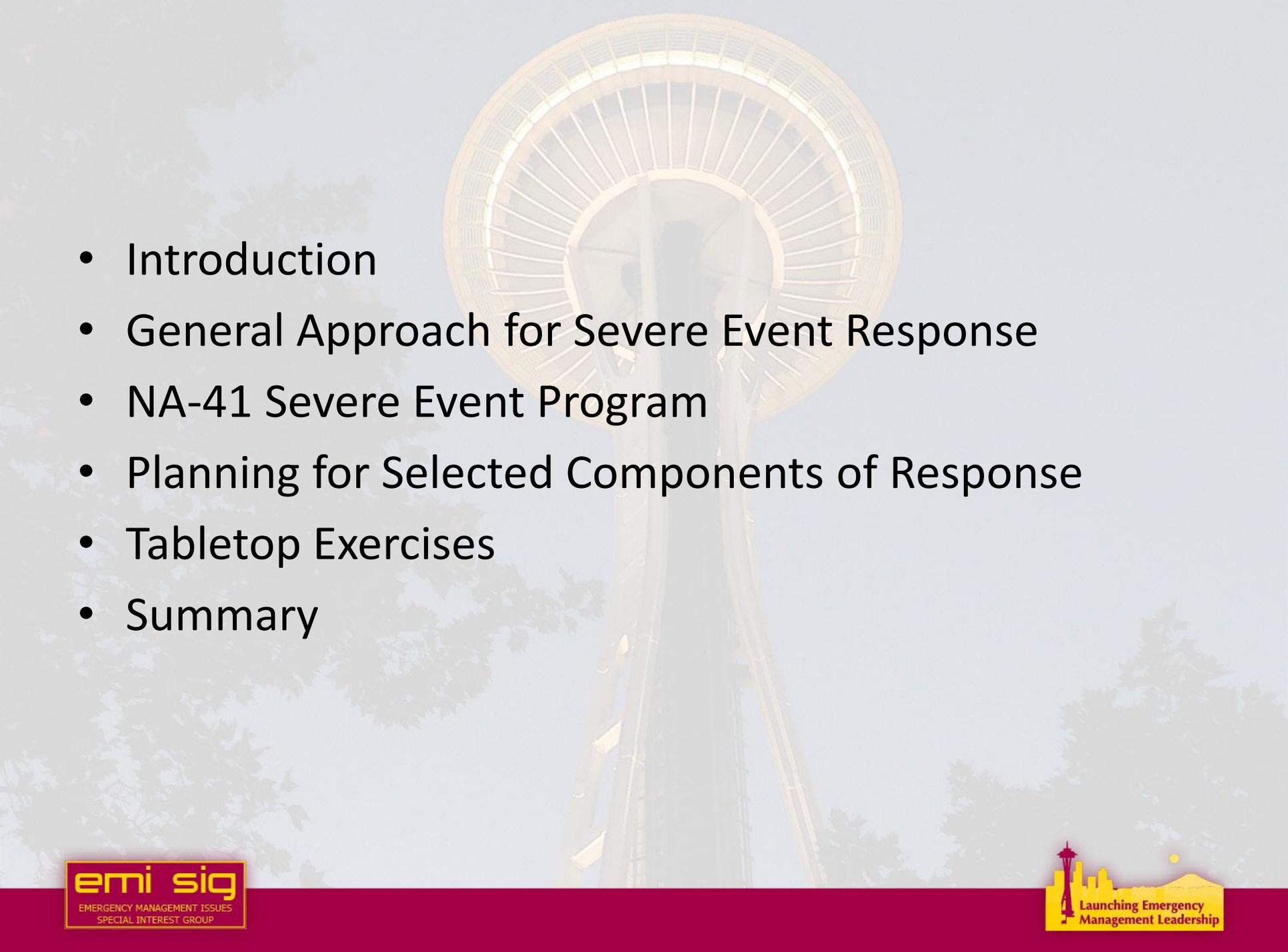


DOE/NNSA “Severe Event” Emergency Management Programs Impact of Fukushima Nuclear Accident

Dave Freshwater, Bill Froh
Bill Hawkins, Steve Lockett, Jim Powers
Office of Emergency Management (NA-41)

- 
- Introduction
 - General Approach for Severe Event Response
 - NA-41 Severe Event Program
 - Planning for Selected Components of Response
 - Tabletop Exercises
 - Summary

