

Role of NAS in Responding to Emergencies/Crises

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Opinions expressed in this presentation are
mine alone

Not the U.S. National Academy of Sciences

Acronyms Used in Presentation

NAS = U.S. National Academy of Sciences

USG = U.S. Government

Presentation Outline

- Talk focus
- Background on NAS
- NAS' role in responding to emergencies/crises
- NAS study process using Fukushima lessons-learned study as example
- Closing thoughts

Talk Focus

(As requested by GRIPS)

What actions have been taken by NAS in response to emergency/crisis situations?

– Will illustrate with four examples

Does NAS have standardized practices for responding in emergency situations?

– Yes: They are the same for all NAS projects

Explain these practices using the NAS Fukushima lessons-learned project

– Will highlight some key features of practices

Background on NAS

An Act to Incorporate the National Academy of Sciences

Approved, March 3, 1863

Abraham Lincoln, President



National Academy of Sciences

The “Academy shall, whenever called upon by any department of the Government, investigate, examine, experiment, and report upon any subject of science or art, the actual expense of such investigations, examinations, experiments, and reports to be paid from appropriations which may be made for the purpose, but the Academy shall receive no compensation whatever for any services to the Government of the United States.”

NAS Structure

Three self-perpetuating honorary organizations

- National Academy of Sciences (1863)
- National Academy of Engineering (1964)
- Institute of Medicine (1970)

One “working” organization

- National Research Council (1916)

**“Advisors to the Nation on Science,
Engineering, and Medicine”**

200-300 reports each year on science, engineering,
and medicine

- Consensus studies
- Workshops and symposia
- Roundtables
- Expert meetings

Involving > 6,000 scientists, engineers, and medical
professionals (U.S. and foreign)

Study sponsors

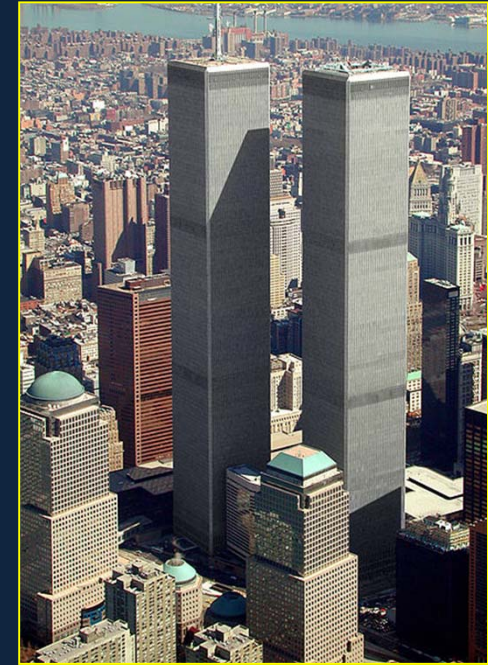
- Primarily USG
- Also states, private foundations

NAS Role in Responding to Emergencies/Crises

- Emergencies/crises arise from many types of events:
 - Terrorist attacks (Example: **September 11, 2001**)
 - Industrial accidents (Example: **Deepwater Horizon**)
 - Natural disasters (Example: **Hurricane Katrina**)
 - Political/economic events (Example: **Science and technology competitiveness**)
- Emergencies/crises prompt USG requests to NAS for advice
- NAS occasionally self-finances its studies

September 11, 2001

- Coordinated terrorist attacks on New York City & Washington, DC
- ~ 3,000 people killed
- Attacks galvanized the United States to strengthen homeland defenses
- NAS initiated a fast-track (6-month) study on how science and technology can contribute to countering terrorism in the U.S. homeland



