

Lessons Learned from the
Fukushima Nuclear Accident
for Improving Safety and Security of U.S. Nuclear Plants

U.S. National Academy of Sciences (NAS) Study

Norman Neureiter, Chairman
Kevin D. Crowley, Study Director

presented to

The Science Council of Japan

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Objectives of Presentation

- To show how the U.S. National Academy of Sciences (NAS) is conducting the study requested by the US Congress on the Fukushima nuclear accident .
- More generally, to explain to the SCJ the processes used by NAS to answer technical questions posed by the US Government.
 - These processes have been honed by NAS over the past 150 years. NAS reports are considered the “gold standard” of technical reports.
 - NAS completes ~200 studies each year

Study Background

- Study recommended by the Blue Ribbon Commission on America's Nuclear Future in report to U.S. Secretary of Energy (January 2012).
- Study mandated by U.S. Congress in Consolidated Appropriations Act of 2012.
- Study sponsored by the U.S. Nuclear Regulatory Commission (federal agency responsible for regulating U.S. nuclear power plants).

Statement of Task

To 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:

Study Charges (1)

Causes of the Fukushima nuclear accident, particularly with respect to the performance of safety systems and operator response following the earthquake and tsunami.

Study Charges (2)

Lessons that can be learned from the accident to improve commercial nuclear plant safety and security systems and operations.

Study Charges (3)

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.

Study Charges (4)

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.

Note: Portions of this study charge are classified

Final Part of Study Charge

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

This Study Will Not

- Assign blame for the Fukushima accident.
- Recommend changes to Japanese nuclear plant operations or regulations.
- Recommend changes to U.S. laws or regulations.
- Recommend specific changes to the designs or operations of U.S. nuclear plants.

Nature of NAS Study Process

Independent: No government control.

Non-partisan: No involvement in political process or issues.

Objective: Scientific consensus through collection and weighing of evidence.

Credible: Careful selection of technical experts; peer review of study reports.

Transparent: Open study process.

Committee Appointments Process

Study is being done by an expert committee of 21 members appointed by NAS President Ralph Cicerone

Appointments process:

- Public call for nominations issued in April, 2012
- ~ 210 nominations considered from all sources
- Committee was appointed provisionally in June 2012
- Bios of provisional committee members posted for a 20-day public comment period
- Two additional members were added to the committee as a result of public comments

Committee Membership

Norman P. Neureiter, Chair, AAAS

John Garrick, Vice-Chair, Consultant

Robert A. Bari, Brookhaven Natl. Lab

Percy M. Beard Jr., INPO (retired)

Jan Beyea, Consulting in the Public Interest

M. Quinn Brewster, U. Illinois, UC

Michael L. Corradini, U. Wisconsin-
Madison

Vijay K. Dhir, UCLA

Shelley Hearne, Johns Hopkins Bloomberg
School of Public Health

Michael W. Golay, MIT

Barbara L. Hamrick, UC Irvine Medical
Center

Paul A. Locke, Johns Hopkins Bloomberg
School of Public Health

James E. Matheson, SmartOrg

Thomas G. Moser, Osprey Global Solutions

Arthur T. Motta, Penn State U.

John A. Orcutt, Scripps Institution of
Oceanography

Emilie M. Roth, Roth Cognitive Engineering

Joseph E. Shepherd, Caltech

Elizabeth Q. Ten Eyck, ETE Consulting, Inc.

Frank N. von Hippel, Princeton U.

Loring A. Wyllie Jr., Degenkolb Engineers

Committee Expertise

- Human Factors and Decisions
- Law and Regulation
- Materials Sciences
- Mechanical/Structural Engineering
- Nuclear Engineering
- Nuclear Fuel and Radionuclide Behavior
- Nuclear Plant Operations
- Nuclear Safety
- Nuclear Security
- Risk Analysis
- Earthquake and Tsunami Analysis

Information-Gathering Activities

- To date, the committee has held 23 partial or full meetings to gather information and develop its final report.
- Committee is also using already-published reports on the Fukushima nuclear accident.
- Committee meetings to gather information are open to the public except when restricted material (such as classified material) is gathered.
- Opportunities are provided at meetings for the public to provide oral and written comments to the committee.
- Committee deliberation and report-preparation sessions are not open to the public .

Information-Gathering Activities (2)

Committee has been gathering information on:

- Fukushima Daiichi nuclear accident initiation and progression
- Performance of Fukushima Daiichi Plant, including spent fuel pools, during accident
- Performance of plant operators during accident
- On-site and off-site decision-making process and execution
- On-site and off-site emergency response preparedness and execution

Committee Meetings in United States

- Held in Washington, DC, and by Webex
- Received testimony from a wide range of experts :
 - U.S. government
 - U.S. nuclear industry
 - Japanese nuclear industry
 - Non-governmental organizations
- Japanese Ambassador Ichiro Fujisaki addressed the committee
- Visits to U.S. boiling water reactor plants still to come

Committee Meeting in Japan

- November 26-30, 2012
- 2-day meeting in Tokyo to hold in-depth discussions with Japanese experts
 - GRIPS provided space and logistical support
 - Science Council of Japan, GRIPS, and Japanese Government helped NAS identify participants
- Committee toured Fukushima Daiichi, Fukushima Daini, and Onagawa nuclear plants

Present Outlook for Report

Note: All dates are tentative

- Committee will finalize its report for NAS peer review in February 2014
 - Review will take ~2-3 months
 - Review will involve ~15 reviewers
- Final report will be released to public in the late spring of 2014
- A report briefing is planned for Tokyo after the public release

Thank You