Suggestions on Incorporation of More Realistic Methods in the RASP Handbook

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Overview

- CCF
  - Concerns
  - Suggested improvements
- HRA
  - Concerns
  - Suggested improvements

CCF Overview

- Concerns
  - High threshold for independence
  - Guidance for analysis of random failures and parameter estimation could be more detailed
- Suggestions
  - Enhanced background discussion on CCF
  - Improved guidance on use of root cause analysis
  - Refined qualitative screening approach
  - Expand guidance on estimation of CCF parameters

Enhanced Background on CCF

- Suggest adding discussion on CCF that emphasizes the relevance of
  - Susceptibility of components within a CCCG to fail due to a particular root cause
  - Coupling factors that create condition for multiple components to be affected by the same cause

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Improved Guidance on Use of Root Cause Analysis

- RASP Handbook cautions against relying on root cause analysis results
- Root cause analysis is essential to determining CCF potential
  - Well-understood cause with no potential for CCF – independent
  - Cause not well-understood – random
- Suggest revising discussion on root cause analysis to emphasize importance in determination of CCF potential

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Potential Qualitative Screening Approach

- RASP Handbook does not appear to give guidance on refining analysis of potential for CCF for events due to random causes
- Coupling mechanisms need to be appropriately characterized to later estimate CCF parameters
- Propose checklist approach to screening coupling mechanisms for random failures

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Potential Qualitative Screening Approach

- Checklist areas
  - Design-based similarity
  - Quality-based similarity
  - Operational-based similarity
  - Maintenance-based similarity
  - Environment-based similarity

Guidance on Estimation of CCF Parameters

- Use of generic CCF parameters can result in over-estimation of contribution of CCF
  - Significant influence on risk evaluations
  - CCF parameters should be based only on applicable events that cause the same failure (e.g. with the same coupling mechanism)
- Particularly important step in analysis of events due to random causes

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Guidance on Estimation of CCF Parameters

- For random failures
  - Cannot necessarily identify the cause of failure, but may be able to exclude some potential causes
  - CCF events due to non-applicable coupling mechanisms can be excluded from the data set used to estimate the CCF parameter
- Suggest incorporating similar guidance and adding an illustrative example

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HRA Overview

- Concerns
  - Insufficient detail on recovery credit
  - Use of SPAR-H
    - Level of detail can be limited
    - Guidance for selection of PSF values needed
    - Dependency analysis tree should be expanded to include Zero Dependence
- Suggestions
  - More in-depth discussion on recovery credit
  - General HRA methodology improvements

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Recovery Credit Details

- Suggest more closely tying recovery credit for specific recovery actions to the appropriate initiating events

Examples of Initial Failure Event(s)	Potential Recovery Action
Automatic actuation fails	Manual actuation
Operator fails to recognize the need to take action (diagnosis failure)	Additional cues or re-visitation
Test and maintenance unavailability	Restore to service (if Tech Spec inoperable for the test/maintenance but can be returned to service quickly)
Failure on demand (electrical, (e.g. fuse or other electrical fault which can be recover)	Replace fuse or if a control power problem, locally manually shut the breaker

Examples of Initial Failure Event(s)	Potential Recovery Action
Failure on demand (mechanical)	Use redundant SSC or a functionally similar component; or repair
Failure to run	Similar electrical / mechanical considerations as in failure on demand
System level failure (e.g. loss of CCW system or loss of offsite power as an initiating event)	Empirical system recovery data
Procedurally-directed manual action in the EOPs	Conduct the procedurally-directed manual action

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General HRA Methodology Improvements

- RASP Handbook directs analyst to use SPAR-H, but does not discuss known limitations
  - One PSF, such as timing, can drive the HEP
  - With the more detailed approaches used in other methods (both industry and NRC), training or procedures could offset timing
- Suggest using SPAR-H as a screening method and allowing use of more detailed methods

Conclusion

- RASP Handbook generally offers succinct guidance on risk assessment of operational events
- Suggested changes could
  - Improve consistency
  - Lead to more realistic results