

**Mitigating System Performance Index Pilot
Public Meeting
December 11, 2002**

Some Observations

by

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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 $1E-15/hr \sim 1E-11/yr$)**

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**

$$\text{URI} = \text{CDF} \sum [\text{FV/UR}] (\text{UR} - \text{UR}_{\text{BL}})$$

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**