

Best-Estimate Plus Uncertainty Approaches to Dose Analysis

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Background



- Many safety analyses are applying a best-estimate plus uncertainty (BEPU)
 - Currently approved for 50.46 LOCA calculations for Peak Clad Temperature
 - NEDE-33005P-A GNF TRACG LOCA PCT Application
 - NEDE-32906P-A GNF TRACG AOO Calculations
- Radiological analysis is a good candidate for applying BEPU approaches
 - Many independent inputs that are defined by probability distributions
- Very similar approach to that assessed by NRC in 1996 in ML003702950
 - Suggested by ACRS
 - Applied to PWR MSLB and SGTR

Current Regulatory Guidance

- Section 5.1.3 of Reg Guide 1.183 Rev. 1
 - *“The licensee should select the numerical values to be used as inputs to the dose analyses with the objective of determining a conservative postulated dose.”*
- For input parameters subject to a probability distribution, the selection of the worst-case (e.g., 10th percentile) for all inputs can lead to overly-conservative dose results.

Inputs Subject to Probability Distribution

Dose Inputs Subject to a Potential Probability Distribution (Not All Inclusive)

5% X/Q

Worst 2-Hour X/Q Occurs at Time of Peak Release

10% Powers Aerosol Removal Rate

Worst Case Core Source Terms

10% Containment/Drywell Spray Removal Rate

Concurrent Independent LOOP

SG Tube Failure is at Worst-Case Location (i.e., top of tube bundle)

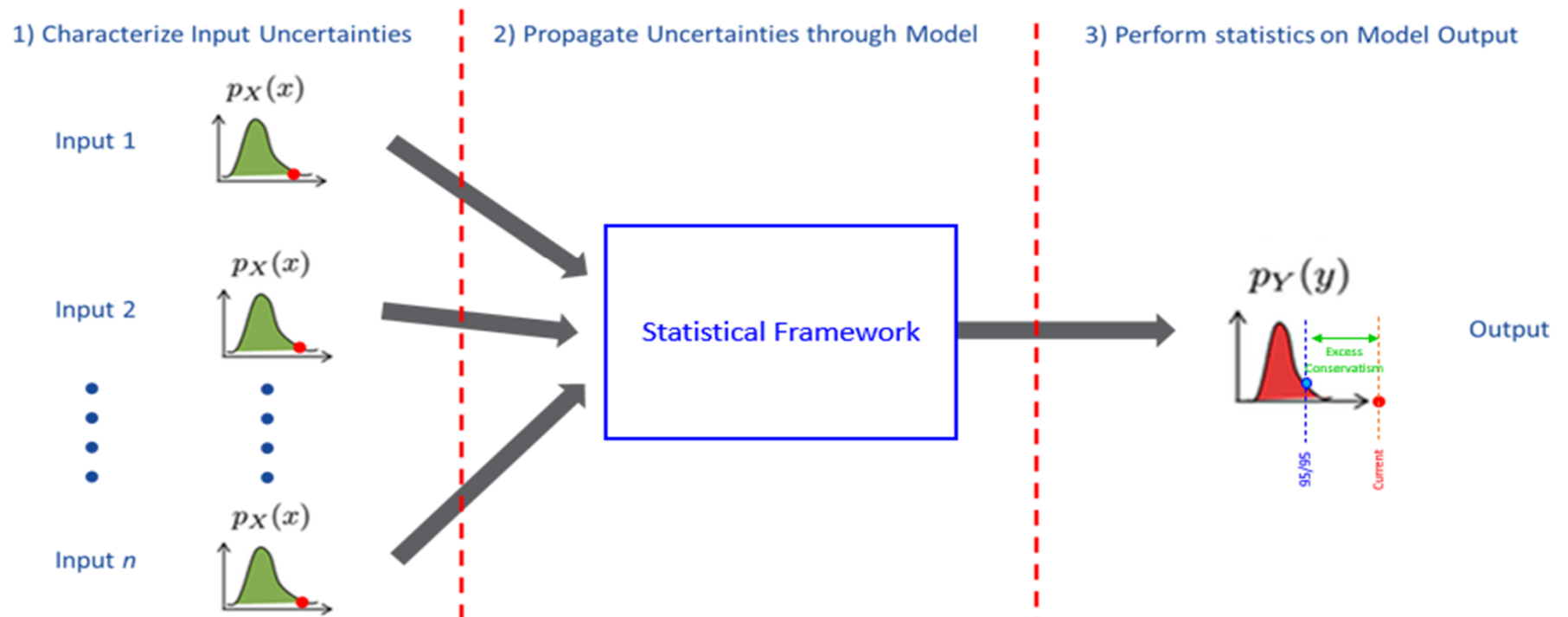
Dropped Bundle in High Peaking Bundle and Impacts Other High Peaking Bundles

