Kauffman, John

From: Hiland, Patrick – NRR
Sent: Wednesday, March 23, 2011 2:35 PM
To: Beasley, Benjamin; Kauffman, John; Stutzke, Martin; Munson, Clifford; Manoly, Kamal
Cc: Khanna, Meena; Skeen, David; Manoly, Kamal
Subject: GI-199 Talking Points
Attachments: GI.199.plan.docx; 199.Memo.pdf

Importance: High

Follow Up Flag: Follow up
Flag Status: Completed

Below is my shot at crafting simple talking points for OPA. Please provide comments to Meena Khanna COB.

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GENERIC ISSUE 199, "IMPLICATIONS OF UPDATED PROBABILISTIC SEISMIC HAZARD ESTIMATES IN CENTRAL AND EASTERN UNITED STATES ON EXISTING PLANTS"

Objective of GI-199

The objective of the GI-199 Safety/Risk Assessment was to perform a conservative, screening-level assessment to evaluate if further investigations of seismic safety for operating reactors in the central and eastern U.S. (CEUS) was warranted consistent with NRC directives.

- Results of the GI-199 safety risk assessment are not final estimates of plant-specific seismic risk.
- The seismic hazard data and plant-level fragility assumptions were conservative estimates useful as a screening tool.
- The NRC does not rank plants by seismic risk.

Key Messages:

1. Safety/Risk Assessment for GI-199 was completed in August 2010. It is publically available in ADAMS at ML100270582. That assessment found that plants have adequate safety margin for seismic issues and are within their licensing basis.
2. Overall seismic risk estimates remain small and adequate protection is maintained.
3. Updates to seismic data and models indicate increased seismic hazard estimates for some operating nuclear power plant sites in the Central and Eastern United States.
4. NRC has separate criteria for evaluating whether plant improvements may be imposed through a back-fit.
5. The Safety/Risk Assessment used readily available information and found that for about one-quarter of the currently operating plants, the change in seismic hazard is enough to warrant further NRC review.
6. Action may include obtaining additional, updated information and developing methods to determine if plant improvements to reduce seismic risk are warranted.

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Status of Operating Plants and Need for Actions due to Japanese Event:

- Existing plants were designed with considerable margin to be able to withstand the ground motions from the largest earthquake expected in the area around the plant.
- During the mid-to late-1990s, the NRC staff reassessed the margin beyond the design basis as part of the Individual Plant Examination of External Events [IPEEE] program.
- The NRC's safety/risk assessment concluded that the probability of exceeding the design basis ground motion may have increased by a small amount at some plants. Those results also indicate that the probabilities of damage are lower than NRC's guidelines for taking immediate action.
- US plants are designed for appropriate earthquake levels and are safe.

The NRC is conducting a regulatory assessment, which includes reviewing the seismic capacity for plants located in central and eastern United States based on the latest data and analysis techniques.

Timeline for Preparation and Issuance of Generic Letter:

- The NRC is working on developing a Generic Letter (GL) to request information from all affected plants (96 plants that are east of the Rockies).
- The GL is planned to be issued in draft form for public comment in the late spring.
- Processes that are planned for review of the GL include a review by the NRC's Committee to Review Generic Requirements, the Advisory Committee on Reactor Safeguards (ACRS), and the GL will be issued as a draft for public comments (60 days), followed by a second meeting with ACRS.
- GL should be issued by end of 2011, as the new consensus seismic hazard models become available.
- Consensus hazard models are being developed by NRC, DOE, and EPRI. In addition the USGS will review the model.
- Information requested from licensees will likely require 3 to 6 months to prepare. NRC's review will be on-going as information is collected.
- Based on NRC's review, a determination will be made regarding beneficial back-fits.

COMMUNICATION PLAN FOR GENERIC ISSUE 199

March 17, 2011
(ML081850477)

Goal

This plan will guide staff communications and activities with internal and external stakeholders of the United States Nuclear Regulatory Commission (NRC) as they relate to Generic Issue 199 (GI-199), "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants."

Key Message Following March 11, 2011, Japanese Earthquake

US plants are designed for appropriate earthquake shaking levels and are safe. Currently the NRC is conducting a program called Generic Issue 199, which is reviewing the adequacy of the earthquake design of US NPPs in central and eastern North America based on the latest data and analysis techniques. The NRC will look closely at all aspects of the response of the plants in Japan to the earthquake and tsunami to determine if any actions need to be taken in US plants and if any changes are necessary to NRC regulations.

Key Messages

The key messages to be communicated to stakeholders based on the GI-199 Safety Risk/Assessment (completed in August 2010) are as follows:

(1) **Operating nuclear power plants are safe:** Plants have adequate safety margin for seismic issues. The NRC's Safety/Risk Assessment confirms that overall *seismic risk* estimates remain small and that adequate protection is maintained.

(2) **Though still small, some seismic hazard estimates have increased:** Updates to seismic data and models indicate increased *seismic hazard* estimates for some operating nuclear power plant sites in the Central and Eastern United States.

(3) **Assessment of GI-199 will continue:** Plants are safe (see key message 1), but the NRC has separate criteria for evaluating whether plant improvements may be imposed. The NRC's Safety/Risk Assessment used readily available information and found that for about one-quarter of the currently operating plants, the estimated *core damage frequency* change is large enough to warrant further attention. Action may include obtaining additional, updated information and developing methods to determine if plant improvements to reduce seismic risk are warranted.

Background

This issue was proposed as a Generic Issue in May 2005 after NRC staff's review of updates to the seismic source and ground motion models provided by applicants in support of early site permits for new reactors. The updated seismic information included new Electric Power Research Institute (EPRI) models to estimate earthquake ground motion and updated models

for earthquake sources in seismic regions such as eastern Tennessee, and around both Charleston, South Carolina and New Madrid, Missouri. The new data and models resulted in increased estimates of the seismic hazards for some plants in the Central and Eastern United States (CEUS). The staff evaluated this new information along with preliminary results from a 2004 U.S. Geological Survey (USGS) letter report regarding seismic hazard estimates. From this review the staff concluded that the likelihood of exceeding the seismic hazard values, used in plant design and in previous evaluations (such as the Individual Plant Examination of External Events (IPEEE) Program), may be higher than previously understood for some currently operating CEUS sites.

The staff compared the new seismic hazard data with the earlier evaluations conducted as a part of the IPEEE Program. From this comparison, the staff determined that the seismic designs of operating plants in the CEUS still provide adequate safety margins. At the same time, the staff also recognized that the new seismic data and models could reduce available safety margins due to increased estimates of the probability associated with seismic hazards at some of the currently operating sites in the CEUS.

The licensing basis for currently operating plants is based on deterministic analysis of design basis loads from the maximum earthquake level determined from historical data. The licensing basis does not include a probabilistic assessment of seismic hazards or probabilistic assessment of their potential impact on plant structures, systems, and components.

To maintain consistency with the performance-based approach for assessing seismic hazards for new reactors, the staff determined that the screening analysis should consider seismic hazard data and models besides those available from the USGS. This determination was based on the staff's ongoing interactions with stakeholders to develop a new performance-based approach for assessing seismic hazards for new reactors, as described in a memorandum to the Commission, "A Performance-Based Approach to Define the Safe Shutdown Earthquake Ground Motion," dated July 26, 2006 (ADAMS Accession No. ML052360044). The NRC staff held a public meeting, in February 2008, to engage external stakeholders. During the meeting, the representative from the Nuclear Energy Institute (NEI) expressed their willingness to support a collaborative approach to GI-199. This led to a Seismic Risk Memorandum of Understanding Addendum between EPRI and NRC.

The staff collected and analyzed seismic hazard information from the USGS and from other sources, and seismic risk information from IPEEE analyses. EPRI reported that they calculated mean seismic hazard results for all nuclear power plant sites in the CEUS and used these results to perform an independent evaluation of the implications of changes in seismic hazard estimates. The staff completed the review and analysis of seismic data in support of the Safety/Risk Assessment in June 2009.

Audience and Stakeholders

Internal

Internal stakeholders include the Commission, Office of the Executive Director for Operations (OEDO), Office of Nuclear Regulatory Research (RES), Office of Nuclear Reactor Regulation (NRR), Office of New Reactors (NRO), Office of Nuclear Material Safety and Safeguards (NMSS), Office of Federal and State Materials and Environmental Management Programs (FSME), Region I, Region II, Region III, Region IV, Office of Public Affairs (OPA), Advisory Committee on Reactor Safeguards (ACRS), Office of International Programs (OIP), Office of Congressional Affairs (OCA). (See the "Communications Team" section for a list of specific Communication Team members.)

External

External stakeholders include licensees, EPRI, Nuclear Energy Institute, Congressional members, public interest groups, media, and the public.

Communication Timeline

Detailed Activities to Support Release of the GI-199 Safety/Risk Assessment Report				
Stakeholder Group	**Specific Audience**	**Tool**	**Lead**	**Date**
Internal	Regional Offices	Brief	RES-Kauffman	May 12, 2010 (c)
	NRR Office Director	Brief	RES-Kauffman	May 12, 2010 (c)
	NRO Office Director	Brief	RES-Beasley	May 19, 2010 (c)
	Region I Management	Brief	RES-Kauffman	June 3, 2010 (c)
	EDO, Deputy EDOs	Brief	RES-Kauffman	June 22, 2010 (c)
	Commission offices	Technical Assistants Brief	RES-Kauffman	July 8, 2010 (c)
	NRC Chairman	Brief	RES-Kauffman	August 23, 2010
	Commission offices	EDO Daily Note (with link to documents)	RES-Killian	T* (September 1, 2010)
	EDO	Issue Safety/Risk Assessment Report (goes public after 5 working days)	RES-Sheron	T
External	General Public	Safety/Risk Assessment Report made public in ADAMS		T + 6 days (September 7, 2010)
	General Public	Press Release	OPA-Burnell	T + 6 days (September 7, 2010)
	Public and Licensees	Information Notice	NRR-Manoly	T + 6 days (September 7, 2010)
	Congressional Members/staff (as appropriate)	Phone Calls	OCA-Riley	T + 6 days (September 7, 2010)
	International contacts (as appropriate)	Phone Calls	OIP	T + 6 days (September 7, 2010)
	State/local governments (as appropriate)	Phone Calls	Regional State Liaison Officers Region I- McNamara/Tifft Region II – Trojanowski Region III – Barker Region IV - Maier	T + 6 days (September 7, 2010)

	USGS	Phone Call	OCA-Riley	T + 6 days (September 7, 2010)
	General Public	Public Meeting	RES-Beasley	T + [1 month]
	General Public	Seismic Fact Sheet Update	RES-Killian OPA-Burnell	August 26, 2010

* *"T"* refers to the time that the Director, RES endorses the Safety/Risk Assessment panel recommendation.

Communication Team

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Additional Communication Tools

The NRC has an internal Generic Issues Program (GIP) website (http://www.internal.nrc.gov/RES/GIP/index.html) and a public GIP website (http://www.nrc.gov/about-nrc/regulatory/gen-issues.html.). These websites include program information and documents, background and historical information, generic issue status nformation, and links to related programs.

The staff created a Seismic Issue Fact Sheet (http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-seismic-issues.html).

Questions and Answers

Background

Q1. What is the NRC Generic Issues Program?

A1. The Nuclear Regulatory Commission (NRC) Generic Issues Program (GIP) evaluates technical issues that apply to two or more facilities and that may not be covered by existing regulatory processes or criteria. Issues are evaluated for their effect on safety, security, and/or the environment. The GIP is a program by which these issues can be formally assessed to see if they can be dispositioned by existing regulatory processes or if not, to determine their safety and/or risk significance and how best to treat them. Information on the program is available on the public NRC GIP website (http://www.nrc.gov/about-nrc/regulatory/gen-issues.html); information is also available to NRC staff on the NRC internal GIP website (http://www.internal.nrc.gov/RES/projects/GIP/). Management Directive (MD) 6.4, "Generic Issues Program," contains GIP guidance (available at http://www.nrc.gov/about-nrc/regulatory/gen-issues/policy-procedures.html). MD 6.4 was updated in November 2009 to incorporate program changes described in SECY-07-0022 (available at http://www.nrc.gov/reading-rm/doc-collections/commission/secys/2007/).

Q2. What is Generic Issue 199 about?

A2. Generic Issue 199 investigates the safety and risk implications of updated earthquake-related data and models. These data and models suggest that the probability for earthquake ground shaking above the seismic design basis (see answers A8, A9, and A10) for some nuclear power plants in the Central and Eastern United States is still low, but larger than previous estimates (see answer A12).

Q3. Where can I get current information about Generic Issue 199?

A3. The public NRC Generic Issues Program (GIP) website (http://www.nrc.gov/about-nrc/regulatory/gen-issues.html) contains program information and documents, background and historical information, generic issue status information, and links to related programs. The GI-199 section of the NRC internal GIP website (http://www.internal.nrc.gov/RES/projects/GIP/Individual%20GIs/GI-0199.html) contains additional information about Generic Issue 199 (GI-199) and is available to NRC staff. The latest Generic Issue Management Control System quarterly report, which has regularly updated GI-199 information, is publicly available at http://www.nrc.gov/reading-rm/doc-collections/generic-issues/quarterly/index.html. Additionally, the U.S. Geological Survey data is publicly available at http://earthquake.usgs.gov/hazards/products/conterminous/2008/.

Q4. Are all U.S. plants being evaluated as a part of Generic Issue 199?

A4. The scope of the Generic Issue 199 (GI-199) Safety/Risk Assessment is limited to all plants in the Central and Eastern United States. Although plants at the Columbia, Diablo Canyon, Palo Verde, and San Onofre sites are not included in the GI-199 Safety/Risk Assessment, the Information Notice on GI-199 is addressed to all operating power plants in the U.S. (as well as all independent spent fuel storage installation licensees). The staff will also consider inclusion

of operating reactors in the Western U.S. in its future generic communication information requests.

Q5. Does GI-199 affect license renewal?

A5. No. The NRC's regulations for license renewal (10 CFR Part 54) require licensees to manage age-related degradation to ensure that systems, structures, and components (SSCs) will fulfill their safety-related functions, as specified in the current licensing basis, for the period of extended operation. The aging management review conducted by license renewal applicants specifically addresses the impact of age-related degradation on SSC seismic capacity. It should be noted that a plant's licensing basis, including its seismic design basis, is established outside of the license renewal process during initial plant licensing and subsequent license amendments. In addition, the NRC has processes to evaluate the adequacy of plant licensing bases (e.g., the Generic Issues Program) based on new information or operating experience and, if necessary, improve safety (e.g., require plant improvements through the backfit process).

Note: Related to license renewal, the County Executive of Westchester County (New York) and groups from New Jersey submitted a petition for rulemaking on license renewal, including a seismic-related aspect. NRC denied this petition. The petitioners then filed suit in the U.S. Court of Appeals Second Circuit and the court upheld the NRC's position. Details are available on the internal webpage of the Office of General Counsel (under Law Library, Summary of AEC-NRC Litigation, "Spano v. NRC" (2d Cir. 2009): http://www.internal.nrc.gov/ogc/internal/AEC-NRC_Cases.pdf.)

Q6. Are the implications of new seismic hazard estimates being considered for the storage of spent fuel?

A6. Yes, while the GI-199 Safety/Risk Assessment focused solely on operating power reactors in the Central and Eastern U.S., spent fuel storage has been considered by NRC.

The NRC Office of Nuclear Materials Safety and Safeguards (NMSS) was informed of GI-199 and a preliminary screening review was performed in November, 2008 by the NMSS Division of Spent Fuel Storage and Transportation. There is a total of 40 operating independent spent fuel storage installations (ISFSIs) in the Central and Eastern U.S. (CEUS). Except for a wet storage facility at G. E. Morris located in Illinois, the ISFSIs are co-located at the operating and permanently shutdown reactor sites. A review of design earthquakes (DE) used at the existing ISFSI locations in CEUS indicated that the safety margin (defined for ISFSIs as the ratio of DE/SSE, where SSE is the *safe shutdown earthquake* discussed in answer A8) for the cask designs were in the range of 1.20 ~ 3.90. Therefore, NMSS considers that there is significant margin built into the existing designs and has confidence that the ISFSIs can continue to operate safely while the licensees' investigate this issue using their site specific information. Even so, holders of operating license for ISFSIs are included among addressees in the Information Notice on GI-199.

Spent fuel pools (SFPs) were not specifically evaluated as part of GI-199. However, based on their design attributes (as follows), SFPs remain safe. SFPs are constructed of reinforced concrete, several feet thick, with a stainless steel liner to prevent leakage and maintain water quality. Due to their configuration, SFPs are inherently structurally-rugged and are designed to the same seismic requirements as the nuclear plant.

Note: Typically, SFPs are about 40 feet deep and vary in width and length. The fuel is stored in stainless steel racks and submerged with approximately 23 feet of water above the top of the stored fuel. Each plant has a preferred SFP make-up water source (the refueling water storage tank for pressurized water reactors and the condensate storage tank for boiling water reactors). SFPs have alternate means of make-up such as service water systems and the fire water system. SFPs are also typically designed (e.g. with anti-siphon check valves) and instrumented such that leakage is minimized and promptly detected.

Q7. Are the implications of new seismic hazard estimates being considered for fuel cycle facilities?

A7. Yes, while the GI-199 Safety/Risk Assessment focused solely on operating power reactors in the Central and Eastern U.S., fuel cycle facilities have been considered by NRC. Based on preliminary reviews of the updated seismic hazard estimates, NRC staff in the Office of Nuclear Material Safety and Safeguards concluded that, for the fuel cycle facilities within the CEUS, there is no immediate safety concern.

Existing facilities (uranium enrichment, fuel fabrication [high and low enriched]) were mostly built to local building codes. These facilities demonstrate compliance with the performance requirements in 10 CFR 70.61 through their Integrated Safety Analyses (ISAs). 10 CFR Part 70 licensees are required to perform an ISA in which seismic events are addressed (through a combination of design and preventive/mitigative actions). To demonstrate compliance with Part 70, licensees must limit the risk of high and intermediate consequence events, by limiting the likelihood or consequence. It is expected that, in view of this new data, existing facilities will consider the updated information as it relates to the performance requirements and see if additional safety controls are necessary.

In addition to the ISA requirements, new facilities have to meet the even higher baseline design criteria (BDC), which requires the design to provide adequate protection against natural phenomena with consideration of the most severe documented historical events for the site. Three new facilities (LES, USEC ACP, and MOX) are undergoing construction. Conservatism was built into the design of these facilities (i.e., design code factors of safety, elasticity in the structures, and conservatism in the design evaluation) resulting in additional safety margin. All new facilities and new processes at existing facilities are required to meet 10 CFR 70.64(a)(2), which requires adequate protection against natural phenomena.

Note: Regarding some particular facilities, the Paducah Gaseous Diffusion Plant (a 10 CFR Part 76 facility) was designed to meet local building codes at the time of its construction in the early 1950s. Later in the late 1990s, as part of the Certification process, the Paducah plant was evaluated and reinforced to meet a 250 year return earthquake. Honeywell's construction was also consistent with the local building codes when it was built 50 years ago. Later during the 1990s, structural modifications were performed at Honeywell to upgrade the plant so it could withstand a 475-yr recurrence site-specific earthquake.

Q8. How can I learn more about earthquakes?

A8. A fact sheet on seismic issues for existing nuclear power plants is available on the NRC public website at http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-seismic-issues.html. Background information on earthquakes can also be obtained at the U.S. Geological Survey website at http://earthquake.usgs.gov/.

Q9. What do the following terms mean?

- ***Annual exceedance frequency***
- ***Core damage frequency***
- ***Design basis earthquake* or *safe shutdown earthquake***
- ***Ground acceleration***
- ***High confidence of low probability of failure capacity***
- ***Large early release frequency***
- ***Seismic hazard***
- ***Seismic margin***
- ***Seismic risk***

A9. The terms are defined as follows:

- ***Annual exceedance frequency (AEF)*** – Number of times per year that a site's ground motion is expected to exceed a specified acceleration.

- ***Core damage frequency (CDF)*** – Expected number of core damage events per unit of time. *Core damage* refers to the uncovery and heat-up of the reactor core, to the point that prolonged oxidation and severe fuel damage are not only anticipated but also involve enough of the core to result in off-site public health effects if released. *Seismic core damage frequency* refers to the component of total CDF that is due to seismic events.

- ***Design basis earthquake* or *safe shutdown earthquake (SSE)*** – A *design basis earthquake* is a commonly employed term for the *safe shutdown earthquake (SSE)*; the SSE is the earthquake ground shaking for which certain structures, systems, and components are designed to remain functional. In the past, the SSE has been commonly characterized by a standardized spectral shape associated with a peak *ground acceleration* value.

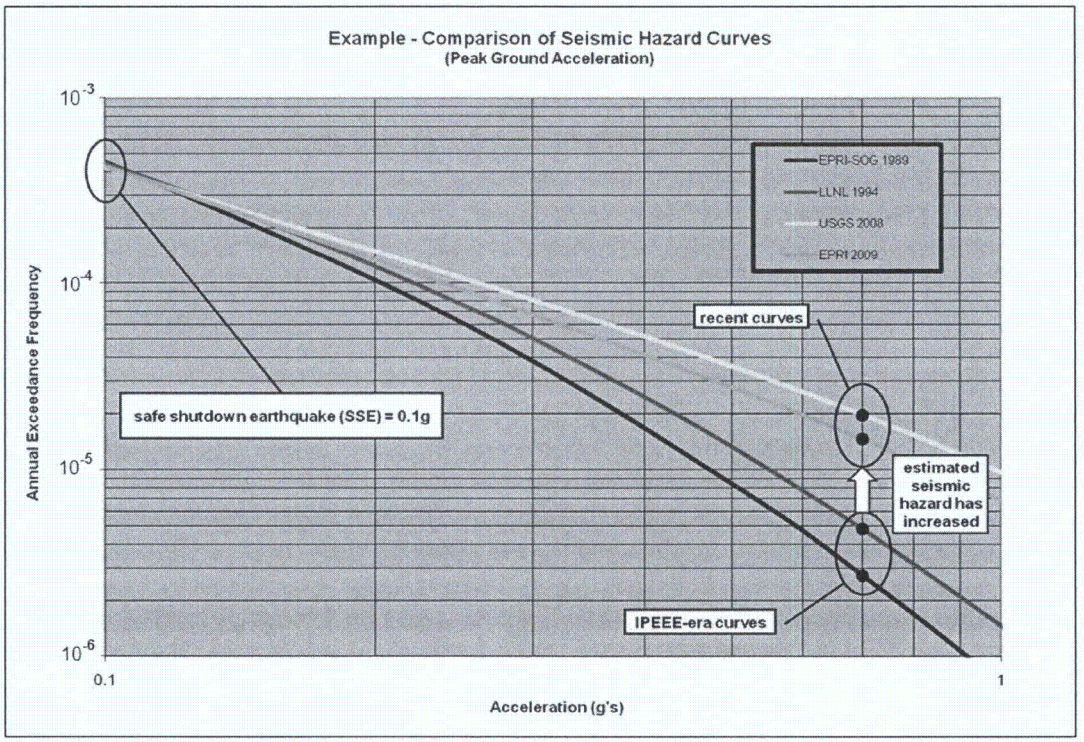
- ***Ground acceleration*** – Acceleration produced at the ground surface by seismic waves, typically expressed in units of *g*, the acceleration of gravity at the earth's surface.

- ***High confidence of low probability of failure (HCLPF) capacity*** – A measure of *seismic margin*. In *seismic risk* assessment, *HCLPF capacity* is defined as the earthquake motion level, at which there is high confidence (95%) of a low probability (at most 5%) of failure of a structure, system, or component.

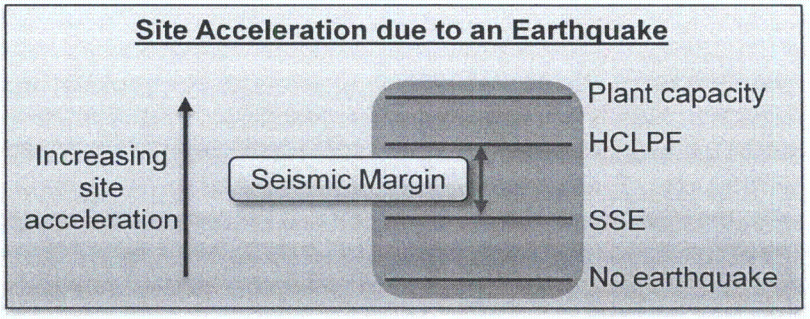
- ***Large early release frequency (LERF)*** – The expected number of large early releases per unit of time. A *large early release* is the rapid, unmitigated release of airborne fission products from the containment building to the environment, occurring before the effective implementation of off-site emergency response and protective actions, such that there is a potential for early health effects. *Seismic large early release frequency* refers to the component of total LERF that is due to seismic events.

- ***Seismic hazard*** – Any physical phenomenon, such as ground motion or ground failure, that is associated with an earthquake and may produce adverse effects on human activities (such as posing a risk to a nuclear facility).

For the representative plant in the chart below, the *annual exceedance frequency* for a 0.7*g* acceleration (e.g., for a large, but highly improbable earthquake) has increased from approximately one in 250,000 years (for IPEEE-era curves) to approximately one in 60,000 years (for recent *seismic hazard* curves). (In other words, the annual exceedance frequency for a 0.7*g* acceleration has increased from about 4 x 10^{-6} (0.000004) per year for IPEEE-era curves to about 1.8 x 10^{-5} (0.000018) per year for recent seismic hazard curves.) Note that the curves in this example are virtually indistinguishable at the SSE (design basis) level, but this is not always the case. Ultimately, GI-199 is about understanding the impact of these seismic hazard changes on reactor risk.



- ***Seismic margin*** – The difference between a plant's *HCLPF* capacity and its seismic design basis (*safe shutdown earthquake, SSE*), as shown in the figure below. (Note that the "plant capacity" label in this figure is the acceleration expected to result in core damage half of the time.) (Also see answer A11.)



- ***Seismic risk*** – The risk (frequency of occurrence multiplied by its consequence) of severe earthquake-initiated accidents at a nuclear power plant. A severe accident is an accident that causes core damage, and, possibly, a subsequent release of radioactive materials into the environment. Several risk metrics may be used to express *seismic risk*, such as seismic *core damage frequency* and seismic *large early release frequency*.

Safety

Q10. How was the seismic design basis for an existing nuclear power plant established?

A10. The seismic ground motion used for the design basis was determined from the evaluation of the maximum historic earthquake within 200 miles of the site, without explicitly considering the time spans between such earthquakes; safety margin was then added beyond this maximum historic earthquake to form a hypothetical *design basis earthquake* (see answer A9). The relevant regulation for currently operating plants is 10 CFR Part 100, Appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants" (http://www.nrc.gov/reading-rm/doc-collections/cfr/part100/part100-appa.html).

Q11. Is there margin above the design basis?

A11. Yes, there is margin beyond the design basis (see answer A9). In the mid to late 1990s, NRC staff reviewed the plants' assessments of potential consequences of severe earthquakes (earthquakes well beyond the safety margin included in each plant's design basis), which licensees performed as part of the Individual Plant Examination of External Events program. From this review, the staff determined that seismic designs of operating plants in the Central and Eastern United States have considerable safety margins, for withstanding earthquakes, built into the designs.

Q12. What do you mean by "increased estimates of seismic hazards" at nuclear power plant sites?

A12. *Seismic hazard* (earthquake hazard) represents the chance (or probability) that a specific level of ground shaking could be observed or exceeded at a given location. Our estimates of seismic hazard at some Central and Eastern United States locations have changed based on results from recent research, indicating that earthquakes occurred more often in some locations than previously estimated. Our estimates of seismic hazard have also changed because the models used to predict the level of ground shaking, as caused by a specific magnitude earthquake at a certain distance from a site, changed. The increased estimates of seismic hazard at some locations in the Central and Eastern United States were discussed in a memorandum to the Commission, dated July 26, 2006. (The memorandum is available in the NRC Agencywide Documents Access and Management System [ADAMS] under Accession No. ML052360044).

Q13. What has the Safety/Risk Assessment found and what does it mean for Generic Issue 199?

A13. Results of the Safety/Risk Assessment confirm that currently operating plants have adequate protection against *seismic hazards* (see Safety/Risk Assessment report transmittal

memorandum). However, based on a separate criterion in the Generic Issues Program, the estimated *core damage frequency* change is still large enough to warrant further attention regarding the possible imposition of plant improvements. Action could include obtaining information and developing methods to complete plant-specific value-impact analyses.

RES staff developed a methodology and implemented it to assess the risk associated with this issue. Overall *seismic risk* estimates remain small in an absolute sense. All operating plants in the Central and Eastern United States have seismic core damage frequency (SCDF) less than or equal to 10^{-4} (0.0001) per year, which is considered safe (see answer to A15). The SCDF changes (the difference in SCDFs calculated using the old and new seismic hazard information) for a number of plants lie in the range of 10^{-4} to 10^{-5} (0.0001 to 0.00001) per year, which meets the NRC Generic Issues Program numerical risk threshold for an issue to continue to be evaluated for possible regulatory action.

Q14. Are the plants safe? If you are not sure they are safe, why are they not being shut down? If you are sure they are safe, why are you continuing evaluations related to this generic issue?

A14. Yes, currently operating nuclear plants in the Central and Eastern United States remain safe, with no need for immediate action. This determination is based on NRC staff reviews associated with Early Site Permits, the conclusions of the Generic Issue 199 Screening Panel (comprised of technical experts), and the conclusions of the Safety/Risk Assessment Panel (also comprised of technical experts).

No immediate action is needed because: (1) existing plants were designed to withstand anticipated earthquakes with substantial design margins, as confirmed by the results of the Individual Plant Examination of External Events; (2) the probability of exceeding the *safe shutdown earthquake* ground motion (see answer A9) may have increased at some sites, but only by a relatively small amount; (3) the increased probability is primarily in the high structural response frequencies, so buildings and equipment should not be affected (seismic amplitudes at lower frequencies are the primary contributors to building and equipment damage); and (4) the Safety/Risk Assessment Stage results indicate that the probabilities of seismic core damage are lower than the guidelines for taking immediate action.

Even though the staff has determined that existing plants remain safe, the Generic Issues Program criteria direct staff to continue their analysis to determine whether any cost-justified plant improvements can be identified to make plants even safer.

Q15. How do you know the plants are safe?

A15. The Safety/Risk Assessment results confirm that plants are safe. The relevant risk criterion for GI-199 is total *core damage frequency* (CDF). The threshold for taking immediate regulatory action (found in NRR Office Instruction LIC-504, see below) is a total CDF greater than or on the order of 10^{-3} (0.001) per year. For GI-199, the staff calculated seismic CDFs of 10^{-4} (0.0001) per year and below for nuclear power plants operating in the Central and Eastern U.S. (CEUS) (based on the new U.S. Geological Survey seismic hazard curves). The CDF from internal events (estimated using the staff-developed Standardized Plant Analysis of Risk models) and fires (as reported by licensees during the IPEEE process and documented in NUREG-1742), when added to the seismic CDF estimates results in the total risk for each plant to be, at most, 4×10^{-4} (0.0004) per year or below. This is well below the threshold (a CDF of

10^{-3} [0.001] per year) for taking immediate action. Based on the determination that there is no need for immediate action, and that this issue has not changed the licensing basis for any operating plant, the CEUS operating nuclear power plants are considered safe. In addition, as detailed in the GI-199 Safety/Risk Assessment and answers A13 and A14 above, there are additional, qualitative considerations that provide further support to the conclusion that plants are safe.

Note: The NRC has an integrated, risk-informed decision-making process for emergent reactor issues (NRR Office Instruction LIC-504, ADAMS Accession No. ML100541776 [not publically available]). In addition to deterministic criteria, LIC-504 contains risk criteria for determining when an emergent issue requires regulatory action to place or maintain a plant in a safe condition.

Despite NRC's determination that plants are safe to operate, MD 6.4, "Generic Issues Program," contains quantitative risk guidelines that place GI-199 into the category of continued evaluation to determine if cost-beneficial backfits can be justified at any plants.

Note: Also, New U.S. Geological Survey seismic hazard information provides ground acceleration likelihoods at each power plant site for both design basis and beyond design basis earthquakes. This seismic hazard information was combined with an estimate of each plant's resistance to earthquakes (seismic fragility) to produce an estimate of the frequency of damage to the reactor core due to earthquakes. This seismic core damage frequency (SCDF) was combined with estimates of the core-damage frequency (CDF) for internal events and fires, and the total CDF was then compared to risk thresholds used by the NRC to assess and assure that nuclear power plants are operated safely. The frequency calculated for all operating nuclear power plants in the CEUS is in the range considered safe.

Q16. Why are new nuclear plants being built to different seismic design requirements than existing nearby plants? Why are the currently operating plants not required to meet the new standards?

A16. Currently operating plants have been determined to adequately protect the public; new plants are designed to different requirements in order to meet the Nuclear Regulatory Commission's expectation that the new plants will provide enhanced margins of safety (see "Regulation of Advanced Nuclear Power Plants; Statement of Policy" 59 FR 35461 at http://www.nrc.gov/reading-rm/doc-collections/commission/policy/#power). There are two primary ways of determining safety: deterministic assessments (based on past events and engineering judgment) and probabilistic assessments. New plants employ probabilistic methods. Existing plants were built to older standards, based on deterministic assessments. Those standards have been monitored, and were found to be sufficient and appropriate. In order to impose new requirements on existing plants, the NRC must be able to justify the new requirements in accordance with the "Backfit Rule" (10 CFR 50.109, available at http://www.nrc.gov/reading-rm/doc-collections/cfr/part050/part050-0109.html). The NRC needs additional information to justify any new requirements, and the Safety/Risk Assessment Panel recommended taking action to acquire the information.

Q17. How does the occurrence of a new earthquake in the Central or Eastern United States affect Generic Issue 199?

A17. The effect of a single earthquake is small on the estimated *seismic hazard* (defined in answer A9) and hence on Generic Issue 199, unless it occurs in an area not previously recognized as being capable of producing earthquakes, or is larger than previously believed possible in a region. In a seismic hazard study, the seismic source zones are specifically delineated to include a sufficient number of earthquakes to provide a stable estimate of the seismicity rate and are thus relatively insensitive to the addition of a single earthquake. If an earthquake does occur in an area not previously recognized as being capable of producing earthquakes or if an earthquake occurs that is larger than previously believed possible in a region, changes to the seismic hazard model used to develop seismic hazard estimates would be required.

Note: The magnitude 5.2 earthquake that occurred on April 18, 2008 in southeastern Illinois provides a good example of the potential impact of a single earthquake. This earthquake occurred in an area recognized as being capable of producing significant earthquakes (the Wabash Valley seismic source zone) and was smaller than the maximum magnitude event defined for the zone based on geologic investigations (maximum magnitude of 7-7.5). The addition of a single event of this magnitude to the earthquake database for this area would likely change the activity rate by less than a few percent and thus have a very small impact on the estimated seismic hazard at any of the nuclear facilities in the area.

Schedule

Q18. What has been done about this issue since it was identified as a generic issue in the Generic Issues Program?

