

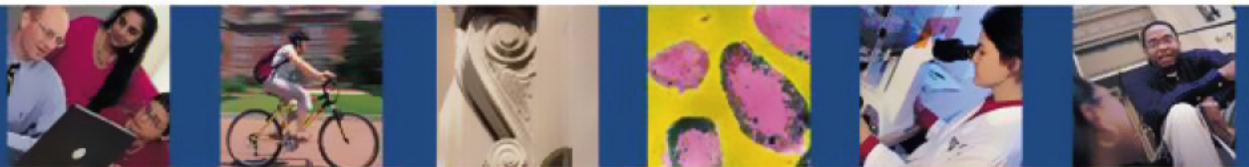


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Risk Communication and the Nuclear Safety Culture

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Protecting Health, Saving Lives—*Millions at a Time*

Presentation Overview

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Introduction and Overview



Why safety culture?

- Recent accidents where safety culture was a contributing cause
 - BP Texas City refinery explosion (2005)
 - WMATA rail collision (2009)
 - Deepwater Horizon oil spill (2010)
 - Upper Big Branch mine explosion (2010)
 - Fukushima Daiichi nuclear accident (2011)
 - CDC Laboratory releases (2014)



After Lapses, C.D.C. Admits a Lax Culture at Labs

By RICHARD FAUSSET and DONALD G. McNEIL Jr. JULY 13, 2014

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ATLANTA — Dr. Thomas R. Frieden, the head of the [Centers for Disease Control and Prevention](#), spent much of Wednesday completing a report that would let the public see, in embarrassing detail, how the sloppy handling of anthrax by scientists at its headquarters here had potentially exposed dozens of employees to the deadly bacteria.

But just as he was sitting down for a late-afternoon lunch at his Washington, D.C., office, an urgent call came in. There had been another accident, this one just as disturbing, if not more so — and no one in the agency's top leadership had been informed about it until that Monday, though the C.D.C.'s lab had been told about it more than a month earlier.

C.D.C. workers had somehow shipped a dangerous strain of avian influenza to a poultry

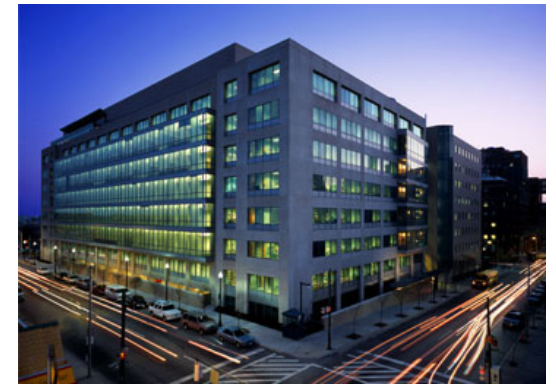


Dr. Michael Bell, left, has been appointed by Dr. Thomas R. Frieden, right, to oversee laboratory safety at the C.D.C. The pair stood outside a potentially contaminated lab. Dustin Chambers for The New York Times





My background







Nuclear Safety Culture Background



Evolution

- TMI 1979 – “beyond hardware problems .. management problems.” (Rogovin report, 1980)
- Chernobyl 1986 – term first used in connection with accident to explain its cause (IAEA/INSAG)
- Fukushima 2011 – lack of safety culture at TEPCO one of the root causes of accident (Japan NAIIC)



Significance – TMI, Chernobyl & Fukushima

"All three severe accidents discussed in this paper had their root causes in system deficiencies **indicative of poor safety management and poor safety culture in both the nuclear industry and government authorities.**"

Holberg, Lars. Root Causes and Impacts of Severe Accidents at Large Nuclear Power Plants. AMBIO 42:267–284, 2013. (Emphasis added: citation from page 283).



International adoption

- Convention on Nuclear Safety (CNS)
 - Adopted Vienna 1994
 - Participating states commit to operating land-based nuclear power plants to maintain a high level of safety by setting international benchmarks
 - 77 contracting states as of April 2014
- Clause 10 of CNS
 - "Each Contracting Party shall take the appropriate steps to ensure that all organizations engaged in activities directly related to nuclear installations shall establish policies that give due priority to nuclear safety."



