The seal of the Defense Nuclear Facilities Safety Board is a circular emblem. It features a central shield with a yellow atomic symbol. Above the shield is a golden eagle with its wings spread. The shield is flanked by green laurel branches. The entire emblem is set against a blue background with a yellow border. The text "UNITED STATES OF AMERICA" is at the top, "DEFENSE NUCLEAR FACILITIES SAFETY BOARD" is at the bottom, and "NATIONAL DEFENSE ACADEMY" is written in a smaller font above the shield.

# DNFSB, DOE and the Contractors: Roles, Responsibilities, and the Road Ahead

**Peter S. Winokur, Ph.D., Chairman  
Defense Nuclear Facilities Safety Board**

**24<sup>th</sup> Annual WCM Decisionmakers' Forum  
October 16, 2012**

# Board Overview

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The Defense Nuclear Facilities Safety Board was established by Act of Congress in 1988

Composed of five Presidentially-appointed members (including a Chairman & Vice-Chairman)

Board members are required by law to be “respected experts in the field of nuclear safety with a demonstrated competence and knowledge relevant to the independent investigative and oversight functions of the Board”

## Current Board Members



**Peter Winokur**  
Chairman



**Jessie Roberson**  
Vice Chairman



**John Mansfield**



**Joseph Bader**



**Sean Sullivan**

# The Board's Enabling Statute

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- Assigns the Board the responsibility to recommend actions to the Secretary of Energy, with respect to DOE's defense nuclear facilities, needed to provide "adequate protection" of public health and safety
- The statute creates an oversight model that addresses several competing Congressional concerns:
  - It preserves the Secretary's power and authority to meet the annual nuclear weapons stockpile requirements
  - It maintains DOE's status as a self-regulating agency
  - It allows DOE to account for budgetary constraints
  - It enhances operational safety of DOE's nuclear facilities, and
  - It restores public confidence that these facilities are operated without undue risk to the public health and safety

# President Bush: The Decider-In-Chief

"I'm the decider, and I decide what's best."

*President GW Bush, April 19, 2006,  
Press Conference at White House*

# The Secretary Makes Final Determinations

**Pursuant to 42 U.S.C. § 2286a(a)(4):**

**REVIEW OF FACILITY DESIGN AND CONSTRUCTION**, The Board shall review the design of a new Department of Energy defense nuclear facility before construction of such facility begins and shall recommend to the Secretary, within a reasonable time, such modifications of the design as the Board considers necessary to ensure adequate protection of public health and safety. During the construction of any such facility, the Board shall periodically review and monitor the construction and shall submit to the Secretary, within a reasonable time, such recommendations relating to the construction of that facility as the Board considers necessary to ensure adequate protection of public health and safety. *An action of the Board, or a failure to act, under this paragraph may not delay or prevent the Secretary of Energy from carrying out the construction of such a facility.*

**Pursuant to 42 U.S.C. § 2286a(a)(5):**

**RECOMMENDATIONS**, The Board shall make such recommendations to the Secretary of Energy with respect to Department of Energy defense nuclear facilities, including operations of such facilities, standards, and research needs, as the Board determines are necessary to ensure adequate protection of public health and safety.

**Pursuant to 42 U.S.C. § 2286d(b)(1):**

**RESPONSE BY SECRETARY**, *The Secretary of Energy shall transmit to the Board, in writing, a statement on whether the Secretary accepts or rejects, in whole or in part, the recommendations submitted to him by the Board ...*

**Pursuant to 42 U.S.C. § 2286d(f)(2):**

**IMPLEMENTATION**, *[The] Secretary of Energy determines [whether] implementation of a Board recommendation (or part thereof) is impracticable because of budgetary considerations, or that the implementation would affect the Secretary's ability to meet the annual nuclear weapons stockpile requirements ...*

# The Board's Major Statutory Powers



With regard to the design, construction, operation, and decommissioning of defense nuclear facilities, the Board:

- Reviews and evaluates the content and implementation of standards
- Analyzes design and operational data
- Reviews facility design and construction
- Provides reports to DOE/public on Board review activities