Fukushima Event

11 March 2011

- Earthquake of 9.0 on the Richter Scale occurred 112 miles (180 km) off the coast of the Fukushima Daiichi Nuclear Power Station
- Peak acceleration exceeded the design basis acceleration in the horizontal direction

Fukushima Event

11 March 2011

- Japan Meteorological Association issued a major tsunami warning, indicating the potential for a tsunami at least 3 meters high
- Maximum tsunami height impacting the site was estimated to be 14 to 15 meters, which exceeded the design basis tsunami height of 5.7 meters



Fukushima Lessons Learned

- Effectiveness of Onsite Response
 - Onsite Damage (Structures, Systems, Equipment, Debris)
 - Hazardous Material Environment (High Radiation)
 - Multiple-facility Events (3 Operating Reactors Damaged)



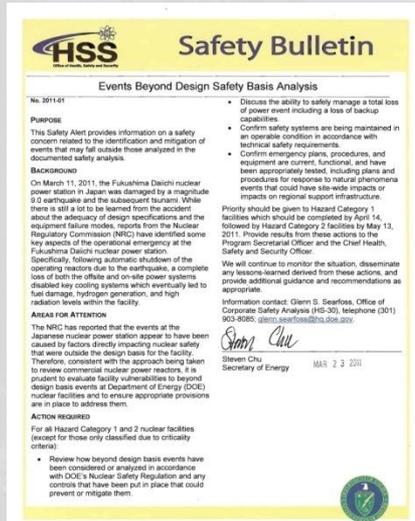
Based on information from: ***Special Report on the Nuclear Accident at the Fukushima Daiichi Nuclear Power Station***, INPO 11-005, November 2011

Fukushima Lessons Learned

- Availability of Offsite Response Assets
 - Little Assistance, Damaged Roads, Few Offsite Personnel
- Loss of Critical Support Systems/Capabilities
 - Power (No Primary Or Backup, Limited Portable Generators)
 - Communications (None)



Post-Fukushima Nuclear Accident



- Issued **Safety Bulletin 2011-01, Events Beyond Design Safety Basis Analysis**

• Conducted a **Nuclear Safety Workshop**

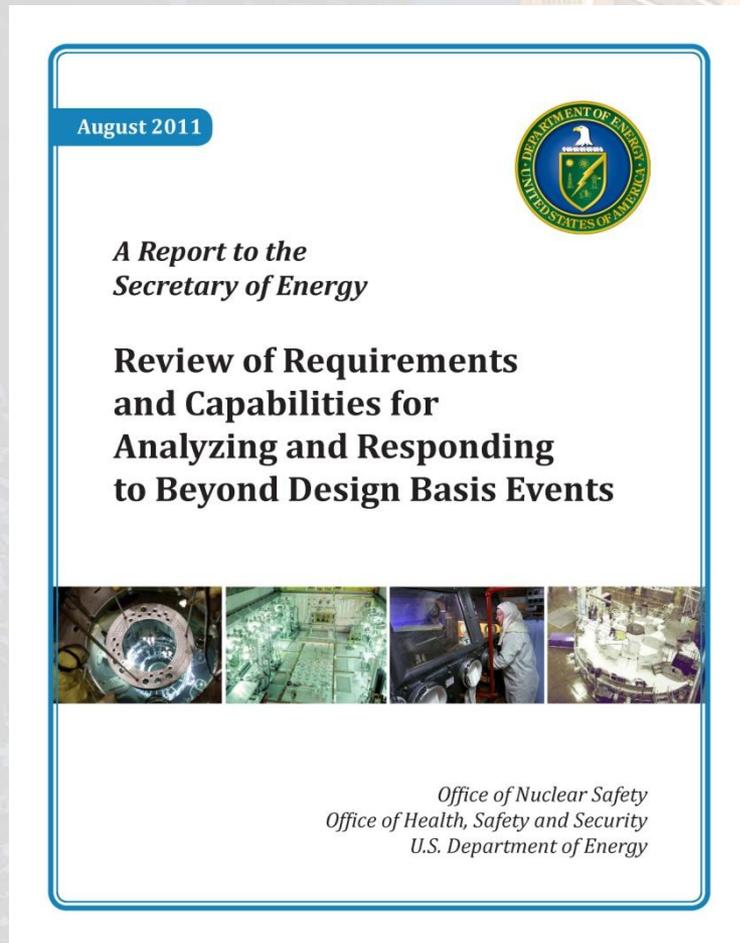
- DOE Evaluation of/Design for BDBE,
- Natural Phenomena Hazards,
- Emergency Management



