Lessons from 9/11/2001 applicable to nuclear waste transportation program planning, security, and emergency response.
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Specialties:
- Political sociology
  - Study of power relations, government influence, and bureaucracies and regulatory agencies.
- Criminology and deviance
  - Terrorism studies
  - Effects on first responders – police, fire, and medical personnel.
1. Pre-September 11, 2001: Nevada’s NRC petition for rulemaking.
4. Post-September 11, 2001: Lessons that can be learned.
5. Recommendations.
6.22.99 Nevada files Rulemaking Petition with NRC
11.29.99 Public comment period ends.
To date no resolution.

Some of the basis for Nevada’s petition:
- Changing nature of shipments and symbolic value of casks as targets.
- Changing nature and characteristics of terrorism.
- Increase in RDD related terrorism activities.

Issues:
- Reexamine design basis threat for radiological sabotage.
- Expand definition of radiological sabotage.
- Strengthen advanced approval requirements of shipment routes.
- Adopt new requirements for planning/scheduling.
- Strengthen escort requirements for road and rail shipments.
- Comprehensive update of consequence assessment methodology.
Pre-September 11: Vulnerability assessment

- Some of the relevant studies on cask and shipment vulnerability:
  - Sandoval 1983.
  - Dietrich and Walters 1983.
  - Halstead and Ballard 1997.
  - Luna 1999.
  - DOE 1999 (DEIS).
  - DOE 2002 (FEIS).
  - Audin 2002.
  - Meserve 2002a.
  - Meserve 2002b.

- Summary of issues these studies pose:
  - NRC Chairman Meserve noted that none of the current casks have been tested full scale for terrorist attacks.
  - DOE’s FEIS notes average rail cask inventories of ~ 816,000 curies of Cesium 137 and ~ 136,000 curies for truck casks.
  - 1980’s era studies indicate the breach vulnerability of casks to shape charges and in particular note the danger when a secondary device for dispersal of contents is used.
  - 1999 study by Sandia indicates both rail and truck casks are vulnerable to shape charges and to anti-tank munitions, especially truck casks.
  - Industrial testing of a European rail cask design shows breach vulnerability.
Pre-September 11, 2001: Consequences assessment.

- Relevant studies on consequences:
  - Sandoval 1983.
  - Dietrich/Walters 1983.
  - NRC 1984.
  - Luna 1999.
  - DOE 1999 (DEIS).
  - DOE 2002 (FEIS).
  - Audin 2002.
  - Lamb et al. 2002.

- Summary of issues these studies pose:
  - Acknowledgment by NRC, DOE and Nevada of the downwind dispersal of respirable particles (< 10 microns).
  - Under certain weather conditions, the dispersal plume (area) could be as large as 10 square kilometers.
  - The larger materials dispersed into the environment could contaminate an area upwards of 100 meters from dispersal point.
  - DOE’s FEIS estimates a successful attack could create a population dose of 96,000 person rem and 48 latent cancer fatalities (LCF).
  - DOE’s FEIS did not estimate clean up costs for a terrorist incident but did note the costs for a worst case accident (~ $10 billion).
  - Reanalysis found a considerable differential in estimates with 300 to 1,800 LCF for a shape charge attack and 3,000 to 18,000 LCF for a fully perforated attack using an antitank weapon.
Post-September 11, 2001: Issues to reconsider.

- The issue of risk reconsidered.
- Changing agency and bureaucratic cultures.
- Communication, response, and prevention.
- The integration of differential levels of government.
- Special issues for urban and rural first responders.
- Oversight in the post-September 11 world.
Risk analysis reconsidered

- Accidents are not terrorist attacks.
- Human initiated events are potentially much more powerful and disruptive.
- Risk assessment and terrorism experts are asking for reconsiderations of how risk assessment is conducted
  - Mark Abkowitz, Vanderbilt University.
  - Kristin Shrader-Frechette, Notre Dame.
  - “Science” as fact debate.
  - Biased methods of risk assessment.
  - Risk v. dose regulation debate.
- James David Ballard, NATO project
  - Suicidal terrorism with respect to nuclear and radiological attacks
  - Unorthodox weapons and tactics used by terrorists.
  - The role of active insiders for nuclear facilities and RDD attacks.
Changing bureaucratic and agency cultures

- Max Weber on bureaucracies.
  - The iron cage of rationality v. the logic of mass suicide attacks.