To accomplish these activities, the Board is authorized to:

- Conduct public or closed hearings and meetings, and subpoena witnesses
- Levy reporting requirements on DOE
- Send letters to DOE on issues from ongoing reviews
- Conduct investigations
- Conduct special studies

# Some context

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**“I would like to begin by posing this question: Is the DOE defense nuclear facilities complex safer now than when the Board commenced operations in the late 1980s? The answer is yes. With respect to the challenges then facing the DOE and the Board, there is no question that the defense nuclear facilities complex is in a safer posture. However, we cannot ignore the current and emerging challenges that will define the future of DOE’s defense nuclear facilities, the need for federal stewardship of this enterprise, and the federal commitment to protect the health and safety of the workers and the public.”**

*Testimony of Dr. Peter S. Winokur, Subcommittee on Strategic Forces, House Armed Services Committee, April 17, 2012*

**“Success is a poor reason to decide we don’t need to continue success... So, I for one can stand success... And I suggest that giving up the elements of success is worse than thoughtlessness and worse than unintelligence.”**

*On Nuclear Weapons, the Triad & the Folly of Global Zero,  
by Gen. Larry Welch*

# What does the Future Hold?

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# What does the Future Hold?

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The answer is

- The Defense Nuclear Facilities Safety Board
- The Department of Energy, and
- People not voted off the island

# What does the Future Hold?

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The answer is

- The Defense Nuclear Facilities Safety Board
- The Department of Energy, and
- People not voted off the island



The question is:

What three groups must cope with the following pressures?

- Increasing strain on limited resources
- Increasing complexity in cleanup activities
- Increasing awareness from a concerned public

# What Does This Look Like?

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History tells us that organizations typically respond to significant external and internal pressures by:

- Shifting authorities, responsibilities, and priorities
- Frequent organizational changes
- Lapses in corporate memory
- Difficulties in aligning resources with needs
- Reductions in available workforce
- Difficulties in maintaining skilled and qualified workers
- Extended use of aging facilities
- Increasing dependency on technology and automation
- Degradation in safety performance

**In general, the historical response has been to accept lower standards in operations, safety, maintenance, and training; in other words, the safety culture tends to degrade**

# What Does This Mean for DOE?

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DOE faces the same stresses as many organizations, and one sees parallels in how DOE is responding to those stresses

- DOE is concerned it is too risk averse and that its safety strategies and framework are overly prescriptive, redundant, and burdensome
- DOE appears to believe that its defense-in-depth approach is too conservative
- DOE is signaling that it is willing to accept more risk; however, no specific criteria or hierarchy of managerial controls exist
- DOE continues to pursue “safety and security reform” based on an “Enterprise Risk Management” model, but no guidance exists
- DOE fails to learn lessons and effectively implement corrective actions on major design and construction projects
- DOE is exhibiting a trend of weakening DSA’s for defense nuclear facilities
- DOE appears to be reinterpreting the concept of “adequate protection”

# The Road Ahead

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To know the road ahead,  
ask those coming back.  
Chinese Proverb



*PhilosophyWall.com*

# Tokaimura Criticality Accident

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“It can be said that the 3 workers and other people [who] ... caused this accident are the victims of the company’s poor policy.”

- “Due to the deteriorated business situation, ... employees in the production division decreased from 68 (in 1996) to 38.”
- “The method to use stainless steel buckets for the dissolution ... could shorten the time to dissolve  $U_3O_8$  material to 15-20 minutes per batch from 30-90 minutes per batch.”
- “[In 1995, the company’s] safety committee ... noticed the illegality [of the procedural changes] but they recognized it [as] criticality safe”
- “[The safety committee] made 2 kinds of [minutes] of this meeting. The confidential one describes what had been discussed in the committee. The public one, however, lacks this discussion.”

