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BW100120

U.S. Nuclear Regulatory Commission
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Braidwood Station, Unit 1
Facility Operating License No. NPF-72
NRC Docket No. STN 50-456

Subject: Technical Requirements Manual, Section 5.3, "Special Reports"

In accordance with Technical Requirements Manual (TRM), Section 5.3.c, "Special Reports", the enclosed Special Report is being submitted. TRM Section 5.3.c, Item 3 requires that, in the event the unit is in MODE 4, 5, or 6 with the reactor head on and either the Power Operated Relief Valves (PORVs), Residual Heat Removal (RHR) suction relief valves, or the Reactor Coolant System (RCS) vents are used to mitigate an RCS pressure transient, a Special Report be prepared and submitted to the NRC within 30 days. The Special Report shall describe the circumstances initiating the transient, the effect of the PORVs, RHR suction relief valves, or RCS vents on the transient, and any corrective action necessary to prevent recurrence.

On October 4, 2010 during shutdown for Braidwood Unit 1 Refueling Outage 15 (A1R15), the 1B RHR suction relief valve lifted in response to an RCS pressure transient during a plant evolution. Therefore, a Special Report is required to be submitted to the NRC by November 3, 2010. The attached enclosure provides the Special Report.

There are no regulatory commitments contained in this letter.

Should you have any questions regarding this matter, please contact Mr. Ronald Gaston, Regulatory Assurance Manager, at (815) 417-2800.

Sincerely,

Amir Shahkarami
Site Vice President
Braidwood Station

Enclosure: 30 Day Special Report Due to Reactor Coolant System Pressure Transient

cc: NRC Regional Administrator, Region III
NRC Senior Resident Inspector – Braidwood Station

Enclosure
30 Day Special Report
Due to Reactor Coolant System Pressure Transient

In accordance with Technical Requirements Manual (TRM), Section 5.3.c, "Special Reports," Item 3, in the event the unit is in MODE 4, 5, or 6 with the reactor head on and either the Power Operated Relief Valves (PORVs), Residual Heat Removal (RHR) suction relief valves, or the Reactor Coolant System (RCS) vents are used to mitigate an RCS pressure transient, a Special Report shall be prepared and submitted to the NRC within 30 days. The Special Report shall describe the circumstances initiating the transient, the effect of the PORVs, RHR suction relief valves, or RCS vents on the transient, and any corrective action necessary to prevent recurrence.

On October 4, 2010 during shutdown for Braidwood Unit 1 Refueling Outage 15 (A1R15), the 1B RHR suction relief valve lifted in response to an RCS pressure transient during a plant evolution. Therefore, the following information is being provided.

Circumstances initiating the transient

On October 3, 2010, at 2300, Braidwood Unit 1 was shut down to begin refueling outage A1R15. Changes from previous outage plans resulted in several activities being performed simultaneously while the RCS was water solid. Typically, one train of Technical Specification (TS) surveillance testing of Engineered Safety Feature Actuation System (ESFAS) Safety Injection (SI) manual initiation and Phase A Containment Isolation manual initiation (SI/Phase A) is performed during the cooldown, and one train is performed while the RCS is under water solid conditions. This allows operators an opportunity to become accustomed to plant response before going water solid since the impact before going solid is not as significant. Delays in placing both RHR trains in service caused a cascading shift in outage activities resulting in both trains of the ESFAS TS surveillance testing being performed during RCS water solid conditions and coincident with RCS degassing.

To reduce dose as low as reasonably achievable (ALARA), hydrogen peroxide is added to the RCS for cleanup. The chemistry criteria for hydrogen peroxide addition include: RCS and pressurizer temperature within limits with the pressurizer solid (i.e., RCS water solid), and Volume Control Tank (VCT) and RCS hydrogen concentration reduced to the extent possible. The hydrogen concentration is reduced by performing a VCT degassing evolution. Mechanical degassing is performed by raising the VCT level to nearly full and opening the VCT vent valve to remove hydrogen gas from the VCT to the Waste Gas System. VCT level is reduced when a nitrogen cover gas is applied and the process is repeated several times until the desired RCS hydrogen concentration is achieved. In support of ALARA considerations, Chemistry requested a maximum RCS letdown flow through the Chemical Volume Control System (CVCS) demineralizers to maximize RCS cleanup prior to hydrogen peroxide addition and to continue after hydrogen peroxide addition until the last reactor coolant pump was stopped. The higher RCS letdown flow also assists in reducing RCS hydrogen concentration faster.

