

Selected Licensee Commitment 16.7.5
Report to the NRC - November 1, 1999

Background

Selected Licensee Commitment (SLC) 16.7.5, "Steam Generator [SG] Overfill Protection," establishes the operability, surveillance requirements, and the required actions when the SG Overfill Protection (SGOP) does not meet the surveillance requirements.

SGOP of the Integrated Control System (ICS) trips the MFW Pumps on high SG level to mitigate potential SG overfill events that could lead to pressurized thermal shock (PTS) of the reactor pressure vessel. SGOP uses both SG level and temperature measurements to determine a density compensated SG level. The SG temperature used as SGOP input is measured in the SG downcomer that diverts incoming feedwater down the inside of the SG shell to the lower SG tubesheet. The downcomer temperature is measured by a dual-element Resistance Temperature Device (RTD) in an instrument well that penetrates the SG shell and extends into the downcomer flow stream.

SLC 16.7.5 requires SGOP to be operable in Modes 1, 2, and in Mode 3 when the reactor coolant system is greater than 325F.

SLC 16.7.5, Required Action B.1, requires a special report to the NRC providing the cause of the system malfunction and plans to restore the system to operability whenever SGOP is inoperable for greater than 72 hours. This report meets the SLC requirement.

Circumstances and Cause

On March 8, 1999, with Unit 1 in Mode 1, a difference was observed between the expected and indicated Unit 1 SG "B" downcomer temperatures. Work Request (WR) 98068853 was initiated at that time to determine and correct the problem. The WR noted both SG "B" lower downcomer temperatures from the dual-element RTD were approximately 10F lower than expected at approximately 526F when approximately 536F was expected. The RTD temperature discrepancy was investigated on June 4, 1999, with Unit 1 defueled and the SGs at ambient temperature. A temperature discrepancy could not be observed at these low temperature conditions. After Unit 1 was returned to operation and with the SG at normal operating temperature, it was recognized that the temperature discrepancy remained on both elements of the RTD. On

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July 29, 1999, with Unit 1 in Mode 1 at approximately 100% power, Work Request (WR) 98089212 was originated to inspect and repair the cause of both SG "B" lower downcomer temperatures reading approximately 7F low.

On September 28, 1999, it was recognized the observed SG "B" temperature measurement error could affect the operability of SGOP: PIP O-99-3857 was originated to initiate a SGOP operability evaluation. The operability evaluation determined on September 29, 1999, the 7F temperature measurement error resulted in a 1% error in SG level causing the SG "B" SGOP to be inoperable.

On September 30, 1999, while researching the cause of the temperature discrepancy, it was determined the dual-element RTD providing the SG "B" downcomer temperatures was 5-1/2 inches too short. The short RTD (Rosemount model 104APF-1) was installed on April 9, 1997 as a replacement for a failed Rosemount model 104APF-2. The installation of the incorrect RTD model occurred due to an outdated and incomplete Unit 1 equipment drawing referenced in the equipment database for these RTDs that did not provide the model number of the RTD. The absence of information about the difference in model numbers led to the incorrect conclusion that although the model numbers differed slightly, the replacement RTD was equivalent. The two models are identical except for the difference in length which was not recognized during installation. The downcomer temperature discrepancies were not previously detected since: 1) Downcomer temperatures are not routinely checked or compared with other parameters; and 2) A level discrepancy of 1% between the two SGs is essentially undetectable. A check of the Unit 2 and 3 SG lower downcomer temperature instrumentation found measured temperatures consistent with expected values.

The difference in temperature discrepancy of 10F reported in the March 8, 1999 WR and the 7F reported in the July 7, 1999 WR is attributed to different points of comparison by the WR originators.

The minor error in the SGOP trip setpoint was of little significance to the health and safety of the public due to the highly unlikely combination of circumstances required to approach

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the trip setpoint. ICS provides protection from a SG overfill event by controlling SG levels significantly below the trip setpoint and by providing an independent high level trip. At the SGOP setpoint, ICS trips the MFW pumps. Should ICS control action fail to limit SG levels, SG high level alarms would alert operators of the condition. The contribution to the core damage frequency from pressurized thermal shock events is small. The contribution from those events specifically resulting from SG overfill and failure of the automatic trip of the MFW pumps on high level would be smaller still. No significant impact on the Oconee CDF would be expected to result from the SG lower downcomer temperature measurement error.

Corrective Actions

Immediate

Compensatory measures for the temperature discrepancy were implemented for Unit 1 SG "B" on September 29, 1999. The compensatory measure is for Operators to follow the Emergency Operating Procedure guidance on responding to a SG "B" overfill event at an indicated level of 96% instead of the specified 98%. Operator action at a SG level of 96% is sufficient to preclude over cooling the RCS.

Subsequent

1. The Unit 1 SGOP MFW pump trip setpoint was reduced to 96% by a minor modification on October 21, 1999. This modification restored the capability of the SG "B" SGOP to provide overfill protection with the 7F temperature discrepancy. The SGOP became fully operable on October 27, 1999, with approval of procedure changes required by the minor modification.
2. Correction of the equipment database reference from the outdated drawing to a drawing representing the Unit 1 SGs "A" and "B" downcomer RTD configuration was included in the above minor modification thereby requiring the correction to occur.

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Planned

1. Parameters and operating conditions needed for a validity check of SG downcomer temperatures will be established. Procedures PT/1,2 & 3/A/600/01, "Periodic Instrument Surveillance," will then be modified to provide a periodic validity check of the SG downcomer temperature measurements.
2. The short RTD will be replaced at the next Unit 1 shutdown of sufficient duration to Mode 3 or lower following receipt of a suitable replacement RTD.

Planned corrective actions 1 and 2 are the only commitments contained in this report.