“Human Factor Analysis on Criticality Accident”  
Kunihide Sasou, Human Factors Research Center, Japan

# Davis-Besse NPP

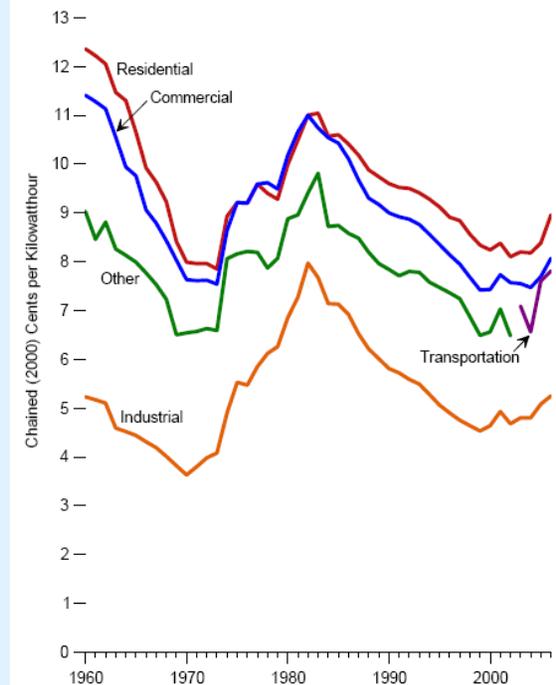


“In the mid-1990s, top quality people left the station and Davis-Besse became more disassociated from the industry. **The station’s focus and level of rigor moved to support the perceived goals (cost, schedule, minimum compliance status quo).**”

- “Programs were weakened in their ability to identify and address potential safety concerns”
- “The use of technical information tended to be selective, ... supported the perceived site goals”
- “The FENOC [FirstEnergy] management monetary incentive program rewards production more than safety”
- “There was little evidence of QA’s involvement in this area”
- “The plant actually went from a minimum compliance standard to a standard that focused on justifying existing conditions”

Root Cause Analysis Report, FirstEnergy; 2002

Figure 47. Average Real<sup>1</sup> Retail Prices of Electricity by Sector



<sup>1</sup> In chained (2000) dollars, calculated by using gross domestic product implicit price deflators. See “Chained Dollars” in Glossary.

Over the decades, industrial consumers paid the lowest rates for electricity; residential customers usually paid the highest prices. Inflation-adjusted prices rose in both 2005 and 2006 but remained well below the peak price levels of the mid-1980s.

# NASA

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“Twice in NASA history, the agency embarked on a slippery slope that ended in catastrophe. Each decision ...seemed correct, routine,... insignificant, and unremarkable. Yet in retrospect, the cumulative effect was stunning.”

- “When pressed for cost reduction, NASA attacked its own safety system”
- “There was no schedule margin”
- “NASA was accepting more and more risk in order to stay on schedule”
- “Lapses in leadership and communication ... made it difficult ... to raise concerns or understand decisions”
- “Neither in the O-ring erosion nor the foam debris problem did NASA’s safety system attempt to reverse the course of actions”
- “NASA’s ... roles and responsibilities were transferred to contractors ...while simultaneously reducing in-house capability”
- “NASA’s safety system lacked the resources, independence, personnel, and authority”

Columbia Accident Investigation Board

# BP Texas City Oil Refinery

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“Cost-cutting and failure to invest in the 1990s by Amoco and then BP left the Texas City refinery vulnerable to a catastrophe. BP targeted budget cuts of 25 percent in 1999 and another 25 percent in 2005, even though much of the refinery’s infrastructure and process equipment were in disrepair. Also, operator training and staffing were downsized.”

- “The Texas City disaster was caused by organizational and safety deficiencies at all levels of the BP Corporation.”
- “Warning signs of a possible disaster were present for several years, but company officials did not intervene effectively to prevent it.”
- “Reliance on the low personal injury rate at Texas City as a safety indicator failed to provide a true picture of process safety performance and the health of the safety culture.”
- “OSHA’s capability to inspect highly hazardous facilities and to enforce process safety regulations is insufficient”

U.S. Chemical Safety Board

# Deepwater Horizon



“*Deepwater Horizon* and its owner, Transocean, had serious safety management system failures and a poor safety culture.”

“[The flag nation’s] oversight of safety issues was inadequate and created an environment in which the casualty could occur.”