Working Together to Enhance Nuclear Safety

DOE • NRC • EPA • DNFBS • NNSA • DHS • INPO

Post-Fukushima Nuclear Accident (cont'd)



- **Report to the Secretary of Energy, *Review of Requirements and Capabilities for Analyzing and Responding to Beyond-Design-Basis Events***

DOE Fukushima Report

Emergency Management Recommendations

- Initiate revisions of DOE O 151.1C and the DOE G 151.1-series to include requirements and guidance for:
 - Analyzing the emergency planning needed to respond to severe events
 - Integrating the analysis of severe events performed as part of the documented safety analysis into emergency planning
 - Planning for the response to simultaneous accidents at multiple facilities

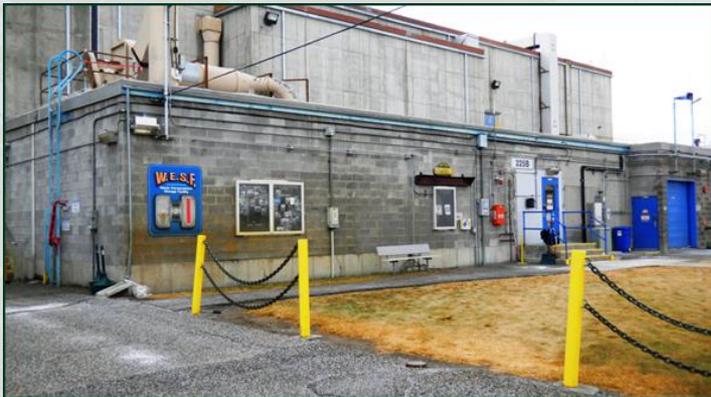
DOE Fukushima Report

Emergency Management Recommendations

- Planning for the response when support services may not be available
- Coordinating site, facility, and community emergency plans
- Integrating the site's emergency management, security, and continuity-of-operations activities
- Integrating severe event requirements and guidance with DOE G 421.1-2, DOE-STD-3009-94, and DOE-STD-1189-2008 or their updates
- Sites with nuclear facilities conduct emergency drills and exercises focusing on severe events

HS-30 Pilots

- Three Pilots
 - ORNL HFIR – March 5
 - Hanford WESF – May 21
 - SRS H Canyon – June 18



HS-30 Pilots

- HS-30 guidance looks at critical safety functions
 - What scenarios cause critical safety functions to fail
- Emergency Management is participating
 - Look at how scenarios flow from safety side into EPHA and emergency program issues
 - Gain insights on implementation of draft guidance

General Approach for Severe Event Response

There are known knowns. These are things we know that we know. There are known unknowns. That is to say, there are things that we know we don't know. But there are also unknown unknowns. There are things we don't know we don't know.

Donald Rumsfeld

http://www.youtube.com/watch?feature=player_detailpage&v=GiPe10iKQuk

Proposed “Severe Event” Emergency Planning Guidance

- The broader term “*severe event*” is used rather than the term “Beyond Design Basis Event (BDBE)”
- “Severe events” (whatever the cause) are expected to:
 - Cause major disruptions/damage to site-wide and offsite infrastructure
 - Cause increased risk to onsite personnel, possibly resulting in injuries and fatalities
 - Potentially isolate a facility or site from onsite/offsite response assistance and infrastructure support

Proposed “Severe Event” Emergency Planning Guidance

- Applicable to all sites, not just nuclear, to protect life and safety of onsite personnel
- Also addresses non-nuclear facilities which contain hazardous materials

Proposed “Severe Event” Emergency Planning Guidance

- Focuses on these components of “severe event” response:
 - Initial Response to Health & Safety Impacts of the Initiating Event(s) (includes “self-help” programs)
 - Compensatory Measures (loss/degradation of support systems and/or response capabilities)
 - Later-Time Unified Response (State/regional/Federal resources become available)

NA-41 Severe Event Program

[In] disciplines that deal with essentially complex phenomena, the aspects of the events to be accounted for about which we can get quantitative data are necessarily limited and may not include the important ones.

