Wisconsin Electric
POWER COMPANY

231 W Michigan, P.O. Box 2046, Milwaukee, WI 53201 (414) 221-2345

VPNPD-90-415
NRC-90-096

10 CFR 50.73

September 27, 1990

U. S. NUCLEAR REGULATORY COMMISSION
Document Control Desk
Mail Station P1-137
Washington, D. C. 20555

Gentlemen:

DOCKETS 50-266 AND 50-301
LICENSEE EVENT REPORT 90-011-00
LOW NPSH TO CONTAINMENT SPRAY PUMPS
WITH ECCS IN RECIRCULATION MODE
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

Enclosed is Licensee Event Report 90-011-00 for Point Beach Nuclear Plant, Units 1 and 2. This report is provided in accordance with 10 CFR 50.73(a)(2)(v), "Any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to...(D) Mitigate the consequences of an accident."

This report details an evaluation discovering that, under certain conditions, the residual heat removal pumps do not provide adequate net positive suction head to the containment spray pumps when the emergency core cooling system is in the recirculation mode.

If any further information is required, please contact us.

Very truly yours,

C. W. Fay
Vice President
Nuclear Power

Enclosure

Copies to NRC Regional Administrator, Region III
NRC Resident Inspector

IE22
1/1

NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO 3150-0104
EXPIRES 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Point Beach Nuclear Plant	0 5 0 0 0 2 6 6	1 OF 0 4

TITLE (4)
Low NPSH to Containment Spray Pumps with ECCS in Recirculation Mode

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 NAMES	DOCKET NUMBER(S)
0 8	2 9	9 0	9 0	— 0 1 1	— 0 0	0 9	2 7	9 0	Point Beach, Unit 2	0 5 0 0 0 3 0 1
										0 5 0 0 0

OPERATING MODE (9): N

POWER LEVEL (10): 1 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)

20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.71(c)
20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (AREA CODE)
C. W. Fay, Vice President - Nuclear Power	4 1 4 2 2 1 - 2 8 1 1

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)

YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single space typewritten lines) (16)

ABSTRACT

On August 29, 1990, an engineering evaluation was completed which indicates that, under certain conditions, the residual heat removal pumps cannot provide adequate net positive suction head (NPSH) to the containment spray (CS) pumps when the emergency core cooling system is in the recirculation mode. Corrective actions include temporary procedure changes limiting use of the CS pumps to conditions under which NPSH will be adequate. Permanent procedure changes will be made as final corrective actions.

BACKGROUND

On August 29, 1990, an engineering evaluation was completed which confirmed that, under certain conditions, the residual heat removal (RHR) pumps cannot provide adequate net positive suction head (NPSH) to the containment spray (CS) pumps when the emergency core cooling system (ECCS) is in the recirculation mode.

At Point Beach the safety injection (SI) pumps and CS pumps initially draw water from the refueling water storage tank (RWST) during the injection mode of ECCS operation. When the water in the RWST is nearly depleted, the plant operators place the ECCS in the recirculation mode, i.e., recirculating water collected in containment sump "B" to the reactor coolant system (RCS). To accomplish this recirculation, the RHR pump suction is lined up by operator action to the sump and isolated from the RWST. During low head recirculation, the coolant flow may then be directed back in the RCS through the reactor vessel core deluge connections. If high head injection capability is required, RHR outlet flow may be directed to the SI pump suction and then returned to the RCS by means of the SI pump discharge to the RCS cold legs.

Normally after the injection phase is completed, containment spray flow will be discontinued and containment pressure controlled by use of the containment air recirculation cooling system. If, however, containment pressure increases, spray flow could be reinitiated by directing a portion of the RHR outlet flow to the CS pump suction.

DESCRIPTION

An operations refueling test (ORT) completed on the RHR pumps during the spring 1990 Unit 1 refueling outage indicated that the RHR pumps were developing less than 95 percent of the design head limit listed in ASME Section XI, Subsection IWP. The lowest developed head value for the two Unit 1 RHR pumps was approximately 89 percent of design head. The current large break Loss of Coolant Accident (LOCA) analysis for the Point Beach Nuclear Plant assumes a uniform degradation of 20 percent of the design head of the pumps across the entire flow versus head curve; therefore, the actual pump degradation is less than 20 percent, and the current LOCA analysis remains valid.

We, nonetheless, were concerned, since the RHR pumps provide the NPSH to the CS and SI pumps while the ECCS is in the recirculation mode. When the CS and SI pumps are both running, the CS pump NPSH is more limiting than the NPSH for the SI pumps. The CS pump requires a greater NPSH, and system design provides a greater absolute pressure at the SI pump suction. To determine the impact of RHR pump degradation during containment sump recirculation and the amount of sump fluid cooling required by the RHR HX's, an ECCS

steady state flow model was used. This best-estimate model was developed to predict flows and pressures in the ECCS for various scenarios including different flow conditions, containment pressures, RCS pressures, and other parameter changes. This evaluation revealed that the high head loss through the common line feeding both the SI and CS pump suctions is the main reason for the inability to operate both pumps while in the recirculation mode. The evaluation also demonstrated that the worst case scenario occurs when RCS pressure is at zero psig, i.e., RCS pressure approximately equal to containment pressure.

We have determined that, with a 20 percent RHR pump degradation and RCS pressure at zero psig, a containment pressure of 50 psig is required in order to maintain adequate NPSH to both the CS and SI pumps during high head recirculation. Both pumps can, therefore, not be operated while in the recirculation mode below this pressure. If using low head recirculation (SI pump off) at low RCS pressures, adequate NPSH is available for the CS pumps only if containment pressure is greater than 10 psig.

CORRECTIVE ACTIONS

Temporary procedure changes have been made stating that in the event of a LOCA, CS pumps should be secured at 6 percent of RWST level and that CS pumps should not be used while in the recirculation mode unless one of the following conditions is met:

1. Containment pressure is greater than 50 psig.

2. Flow control valve to core deluge is closed and containment pressure is greater than 40 psig.

3. High head SI pump in that train is secured and containment pressure is greater than 10 psig.

We are currently in the process of making these temporary changes part of a permanent procedure change. Additional corrective actions concerning changes to the ORT and long-term trending of RHR pump degradation are under consideration. The FSAR will also be updated to reflect these conditions of operation for the CS pumps when in the ECCS recirculation mode.

SAFETY ASSESSMENT

Following a design basis LOCA, the CS pumps are not required once the ECCS is in the recirculation mode (current procedures included securing of the CS pumps prior to establishing recirculation mode). Calculations verify that most of the iodine released to the containment atmosphere in a design basis LOCA will be scrubbed during the first twenty minutes of the injection phases. The CS pumps are, therefore, not required while on sump recirculation to

satisfy 10 CFR 100 radiological release requirements. In addition, the containment air recirculation cooling is sized such that one train of the air recirculation system is adequate for containment pressure control during the recirculation mode of ECCS. If CS pumps are lost during the recirculation mode, high and low head sump recirculation is still available to cool the core along with the air recirculation cooling system for containment pressure control.

REPORTABILITY

This event is reported in accordance with the requirements of 10 CFR 50.73(a)(2)(v) which requires the reporting of "Any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to...(D) Mitigate the consequences of an accident."

GENERIC IMPLICATIONS

The circumstances and concerns regarding this event have been discussed with representatives of the NSSS vendor for the Point Beach Nuclear Plant. That vendor was the designer of the Point Beach ECCS and containment spray systems. Based on these conversations, we understand there are no similar designs at other facilities. We, therefore, believe there are no generic implications from this event.