



Phenomenological Uncertainties in SOARCA Study

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Outline

- Uncertainty Quantification Phase
- Focus on BWR Long Term Station Blackout
- Melt Progression Uncertainties
- Sequence Progression Uncertainties
- Atmospheric Transport Uncertainties
- Emergency Response Uncertainties
- Expectations

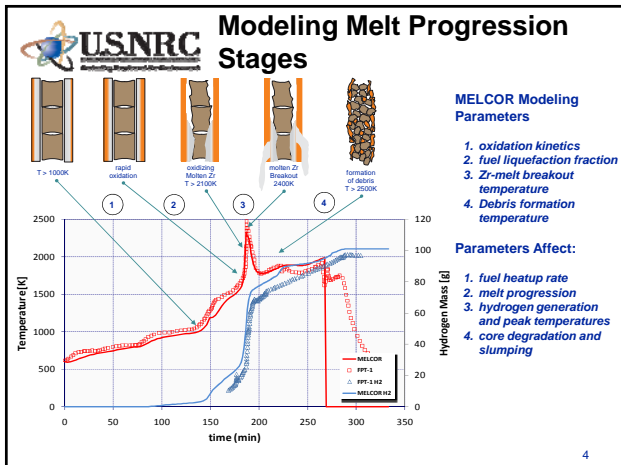
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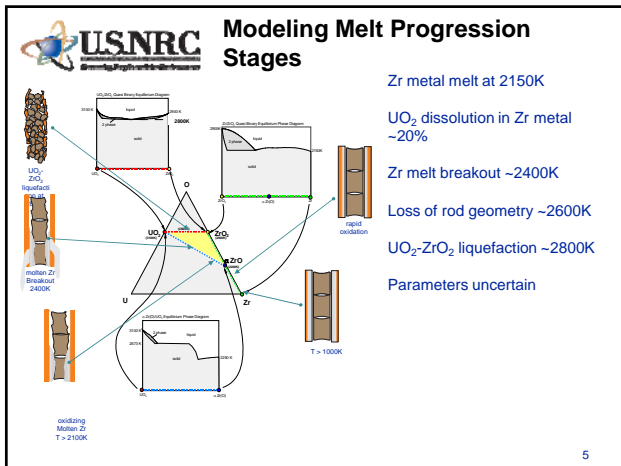


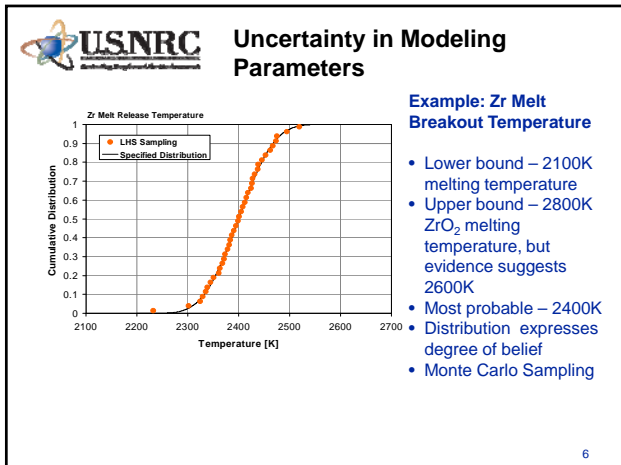
MELCOR UNCERTAIN PARAMETERS

- MELCOR uncertain parameters pertain to:
 - Accident sequence
 - In-vessel accident progression
 - Ex-vessel accident progression
 - Containment behavior
 - Chemical forms of iodine and cesium
 - Fission product release, transport, and deposition

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MACCS Consequence Uncertainties

- Distributions for non-site-specific parameters based on expert elicitations (NUREG/CR's 6244, 6526, 6545, and 6555)
- Site-specific parameters will be developed as part of the study
- Significant parameters for uncertainty analysis include
 - Vertical and crosswind dispersion
 - Dry deposition velocity
 - Wet deposition scavenging rate
 - Breathing rate
 - Inhalation protection factor



Example Evacuation Delay

- Delay to Evacuation is the length of the sheltering period from the time the public enters the shelter until the point at which they begin to evacuate.
- Delay to shelter is typically 1.5 hours for LTSBO: therefore delay to evac of 0.0 hrs means that evacuees leave at 1.5 hours.

parameter	baseline	distribution
evacuation delay – cohort 1 Public	1.0	LB = 0.0 hr UB = 4.0 hr
evacuation delay – cohort 2 10-20 Shadow	1.0	LB = 0.0 hr UB = 4.0 hr
evacuation delay – cohort 3 Schools/0-10 shadow	0.75	LB = 0.0 hr UB = 4.0 hr
evacuation delay – cohort 4 Special Facilities	4.25	LB = 0.0 hr UB = 6.0 hr
evacuation delay –cohort 5 Tail	4.25	LB = 4.0 hr UB = 8.0 hr

Note: Evacuation delays are sampled independently for each cohort and for each radial ring within each cohort. Distributions to be determined.



Example Evacuation Speed

- 3 speeds are established in WinMACCS for each cohort: early, mid and late.
- Early is typically 15 minutes for the public and shadow (2 largest groups).
- Late speed begins after evacuees have exited the EPZ.
- Therefore we are considering varying the mid speed which covers the majority of the travel time within the EPZ.

parameter	baseline	distribution
evacuation speed – cohort 1 Public	3 mph	LB = 1.0 UB = 10.0
evacuation speed – cohort 2 10-20 Shadow	3 mph	LB = 1.0 UB = 10.0
evacuation speed – cohort 3 Schools/0-10 shadow	20 mph	LB = 10.0 UB = 30.0
evacuation speed – cohort 4 Special Facilities	20 mph	LB = 10.0 UB = 30.0
evacuation speed – cohort 5 Tail	20 mph	LB = 10.0 UB = 30.0

Note: Evacuation speeds are perfectly rank correlated between cohorts. Cohorts 1 and 2 are triangular with mode at 3. Remaining cohorts are uniform distribution.
