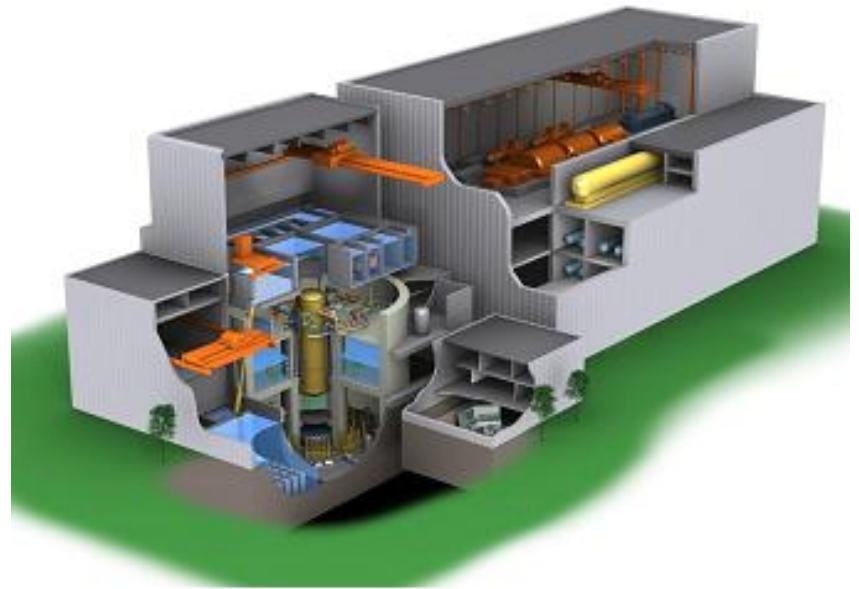


# Reactor Building Holdup

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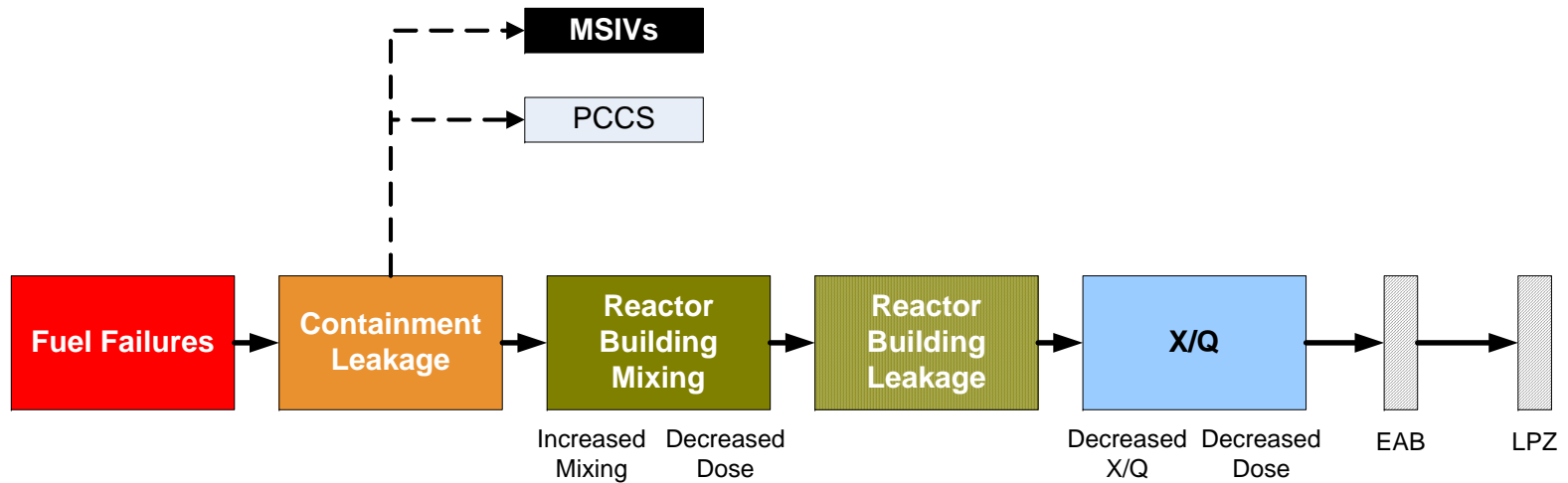
GE Hitachi Nuclear Energy



## ESBWR design meets 10CFR52.47(a)(2)(iv) fission product release limits without a secondary containment

The ESBWR Reactor Building is designed as a passive fission product holdup volume and credited in the LOCA dose analysis

- Robust Seismic Category 1 concrete structure
- Encloses Primary Containment
- Compartmentalized
- Door designed to limit leakage
- Doors & hatches have monitoring and alarms
- Operability and Testing are prescribed in Technical Specifications



Assumption	Significant core melt	0.4% weight/day	40% assumed	No plate out 50%/day assumed	<u>Non-mechanistic Concurrent Conditions:</u> High wind velocity – high building leakage Low wind velocity – stable atmosphere & low dispersion	
Reality	No LOCA induced fuel failures	0.3% weight/day (ILRT @ 75% La) (LLRT @ 60% La) Containment depressurizes below design pressure	Verified by analysis	Some plate out Verified by analysis, preop test and surveillance	Wind ↑ →	RB leakage ↑ X/Q ↓ Dose ↑ Dose ↓

	<b>X/Q Review</b>		<b>ESBWR Candidate</b>	
	Regulatory Limit 10CFR50.47(a)(2)(iv)	ESBWR as designed	Site 1 estimated	Site 2 estimated
LPZ (30 days)	≤ 25 Rem	20.37 Rem	1.54 Rem	7.7 Rem
EAB (2 hrs)	≤ 25 Rem	15.59 Rem	1.76 Rem	4.63 Rem
Control Room (30 days)	≤ 5 Rem	4.97 Rem	3.21 Rem	2.37 Rem

# Monitoring Radioactivity Releases

- Stack radiation monitors are safety-related
- Primary function is isolation of CONAVS and REPAVS on detection of high radiation
- RB also isolates on loss of power
- Consistent with assumptions in dose calculations
- With power available, RB HVAC [CONAVS/REPAVS] can establish flow through a purge exhaust filter which is monitored and can maintain a negative building pressure
- Monitoring RB releases after isolation performed by field monitoring teams – NEI 99-01, Methodology for Development of Emergency Action Levels, provides guidance for EPlan implementation same as existing plants
- ESBWR conforms with GDC 64

## ESBWR design meets 10CFR52.47(a)(2)(iv) fission product release limits without a secondary containment

### Analytical conservatisms:

- Accident source term
- Containment Leak Rate
- Impossible worst case combination of RB leakage and X/Q value
- (High Wind RB leakage/Low Wind X/Q)

### Support for analytical margin

- No LOCA-induced fuel failures
- Containment Leak Rate
  - Supported by Containment Leak Rate testing
- Reactor Building leakage
  - Supported by analysis to confirm design margin assumptions
  - Supported by SR 3.6.3.1.1 & 2 (doors & hatches)
  - Supported by SR 3.6.3.1.4 exfiltration testing
- Reactor Building mixing
  - Gothic Reactor Building analysis to confirm analysis value
- X/Q default values used for DCD

ESBWR Dose limits are met without a secondary containment  
Secondary containment is not required by regulations