LER 266/97-014

Wisconsin Electric
POWER COMPANY

231 W Michigan, PO Box 2046 Milwaukee WI 53201-2046 (414) 221-2345

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Gentlemen:

DOCKET 50-266 AND 50-301
LICENSEE EVENT REPORT 97-014-00
AUXILIARY FEEDWATER SYSTEM INOPERABILITY
DUE TO LOSS OF INSTRUMENT AIR
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

Enclosed is Licensee Event Report 97-014-00 for Point Beach Nuclear Plant, Units 1 and 2. This report is provided in accordance with 10 CFR 50.73(a)(2)(v)(D), "Any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident." This report describes a plant condition in which the Auxiliary Feedwater System may not have been able to perform as analyzed due to a loss of instrument air to the motor-driven AFW Pump flow control valves.

If you require additional information, please contact us.

Sincerely,

Thomas G Malanowski
for

Douglas F. Johnson
Manager - Regulatory Services
and Licensing

GDA
Enclosure

A/62

cc: NRC Resident Inspector
NRC Regional Administrator

bcc: Adams, Anthony, Cartwright, Cayia, Flentje, Gorecki, Grigg, Guay, Hoefert, D. Johnson, Krieser, Malanowski, Patulski, Reimer, Swetlick (OSRC), Rick Pulec (WPS), Gene Eckholt (NSP),

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

Event Description:

At 1800 CST on March 21, 1997, with Unit 1 in cold shutdown and Unit 2 in a defueled condition, licensee engineers discovered a condition that alone could have prevented the Auxiliary Feedwater (AFW) System from automatically performing its safety-related function during certain design basis accidents involving a loss of instrument air and reduced steam generator pressures.

The loss of instrument air, which may be caused by a loss of offsite power, would cause both motor-driven AFW pump (MDAFWP) flow control valves to fail open. Without automatic flow control, the MDAFWPs' flowrate would be determined by steam generator pressure and feed line flow resistance. If steam generator pressure is below the relief valve setpoints, which may occur for a low decay heat history, the pump motor breakers could trip on time-overcurrent. Also, the loss of instrument air would disable the remote-manual capability to control AFW flowrate from the main control board.

Immediately following discovery of these conditions, the AFW system was declared inoperable. The existing plant conditions did not require operability of the AFW system.

Soon after discovery of these conditions, an AFW System design basis evaluation was initiated to ascertain those design basis accidents that would be most affected by this sequence of events. That design basis evaluation determined that any event involving a loss of offsite power (LOOP) could lead to the eventual loss of the MDAFWPs, but that the main steamline break (MSLB) accident would present the most-limiting conditions.

During a MSLB, one steam generator may blowdown at the maximum rate. The MDAFWP feeding the faulted steam generator would probably trip on low suction pressure. If the turbine-driven AFW pump fails to operate (i.e., the single active failure), then the requirement to maintain steam generator inventory would rely on the performance of the remaining MDAFWP.

The rapid cooldown of the reactor coolant system (RCS) would rapidly reduce the pressure of the intact steam generator to approximately 600 psig. The reduced pressure (below the steam generator relief valve setpoint) could result in the eventual tripping of the remaining MDAFWP on time-overcurrent. In this case, and other less-limiting cases where the MDAFWP(s) could trip later in the accident, manual action would be necessary to ensure adequate inventory in the steam generators.

The IEEE Standard 803A-1983 component identifiers for this report are:

Pump -	(p)	52 - Circuit Breaker, AC
Valve -	(V)	PCV -Pressure Control Valve

If emergency diesel generator loading allows, there is a procedural provision to load an IA compressor during an accident. This action would restore automatic operation of the control valve at the setting provided on the main control board.

The motor-drivers for AFW pumps P-38A and P-38B are provided with time-overcurrent devices which prevent overheating of the motor and cable at values of current that exceed the long-term current rating, but are less than the instantaneous trip setting that is indicative of a motor fault or stall. When the MDAFWPs operate at approximately 200 gpm (their nominal design operating point), the time-overcurrent settings are not broached. However, when the MDAFWPs operate at a flowrate greater than 200 gpm, the time-overcurrent settings may be broached and lead to a motor breaker trip after the prescribed time passes.

Cause:

The postulated event scenario is the result of a latent characteristic of the original AFW system design. Previous analyses of this scenario have considered that the steam generator pressure at the safety valve settings would limit MDAFW flow to approximately 200 gpm. However, the steam generator pressure would be maintained at the safety valve settings only when those accidents occurred with the maximum decay heat conditions described in FSAR Chapter 14. For less-limiting decay heat conditions, the actual steam generator pressure would be reduced below the safety valve settings.

Also, it is evident that the original design took credit for operator action to control MDAFW pump flowrate to the nominal 200 gpm value. There was not any documented basis for assuming the capability to restore flow control within a short period of time. However, the original design did have provisions for restoring instrument air following a LOOP, and it did provide the capability to reset a MDAFWP from the control room if the breaker did happen to trip on time-overcurrent. The original design basis did not specifically analyze the capability of the operating crew to take local-manual control for all events and preclude the loss of the MDAFWPs. Therefore, the original design did not provide ample assurance that the MDAFWPs would automatically function during all design basis events.

Corrective Actions:

A design evaluation was initiated following the discovery of the condition. Design modifications have been initiated to provide a reliable pneumatic supply to the control valves. *These design modifications, or another appropriate remedy, will be completed to restore AFW System operability prior to exceeding 350 °F during the tartup of either Unit 1 or Unit 2.*

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Similar Occurrences:

Latent design flaws in the original design that affected the capability of safety-related equipment were reported in the following LERs:

LER	Description
266/97-006-00	Potential Refueling Cavity Drain Failure Could Affect Accident Mitigation
266/97-001-00	Safety Injection Delay Times Exceed Design Basis Values
266/96-005-00	Potential Service Water Flashing in Containment Fan Coolers