuit were confirmed, and on June 5, 2000, this condition was determined to be reportable in accordance with 10CFR50.73(a)(2)(ii) as a condition outside the design bases.

The apparent cause was an original design error. A design change has been installed for Unit 2 to correct the condition, and a similar design change will be installed on Unit 1 prior to Mode 4.

Multiple scenarios involving the affected pumps were evaluated as well as the procedures for coping with the effects of the sneak circuit. It was found that the procedures and operator response times were adequate to preclude damage to operating equipment necessary to mitigate the vent. Based on the evaluated scenarios and the proceduralized guidance provided for coping with the effects of the sneak circuit, the safety significance of this condition is low.

FACILITY NAME (1)	DOCKET NUMBER(2)	LER NUMBER (6)					PAGE (3)
		YEAR	SEQUENTIAL NUMBER			REVISION NUMBER	
Donald C. Cook Nuclear Plant Unit 1	05000-315	2000	--	004	--	00	2 of 3

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

Conditions Prior to Event
Unit 1 was in Mode 5, Cold Shutdown
Unit 2 was in Mode 6, Refueling

Description of Event
On July 19, 1999, a concern was raised by Expanded System Readiness Review teams that some automatic safety systems could respond inappropriately to a Loss of Coolant with a concurrent Loss of Offsite Power (LOCA/LOOP) event. The concern was that the Donald C Cook (CNP) design of the Emergency Diesel Generator (EDG) load sequencing is for coping with a LOOP concurrent with a LOCA. However, circuit breaker logic for the Essential Service Water (ESW) pumps, the Non-Essential Service Water (NESW) pumps, the Component Cooling Water (CCW) pumps and the Motor Driven Auxiliary Feedwater pumps (MDAFPs) contains a "sneak circuit" that could prevent proper EDG load sequencing if a LOOP were to follow a LOCA. A "sneak circuit" is defined as a latent path that can cause the occurrence of unwanted functions or inhibit desired functions. If this were to occur, operators would have to take manual action to ensure that the necessary pumps were running.

This concern was evaluated and it was determined that a sneak circuit did exist which could cause improper EDG load sequencing if the LOOP was not sensed on the plant's 4KV buses within 7-10 seconds following Safety Injection. Delayed sensing of 4KV bus undervoltage is possible even when postulating LOCA with concurrent LOOP due to CNP's generator trip logic. In the event of a LOCA, the generator trip is initiated from the turbine trip. In this situation, the trip logic acts to delay transfer of the 4KV buses from normal to reserve feed by approximately 30 seconds.

The specific effect of the sneak circuit on pump response to the event is primarily dependent on the associated breaker's initial control switch position and safety injection sequence (SIS) time delay setpoint. EDG time response and the actual generator trip time delay also have some influence. CCW and ESW pumps with control switches in RUN will trip on load shed and not restart. This same response will occur with a control switch in AUTO if low discharge pressure is sensed prior to loss of bus voltage. The MDAFW pumps with control switches in RUN or AUTO (normal standby switch position) will either trip and not restart or start early out of their normal sequence. The NESW pumps with control switches in RUN will also start early out of their normal sequence. These responses are due to the sneak circuit, which results in an unintended seal-in of each pump's safety injection sequence (SIS) timing relay through the associated breaker's control switch. If the SIS relay picks up before load shedding is complete, the resulting breaker close signal and subsequent load shed trip signal actuates the breaker's anti-pump lockout feature. If the SIS relay picks up after load shedding is complete the breaker is signaled to close early due to the failure of the timer to be reset by the loss of bus voltage.

Reportability of this condition was evaluated in November 1999 based on the past operability determination performed at that time, which concluded that the equipment was operable. The past operability was re-opened in late May 2000 and revised to reflect a conclusion that the equipment was operable but degraded. Reportability was re-evaluated based on the revised past operability and on June 5, 2000, it was determined that this condition was reportable in accordance with 10CFR50.73(a)(2)(ii) as a condition outside the design bases. As the issue was originally documented in July 1999, this LER is submitted outside the 30 day requirement of 10CFR50.73(a).