Jeffmock

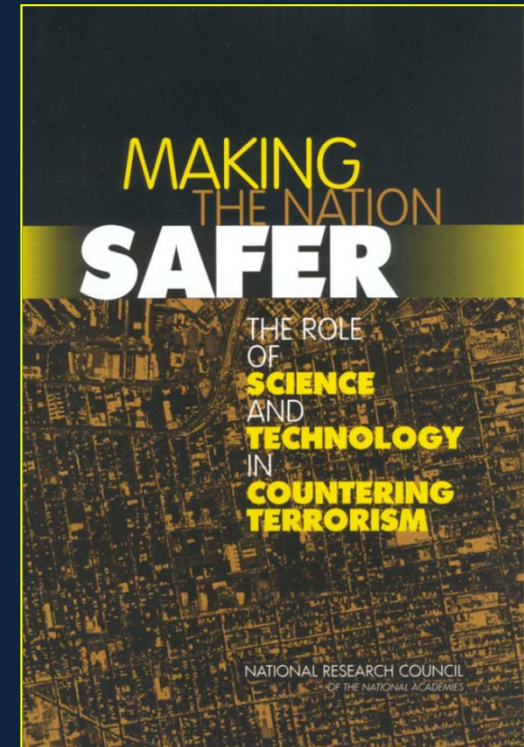
Task: Develop a framework and prepare research agendas for applying science and technology to countering terrorism

Committee (24 members)

Eight subpanels (94 members)

Nine study topics, including:

- Nuclear and radiological threats
- Energy systems
- Transportation systems
- Information technology
- Human and agricultural health
- Cities and fixed infrastructure
- Equipping the Federal government to counter terrorism



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Deepwater Horizon

April 20, 2010, explosion/fire
on offshore drilling rig
in Gulf of Mexico

11 workers killed,
16 seriously injured
Uncapped well released ~5
million barrels of oil into
Gulf of Mexico over a 3-
month period



Google Maps



U.S. Coast Guard

USG Response

USG task group led by DOE Secretary Steven Chu

- How to cap well and stop oil flow

National Commission on the Deepwater Horizon Oil Spill and Offshore Drilling

- Determine causes of accident; improve spill responses & energy production safety

Det Norske Veritas investigation

- Forensic analysis on blowout preventer

USG request to NAS for advice

NAS Deepwater Study

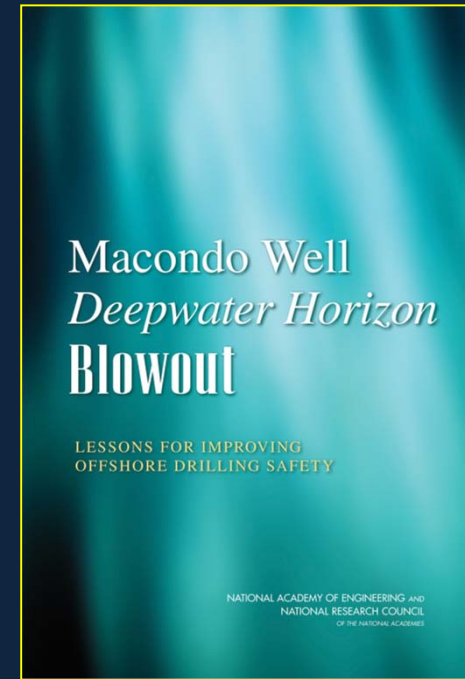
Requested by U.S. Department of Interior

Tasks:

- Examine probable causes of accident
- Identify measures for preventing future recurrences