U.S. Coast Guard

“Decision-making processes at Macondo did not adequately ensure that personnel fully considered the risks created by time- and money-saving decisions. **Whether purposeful or not, many of the decisions ... that increased the risk of the Macondo blowout clearly saved those companies significant time (and money).**”

FIGURE 4.10: Examples of Decisions That Increased Risk At Macondo While Potentially Saving Time

Decision	Was There A Less Risky Alternative Available?	Less Time Than Alternative?	Decision-maker
Not Waiting for More Centralizers of Preferred Design	Yes	Saved Time	BP on Shore
Not Waiting for Foam Stability Test Results and/or Redesigning Slurry	Yes	Saved Time	Haliburton (and Perhaps BP) on Shore
Not Running Cement Evaluation Log	Yes	Saved Time	BP on Shore
Using Spacer Made from Combined Lost Circulation Materials to Avoid Disposal Issues	Yes	Saved Time	BP on Shore
Displacing Mud from Riser Before Setting Surface Cement Plug	Yes	Unclear	BP on Shore
Setting Surface Cement Plug 3,000 Feet Below Mud Line in Seawater	Yes	Unclear	BP on Shore (Approved by MMS)
Not Installing Additional Physical Barriers During Temporary Abandonment Procedure	Yes	Saved Time	BP on Shore
Not Performing Further Well Integrity Diagnostics in Light of Troubling and Unexplained Negative Pressure Test Results	Yes	Saved Time	BP (and Perhaps Transocean) on Rig
Bypassing Pits and Conducting Other Simultaneous Operations During Displacement	Yes	Saved Time	Transocean (and Perhaps BP) on Rig

National Oil Spill Commission Report

# Fukushima Dai-ichi

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“Following the 1970s “oil shocks,” Japan accelerated the development of nuclear power in an effort to achieve national energy security ... With such a powerful mandate, nuclear power became an unstoppable force, immune to scrutiny by civil society.”

- “Regulation was entrusted to the same government bureaucracy responsible for its promotion”
- “The root causes were the organizational and regulatory systems that supported faulty rationales for decisions and actions”
- “If the risk factors of tsunami were raised, for example, TEPCO would only look at the risk to their own operations, and ... ignored the potential risk to the public health and welfare”
- “The regulators did not monitor or supervise nuclear safety. The lack of expertise resulted in “regulatory capture”

The National Diet of Japan Investigation Report

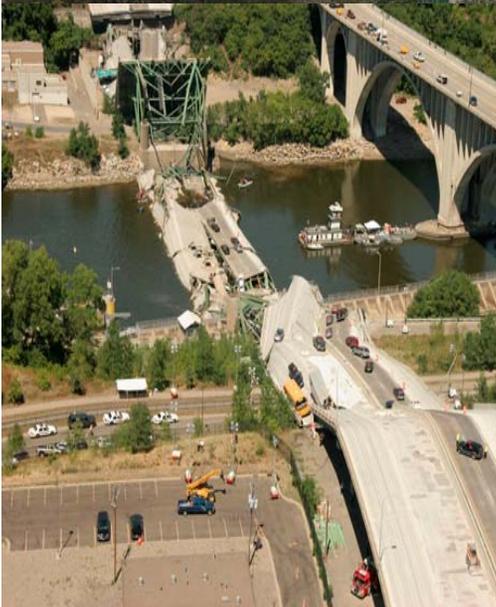
# Other Observations

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- A 1999 NRC study on the relationship between a licensee's financial situation and its operational status concluded that
  - “A site is likely to be discussed at a [Senior Management Meeting] if its revenue factor is below 65 to 70 percent for 2 consecutive years”
  - “Comparing the trends of .. four [financial] variables to single-unit and multiunit industry trends identifies adverse trends that often preceded decisions to discuss a plant at a [Senior Management Meeting]”
- A 2001 NRC study on safety in deregulated industries noted that:
  - “the link between poor profitability and safety problems appears strongest for small and unprofitable companies,” and
  - “companies having financial difficulties may have increased incentives to cut corners. **Therefore, financial difficulty may be an indicator of declining safety margins in the nuclear power industry**”

