Extended Power Uprate Licensing Challenges

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Background

- NRC approved 17% extended power uprate (EPU) for Dresden and Quad Cities in 2001, and modifications were implemented in 2001-2002
- Two major categories of EPU issues since implementation
  - Vibration effects
    - Steam dryer failures
    - Main steam relief valve degradation
    - One example of small bore piping failure
    - Feedwater sample probe failures
  - Reduced operating or safety margin

Licensing Process Issues

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- Approved EPU topical reports do not provide sufficient guidance on the depth or focus of analyses required, especially concerning vibration
- Effects of core design and fuel transitions, combined with EPU, may result in unanticipated cycle-specific analysis results
  - Example is requirement for additional safety valve at Dresden
- Review of previous generic communications and operating experience (OE) information for EPU needs to be more thorough
  - EPU exacerbated condition reported in GE Service Information Letter (SIL) on main steam line low pressure isolation setpoint margin
  - SIL regarding sample probe failures was thought to be unaffected by EPU
- BWRVIP documents regarding steam dryers and effects of loose parts require re-evaluation/revision

Regulatory Implications

- NRC confidence in the EPU licensing process has eroded
  - Extensive high level interactions with NRC management
  - Additional NRC information and review requests
  - Letters of expectation and commitment confirmation
  - Recognized need to revise safety evaluation for previous EPU amendment
- NRC has shown increased sensitivity toward potential EPU impact on licensing actions and plant issues
- Licensing process is still robust
  - Safety analysis acceptance criteria are verified to be met
  - Issues to date have not been safety significant
- Issues show there is some uncertainty when moving into previously uncharted territory
  - Uncertainty is mitigated through sharing of OE, similar to experience gained during early stages of nuclear industry
- Emphasizes need for continued focus on effective use of industry OE

Exelon and Industry Response

- Exelon and industry EPU evaluation
  - Exelon has undertaken several in-depth reviews to prevent additional unexpected outcomes
  - BWR Owners' Group committee on EPU effects
  - BWR Owners' Group subcommittee and BWRVIP working group on steam dryers

Conclusion

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- EPUs have produced significant benefit to the industry by increasing generation at acceptable costs
- Unexpected issues clearly demonstrate the need to make adjustments in the analyses and reviews
- NRC sensitivity toward potential EPU impacts has increased significantly
- Implications are manageable through a combination of more detailed up-front analyses and continued effective use of OE