18 months; 3 reports

Interim report helped to broaden scope of National Commission inquiry



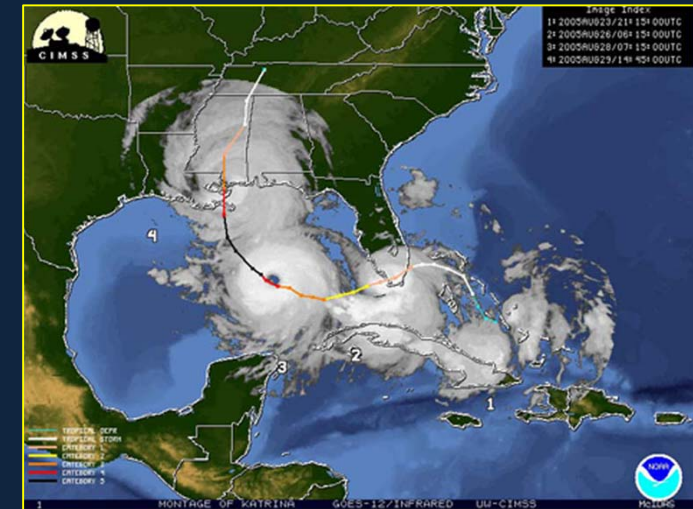
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Hurricane Katrina

Category 3 hurricane made landfall near New Orleans on August 29, 2005

>1800 deaths, >US\$80 billion property damage

Multiple levee breaches caused extensive flooding of New Orleans



National Oceanic and Atmospheric Administration

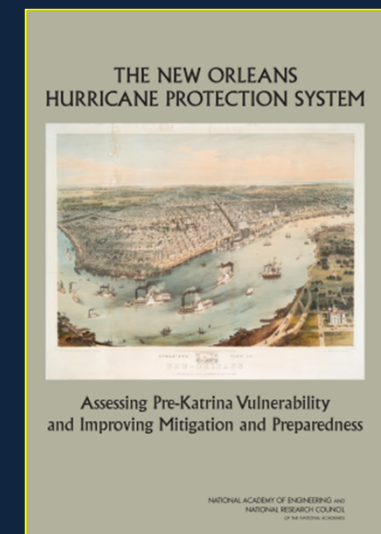


U.S. Army Corps of Engineers

USG Response

- Interagency Performance Evaluation Task Force (IPET) established by USG to evaluate performance hurricane protection system (October 2005)
- USG asked NAS to provide independent advice to IPET (December 2005)
 - 3.5 year project; 5 reports
 - Included lessons learned for hurricane preparedness and planning

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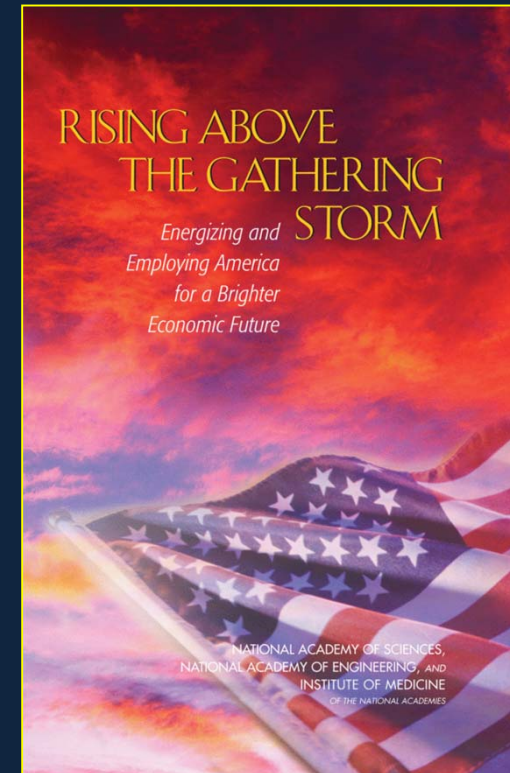
Science & Technology Competitiveness

Several members of US Congress asked NAS to provide advice to assist congressional deliberations:

- What are the top 10 actions, in priority order, that federal policymakers could take to enhance the science and technology enterprise so that the United States can successfully compete, prosper, and be secure in the global community of the 21st century?
- What implementation strategy, with several concrete steps, could be used to implement each of those actions?

