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POWER COMPANY

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U.S. NUCLEAR REGULATORY COMMISSION
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Ladies/Gentlemen:

DOCKET 50-266
LOW TEMPERATURE OVERPRESSURE
PROTECTION SYSTEM OPERATION
POINT BEACH NUCLEAR PLANT, UNIT 1

On October 23, 1997, an evolution being performed at the Point Beach Nuclear Plant, Unit 1, resulted in the operation of the Low Temperature Overpressure Protection System. This occurrence resulted in the momentary lifting of Pressurizer Power Operated Relief Valve (PORV) 431C which was aligned for operation in the low temperature overpressure protection mode in accordance with Technical Specification 15.3.15.

Attached is a special report for this occurrence as required by Technical Specification 15.6.9.2.C. This Specification requires a special report to the NRC in the event that the evaluation of the occurrence determines that an overpressurization incident could have occurred had the Low Temperature Overpressure Protection System not been operable. As required by Specification 15.6.9.2.C, this report describes the circumstances initiating the transient and corrective actions identified to prevent recurrence. This report summarizes a root cause evaluation of this occurrence and recommended corrective actions.

New commitments that have not been previously docketed are identified italics.

If you have any questions regarding the event and our report, please contact us.

Sincerely,

Douglas F. Johnson
Manager - Regulatory Services & Licensing

Attachment

cc: NRC Resident Inspector
NRC Regional Administrator

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POINT BEACH NUCLEAR PLANT, UNIT 1

At approximately 1230 on October 23, 1997, Unit 1 operators were in the process of completing OP 4A, "Filling and Venting Reactor Coolant System." OP 4A directed the operators to OP 4B, "Reactor Coolant Pump Operation," to start a reactor coolant pump (RCP). OP-4B has two sections for starting an RCP. OP-4B contains separate directions for starting an RCP dependent on whether the Reactor Coolant System (RCS) loops have previously been filled and vented and for when starting an RCP is necessary for filling and venting an RCS loop. In this case the RCS loops were filled and vented. Unit 1 was at approximately 350 psig primary pressure, 127°F primary temperature, with the RCS in a water-solid condition.

Between 1230 and 1349, preparations were made to start the pump. These preparations included a pre-job brief involving the Unit 1 Control Operator, Operating Supervisor, third Reactor Operator, Duty Operating Supervisor and was observed by the Duty Shift Supervisor (DSS). The briefing identified that plant conditions necessary for the RCP start were different than previously experienced by the operating crew. The operating crew had started an RCP prior to this event with the plant solid , but it was directly after filling and venting of the RCS with the water in the reactor vessel and loops at approximately the same temperatures. In the existing plant conditions, the water in the reactor vessel was at approximately 127°F and the steam generator temperatures were approximately 70°F. During the brief, the Duty Operating Supervisor noted that approximately three weeks prior, this same evolution, performed by a different crew, resulted in a pressure increase requiring aggressive action by the operator to prevent an overpressure condition. Initial primary pressure for this earlier evolution was approximately 325 psig. Pressure peaked at approximately 390 psig during this earlier evolution.

At approximately 1349, "A" RCP was started. RCS pressure began to decrease as expected due to cooling of the RCS due to lower temperature water in the Steam Generators. The Unit 1 Control Operator took action to control the pressure decrease by throttling RCS letdown and raising charging pump speed. Primary pressure decreased to approximately 340 psig, and then began to rapidly increase due to reactor coolant pump discharge pressure and charging flow into the water solid RCS exceeding letdown flow by approximately 50 gpm. The control operator, noting the pressure increase, took action to increase letdown flow and decrease charging to control the pressure transient. During this time, the position indication light for RC- 431C flashed on indicating that the PORV had opened and was confirmed by an associated computer alarm. Pressure was observed by the operating crew to peak between 405 psig and 415 psig. Computer data indicates that the PORV remained open for less than 1 second.

A calculation performed for this occurrence concluded that, absent operator action to mitigate the pressure increase and absent LTOP actuation, RCS pressure would have reached a level exceeding applicable 10 CFR 50, Appendix G limits within approximately 15 seconds. Therefore, this report is being provided pursuant to Technical Specification 15.6.9.2.C.

The Low Temperature Overpressure Protection System (LTOP) at PBNP utilizes the two installed PORVs. The PORVs are made operational for low pressure relief by utilizing a dual setpoint where the

low pressure circuit is energized and de-energized by the operator with a keylock switch depending on plant conditions. LTOP mode of operation is required to be enabled and operable when RCS temperature is less than 355°F. The PORV lift setpoint during LTOP operation is 415 psig (≤ 440 psig is required by the Technical Specifications). RHR system relief valves are also available to limit RCS pressure when the RHR system is aligned for shutdown cooling.

The root cause evaluation performed for this occurrence determined that the root cause of this event was starting the reactor coolant pump with a water-solid reactor coolant system at 350 psig and misoperation of the charging and letdown systems. We concluded that the operating crew did not have a complete understanding of the magnitude of the pressure transient expected resulting in an overaggressive response to the pressure decrease immediately following the RCP start.

Contributing to this occurrence were procedure inadequacies. OP 4B, "Reactor Coolant Pump Operation," does not provide clear guidance on minimum RCS pressure required to start an RCP with the RCS solid. OP 4A, "Filling and Venting Reactor Coolant System," requires RCS pressure to be between 325 psig and 400 psig prior to starting an RCP. OP 4B states that the 325 psig minimum pressure for starting an RCP is not applicable during other than fill and vent operations, but has the operator check pressure greater than 325 psig immediately after starting the pump. If the pump had been started at less than 325 psig, and there had been no misoperation of the charging and letdown systems, it is likely that the LTOP operation would have been prevented.

The following corrective actions are being taken:

1. *By March 15, 1998, operating personnel will be briefed on this event. The briefing will include how to identify abnormal event precursors and will reinforce the need to maintain a questioning attitude.*

2. *OP-4B, "Reactor Coolant Pump Operation," will be revised by December 15, 1997.*

3. *Licensed operators will be provided training on reactor coolant pump operations in solid plant conditions with various loop and steam generator temperature differences and on control of the chemical and volume control system during solid plant conditions. Training will be completed by March 15, 1998.*