

# Monticello Nuclear Generating Plant

Pre-Application Meeting  
February 8, 2018

Risk-Informed Exemption Request Regarding Exposed Structural Steel

# Meeting Purpose



- Describe a future exemption request
- Establish a common understanding of the scope of the request
- Establish a common understanding of the schedule
- Obtain NRC feedback

# Summary of Issue



- Identified exposed structural steel supporting the Cable Spreading Room floor
- The Cable Spreading Room has been grouped into Fire Area VI
- Safe Shutdown Strategy for Cable Spreading Room is Alternate Shutdown System
- Division II Equipment is credited for remainder of Fire Area VI
- Barriers between Cable Spreading Room and adjacent fire zones in Fire Area VI not previously credited to meet 10 CFR 50, Appendix R, III.G.2

# Cable Spreading Room Location



- 939 ft Elevation of Plant Administration Building (PAB)
  - Below Control Room
  - Above Battery Rooms and Access Control
- Existing Appendix R Barriers
  - North Wall (Turbine Building)
  - West Wall (Reactor Building)
  - Ceiling (Control Room)
  - Floor (Portion over Division 2 Battery Room)
- Barriers that can be qualified
  - East Wall (PAB)
  - South Wall (PAB)
- Scope of Exemption Request
  - Floor not above the Division 2 Battery Room

# Immediate Corrective Actions



- Applied fireproofing material to the exposed structural steel columns supporting the Cable Spreading Room floor
- Removed combustible materials from fire zones below the Cable Spreading Room

# Considered Resolution Paths



- Fireproof the exposed structural steel horizontal beams
- Modify the evacuation path from the control room to alternate shutdown panel
- Request an exemption from 10 CFR 50, Appendix R, III.G.2



# Fireproof Structural Steel



# Modify Evacuation Path



- Existing path
  - Simple
  - Most Direct
  - Indoor travel
  
- Alternate Path
  - Complex
  - Longer
  - Outdoor Travel
  - Plant Modification Required



# Proposed Solution



- Request an exemption from 10 CFR 50, Appendix R, III.G.2

- NUREG-0991, Supplement 2, approved a structural steel survivability analysis for the Limerick Generating Station
  - Using conservative assumptions, the temperature of the steel is calculated after three hours of a postulated fire. If the temperature of the steel does not exceed 1100°F at the end of the three hours, the steel need not be protected.
- The NRC found that the methodology provides an adequate level of fire protection
- Subsequently, several plants used this approach to receive exemptions from 10 CFR 50, Appendix R, III.G.2
- Methodology screened out applicable areas due to lack of specific combustibles

- The ASME/ANS RA-Sa-2009 PRA Standard High Level Requirement FSS-F does not require modeling the structural collapse of the room via structural steel failure in the absence of a high-hazard initiator
- The area below the Cable Spreading Room was determined to not house any high hazard initiators
- Structural steel failure in the Cable Spreading Room floor is not considered in the MNGP Fire PRA
- Therefore, a quantitative evaluation of this fire scenario cannot be performed

# Risk-Informed Exemption



- Submitted using the guidance in Regulatory Guide 1.174
- Qualitative discussion on the very small increase in risk
- Will describe the remaining applicable principles from RG 1.174
  - Maintain defense in depth
  - Maintain sufficient safety margins
  - Monitored using performance-based aspects

- FDS is chosen as the best available fire simulation tool based on a review of NUREG-1824
- Two bounding analyses were performed using FDS
  - Plant Access Control Analysis
  - Bounding Division 1 Battery Room Analysis
- Sensitivities were created for potentially significant modeling parameters such as fire dimensions, simulated grid size, fire soot yield, fire initiator (electrical cabinet vs transient), and door position.