Rising Above the Gathering Storm (2007)

- 20 NAS study committee members included presidents of major universities, Nobel laureates, CEOs of Fortune 100 corporations, and former presidential appointees.
- Study self-funded by NAS
- Report completed in several weeks



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Attributes of Study Examples

- Studies are USG requested and self initiated
- Studies can have different objectives:
 - Review of USG work (Katrina study)
 - Independent review (Deepwater Horizon study)
 - Advice to inform high-level USG policymaking (September 11, 2001 & Gathering Storm studies)
- Studies can be completed on short timescales when necessary (weeks to months)

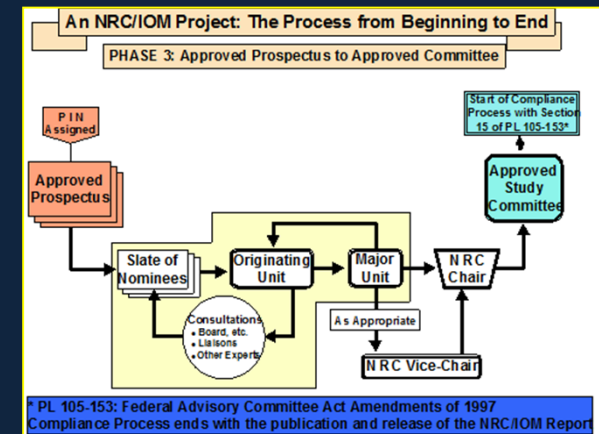
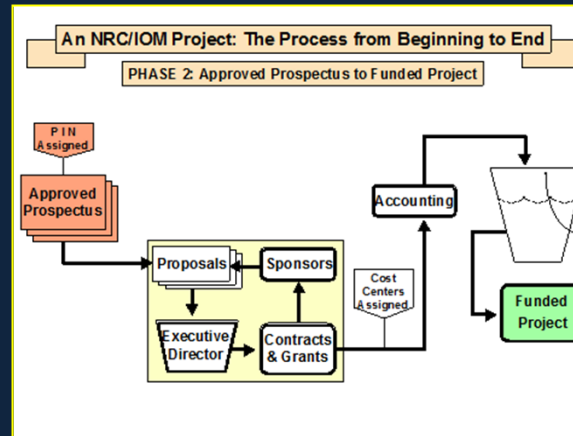
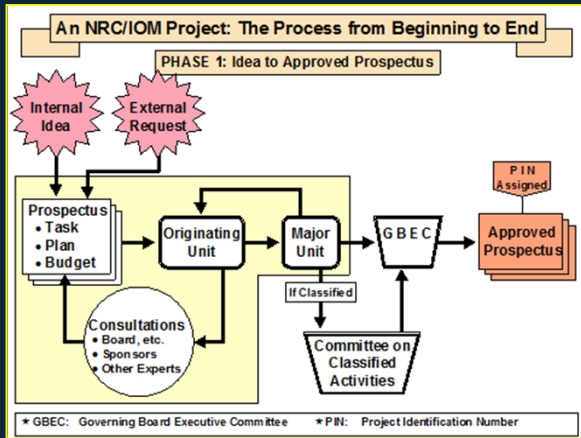
NAS Study Process

GRIPS asked for information on:

