TS Change - Testing of Idle RCS Cooling Loop

March 15, 2011

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INTRODUCTION

- *On August 24, 2010, Entergy submitted proposed Technical Specification (TS) change extending the allowed time in which one required Reactor Coolant System (RCS) cooling loop may be removed from service for testing (Modes 5 and 6-low water level)*
- *The proposal also revised the Mode 4 requirements for one inoperable loop to be consistent with other TS requirements*
- *Entergy provided additional information in letters dated November 12, 2010, and February 28, 2011*

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PURPOSE

Discuss the proposed changes, understand the Staff's concerns, and identify areas for improvement

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BACKGROUND – MODE 4 (200 - 280 °F)

- ***Mode 4 Completion Time for one inoperable Reactor Coolant System (RCS) cooling loop:***
  - ***48-hour Completion Time requested consistent with the same pump Low Pressure Injection (LPI) TS***
  - ***The 48 hours is conservative with respect to the Mode 3 RCS Cooling Loops Completion Time of 72 hours***
  - ***In Mode 4, Decay Heat Removal (DHR) loops and/or cooling via Steam Generators (SGs) are available, dependent on RCS pressure***
  - ***The current "take immediate action" requirement came from NRC letter dated June 11, 1980, due to "inadequate administrative controls" associated with DHR systems, and was applicable to all plants.***

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TECHNICAL INFORMATION – MODE 4

- ***The August 24, 2010, submittal provided the basis for permitting a 48-hour out-of-service period for one required cooling loop***
- ***The basis focused on the multiple cooling sources available in this mode and the lower operating temperatures/pressures when compared to Mode 3, which contains a 72-hour out-of-service allowance for one loop***
- ***Request is consistent with the Mode 3 & 4 48-hour allowance for an inoperable Emergency Core Cooling System (ECCS) train***

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QUESTIONS – MODE 4

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BACKGROUND – MODES 5 & 6

- ***In Modes 5, and Mode 6 with low water level, the proposed change extends the current 2-hour allowance for testing of one cooling loop to up to 8-hours, with restriction***
- ***Current TS Note:***
  - ***One required DHR loop may be inoperable for ≤ 2 hours for surveillance testing provided that the other DHR loop is OPERABLE and in operation.***
- ***Proposed TS Note:***
  - ***One required DHR loop may be inoperable for ≤ 8 hours for surveillance testing provided that the other DHR loop is OPERABLE and in operation, and the inoperable DHR loop can be restored to OPERABLE status within the calculated time-to-boil period.***

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BACKGROUND

- *The only restriction for the current 2-hour allowance is that the remaining cooling loop is operable and in operation*
- *To ensure margin to safety is maintained, Entergy proposed an additional restriction related to the core time-to-boil (TTB)*
- *Entergy proposed to extend this allowance to up to 8-hours in support of non-intrusive testing, such as the Degraded Voltage Monitoring Integrated Test*

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TECHNICAL INFORMATION – MODE 5

- *The August 24, 2010, submittal provided the basis for permitting one required cooling loop to be removed from service for testing for up to 8-hours*
- *The basis focused on the low energy of the RCS fluid in this mode and the multiple administrative controls related to protection of the operating cooling loop, availability of SGs via forced or natural circulation cooling, and available RCS makeup sources*
- *An additional margin to safety is ensured beyond that currently required by the TSs (TTB)*

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TECHNICAL INFORMATION – MODE 6

- *The August 24, 2010, submittal provided the basis for permitting one required cooling loop to be removed from service for testing for up to 8-hours*
- *The basis focused on the multiple administrative controls related to protection of the operating cooling loop (similar to Mode 5), the amount of water in the refueling canal, and available RCS makeup sources*
- *By proposing the new TTB restriction, an additional margin to safety is ensured beyond that currently required by the TSs*

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The November 12, 2010, submittal provided additional information as follows:

- ***A discussion of proceduralized administrative controls related to GL 88-17, as generically discussed in the original submittal***
- ***Further discussion of core cooling methods and related procedure controls was provided***
- ***Information of the TTB calculation, with discussion of different plant configurations and effects on TTB***

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The February 28, 2011, submittal provided additional information as follows:

- ***A discussion of the rare condition when no cooling loop may be available, including a historical search of loss of cooling events***
- ***Further discussion of procedural controls for SG nozzle dams***
- ***Further procedure discussion geared toward operator capability and TTB and time-to-core-uncovery (TTCU) examples***
- ***Further discussion of the TTB estimate and assumptions, specifically addressing thermohydraulic mixing of the refueling canal water***
- ***Instrumentation requirements (consistent with that required by GL 88-17)***
- ***Discussion of effects of upper reactor vessel internals on natural convection cooling***

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Future information to be provided is as summarized below:

- ***Further information related to required testing for which the 8-hour allowance supports***
- ***Further examples of TTB estimates and the assumptions (parameters) assumed in these examples***

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In summary, the idle cooling loop would no longer be removed from service for testing without verifying that the loop can be returned to service within the estimated TTB.

This requirement places an additional restriction on the current 2-hour allowance and maintains a reasonable margin to safety for testing activities during this period.

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CONCLUSION

ANO-1 meets the requirements of GL 88-17 and has substantial defense-in-depth strategies to prevent a loss of DHR event. This includes necessary systems, components, and instrumentation to permit identification of a potential loss of DHR and minimize the consequences should a loss of DHR occur.

Significant deterministic technical information has been provided to establish a reasonable margin to safety when testing an idle cooling loop.

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QUESTIONS – MODES 5/6