

Energy and Nuclear Energy Policy in Japan after the 3/11 Fukushima nuclear accident

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**Yomiuri-IEEJ Joint International Symposium
On
The Best Energy Portfolio and the Nuclear Power**

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Note: The views expressed here are of my own and do not necessarily reflect those of the JAEC nor the government.

SUMMARY

- The 3/11 Fukushima nuclear accident triggered by the East Japan Great Earthquake and Tsunami has become one of the worst nuclear accident not only in Japan but also in the world, and not yet under control.
- In the short term, cold shutdown of the reactors, decontamination and recovery of life in Fukushima area, securing safety of existing reactors are the top priorities.
- For mid-long term, clean up the site is major challenge for us and it will probably take decades to do so.
- The government set up new policy making processes for wider public debate on future energy policy, while aiming at “reducing dependence on nuclear power.” Transparent national debate is essential for recovering public trust.
 - Atomic Energy Commission has restarted its deliberation process for Framework of Nuclear Energy Policy.



Loss of all power sources due to the Earthquake and Tsunami

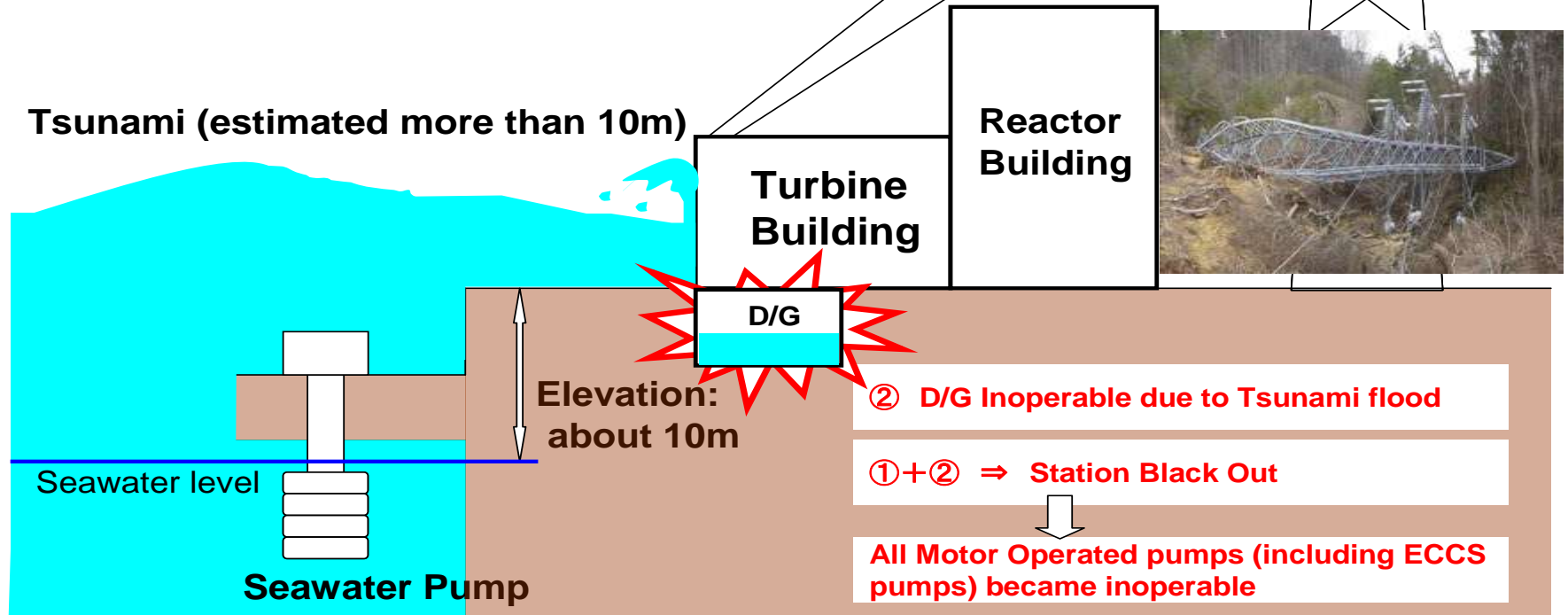


Note:

- All operating units when earthquake occurred were automatically shut down.
- Emergency D/Gs have worked properly until the Tsunami attack.

① Loss of offsite power due to the earthquake

Tsunami (estimated more than 10m)



Source: Nuclear and Industry Safety Agency(NISA), April 4, 2011, at IAEA

<http://www.nisa.meti.go.jp/english/files/en20110406-1-1.pdf>

Fukushima Dai-ichi NPS Unit 1

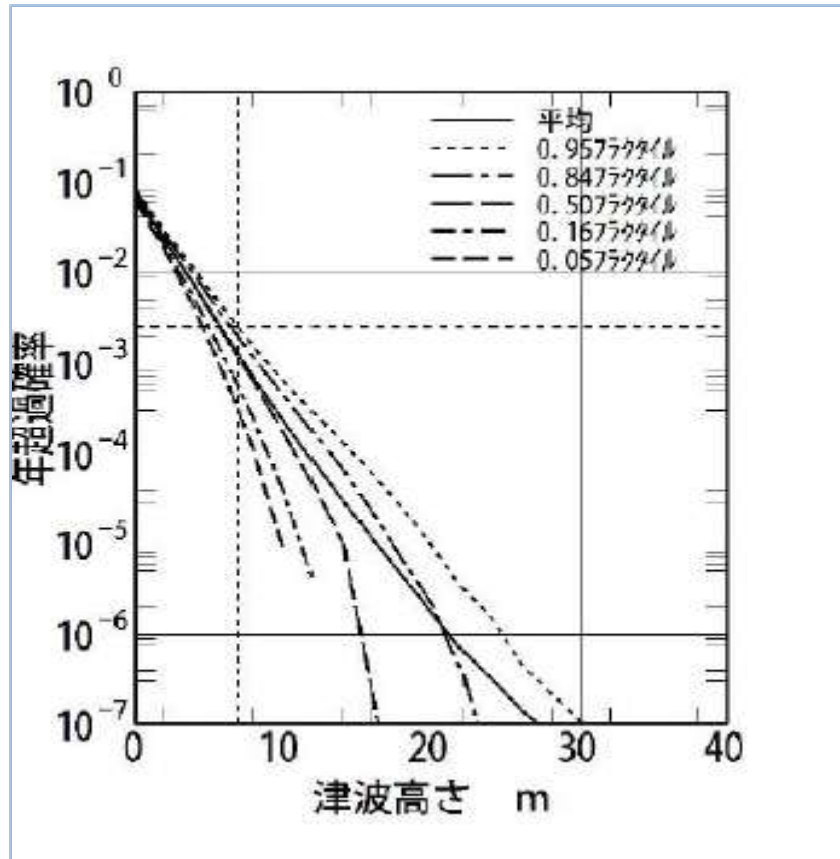
(Status of the reactor core)

- 14:46 March 11: Loss of external power supply, Start-up of emergency diesel generators
 - 14:52 March 11: Start-up of isolation condenser
 - 15:37 March 11: Loss of all AC power
 - 05:46 March 12: Start of fresh water injection from a fire extinguishing line
- Water injection seemed to have stopped for 14 hours and 9 minutes.
- around 17:00 March 11: The fuel was exposed, and the core melt started afterwards.



