

# Emergency Preparedness Challenges Associated with Transportation

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# Transportation Objectives



- Ship radioactive or other hazardous materials
  - Safely
  - Securely
  - With public confidence
- Deal effectively with emergencies



# Example EP Challenges

How to deal with:

- Aftermath of a large hurricane
- Allocation of emergency supplies geographically
- Planning for a bird flu pandemic
- Shipping radioactive or hazardous materials



# What do they have in common?

- A need that is always greater than the resources
- Competition with other noble needs
- The challenge of determining “where to draw the line”



# Typical Approach to Such Challenges

- Start with the available money.
- Ask for more money.
- Try to get the most “bang for the buck.”



# Approach for Nuclear Facilities and Radioactive or Hazardous Material Transportation

- Develop Design Basis Accidents (DBAs)
- Design to withstand those accidents
- Accept the risk that the DBAs will be exceeded

*The same sort of approach was used in planning for hurricanes in New Orleans.*



# DOT Defines Design Basis for Containers

- Impact (30-foot drop)
- Crush (1100 lb plate—30 feet)
- Puncture (40-in drop, 6-in pin)
- Fire (1400 F for 30 minutes)
- Immersion (50 feet deep)



# Can the Design Basis be exceeded?

- Long-duration fire difficult to extinguish (Baltimore tunnel)
- Drop more than 30 feet (high bridges)
- Low-probability, potentially high-consequence events (terrorists)



# Why we are *probably* ok?

- Engineers are conservative and over-design.
- Likelihood of greater-than-Design Basis events may be acceptably low.
- Less-protected targets are more attractive to terrorists.



# What about those terrorists?

- Container testing (ability to withstand explosions, guns, etc.)
- Satellite tracking, delay measures, etc.
- Additional analysis

*We need to think very creatively.*



# Elements Common to Creative Thinking

- **Attention**  
Consider something not previously considered important (e.g., Apple Computer).
- **Escape**  
Depart from current patterns of thinking.
- **Movement**  
Keep exploring and connecting thoughts—don't reject ideas.



# Specifically, what should we do?

*Set aside normal **paradigms!***

## Paradigms

- Ignore everything worse than DBAs.
- Follow regulations.
- Worry about lack of money.
- Use containers of only simple geometric shapes

## Better Approach

- Consider full range of accidents.
- Go beyond regulations.
- Consider simple and less expensive solutions.
- Get creative (e.g., F-117).



# Where does creative thinking lead us?

- Additional analysis of beyond-DBA events
- Full-scale testing
- Operational controls to reduce likelihood of beyond-DBA events
- More training of emergency responders

## National Research Council Report:

*The Safe Transport of Spent Nuclear Fuel and High-Level Radioactive Waste in the United States, February 2006.*



# Full-Scale Test

## Sandia National Laboratories Crash Test



# General Relevance

None of this is unique to packaging and transportation.

Creative thinking and departure from paradigms can be applied to all Emergency Preparedness challenges.



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