A18. The following summarizes what has been done on Generic Issue 199 (GI-199):

Prioritization and Screening

- *June 2005:* The issue was logged into the Generic Issues Program (GIP) and, based on the NRC determination that the seismic design of plants in the Central and Eastern United States still provided an adequate level of protection, the Agency decided that this issue was a relatively low priority.
- *November 2005 – February 2007:* The Agency awarded a contract to screen this issue and determine whether it should continue to be evaluated under the GIP. In 2006, the contractor notified RES of problems obtaining information that the contractor wanted to perform its task.
- *April 2007:* The NRC decided to use Agency staff to complete the screening analysis using guidance provided in Management Directive (MD) 6.4 and SECY-07-0022, "Status Report on Proposed Improvements to the Generic Issues Program," dated January 30, 2007. MD 6.4 outlines the seven GIP criteria for use in determining whether proposed generic issues should be designated generic issues (the screening process) and proceed to the Safety/Risk Assessment Stage of the GIP.
- *September 2007:* An initial screening analysis was completed.
- October 2007: For consistency with the performance-based approach for assessing *seismic hazards* for new reactors, the staff determined that the screening analysis should consider seismic hazard data and models besides those available from the U.S.

Geological Survey.

- *February 2008:* The NRC completed the GIP screening with the GI-199 Screening Panel concluding that the issue should proceed to the Safety/Risk Assessment Stage under the GIP. The NRC staff held a public meeting to engage external stakeholders. During the meeting, the representative from NEI expressed their willingness to support a collaborative approach to GI-199. (This led to a Seismic Risk Memorandum of Understanding Addendum between the Electric Power Research Institute and the NRC Office of Nuclear Regulatory Research (RES).)

Safety/Risk Assessment Stage

- GI-199 then entered the Safety/Risk Assessment Stage of the GIP. RES staff collected and analyzed seismic hazard information from the U.S. Geological Survey and other sources, and *seismic risk* information from Individual Plant Examination of External Events analyses.
- *November 2008:* The NRC Office of Nuclear Material Safety and Safeguards (NMSS) performed a preliminary review related to independent spent fuel storage installations (ISFSIs). A review of design earthquakes (DE) used at the existing ISFSI locations in Central and Eastern U.S., indicated that there is significant margin built into the existing designs and NMSS determined that they have confidence that the ISFSIs can continue to operate safely while GI-199 is processed.
- *June 2009:* In support of the Safety/Risk Assessment, the staff completed the review and detailed analysis of seismic data for 96 plants.
- *July 2009 – March 2010:* Several Safety/Risk Assessment Panel meetings were held to determine recommendations in light of stakeholder input that was received.
- *April 2010 – August 2010:* The Safety/Risk Assessment report is finalized. Internal briefings and communications are carried out (to build NRC consensus and to prepare for the release of the Safety/Risk Assessment report and associated public meeting).
- During the process of resolving GI-199, staff responded to Freedom of Information Act requests and held numerous meetings with internal and external stakeholders.

Q19. Why is it taking the NRC so long to process Generic Issue 199?

A19. This is a complicated issue involving the intersection of the probabilistic risk analysis and seismic disciplines. Obtaining data, developing methods, and performing analyses are all required to address the issue. Analyzing a few representative plants for this issue (as is normally done in the Generic Issues Program) is inappropriate.because the *seismic hazard* and associated impact to the power plant are very site-specific; so analysis for 96 separate plants is required. (Refer to A14 for a summary of what has been done on GI-199 since it was first identified.) GI-199 has also been a communication-intensive generic issue because it affects many parts of the NRC and industry, and because it is important to NRC and all stakeholders that the Safety/Risk Assessment results are properly conveyed.

Q20. What will happen next regarding Generic Issue 199?

A20. The next step is for the staff to complete the Safety/Risk Assessment Stage of the Generic Issues Program (GIP). The Safety/Risk Assessment report will soon be published, followed by an information notice being sent to all licensees of nuclear power reactors and independent spent fuel storage installations. A public meeting will be held to discuss the results of the Safety/Risk Assessment and the next steps for GI-199. After the Safety/Risk Assessment

Stage, further action regarding GI-199 will be pursued (such as obtaining more detailed, plant-specific information and performing analysis to determine whether plant-specific improvements are warranted). NRC staff will also make presentations to the Advisory Committee on Reactor Safeguards.

Q21. Aside from evaluations for GI-199, what is the NRC's expectation regarding the use of updated probabilistic seismic hazard information in regulatory applications?

A21. It is expected that all NRC licensees that are required to analyze risks and hazards impacting their operations will use the most current seismic hazard information.

Regarding currently operating nuclear power plants, there is no requirement that the plants re-evaluate their seismic design basis (10 CFR 100, Appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants"), but plants do need to use the most updated information available in the case of risk-informed licensing amendments.

Note: The NRC guidance for using probabilistic risk assessment (PRA) in risk-informed decisions on plant-specific changes to the licensing basis is provided in RG 1.174. The scope, level of detail, and technical acceptability of the PRA are to be commensurate with the application for which it is intended and the role that the PRA results play in the integrated decision process. One over-riding requirement is that the PRA should realistically reflect the actual design, construction, operational practices, and operational experience of the plant and its owner. RG 1.200 provides further guidance concerning the technical adequacy of PRAs and states that seismic hazard analysis should include current information. Consistent with this guidance, the staff expects that licensees will use the most recent seismic hazard information available for risk-informed regulatory applications.

Regarding seismic requirements for dry cask storage systems and independent spent fuel storage installations (ISFSIs), the staff also expects that licensees will use the most recent seismic hazard information available for risk-informed regulatory applications.

Note: NRC regulations (in 10 CFR Part 72) require licensees to perform written evaluations to establish that, for their site-specific conditions, the conditions set forth in the Certificate of Compliance (CoC) have been met. They must also perform evaluations showing that cask storage pads and areas have been designed to adequately support the static and dynamic loads of the stored casks, considering potential amplification of earthquakes through soil-structure interaction as well as soil liquefaction potential or other soil instability due to vibratory ground motion.

Stakeholder Interest

Q22. Has the NRC received any requests from government officials regarding seismic issues?

A22. Yes. On November 15, 2007, the NRC received a letter (available in the NRC Agencywide Documents Access and Management System, ADAMS, under Accession No. ML0732500954) from the Attorneys General of six states (Connecticut, Delaware, Illinois, Kentucky, New York, and Vermont). The letter encouraged the NRC to consider siting and safety requirements, including geographic and seismic issues, in the regulatory process for license renewal. The NRC reviewed this letter and responded that the items of concern are

addressed in "ongoing regulation [that]... occurs throughout the life of the license... [and that] expand[ing] the scope of license renewal to cover...[the] issues raised in [the] letter...[would be] duplicating the Commission's responsibilities..." (ADAMS Accession No. ML073400603). Additionally, several Freedom of Information Act requests were received, and NRC staff responded to the requests; the U.S. Geological Survey data related to these requests is publicly available under ADAMS Accession No. ML072880133.

Also, the County Executive of Westchester County (New York) and groups from New Jersey submitted a petition for rulemaking on license renewal, including a seismic-related aspect. The NRC denied this petition. The petitioners then filed suit in the U.S. Court of Appeals Second Circuit and the court upheld the NRC position. Details are available on the internal webpage of the NRC Office of General Counsel (under Law Library, Summary of AEC-NRC Litigation, "Spano v. NRC" (2d Cir. 2009): http://www.internal.nrc.gov/ogc/internal/AEC-NRC_Cases.pdf.)

Q23. Will the NRC release the results of the Safety/Risk Assessment? If so, will plant-specific results be included?

A23. The Safety/Risk Assessment report will be made available on the public NRC Generic Issues Program (GIP) website (http://www.nrc.gov/about-nrc/regulatory/gen-issues.html), on the internal NRC GIP website (http://www.internal.nrc.gov/RES/projects/GIP/), and in the NRC Agencywide Document Access and Management System (ADAMS) under Accession No. ML100270582.

Regarding the plant-specific results, they are included in the Safety/Risk Assessment report (in appendix D), and have been used in the aggregate for the determination that further, plant-specific information and analysis is needed to investigate possible plant-specific improvements. (See the last section, "Safety/Risk Assessment Results - Plants in the GIP "Continue Region," of this Communication Plan.)

Note: Results of the Safety/Risk Assessment confirm that currently operating plants have adequate protection against seismic hazards; however, the results also indicated that GI-199 meets the NRC Generic Issues Program numerical risk threshold for an issue to continue to be evaluated for possible regulatory action (see answer A13). The Safety/Risk Assessment utilized simplifying methods and assumptions to produce plant-specific results to determine trends, not to finalize which plants will or will not be further analyzed.

Safety/Risk Assessment Results - Plants in the GIP "Continue Region"

Plant-specific results are included in the Safety/Risk Assessment report (in appendix D) and have been used in the aggregate to determine that further, plant-specific information and analysis is needed to investigate possible plant-specific improvements. Listed below are plants that are currently above the Generic Issues Program (GIP) numerical risk threshold for an issue to continue to be evaluated for possible regulatory action (see answers A13 and A23). (Note that the plants are listed in alphabetical order by NRC region.) During the analysis, this group of plants was referred to as the "plants in the *continue region*."

As more information becomes available and more detailed analysis is performed, this group of plants *will* change. As discussed in answer A4, generic communications on this issue will be addressed to all operating power plants in the United States. More detailed, plant-specific analysis of all plants will allow NRC staff to prioritize plants that may be considered for regulatory action. The need to continue evaluating GI-199 is based on the collective results, not the results for any particular plant.

Region I
Indian Point 2
Indian Point 3
Limerick 1
Limerick 2
Peach Bottom 2
Peach Bottom 3
Seabrook 1

Region II
Crystal River 3
Farley 1
Farley 2
North Anna 1
North Anna 2
Oconee 1
Oconee 2
Oconee 3
Saint Lucie 1
Saint Lucie 2
Sequoyah 1
Sequoyah 2
Summer
Watts Bar 1

Region III
Dresden 2
Dresden 3
Duane Arnold
Perry 1

Region IV
River Bend 1
Wolf Creek 1

Q24. There was a recent Part 21 (60-Day Interim Report) Notification concerning seismic input for control rods that might lead to a failure to scram at Boiling Water Reactors (BWRs). Was this information included in the GI-199 Safety/ Risk Assessment (S/RA)? Could this information change the results of the S/RA?

A24. On September 3, 2010, General Electric Hitachi (GEH) Nuclear Energy submitted a 10CFR50 Part 21 Notification regarding a failure to include seismic input in reactor control blade customer guidance for BWRs. BWRs remain safe because (1) control rods are expected to fully or partially insert even with channel-control rod interference, (2) operators will still have the ability to manually scram partially inserted rods, and (3) the limited time spent at conditions where the failure to scram could occur (low reactor pressure). NRR has been following this Part 21 issue and has determined that the GEH has provided effective interim guidance to the affected licensees that experience channel-control rod interference, and that additional guidance detailed in the Part 21 notice, provides licensees with conservative strategies to assist in the insertion of control rods under low reactor pressure conditions.

The GI-199 S/RA was completed in August, prior to the Part 21 notice. Considering the above, information from the new Part 21 notice would not be expected to change the conclusions of the GI-199 S/RA. Information from this Part 21 Notification will be considered in future efforts to address GI-199.

September 2, 2010

MEMORANDUM TO: Brian W. Sheron, Director
Office of Nuclear Regulatory Research

FROM: Patrick Hiland, Chairman **/RA/**
Safety/Risk Assessment Panel for Generic Issue 199

SUBJECT: SAFETY/RISK ASSESSMENT RESULTS FOR GENERIC ISSUE 199, "IMPLICATIONS OF UPDATED PROBABILISTIC SEISMIC HAZARD ESTIMATES IN CENTRAL AND EASTERN UNITED STATES ON EXISTING PLANTS"

In accordance with Management Directive (MD) 6.4, "Generic Issues Program," a Safety/Risk Assessment panel was established to:

- Determine, on a generic basis, if the risk associated with Generic Issue (GI) 199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States (CEUS) on Existing Plants," warrants further investigation for potential imposition as a cost-justified backfit.

- Provide a recommendation regarding the next step (i.e., should the issue continue to the Regulatory Assessment Stage for identification and evaluation of potential generic, cost-justified backfits, be dropped due to low risk, or have other actions taken outside the Generic Issues Program [GIP]).

The panel completed its independent review of the Safety/Risk Assessment (see Enclosure 1) for GI-199. The panel reached the following conclusions and observations:

- Overall seismic core damage risk estimates are consistent with the Commission's Safety Goal Policy Statement because they are within the subsidiary objective of 10^{-4}/year for core damage frequency. The GI-199 Safety/Risk Assessment, based in part on information from the U.S. Nuclear Regulatory Commission's (NRC's) Individual Plant Examination of External Events (IPEEE) program, indicates that no concern exists regarding adequate protection and that the current seismic design of operating reactors provides a safety margin to withstand potential earthquakes exceeding the original design basis.

- The changes in seismic core-damage frequency (SCDF) estimated in the Safety/Risk Assessment Stage of GI-199 for numerous plants lie in the range of 10^{-4}/yr to 10^{-5}/yr, which meet the numerical risk criteria for an issue to proceed to the Regulatory Assessment Stage of the GIP.

CONTACT: John Kauffman, RES/DRA
301-251-7465

- New consensus seismic-hazard estimates will become available in late 2010 or early 2011 (these are a product of a joint NRC, U.S. Department of Energy, U.S. Geological Survey (USGS) and Electric Power Research Institute (EPRI) project). These consensus seismic-hazard estimates will supersede the existing EPRI, Lawrence Livermore National Laboratory, and USGS hazard estimates used in the GI-199 Safety/Risk Assessment.

- Certain factors that affect the development of realistic SCDF estimates will remain unresolved even after the new consensus seismic hazard estimates are developed. The issue is primarily that many IPEEEs did not produce SCDF estimates and so lack some of the information needed to produce such estimates.

    - For a number of the plants that performed reduced-scope seismic margins analyses as part of the IPEEE program, limited detailed information exists regarding plant seismic capacity (the ability of a plant's structures, systems, and components [SSCs] to successfully withstand an earthquake) beyond the required design-basis level.

    - The approach used in the attached Safety/Risk Assessment to estimate SCDF considers the plant-level seismic capacity and, therefore, does not provide insight into which SSCs are important to seismic risk. Such knowledge would be required in order to postulate potential cost-beneficial backfits.

- IPEEE submittals generally provided limited, qualitative information about the seismic capability of containments. Any regulatory analysis of GI-199 should consider potential plant modifications for reducing the probability of seismically induced containment failure as discussed in Section 3.3.1 of NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission."

The panel recommends the following:

- Transfer lead responsibility for subsequent GI-199 actions to the Office of Nuclear Reactor Regulation for regulatory office implementation, including maintenance of the GI-199 Communication Plan and stakeholder briefings and interactions. (Note: the GIP will continue to track the issue and report its status in the Generic Issues Management Control System until all actions are completed).

- Take further actions to address GI-199 outside the GIP (i.e. obtain information and develop methods, as needed, to complete plant-specific value-impact analyses of potential backfits to reduce seismic risk). Any needed Office of Nuclear Regulatory Research support can be obtained using the User Need Request process.

Enclosure:
Safety/Risk Assessment for GI-199

Approved: **/RA/** Date: 9/2/2010

Brian W. Sheron, Director
Office of Nuclear Regulatory Research

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Enclosure:
Safety/Risk Assessment for GI-199

Approved: /RA/ Date: 9/2/2010
Brian W. Sheron, Director
Office of Nuclear Regulatory Research

DISTRIBUTION: See next page

ADAMS Accession No.: ML100270582

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Memo to Brian W. Sheron from Patrick L. Hiland dated September 2, 2010

SUBJECT: SAFETY/RISK ASSESSMENT RESULTS FOR GENERIC ISSUE 199, "IMPLICATIONS OF UPDATED PROBABILISTIC SEISMIC HAZARD ESTIMATES IN CENTRAL AND EASTERN UNITED STATES ON EXISTING PLANTS"

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Lee, Richard

From: Lee, Richard
Sent: Friday, April 08, 2011 3:57 PM
To: Wagner, Katie
Subject: FW: QUESTION

Pls. log it in.

-----Original Message-----
From: Brock, Terry
Sent: Friday, April 08, 2011 12:15 PM
To: Scott, Michael; Dion, Jeanne; Lee, Richard
Cc: Rini, Brett; Bush-Goddard, Stephanie
Subject: RE: QUESTION

ok, let me take a look.

From: Scott, Michael
Sent: Friday, April 08, 2011 11:13 AM
To: Dion, Jeanne; Lee, Richard; Brock, Terry
Cc: Rini, Brett; Bush-Goddard, Stephanie
Subject: RE: QUESTION

Terry:

Stephanie said you could provide an edit to the below blurb, which is needed ASAP today. I think some revs are needed to it, but will let you take first crack. Okay?

Thanks

Mike

From: Dion, Jeanne
Sent: Friday, April 08, 2011 10:59 AM
To: Lee, Richard
Cc: Scott, Michael; Rini, Brett
Subject: FW: QUESTION
Importance: High

Mike-
If Mourad Aissa is not in the office today can we find someone else in FSTB to provide comments to highlighted portions below?
We need a response ASAP. Sorry for the quick turnaround.
Thanks,
Jeanne

From: Rihm, Roger
Sent: Friday, April 08, 2011 10:24 AM
To: Dion, Jeanne
Subject: FW: QUESTION

FYI

From: Rihm, Roger

2/338

Sent: Friday, April 08, 2011 10:23 AM
To: Rini, Brett
Subject: FW: QUESTION

FYI

From: Rihm, Roger
Sent: Friday, April 08, 2011 9:37 AM
To: Aissa, Mourad
Cc: Uhle, Jennifer; Sheron, Brian
Subject: QUESTION

Mourad, are you in today (I called but you were not at your desk). I'm contacting you because I have seen your name on MOX information previously provided to the chairman.

We are rushing today to wrap up some Qs and As for Senator Boxer. One question we had was the following: What increased risk is associated with exposure to MOX? At 10PM last night, the best answer we could come up with was the following:

Mixed oxide (MOX) fuel involves the use of plutonium as a fuel, in addition to enriched uranium. Plutonium is a long-lived alpha emitter, which presents different risks than those presented by uranium fission products. Regarding exposure to mixed oxide fuel, in Japan, prompt evacuation has minimized radiation exposure to the public, so long-term public health consequences from radiation exposure resulting from the events, whether due to MOX or uranium fuel, are expected to be small. Also, given the small number of MOX fuel assemblies at Fukushima Daiichi Unit 3 at the time of the event, coupled with the short time of irradiation of the MOX fuel, it is likely that the MOX fuel has had and will have no perceptible impact on any consequences from the event.

Do you have corrections/edits/additions to suggest for this response? Need to wrap this up by about 11AM. Thank you.

Roger S. Rihm
Communications and Performance Improvement Staff Office of the Executive Director for Operations US NRC
301.415.1717
roger.rihm@nrc.gov

Lee, Richard

From: Lee, Richard
Sent: Friday, April 08, 2011 3:27 PM
To: Voglewede, John
Subject: FW: QUESTION

John:

We should respond to this.

Richard

From: Sheron, Brian
Sent: Friday, April 08, 2011 3:08 PM
To: Lee, Richard
Subject: FW: QUESTION

Richard, please respond to Roger. Remind him that all fuel that has been burned has Plutonium in it.

From: Rihm, Roger
Sent: Friday, April 08, 2011 9:37 AM
To: Aissa, Mourad
Cc: Uhle, Jennifer; Sheron, Brian
Subject: QUESTION

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Roger S. Rihm
Communications and Performance Improvement Staff
Office of the Executive Director for Operations
US NRC
301.415.1717
roger.rihm@nrc.gov

2/339

Lee, Richard

From: Lee, Richard
Sent: Friday, April 08, 2011 4:31 PM
To: Wagner, Katie
Subject: FW: As discussed

The same thing. FYI

From: Scott, Michael
Sent: Friday, April 08, 2011 4:28 PM
To: Rihm, Roger
Cc: Lee, Richard; Brock, Terry; Bush-Goddard, Stephanie; Scott, Harold; Aissa, Mourad
Subject: RE: As discussed

I would delete the last sentence, which appears to contradict the rest. If Pu not far different from U, number of MOX assemblies not very relevant. I wish we had more time to polish, but guess it is best we can do in a rush.

Mike

From: Rihm, Roger
Sent: Friday, April 08, 2011 4:20 PM
To: Scott, Michael
Subject: As discussed

4. How comprehensive is the radiation monitoring system in Japan? Would the U.S. take a similar monitoring approach if a serious accident were to occur here? What increased risk is associated with exposure to mixed oxide fuel?

The NRC does not currently have sufficient information to describe in detail the radiation monitoring system in Japan. In addition to the radiation monitoring that is required to be performed by all U.S. reactor licensees, the U.S. Environmental Protection Agency conducts environmental monitoring of radiation. Questions concerning the EPA's monitoring systems and actions should be directed to the EPA.

Mixed oxide (MOX) fuel involves the use of plutonium as a fuel, in addition to enriched uranium. Plutonium, like uranium, is a long-lived alpha emitter, and they present similar biological risks. All commercial reactors produce plutonium from uranium during operation regardless of whether the material was there to begin with. Regarding exposure to mixed oxide fuel, in Japan, prompt evacuation has minimized radiation exposure to the public, so long-term public health consequences from radiation exposure resulting from the events, whether due to MOX or uranium fuel, are expected to be small. Also, given the small number of MOX fuel assemblies at Fukushima Daiichi Unit 3 at the time of the event, coupled with the short time of irradiation of the MOX fuel, it is likely that the MOX fuel has had and will have no perceptible impact on any consequences from the event.

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Unit 3 at the time of the event, coupled with the short time of irradiation of the MOX fuel, it is likely that the MOX fuel has had and will have no perceptible impact on any consequences from the event.

Do you have corrections/edits/additions to suggest for this response? Need to wrap this up by about 11AM. Thank you.

Roger S. Rihm
Communications and Performance Improvement Staff
Office of the Executive Director for Operations
US NRC
301.415.1717
roger.rihm@nrc.gov

Lee, Richard

From: Lee, Richard
Sent: Friday, April 08, 2011 4:01 PM
To: Rihm, Roger
Cc: Dion, Jeanne; Scott, Michael; Aissa, Mourad
Subject: RE: QUESTION

Hi, Roger:

Please add the following after the second sentence in the highlighted paragraph-

"However, all commercial nuclear reactors produce plutonium from uranium during operation regardless of whether the material was there to begin with."

Thanks, Richard

From: Aissa, Mourad
Sent: Friday, April 08, 2011 3:37 PM
To: Lee, Richard
Cc: Dion, Jeanne; Scott, Michael; Rihm, Roger
Subject: RE: QUESTION
Importance: High

Roger, I am sorry but I am away from the office today. I check my email on a regular basis but for some reason your did not show the last time I log in (about 11:30am). Here is my personal cell phone, just in case: 919 601 3604.

I would add the following:
What we want to concentrate on is the impact of MOX on accident consequences. In my fact sheet that I sent last week, I mentioned an extensive DOE study that involved 3 different reactors loaded with 40% MOX **(about 8 times the loading at Fukushima Daiichi Reactor 3).** The consequences were found to be within the uncertainty associated with the consequences analyses methodology. NRC also conducted its own studies to evaluate the MOX lead test assemblies at Catawba, and had a similar conclusion. NRC subsequently authorized the use of the LTAs at Catawba.

I would have phrased the part about the alpha radiation differently: **Both** Uranium and Plutonium are long-lived alpha emitters, and they pause the same biological risk. Alpha radiation is very easy to stop (a sheet of paper is enough) and pauses a - significant - health hazard only if ingested/inhaled.

From: Lee, Richard
Sent: Friday, April 08, 2011 2:34 PM
To: Aissa, Mourad
Subject: FW: QUESTION

Mourad:

Did you see this writeup? Was the language came from previous writeup?

Richard

From: Dion, Jeanne
Sent: Friday, April 08, 2011 10:59 AM

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To: Lee, Richard
Cc: Scott, Michael; Rini, Brett
Subject: FW: QUESTION
Importance: High

Mike-
If Mourad Aissa is not in the office today can we find someone else in FSTB to provide comments to highlighted portions below?
We need a response ASAP. Sorry for the quick turnaround.
Thanks,
Jeanne

From: Rihm, Roger
Sent: Friday, April 08, 2011 10:24 AM
To: Dion, Jeanne
Subject: FW: QUESTION

FYI

From: Rihm, Roger
Sent: Friday, April 08, 2011 10:23 AM
To: Rini, Brett
Subject: FW: QUESTION

FYI

From: Rihm, Roger
Sent: Friday, April 08, 2011 9:37 AM
To: Aissa, Mourad
Cc: Uhle, Jennifer; Sheron, Brian
Subject: QUESTION

Mourad, are you in today (I called but you were not at your desk). I'm contacting you because I have seen your name on MOX information previously provided to the chairman.

We are rushing today to wrap up some Qs and As for Senator Boxer. One question we had was the following: What increased risk is associated with exposure to MOX? At 10PM last night, the best answer we could come up with was the following:

Mixed oxide (MOX) fuel involves the use of plutonium as a fuel, in addition to enriched uranium. Plutonium is a long-lived alpha emitter, which presents different risks than those presented by uranium fission products. Regarding exposure to mixed oxide fuel, in Japan, prompt evacuation has minimized radiation exposure to the public, so long-term public health consequences from radiation exposure resulting from the events, whether due to MOX or uranium fuel, are expected to be small. Also, given the small number of MOX fuel assemblies at Fukushima Daiichi Unit 3 at the time of the event, coupled with the short time of irradiation of the MOX fuel, it is likely that the MOX fuel has had and will have no perceptible impact on any consequences from the event.

Do you have corrections/edits/additions to suggest for this response? Need to wrap this up by about 11AM. Thank you.

Roger S. Rihm
Communications and Performance Improvement Staff

Office of the Executive Director for Operations
US NRC
301.415.1717
roger.rihm@nrc.gov

Lee, Richard

From: Lee, Richard
Sent: Friday, April 08, 2011 4:33 PM
To: Aissa, Mourad
Subject: RE: QUESTION

I have already spoken to Brian a few minutes ago that you have responded. No need to send anything to him.

From: Aissa, Mourad
Sent: Friday, April 08, 2011 4:24 PM
To: Lee, Richard
Subject: RE: QUESTION
Importance: High

Richard,
Could you forward my recent emails to Brian. I am concerned that he thinks I have not been responding to the EDO office.
Thanks
Mourad

From: Lee, Richard
Sent: Friday, April 08, 2011 3:46 PM
To: Aissa, Mourad; Voglewede, John
Subject: FW: QUESTION

Mourad:

Since, I did not know of your response, John is looking at it.

Richard

From: Sheron, Brian
Sent: Friday, April 08, 2011 3:08 PM
To: Lee, Richard
Subject: FW: QUESTION

Richard, please respond to Roger. Remind him that all fuel that has been burned has Plutonium in it.

From: Rihm, Roger
Sent: Friday, April 08, 2011 9:37 AM
To: Aissa, Mourad
Cc: Uhle, Jennifer; Sheron, Brian
Subject: QUESTION

Mourad, are you in today (I called but you were not at your desk). I'm contacting you because I have seen your name on MOX information previously provided to the chairman.

We are rushing today to wrap up some Qs and As for Senator Boxer. One question we had was the following: What increased risk is associated with exposure to MOX? At 10PM last night, the best answer we could come up with was the following:

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Mixed oxide (MOX) fuel involves the use of plutonium as a fuel, in addition to enriched uranium. Plutonium is a long-lived alpha emitter, which presents different risks than those presented by uranium fission products. Regarding exposure to mixed oxide fuel, in Japan, prompt evacuation has minimized radiation exposure to the public, so long-term public health consequences from radiation exposure resulting from the events, whether due to MOX or uranium fuel, are expected to be small. Also, given the small number of MOX fuel assemblies at Fukushima Daiichi Unit 3 at the time of the event, coupled with the short time of irradiation of the MOX fuel, it is likely that the MOX fuel has had and will have no perceptible impact on any consequences from the event.

Do you have corrections/edits/additions to suggest for this response? Need to wrap this up by about 11AM. Thank you.

Roger S. Rihm
Communications and Performance Improvement Staff
Office of the Executive Director for Operations
US NRC
301.415.1717
roger.rihm@nrc.gov

Andersen, James

From: ET07 Hoc
Sent: Friday, April 08, 2011 7:35 AM
To: Franovich, Mike; Castleman, Patrick; Snodderly, Michael; Hipschman, Thomas; Marshall, Michael; Orders, William; Andersen, James
Subject: *** ATTACHMENTS OUO *** DOE Japan Earthquake 8 April 2011 0600 EDT Situation Report *** ATTACHMENTS OUO ***
Attachments: Japan_Earthquake_Response_04082011_0600.pdf; SITREP_APR8 0600 (4).docx

Please find attached the latest DOE SITREP regarding the ongoing earthquake and tsunami response in Japan.

This information is provided for your internal use and should be shared only with those who have a need to know.

Status Officer

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Andersen, James

From: Muessle, Mary
Sent: Saturday, April 09, 2011 2:56 PM
To: Andersen, James; Kasputys, Clare; Landau, Mindy; Jacobs-Baynard, Elizabeth
Subject: FW: Followup to Interagency Meeting on Japan Funding Coordination and Reimbursements (FOUO)
Attachments: NRC Japan Event Cost Projections.docx

FYI

Mary Muessle
Assistant for Operations - Acting
Office of the Executive Director for Operations
U.S. Nuclear Regulatory Commission
301-415-1703 office
301-415-2700 fax

From: Dyer, Jim
Sent: Friday, April 08, 2011 11:49 AM
To: McDonald, Christine; efalkcurtin@omb.eop.gov; nschwartz@omb.eop.gov
Cc: Batkin, Joshua; Coggins, Angela; Virgilio, Martin; Burns, Stephen; Weber, Michael; Ash, Darren; Brown, Milton
Subject: Followup to Interagency Meeting on Japan Funding Coordination and Reimbursements (FOUO)

Attached is the updated estimate for NRC incremental costs associated with the international response provided for the ongoing reactor events in Japan. It is a best estimate of anticipated costs for the NRC Japan team deployed initially with the USAID DART and NRC Headquarters Support to the team. Additional NRC costs are being accumulated for briefings, FOIA responses, reviewing domestic designs and developing regulatory lessons learned which are not captured in the attached estimates. We have outlined three levels of support over approximately 6 months (24 weeks) divided into three phases;

-Emergency Response Phase (4 weeks) where NRC staff are embedded with USAID DART and NRC Headquarters Operations Center is staffed providing around-the-clock support with a Reactor Safety Team, Protective Measures Team, Executive Team and Liaison Team.
-Heightened Response Phase (8 weeks) where NRC staff continue to support in country activities at a reduced staffing level and NRC Headquarters Operations Center continues to be staffed around-the-clock, but at a reduced level from the Emergency Response Phase, and
-Long Term Response Phase (12 weeks) where NRC staff continue to support in country activities at a further reduced level and NRC Headquarters support is provided through normal organizational taskings.

These phases assume continued stabilization of the reactor safety situation during this period. Cost estimates for the first phase consider support by USAID for the NRC Japan Team, but this support is assumed absent for the second and third phases and we have increased out traveler support by an amount that may be uncertain. With successful reprogramming of existing prior year funds, NRC will be able to execute this level of support and effectively carry out its domestic regulatory mission.

NRC does not believe it should be reimbursed by the Japanese Government for its costs incurred in responding to the reactor event. Once the situation is stable in Japan, it may be appropriate for the NRC to enter into a reimbursable agreement for providing support to the Government of Japan. NRC also believes that it's salaries and benefits expenses associated with support for the Japanese Government should not be categorically excluded from reimbursement considerations. NRC appropriations are supported by industry fees. As such, NRC collects approximately 90 % of its

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appropriations from licensees through fees, less specific appropriations for Generic Homeland Security, Waste Incidental to Reprocessing and Nuclear Waste Fund activities. NRC appropriations specifically allow for support to foreign governments and international organizations which is accounted for as part of the 10% fee relief activities. Depending on other agency fee relief activities, the increased support for Japan event response may exceed 10% of agency FY 2011 appropriations resulting in increased fees to NRC licensees. NRC does not believe its domestic licensees should bear an unreasonable burden for its international event response costs.

Sorry for the late delivery; it's been busy here.

Jim Dyer,
CFO, USNRC
301-415-7322

NRC Japan Event Cost Projections

Emergency Response Phase (4 Weeks)

- Japan Team (12-15 Travelers)
  - Salaries and Benefits $ 250K
  - Traveler Support not provided by USAID $ 120K
  - Japan Team Total $ 370K

- HQ Operations Center (35-50 StaffX 3 Shift Support)
  - Salaries and Benefits $ 1,800K
  - Operations Center Support $ 130K
  - HQ Ops Ctr Total $ 1,930K

Estimated Total NRC Emergency Response Phase Costs: $ 2,300K

Heightened Response Phase (8 Weeks)

- Japan Team (10 Actual Travelers)
  - Salaries and Benefits $ 280K
  - Travel and Support Costs $ 1,220K
  - Japan Team Total $ 1,500K

- HQ Operations Center (10 Staff X 3-Shift Support)
  - Salaries and Benefits $ 840K
  - Operations Center Support $ 260K
  - HQ Ops Ctr Total $ 1,100K

Estimated NRC Heightened Response Phase Costs: $ 2,250K

Long Term Response Phase (12 Weeks)

- Japan Team (6 Actual Travelers)
  - Salaries and Benefits $ 250K
  - Travel and Support Costs $ 1,000K
  - Japan Team Total $ 1,250K

- Headquarters Staff Support (10 Staff-No Shift Work)
  - Salaries and Benefits $ 420K
  - Contract Support Costs $ 250K
  - Headquarters Total $ 670K

Estimated NRC Costs for Long Term Response Phase Costs: $ 1,920K

Total NRC Estimated Costs for Japan Event Response $ 6,470K

Wittick, Brian

From: Wittick, Brian
Sent: Monday, April 11, 2011 5:18 AM
To: LIA08 Hoc
Subject: RE: CONSORTIUM CALL AT 2000 EDT TODAY

Guess they are losing interest in the issue.

From: LIA08 Hoc
Sent: Monday, April 11, 2011 5:16 AM
To: Wittick, Brian
Subject: RE: CONSORTIUM CALL AT 2000 EDT TODAY

Thanks. The last 7.1 quake was a few days ago, and we got calls from Richard Reed and Col. Julie Bentz at the white house within minutes. Jeff

---

From: Wittick, Brian
Sent: Monday, April 11, 2011 5:15 AM
To: LIA08 Hoc
Subject: RE: CONSORTIUM CALL AT 2000 EDT TODAY

You are all set to talk to Barack then.