TEPCO Has Evaluated High-Tsunami

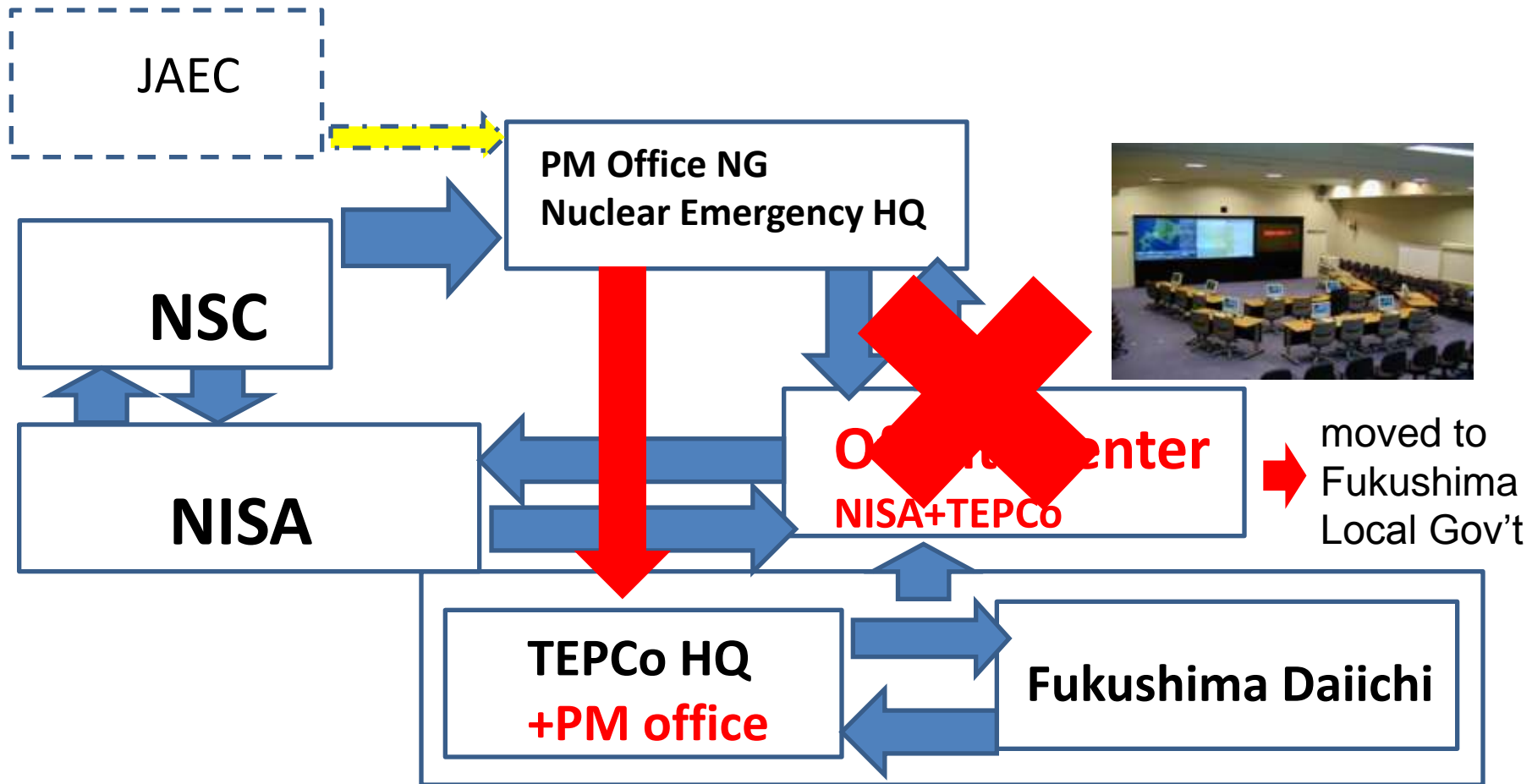
Tsunami Height Analysis (2010)



Tsunami Study has been reported to NISA

- 2008: TEPCO studied Jogan-Tsunami
- June, 2009年: TEPCO asked civil engineering society to evaluate their analysis
- June 2009: TEPCO reported to NISA on preliminary results
- March 7, 2011: NISA was briefed on “possible 10m height tsunami at Fukushima.”