On October 4, 2010, the first SI/Phase A TS surveillance test was started with the RCS at approximately 350 psig and 140°F and the RCS under water solid conditions. A Heightened Level of Awareness (HLA) brief was performed. After the HLA brief, the Nuclear Station Operator (NSOs) began to align plant systems for the SI/Phase A TS surveillance test. This alignment required approximately 1.5 hours to complete. During plant alignment, an NSO was maintaining the RCS water solid. RCS letdown flow was 135 gpm and matched with charging flow to maintain the RCS water solid. A slight RCS cooldown was in progress and required

some adjustments to charging and letdown flow to maintain the RCS water solid. In addition, VCT degassing was continued by raising and lowering VCT level.

Following plant alignment to support the TS surveillance test and just prior to the actuation of the manual SI/Phase A signal, the Test Coordinator performed an update brief with the Control Room. The update brief focused on the actuation and expected annunciator response, not on expected plant response. Current plant conditions were not verified against the prerequisites. At the time of the initial HLA brief, the VCT level prerequisite was met at 48%. However, during plant alignment to support surveillance testing, VCT degassing continued resulting in VCT level rising. At the time of actuating the manual SI/Phase A signal, the VCT level was at 88%.

In support of SI/Phase A surveillance testing, the charging pump suction from the VCT was realigned to the Refueling Water Storage Tank. However, letdown was still directed to the VCT. Although the normal letdown isolation valves closed on the Phase A isolation signal, letdown flow was still aligned from the RHR pump discharge through the RHR to CV Letdown Flow Control Valve (1CV128). This resulted in the VCT filling at a rate of 135 gpm, because letdown was still established while normal charging was isolated.

The input to the VCT was recognized by the NSOs with the level at 88% and rising rapidly. The NSO immediately diverted letdown flow to the Hold Up Tank (HUT). However, this flowpath created a change in letdown flow backpressure resulting in letdown flow rising to 150 gpm. In an attempt to match letdown and charging flowrates, one NSO began to reduce letdown flow while another NSO began to reduce charging flow to maintain the RCS water solid and reduce the flow through the CVCS demineralizers due to concerns with the potential for channeling the resin. The flow balance was required to maintain RCS pressure adequate for RCP operation. Due to the difference in valve controller response times, the NSO reduced letdown flow faster than the other NSO reduced charging flow. Normally, letdown and charging flow would be reduced in small increments and allow RCS pressure to stabilize. As a result of the reduced letdown flow with higher charging flow while the RCS was water solid, an RCS pressure perturbation was experienced and an RHR suction relief valve lifted to lower RCS pressure. Charging and letdown flow were re-balanced to maintain 135 gpm letdown flow and RCS pressure stabilized at 350 psig.

Effect of the RHR Suction Reliefs on the Transient

The 1B RHR suction relief lifted at 450 psig to lower RCS pressure and reseated. The 1A RHR suction relief did not lift. The 1B RHR suction relief valve lifted at the proper setpoint and was verified reseated by thermography. No Technical Specifications were required to be entered. No EAL thresholds were met.

Corrective Actions to Prevent Recurrence

The following corrective actions will be implemented:

- This event will be incorporated into Just-In-Time Training performed prior to refueling outages to address operation during RCS water solid conditions and contingencies.
- Procedures will be revised to add better controls because the surveillance alignment requires several hours to complete and some plant conditions and strategies for controlling key plant parameters when the RCS is water solid may change.

- Any activities impacting RCS letdown or charging during RCS water solid conditions will be identified in the refueling outage schedules and logic ties incorporated to control schedule changes during this time period.