# Past 5 Years



# Secretary's Safety Bulletin



- DOE recognized that lessons from Fukushima can be applicable to its operations
- The complex identified the need to take action to address gaps in existing requirements and guidance
- Some sites have initiated severe event exercises
- Yet, 18 months later, no additional guidance or associated substantive actions have been completed

**HSS**  
Hazardous Site Safety

## Safety Bulletin

### Events Beyond Design Safety Basis Analysis

No. 2011-01

**PURPOSE**  
This Safety Alert provides information on a safety concern related to the identification and mitigation of events that may fall outside those analyzed in the documented safety analysis.

**BACKGROUND**  
On March 11, 2011, the Fukushima Dai-ichi nuclear power station in Japan was damaged by a magnitude 9.0 earthquake and the subsequent tsunami. While there is still a lot to be learned from the accident, about the adequacy of design specifications and the equipment failure modes, reports from the Nuclear Regulatory Commission (NRC) have identified some key aspects of the operational emergency at the Fukushima Dai-ichi nuclear power station. Specifically, following automatic shutdown of the operating reactors due to the earthquake, a complete loss of both the offsite and on-site power systems disabled key cooling systems which eventually led to fuel damage, hydrogen generation, and high radiation levels within the facility.

**AREAS FOR ATTENTION**  
The NRC has reported that the events at the Japanese nuclear power station appear to have been caused by factors directly impacting nuclear safety that were outside the design basis for the facility. Therefore, consistent with the approach being taken to review commercial nuclear power reactors, it is prudent to evaluate facility vulnerabilities to beyond design basis events at Department of Energy (DOE) nuclear facilities and to ensure appropriate provisions are in place to address them.

**ACTION REQUIRED**  
For all Hazard Category 1 and 2 nuclear facilities (except for those only classified due to criticality criteria):

- Review how beyond design basis events have been considered or analyzed in accordance with DOE's Nuclear Safety Regulation and any controls that have been put in place that could prevent or mitigate them.
- Discuss the ability to safely manage a total loss of power event including a loss of backup capabilities.
- Confirm safety systems are being maintained in an operable condition in accordance with technical safety requirements.
- Confirm emergency plans, procedures, and equipment are current, functional, and have been appropriately tested, including plans and procedures for response to natural phenomena events that could have site-wide impacts or impacts on regional support infrastructure.

Priority should be given to Hazard Category 1 facilities which should be completed by April 14, 2011 followed by Hazard Category 2 facilities by May 13, 2011. Provide results from these actions to the Program Secretarial Officer and the Chief Health, Safety and Security Officer.

We will continue to monitor the situation, disseminate any lessons-learned derived from these actions, and provide additional guidance and recommendations as appropriate.

Information contact: Glenn S. Searfoss, Office of Corporate Safety Analysis (HS-30), telephone (301) 903 9085; glenn.searfoss@ha.doe.gov.

*Steve Chu*  
Steve Chu  
Secretary of Energy

MAR 22 2011

# Emergency Preparedness, Response, & Recovery



DOE's emergency management directives have been one of the few where requirements have been added rather than deleted, and guidance has become more prescriptive

Performance at DOE sites has varied; some improvements have been noted but are not consistently maintained over the long term

DOE has yet to issue guidance or change directives based on Fukushima lessons. Key areas of Board concern are:

- Multi-facility impacts
- Cascading or “connected” events
- Loss of utilities and supporting infrastructure
- Coordination of DOE and local response resources



# Conclusions

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- Even under severe budget constraints, DOE must continue to ensure that its priorities are balanced between mission and safety
- DOE's current safety strategies have evolved from years of painful experience and learning; they are too valuable to set aside
- DOE needs to ensure that changes in directives, organizations, and operations provide equivalent or better protection than current systems
- Design Basis and Beyond Design Basis Accidents are real; a robust defense-in-depth represents your best defense against accidents
- Preparation for future emergencies is vitally important to DOE; it needs to be taken seriously and given priority