Nuclear Emergency: Institutional Arrangement under the Law* did not work well

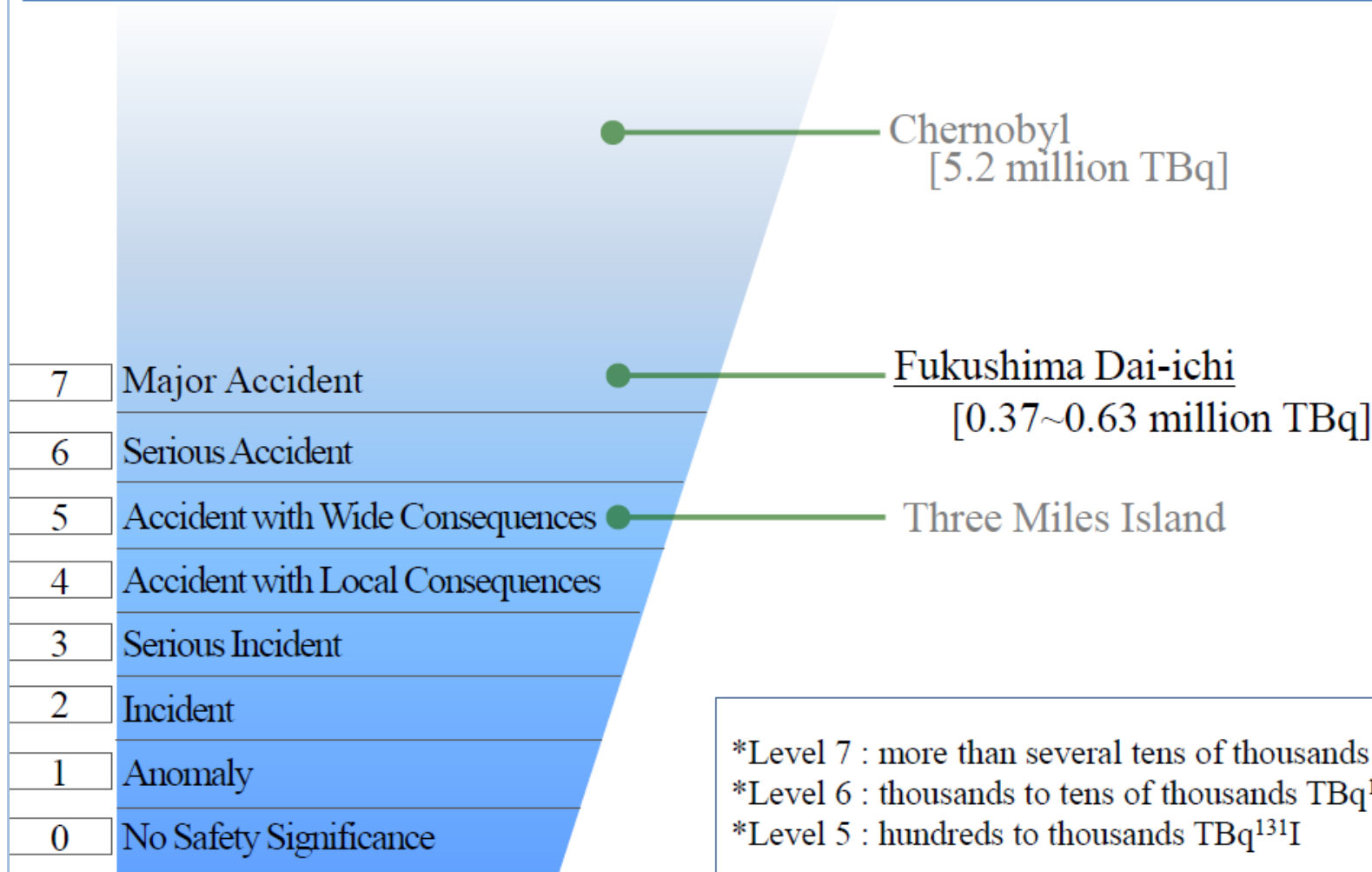


*Act on Special Measures Concerning Nuclear Emergency Preparedness (ASMCNE)



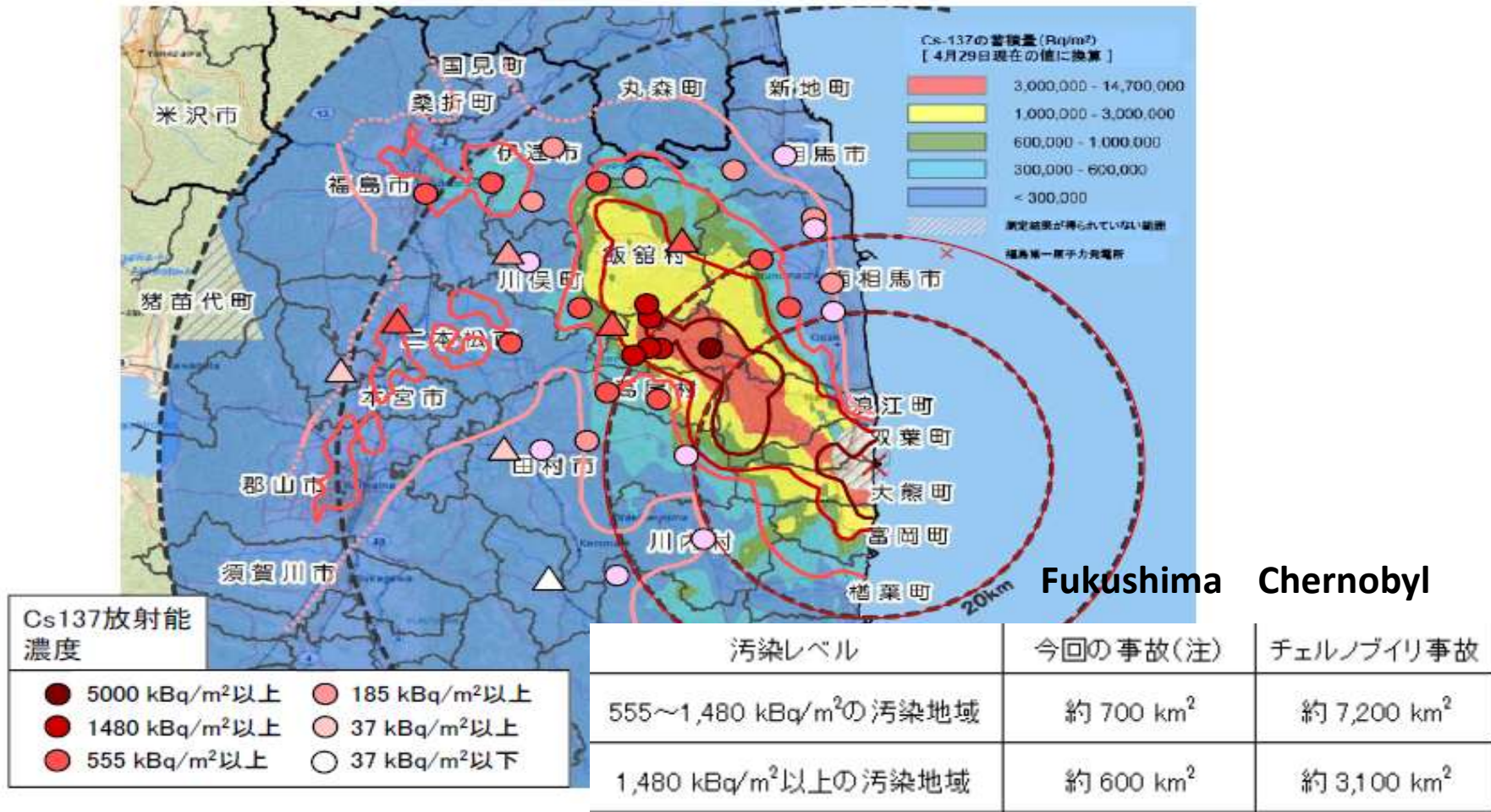
INES Rating on the Events in Fukushima Dai-ichi NPS

The Rating of the International Nuclear and Radiological Event Scale (INES) on Fukushima Dai-ichi Nuclear Power Station (NPS), is temporarily assessed as Level 7.



Contamination Map by MEXT and DOE (as of May 6, 2011)

5月6日公表文科省・米国DOE航空機モニタリング結果との重ね合わせ



Source: T. Kawada, "Current Status of Soil Contamination and how to respond,"

