

# Industry Priorities for Changes to Section 9 “Human Reliability Analysis” of the *Risk Assessment Standardization Project (RASP) Handbook Volume 1,* *Revision 2*

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# Overview

- High level HRA comments
  - Repair vs. Recovery
  - Required Expertise
  - Recent Advances in HRA
  - Treatment of Dependencies
  - Minimum HEP
  - Uncertainty
- EPRI HRA User Group Dependency Committee

## Repair vs. Recovery

- For internal events the handbook **appropriately differentiates between repair and recovery.**
- For shutdown scenarios there could be days available for repair type actions and these could be credited as recoveries.
  - Feasibility
  - Procedures
  - Planned organizational response strategies

## Required Expertise

- Section 9 (general) invokes times when the analyst should consult an “HRA expert”
  - This could be generalized to say multi-disciplinary team
- Expert team could include
  - Thermal hydraulics experts
  - Experts in plant operations including plant response

# Recent Advances in HRA

- The HRA guidance does not include references/discussions on recent HRA advances
  - Provide additional guidance on qualitative analysis
    - Halden Benchmarking studies (2011/2012)
    - IDHEAS
    - NUREG-1921 – Fire HRA guidelines
- SDP cases often involve conditions/situations where the HRA methods were not designed /benchmarked, such that the
  - qualitative discussion of staffing,
  - cues,
  - procedures
  - timingare important to establishing the degree of confidence in the HEP.

# Treatment of Dependencies

- The RASP Handbook recognizes that *“Simply having two or more HFEs together in a sequence or cut set does not make them dependent”, which is good!* however, this is contradicted later in the document
  - *“An analyst should not use a minimum joint HEP of less 1E-06 for SDP analyses. Therefore, a SDP analysis always assumes some level of dependence between HFEs even if the specific reason for that dependence cannot be identified”.*
- Industry believes that minimum joint HEP of 1E-6 is too conservative if independence can be shown (See next slide)
  - Criteria for defining independence when assessing Joint HEPs should be included.
  - A minimum joint HEP could be used applied as a screening tool to make sure that multiple HFE scenarios don't get screened, and then rely on constructing a qualitative story to come up with a final judgment on whether the scenario warrants additional justification

# Minimum HEP

- Section 9.3 is generally accepted by the industry, however, the discussion does not reflect conditions where this could be overly conservative.
- Any dependency floor applied is arbitrary, there is no technical basis to support the choice.
- A dependency floor can be useful for screening, however, using an absolute floor beyond that **distorts the overall risk profile**:
  - Application of a minimum joint HEP equates cutsets with 3-4 opportunities for operator recovery with those cutsets with 10-12 opportunities for recovery.
  - Effects calculation of component and operator action risk importances such that real drivers may be masked.
  - Does not help identify deficiencies or opportunities for improvement, because the cause is not known or unspecified.
- There is a general understanding that PRAs are less about the absolute value of risk, e.g., CDF, LERF; and more about the relative importance of the PRA constituents, which is why PRA should be “best estimate,” not overly conservative.
  - Uncertainty should be treated by sensitivity studies

# Uncertainty

- Guidance currently lacks discussion on uncertainty
  - No guidance is provided to determine the impact of the assumed minimum HEPs, which are a source of uncertainty.
- Guidance should be included to assess the importance (i.e., perform sensitivity analysis) of the assumed HEP and/or dependency values including consideration of independence.
- EPRI 1026511 and NUREG 1855– Uncertainty in risk informed decision making



# EPRI HRA User Group Dependency Committee

- HRA Dependency Committee
  - First formal meeting at Risk Technology workshop next week
  - NRC Research provides input to the committee
- Overall Goal of Committee
  - Provide guidance on minimum Joint HEPs
  - Provide guidance on the application of dependencies.
  - Determine if there is a need for future research.

# Questions