Worst-Case Single Active Failure

Control Room Breathing Rates

Approach Overview

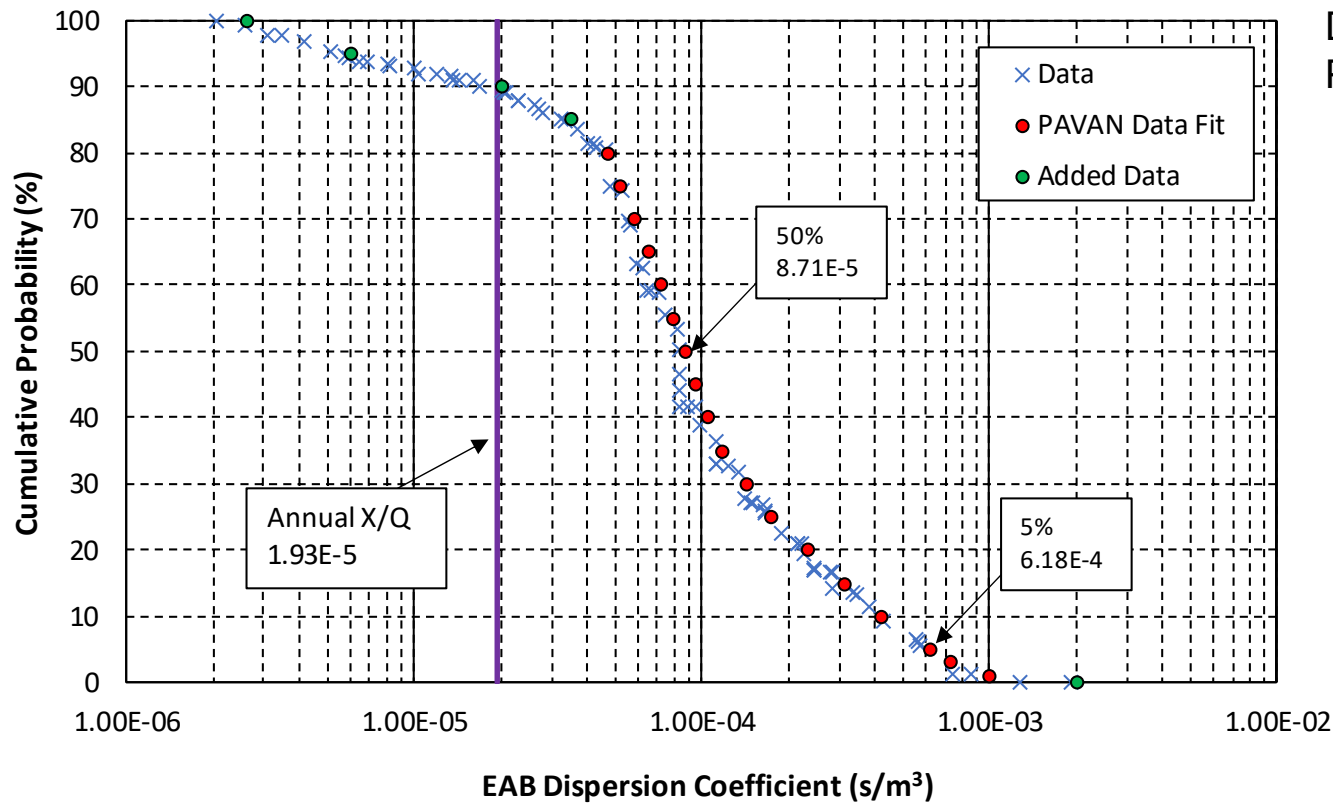
Best Estimate Plus Uncertainty (BEPU)



EAB Short-Term Probability Distribution



EAB Short-Term Overall Site Limit X/Q Distribution



Direct from
PAVAN Output

Conclusions

- Consistent with current regulations
 - Continues to provide “reasonable assurance” of meeting the 50.67 regulatory limits
 - Consistent with other approved methodologies (e.g., PCT)
- Consistent with current regulatory guidance
 - Meets the objective of determining a conservative postulated dose per Section 5.13 of RG 1.183 Rev. 1
- For additional clarity, does Section 5.1.3 need a statement to the effect of:
Best-Estimate Plus Uncertainty approaches that develop conservative doses based on sampling input distributions are acceptable and will be evaluated on a case-by-case basis.