From: LIA08 Hoc
Sent: Monday, April 11, 2011 5:14 AM
To: Wittick, Brian
Subject: RE: CONSORTIUM CALL AT 2000 EDT TODAY

Yes. Sounds like the power is back on and normal pumping is back on line at units 1-3

From: Wittick, Brian
Sent: Monday, April 11, 2011 5:13 AM
To: LIA08 Hoc
Subject: RE: CONSORTIUM CALL AT 2000 EDT TODAY

Yes, but it was much less. Are you catching the press briefing on NHK

From: LIA08 Hoc
Sent: Monday, April 11, 2011 5:11 AM
To: Wittick, Brian
Subject: RE: CONSORTIUM CALL AT 2000 EDT TODAY

Another aftershock?

From: Wittick, Brian
Sent: Monday, April 11, 2011 5:06 AM
To: LIA08 Hoc
Subject: RE: CONSORTIUM CALL AT 2000 EDT TODAY

Here it goes again

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From: LIA08 Hoc
Sent: Monday, April 11, 2011 5:06 AM
To: Wittick, Brian
Subject: RE: CONSORTIUM CALL AT 2000 EDT TODAY

That's where we are getting our info as well. Please forward any TEPCO press releases or embassy press releases or other info as you receive it. Hope you stay safe. Jeff

---

From: Wittick, Brian
Sent: Monday, April 11, 2011 5:00 AM
To: Emche, Danielle; LIA08 Hoc; LIA02 Hoc; ET02 Hoc
Cc: LIA06 Hoc
Subject: RE: CONSORTIUM CALL AT 2000 EDT TODAY

We also have unconfirmed information that they have fire trucks available to line up for makeup water supplies. Make sure you are tuned to NHK which is were we are getting much of our info.

Thanks
Brian

From: Emche, Danielle
Sent: Monday, April 11, 2011 4:55 AM
To: LIA08 Hoc; Wittick, Brian; LIA02 Hoc; ET02 Hoc
Cc: LIA06 Hoc
Subject: RE: CONSORTIUM CALL AT 2000 EDT TODAY

We just heard that units 1-3 lost power and stopped injecting water. We heard from the admiral at the Embassy. It was not a fun earthquake to experience, it was very unsettling.

From: LIA08 Hoc
Sent: Monday, April 11, 2011 4:50 AM
To: Wittick, Brian; LIA02 Hoc; ET02 Hoc
Cc: Emche, Danielle; LIA06 Hoc
Subject: RE: CONSORTIUM CALL AT 2000 EDT TODAY

Thanks Brian and Danielle. As soon as you can get us any info about the condition of nuclear plants in NE Japan after the aftershock of 7.1 a few minutes ago, please let us know. The White House will be calling soon for info. Jeff Temple

---

From: Wittick, Brian
Sent: Monday, April 11, 2011 3:52 AM
To: LIA02 Hoc; ET02 Hoc
Cc: Emche, Danielle; LIA06 Hoc; LIA08 Hoc
Subject: RE: CONSORTIUM CALL AT 2000 EDT TODAY

Request the "liaison japan" group address be updated with the current list of people in Japan. Also, request that the "pre-travel checklist" for new people coming to Japan be updated to identify that people should check in with OIS to ensure they have the correct type of international blackberry. I have an international blackberry and assumed it would work everywhere since it previously had and the carrier said it should, but turns out only specific international blackberries do and OIS knows which ones.

Thanks,
Brian

From: Stahl, Eric
Sent: Sunday, April 10, 2011 5:58 PM
To: LIA02 Hoc; Liaison Japan
Cc: Emche, Danielle; Wittick, Brian
Subject: RE: CONSORTIUM CALL AT 2000 EDT TODAY

It is our understanding that the call the is still occurring and that NRC HQ will continue to take the lead (at least for today). Last I heard was that Embassy or DOE will transition to the lead at some point in the near future.

Thanks,
Eric

From: LIA02 Hoc
Sent: Monday, April 11, 2011 6:56 AM
To: Liaison Japan
Cc: Emche, Danielle; Stahl, Eric
Subject: CONSORTIUM CALL AT 2000 EDT TODAY
Importance: High

All,

Please confirm the Consortium call is still on for today at 2000 EDT.

Assuming it is on, please advise as to who will be heading up today's Consortium call.

Thanks,

LIA02

Lee, Richard

From: Lee, Richard
Sent: Monday, April 11, 2011 8:57 AM
To: Esmaili, Hossein
Subject: FW: SFP MCCI

fyi

From: Gauntt, Randall O [mailto:rogaunt@sandia.gov]
Sent: Sunday, April 10, 2011 4:37 AM
To: Salay, Michael; Schaperow, Jason; Lee, Richard; 'kcw@dycoda.com'; Tinkler, Charles
Subject: Re: SFP MCCI

I recall KC looked at a number of cases scoping potential for MCCI. I recall that it was marginal in terms of generating a MCCI, but dumping sand might assure it initiates MCCI. Then, I might recall incorrectly.

From: Salay, Michael [mailto:Michael.Salay@nrc.gov]
Sent: Sunday, April 10, 2011 02:09 AM
To: Schaperow, Jason <Jason.Schaperow@nrc.gov>; Lee, Richard <Richard.Lee@nrc.gov>
Cc: Gauntt, Randall O
Subject: SFP MCCI

Jason, Richard,

I can't remember which one of you were involved with this or if Randy was involved with this.

A few days ago we received an SFP heat conduction analysis from DOE to support the assessment for entombment with sand. A bullet stated "Temperatures well beyond melting point of materials in pool and could result in structural concrete failure".

While on the phone with HQ yesterday, Jennifer mentioned an analysis that indicated that structural concrete would not fail in the event of a Zirconium fire. Is this Mitch Farmer's calculation?

- Would you please provide me with a copy of the analysis.
- Although I have not seen the analysis, I recall that an MCCI analysis came in during the initial concern on SFP4 – i.e. before the sand issue was discussed. If this is the case, would the conclusion be different in the event that the pool is covered with sand?
- There was also an analysis indicating an exothermic reaction with Si and Zr. If you have this would you please send?

This is just to prepare a package to give to NISA in the event that this issue comes up again.

Thanks,
-Mike

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Merzke, Daniel

From: Merzke, Daniel
Sent: Monday, April 11, 2011 8:51 AM
To: Hipschman, Thomas; Castleman, Patrick; Snodderly, Michael; Orders, William; Franovich, Mike
Subject: FW: Fukushima NPP Radiation Health Risks v 1 modified
Attachments: Fukushima NPP Radiation Health Risks v 1 modified.doc

Attached is a document from the Operations Center detailing radiation levels around Fukushima, as requested.

Dan

From: Hoc, PMT12
Sent: Sunday, April 10, 2011 9:08 AM
To: Batkin, Joshua; Merzke, Daniel
Subject: Fukushima NPP Radiation Health Risks v 1 modified

As requested by Pat Castleman in today's TA Brief.

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This document is sensitive and should be handled appropriately by the recipients. Therefore, this document is intended to be reviewed by the addressed recipients and is **not** intended to be shared with other stakeholders without NRC approval.

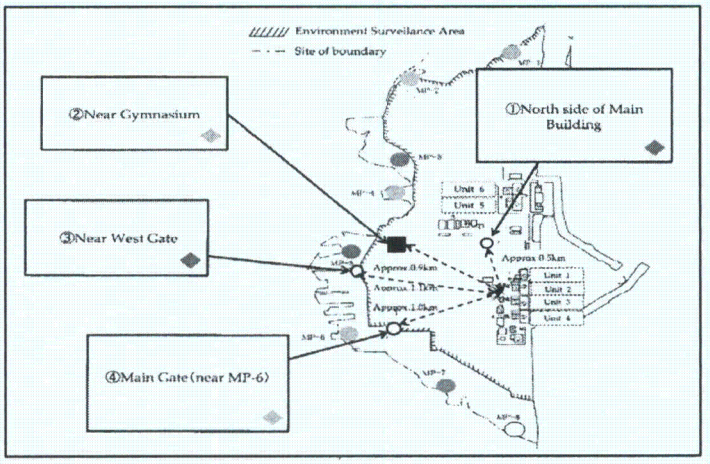
This document should only be used for informational purposes, not for decision-making in changing protective action recommendations. The PMT needs actual field measurements in order to make recommendations to expand or relax the current protective actions or to permit entry into the emergency planning zone. The staff has asked the site team for this data, but has not yet received the information.

Summary of Radiological Hazards in Japan

The situation at the Fukushima Daiichi Nuclear Power Plant remains serious although there are early signs of recovery based on plant conditions and decreasing doses in and around the power plant. This nuclear incident raises concern for the possible impact of radiation on the Japanese public.

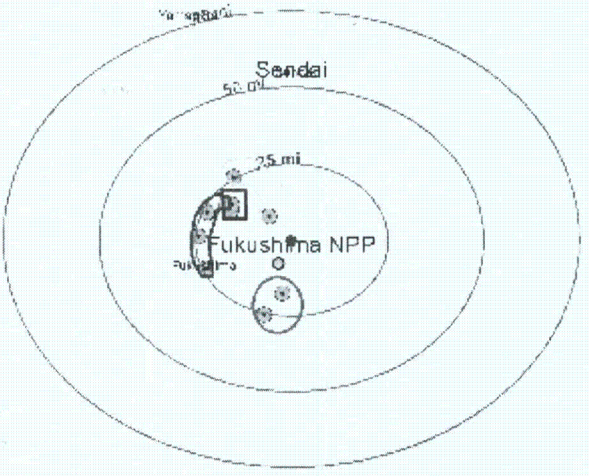
On-site at the Fukushima Daiichi plant, radiation levels in certain areas continue to be life-threatening – 30 Sv/hr (3,000 R/hr) in the dry wells for Units 1 and 2, and 20 Sv/hr (2,000 R/hr) near the drywell of Unit 3. Additionally, debris has been located outside of the reactor building of unit 3 with radiation levels measuring 1 Sv/hr (100 R/hr) [1].

Figure 1



Dose rates are being measured at four different locations around the site, as shown on Figure 1: the gymnasium, west gate, main building and the main gate. The most recent dose rate readings are: 82 µSv/hr (8.2 mrem/hr) at the main gate located west of unit 4; 54 µSv/hr (5.4 mrem/hr) at the west gate; and 645 µSv/hr (64.5 mrem/hr) at the main building. The gymnasium point has not been measured since March 17th. All readings have been decreasing over the past weeks.

Figure 2



The largest radiation plume was observed to pass in the north-west direction as confirmed by MEXT radiation monitoring results [2] and DOE overflights. Four clusters of exposure data were plotted based on 89 measurement locations supplied by MEXT (see Figure 2). The exposure rates plotted were spread across the west, northwest, south and a tight cluster of locations to the northwest. The highest dose rates measured by MEXT are in the northwest cluster (in the red square outline) and have been slowly decreasing from a high of 170 µSv/hr (17 mrem/hr) to a current value of 25 µSv/hr (2.5 rem/hr), 30 km (18.6 miles) from the Fukushima Daiichi plant.

This document is sensitive and should be handled appropriately by the recipients. Therefore, this document is intended to be reviewed by the addressed recipients and is **not** intended to be shared with other stakeholders without NRC approval.

MEXT samples for dust, drinking water and vegetation test positive for both I-131 and Cs-137 contamination [3]. Most of these monitoring points are located at least 18.6 miles (30 km) northwest of the site. While the data on the concentration of I-131 and Cs-137 in dust is inconsistently reported from each sampling location, most locations show I-131 concentrations (measured in Bq/m^3, apparently from air samples) decreasing to the single digits for the first week of April. Typical Cs-137 concentrations within 18.6 miles (30 km) vary from 0.5 to 4.5 Bq/m^3 (13.5 to122 pCi/m^3). Half of the sampling locations beyond 40 km (24.8 miles) show I-131 and Cs-137 below detectable levels, with the highest readings in the north and northwest and do not show a consistent pattern, based on a single daily sample.

Soil samples, taken on April 5 and 6, indicate I-131 in concentrations ranging from 41,000 to 200,000 Bq/kg (1.1E6 to 5.4E6 pCi/kg) and Cs-137 levels 25,000 to 100,000 Bq/kg (6.76E5 to 2.70E6 pCi/kg). Based on conversion to surface contamination, the computer code, Radiological Assessment System for Consequence Analysis (RASCAL), predicts a dose of approximately 4.4 rem in the 1st year, which exceeds the Environmental Protection Agency's relocation Protective Action Guideline of 2 rem in the 1st year.

Deposition of these radionuclides in leafy vegetation, measured at the same locations, are consistently higher than in soil, and show a high value of 300,000 Bq/kg (8.11E6 pCi/kg) for I-131 and 1,440,000 Bq/kg (3.89E7 pCi/kg) for Cs-137 at a distance of 40 km (24.9 miles) northwest of the site. Other sampling locations to the north, south and west show concentrations an order magnitude lower for each radionuclide. The Food and Drug Administration's Derived Intervention Levels (DIL) for food interdiction are 170 Bq/kg for I-131 and 1200 Bq/kg for Cs-137 + Cs-134 [4]. Japanese interdiction levels are 2000 Bq/kg for I-131 and 500 Bq/kg for Cesiums in food. .

In Tokyo, radiation levels are nearly indistinguishable from other man-made background radiation levels, ranging between 0.03 and 0.08 µSv/hr (3 and 8 µrem/hr).

In perspective, these summaries are limited because they are based on a few sample measurements. More sample data and analysis is needed for appropriate protection action decisions.

References:

[1] NRC Emergency Operations Center Status Update dated April 4, 2011.

[2] http://www.mext.go.jp/english/radioactivity level/detail/1304082.htm

[3] http://www.mext.go.jp/english/radioactivity_level/detail/1304099.htm

[4]www.fda.gov/downloads/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/UCM094513.pdf

Lee, Richard

From: Lee, Richard
Sent: Monday, April 11, 2011 12:30 PM
To: 'Powers, Dana A'
Subject: RE: TEPCO Seismic data

o.k. thanks, Dana. Do you think from the 2 Japanese earthquakes that we may learned something that may improve our treatment of earthquakes? If so, you may want to touch base with Annie. Richard

-----Original Message-----
From: Powers, Dana A [mailto:dapower@sandia.gov]
Sent: Monday, April 11, 2011 11:52 AM
To: Lee, Richard
Subject: RE: TEPCO Seismic data

Richard, Thanks. The earthquake did not produce peak ground accelerations as large as those at the nuclear site in 2006. It is true that the plants on the Fukushima site were older and may have suffered more damage from the earthquake, but it looks like they might have survived had not they been hit by the tsunami and attendant flooding. It will be of interest to see in the coming months whether predictions concerning the response to the earthquake actually conform to observations. My impression is that observations of plant damage from Japanese earthquakes are not in complete accord with generalizations drawn from the IPEEE evaluations, but I have not seen a formalized comparison. We may be able to do something real using data from the 2006 earthquake and Fukushima. Dana

-----Original Message-----
From: Lee, Richard [mailto:Richard.Lee@nrc.gov]
Sent: Monday, April 11, 2011 7:34 AM
To: Powers, Dana A
Subject: FW: TEPCO Seismic data

fyi

-----Original Message-----
From: Kammerer, Annie
Sent: Saturday, April 09, 2011 9:27 AM
To: Lee, Richard
Subject: RE: TEPCO Seismic data

I concur with the basic premise. The diesels started up until the fuel ran out, due to the fuel tanks being destroyed by the tsunami. They may have had seismic damage, but they would not have had an accident.

From: Lee, Richard
Sent: Saturday, April 09, 2011 9:19 AM
To: Kammerer, Annie
Subject: RE: TEPCO Seismic data

Thanks, Annie:

I will let Dana knows. So far, he said the plant survived the earthquake, but the tsunami did them in.

Richard

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From: Kammerer, Annie
Sent: Saturday, April 09, 2011 6:21 AM
To: Lee, Richard
Subject: FW: TEPCO Seismic data

I hope this answers Dana's questions. Of course, PGA is site specific.

BTW, I forgot to put a notification on, but I'm out of the country.

Annie

Lee, Richard

From: Lee, Richard
Sent: Monday, April 11, 2011 6:16 PM
To: 'Powers, Dana A'
Subject: RE: sand filter interaction with FPs

Thanks, Dana:

In your short writeup on sand interaction with Zr, you can also include what you mentioned herein.

Richard

From: Powers, Dana A [mailto:dapower@sandia.gov]
Sent: Monday, April 11, 2011 6:14 PM
To: Lee, Richard
Subject: RE: sand filter interaction with FPs

Richard if sufficiently warm, the sand can react with cesium to form Cs2Si4O9 – we actually saw this at TMI where cesium reacted with the silica impurity in the stainless steel of the control rod drive screws. We subsequently validated it in special effects tests, but you need to have the silica at temperatures on the order of 1000 C. I would expect that both Ba and Sr could react with silica at sufficiently elevated temperatures. Dana

---

From: Lee, Richard [mailto:Richard.Lee@nrc.gov]
Sent: Friday, April 08, 2011 3:40 PM
To: CLEMENT Bernard
Cc: Powers, Dana A; Dana Powers
Subject: sand filter interaction with FPs

Dear Bernard:

I appreciate it if you can send be papers and white papers on fission products interaction with sand/wet sands (filtered venting system used in European reactors).

Thanks, Richard

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Sanfilippo, Nathan

From: Tabatabai, Omid
Sent: Monday, April 11, 2011 8:53 AM
To: Frye, Timothy; Hawkins, Kimberly; Dudes, Laura; Holahan, Gary; Thorp, John; Brown, Frederick; Karas, Rebecca; Munson, Clifford; Shuaibi, Mohammed; Cook, Christopher; Beardsley, James; Kowal, Mark; Roach, Edward; Rosenberg, Stacey; Chokshi, Nilesh; Sanfilippo, Nathan; Cubbage, Amy; Grobe, Jack; King, Mark; Casto, Chuck; Tappert, John; Copeland, Douglas; Craffey, Ryan; Harmon, David; Issa, Alfred; Patel, Jay
Subject: INFO: Slides from the Japanese Delegation on Fukushima Event
Attachments: Fukushima - safety measures at other NPPs.pdf; Fukushima event - seismic damage to NPPs.pdf

Just got back from the 5th Convention on Nuclear Safety (CNS) meeting at the IAEA. Attached are two sets of slides that the Japanese delegation presented on the first day of the Convention. The Japanese delegation also held a special session on this event on Wednesday of last week but they did not provide any handouts. Many slides that they used on the Wednesday's session were the same ones that they had used on the first day.

The attached file entitled, "Fukushima – safety measures...", summarizes what the Japanese regulator have planned to implement, short- and long-term, at other NPPs as a result of the events at Fukushima. The other attached file entitled, "Fukushima – seismic damage...", summarizes the event and the accident progression.

I also brought back another set of slides that provided detailed environmental monitoring and radiation/radioactive release data after the event. That set of slides was too big to .pdf and distribute via email. I provided this copy to NRO/DSER (Cliff Munson) if anyone needs to make a copy.

The Convention will conclude at the end of this week and a summary of the meeting will be published. I will distribute additional information once I receive them from the IAEA.

Thanks,
Omid

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The 2011 off the Pacific coast of Tohoku Pacific Earthquake and the seismic damage to the NPPs

4th April, 2011

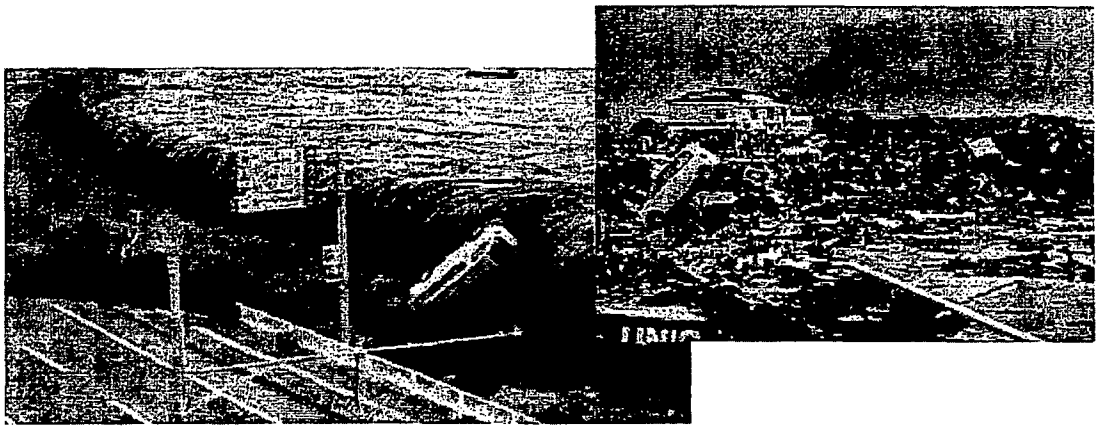
Nuclear and Industrial Safety Agency (NISA)
Japan Nuclear Energy Safety Organization (JNES)

Japan

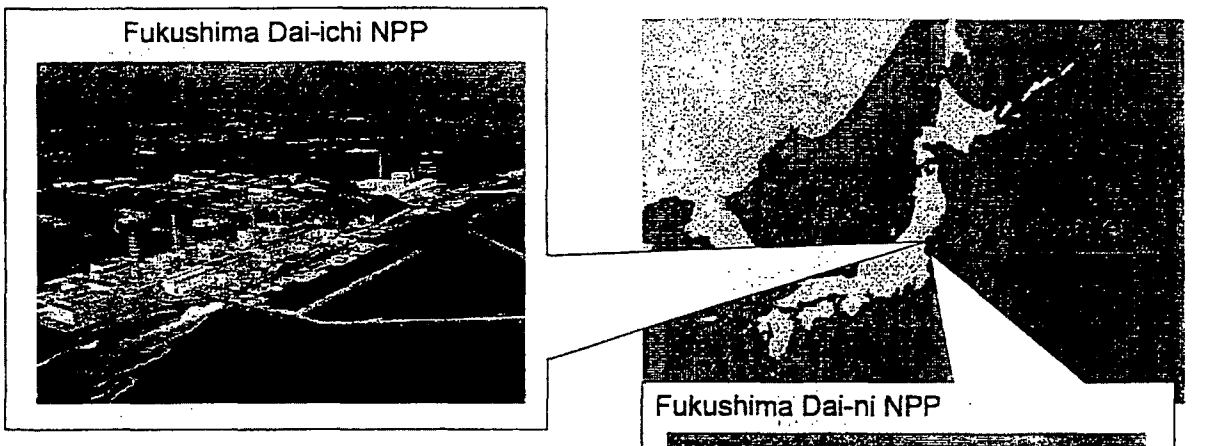
Contents

Note: Some date in this material may be incorrect. Especially, all the plant parameters were lost during some period in the accident and some parameters are apparently inconsistent among them.

1. Outline of earthquake and nuclear reactors



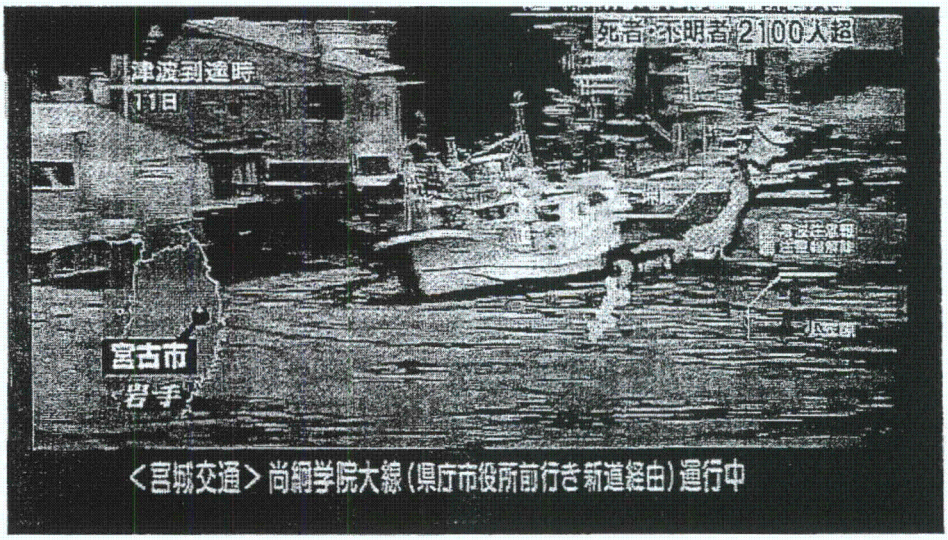
1-1. 2011 off Tohoku Pacific Earthquake



- **Occurred 14:46 March 11, 2011**
- **Magnitude:9.0 Mw**
- **Epicenter location: 38° 6"N and 142° 51"E, and 24km in depth**
- **It is said that the height of tsunami attacked Fukushima NPP was more than 14m**

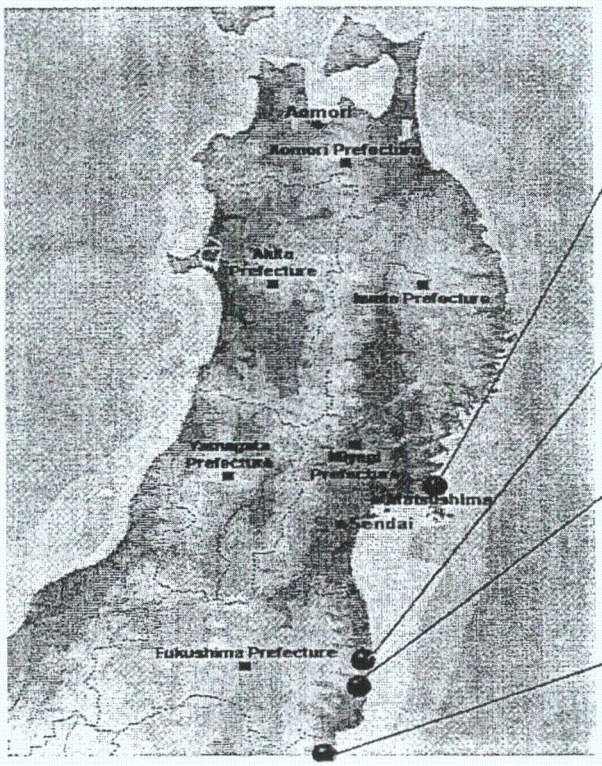
1-2. Tsunami after the earthquake

- East coast of northern area in the main island of Japan is seriously damaged
- As of April 4, 12,175 people are dead and 15,489 people are missing



1-3. Nuclear reactors near epicenter of the earthquake

Location of the Nuclear Installations



Onagawa
- Unit1: 524 MW, 1984-
- Unit2: 825 MW, 1995-
- Unit3: 825 MW, 2002-

Fukushima Ⅰ
- Unit1: 460 MW, 1971-
- Unit2: 784 MW, 1974-
- Unit3: 784 MW, 1976-
- Unit4: 784 MW, 1978-
- Unit5: 784 MW, 1978-
- Unit6: 1,100 MW, 1979-

Fukushima Ⅱ
- Unit1: 1,100 MW, 1982-
- Unit2: 1,100 MW, 1984-
- Unit3: 1,100 MW, 1985-
- Unit4: 1,100 MW, 1987-

Tokai Ⅱ (1,100 MW, 1978-)

1-4. Automatic shut-down of nuclear reactors

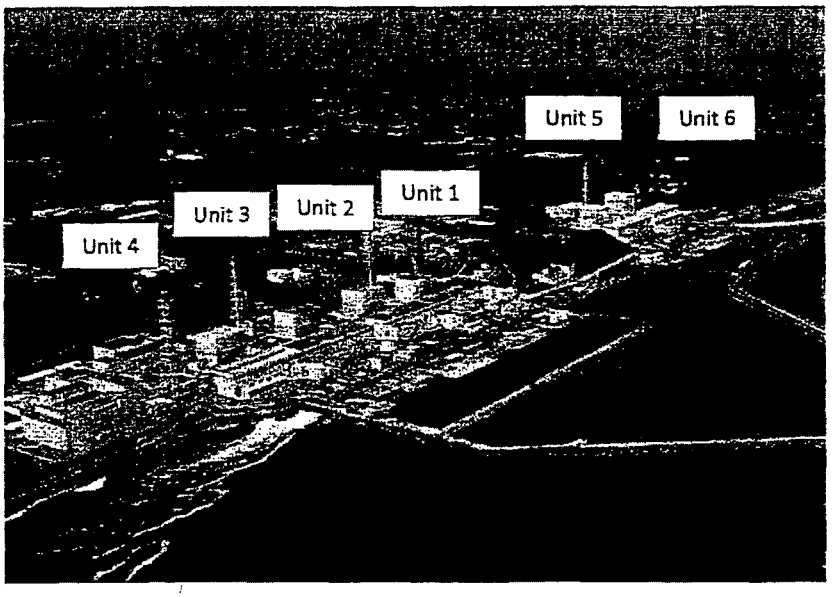
- **11 reactors were automatically shut-down**
  - Onagawa Unit 1,2,3
  - Fukushima Dai-ichi (I) Unit 1,2,3
  - Fukushima-Dai-ni (II) Unit 1,2,3,4
  - Tokai Dai-ni (II)

- **3 reactors were under periodic inspection**
  - Fukushima Dai-ichi (I) Unit 4,5,6

-After the automatic shut-down, the Unit 1-3 at Onagawa Nuclear Power Station, the Unit 3 at Fukushima II Nuclear Power Station, and the Unit at Tokai II Nuclear Power Station have been cold shut down safely.

-As for the unit 1,2,4 at Fukushima II Nuclear Power Station, the operator of the station reported NISA nuclear emergency situation because the temperature of the suppression pools became more than 100 ℃, but afterward the three units have been cold shut down.

2. Outline of Fukushima Dai-ichi NPS

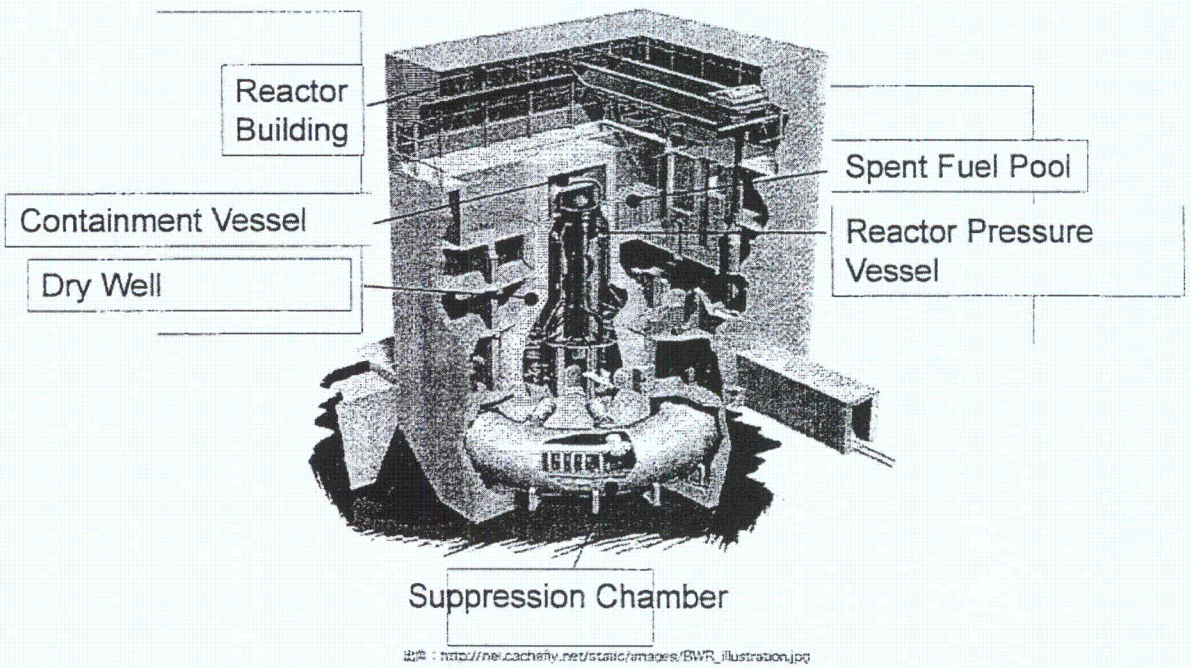


2-1. Summary of Fukushima Dai-ichi NPS

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
	BWR-3	BWR-4	BWR-4	BWR-4	BWR-4	BWR-5
PCV Model	Mark-1	Mark-1	Mark-1	Mark-1	Mark-1	Mark-2
Electric Output (MWe)	460	784	784	784	784	1100
Max. pressure of RPV	8.24MPa	8.24MPa	8.24MPa	8.24MPa	8.62MPa	8.62MPa
Max. Temp of the RPV	300℃	300℃	300℃	300℃	302℃	302℃
Max. Pressure of the CV	0.43MPa	0.38MPa	0.38MPa	0.38MPa	0.38MPa	0.28MPa
Max. Temp of the CV	140℃	140℃	140℃	140℃	138℃	171℃(D/W) 105℃(S/C)
Commercial Operation	1971,3	1974,7	1976,3	1978,10	1978,4	1979,10
Emergency DG	2	2	2	2	2	3*
Electric Grid	275kV × 4				500kV × 2	
Plant Status on Mar. 11	In Operation	In Operation	In Operation	Refueling Outage	Refueling Outage	Refueling Outage

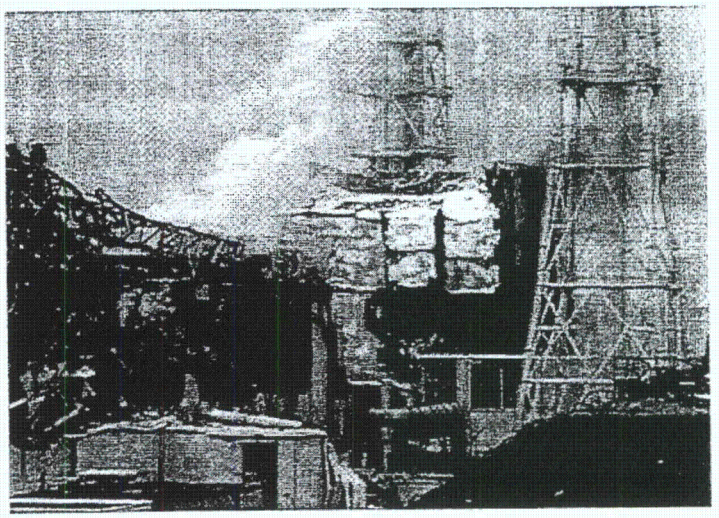
* One Emergency DG is Air-Cooled

2-2. Overview of Mark-1 Type BWR (Unit 1,2,3 and 4)