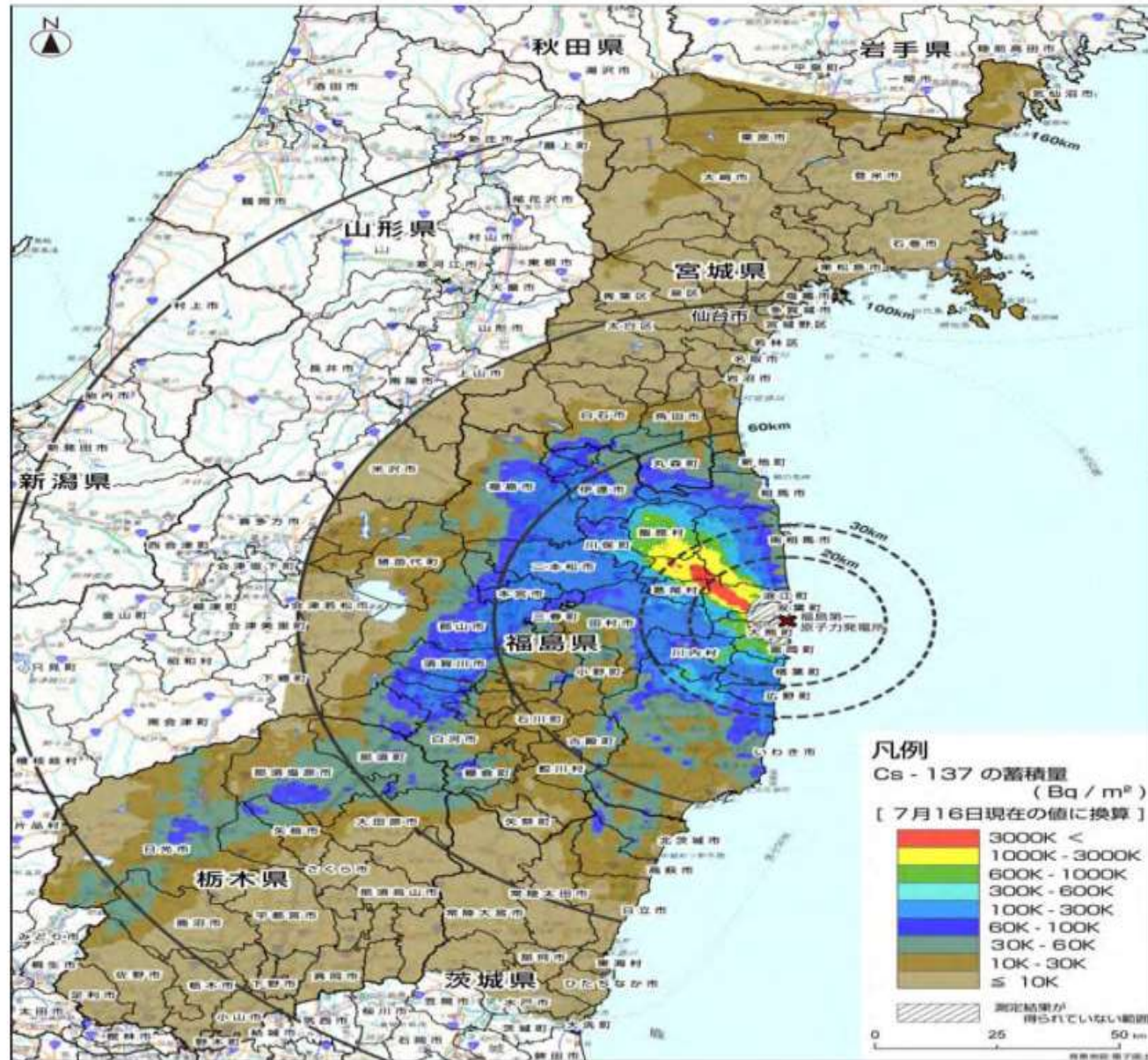
Presentation at Japan Atomic Energy Commission Meeting, May 24, 2011

<http://www.aec.go.jp/jicst/NC/iinkai/teirei/siryo2011/siryo16/siryo2.pdf>

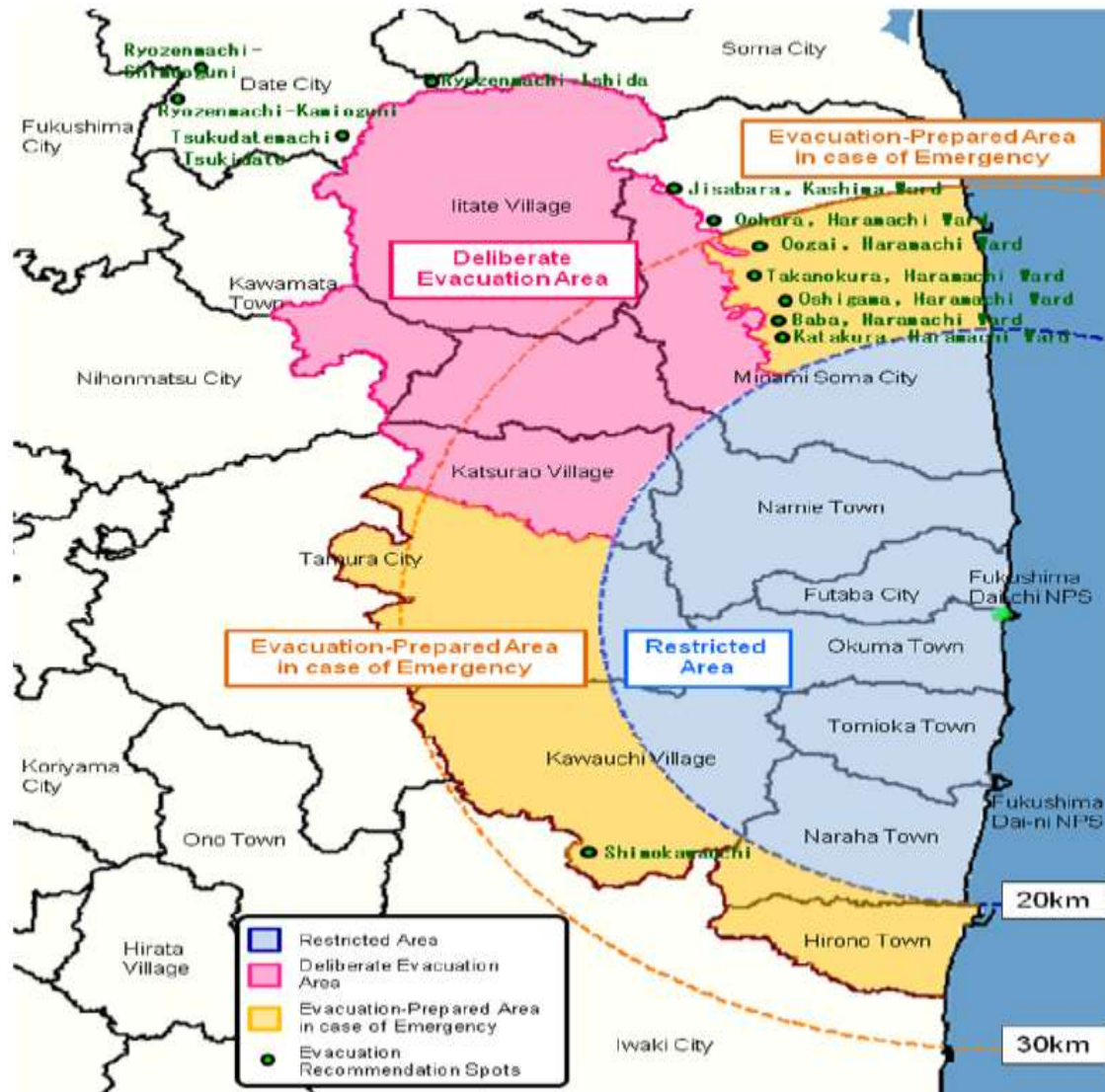


文部科学省による航空機モニタリングの結果(改訂版)
 (福島第一原子力発電所から100,120kmの範囲及び宮城県北部
 並びに栃木県南部の地表面に沈着したセシウム137の濃度)