Fredrich Hayek

Emergency Management Flows from Safety Programs

- Emergency Management depends on safety analysts to identify hazards and develop controls
- Analysis of responses to the Safety Bulletin showed inconsistent consideration of BDBE in safety analysis
 - Requirements and guidance changes in DOE G 421.1-2, DOE-STD-3009, DOE-STD-1189
 - Changes made in DSAs and other safety documents
- Changes flow to HS and EPHA
 - Always considered spectrum of events
 - Changes to BDBE may help shape severe event scenarios

Emergency Management Flows from Safety Programs

- Changes in DSA and other safety documents flow into
 - Alternate Operating Procedures
 - Emergency Operating Procedures
 - Limiting Conditions of Operation
 - “Walk-away” or safe shutdown procedures
- The ERO may end up overseeing many of these – especially safe shutdown

Planning for Hazardous Materials Releases at Multiple Facilities

- EPHA should contain information about the impact of hazardous material releases
- Existing requirements do not address scenarios where the same severe event triggers hazardous material releases from multiple facilities

Planning for Hazardous Materials Releases at Multiple Facilities

- If site-wide ERO not available, integrate control at the local event scenes into a Unified Command structure (IAW NIMS)

Planning for Hazardous Materials Releases at Multiple Facilities

- Use National Response Priorities (40 CFR 300.317) to guide response
 1. Safety of human life,
 2. Stabilize the situation to prevent it from worsening, and
 3. Minimize adverse impacts to the environment
 - If sufficient assets are available, all three priorities may be addressed concurrently, but safety and stabilization are the highest priorities.

Planning for Severe Event Impacts

- Support Services May Not Be Available
 - Site may be isolated from the surrounding community
- Coordinating Facility, Site, and Community Emergency Plans
 - Within the NRF
 - National Incident Management System and Unified Command principles allows multiple jurisdictions to meet response priorities
 - Response assets from the State, regional and national levels are rapidly mobilized and pushed to control of the local unified command

Integrating Emergency Management, Security, and Continuity-of-Operations Activities

- Security plans may identify places where they cannot “walk-away”
- Continuity plans identify critical functions
 - Cannot walk-away from or establish restoration priority
- Continuity plans may also have already identified compensatory measures, such as existing plans for dealing with loss of power or communications capabilities

Planning for Selected Components

Prediction is very difficult, especially if it's about the future.

Niels Bohr

Compensatory Measures

- Measures to compensate for the loss or degradation of support systems or capabilities that play a critical role in
 - Hazardous material control
 - Emergency responseand that could suffer damage due to the impact of a severe event initiator
- Measures are alternate: designs, procedures, equipment, components, structures, or organizational arrangements

Compensatory Measures

- These measures can vary considerably among facilities
 - Differences in facility designs
 - Dependence on the support system or capability
- Need for these measures is determined on a case-by-case basis for each facility to avoid expending unnecessary resources
- The compensatory measures should be developed by assuming that the system or capability is out of service and then identifying measures to compensate for the loss

National Response Framework

- To prepare for a potential severe event, NRF stresses that leaders at all levels must communicate and actively support engaged partnerships by developing shared goals and aligning capabilities so that no one is overwhelmed in times of crisis.
- Goal is to provide layered, mutually supporting capabilities between onsite personnel and offsite Federal, State, tribal, and local organizations
- NRF calls these “engaged partnerships”

National Incident Management System

- NIMS utilizes Incident Command System
- Unified Command allows all agencies involved to provide joint support through mutually developed incident objectives and strategies established at the command level

Mass Evacuation Planning

- Large-scale evacuations resulting from a catastrophic event will require national-level coordination
- The Mass Evacuation Incident Annex to the *NRF* provides an overview of mass evacuation functions, agency roles and responsibilities, and overall guidelines for the integration of support in the evacuation of large numbers of people in incidents requiring a coordinated Federal response

Multiple Facility Response Analysis

- Evaluate hazard interactions among facilities
- Protective Actions
- Redundant Capabilities/resources
- Facility Accessibility
- Decision-making
- Prioritizing Response
- Initiator-caused Health and Safety Issues

“Self-Help” Programs

- In a severe event, response timelines are extended
 - Demand greatly exceeds available resources
- Many facilities already have some limited “self-help” programs
- If the site chooses to establish a formal self-help program, a graded approach (commensurate with hazards) should be used
- Many California facilities have extensive self-help programs

Tabletop Exercises

There is no limit to how complicated things can get, on account of one thing always leading to another.