Safety Culture definitions (IAEA)

- "Safety Culture is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance." (page 1)
- "Safety Culture has two general components. The first is the necessary framework within an organization and is the responsibility of the management hierarchy. The second is the attitude of staff at all levels in responding to and benefiting from the framework." (page 5)

[INSAG-4 (IAEA International Nuclear Safety Advisory Group) 1991]



Nuclear Safety Culture in the US



Nuclear Safety Culture at the US NRC

- 1989 Policy Statement (54 FR 3424) – NPP management has duty and obligation to foster development of safety culture at each facility.
- “Each individual licensed by the NRC to operate the controls of a nuclear power reactor must be keenly aware that he or she holds the special trust and confidence of the American people, conferred through the NRC license, and that his or her responsibility is to assure that the reactor is in a safe condition at all time.” (page 3425)



Nuclear Safety Culture at the NRC

- 2011 Safety Culture Policy Statement (76 FR 34773)
- Nine traits:
 1. Leadership Safety Values and Actions
 2. Problem Identification
 3. Personal Accountability
 4. Work Processes
 5. Continuous Learning
 6. Environment for Raising Concerns
 7. Effective Safety Communication
 8. Respectful Work Environment
 9. Questioning Attitude
- Safety culture applies to ALL LICENSEES



Final Safety Culture Definition

“Nuclear safety culture is the core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment.”

INPO Safety Culture Principles

1. Everyone is personally responsible for nuclear safety
2. Leaders demonstrate commitment to safety
3. Trust permeates the organization
4. Decision-making reflects safety first
5. Nuclear technology is recognized as special and unique
6. A questioning attitude is cultivated
7. Organizational learning is embraced
8. Nuclear safety undergoes constant evaluation



Interdependence between safety culture and risk communication



Defining Risk Communication

- An **interactive process** of **exchange of information and opinion** among individuals, groups, and institutions;
- Often involves **multiple messages** about the nature of risk, or **expressing concerns, opinions, or reactions** to risk messages or to **legal or institutional arrangements for risk management**.

National Research Council, Improving Risk Communication (1989)



Risk communication is a priority for the NRC

“Risk communication provides the essential links between risk analysis, risk management, and the public. Successful completion of the NRC mission requires integration among each of these areas regarding values and assumptions, technical information, and decisions.”

USNRC, Effective Risk Communication: The Nuclear Regulatory Commission's Guidelines for External Risk Communication



Communicating about safety culture

- Community and public outreach about what safety culture programs exist and how they work
- A possible approach:
 - Explain how system works to protect public health
 - How problems are identified
 - How problems are fixed
 - Seek opportunities and future engagement
- NOT “winning over” skeptics or “educating” the community



Communication as a tool to improve safety culture

- Safety culture traits that benefit from risk communication
 - Questioning attitude
 - Management support and commitment
 - Problem identification
 - Continuous learning
- Build and/or increase trust (if possible)
 - Ask for input and act on it
 - Seek community watchfulness and participation
 - Implement continuous/continuing dialogue
- Set and manage expectations



Some challenges

- Reorientation of historical approaches to communication and information sharing
- High knowledge bar for community engagement
- Safety vs. Security – disclosure vs. secrecy
- Issues of scale and significance
 - Not every “incident” is a “problem”
 - Comprehension of system and prioritization
- Range of NRC licensees – from NPPs to well logging
 - Available resources and sophistication of licensees
 - Scale of commitment to safety culture





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EXTRA SLIDES



Radiation Protection

Radiation protection “denotes the protection of people and the environment against radiation risks, and the safety of facilities and activities that give rise to radiation risks.”

IAEA Safety Glossary 2007

NRC Concept of Risk

- What can go wrong?
- How likely is it?
- What are the consequences?
- (See [NRC's page on risk assessment in regulation](#))



What is Risk?

- Risk = Hazard + Outrage
 - Hazard is an act or phenomenon posing potential harm to someone or something
 - **technical** component of risk
 - probability and magnitude
 - Outrage is a function of how the risk is perceived and is dependent upon factors such as:
 - **Voluntary** or coerced?
 - Who or what **controls** the risk?
 - How **responsive** is the process?
 - Do those at risk **trust** those in charge of protecting against the risk?
 - Is the risk caused by a **dreaded substance or condition**?

See <http://www.psandman.com/col/4kind-1.htm>