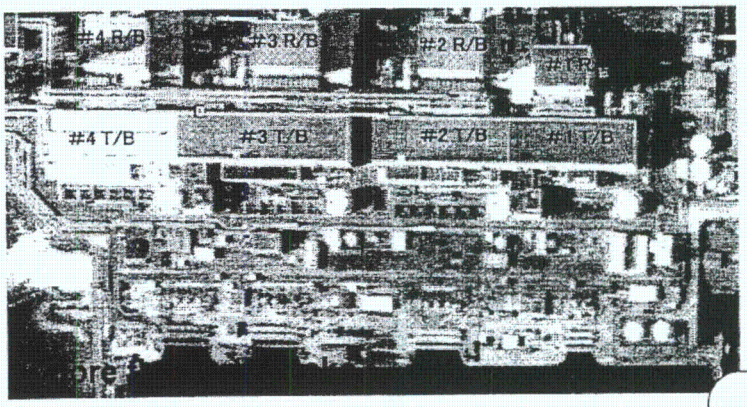


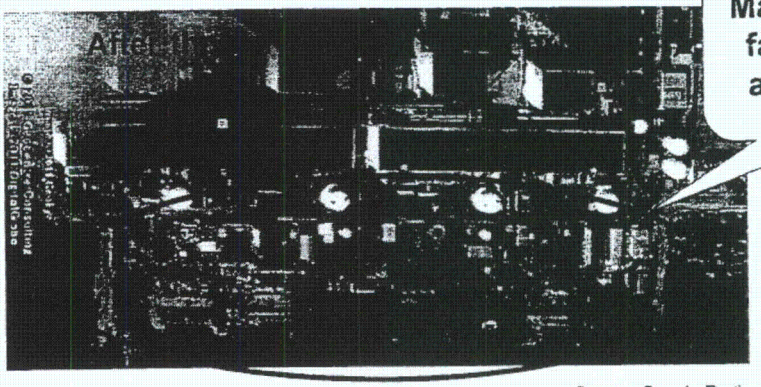
出典：http://net.cachefly.net/static/images/BWR_illustration.jpg

3. Report concerning incidents at Unit 1 through 6 in the Fukushima Dai-ichi NPS



3-1. Satellite view of Fukushima Dai-ichi NPP



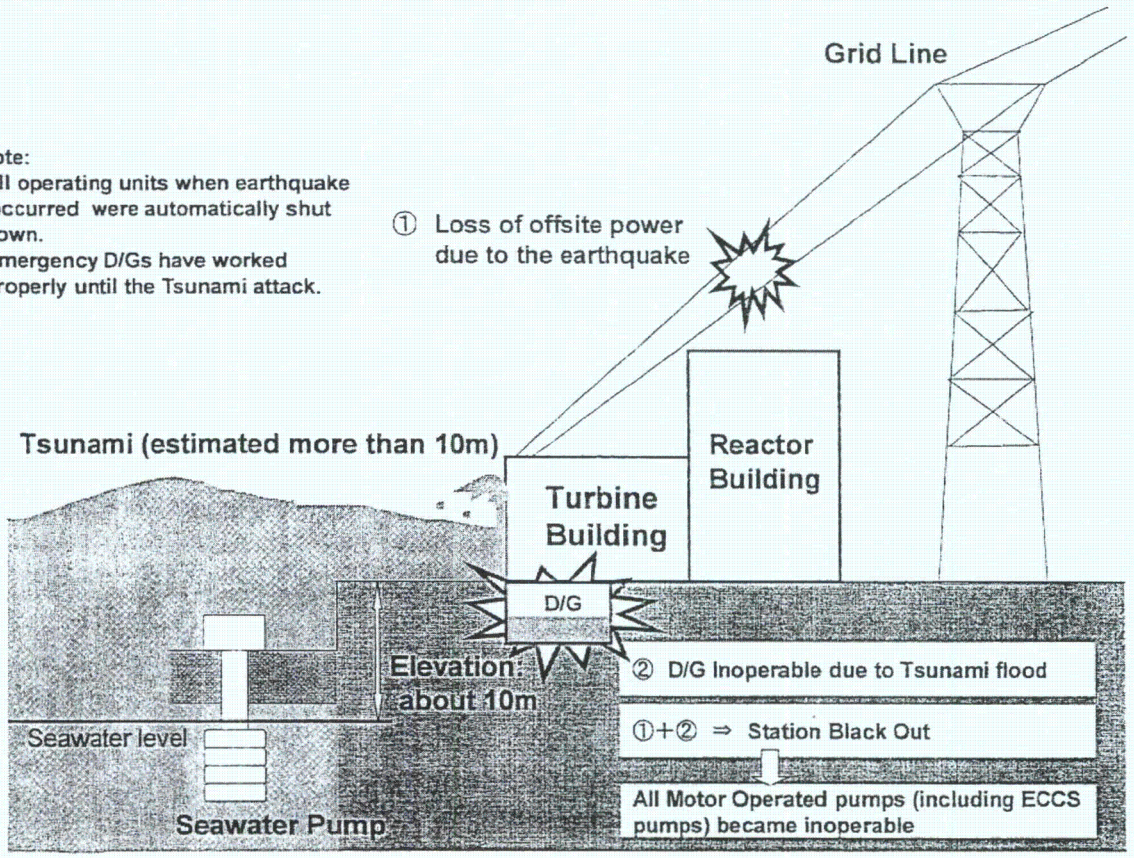


Many structures facing the bay are destroyed

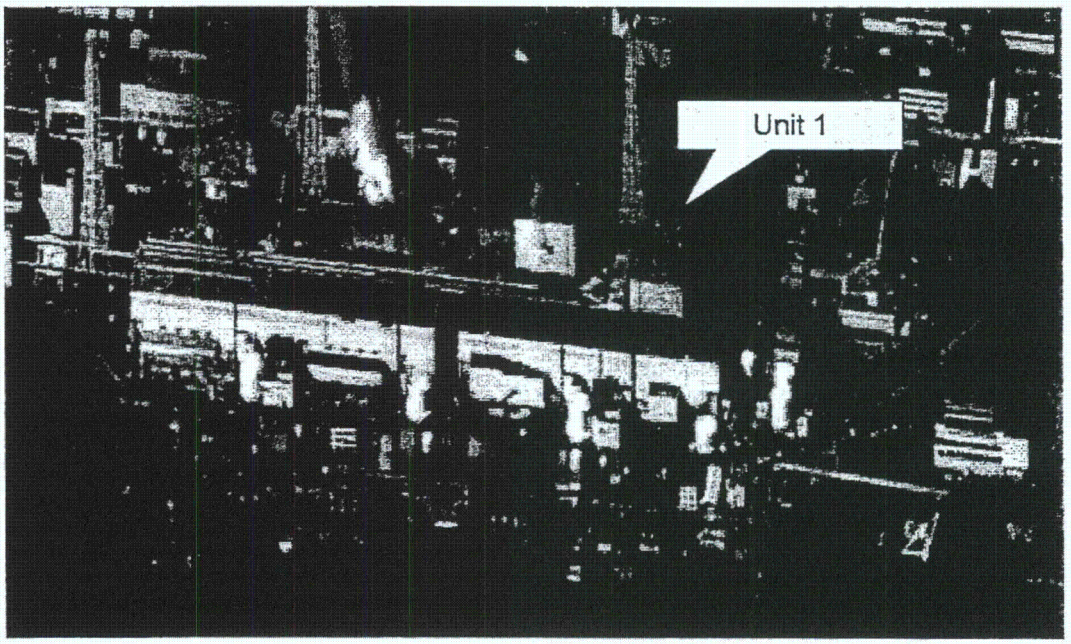
Source: Google Earth

3-2. Major root cause of the damage

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



3-3. Accident Progression at Unit 1 Reactor



3-4. Chronology of Unit 1 after the earthquake

●*Unit 1*

11th
- ●Under operation, Automatic shutdown by the earthquake
- ●Loss of A/C power
- ●Loss of water injection function

12th
- ●Unusual increase of PCV pressure
- ●Started to vent
- ●Sound of explosion
- ●Started of injection of seawater and borated water to the core

22nd
- ●Rise of reactor temperature (383℃) → Drop (26th 05:00 144.3℃)

23rd
- ●Water supply line in addition to the Fire Extinguish line. Switched to water supply line only.(Flow rate: 7m^3/h)

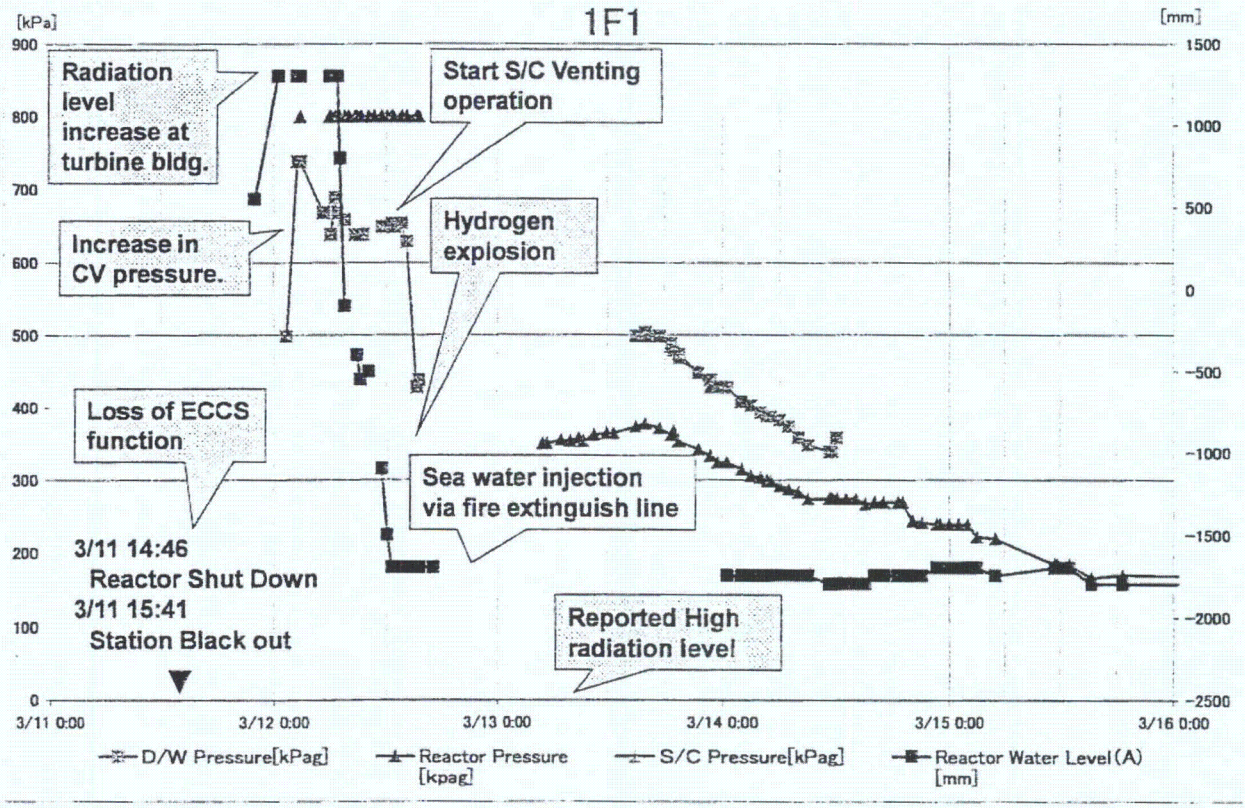
24th
- ●Lighting in the Central Control Room was recovered.

25th
- ●Started fresh water injection

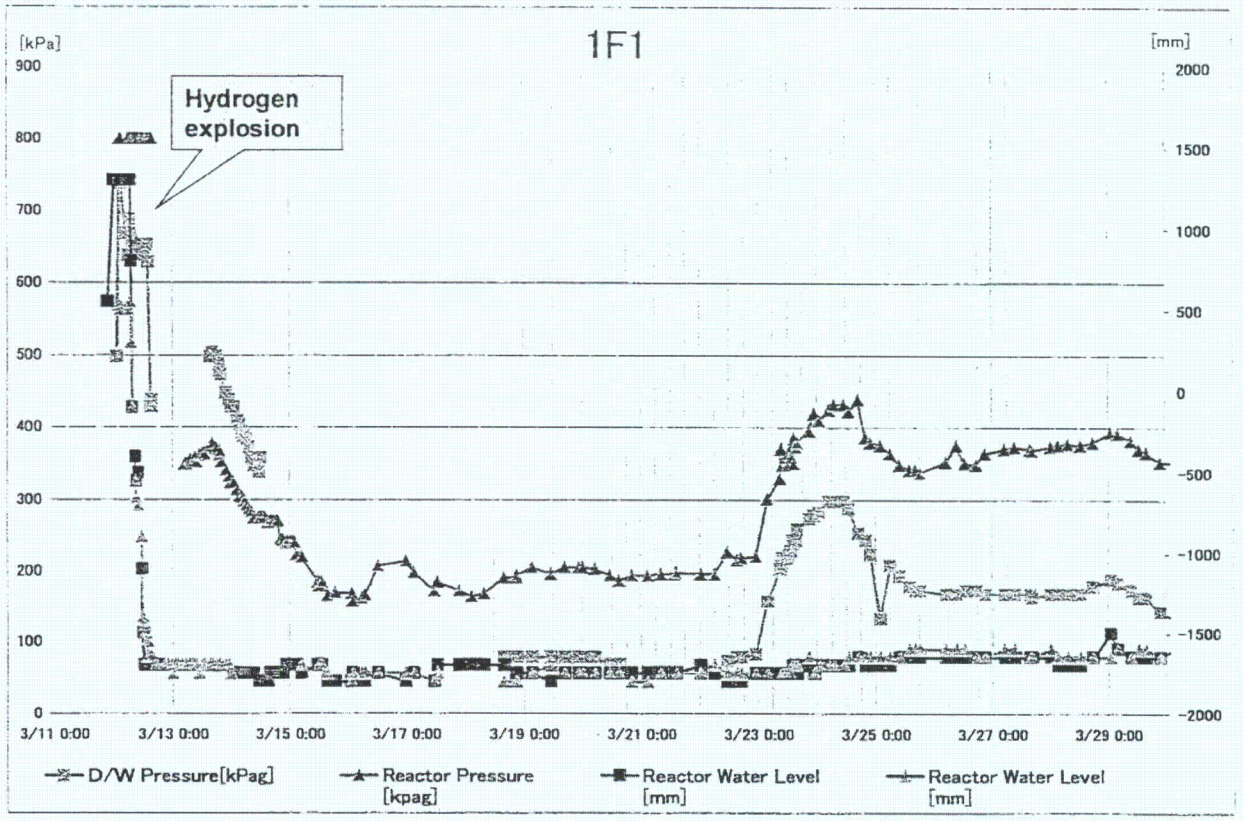
29th
- ●Switched to the water injection to the core using a temporary motor operated pump.

31st
- ●White smoke was confirmed to generate continuously
- ●Freshwater is being injected into the RPV

3-5. Trend data of Unit 1 until March 15

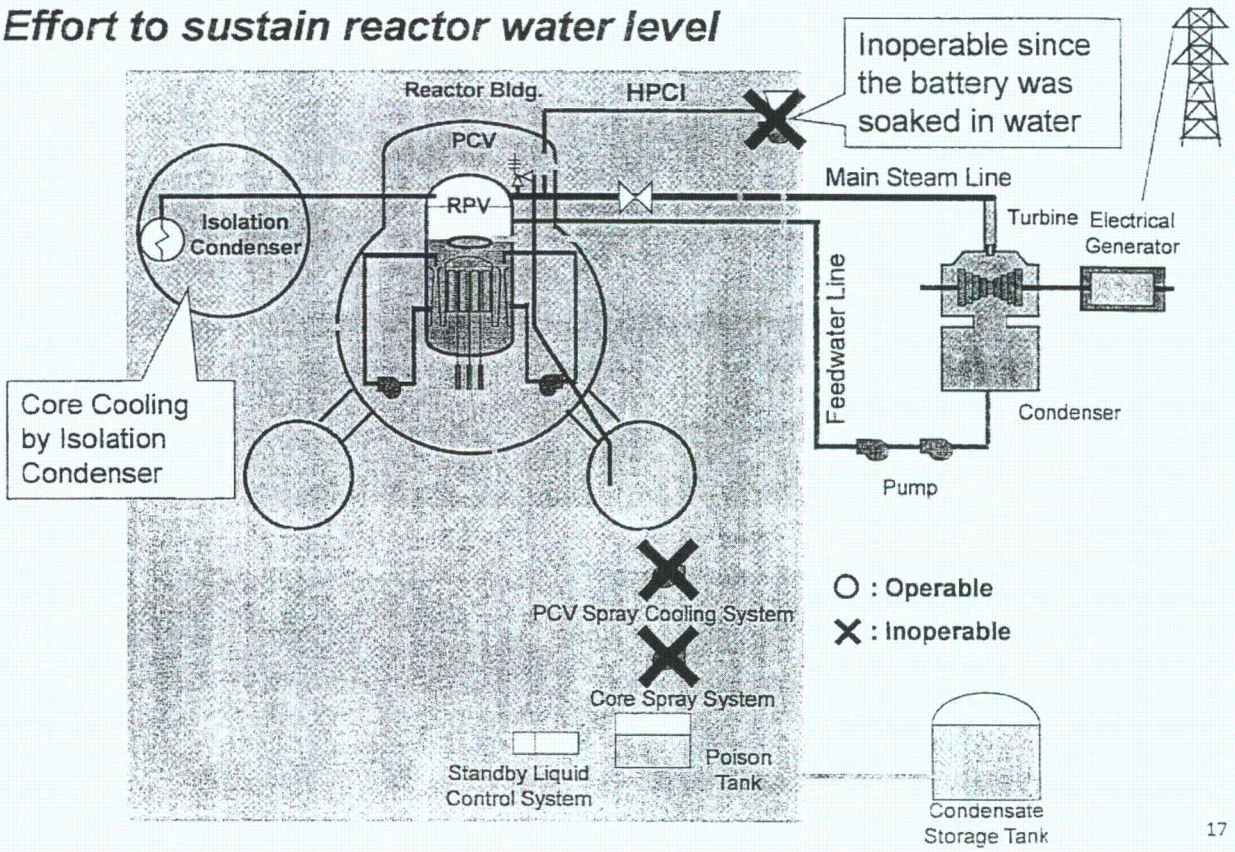


3-6. Trend data of Unit 1 until March 30



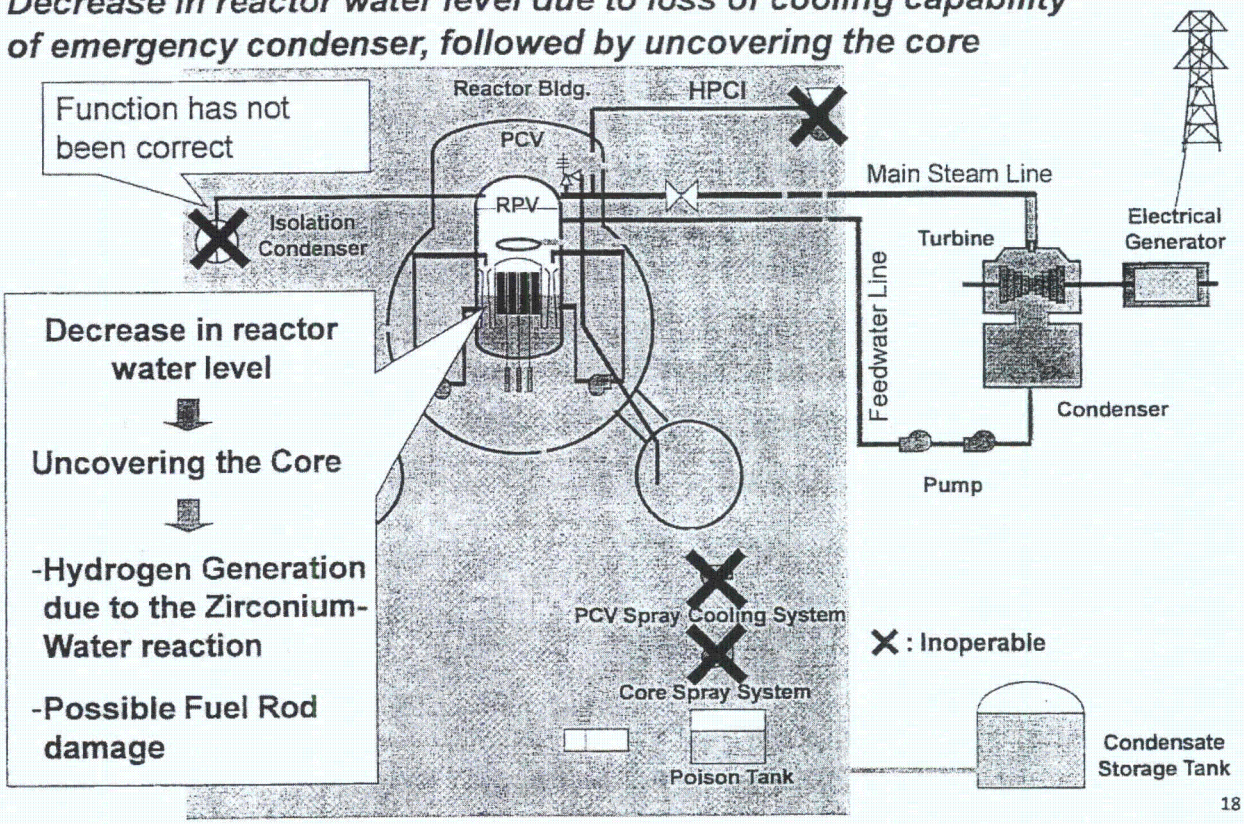
3-7. Major event progression at Unit 1 (1/4)

Effort to sustain reactor water level



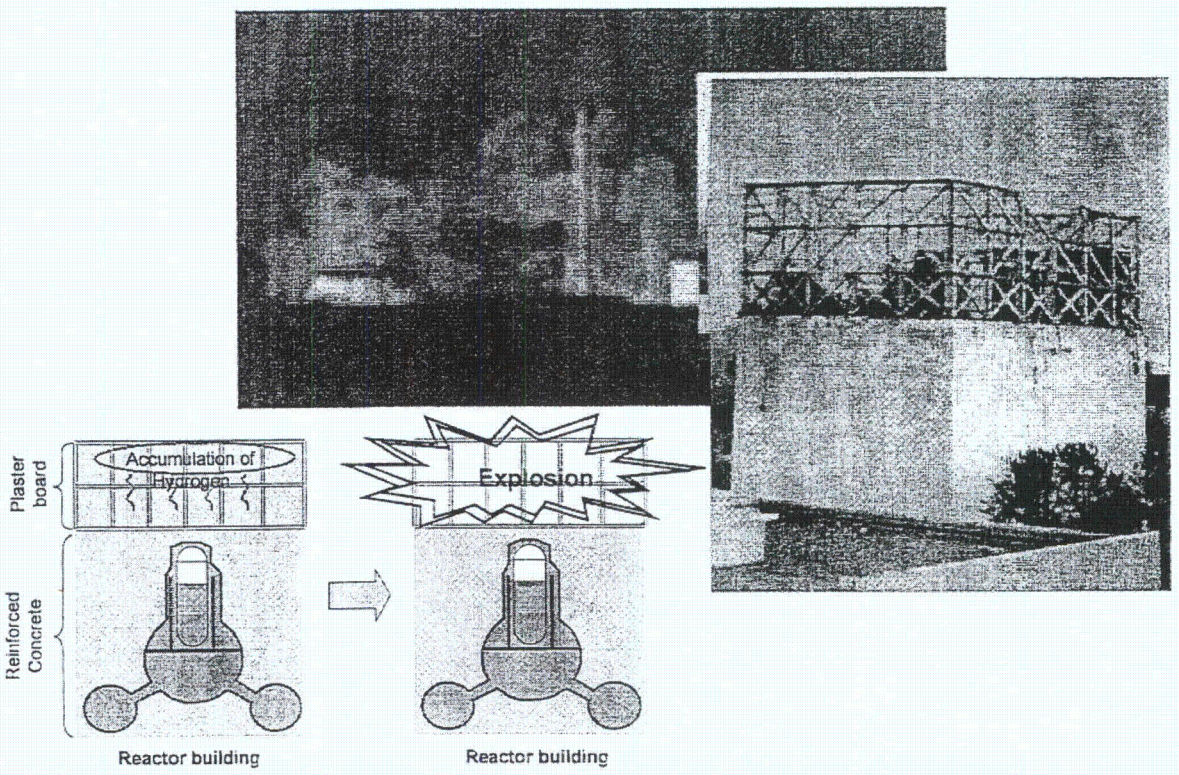
3-7. Major event progression at Unit 1 (2/4)

Decrease in reactor water level due to loss of cooling capability of emergency condenser, followed by uncovering the core



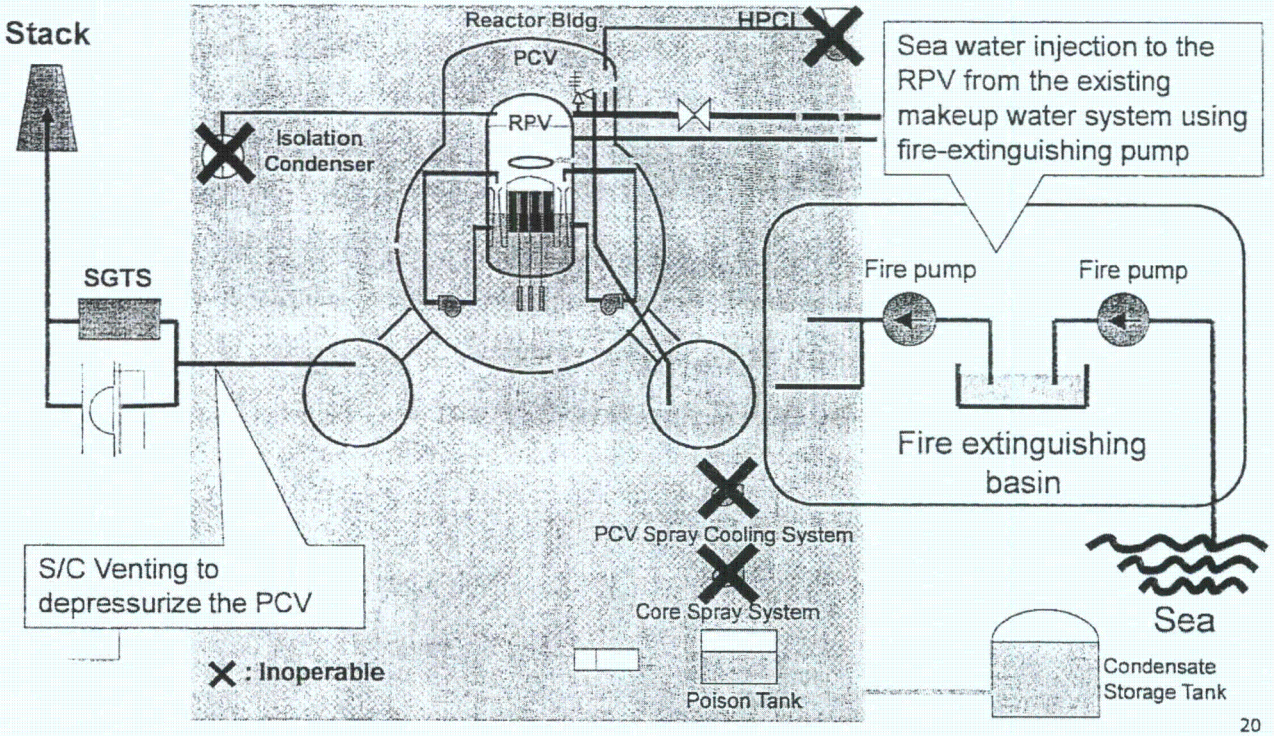
3-7. Major event progression at Unit 1 (3/4)

Hydrogen explosion in the operation floor

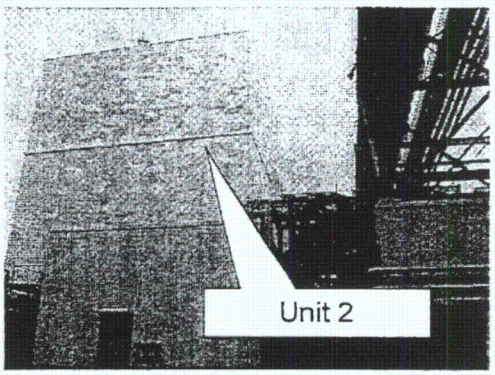


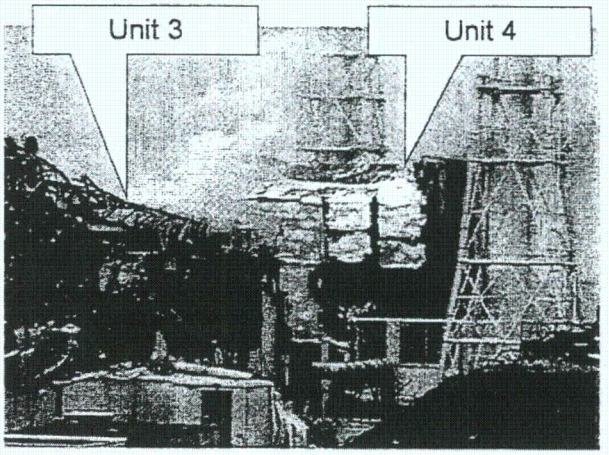
3-7. Major event progression at Unit 1 (4/4)

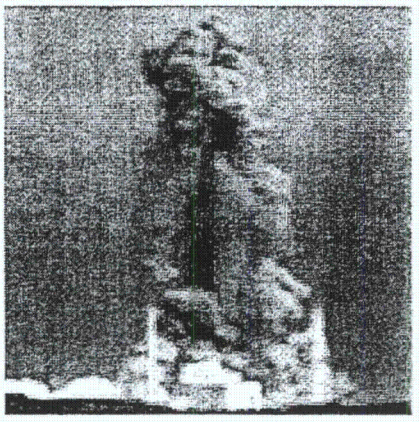
- Sea water injection using fire water pump
- S/C Venting to depressurize the PCV

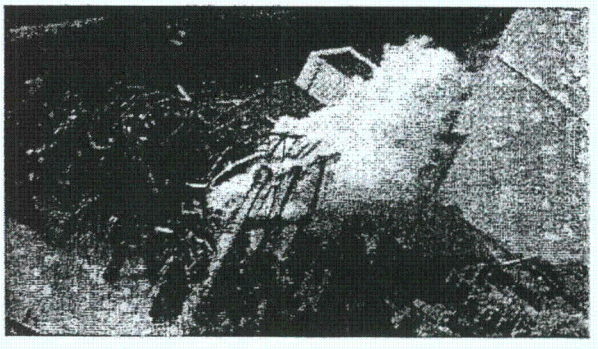


3-8. Accident Progression at Unit 2 through 4 reactors









3-9. Chronology of Unit 2 after the earthquake (1/2)

● *Unit 2*

11th
- ●Under operation, Automatic shutdown by the earthquake
- ● Loss of A/C power
- ● Loss of water injection function

14th
- ● Loss of water cooling function
- ● Unusual increase in PCV pressure

15th
- ● Sound of explosion
- ● Possible damage of the suppression chamber

20th
- ● Injection of about 40 tons of seawater into SFP through fire extinguishing system.
- ● Injection of seawater to the Spent Fuel Pool (SFP)

21st
- ● White smoke generated

22nd
- ● Injection of seawater to the Spent Fuel Pool (SFP)

25th
- ● Injection of seawater to SFP

3-9. Chronology of Unit 2 after the earthquake (2/2)

● *Unit 2(Continued)*

26th
- ●Lighting in the Central Control Room was recovered

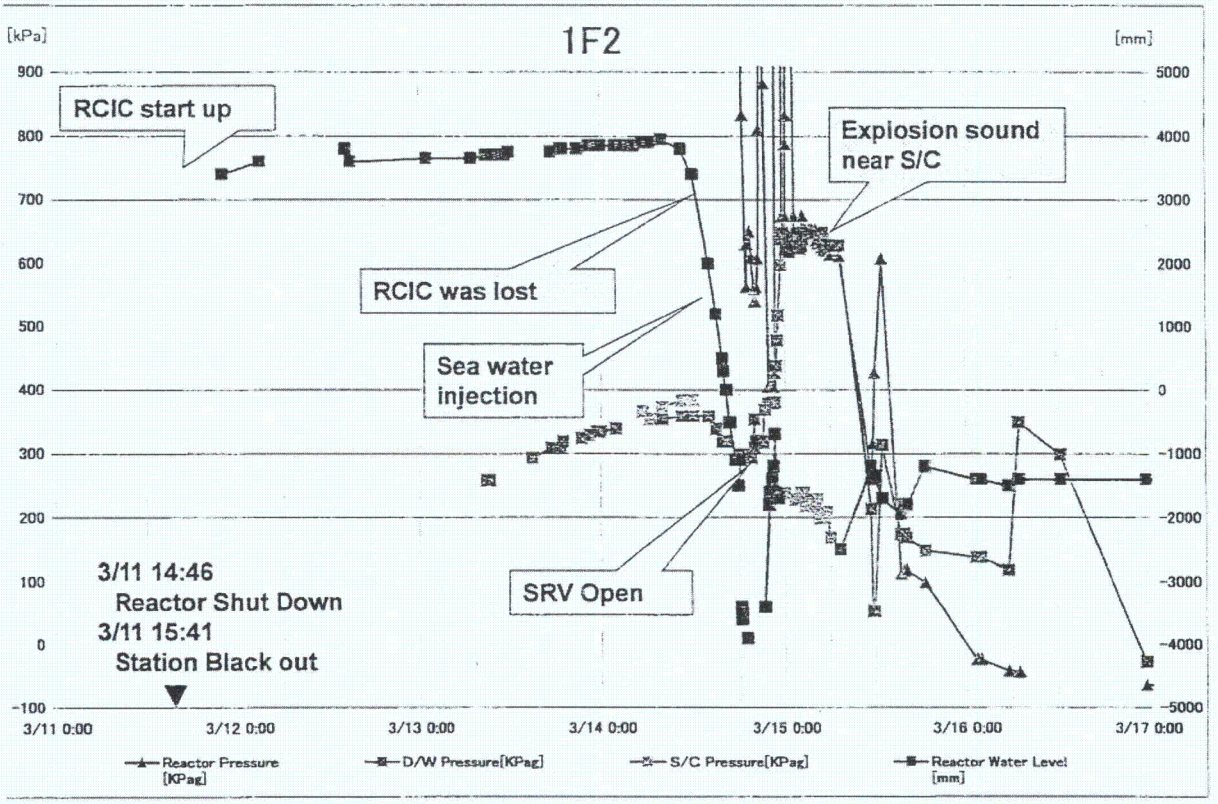
27th
- ●Switched to the water injection to the core using a temporary motor-driven pump.

29th
- ●The Seawater injection to the Spent Fuel Pool using the Fire Pump Truck was switched to the fresh water injection using the temporary motor-driven pump
- ●In order to prepare for transferring the stagnant water on the basement floor of turbine building to the Condenser, the water in the Condensate Storage Tank is being transferred to the Surge Tank of Suppression Pool Water.