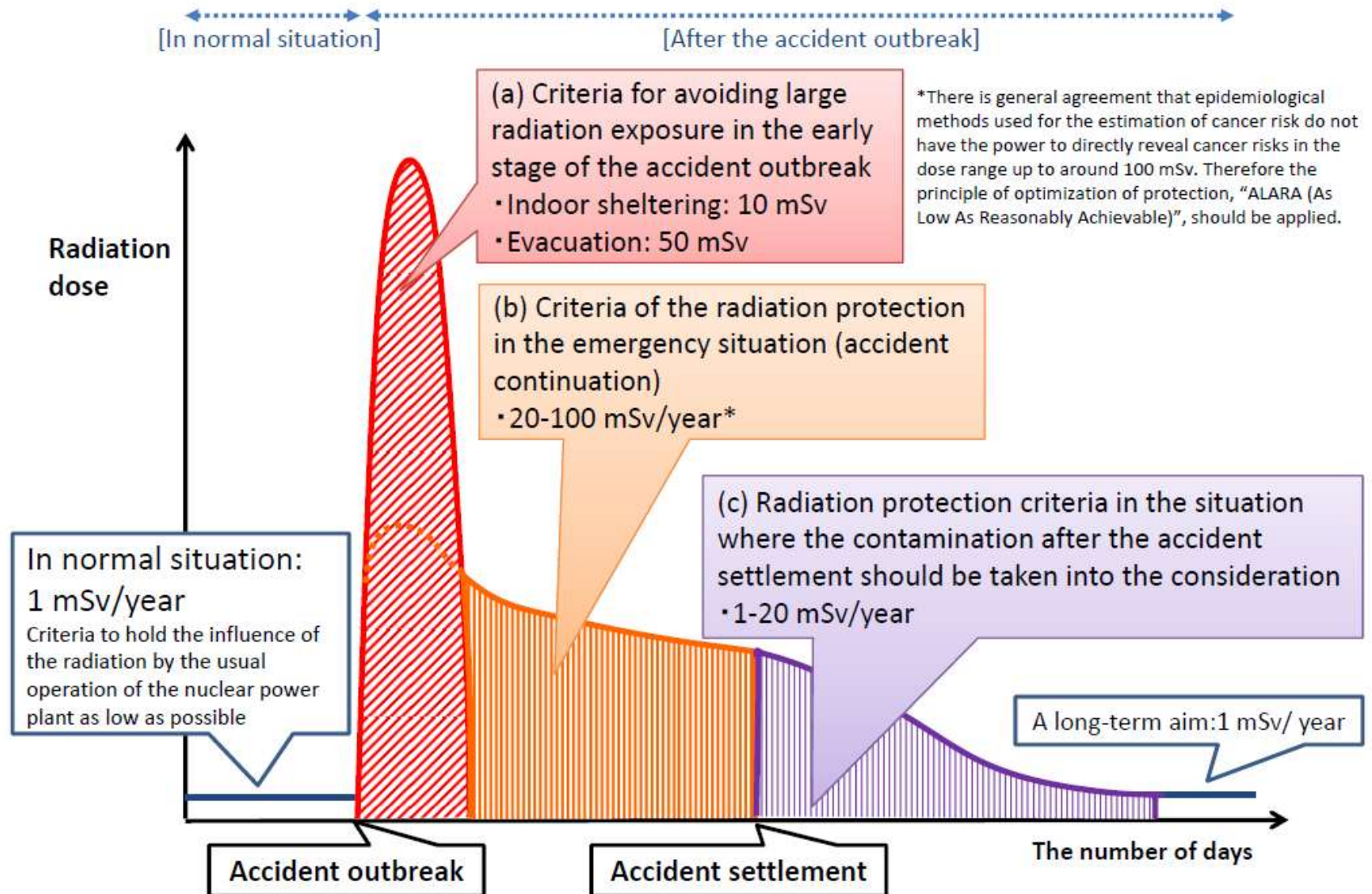
別紙3-3



**Restricted Area, Deliberate Evacuation Area, Evacuation-Prepared Area in case of Emergency
And Evacuation Recommendation Spots (As of August 3, 2011)**



The idea of the criteria of the radiation dose for the radiation protection



Report of Japanese Government to the IAEA Ministerial Conference on Nuclear Safety (06/07/2011)

- 5 Categories 28 list of Lessons learned
 1. Strengthen preventive measures against a severe accident
 2. Enhancement of Responsive measures against a severe accident
 3. Emergency responses to nuclear disaster accident
 4. Robustness of the safety infrastructure established at the nuclear power station
 5. Thoroughness in safety culture while summing up all the lessons.

Source: Nuclear Emergency Response Headquarters, Government of Japan,
"Report of Japanese Government to the IAEA Ministerial Conference on Nuclear Safety
-The Accident at TEPCO's Fukushima Nuclear Power Stations -", June 2011.

http://www.kantei.go.jp/foreign/kan/topics/201106/iaea_houkokusho_e.html



IAEA's Action Plan on Nuclear Safety (Sept.2011)

IAEA's Peer Reviews on Nuclear Safety

- The IAEA Secretariat, **in order to enhance transparency**, to provide summary information on where and when IAEA peer reviews have taken place, and to make publicly available in a timely manner the results of such reviews with the consent of the State concerned.
- **Member States to be strongly encouraged to voluntarily host IAEA peer reviews**, including follow-up reviews, on a regular basis; the IAEA Secretariat to respond in a timely manner to requests for such reviews.

Emergency Response

- The IAEA Secretariat, Member States and relevant international organizations to **strengthen the assistance mechanisms to ensure that necessary assistance is made available promptly**.
- Consideration to be given to enhancing and fully utilizing the IAEA Response and Assistance Network (RANET), including expanding its rapid response capabilities.

