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FACIL:50-316 Donald C. Cook Nuclear Power Plant, Unit 2, Indiana M 05000316
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SUBJECT: LER 91-007-02:on 910802,simulator scenario identified flowpath that diverted ECCS flow.Caused by steps on EOPs. EOPs revised.W/961230 ltr.

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December 30, 1996

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

91-007-02

Sincerely,

A. A. Blind
Site Vice President

/rsp

Attachment

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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), 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.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	Page 1 of 5
Donald C. Cook Nuclear Plant - Unit 2	50-316	

TITLE (4)
Simulator Scenario Identified Flowpath That Diverted ECCS Flow, Caused by Plant Design/Emergency Response Guidelines

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
08	02	91	91	-- 007 --	02	12	30	96	Cook Unit 1	50-315
									FACILITY NAME	DOCKET NUMBER

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

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Robert Gillespie, Operations Superintendent	616/465-5901, x2535

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES	X	NO				

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

This LER revision is being submitted to update the dose rate and leakage assumptions associated with this event, to revise the corrective actions, and to reflect additional information discovered as part of the Design Basis Documentation Program.

On 8-2-91, a "small break loss of coolant accident" run on the Plant simulator identified a flowpath which may be established by plant conditions and the Emergency Operating Procedures (EOPs) with the potential to divert water away from the emergency core cooling system and the containment building. The flowpath was from the Centrifugal Charging Pump discharge through an emergency leakoff valve, through the seal return line safety valve to the volume control tank (VCT), and through the VCT safety valve to the chemical and volume control system holdup tanks.

A review of the finding concluded that the amount of water which could be diverted did not significantly affect core cooling. However, the diverted water would be discharged from the containment building. Analysis of the potential dose rate from the diverted water to the whole body at the site boundary was calculated to be insignificant compared to the 10 CFR 100 accident dose limit and even within the 10 CFR 20.105 dose limits for unrestricted areas during normal operations for 1% failed fuel. Additional calculations assuming 50 % of the core iodines were present in the leaking fluid demonstrated that total LOCA doses at the site boundary and the low population zone are also within the 10 CFR 100 limits. Control room doses are within 10 CFR 50 Appendix A Criterion 19 limits. The condition identified has the potential to be a generic issue for Westinghouse-designed plants. The appropriate EOP was revised to address the simulator finding.

Conditions Prior to Occurrence

Unit one (U-1) in mode one at 100% power.

Unit two (U-2) in mode three (hot standby).

Description of Event

On 8-2-91, while the Training Department was running a small break loss of coolant accident (LOCA) on the Plant simulator, a flowpath was identified which could result in the diversion of water away from the emergency core cooling system (ECCS) (EIIS/BQ) and the containment building (EIIS/NH).

Description of systems (reference Figure 1):

Upon receipt of a safety injection signal (EIIS/JE-ACO), the safety injection system (SIS) centrifugal charging pump (CCP) (EIIS/BQ-P) suction transfers from the volume control tank (VCT) (EIIS/CB-TK) to the refueling water storage tank (RWST) (EIIS/BP-TK). The CCP emergency leakoffs (ELO) isolation valves (EIIS/BQ-LOV) close and then reopen if the Reactor Coolant System (RCS) pressure increases to greater than 2000 psi. If the accident has progressed to the point of switch over from the RWST to the containment recirculation sump (EIIS/NH-RVR), the CCP suction is realigned to the discharge of the residual heat removal (RHR) pumps (EIIS/BP-P). With the RHR pump supplying the suction to the CCP, the CCP suction pressure could be as high as 205 psig (RHR pump shutoff head pressure). Since the suction to the CCP is supplied by the discharge of the RHR pump and the CCP ELO (if opened) is returned to the suction of the pump, the pressure in the ELO line could be in excess of the 150 psig pressure setpoint for safety valve SV-54 (EIIS/CB-RV) located upstream of the seal water heat exchanger (EIIS/CB-HX). If SV-54 lifts and one CCP is in operation, then approximately 60 gpm flow would be diverted from the Emergency Core Cooling System (ECCS) into the VCT. If not terminated, the VCT would fill then lift the VCT safety valve SV-53 (EIIS/CB-RV). SV-53 is set at 75 psig and will divert flow to the chemical and volume control system (CVCS) holdup tanks (EIIS/WD-TK).

Cause of Event

The potential divert flowpath identified by the simulator scenario was caused by steps in the Emergency Operating Procedures (EOP). The EOP instructs the operators to open the CCP ELO isolation valves in preparation for switch over of the CCP discharge from the ECCS lineup through the boron injection tank (BIT) (EIIC/BQ-TK) to the normal charging discharge lineup.

The EOP steps to reset and open the CCP ELO valves in preparation for the switch over of the pump discharge to the normal lineup are based on the EOP Westinghouse Owners Group (WOG) Emergency Response Guidelines (ERG). The EOP ERG states that the ELO should be reestablished before the BIT is isolated. The affects of this ELO alignment in the above described Plant condition were not previously recognized by the Cook Nuclear Plant design and safety valve setpoints review.

Cause of Event (cont'd)

Although not discussed in the Westinghouse letter, American Electric Power Service Corporation (AEPSC) has been informed by Westinghouse that it is not possible to conclude positively that the RCS will be below 2000 psi by the time of switch over to recirculation. This may be especially true for ice condenser plants, because the lower containment spray initiation setpoint for ice condenser plants makes it more likely that containment spray will be activated resulting in more rapid depletion of the refueling water storage tank.