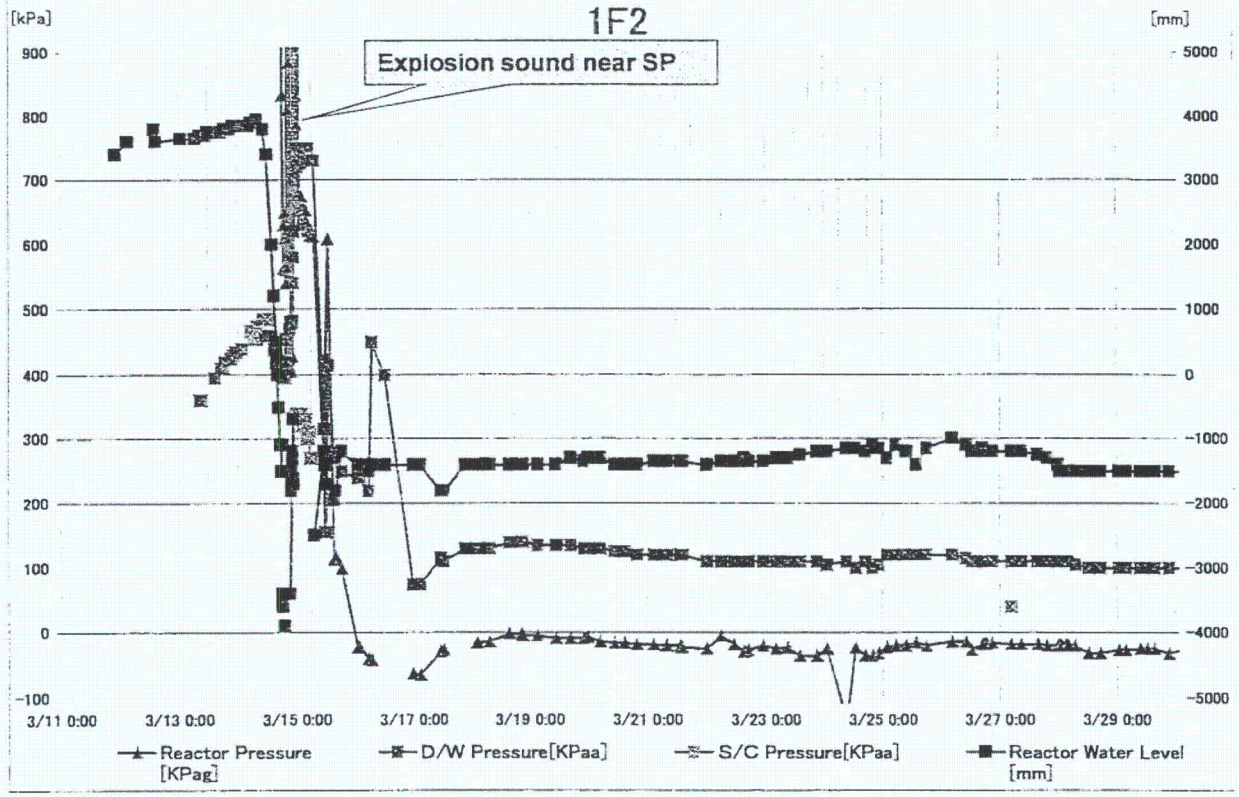
30th
- ●The injection pump was switched to the Fire Pump Truck. However, because cracks were confirmed in the hose (12:47 and 13:10 March 30th), the injection was suspended. The injection of fresh water resumed at 19:05 March 30th.

31st
- ●White smoke was confirmed to generate continuously.
- ●Fresh water is being injected to the spent fuel pool and the RPV

3-10. Trend data of Unit 2 until March 17



3-11. Trend data of Unit 2 until March 30



3-12. Chronology of Unit 3 after the earthquake (1/2)

●*Unit 3*

11th
- ●Under operation, Automatic shutdown by the earthquake
- ● Loss of A/C power

13th
- ● Loss of water injection function
- ● Started to vent

14th
- ●Unusual increase in PCV pressure
- ●Sound of explosion

16th
- ●White smoke generated

17th
- ●Water discharge by the helicopters of Self-Defense Force(4 times)
- ●Water spray from the ground by High pressure water-cannon trucks (Police: once, Self-Defense Force: 5 times)

18th
- ●Water spray from the ground by same trucks (Self-Defense Force: 6 times)
- Water spray from the ground by US water-cannon trucks (US armed force:1 time)

19th
- ●Water spray from the ground by High pressure water-cannon trucks by Hyper Rescue Unit of Tokyo Fire Department.

3-12. Chronology of Unit 3 after the earthquake (2/2)

●*Unit 3(Continued)*

20th
- ●Sprayed by Hyper Rescue Unit of Tokyo Fire Department

22nd
- ●Lighting in the Central Control Room was recovered.

23rd
- ●Injection of seawater to the SFP

24th
- ●Injection of seawater to the SFP

25th
- ●Water spray (Emergency fire support team
- ●Started fresh water injection

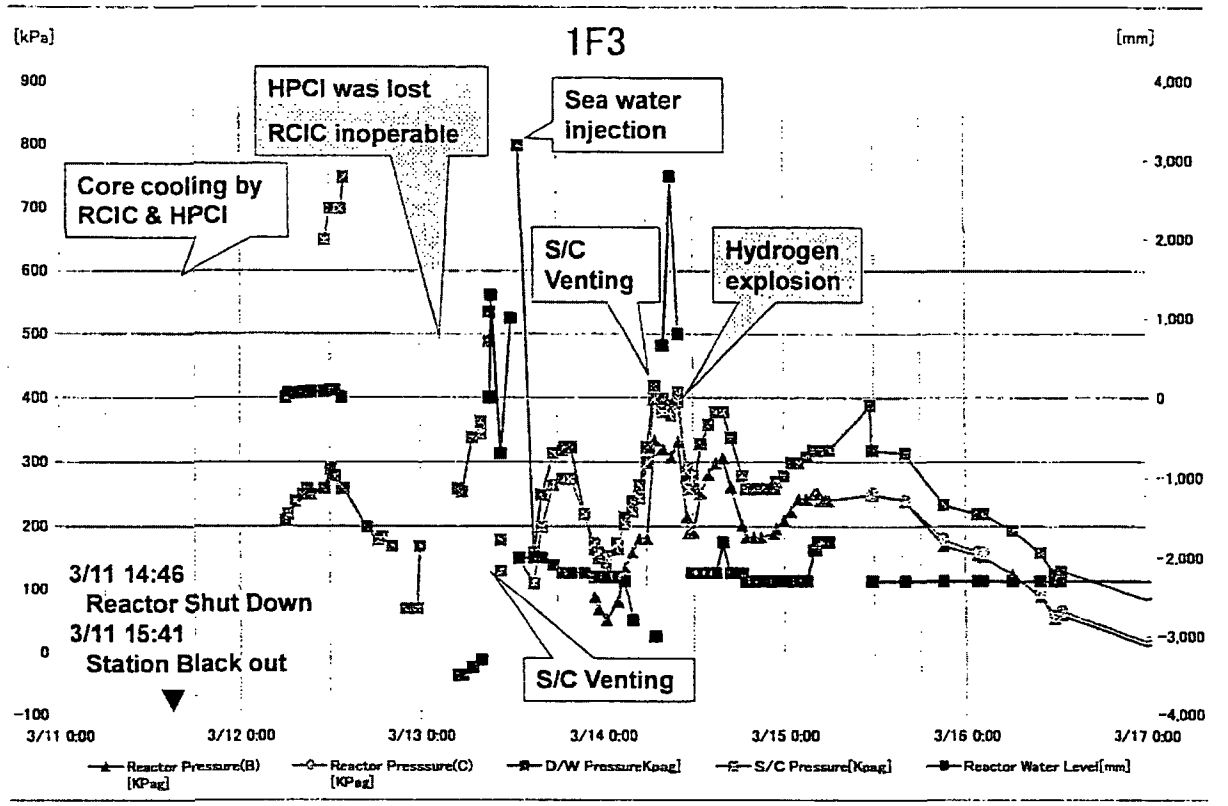
27th
- ●Water spray by Concrete Pump Truck

28th
- ●Switched to the water injection to the core using a temporary motor-driven pump
- ●in order to prepare for transfer the stagnant water on the basement floor of turbine building to the Condenser, the water in the Condensate Storage Tank is being transferred to the Surge Tank of Suppression Pool Water

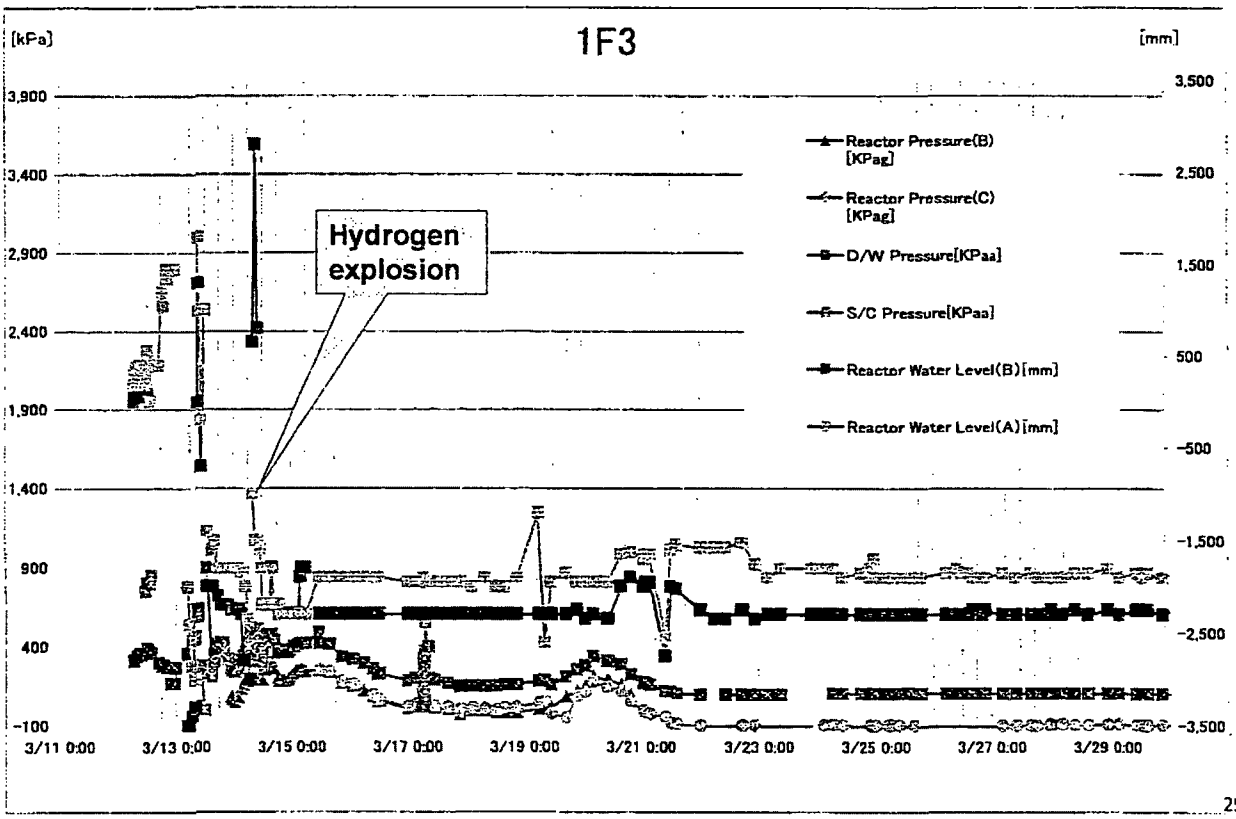
29th
- ●Started to spray freshwater by Concrete Pump Truck

31st
- ●White smoke was confirmed to generate continuously
- ●Fresh water is being injected to the spent fuel pool and the RPV

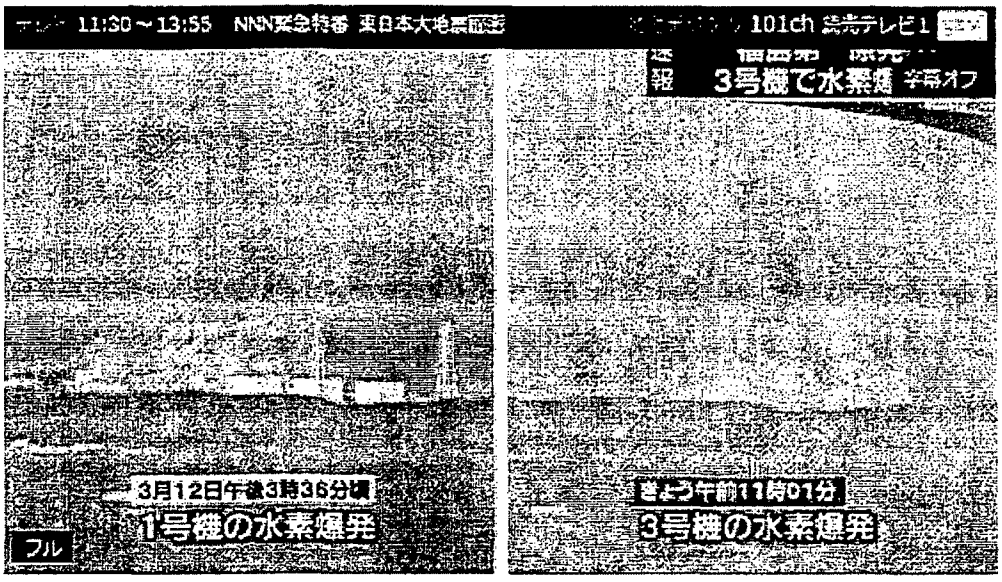
3-13. Trend data of Unit 3 until March 17



3-14. Trend data of Unit 3 until March 30



3-15. Hydrogen explosion at Unit 1 & 3



Unit 1 **Unit 3**

3-16. Chronology of Unit 4 after the earthquake

●*Unit 4*

14th	●Water temperature in the Spent Fuel Pool, 84℃
15th	●Damage of wall in the 4th floor confirmed ●Fire occurred in the 3rd floor (12:25 extinguished)
16th	●Fire occurred. TEPCO couldn't confirm any fire on the ground.
20th	●Water spray over the spent fuel pool by Self Defense Force
21st	●Water spray over the spent fuel pool by Self Defense Force
22nd-24th	●Water spray (Concrete Pump Track (3 times)
25th	●Injection of seawater to SFP via the Fuel Pool Cooling Line (FPC) ●Water spray (Concrete Pump Truck)
27th	●Water spray (Concrete Pump Truck)
29th	●Lighting in the Central Control Room was recovered.
3oth	●White smoke was confirmed to generate continuously. ●Spray of fresh water (Around 140t) over the Spent Fuel Pool using Concrete Pump Truck (50t/h) was carried out. ●Fresh water is being injected to the spent fuel pool

3-17. Chronology of Unit 5 & 6 after the earthquake

● *Unit 5&6*

20th
- Unit 5 under cold shutdown (Water temperature of reactor water is less than 100℃)
- Unit 6 under cold shutdown (Water temperature of reactor water is less than 100℃)

21st
- Water spray over the Common Spent Fuel Pool started

22nd
- Recovering power supply of unit 5 and 6 is completed.

24th
- The power was started to be supplied. Cooling also started

30th
- Bach up power of Unit 6 is in working condition and external power was supplied to Unit 5 as of March 30th

4. Report concerning incidents at spent fuel pools in the Fukushima Dai-ichi NPS

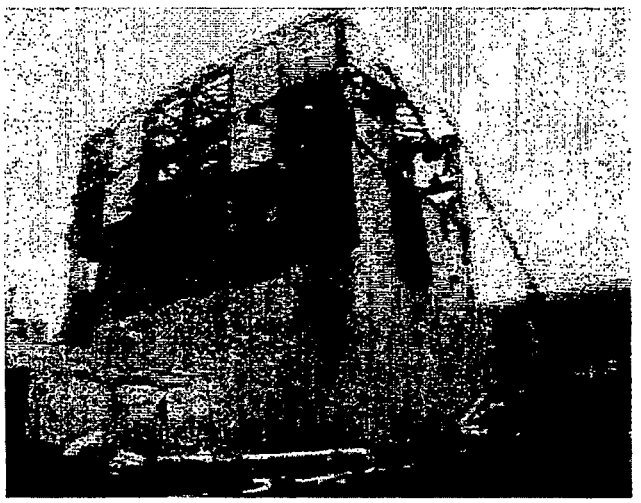
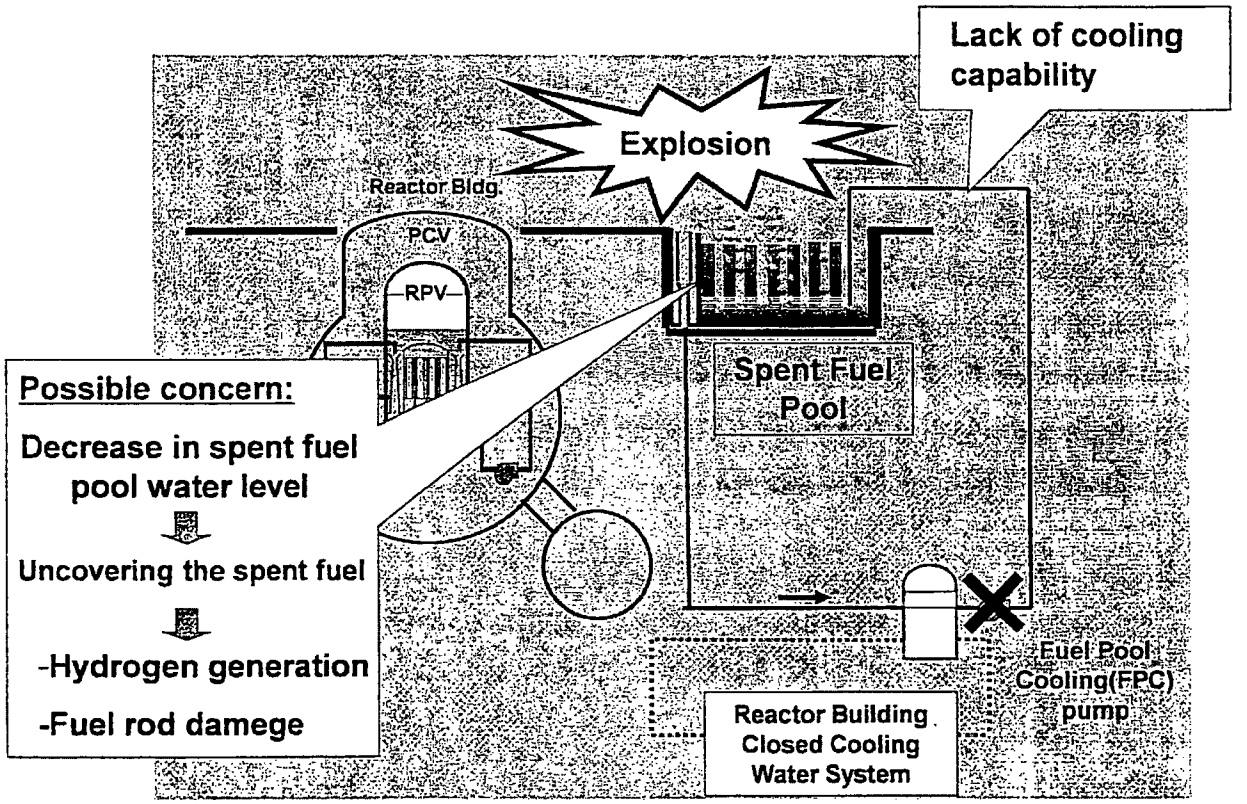


Photo: Water spray into the SFP in Unit 4 using concrete pump truck

4-1. Possible concerns about Spent Fuel Pool



4-2. Status of the Fuel as of March 11, 2011

Unit	1	2	3	4	5	6
Number of Fuel Assembly in the Core	400	548	548	-	548	764
Number of Spent Fuel Assembly in the Spent Fuel Pool	292	587	514	1,331	946	876
Number of New Fuel Assembly in the Spent Fuel Pool	100	28	52	204	48	64
Water Volume (m^3)	1,020	1,425	1,425	1,425	1,425	1,497

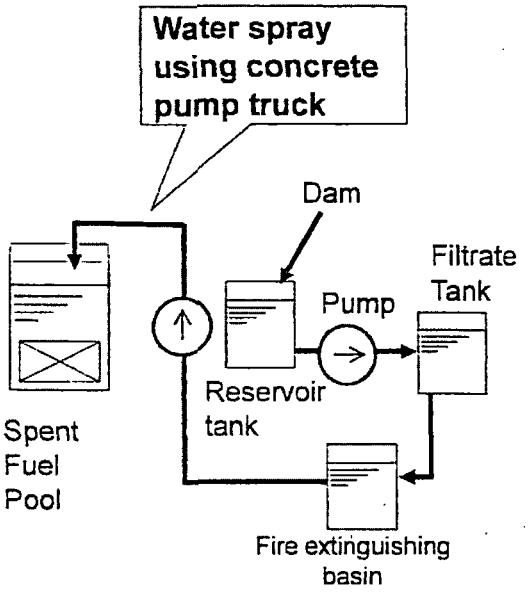
Condition of the fuel in the Spent Fuel Pool

Unit 1	Unit 2	Unit 3	Unit 4
-Most recent shut down was on Sep.27,2010	- Most recent shut down was on Nov.18,2010	- Most recent shut down was on Sep.23,2010	-Most recent shut down was on Nov.29,2010 -All fuel assembly was removed from the core and located in the pool due to the core shroud replacement

4-3. Measures taken to cool the Spent Fuel Pool (1/4)

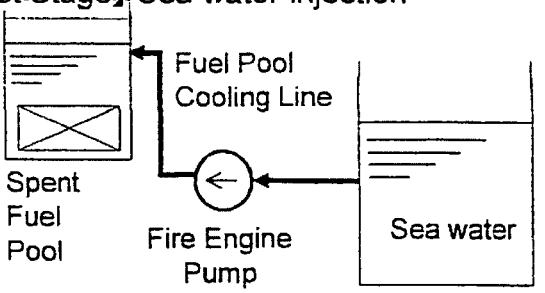
Unit 1

Fresh water injection

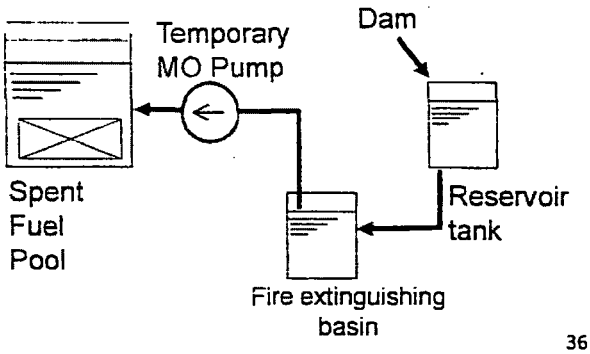


Unit 2

【1st Stage】Sea water injection



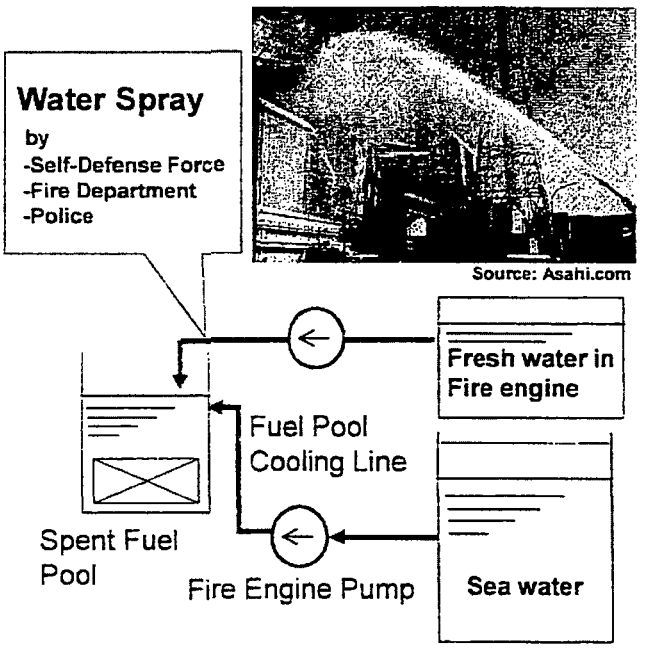
【2nd Stage】Fresh water injection



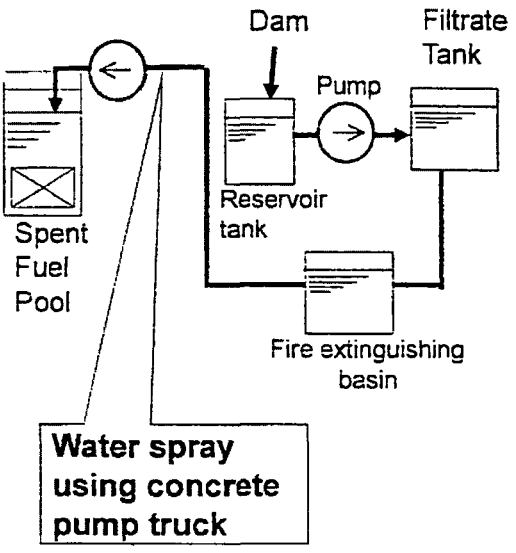
4-3. Measures taken to cool the Spent Fuel Pool (2/4)

Unit 3

【1st Stage】Sea water injection



【2nd Stage】Fresh water injection

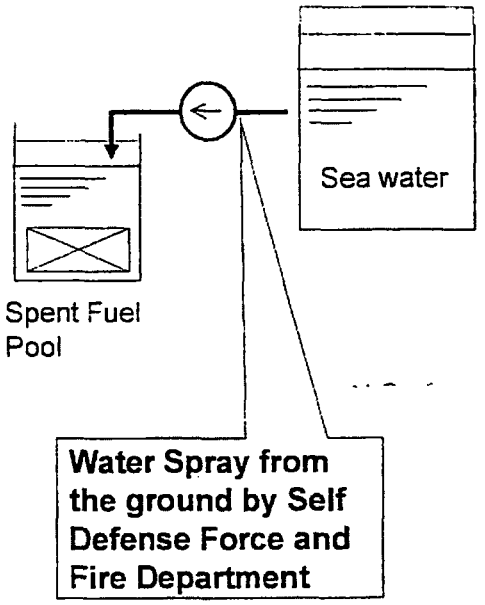


* Sea water discharge by helicopters of the Self Defense Force

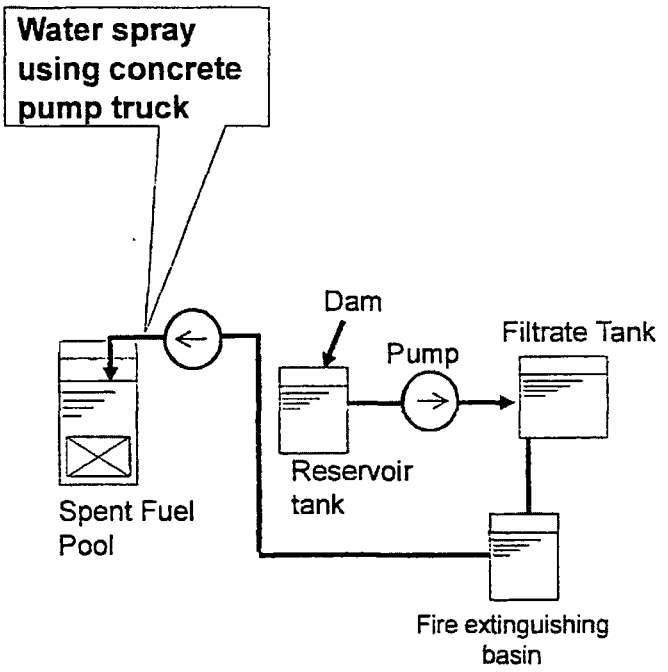
4-3. Measures taken to cool the Spent Fuel Pool (3/4)

Unit 4

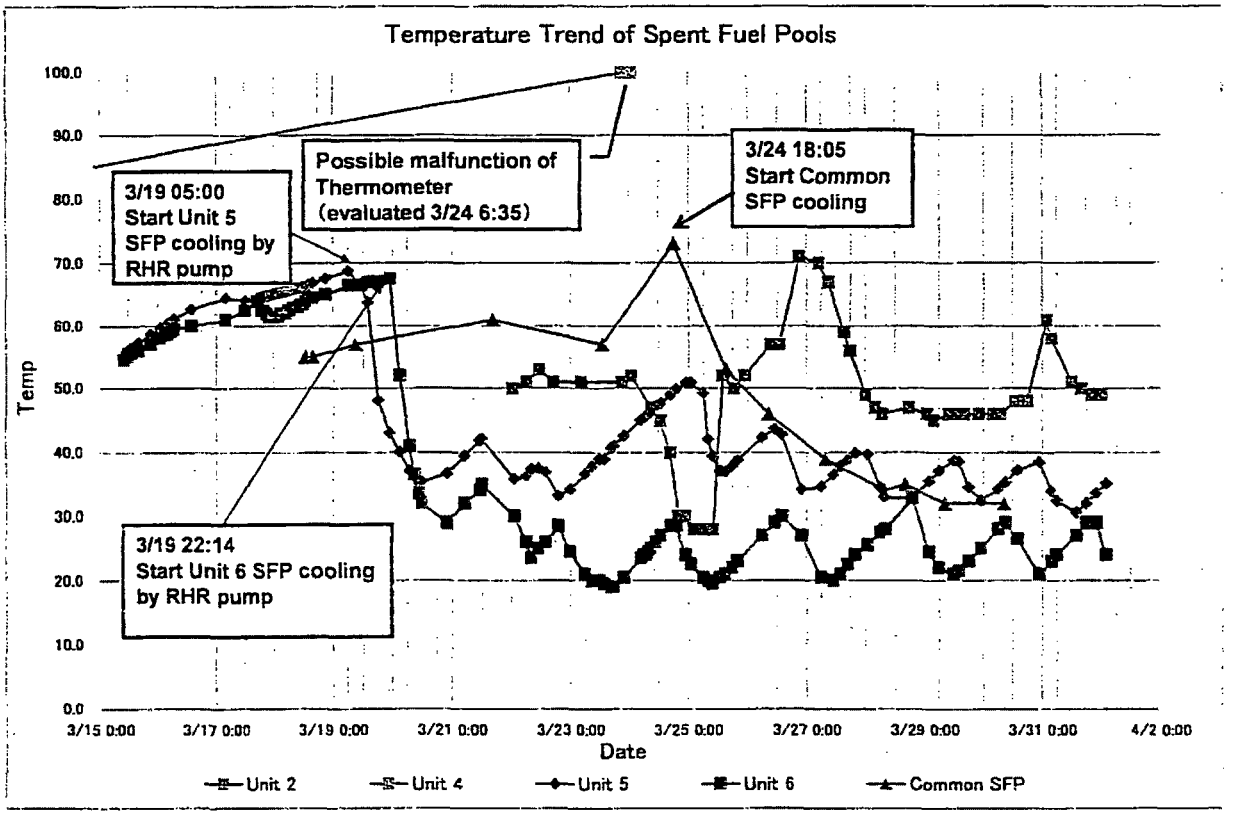
【1st Stage】 Sea water injection



【2nd Stage】 Fresh water injection



4-3. Measures taken to cool the Spent Fuel Pool (4/4)



4-4. INES Rating

- NISA issued temporary INES ratings 3 times. Those provisional ratings are provided based on "What is known" at the time.

- The first temporary rating was issued at 0:30 on March 12 (About 10 hours later from the earthquake attack)
  At that moment, Following units were rated as Level 3 since all heat removal function became inoperable based on "Defense in Depth" criteria.
  - Fukushima dai-ichi unit 1, 2 and 3
  - Fukushima dai-ni Unit 1, 2 and 4

- In the evening on March 12, the rating of Fukushima dai-ichi Unit 1 was re-evaluated to Level 4 base on the "Radiological Barriers and Control" criteria, since the radiation level in the site increased.

- On March 18, re-evaluation was carried out. The rating of Fukushima dai-ichi Unit 1, 2 and 3 were re-rated to Level 5 based on "Radiological Barriers and Control" criteria because the fuel damage was highly possible. Fukushima dai-ichi Unit 4 was evaluated to Level 3 based on the "Defense in Depth" criteria.

5. Action taken by the government

5. Action Taken by the Government(1/5)

March 11th, 2011

14:46 ●Set up of the NISA Emergency Preparedness Headquarters (Tokyo) immediately after the earthquake

19:03 ●Government declared the state of nuclear emergency. (Establishment of Government Nuclear Emergency Response Headquarters and Local Emergency Response Headquarters)

21:23 ●Directives from Prime Minister to the Governor of Fukushima Prefecture and heads of towns were issued regarding the eventoccurred at Fukushima Daiichi NPS, TEPCO, in accordance with the Acton Special Measures Concerning Nuclear Emergency Preparedness as follows:
- Direction for the residents within 3km radius from Unit 1 to evacuate
- Direction for the residents within 10km radius from Unit 1 to stay in-house

24:00 ●Vice Minister of Economy, Trade and Industry, Ikeda arrived at the Local Emergency Response Headquarters

5. Action Taken by the Government(2/5)

March 12nd, 2011

05:44 ●Residents within 10km radius from Unit 1 of Fukushima Dai-ichi NPS shall evacuate by the Prime Minister Direction

07:45 ●Directives from Prime Minister to the Governor of Fukushima Prefecture and heads of towns were issued regarding the event occurred at Fukushima Dai-ni NPS, TEPCO, pursuant to Act on Special Measures Concerning Nuclear Emergency Preparedness as follows:
- Direction for the residents within 3km radius from Fukushima Dai-ni NPS to evacuate
- Direction for the residents within 10km radius from Fukushima Dai-ni NPS to stay in-house

17:39 ●Prime Minister directed evacuation of the residents within the 10 km radius from Fukushima-Dai-ni NPS

18:25 ●Prime Minister directed evacuation of the residents within the 20km radius from Fukushima Dai-ichi NPS

20:05 ●Considering the Directives from Prime Minister and pursuant to the Nuclear Regulation Act, the order was issued to inject seawater to Unit 1 of Fukushima Dai-ichi NPS and so on.

5. Action Taken by the Government(3/5)

March 13th, 2011

09:30 ●Directive was issued for the Governor of Fukushima Prefecture and heads of towns in accordance with the Act on Special Measures Concerning Nuclear Emergency Preparedness on the contents of radioactivity decontamination screening.

March 15th, 2011

05:30 ●Prime Minister, Kan expressed to establish The Joint Headquarters to Fukushima Dai-ichi NPS accident

10:30 ●According to the Nuclear Regulation Act, Minister of Economy, Trade and Industry issued the directions as follows.
-For Unit 4: To extinguish fire and to prevent the occurrence of re-criticality
-For Unit 2: To inject water to reactor vessel promptly and to vent Drywell

11:00 ●Prime Minister directed the in-house stay area. -In-house stay was additionally directed to the residents in the area from 20 km to 30 km radius from Fukushima Dai-ichi NPS considering reactor situation

22:00 ●According to the Nuclear Regulation Act, Minister of Economy, Trade and Industry issued the following direction.
- For Unit 4: To implement the injection of water to the Spent Fuel Pool.