E. B. White

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- Events to consider include severe weather (e.g, tornadoes, blizzards/ice, hurricanes, flooding) and earthquakes
- Consider preparing for the “worst-case” event
 - Sustained loss of power (disruptive loss of communications, power)
 - Loss of infrastructure (highways blocked/impassable, no utilities)
 - Structural Damage – On site debris
 - No offsite response resources

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- How to approach/address a severe event
 - We know what it is
 - We know the requirements, guidance
 - We kind of know what to do
 - What follows is an effective TT approach to a Severe Event

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- Basics
 - Purpose
 - Something new?
 - Base Program
 - Hazardous Material Program
 - Is it different?
 - Interfaces (planning and response)?
 - Additional exercises?

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- Principles
 - Planning –doing your homework
 - Preparedness
 - Mitigation
- Components of ICS Structure– useful?

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- What to do? Is this a Puzzle?
 - Fourth down and 47 yards
 - Punt? OR
 - Draw a plan in the dirt?
 - It is what you make of it
 - Determine the issues
 - Determine what we have – what we need
 - Identify the pieces – sort
 - start assembling

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- Homework
 - Flexible
 - Creative
 - Canvas-Solicit
 - responsible programs
 - offsite responders
 - offsite/out-of-area suppliers

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- ORGANIZING – Just one approach
 - Beg, Borrow, Recreate
 - NA-81’s “Thunder” Approach
 - NNX philosophy
 - Design, create visuals, modify photos, damage
 - Layout, Structure, Involvement
 - Use of building blocks to an extended, all players, TT

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- SETUP—Organizational Arrangement
 - Effective interaction, hear each other, focuses on events
 - Avoid piles/clusters
 - Horseshoe shape w/support elements
 - Two person “talking head” –tag team
 - Use of visual aids
 - Show and Tell vs. all lips
 - Use electronic white boards, flip charts, overheads, etc.
 - Site/area layouts, schematics, photos
 - Must illustrate events, where and what is transpiring

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- Audio Support – microphones
 - Facilitators, Main table
 - Support staff to facilitators or main table
- Identify (Tent cards) players, organizations
- Videotape? Future discussion/reference
- LUNCH??? ARRANGEMENTS?????

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- STORY TELLING
 - Essential to “set-the-stage” – develop challenging scenario
 - As TT progresses, possibilities exists that could alter response

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- Narrator(s) with a Storybook
 - Set the Stage, scenario
 - adequate level of detail throughout the TT
 - offer challenges to response resources
 - Infrastructure
 - emergency public information
 - interfaces
 - leadership decision making
 - consider re-entry and recovery
 - Provide phase-in of injects
 - Time base directives/sequences

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- Drive the road –ask questions as you set the storylines
 - Participants to address “that resource” is not available....delayed
 - What is an alternative action/response?
- ALWAYS REMEMBER...
 - Purpose – mitigation
 - Impact on sites resources
 - Impact on off-site response elements
 - Physical, human, environment
 - Be prepared to “be alone”
- Facilitator(s) must KEEP THINGS ON TRACK!!

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- RESPONSE ISSUES
 - Categorize/Bin
 - infrastructure –power, utilities
 - people, tools, equipment, supplies
 - Emergency Public Information
 - Money
 - Cerrone’s World – COOP, etc.; plans and procedural adjustments
 - What don’t I have, where can I get what I need; long reach out

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- After we mitigate, should we be concerned.. with reentry? Recovery? Walkaway?
- BIG ISSUE –FAMILY Concerns

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- CONTINGENCIES
 - Facilitator’s injects
 - What “ifs” not available
 - time delayed, never able to respond
 - On site situation
 - Off-site response is overwhelmed
 - Roadways, utilities
 - Discussions, meetings to address the issues

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- POTENTIAL ISSUES? CONCERNS
 - Is my family safe? I want to go home, etc.
 - Release of hazardous material
 - Public Affairs –a resource to use?
 - Medical needs
 - Self sufficient – Y/N –Where do I go?

