Attachment 6

Mitigating System Performance Index Pilot Public Meeting December 11, 2002

Some Observations

by

D.A. Dube
Office of Nuclear Regulatory Research

Status of Independent Verification

- Review of 3rd QTR 2002 data submitted by all plants
- In-depth benchmarking of NEI spreadsheets with SPAR models for two-unit plant
- Started a matrix of "Invalid Indicators" for all components for in-scope systems for all plants
- Comparison of Pilot Plant component failure rates to other sources including Table 2 of Appendix F of NEI 99-02
- Started comparison of all FV/UR for all components
- On-target for late March 2003 completion of verification

Other On-Going Activities

- Determining the effect on MSPI results with and without common cause failure contribution to importance measure
- Comparing MSPI results to SDP and ASP results for a limited set of events
- Will assess feasibility of rolling up individual mitigating systems into a "higher level" indicator
- Will assess issue of importance measures for support systems as initiators (CCW, SW)

General Observations

- Some active components not modeled in PRA
- Components modeled in PRA but not included in MSPI
- Many FV/UR of zero
- Possible model truncation issues (SPAR model benchmark using 1E-15/hr ~ 1E-11/yr)

Specific Observations

- Pooling of data for like components and then entering the pooled data for each individual component results in double counting failures and demands
- Component type coded incorrectly
- SPAR model and Plant PRA FV/UR's show significant differences; an area for further review
- Preferable if FV, UA and UR were shown separately in the worksheets

Invalid Indicators

- Based on limited sampling, as many as 20 to 30% of the MSPI systems may have at least one component that would give an invalid indicator based on the current approach (0 to 1, or n to n+1)
- Of the order of 5 to 15% of all components within scope of MSPI may pose an invalid indicator problem based on the current analytical approach
- "Invalid indicator" is a strong function of FV/UR
- The higher the FV/UR, the higher the likelihood of posing as an invalid indicator
- FV/UR greater than about 5 are problematic

Ideas to Address Invalid Indicators

- For URI, increase the data collection period from 12 to 20 quarters
- Expand the component population of like types to improve the statistics of small numbers
- Change the *Prior Distribution*
- Use plant-specific baselines
- Adjust the thresholds to ensure low probability of false positives and false negatives
- Identify upfront the components with Invalid Indicators and use statistical tests of adverse trending rather than the URI and UAI measures

Component Failure Rates

- From Pilot Plant data for last 12 quarters, component failure rates are 2 to 8 times lower than industry prior per Table 2 of Appendix F of NEI 99-02
- Sole exceptions are diesel driven pump failure rates owing to limited population in Pilot Program
- No proposed changes to Table 2 at this time

Example of Active Components *Not* Needed to be Included in MSPI

- MOVs on infrequently used test line that receive automatic isolation on SI signal

(Test frequency) x (test duration) x (MOV FTC)

(4 test/yr) x (2hr/test) (1yr/8760hr) x (2.1E-3)

~ 2E-6

Many orders of magnitude below train or even system unavailability & unreliability

Summary

- Appreciate prompt input of Pilot Plant data
- Still a few simplified system diagrams outstanding
- In the fundamental expression for the MSPI

$$URI = CDF \Sigma [FV/UR] (UR - UR_{BL})$$

most of the variance between models is in FV/UR

- Will need to work together to understand the differences
- January 2003 mini-workshop good opportunity to work through technical issues