March 20th, 2011

23:30 ●Directive from Local Emergency Response Headquarters to the Prefectural Governor and the heads of cities, towns and villages was issued regarding the change of the reference value for the screening level for decontamination of radioactivity

5. Action Taken by the Government(4/5)

March 21st, 2011

07:45 ●Directive titled as "Administration of the stable Iodine" was issued from Local Emergency Response Headquarters to the Prefectural Governor and the heads of cities, towns and villages.

16:45 ●Directive titled as "Ventilation for using heating equipments within the in-house evacuation zone" was issued from the Head of Local Emergency Response Headquarters to the Prefectural Governor and the heads of cities, towns and villages.

17:50 ●Directive from the Head of Government Nuclear Emergency Response Headquarters to the Prefectural Governors of Fukushima, Ibaraki, Tochigi and Gunma was issued, which directs the above-mentioned governors to issue a request to relevant businesses and people to suspend shipment of spinach, Kakina (a green vegetable) and raw milk for the time being.

March 25th, 2011

●NISA directed orally to the TEPCO regarding the exposure of workers at the turbine building of Unit 3 of Fukushima Dai-ichi Nuclear Power Station occurred on March 24th, to review immediately and to improve its radiation control measures from the viewpoint of preventing a recurrence.

5. Action Taken by the Government(5/5)

March 25th, 2011

- Since there was a mistake in the evaluation regarding the concentration measurement of radioactive materials, NISA directed TEPCO orally to prevent the recurrence of such a mistake

13:50
- Receiving the suggestion by the special meeting of Nuclear Safety Commission, NISA directed TEPCO orally to add the sea water monitoring points and carry out the groundwater monitoring.
- Regarding the delay in the reporting of the water confirmed outside of the turbine buildings, NISA directed TEPCO to accomplish the communication in the company on significant information in a timely manner and to report it in a timely and appropriate manner.

March 29th, 2011

- In order to strengthen the system to assist the nuclear accident sufferers, the "Team to Assist the Lives of the Nuclear Accident Sufferer" headed by the Minister of Economy, Trade and Industry was established

March 30th, 2011

- Directions as to implement the emergency safety measures for the other power stations considering the accident of Fukushima Dai-ichi and Dai-ni NPSs in 2011 was issued and handed to each electric power company and the relevant organization.

6. Current situation on resident evacuation and radiation exposure, etc

6-1. Current Situation on Resident Evacuation(1/2)

- At 5:44 on March 12, residents within 10km radius from Unit1 of Fukushima Dai-ichi NPS shall evacuate by the Prime Minister Directive.

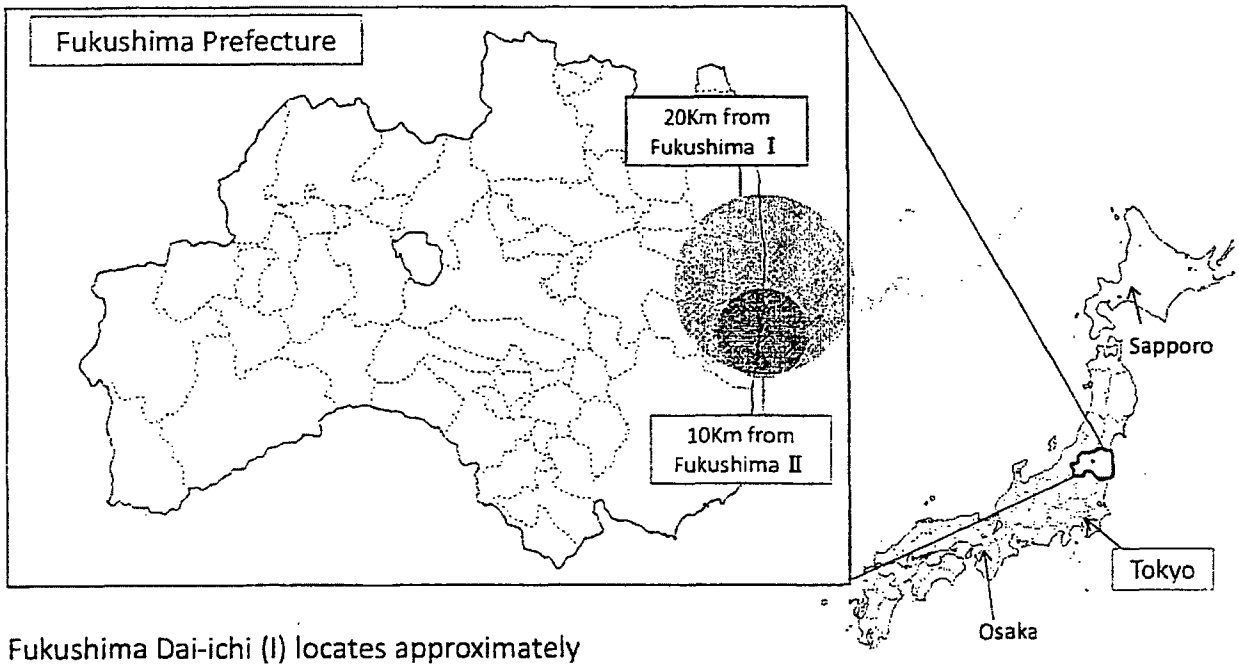
- At18:25 on March 12, Prime Minister directed evacuation of the residents within the 20 km radius from Fukushima Dai-ichi NPS.

- On March 15th, the Local Emergency Response Headquarter issued "the direction to administer the stable Iodine during evacuation from the evacuation area (20 km radius)" to the Prefecture Governors and the heads of cities, towns and villages.

- Regarding the evacuation as far as 20 km from Fukushima Dai-ichi NPS and 10 km from Fukushima Dai-ni NPS, necessary measures have already been taken.
  - The sheltering stay in the area from 20km to 30km from Fukushima Dai-ichi NPS is made fully known to the residents concerned.
  - Cooperating with Fukushima Prefecture, livelihood support to the residents in the sheltering area are implemented.

- On March 25th, Chief Cabinet Secretary, Edano promoted voluntary evacuations for the residents within the area from 20 km to 30 km from Fukushima Dai-ichi NPS in a press conference.

6-1. Current Situation on Resident Evacuation(2/2)



Fukushima Dai-ichi (I) locates approximately
- 230 km from Tokyo
- 580 km from Osaka
- 600 km from Sapporo

6-2. Major Possibility on radiation exposure to residents (As of 15:30 April 1st)

- 95 patients of Futaba Welfare Hospital transferred by JSDF helicopters and commercial buses. If explosion occurred while 60 patients to be transferred by JSDF helicopters were standing by on Futaba High School playground. No exposure suspected. (19:00, March 16)

- Screening started at Off-site Center on Sat. March 12. 162 screened as of March 15. Against initially-set decontamination threshold of 6,000cpm, 110 patients registered below the threshold, 41 above it. Of 162 screened patients, 5 were given decontamination measures and transferred to hospital.

- Fukushima Prefecture conducted screening at 4 locations in the prefecture. Some 30 people registered above 13,000cpm. After measuring for the second time following decontamination they showed low values, therefore they were returned to shelters without examination.

- 3 women who lived around 10km radius of Fukushima Dai-ichi until March 14 were examined at Iwate Medial University Hospital. Simple decontamination procedure was given without surveying. They were hospitalized for follow-up.

6-3.Major exposure of workers (As of 15:30 April 1st)

- To date a total of 21 people have registered exposure dose above 100mSv. Following measures were taken.

-17 people had facial contamination on March 12 (9 TEPCO employees, 8 support company employees). Exposure identified upon their measurement after returning from Controlled Area. However, the level of exposure would not affect their health.

-At the time of ventilation operation at Unit 1 on March 12, one TEPCO employee registered above 100mSv (106.30mSv/h). As the level was below acute exposure he conducted work after self-air setting. As he afterwards complained of headache and other symptoms, he was transferred to hospital and placed at rest. He now has returned home.

-On March 24, dosage above approx. 170mSv was confirmed on 3 workers who were laying cables on 1st floor and basement of Unit 3 Turbine Bldg. Attachment of radioactive substances on the skin of both legs was confirmed on two of them. Examination showed that none of the 3 had any major systemic risk. Exposure dose on the legs of the 2 was estimated to be 2～3Sv. While the level of leg and internal exposure did not require treatment, they were hospitalized. They were discharged on March 28.

- On April 1st, a worker fell into the sea when he got into a barge of US. He was rescued by workers, and was not injured etc. However, he was confirmed surface contamination and decontaminated by the shower. He was confirmed the non-contamination by nasal smears.

6-4. Major Situation of the injured (As of 15:00 April 3rd)

<Death due to earthquake(Found on March 30)>

- Two employees found in the turbine building of Unit 4)

<Injury due to earthquake(March11)>

- Two employees (slightly)
- Two subcontract employees (one fracture in both legs)

<Injury due to the explosion of Unit 1 of Fukushima Dai-ichi NPS(March12)>

- Four employees were injured at the explosion and smoke of Unit 1 around turbine building (non-controlled area of radiation) and were examined by Kawauchi Clinic.

<Injury due to the explosion of Unit 3 of Fukushima Dai-ichi NPS(March14)>

- Four TEPCO's employees
- Three subcontractor employees
- Four members of Self-Defence Force (The member was discharged from the institute on March 17th.)

<Other injuries>

- Two subcontractor's employees were injured during working at temporary control panel of power source in the Common Spent Fuel Pool(March22,23)

6-5. Directive regarding foods and drinks

(1) Agricultural Goods

- Ministry of Health, Labor and Welfare (MHLW) set provisional regulatory standards for foods detected with radioactive substances and notified prefectures, etc. as "Handling of food contaminated by radioactivity".
- MHLW notified prefectures, etc. regarding points to be mindful of in examining foods detected with radioactive substances.
- Prime Minister instructed local governments concerned to restrict distribution and/or consumption of foods concerned in accordance with Special Law of Nuclear Emergency Preparedness.
  - Fukushima Pref. (Distribution restricted→spinach, kakina, raw milk, etc.)
  - Ibaraki, Tochigi, Gunma Prefs. (Distribution restricted→spinach, kakina)

(2) Drinking Water

- MHLW notified water suppliers in prefectures concerned the followings regarding response to radioactive substances in tap water caused by the nuclear accident.
  - Refrain from drinking tap water exceeding index values (300Bq/kg for radioactive Iodine, 200Bq/kg for radioactive Cesium).
  - In case radioactive Iodine exceeds 100Bq/kg, refrain from giving tap water to infants, including preparing infant formula.
  - There is no problem in using tap water for other domestic uses.
  - Lack of substitute drinking water.

7. Implementation Status of Radiation Monitoring

7-1. Implementation Status of Radiation Monitoring(1/2)

(1) On-site monitoring (1F) (conducted by TEPCO)

① Measurement of air dose rates

- On site, air dose rates were measured at 1 point using monitoring car and at 3 points using portable dosimeter.

② Analysis of soil samples

- Soils were sampled at 5 on-site points and analyzed.

③ Measurement of water in Turbine Bldg basement and Trench

- Measured concentration of radioactive substances in Turbine Bldg basement and Trench.

④ Sampling of seawater

- Measured concentration of radioactivity around South Flood Gate.

7-1. Implementation Status of Radiation Monitoring(2/2)

(2) Off-site Monitoring (conducted by MEXT and local nuclear emergency response HQ)

① Measurement of air dose rate

Measurement by monitoring car

- MEXT measured air dose rate beyond 20km from 1F using monitoring cars in cooperation with Fukushima Pref., National Police Agency, Defense Ministry, Electric Utility and others concerned.
- local nuclear emergency response HQs measured air dose rate beyond 30km from 1F.

② Measurement of cumulative dose

- MEXT measured cumulative dose rates by installing simplified dosimeters at 10 points.
- local nuclear emergency response HQs measured it by setting equipment 20~50km from 1F.

③ Measurement of radioactive substance concentration in soil, etc.

- MEXT collected dust and soils beyond 20km from 1F and analyzed radioactive substance concentrations in the air and soils.
- local nuclear emergency response HQs measured concentrations in tap water, leaf vegetables, soil and dust in Fukushima Pref.

④ Off-shore monitoring

- MEXT sampled seawater from surface water (1m from the sea surface) and sub-surface (10m above the sea bottom) around 30km off-shore Fukushima Pref. and measured radioactive substance concentrations and also measured air dose rates.

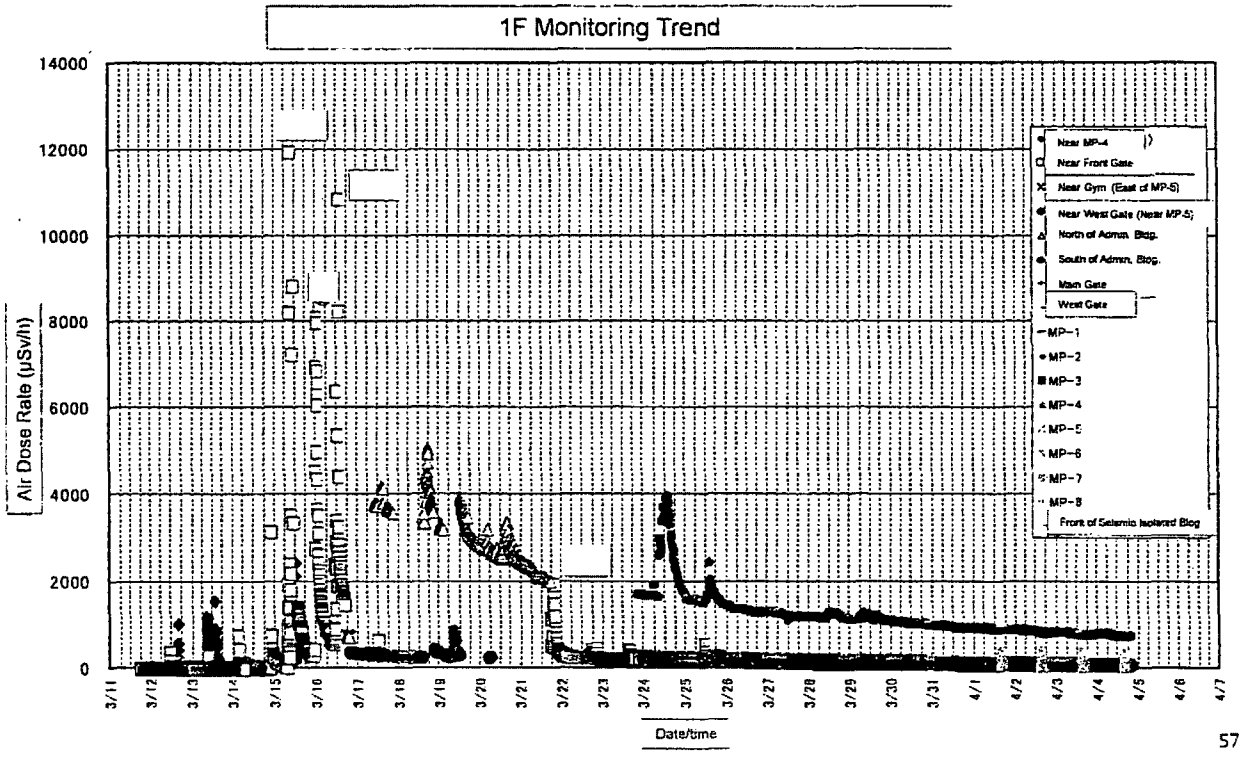
⑤ Aerial monitoring

- MEXT measured radioactive substance concentrations and dose rates in the air using aircrafts.

7-2.Monitoring On-site(1F) (conducted by TEPCO)(1/7)

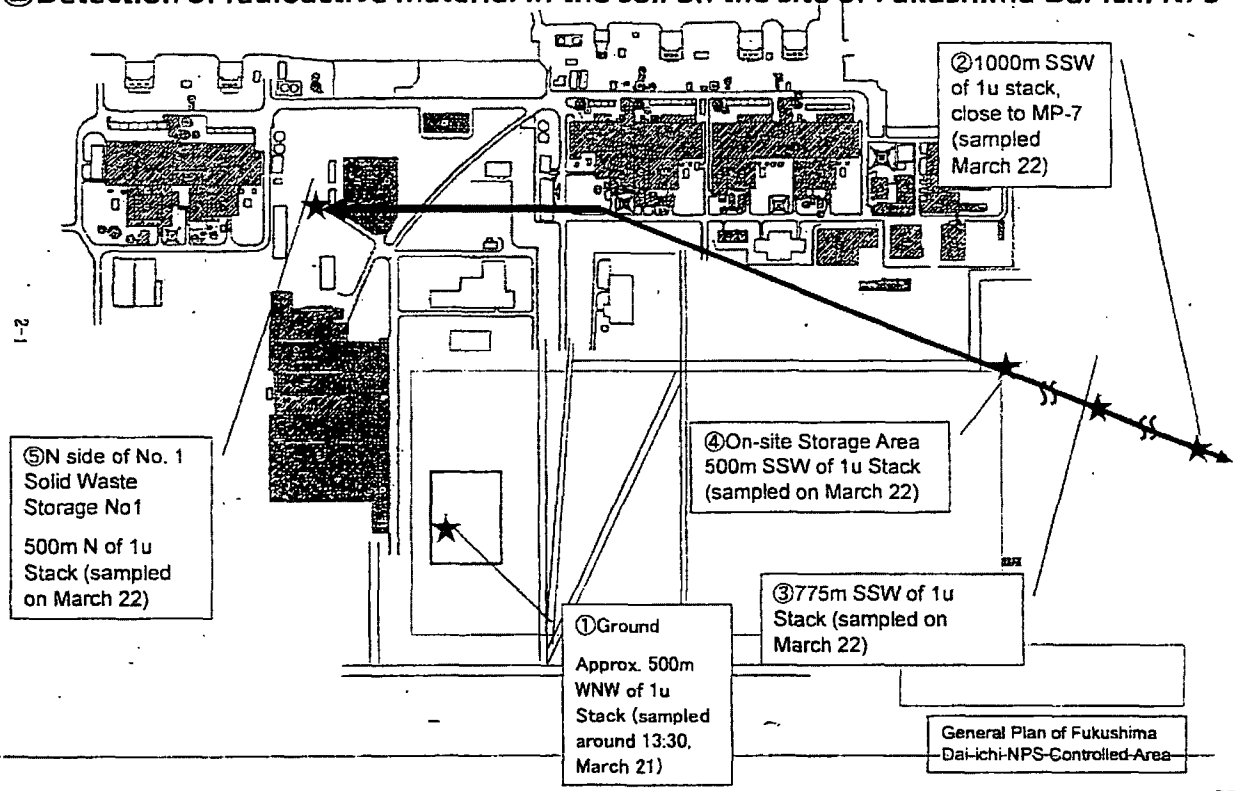
① Measurement of air dose rate

○Registered 11930μSv/h around Front Gate on March 15.



7-2.Monitoring On-site(1F) (conducted by TEPCO)(2/7)

②Detection of radioactive material in the soil on the site of Fukushima Dai-ichi NPS



7-2.Monitoring On-site(1F) (conducted by TEPCO)(3/7)

②Detection of radioactive materials in the soils on the site of Fukushima Dai-ichi

- Density of detected Pu-238, Pu-239 and Pu-240 are within the same level of the fallout observed in Japan after the atmospheric nuclear test in the past.
- Activity ratio of Pu-238 detected at the site field and solid waste storage against Pu-239 and Pu-240 are 2.0 and 0.94 respectively. Those Pus are considered to come from the recent incident.

(Unit: Bq/km・dry soil)

Sampling Spot	Time of sampling	Pu-238	Pu0239, Pu-240
①Site field	13:30, March21	(5.4±0.62)×10-1	(2.7±0.42)×10-1
②1km away from Unit ½ exhaust stack	7:00, March 22	N.D	(2.6±0.58)×10-1
③0.75km away from Unit ½ exhaust stack	7:10, March 22	N.D	1.2±0.12
④0.5 km away from unit ½ exhaust stack	7:18 March 22	N.D	1.2±0.11
⑤Solid waste storage	7:45 March 11	(1.8±0.33)×10-1	(1.9±0.34)×10-1
Ordinary domestic soil		N.D～1.5×10-1	N.D～4.5

7-2.Monitoring On-site(1F) (conducted by TEPCO)(4/7)

③Water in Turbine Bldg Basement (Results of nuclide analysis in the stagnant water in turbine building basement of each Unit)

- There is pool of water with high radioactive substance concentration in turbine bldg basement of Units 1~4. Above 1,000mSv/h dose has been measured at water surface in Unit 2.
- Water with approx. 100,000 times normal radioactivity concentration in reactor water was confirmed in turbine bldg basement of Unit 2.

Nuclide (half- life time)	Concentration of Radioactivity (Bq/cm³)			
	Unit 1 (2nd time) Sampled on March 26	Unit 2 Sampled on March 26	Unit 3 (2nd time) Sampled on March 26	Unit 4 Sampled on March 24
	Water level 195mm	Water level 1,000mm	Water level 1,500mm	Water level 940mm
	Dose rate on the surface of the water 60 mSv/h	Dose rate on the surface of the water >1,000 mSv/h	Dose rate on the surface of the water 750 mSv/h	Dose rate on the surface of the water 0.50 mSv/h
Co-56 (about 77 days)	N.D	N.D	N.D	N.D
Co-58 (about 71 days)	N.D	N.D	N.D	2.7×10^{-1}
Co-60 (about 5 years)	N.D	N.D	2.7×10^{2}	N.D
Mo-99 (about 66 hours)	N.D	N.D	N.D	1.0×10^{0}
Tc-99m (about 6 hours)	N.D	8.7×10^{4}	2.2×10^{3}	6.5×10^{-1}
Ru-106 (about 370 days)	N.D	N.D	N.D	3.3×10^{0}
Ag-108m (about 418 years)	N.D	N.D	N.D	N.D
Te-129 (about 70 minutes)	N.D	N.D	N.D	2.6×10^{1}
Te-129m (about 34 days)	N.D	N.D	N.D	1.3×10^{1}
Te-132 (about 3 days)	N.D	N.D	N.D	1.4×10^{1}
I-131 (about 8 days)	1.5×10^{5}	1.3×10^{7}	3.2×10^{5}	3.6×10^{2}
I-132 (about 2 hours)	N.D	N.D	N.D	1.3×10^{1}
I-134 (about 53 minutes)	N.D	N.D	N.D	N.D
Cs-134 (about 2 years)	1.2×10^{5}	2.3×10^{6}	5.5×10^{4}	3.1×10^{1}
Cs-136 (about 13 days)	1.1×10^{4}	2.5×10^{5}	6.5×10^{3}	3.7×10^{0}
Cs-137 (about 30 years)	1.3×10^{5}	2.3×10^{6}	5.6×10^{4}	3.2×10^{1}
Ba-140 (about 13 days)	N.D	4.9×10^{5}	1.9×10^{4}	N.D
La-140 (about 2 days)	N.D	1.9×10^{5}	3.1×10^{3}	7.4×10^{-1}

7-2.Monitoring On-site(1F) (conducted by TEPCO)(5/7)

③Stagnant Water in Trench

- High level of radiation dose was measured at the surface of water in the vertical pit of the tunnel called "trench" which extends from turbine bldg towards the sea.
- In particular, at Unit 2 ambient dosage around the vertical pit is 100~300mSv/h and dosage in surface water 1,000mSv/h, which are far greater than in Units 1 and 3.

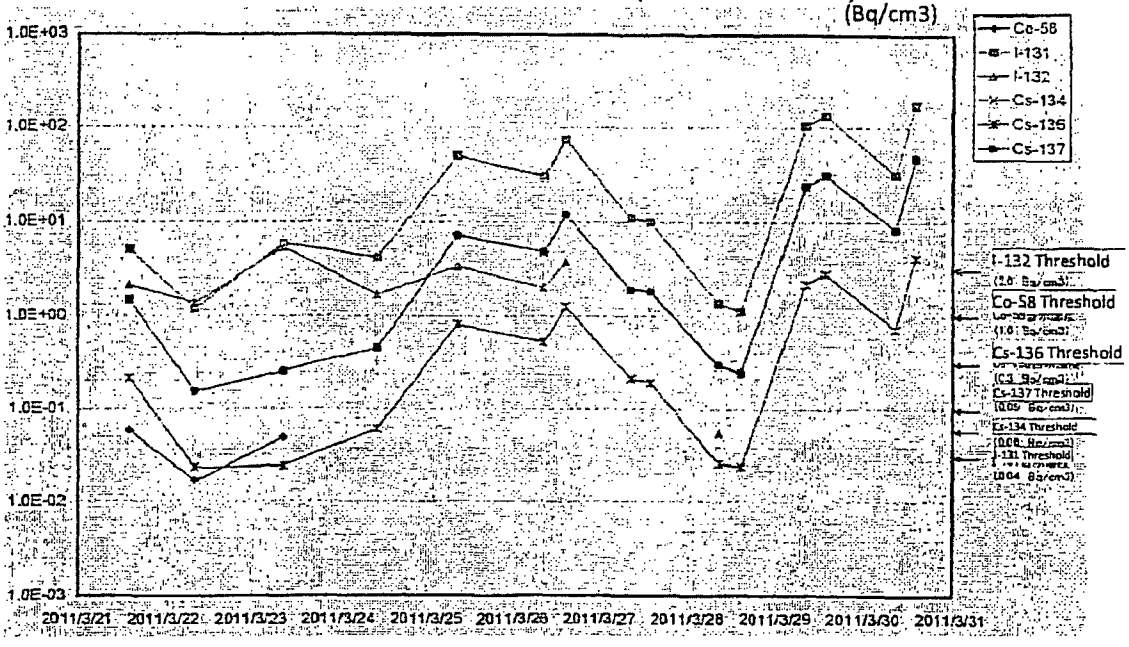
	Unit 1	Unit 2	Unit 3
Location of trench	○Approx. 56m to sea ○162m from turbine bldg (length of trench)	○Approx. 55m to sea ○76m from turbine bldg (length of trench)	○Approx. 69m to sea ○74m from turbine bldg (length of trench)
Trench volume (incl. vertical pit)	3,100m3	6,000m3	4,200m3
Depth of vertical pit	16.9m	16.3m	21.7m
Depth of water in vertial pit	16.8m	15.3m	20.2m
Dosage at water surface	0.4～1.9mSv/h	Above 1000mSv/h	Impossible to measure due to debris
Ambient dosage in vertical pit	0.4～1.0mSv/h	100～300mSv/h	0.8mSv/h

7-2.Monitoring On-site(1F) (conducted by TEPCO)(6/7)

④ Radioactivity Concentration of Seawater Samples Near 1F South Outlet

- Concentration of radioactive iodine131 recorded on March 31th was approx. 4385 times the limit set for water outside the environmental monitoring area.

Concentration in Seawater near (1F South Outlet)

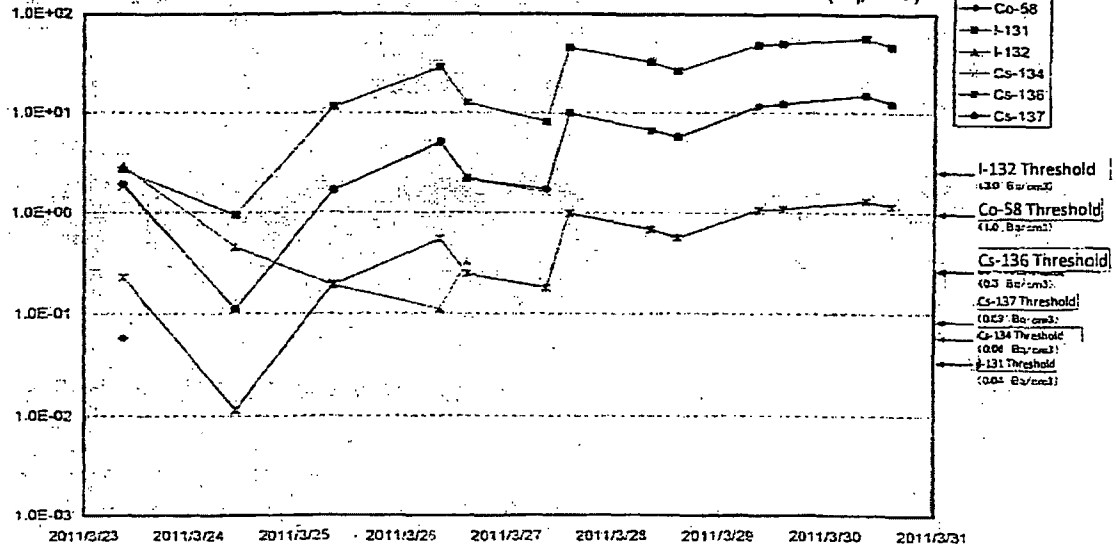


7-2.Monitoring On-site(1F) (conducted by TEPCO)(7/7)

⑤ Radioactivity Concentration of Seawater Samples Near Unit 5 and 6 of 1F in North Outlet

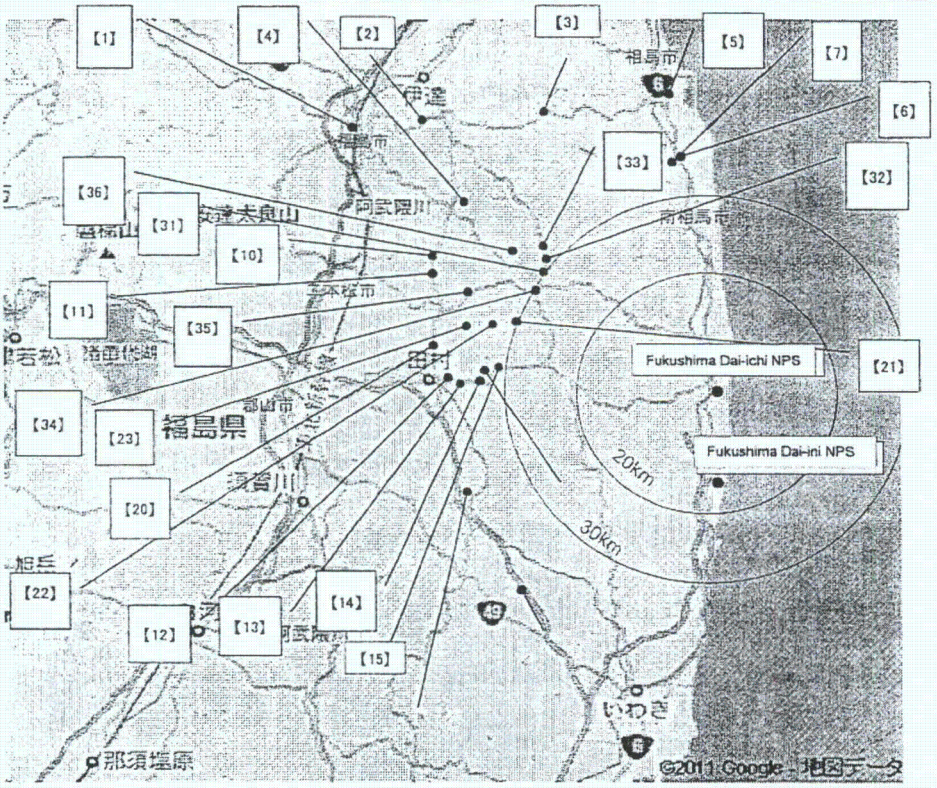
- Concentration of radioactive iodine131 recorded on March 31th was approx. 1425 times the limit set for water outside the environmental monitoring area.

1F 5-6 Northern Water Discharge Canal (Around 30 m north of The 5-6u canal) Radioactive concentration



7-3. Monitoring by MEXT and local nuclear emergency response HQ(1/6)

① Air Dose Rate Measuring Locations Using Monitoring Vehicles

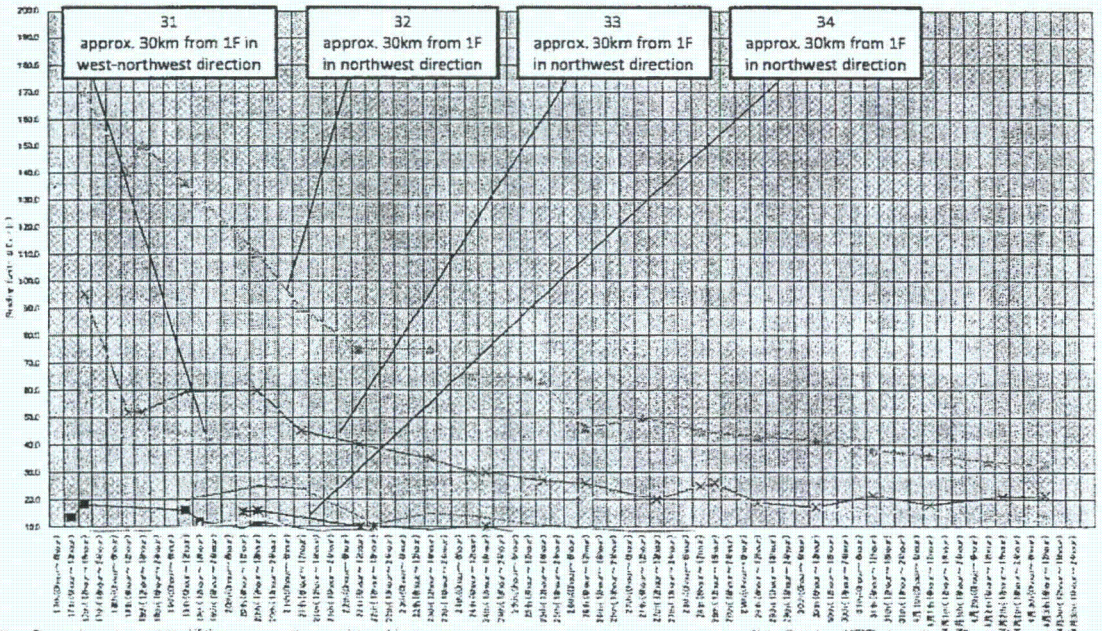


7-3. Monitoring by MEXT and local nuclear emergency response HQ(2/6)

①Air Dose Rate Measured Using Monitoring Vehicles

- Overall dose rate trending down since March 17th.
- E.g. The highest value recorded at Monitoring Point #32 has peaked out at approx. 170μSv/h and has been declining since, rendering no immediate health hazard.

Readings at Monitoring Post out of 20 Km Zone of Fukushima Dai-ichi NPP



Note : The maximum data is plotted if there are more than one data in 4 hours.
Note : This graph only shows the dates over 16 in Sv/h.