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- Prepare for long stay
 - Food
 - Sleep
 - Safe Areas
 - Safe routes –response, egress

CONDUCTING A TABLETOP EXERCISE FOR “SEVERE EVENT” PLANNING

- REMEMBER
 - Scouting Days
 - Alan Iverson

Summary

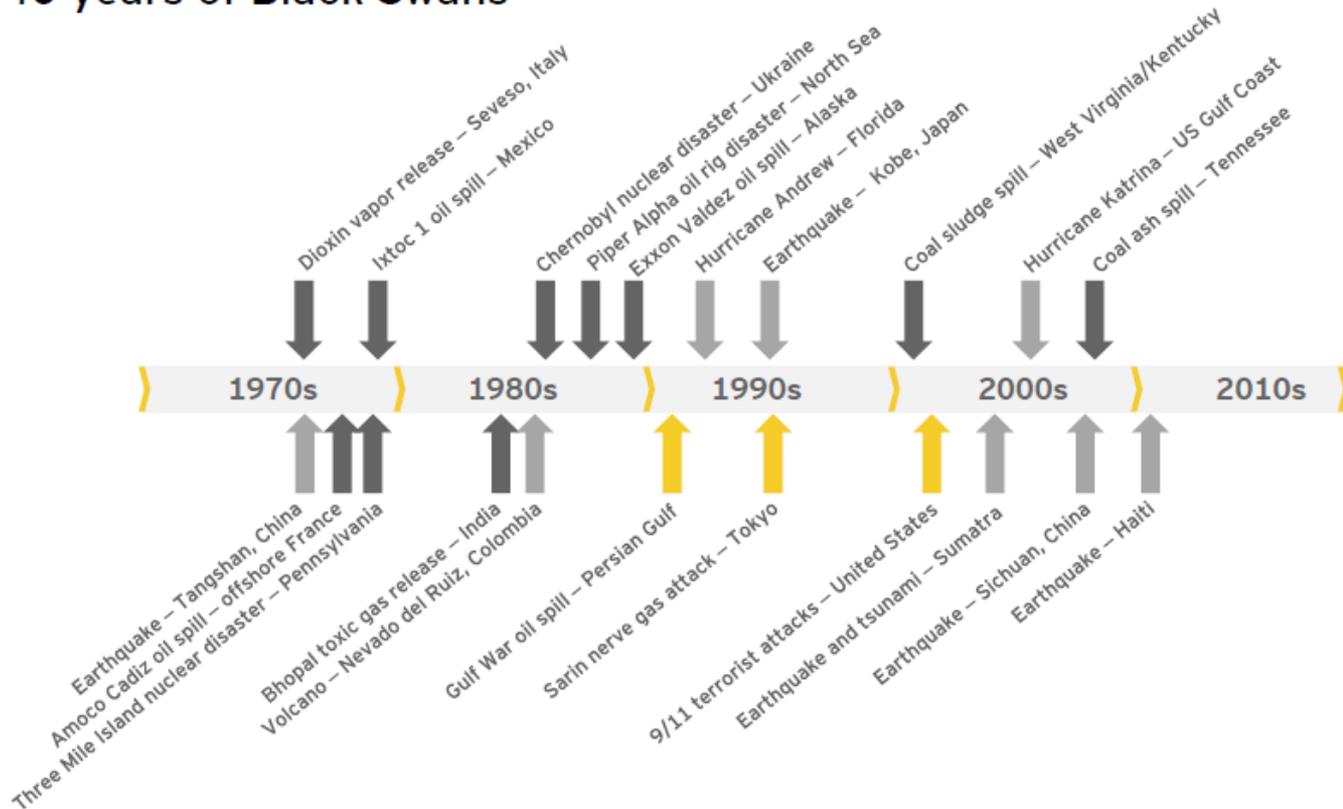


Black Swan

- Based on Nassim Taleb's theory of black swan events in his 2007 book, *The Black Swan*
- Considered a black swan if:
 - The event is a surprise (to the observer).
 - The event has a major impact.
 - In hindsight, the event *could have been expected*)

Black Swans- last 40 years

40 years of Black Swans



Black Swan response

- No way to prevent Black Swans
- Have a general plan in place
- Keep basic goals in mind, and work towards them: protect life, property, environment
- Have a Plan B, C, in the works



Never let the future disturb you. You will meet it, if you have to, with the same weapons of reason which today arm you against the present.

Marcus Aurelius Antoninus

http://www.youtube.com/watch?feature=player_detailpage&v=q3dopJFvPVE