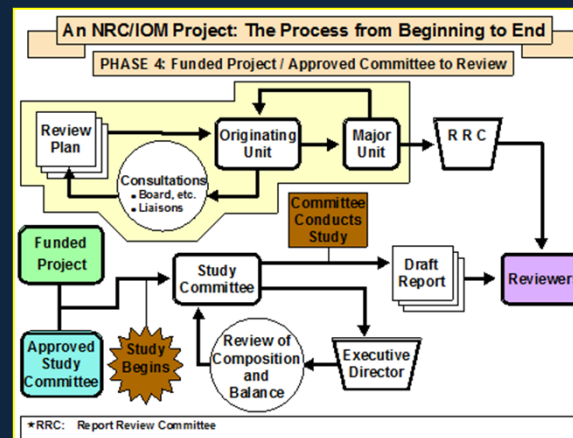
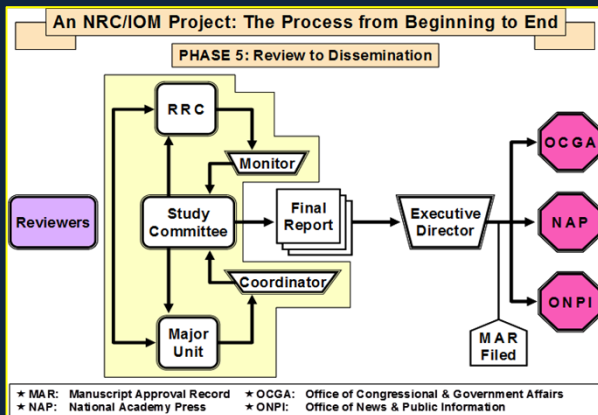
- Study initiating process
- Selection of study group members
- Management of study process
- Quality control
- Public release and communication

Will highlight some key practices using NAS
Fukushima lessons-learned study

Study Process from Beginning to End

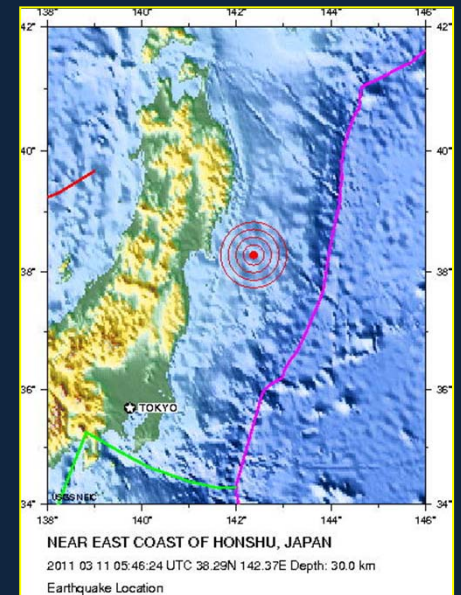


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Fukushima Background

- March 11, 2011, M. 9.0 Great East Japan Earthquake and tsunami
- Earthquake and tsunami cause extended station blackout and loss of ultimate heat sink at Fukushima Daiichi Nuclear Plant
- Reactor core meltdowns in Units 1-3 result in release of radioactive materials to the environment



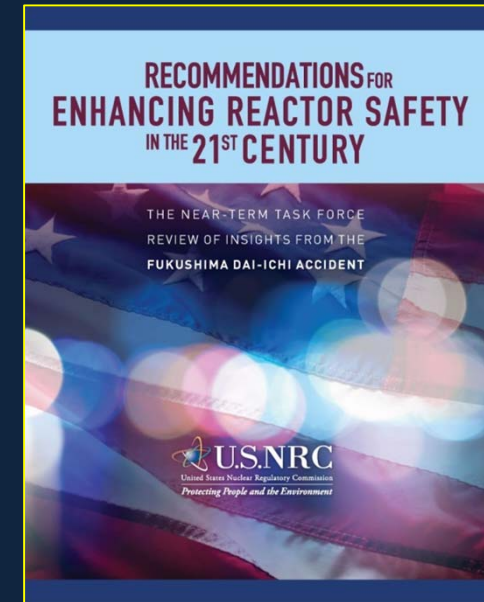
U.S. Geological Survey

NAS Fukushima Study

Mandated by U.S. Congress

Complementary to ongoing USG
and industry efforts

- USG: Near Term Task Force Review
- Industry: Way Forward and FLEX



U.S. Nuclear Regulatory Commission

Fukushima Study Initiating Process

Blue Ribbon Commission on America's Nuclear Future

"[T]he Commission recommends that the National Academy of Sciences (NAS) conduct a thorough assessment of lessons learned from Fukushima and their implications for conclusions reached in earlier NAS studies on the safety and security of current storage arrangements for spent nuclear fuel and high-level waste in the United States."