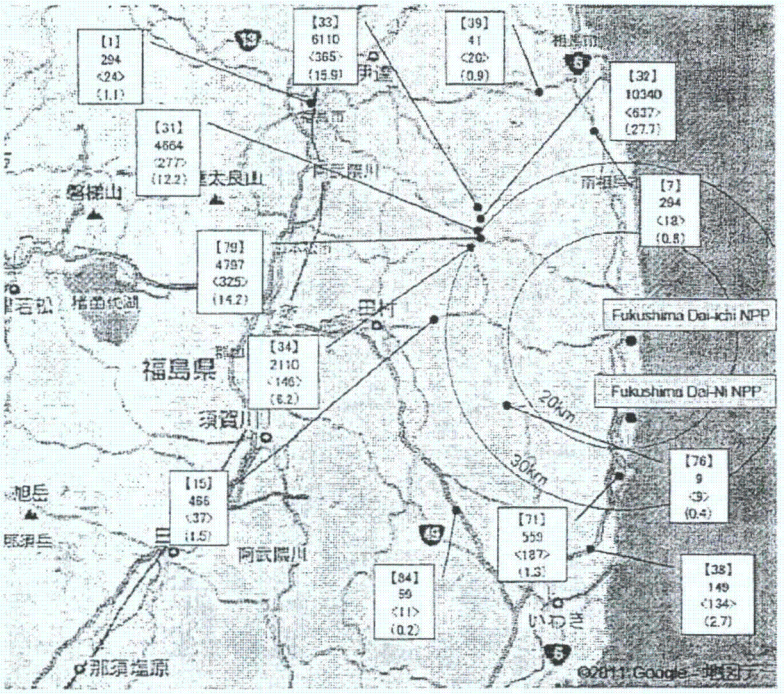
Note : Data from MEXT, Japan Atomic Energy Agency, and NUCLEAR Safety Technology Center

7-3. Monitoring by MEXT and local nuclear emergency response HQ(3/6)

②Cumulative Doses Measured

- Air dose rate cumulatively measured since April 3 topped 10,340μSv at #32, approximately 30km North West from 1F.

Readings of Integrated Dose at Monitoring Post out of Fukushima Dai-ichi NPP



Monitoring Time
- March 23th～April 3rd (Monitoring Post: 7、31～34、79)
- March 23 th ～28th、April 3rd (Monitoring Post: 71)
- March 24 th ～April 3rd (Monitoring Post: 1、15)
- March 25 th ～April 1st、April 3 rd (Monitoring Post: 84)
- March 31 th ～April 1 st 、April 3rd (Monitoring Post: 38)
- April 1 th ～April 3rd (Monitoring Post: 39)
- April 2 th ～April 3rd (Monitoring Post: 76)
- ● Monitoring Post

(explanatory note)

[Monitoring Post number]
Readings of Integrated Dose ※
<increment from the last monitoring>
(average dose per hour)

Readings of Integrated Dose indicate that accumulation of dose from each starting date till April 2nd, for 1 day to 10days.

Unit: μ Sv per hour

7-3. Monitoring by MEXT and local nuclear emergency response HQ(4/6)

③Concentration of Radioactive Materials

●Soil Samples

Sampling Point	Address of Sampling Point	Sample	Sort or Region	Sampling Time and Date	Radioactivity Concentration (Bq/kg) ^{131}I	^{137}Cs
【2-1】 (About40kmNorthWest.)	Iitate Village	Land Soil	Soil	2011/3/19 11:40	300,000	28,100
	Iitate Village	Land Soil	Soil	2011/3/20 12:40	1,170,000	163,000
	Iitate Village	Land Soil	Soil	2011/3/21 12:32	207,000	39,900
	Iitate Village	Land Soil	Soil	2011/3/22 12:00	256,000	57,400
	Iitate Village	Land Soil	Soil	2011/3/23 12:25	135,000	32,200
	Iitate Village	Land Soil	Soil	2011/3/24 13:05	43,500	1,870
	Iitate Village	Land Soil	Soil	2011/3/25 13:05	265,000	27,900
	Iitate Village	Land Soil	Soil	2011/3/26 12:00	564,000	227,000
	Iitate Village	Land Soil	Soil	2011/3/26 15:20	82,000	28,000
	Iitate Village	Land Soil	Soil	2011/3/27 11:40	169,000	29,100
	Iitate Village	Land Soil	Soil	2011/3/27 12:00	69,800	20,800
	Iitate Village	Land Soil	Soil	2011/3/28 11:50	14,000	2,040
	Iitate Village	Land Soil	Soil	2011/3/28 12:10	23,100	860
	Iitate Village	Land Soil	Soil	2011/3/29 11:50	53,700	5,650
	Iitate Village	Land Soil	Soil	2011/3/29 12:10	53,400	25,100
	Iitate Village	Land Soil	Soil	2011/3/30 12:25	89,000	32,300
	Iitate Village	Land Soil	Soil	2011/3/30 12:45	11,900	408
	Iitate Village	Land Soil	Soil	2011/3/31 11:30	149,000	27,600
	Iitate Village	Land Soil	Soil	2011/3/31 11:45	69,800	26,500
	Iitate Village	Land Soil	Soil	2011/4/1 11:30	146,000	43,700
	Iitate Village	Land Soil	Soil	2011/4/1 12:05	21,400	1,410
	Iitate Village	Land Soil	Soil	2011/4/2 11:24	55,500	8,140
	Iitate Village	Land Soil	Soil	2011/4/2 11:46	61,900	30,800

7-3. Monitoring by MEXT and local nuclear emergency response HQ(4/6)

③Concentration of Radioactive Materials

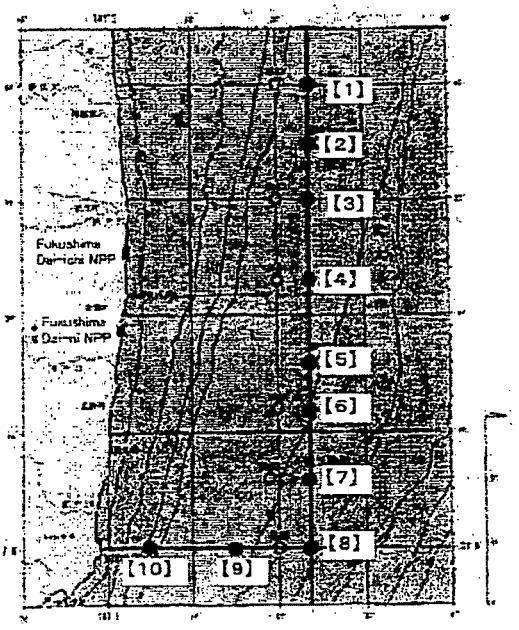
- Dust Samples

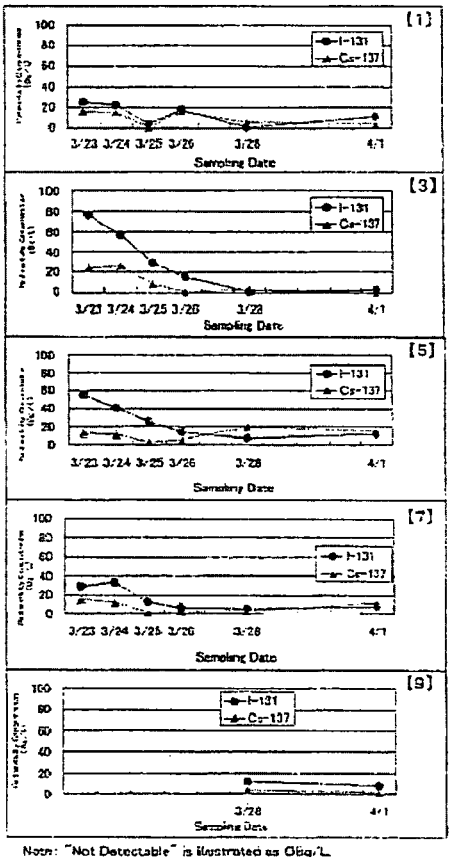
Sampling Point	Sampling Time and Date	Radioactivity Concentration(Bq/m3)		Reading (μSv/h)
		^{131}I	^{137}Cs	
【2-1】(About40 kmNorthWest)	3/21 13:00~13:20	12.80	2.37	4.1
	3/22 12:26~12:46	5.87	ND	4.2
	3/23 12:50~13:10	2.99	ND	16.8
	3/24 13:30~13:50	5.80	1.51	10.0
	3/25 12:45~13:05	5.87	ND	12.3
	3/26 12:26~12:46	5.39	1.33	7.8
	3/27 12:06~12:26	2.22	ND	11.2
	3/28 12:05~12:25	1.66	ND	9.6
	3/29 12:07~12:27	2.42	6.79	9.2
	3/30 13:22~13:42	3.47	LTD	8.5
	3/31 11:50~12:10	1.74	LTD	8.0
	4/1 12:00~12:20	1.78	1.69	7.7
	4/2 11:46~12:06	0.84	ND	8.6

7-3. Monitoring by MEXT and local nuclear emergency response HQ(5/6)

④Sea Water Monitoring Around Fukushima Dai-ichi NPS

●Concentration of radioactive materials at location #3 peaked at 76.8Bq/L, exceeding the limit for the environmental monitoring area.





Note: "Not Detectable" is illustrated as 0Bq/L.

⑤Aerial Monitoring

- Flight Details : April 1st, from 11:02 to 13:45, cloudless skies with S winds
  Average altitude 1070 meters above sea, average speed 220km/h

Main Reading Point	City	Latitude longitude	Altitude above sea level [above ground level] (m)	Monitoring Time	Readings(μSv/h)
[1]	Shirakawa (Fukushima Prefecture)	37° 03.39′N 140° 17.38′E	1193 [851]	11:45	0.0409
[2]	Iwaki (Fukushima Prefecture)	36° 32.19′N 140° 53.19′E	1209 [1203]	11:57	0.0261
[3]	Tamura (Fukushima Prefecture)	37° 27.16′N 140° 34.19′E	1267 [844]	12:13	0.0281
[4]	Shinchi-cho (Fukushima Prefecture)	37° 46.46′N 140° 52.50′E	1182 [1117]	12:23	0.0275
[5]	Fukushima (Fukushima Prefecture)	37° 47.12′N 140° 29.47′E	900 [842]	12:37	0.0234
[6]	Koriyama (Fukushima Prefecture)	37° 26.33′N 140° 22.46′E	933 [691]	12:47	0.0402
[7]	Shirakawa (Fukushima Prefecture)	37° 09.40′N 140° 12.59′E	898 [502]	12:56	0.0402
[8]	Utunomiya (TochigiPrefecture)	36° 35.02′N 140° 00.49′E	888 [737]	13:14	0.0147

8. Provision of Relevant Information Overseas

8. Provision of relevant information overseas(1/2)

1. Communication to IAEA and its Member States

(1) ENAC Website

NISA has constantly been providing facility-related and other relevant information on the Emergency Notification and Assistance Convention Website, designed for member states to exchange information on nuclear accidents.

(2) IEC (IAEA)

NISA has constantly been providing the Incident and Emergency Centre of IAEA with press releases and other relevant information, as well as responses to questions on such communication.

(3) Others

-March 21st Technical Briefing

Following the special meeting of the IAEA Board of Governors, NISA officials briefed the member state representatives on the overview of the earthquake itself as well as the status of and ongoing measures to address the Fukushima NPS accident.

-IAEA Expert Missions

The Government of Japan has been receiving IAEA expert missions to Japan.

8. Provision of relevant information overseas(2/2)

2. To International Media in Japan

(1) Foreign Media Briefing

- NISA joins relevant government agencies in daily foreign media briefings at the PM's official residence on March 14, 17 and every day afterwards.
- NISA officials give account to damages suffered at Fukushima NPSs and respond to questions.
- English documents distributed include updates on earthquake-related damange, status of F1 NPSs and monitoring results in the vicinity.

(2) Briefings for Diplomatic Representatives in Tokyo

- NISA joined the Ministry of Foreign Affairs in briefing sessions for Diplomatic representatives in Tokyo.
- Distributed press releases (English), provided explanations and answered questions.

(3) English information on the Web

- Nuclear and Industrial Safety Agency: http://www.nisa.meti.go.jp/english/index.html
- Office of Prime Minister: http://www.kantei.go.jp/foreign/index-e.html

9. Remarks

9. Remarks

- Continue to make every possible efforts to bring the situation under control
- Will identify the cause of the accident completely and review safety assurance measures
- Offer the information as much as possible and share the experience and knowledge of the accident with the international community

On the Implementation of Emergency Safety Measures at Other Power Plants drawn from the 2011 Accident at Fukushima Dai-ichi and Dai-ni Nuclear Power Stations
(Minister's Instructions, Released on March 30th)

Nuclear and Industrial Safety Agency
April 4th , 2011

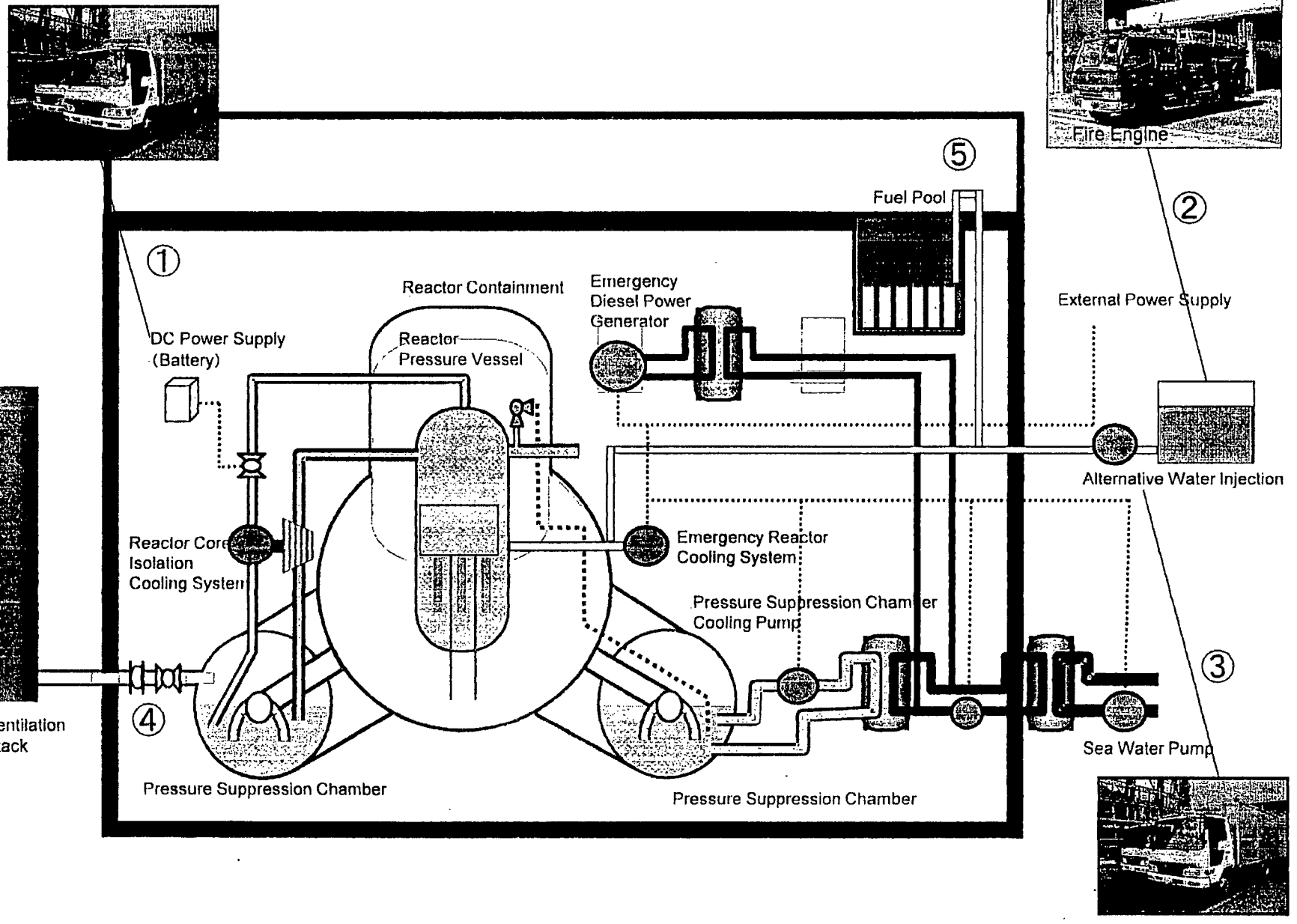
Summary

- While continuing to do our utmost to take every possible measure to deal with the accident, NISA will launch an effort to understand every aspect of the accident, including the onset mechanism of the tsunami that struck the area, and to analyze and assess the situation so as to take drastic and fundamental corrective measures.
- NPPs other than Fukushima Dai-ichi and Fukushima Dai-ni will implement emergency safety measures to enable the recovery of cooling functions while preventing, to the extent possible, the release of radioactive materials. This activity will be based on the currently available scientific knowledge.
- Electric utility companies are to appropriately undertake these emergency safety measures which would then be verified through NISA inspections, thereby preventing the possible damage to reactor core due to tsunami-induced loss of all AC power supply and preventing the subsequent nuclear disaster.

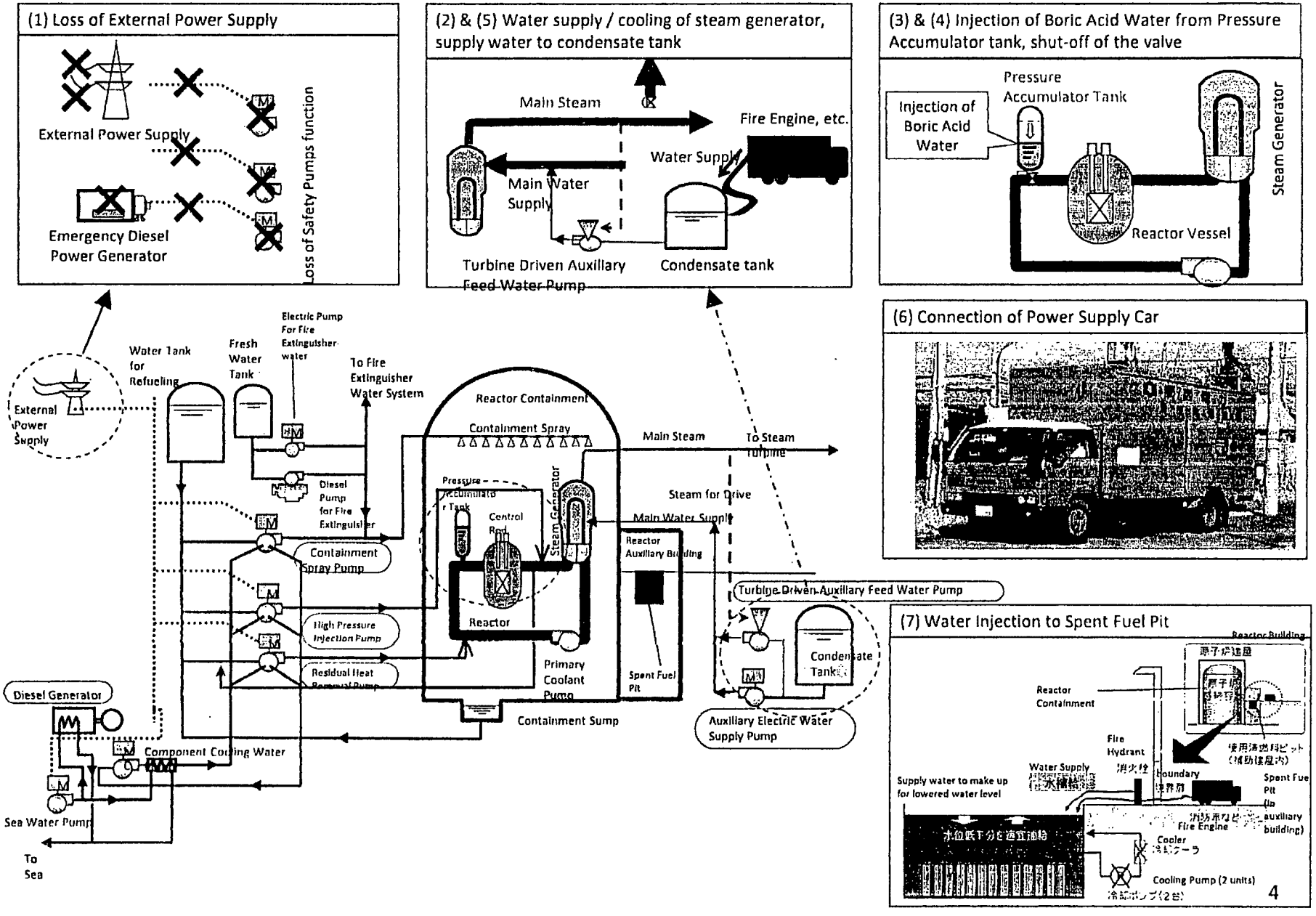
Measures drawn from Fukushima Dai-ichi Nuclear Power Accident

Phase	Emergency Safety Measures	Drastic measures
	Short term	Medium-to-Long term
Expected completion	Approx. 1 month (around mid-April)	Decide as per debate at Accident Investigation Commission, etc.
Target (Required standard)	Depending on tsunami, prevent core damage and occurrence of spent-fuel damage even when 1) all alternate-current power sources, 2) seawater cooling function, and 3) spent-fuel pool cooling function are lost.	Prevent occurrence of disasters taking into account "anticipated tsunami height" to be set by referencing tsunami that caused recent disaster.
Examples of specific measures	Securing equipment: ・Deploy power-supply vehicles (to cool reactors and spent-fuel pools). ・Deploy fire engines (to supply coolant water). ・Deploy fire hoses (to secure water-feeding path from fresh-water tank, sea-water pit, etc.). Developing manual: ・Develop implementation procedures for emergency measures utilizing above-mentioned equipment. Training: ・Implementation of training on emergency measures based on implementation procedures manual.	Securing equipment ・Build seawalls. ・Deploy watertight doors. ・Devise other necessary equipment-related measures. *To be followed by implementation of equipment-related improvements as necessary (e.g.: secure spare air-cooled diesel generators, sea water pump motors). Develop manual Conduct training
Confirmation by NISA, etc.	・Approval of amendment of ministerial ordinance to ensure effectiveness of emergency safety measures as well as operational safety program that incorporates those measures. ・Rigorous vetting of implementation status of emergency safety measures by means of inspection, etc.	
Operators' response	・Efforts under way to procure equipment. (Locations to set them up also being secured). ・Manual compiled anew drawing on recent accident. Training being implemented. ・Strive to improve emergency safety measures continuously, even after their confirmation, to ensure their reliability.	

Series of Events and Countermeasures in case of TSUNAMI, for BWR



Series of Events and Countermeasures in case of TSUNAMI, for PWR



Clayton, Kathleen

From: Snodderly, Michael
Sent: Monday, April 11, 2011 3:52 PM
To: Sanfilippo, Nathan
Subject: Description of Japanese Hard Pipe Vent
Attachments: ISAMM 2009 Paper on Severe Accident Mitigation in Japan 1.4(8)Fujimoto.pdf

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From: BRADLEY, Biff [mailto:reb@nei.org]
Sent: Friday, March 25, 2011 12:02 PM
To: Snodderly, Michael
Subject: RE: Budnitz PSA 2011 paper

Mike:

Thanks. See attached for description of Japanese Hard Pipe Vent (slide 7).

Biff

From: Snodderly, Michael [mailto:Michael.Snodderly@nrc.gov]
Sent: Friday, March 25, 2011 11:42 AM
To: BRADLEY, Biff
Subject: FW: Budnitz PSA 2011 paper

Biff,

Commissioner Apostolakis thought you may find the attached paper to be of interest.

Mike Snodderly
Technical Assistant for Reactors
to Commissoner Apostolakis
U. S. Nuclear Regulatory Commission

Phone: 301-415-2241
Email: michael.snodderly@nrc.gov

From: Apostolakis, George
Sent: Friday, March 25, 2011 11:18 AM
To: Snodderly, Michael
Subject: Budnitz PSA 2011 paper

Mike:

Please send the attached paper to Biff Bradley (reb@nei.org).

Thanks.

2/351

Commissioner George Apostolakis
US Nuclear Regulatory Commission
One White Flint North, MS O16 G4
11555 Rockville Pike
Rockville, MD 20852

(301) 415-1810

nuclear
Putting Clean Air Energy to Work.

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Circumstances and Present Situation of Accident Management Implementation in Japan

OECD/NEA Workshop on Implementation of Severe Accident Management Measures (ISAMM-2009)
Böttstein, Switzerland

October 26 - 28, 2009

Haruo Fujimoto, Keisuke Kondo, Tomomichi Ito, Yusuke Kasagawa, Osamu Kawabata, Masao Ogino and Masahiro Yamashita

Japan Nuclear Energy Safety Organization (JNES)

Contents

1. Background and history
2. Accident management measures implemented to the operating NPPs
3. Accident management measures implemented to the recent NPPs
4. Conclusions

1. Background and history

Date	Major events for AM
May, 1992	The Nuclear Safety Commission (NSC) of Japan issued a decision statement "Accident Management as a Measure against Severe Accidents at Power Generating LWRs," which strongly recommended the regulatory body and utilities to introduce AM measures.
July, 1992	MITI encouraged utilities to establish AM implementation plans, using benefit of insights obtained from PSA.
March, 1994	The utilities submitted AM implementation plans to MITI. MITI reviewed utilities plans.
October, 1994	MITI made a report entitled "AM for Light Water NPPs," in which MITI recommended utilities to undertake AM implementation plans toward 2000 and to prepare operating procedures and administrative framework.

1. Background and history (cont'd)

Date	Major events for AM
February, 2002	The utilities completed implementation of AM and reported to NISA (new regulatory body founded in January, 2001.) The effectiveness of AM for representative plants were evaluated by NUPEC (former of JNES.) NISA recognized that it was also important to evaluate effectiveness of AM measures for NPPs other than representative plants. And NISA requested utilities to perform evaluation of every NPPs.
March, 2004	The utilities performed evaluation of effectiveness of AM measures for every NPPs and submitted report entitled "PSA evaluation Report following AM Implementation." NISA reviewed this report with the help of JNES.
Up to now	Besides fifty-two operating NPPs, AM have been studied and implemented to four newly constructed NPPs.

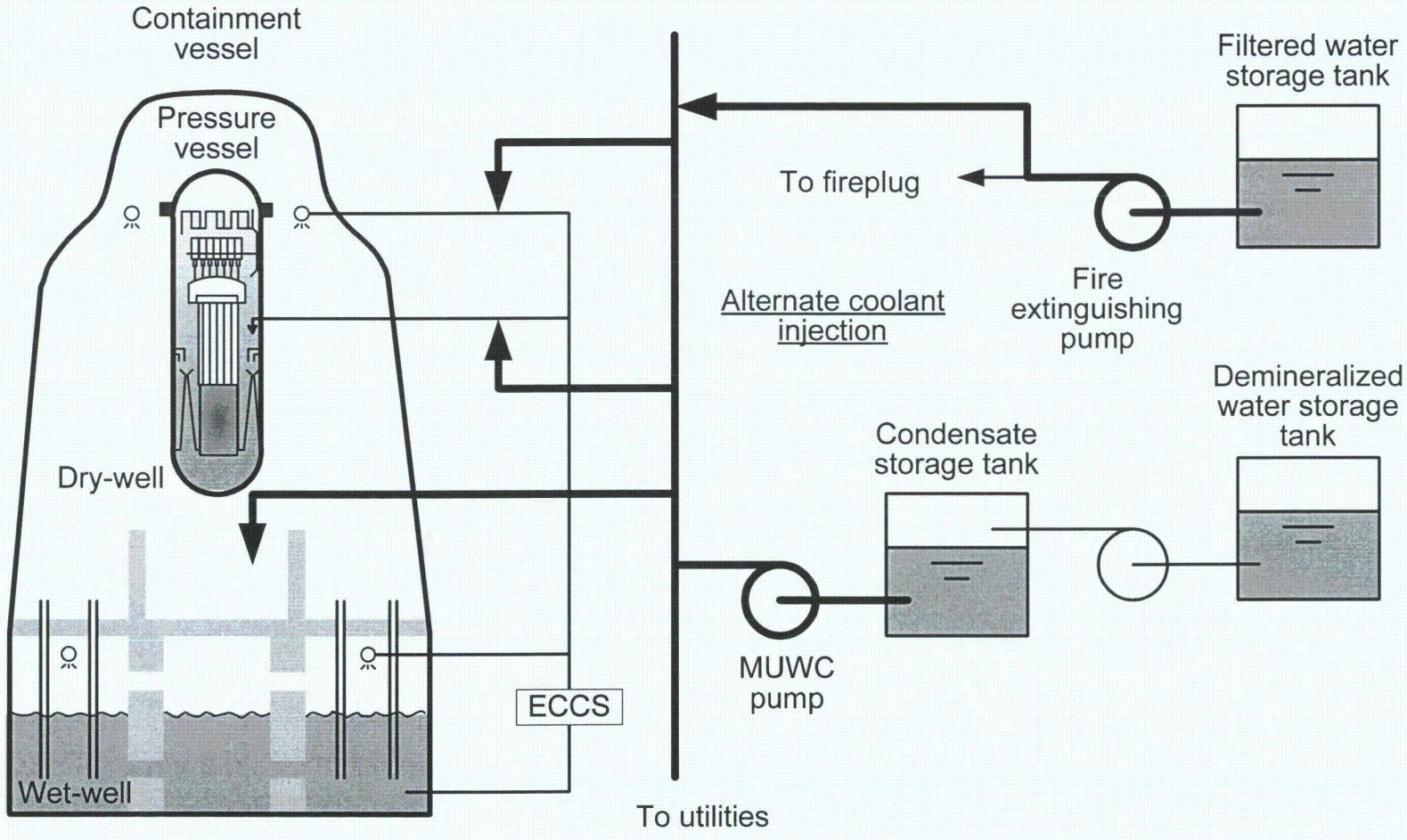
2. Accident management measures implemented to the operating NPPs

AM measures for BWR

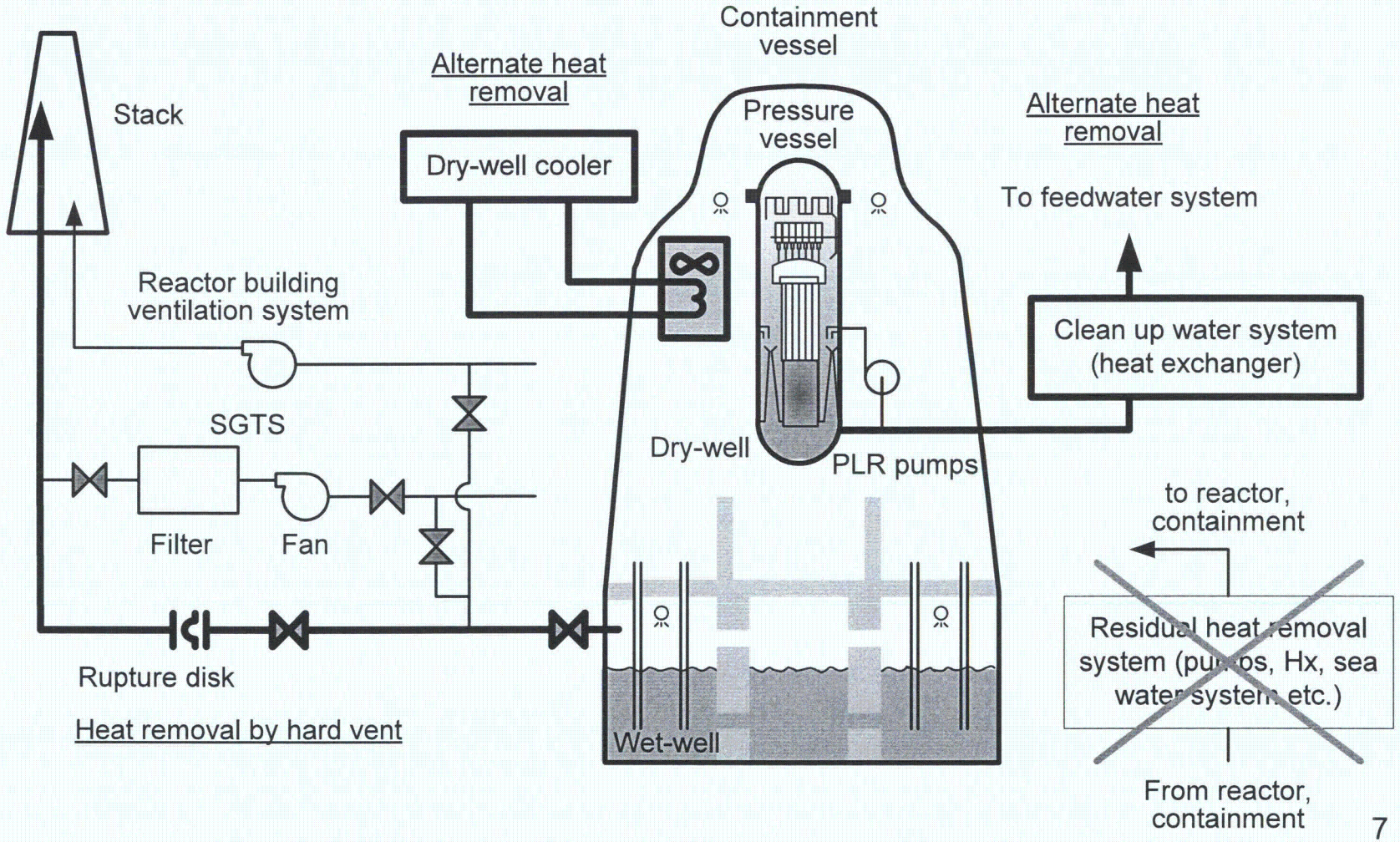
Safety function	Purpose	Prevention of core damage	Mitigation of core damage
Reactor shutdown	Alternate reactivity control	● ARI (except ABWR) ● RPT (except ABWR)	-
Coolant injection to RPV and CV	Reactor depressurization	● ADS actuation by L-1 (except BWR2, 3 and ABWR)	-
	Alternate coolant injection	● MUWC ● Fire extinguishing system or filtrate water system	
Heat removal from CV	Hard vent system	● Hard vent system	
	Alternate cooling	-	● Alternate cooling by dry-well cooler or CUW
	Recovery of RHR	● Recovery of RHR	
Supporting function	Electric power supply	● Electric power supply from adjacent unit ● Electric power supply from HPCS-DG (Single-unit site) ● Installation of dedicated EDG	
	Recovery of EDG	● Recovery of EDG	

ARI: Alternate rod insertion, RPT: Recirculation pump trip, ADS: Automatic Depressurization System,
MUWC: Makeup water system condensated, CUW: Reactor water cleanup,
RHR: Residual heat removal, HPCS: High pressure core spray

AM measures for alternate coolant injection (BWR)



