

PWROG-NRC Meeting to Discuss the DSE for WCAP-17308 “Treatment of Diesel Generator (DG) Technical Specification Frequency and Voltage Tolerances”

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P R E S S U R I Z E D W A T E R R E A C T O R O W N E R S G R O U P

Agenda

- Purpose of the Meeting
- Background
- Revised Draft Safety Evaluation (DSE)
- NRC Review Fees
- Summary and Conclusions

Purpose of the Meeting

- Discuss the PWROG issues associated with the revised Draft Safety Evaluation (DSE) for WCAP-17308 that was issued on July 20, 2016

Background

- The methodology in WCAP-17308 addresses CDBI findings associated with the Technical Specification (TS) 3.8.1, “AC Sources- Operating,” Surveillance Requirements (SRs) associated with steady state DG frequency and voltage tolerances
- The CDBIs questioned whether the SSCs that are powered by the DG could perform their functions as assumed in the safety analyses at the steady state DG frequency and voltage tolerances allowed by the TS
- The WCAP methodology results in revising (reducing) the TS steady state DG frequency and voltage tolerances and evaluating the SSCs that are powered by the DG to within the revised tolerances

Background (cont.)

- This WCAP methodology will ensure that the SSCs that are powered by the DG will perform their functions as assumed in the safety analyses
- This will also ensure that any other SSCs powered by the DG will continue to perform their design functions consistent with the DG electrical system design and licensing basis
- There are statements in the revised DSE that make the document virtually unusable

Revised DSE

- The DSE was issued on February 12, 2016
- The PWROG met with the NRC on March 10, 2016 to discuss the PWROG comments on the DSE
- A telecon was held on April 21, 2016 to discuss the PWROG comments with the Electrical Branch reviewer
- The NRC issued a revised DSE on July 20, 2016
- The revised DSE concludes that the WCAP methodology will ensure that the SSCs powered by the DG will perform their functions as assumed in the safety analyses

Revised DSE

- The revised DSE states that the methodology prescribed in TR WCAP-17308-NP, Revision 0, is acceptable for demonstrating that the ECCS can mitigate the consequences of an accident when the onsite sources are operating at the extremes of allowable frequency and voltage. Safety related systems and components, other than ECCS, required to mitigate the consequences of an accident and support safe shutdown of a NPP are outside the scope of the methodology prescribed in the TR and should therefore be evaluated independently for satisfactory operation within the allowable DG operating band.
 - In fact, the methodology addresses the impact on pumps, MOVs, fans, DG loading and DG fuel oil consumption for any system that is automatically loaded onto the DG
- The revised DSE discusses that support systems such as heating, ventilation, and air conditioning systems, battery chargers and uninterruptible power supplies, not included in the TR should also be evaluated
 - By virtue of requiring the DG to maintain frequency and voltage within the capabilities of the control systems, all of the above SSCs should be perform as design

Revised DSE

- The revised DSE states that plants that have equipment with marginal capabilities should perform detailed analyses to evaluate the performance of ECCS components at the allowable frequency and voltage range
 - This appears to be tantamount to requiring a complete electrical design verification
- SR 3.8.1.2 is a functional test of the DG, that is performed every 31 days, to demonstrate that the DG starts from a standby condition, and maintains steady state voltage and frequency to nominal values of [4160] V and [60] Hz, respectively, as opposed to tolerance bands for this SR
- Our concern is that licensees will not implement the WCAP due to these requirements

NRC Review Fees

- To date, the PWROG has been billed \$205,189 for Review Fees

Summary and Conclusions

- The PWROG has proactively submitted a methodology to address the CDBI findings
- The PWROG has expended significant resources to address this issue
- The TR was submitted for review over 4 years ago
- To date, the PWROG has been billed \$205,189 for Review Fees
- The revised DSE requires a re-verification of the DG electrical system design and licensing basis, which is beyond the intent and scope of the TR
- Our concern is that licensees will not implement the methodology based on the revised DSE



Backup Slides

CDBIs

- McGuire Nuclear Station – NRC Component Design Bases Inspection Report 05000369/2006007 and 05000370/2006007, dated June 22, 2006
- “Introduction: The team identified a Green, non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, Design Control. Specifically, the licensee did not account for emergency diesel generator under-frequency in test acceptance criterion for ASME Section XI testing of the NV pumps 1A and 1B.”

CDBIs (cont.)

- “Description: The team identified that acceptance criterion for the ASME Section XI testing of the NV pumps, PT/1(2)/A/4209/012 A(B), Centrifugal Charging Pump 1(2)A(B) Head Curve Performance Test, did not account for the emergency diesel generator (EDG) allowed under-frequency variation. The team evaluation identified that the test results, when corrected for the EDG allowed under-frequency variation and other non-conservative assumptions, were less than the pump acceptance criterion.

CDBIs (cont.)

- The acceptance criterion for the NV pumps was established in the licensee's calculation MCC-1552.08-0197, CNC-1552.08-00-0181, Rev. 15, Safety Injection Flows for Safety Analysis. This calculation was performed in support of the TS surveillance requirement (SR) for the TS 3.5.2. This calculation established the minimum acceptable performance for all ECCS pumps based on their required performance to mitigate the spectra of large and small break loss of coolant accidents (LOCA and SBLOCA). The acceptance criteria established by this calculation did not take into account the EDG under-frequency. The test results were also not corrected for the EDG under-frequency. The EDG under-frequency value of 58.8 hertz (i.e., a 2% reduction) used in the team's evaluation was the TS limit provided in SR 3.8.1.2, "Verify each DG starts from standby conditions and achieves steady state voltage ≥ 3740 V and ≤ 4580 V, and frequency ≥ 58.8 hertz and ≤ 61.2 hertz." The effect of the 2% frequency reduction would result in the decrease of the pump flows by 2% and the total developed head (TDH) by 4%. When the test results were corrected for the EDG under-frequency and instrument error, the corrected test results were below the acceptance criterion for NV Pumps 1A and 1B in the minimum flow region."

Previous PWROG-NRC Meetings

- An initial program meeting was held on June 30, 2010
- The pre-submittal meeting for the Topical Report (TR) was held on August 10, 2011
- A meeting was held on May 20, 2015 to discuss the generic applicability of the WCAP methodology
- A meeting was held on March 10, 2016 to discuss the PWROG comments on the DSE
- A telecon was held on April 21, 2016 to discuss the Electrical Branch reviewer's comments

WCAP-17308 Correspondence

- The TR was submitted for NRC review on May 1, 2012 via OG-12-162
- The NRC's Acceptance Letter for the review of the TR was issued on July 16, 2012
- The first set of NRC RAIs was issued on February 25, 2013
- The PWROG responded to the first set of NRC RAIs on March 28, 2013 via OG-13-126

WCAP-17308 Correspondence (cont.)

- The second set of NRC RAIs was issued on July 10, 2013
- The PWROG responded to the second set of NRC RAIs on August 22, 2013 via OG-13-294
- The PWROG transmitted additional changes to the TR on February 12, 2015 via OG-15-64