Congressional Mandate for NAS Study

The Committee [on Appropriations] directs the Nuclear Regulatory Commission to contract with the National Academy of Sciences [NAS] for a study of the lessons learned from the Fukushima nuclear disaster. The study should assess:

- the causes of the crisis at Fukushima;
- the lessons that can be learned;
- the lessons' implications for conclusions reached in earlier NAS studies on the safety and security of current storage arrangements for spent nuclear fuel and high-level waste in the United States, including an assessment of whether the amount of spent fuel currently stored in reactor pools should be reduced;
- the lessons' implications for commercial nuclear reactor safety and security regulations; and
- the potential to improve design basis threats assessment.

This study shall build upon the 2004 NAS study of storage issues and complement the other efforts to learn from Fukushima that have already been launched by the NRC and industry.

Final NAS Study Task

The National Research Council will provide an assessment of lessons learned from the Fukushima nuclear accident for improving the safety and security of nuclear plants in the United States. This assessment will address the following issues:

1. Causes of the Fukushima nuclear accident, particularly with respect to the performance of safety systems and operator response following the earthquake and tsunami.
2. Re-evaluation of the conclusions from previous NAS studies on safety and security of spent nuclear fuel and high-level radioactive waste storage, particularly with respect to the safety and security of current storage arrangements and alternative arrangements in which the amount of commercial spent fuel stored in pools is reduced.
3. Lessons that can be learned from the accident to improve commercial nuclear plant safety and security systems and operations.
4. Lessons that can be learned from the accident to improve commercial nuclear plant safety and security regulations, including processes for identifying and applying design basis events for accidents and terrorist attacks to existing nuclear plants.

The study may examine policy options related to these issues but should not make policy recommendations that involve non-technical value judgments.

Development of Study Prospectus

- Describes the proposed study
 - Problem description
 - Study task
 - Committee numbers and composition
 - Preliminary work plan (meetings, locations, important sources of information)
 - Staffing and budget
- Reviewed and approved by NAS
- Basis for proposal submitted to sponsor

Committee Selection

Call for nominations

- > 200 nominations received for ~22 positions

Primary criteria for selection:

- Technical excellence (for members)
- Leadership ability (for chair)

Other considerations:

- Avoid conflicts of interest
- Balance important perspectives on study issues
- Diversity (in many dimensions)

Committee slate undergoes internal review and approval

Committee Selection (2)

- Committee is appointed provisionally
- Committee membership and bios posted on NAS website for public review and comment
- Committee holds composition-and-balance discussion and discusses public comments on provisional membership
- Committee membership is adjusted by NAS if needed

Management of Study Process

- Committee chair, vice-chair, and study director are partners in managing the study
- Preliminary work plan (from study prospectus) serves as starting point for organizing the study
 - Number of meetings and locations
 - Sources of information
- Study structure (e.g., meeting agendas) provided by leadership and informed by membership
- Many different models for writing study report

Quality Control

- NAS study reports undergo peer review before being released
 - Typically 10-40+ peer reviewers
 - Overseen by NAS Report Review Committee
 - Study committee must address all reviewer comments
- Peer reviewers asked to assess
 - Responsiveness to study task
 - Completeness, fairness, and evenhandedness
 - Support for report findings and recommendations

Public Release and Communication

Dissemination plan developed for each report

Sponsor briefings

Congressional briefings

White House briefings

Press releases and press briefings

Public briefings

NAS Fukushima report will likely have many of these dissemination elements

Closing Thoughts

Why Does USG Seek Advice from NAS?

- NAS was created by USG to provide advice
- NAS study process produces high-quality reports that have high credibility with USG and public:
 - No USG control of study or final report
 - Careful scoping of study task and work plan
 - Study committees are technically strong, balanced, and free from conflicts of interest
 - Effective peer review (considered to be the “gold standard” by USG) helps ensure report quality
 - Study inputs and reports are released to public

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