Analysis of Event

This condition is being reported in accordance with 10 CFR 50.73(a)(2)(ii)(B) as a condition outside of the design basis of the Cook Nuclear Plant.

Following a review of the findings of this LER, it has been concluded that the amount of water diverted from the ECCS is not considered to be significant, based on the following:

1. In order to establish the normal CCP discharge lineup per the EOP, the RCS inventory control must be manageable with the conditions described in the investigation section of this report.

2. In addition, under the conditions described, the RCS cooldown would be progressing in preparation for placing the RHRs in service for decay heat removal and cooldown.

3. Also, considering that the flowrate diverted from the sump is estimated to be about 60 gpm, the flow diverted is considered small in relation to the total volume of water expected to be in the sump (well in excess of 255,000 gallons). This volume in the containment sump is considering the stable condition expected for the ECCS and RCS at the time of the CCP discharge realignment.

Although the amount of water diverted from the ECCS is not considered to be significant from a core cooling perspective, the diverted water does represent a condition whereby coolant is being discharged from the containment building. Therefore, the diverted water is considered to be a condition outside of the Cook Nuclear Plant design basis.

An analysis of the potential dose consequences of this condition was performed. The analysis assumed a 10 gpm leak from the VCT or CVCS holdup tanks and 1% failed fuel recirculation coolant activity. With the assumed stated conditions, the whole body dose rate at the site boundary was determined to be only 0.293 mR/hr. This is insignificant compared to the 10 CFR 100 accident dose limit and is even below the 10 CFR 20.105 dose limits for unrestricted areas during normal operation. Subsequently, doses were reanalyzed for a 50% core iodine source term and a 70 gpm leak (i.e., 60 gpm miniflow and 10 gpm additional leakage), the total (i.e., LOCA containment leakage plus additional dose from fluid bypassing containment) thyroid dose was calculated for the site boundary, the low population zone and the control room. The total calculated thyroid dose to each of these areas is as follows: the total 2 hour site boundary thyroid dose is 146.1 rem, the 30 day low population zone thyroid dose is 160.2 rem, and the 30 day control room operator thyroid dose is 19.6 rem. For purposes of the control room dose, it was assumed that the operator stopped the pump within 4 hours, thereby reducing the leakage flow as described below. Each dose is within the regulatory requirements.

Analysis of Event (cont'd)

Westinghouse's review of this issue resulted in a determination that for a small break (2.3 inches) that may allow the RCS to remain at an elevated pressure, the flow out the break is expected to be sufficient to preclude repressurizing the RCS above 2,000 psig. For smaller breaks where RCS repressurizing may occur, the operator is expected to terminate safety injection before charging pump deadheading could occur. Additionally, Westinghouse reviewed a concern for adequate charging flow with the miniflow isolated. Break sizes needed to result in charging flow below that required for adequate cooling were found to be less than 3/8 inch in diameter, a break size that is not considered to be a LOCA. Therefore, Westinghouse believes that adequate cooling of the charging pumps during operation in the recirculation modes is assured under LOCA conditions with miniflow isolated.

As part of our Design Basis Documentation Program, it was identified that the procedures outlined above can be implemented, but were not single failure proof. In the event that the single failure is a miniflow valve that cannot be isolated, the EOPs have been revised to instruct the operator to turn off the pump. Flow through the idle pump of up to 5.2 gpm may still exist, therefore, instructions have been added to isolate the valve manually. The maximum dose expected to isolate the valve is 0.28 rem 24 hours after the accident occurs.

The dose associated with the 5.2 gpm leakage before the valve can be closed locally had already been accounted for in previous analysis, which includes 10 gpm of unidentified leakage outside containment in the dose estimates. The leakage through the stopped pump is accounted for as part of the unidentified leakage.

Corrective Actions

By letter dated November 3, 1992, Westinghouse notified potentially affected licensees of the results of their review of the issue discussed in our original LER submittal. Although licensees were notified of the issue, Westinghouse's evaluation concluded that the situation does not represent a Substantial Safety Hazard or Failure to Comply pursuant to 10 CFR 21.

The affected Emergency Operating Procedure was revised to caution the operator to establish minimum charging flow to protect the operating CCP if cold leg recirculation has been initiated, and to verify proper operation of the CCP emergency leakoff valves, during SI conditions.

The Westinghouse letter provided several potential means for resolving the issue. One specific option was to review plant specific EOPs to ensure that procedures are provided to plant operators to depressurize and cooldown during a postulated small break LOCA, and to modify the EOPs to ensure that the charging pump miniflow lines are isolated during recirculation.

Following conversations with Westinghouse that preceded receipt of the letter described above, revisions were made to the EOPs that meet the intent of the Westinghouse recommendation. EOP ES-1.3, "Transfer to Cold Leg Recirculation", was revised to instruct the operator to open a pressurizer PORV, as necessary, to reduce RCS pressure and to maintain minimum charging pump flow. The procedure instructs the operator to close the charging pump miniflow valves as part of the switch over from injection to recirculation. Precautions are included, however,

Corrective Actions (cont'd)

that instruct the operator to shut off a redundant charging pump, or to open the miniflow valves if conditions that ensure adequate pump protection are not met. If the miniflow valve fails to close properly, the procedure contains additional instructions to shut off the CCP pump and to locally close the miniflow valves.

Failed Component Identified
None

Previous Similar Events
None