<http://www.iaea.org/About/Policy/GC/GC55/Documents/gc55-14.pdf>

Additional Report to the IAEA by the Japanese Government (Sept. 15, 2011)

“Basic Concept of Structural Reform of Nuclear Safety Regulations” at the Cabinet Meeting of August 15

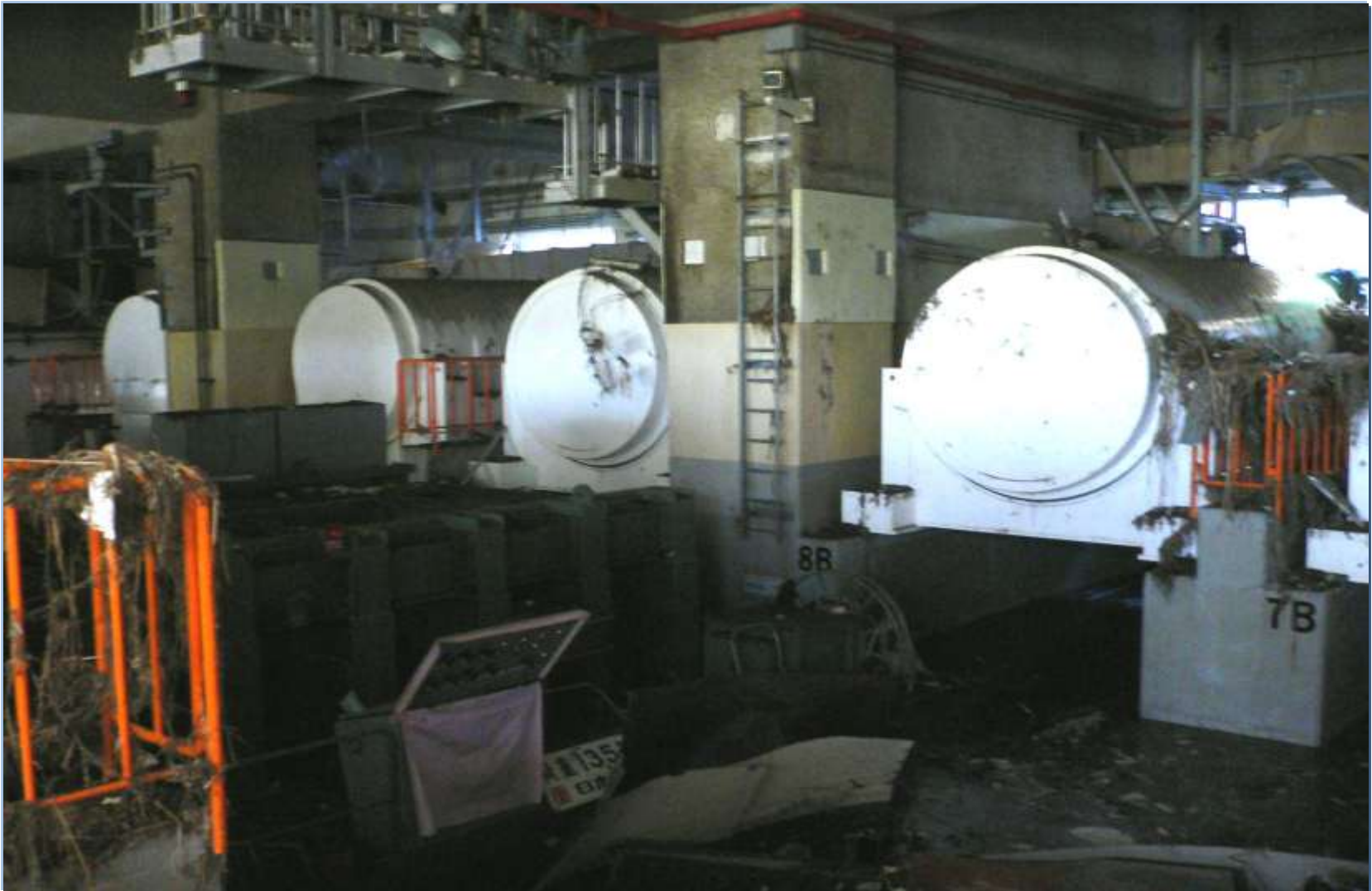
- Launch of a new safety regulatory body, on the basis of the principle of “**separating regulation from utilization**,” the nuclear safety regulatory divisions of NISA will be separated from the Ministry of Economy, Trade and Industry with a “**Nuclear Safety and Security Agency (tentative name)**” aimed to be established by April 2012 as an external agency of the Ministry of Environment by integrating into it the functions of the NSC.

http://www.kantei.go.jp/foreign/noda/topics/201109/201109_additional_report_all.pdf

Implications for Nuclear Security and Non-Proliferation

- Future of global nuclear power is less certain now.
 - The world could be divided into “pro-” and “anti-” nations towards nuclear power, which may make global consensus on nuclear issues more difficult.
- The Fukushima accident proved that common approaches could be effective for enhanced safety and security (esp. emergency response)
 - Especially, **spent fuel management and emergency response** have become important subjects for both security and safety.

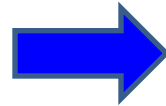
Dry cask storage after 3.11 (@Fukushima)



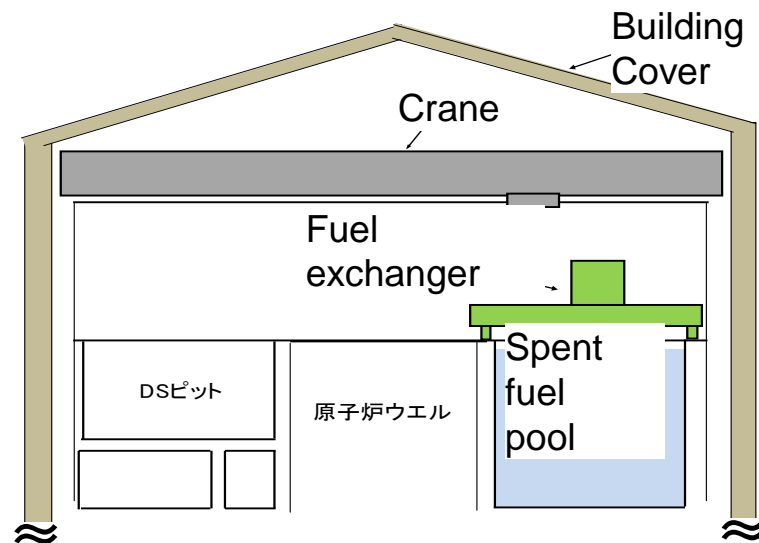
Removal of SF from SF pool

SF remain covered by water during and after the accident: sipping analysis suggests that SF is mostly intact, though some might be damaged by falling objects due to hydrogen explosion