- How do you change bureaucracies that were enabled to fight the Cold War and get them refocused on the war on terrorism?
  - One key issue: Accidents are not terrorism and the security requirements, responses, and consequences are likewise different.
Communication, prevention and response.

- Kevin Jack Riley and Bruce Hoffman, Rand Inc. researchers, conducted a survey of law enforcement agencies and what these agencies felt were key issues in terrorism:
  - Bi-directional and informed communication is critical for prevention and response.
  - Local experiences are key to prevention of terrorism attacks.
  - Differential expectations and perceptions between local law enforcement and federal agencies with respect to terrorism.
Integration of the various levels of government.

- Prevention is front line defense.
  - Needs interaction between various levels of government.
  - Must be future orientated, not historically bound.
- Response post-incident is localized, at least for the first hours/days after the attack.
  - Key is training of first responders.
- Consequence management is another critical post-incident issue.
  - Funding, training, public relations, crime scene issues, health and safety of first responders.
  - Potential for change of regulations *ex post facto* and public reaction to said changes.
- Increasing institutional complexity at federal level.
  - Department of Homeland Security
  - Transportation Security Administration.
Special issues for urban and rural emergency responders.

- **Urban:**
  - Threats from outside groups that may reside in the urban location.
  - Higher probability of attacks due to proximity of media, supplies, and symbolic value of attack site itself.
  - Long term consequences for radiological contamination of a urban area.
  - Other issues logically related to a terrorist attack and already noted in the literature (LCF, cost of clean-up, etc.)

- **Rural:**
  - Large size and remote location of some jurisdictions.
    - Response times are slower due to distance and lack of resources.
    - Difficulty of communications due to terrain and infrastructure.
  - Rates of turn over in personnel.
    - Paid forces are small, cross trained, and typically underpaid.
    - Unpaid forces are subject to high turn over and have serious issues of availability and commitment in the event of a radiological attack.
  - Funding for emergency response personnel and equipment is very limited and can be subject to highly variable budgets at the local, state, and federal levels.
  - Funding siphoned towards larger cities and thus away from rural agencies as part of the political appropriations process.
Oversight activities, post 911

- Oversight of the transportation planning must be reviewed periodically.
  - NY Twin Towers built to withstand an airplane hit but not by the new generation of planes that came decades later.
  - Will nuclear waste casks hold up under new technologies and do risk mitigation efforts make sense in light of new tactics, weapons, philosophies, etc.

- Oversight must be build in and systematized to have a chance at effectiveness.
  - ? year reviews of the planning.
  - ? year review of the cask testing.
  - ? year review of the regulation.
  - ? year review of the threat environment.
Recommendations

- Operationally define terms (e.g., shipment, etc.) and standardize the discussion.
- Analyze these radioactive cargoes as potential RDD’s and as a symbolically important target for domestic and international terrorists.
- Settle outstanding regulatory issues (e.g., Nevada petition, etc.).
- Review the DOE Yucca Mountain EIS assessment of vulnerabilities and consequences.
- Consult stakeholders on transportation planning and revisions.  
  - Address pre-September 11, 2001 alterations in risk assessment paradigms.  
  - Address the lessons learned from September 11, 2001 attacks.
- Prioritize the role of the first responder community.  
  - They will respond to an incident or accident.  
  - The burdens (health, safety, response, and consequences) will fall on them.  
  - The pre and post incident costs will impact their budgets.  
  - Their relevant experiences and knowledge are relevant to all aspect of planning.