

# Revisiting the Level of Readiness for a Nuclear Criticality Accident using an Event Timeline

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# Detailed Accident Scenario

Operations, safety, and emergency responders participated in producing a detailed accident scenario to clearly identify actions associated with the first hour for drill development and follow-on actions for incident action planning\*

- Parallel activities
- Formal and informal communications timelines
- Concurrent resource demands
- Predecessor relationships

\*Consistent with ANSI/ANS-8.23-2007 requirements and recommendations

# Assessing the Criticality Event Timeline

The detailed accident scenario increased visibility of

- The demands on first aid resources from the building evacuation
- Effective and timely notifications
- Personnel sheltering and transport
- Quick-sort procedures timing and location
- Contamination control measures
- Mobilization of offsite technical support staff
- Measures to release exposed personnel not requiring immediate medical attention

# Estimating the Number of Affected Staff

Building structure and laboratory arrangement that impact the evacuating staff

- Aging workforce
- Multi-story older building with narrow stairs and hallways
- Structure virtually transparent to radiation
- Winter temperatures, wind, and ice
- Summer extreme heat
- Construction changes to terrain between building and staging areas

A running evacuation to limit subsequent dose likely increases the number of first-aid cases and possible medical transport due to stress, slips, trips, and falls impacted planning

# Estimating the Number of Affected Staff

Criticality will expose a large percentage of building occupants to enough neutron radiation to trigger quick-sort actions

- Small number of medical emergencies (within 5 meters of criticality)
- Large number of staff exposed to a level of quick-sort detection
- Radiation protection staff and building emergency response team exposure anticipated

# Estimating the Number of Affected Staff

## Solution criticality and building structure impacts

- Pulses continue to expose emergency responders within 12 meters of the building
  - Evacuation zone radiation field varies; any reentry is likely to result in additional exposure without careful planning
  - Additional firefighter training on evacuation zone and building hazards
- Building effluent system will quickly sweep large quantities of fission gas to areas around the building
  - Fission gas releases will continue with pulsing criticality
  - Event may not terminate for several hours, up to several days

# Tackling Communications Challenges

- ▶ Informal communications from personnel who evacuated the building or witnessed the evacuation will begin immediately and quickly extend to secondary and tertiary callers that may overwhelm information from vetted channels
- ▶ Media relations plans were evaluated anticipating inquiries with very specific data from these informal information networks
- ▶ Senior management and communications personnel were included in periodic briefings covering the accident scenario to help field questions or interpret data
- ▶ A communications package developed by technical and communications staff would be an effective tool to address disconnected data distributed through social networks

# Planning Emotional Support

- ▶ When accidents irradiate a large number of personnel, demands on human relations specialists and dose assessors may exceed planning
- ▶ Logistic challenges include:
  - Identifying facilities that could be available within hours and methods of transporting affected staff
  - Technical support personnel to address technical questions from affected workers and families
  - Human resources staff to provide emotional support and information packets addressing anticipated questions

# Periodic Reviews

- ▶ A written Criticality Accident Scenario is a valuable review and training tool
- ▶ Changing communications channels, including widespread use of personal wireless communications and social networking, challenge media relations plans
- ▶ Support staff planning and training must be extended to address affected personnel beyond the initial building evacuation



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Questions?