1. Remove rubbles by crane



2. Install refueling machine & overhead crane



3. SF transfer by cask



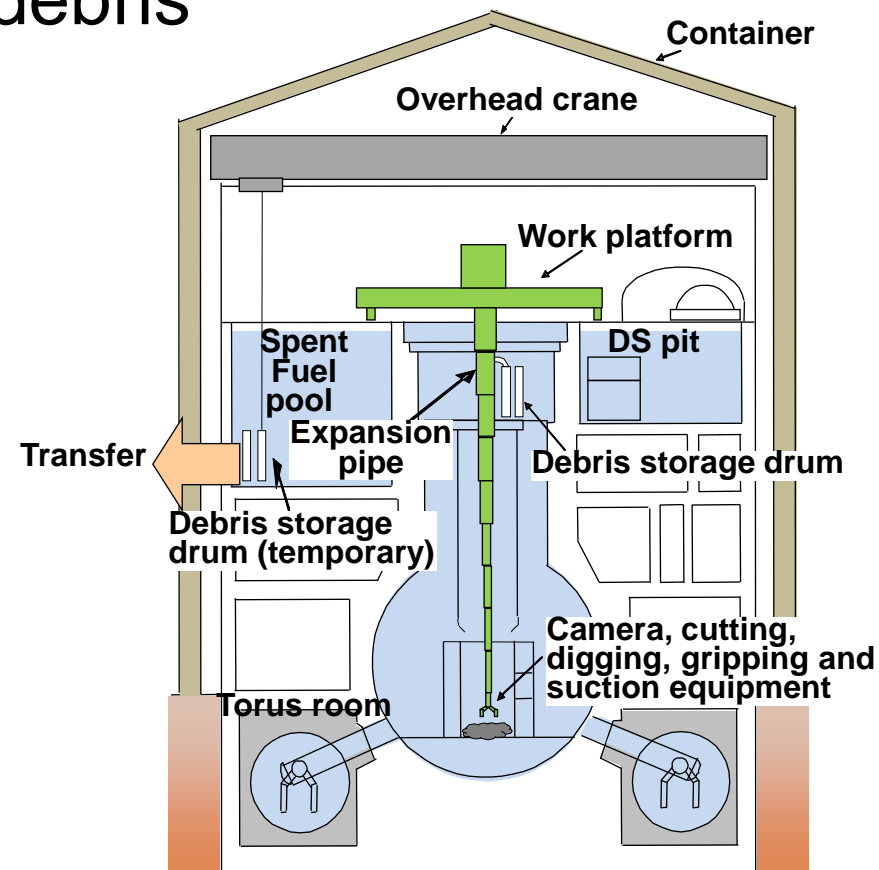
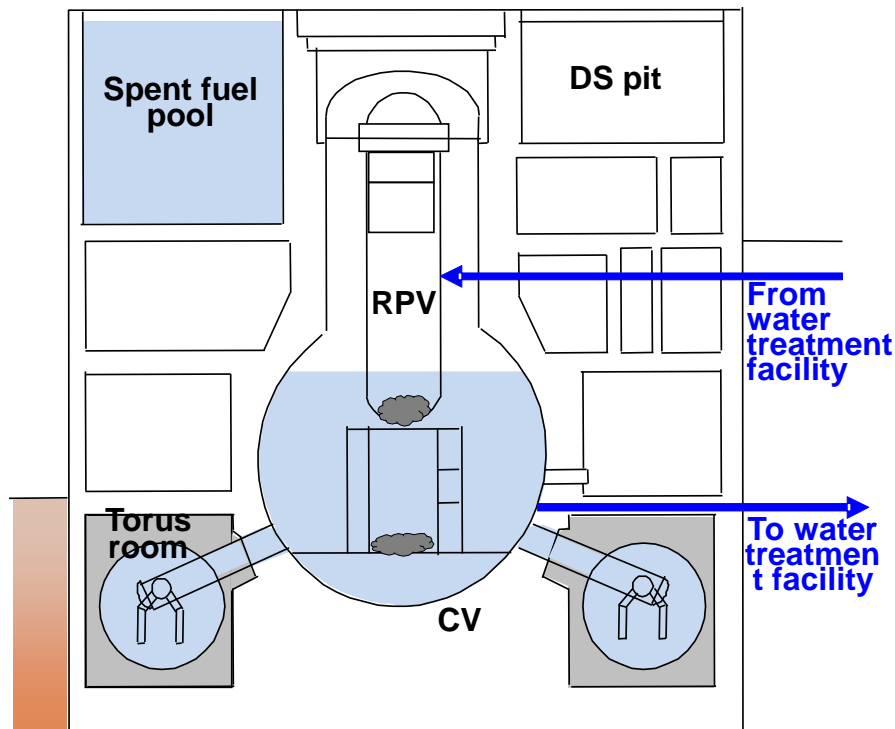
Removal of core debris

Decontamination (to reduce exposure)

→ Plugging the leaky holes

→ Flooding the containment

→ Removal of core debris



Statement of PM Kan on Nuclear Power Policy on July 13, 2011

- *“..It was when I considered the scale of such risks arising from the nuclear incident that I realized that it would no longer be possible to conduct policy on the basis of ensuring safety alone...”*
- *“...with regard to Japan’s future nuclear power policy, we should aim to achieve a society that is not dependent on nuclear power. In other words, we should reduce our dependence on nuclear power in a planned and gradual manner and aim to realize a society in the future where we can do without nuclear power stations. “*

Press conference on July 13, 2011

http://www.kantei.go.jp/foreign/kan/statement/201107/13kaiken_e.html

PM Noda's Speech at UN High-level meeting on Nuclear Safety and Security (11/09/22)

- Japan will disclose to the international community all the information related to this accident, in both swift and accurate manner.
- Japan is determined to raise the safety of nuclear power generation to the highest level in the world.
- Japan stands ready to respond to the interest of countries seeking to use nuclear power generation.
- Japan will also participate actively in efforts to ensure nuclear security.
- Energy is the 'lifeblood' of the economy and serves as a foundation for the daily human lives.
- I should like to close my remarks by pledging that Japan, as the country in which this accident occurred, will dedicate itself to shouldering its responsibilities and taking action.

New Energy Policy: Three Philosophies (July 29, 2011) by Energy and Environment Min. Council

- (1) Three principles toward new best energy mix (*reducing dependency on nuclear power*, strategic approach for energy security, *complete reevaluation of nuclear energy policy*)
- (2) Three principles toward new energy system (realization of distributed energy system, international contribution, multi-eyed approach)
- (3) Three principles toward national consensus (*national debate in order to overcome “pro-“ “anti-“ conflict*, strategy based on objective data, dialogue with various sectors of the public).

(4) 原子力 Nuclear Power Policy

高い安全性の確保と原発への依存度低減への挑戦: Securing High Standard of Safety and Reducing Dependence on Nuclear Power

ミッション Mission

- ・聖域なき検証・検討: No “sacred area” (taboo)
- ・原子力安全の徹底: Assuring Safety
- ・原発への依存度低減に関する国民的議論を踏まえた対応: National Discussion on reducing dependence on nuclear energy

優先課題 Issues

短期 Short

- より高い安全性のもとでの活用と
原発への依存度低減に関する
国民的議論を踏まえた対応の決定
Utilization of existing nuclear power plants
with enhanced safety
National discussion on reducing dependence
on nuclear energy

中期 Mid

- 原発への依存度低減に
関する国民的議論を踏まえた
対応
Appropriate measures to
the results based on
national discussion on
reducing dependence on
nuclear energy