# FDS Model Conservatism

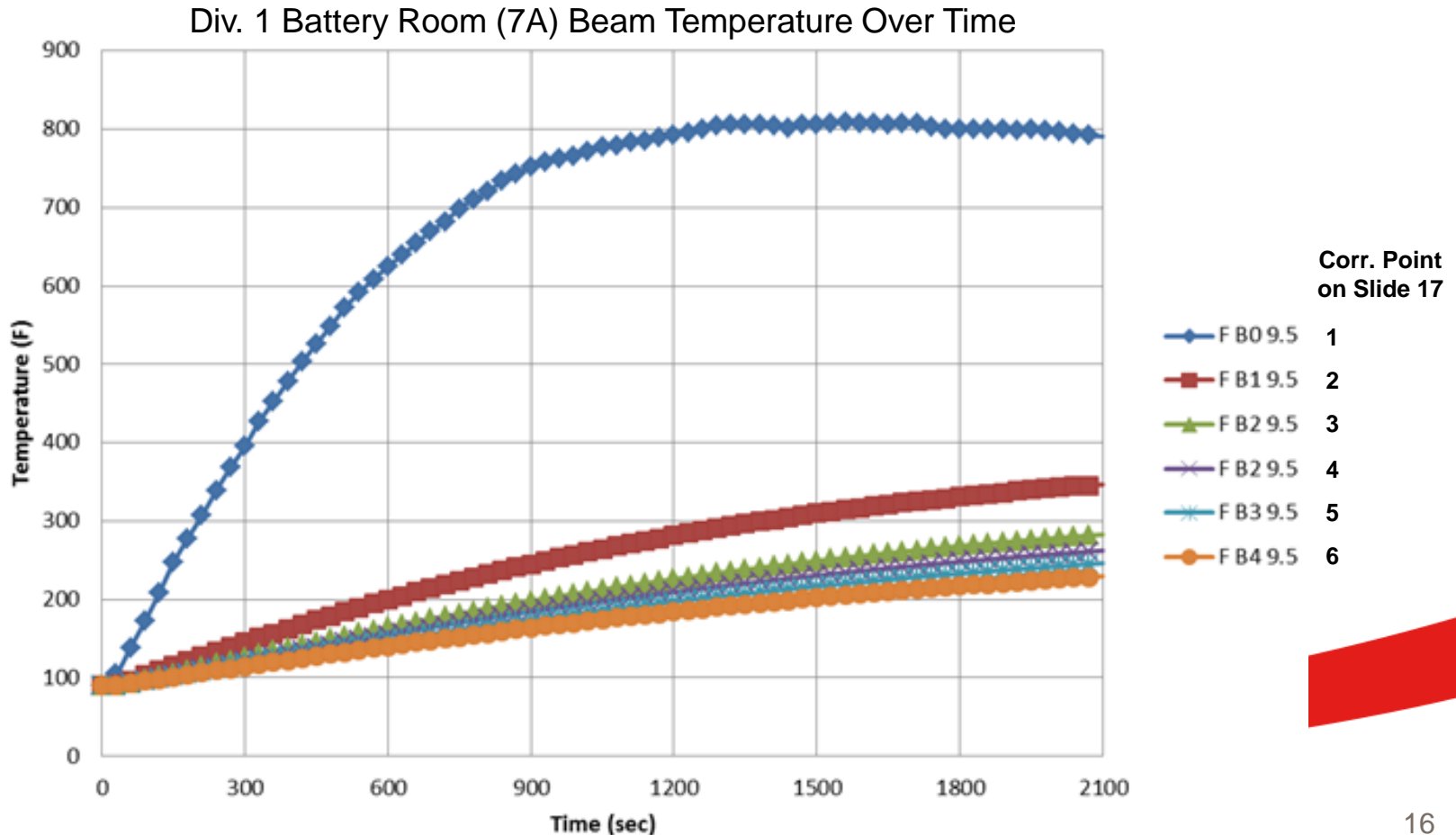
- These conservatisms apply to both analyses
  - FDS only simulates one dimensional heat conduction therefore conduction of heat away from the fire plume is not accounted for.
  - The 98<sup>th</sup> percentile fire heat release rates (HRR) from NUREG/CR-6850 were used to bound any potential fire initiator. Transient fires were conservatively assumed to burn continuously for an hour.
  - Fire suppression is assumed unsuccessful even though the Division 1 Battery Rooms have fire detection that directly alarms the control room
    - Remainder of the analysis areas do not have installed fire detection
  - It is assumed that a fire would progress undetected by personnel throughout its duration