Cause of Event
The apparent cause of the identified condition is an original design problem as the circuitry configuration has existed since the plant was constructed.

Analysis of Event
The EDG System provides reliable AC power with sufficient capacity to operate the Engineered Safeguard Features loads and the protection systems in the event of a LOOP, to ensure safe shutdown of the reactor and to mitigate the

FACILITY NAME (1)	DOCKET NUMBER(2)	LER NUMBER (6)					PAGE (3)
		YEAR	SEQUENTIAL NUMBER			REVISION NUMBER	
Donald C. Cook Nuclear Plant Unit 1	05000-315	2000	--	004	--	00	3 of 3

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

consequences of a LOOP, LOOP with SI, or LOOP with Containment Spray. Each EDG starts automatically upon receipt of a LOOP and/or SI signal and is ready to accept loads within 10 seconds of receiving the start signal.

Assuming the 4 kV busses are powered from the main generator, when voltage on the bus is less than the setpoint for a duration of 2 seconds, an automatic transfer to the offsite power source is initiated. If that transfer is not successful because offsite power is not available, a LOOP signal is generated. Through the use of master load shed relays, the LOOP initiates load shedding and provides a permissive for closing the EDG output breakers.

Multiple scenarios were evaluated, and an evaluation was performed of the length of time the Emergency Core Cooling System pumps cooled by the affected components would be able to function. The various scenarios are discussed below, according to the affected pumps. Each of the scenarios postulates a limiting single failure, and assumes that the control switches for the ESW, CCW and NESW pumps are in their normal positions, with one pump in RUN and the other in AUTO. Both MDAFP control switches are normally in AUTO.

Any ESW or CCW pump with the control switch in RUN will "lock out" in response to SI and LOOP that involves delayed sensing of the LOOP. This, combined with a single failure of the opposite train pump to start, results in a loss of flow. The opposite train pump, with its control switch set to AUTO, will not lock out as long as discharge pressure on the running pump is maintained above setpoint prior to the loss of bus voltage. Manual action to check and start the ESW and CCW pumps is provided in accordance with Emergency Operating Procedure (EOP) 1/2 OHP 4023.E-0, "Reactor Trip or Safety Injection", in sufficient time to meet post-accident flow demands on the ESW pumps, and to preclude damage to the pumps cooled by CCW.

Any MDAFP with control switch in AUTO or RUN may "lock out" in response to the same scenario. Combined with a single failure of the Turbine Driven Auxiliary Feedwater pump to start results in a loss of Auxiliary Feedwater (AFW) to the Steam Generators (SG). Manual action to start AFW pumps is provided in accordance with 1/2 OHP 4023.E-0 in sufficient time to avoid depleting the stored inventory of SG feedwater following unit trip and to ensure that the SG heat sink requirements are met in a timely manner.

Alternately, depending on EDG starting time response and the actual response of generator trip and load sequence timers, it is possible that any MDAFP with control switch in AUTO or RUN may start out of sequence. In addition, any NESW pump with the control switch in RUN will also start out of sequence in response this scenario. Reasonable assurance exists that the EDG has adequate capacity to start these out-of-sequence loads.

The EOPs were reviewed to determine if adequate and timely instruction existed to cope with the effects of the sneak circuit. Operator response times were also evaluated against the effects of loss of cooling that results from this condition. It was found that the procedures and operator response times were adequate to preclude damage to operating equipment necessary to mitigate the event. Based on the evaluated scenarios and the proceduralized guidance provided for coping with the effects of the sneak circuit, the safety significance of this condition is low.

Corrective Actions
Design changes were initiated for both units to reconfigure the wiring for each of the affected pumps. The design change has been installed on Unit 2, and a similar design change for Unit 1 will be installed prior to Mode 4.

Previous Similar Events
None