長期 Long

- 原発への依存度低減に
関する国民的議論を踏まえた
対応

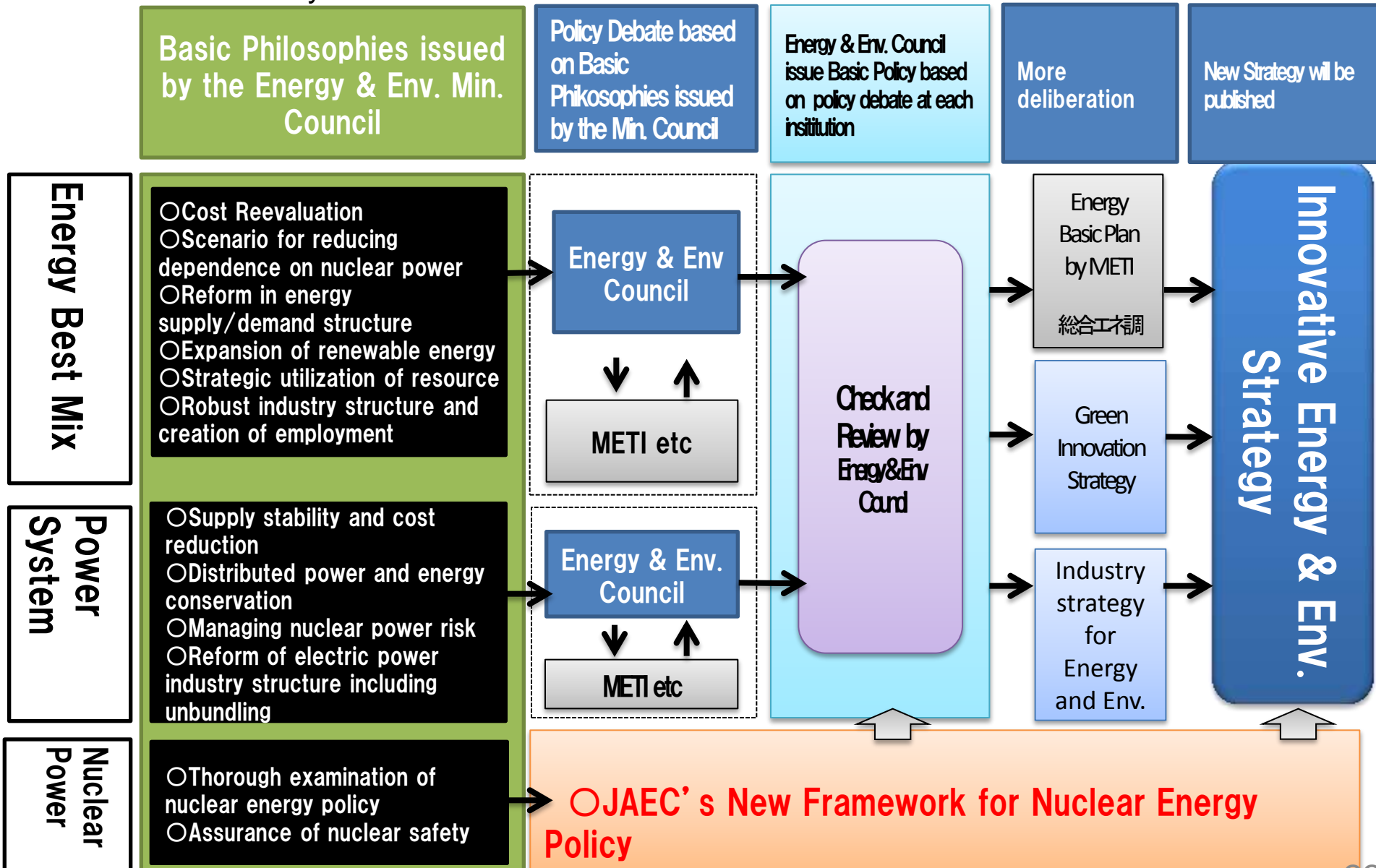
6. Towards Innovative Energy and Environmental Strategy

— Structures for New Energy/Environmental Policy Making Processes —

By Mid-2011

End of 2011

2012



Japan Atomic Energy Commission (JAEC)

○The Role of Japan Atomic Energy Commission

The Japan Atomic Energy Commission is set up in the Cabinet Office and has five commissioners. Its mission is *to conduct planning, deliberations, and decision-making regarding basic policy for research, development, and utilization of nuclear energy, including the formulation of the Framework for Nuclear Energy Policy except matters related to nuclear safety*. When the JAEC deems it necessary as a part of its assigned mandate, *JAEC can recommend and demand reports of the head of relevant administrative organization through the Prime Minister*.

Members: 5 (appointed by the Prime Minister with the consent of the House of Representatives and House of Councillors)



Chairman
Dr. Shunsuke KONDO



Vice Chairman
Dr. Tatsujiro SUZUKI



Commissioner
Ms. Etsuko AKIBA



Commissioner
Dr. Mie OBA



Commissioner
Mr. Akira OMOTO

JAEC's Activities for Nuclear Energy Policy

- Restarted the deliberation process for new Framework for Nuclear Energy Policy (Sept. 27, 2011)
 - It was suspended after the 3/11 Fukushima accident
 - Members of the Committee have been changed slightly to reflect changing circumstances after the accident
 - Major issues: Safety, Cost, Nuclear Power and Fuel Cycle Options, Waste Management, International Perspectives, R&D planning, etc.
- Established Sub-Committee on Evaluation of Nuclear Power and Fuel Cycle Technology options
 - 7 expert members (Chair: Tatsujiro Suzuki)
 - Identify options and criteria for evaluations
 - Identify key differences of cost estimates/evaluations over different options
 - Submit key findings to the JAEC (as necessary)

Comparison of once-through and recycling

Discount Rate 3%

(Yen/kWh)

Item	All Reprocessing	Partial reprocessing and Interim storage (rep. later)		Direct disposal	
		50% rep.	64% rep.	2011	2005
U Fuel	0.73	0.77	0.59	0.81	0.64
MOX Fuel	0.15	0.07	0.07	-	-
(Sub total: Front-end)	0.88	0.84	0.66	0.81	0.64
Reprocessing etc.	1.03	0.46	0.65	-	-
Interim Storage of SF	-	0.05	0.04	0.09	0.12
HLW Disposal	0.08	0.04	0.12	-	-
Direct Disposal of SF	-	-	-	0.10~0.11	0.12~0.21
(Sub total: Back-end)	1.11	0.55	0.81	0.19~0.21	0.24~0.33
Total	1.98	1.39	1.47	1.00~1.02	0.9~1.0

Source: Japan Atomic Energy Commission;

<http://www.aec.go.jp/jicst/NC/tyoki/hatukaku/siryo/siryo3/index.htm>

Report from the Advisory Committee on Nuclear Security, Japan Atomic Energy Commission (Sept. 5, 2011)

Lessons Learned from the Fukushima Accident

1) Strengthen Nuclear Security Measures

- Considering that accident, there is a clear necessity of stronger nuclear security measures for facilities and equipment

2) Strengthen measures against Internal Threats

- Control of entry and exit was clearly insufficient during the accident's initial period. Licensees should strengthen measures against internal threats, including thorough measures to prevent trespassing.

3) Strengthen Education and Training

- It is clearly important to provide emergency response training which hypothesizes very severe situations.

4) Strengthen Nuclear Security System

- In response during emergency, quick response under a clear chain of command is clearly important. Similar to ensuring safety, for ensuring nuclear security during emergencies, the government should allocation of roles in the government, clarify the chain of command, and arrange its approach to radiation safety in order.