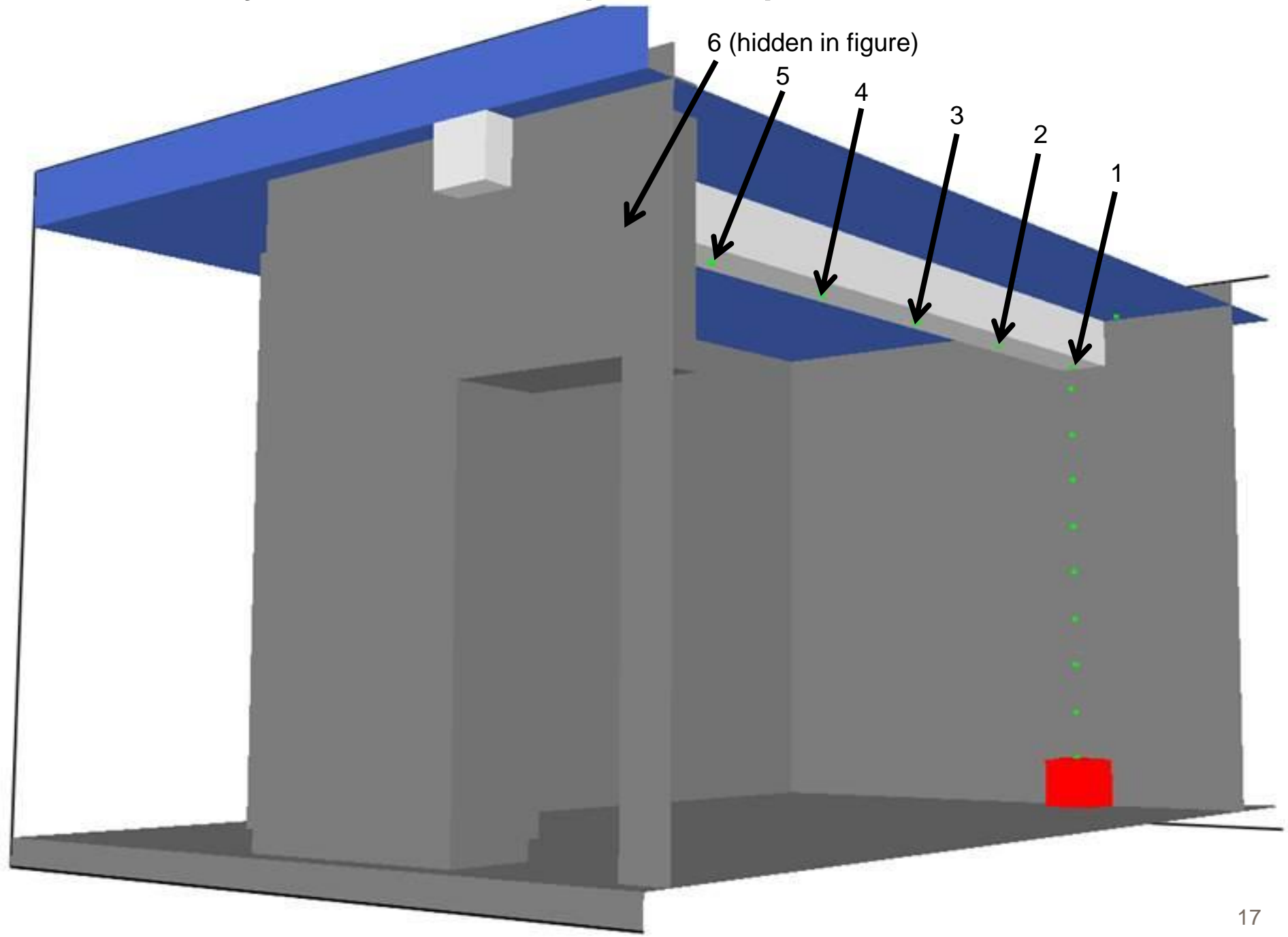
- Further conservatisms for the battery room model include:
  - Ventilation to and from the rooms are assumed failed for the duration of the fire simulations.
  - The door to the room is assumed open to ensure the fire does not become oxygen limited. Sensitivities with the door shut show the fire burns out from lack of oxygen.
  - Fire location (wall and corner), size (1 ft<sup>3</sup>), and room (fire zone 7A, ~37% smaller) were chosen to be bounding.

# FDS Model Conclusions

- This evaluation demonstrates that a fire with a conservatively assumed constant heat release rate of 317kW (NUREG/CR-6850) would remain well below the failure threshold (1100°F) of the structural steel beam.



# Div. 1 Battery Room FDS Mockup and Temperature Measurement Points



# Summary



- Exposed structural steel in a portion of the Cable Spreading Room floor
- Risk-informed exemption from 10 CFR 50, Appendix R, Section III.G.2
  - Discuss the increase in risk qualitatively
  - Will use the new revision of RG 1.174
- Anticipate submittal in March 2018