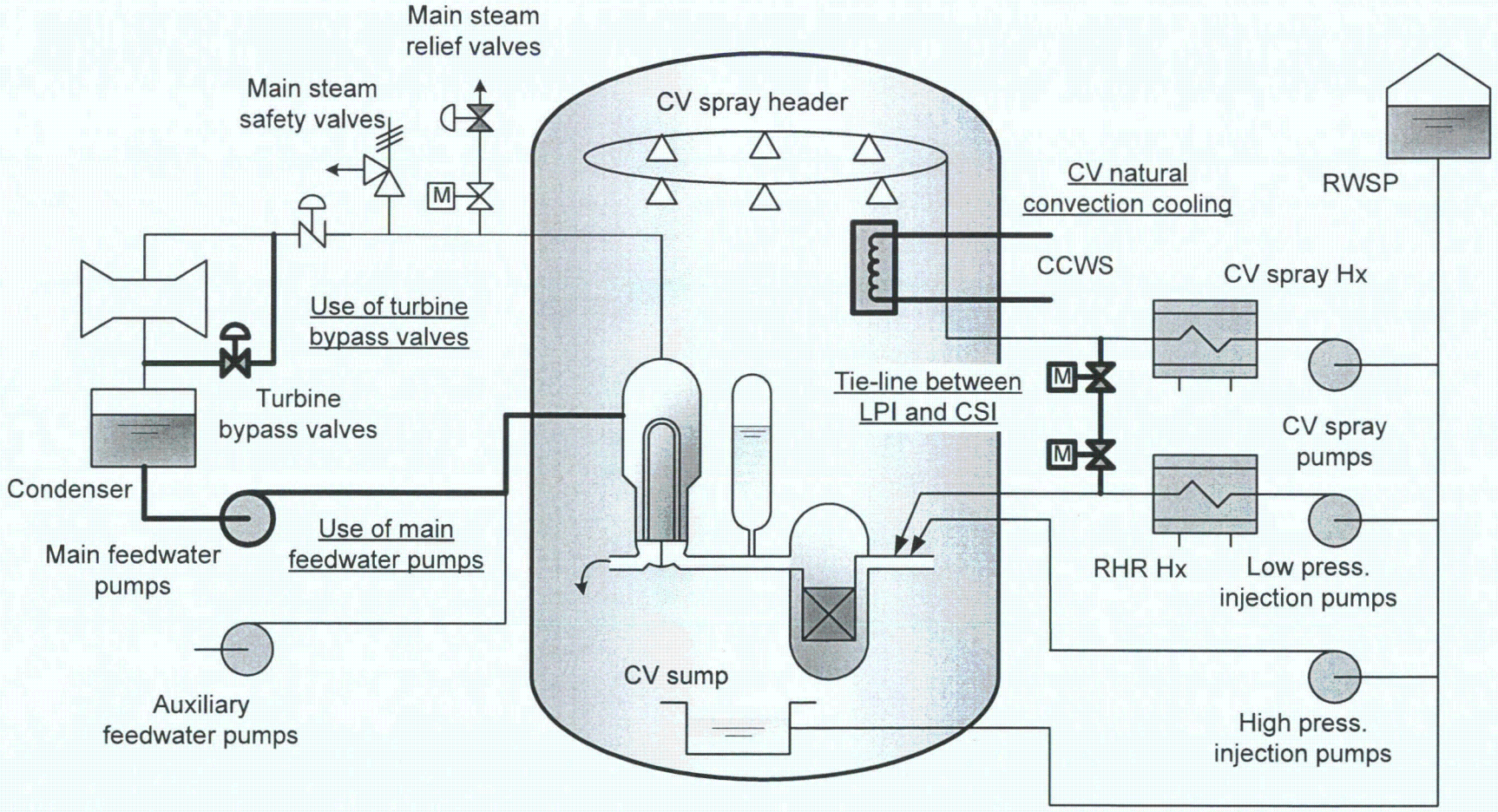
AM measures for CV heat removal (BWR)



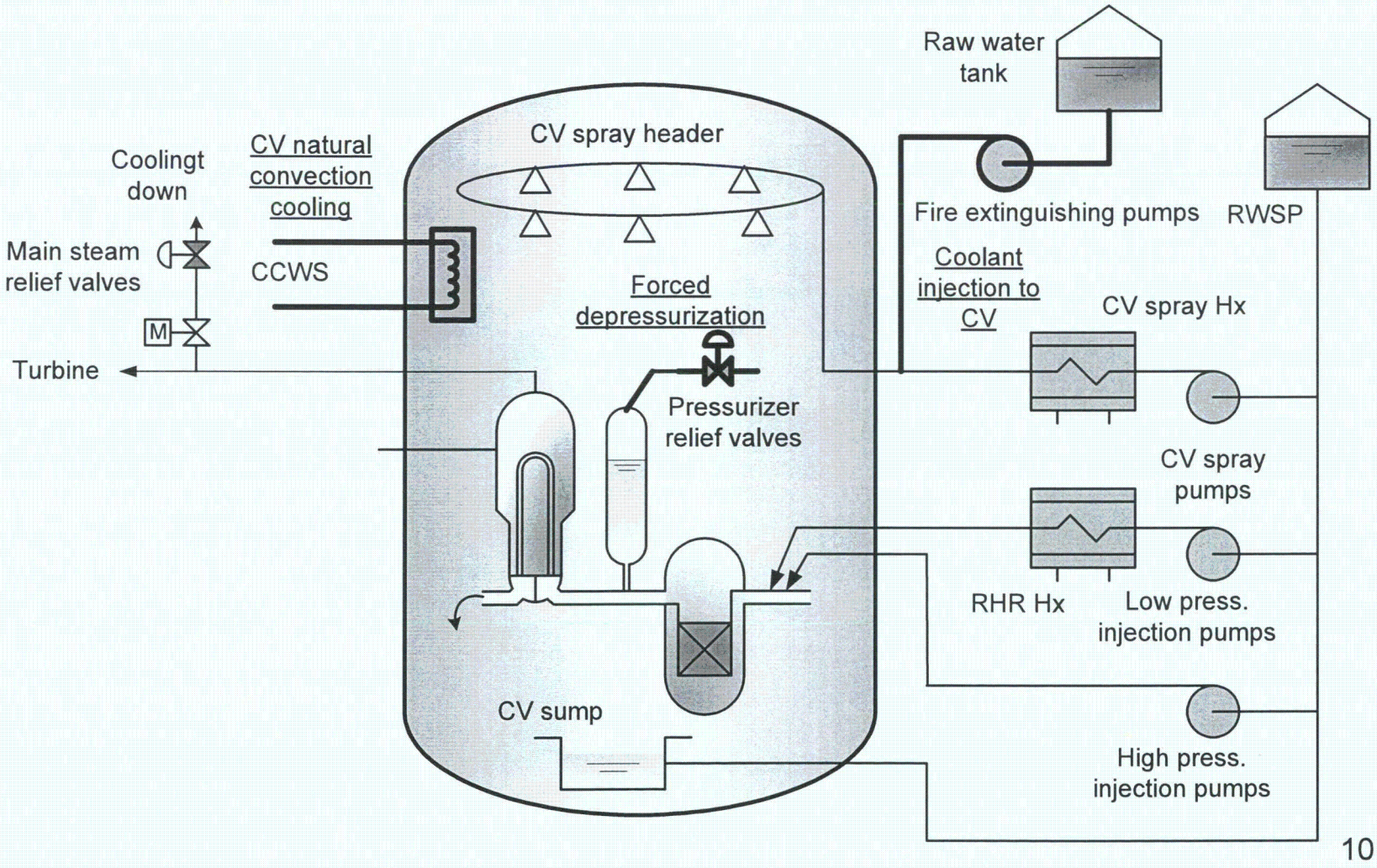
AM measures for PWR

Safety function	Purpose	Prevention of core damage	Mitigation of core damage
Reactor shutdown	Reactor shutdown	● Use of main feedwater pumps (ATWS)	-
Core cooling	ECCS injection	● LPI with turbine bypass valves	-
	ECCS recirculation	● Alternative recirculation ➢ Tie-line between LPI and CSI ➢ Alternate recirculation pump ➢ Recirculation sump isolation valve bypass line	-
	Isolation of coolant leakage	● Cooldown and recirculation	-
Confinement of radioactive materials	Heat removal from CV	● Natural convection heat removal ➢ Use of non-safety CV heat removal system ➢ Outside CV spray	● Natural convection heat removal ● Coolant injection to CV ● Forced depressurization of primary system ● Hydrogen igniter (Ice condenser CV plant)
Supporting function	Supporting function	● Alternate component cooling ➢ Air conditioning system ➢ BOP CCWS ➢ CV cooling system ➢ Fire extinguishing system	-
		● Electric power supply from the adjacent unit	-

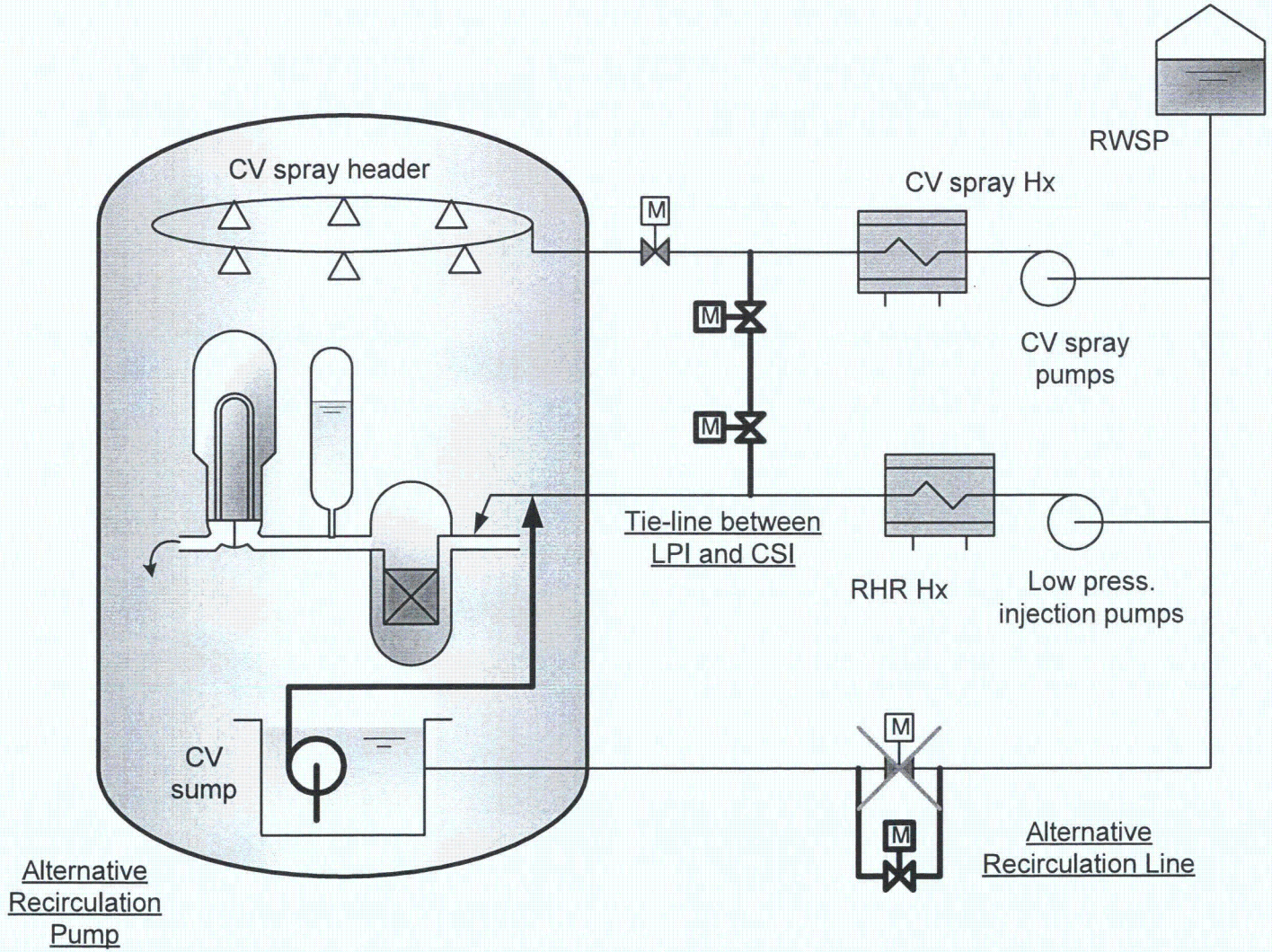
AM measures to prevent core damage (PWR)



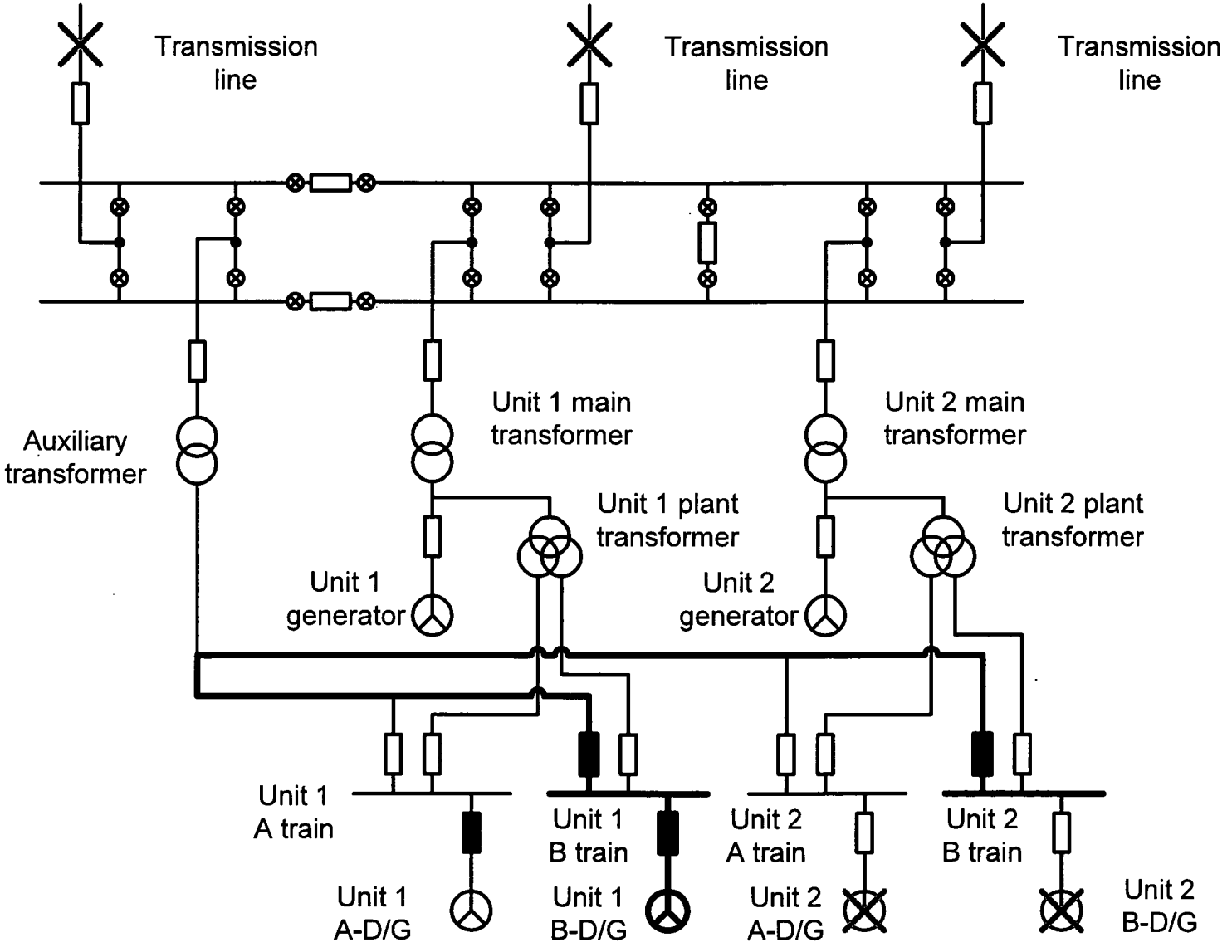
AM measures to prevent containment failure (PWR)



Comparison of alternatives for ECCS recirculation



Power supply from the adjacent unit



Reactor types and safety systems (BWR)

		type A	type B	type C	type D
Reactor		BWR2, 3	BWR4	BWR5	ABWR
Containment vessel		MARK-I	MARK-I	Mod. MARK-I, MARK-II, Mod. MARK-II	RCCV
Reactor scram		CRDHS SLCS	CRDHS SLCS	CRDHS SLCS	CRDHS SLCS, ARI FMCRD
ECCS	High pressure	HPCI IC(2)	HPCI RCIC	HPCS RCIC	HPCF(2) RCIC
	Low pressure	CS(2)	CS(2) LPCI(2)	LPCS LPCI(3)	LPFL(3)
Containment heat removal		SHC(2) CCS(2)	RHR(2)	RHR(2)	RHR(3)

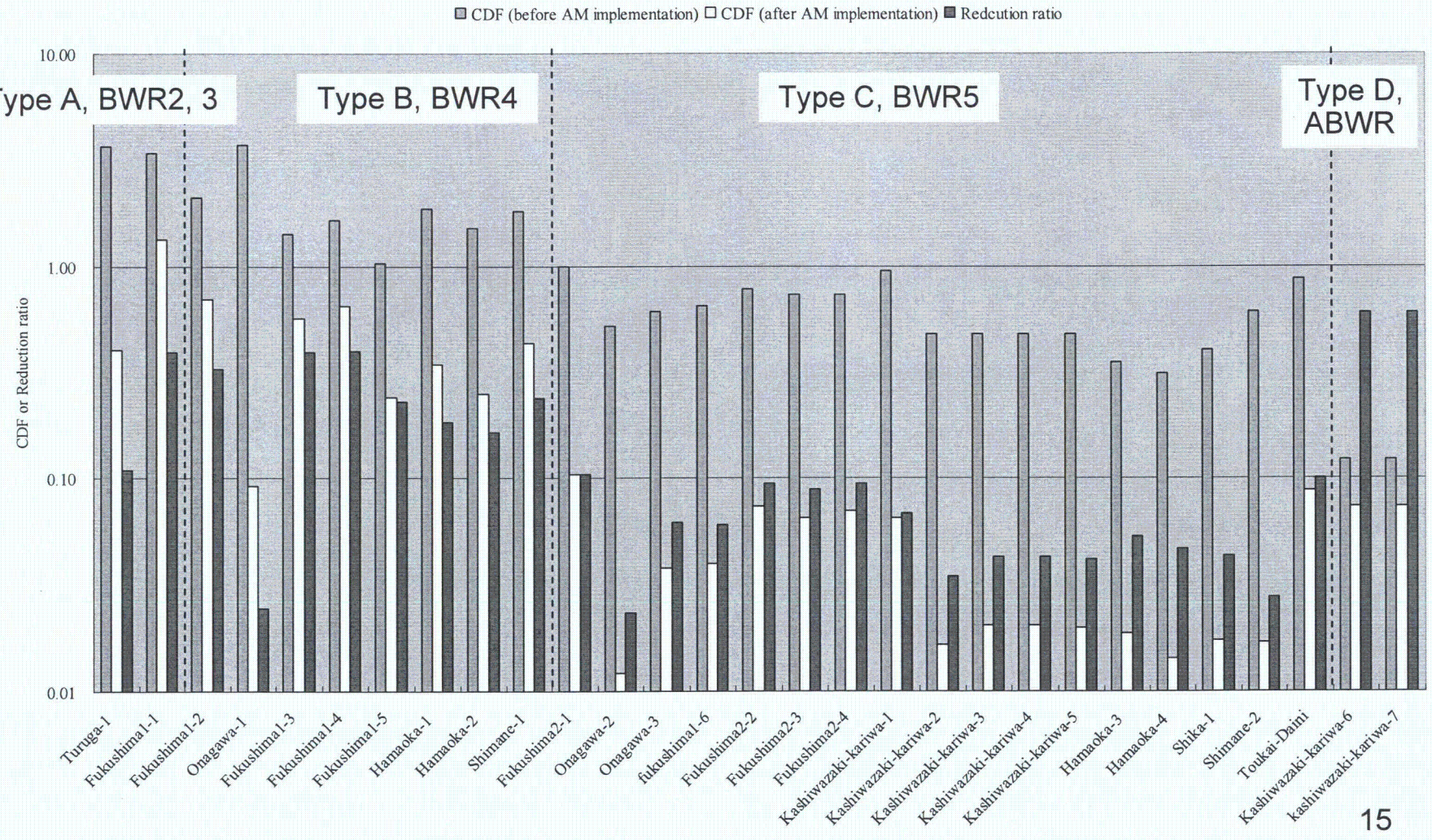
ARI: Alternate rod insertion, CCS: Containment cooling system, CRDHS: Control rod drive hydraulic system, CS: Core spray, FMCRD: Fine motion control rod drive, HPCF: High pressure core flooder, HPCI: High pressure coolant injection, HPCS: High pressure core spray, IC: Isolation condenser, LPCI: Low pressure coolant Injection, LPFL: Low pressure flooder, LPCS: Low pressure core spray, RCCV: Reinforced concrete CV, RCIC: Reactor core isolation cooling, RHR: Residual heat removal, SLCS: Standby liquid control system, SHC: Shutdown cooling

Reactor types and safety systems (PWR)

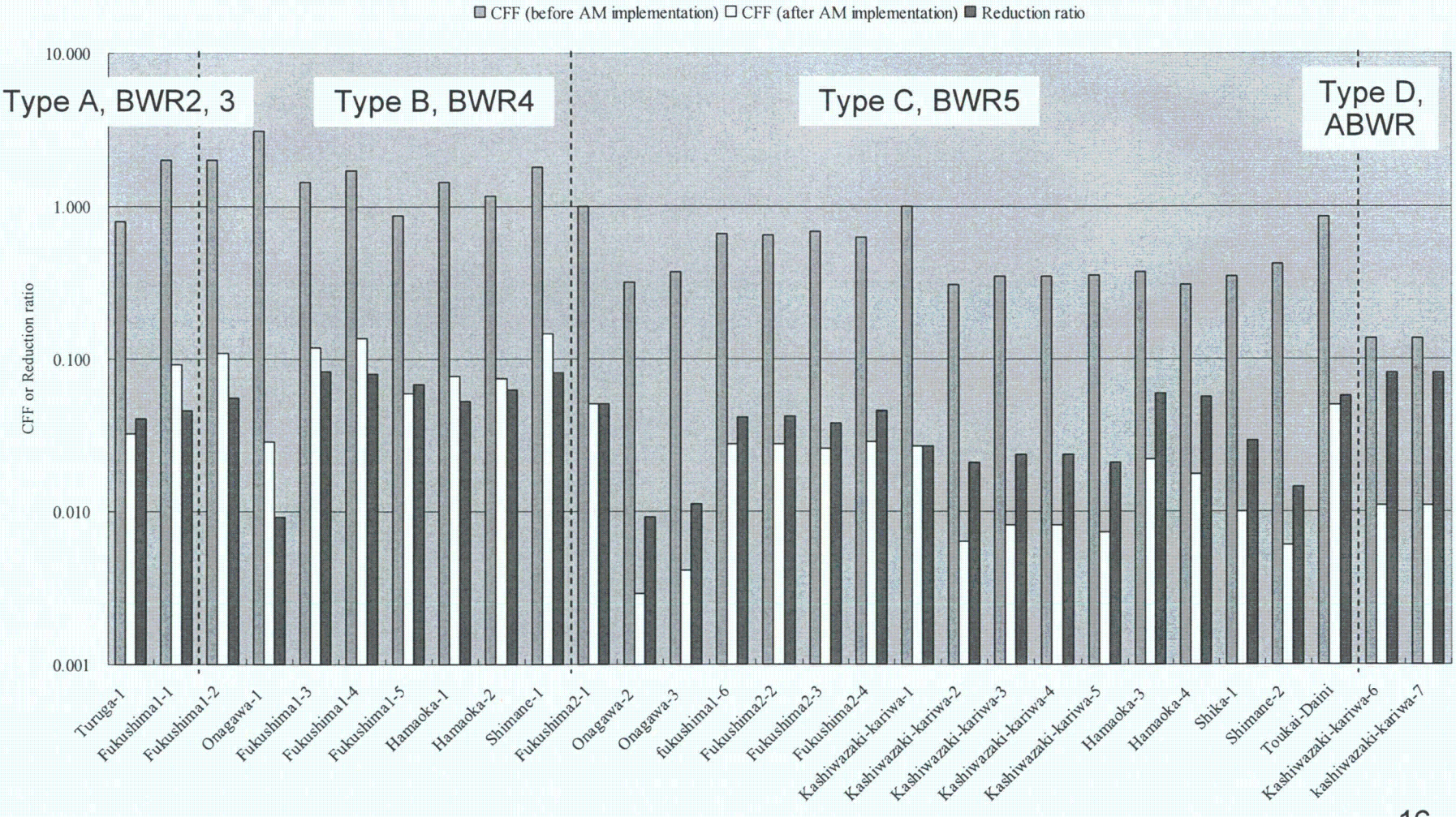
Safety systems		type A	type B	type C	type D
Reactor Type		Two-loop	Three-loop	Four-loop with ice condenser	Four-loop
ECCS	HPI	HPI(2), Boosted by LPI during recirculation	CHSI(3), Boosted by LPI during recirculation	CHSI(3), HPI(2), Boosted by LPI during recirculation	HPI(2)
	LPI	2	2	2	2
	Acc.	2	3	4	4
Aux. feedwater		M/D (2) T/D (1)	M/D (2) T/D (1)	M/D (2) T/D (2)	M/D (2) T/D (1)
CV spray		2	2	2 RHR spray(2)	2

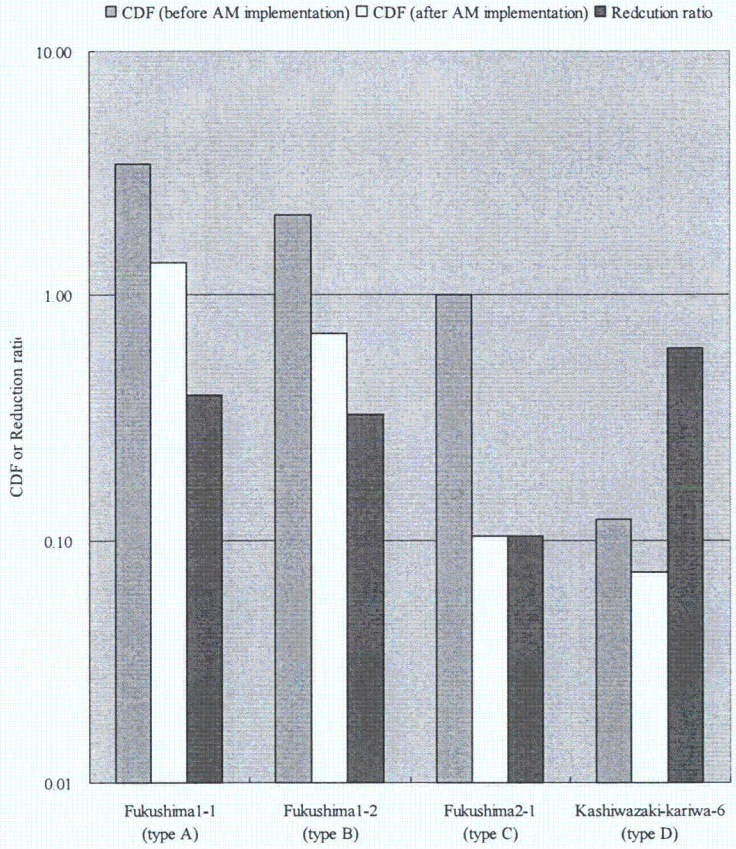
HPI: High pressure injection, LPI: Low pressure injection,
CHSI: Charging safety injection, M/D: Motor-driven, T/D: Turbine-driven,
RHR: Residual heat removal

CDF results before and after AM implementation (BWR)

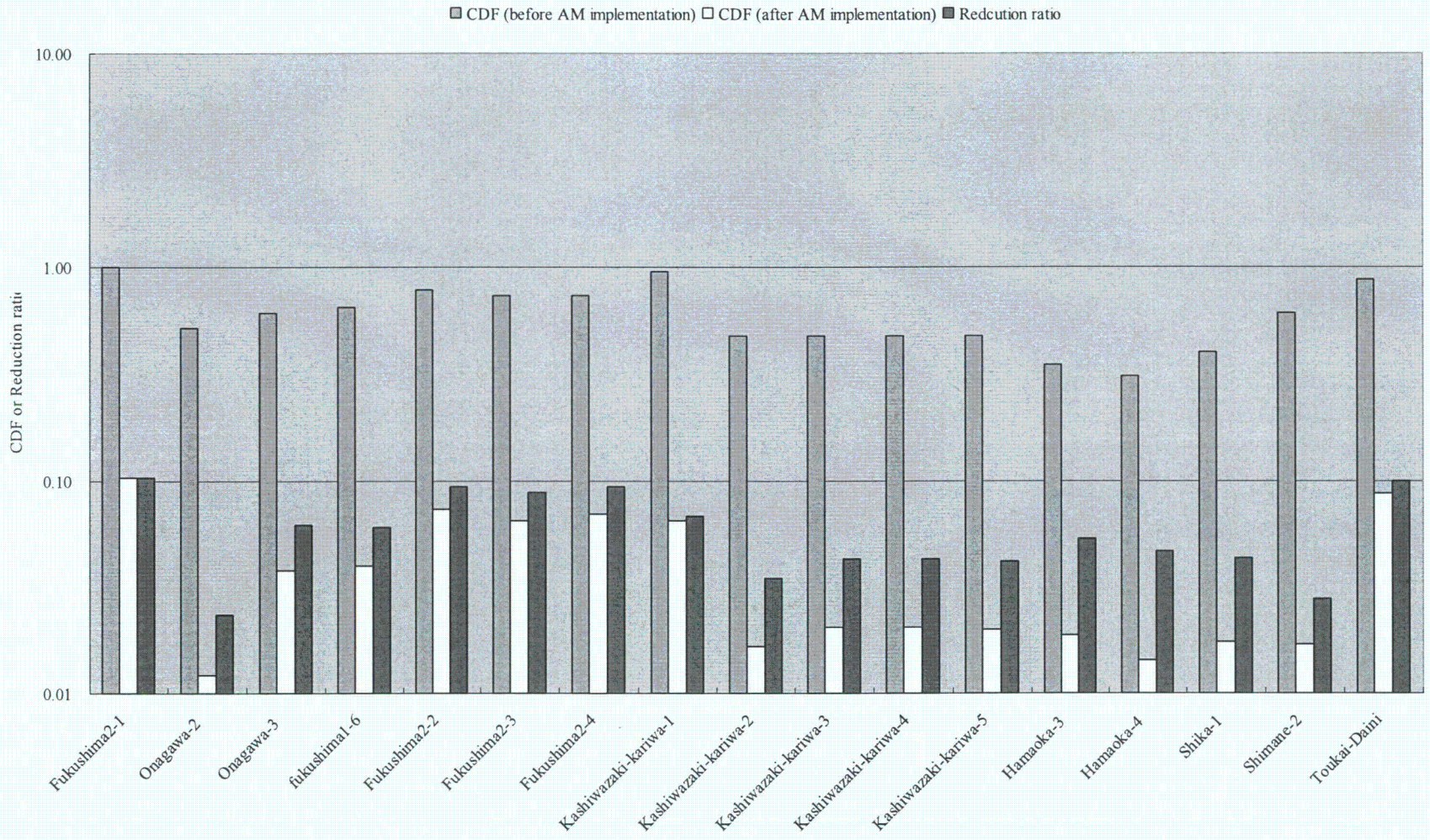


CFF results before and after AM implementation (BWR)



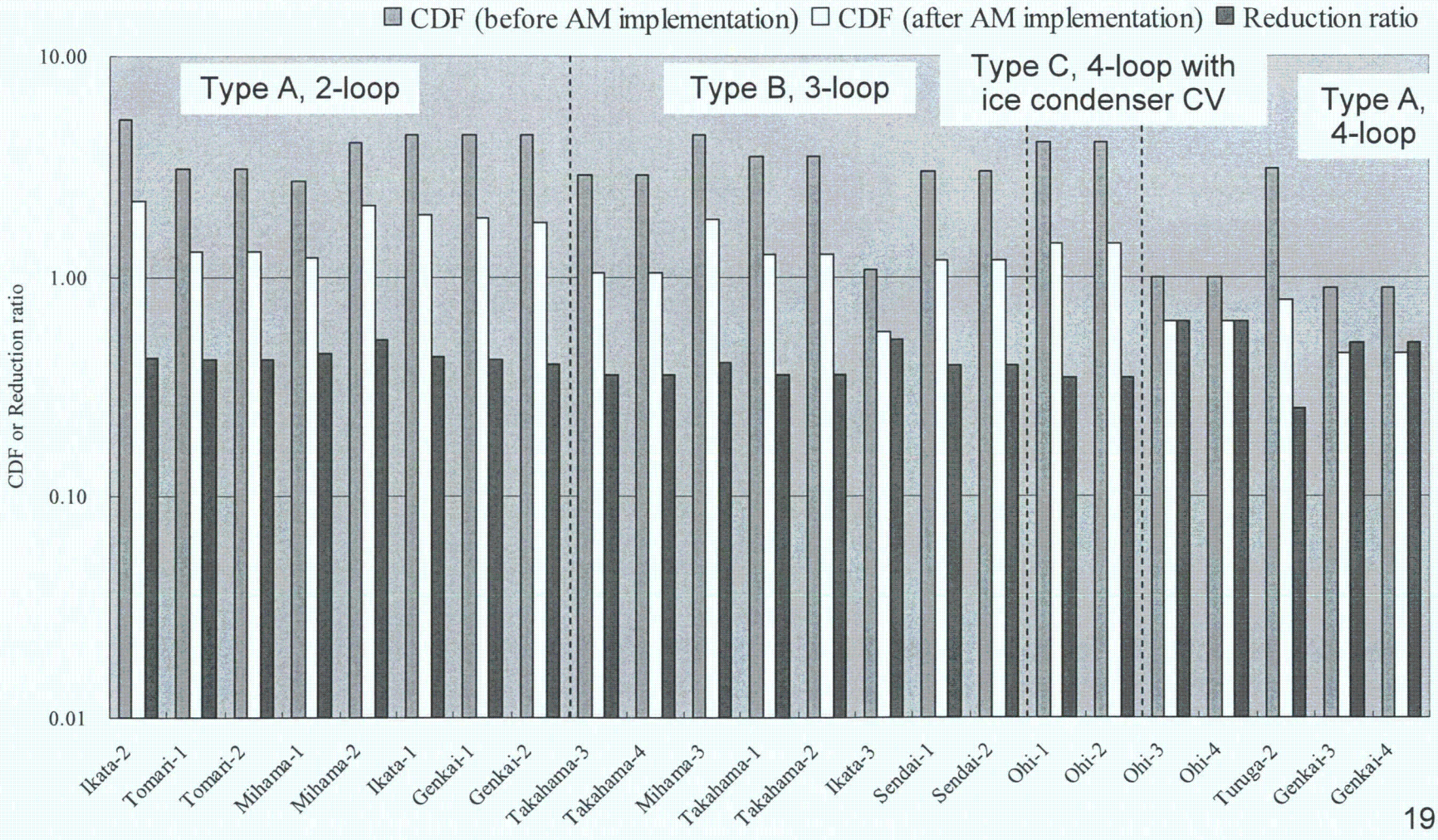


- CDFs of type D plants before AM implementation are small comparing to type A, type B, and type C plants, while the reduction ratios by AM are large, i.e. AM effect is small.
- ARI and RPT are installed, and highly redundant systems are used for the coolant injection and residual heat removal functions in type D plants, which make CDFs before AM implementation much smaller than the other.
- Additional reactor shutdown, coolant injection, and residual heat removal function are considered not needed as AM measures.

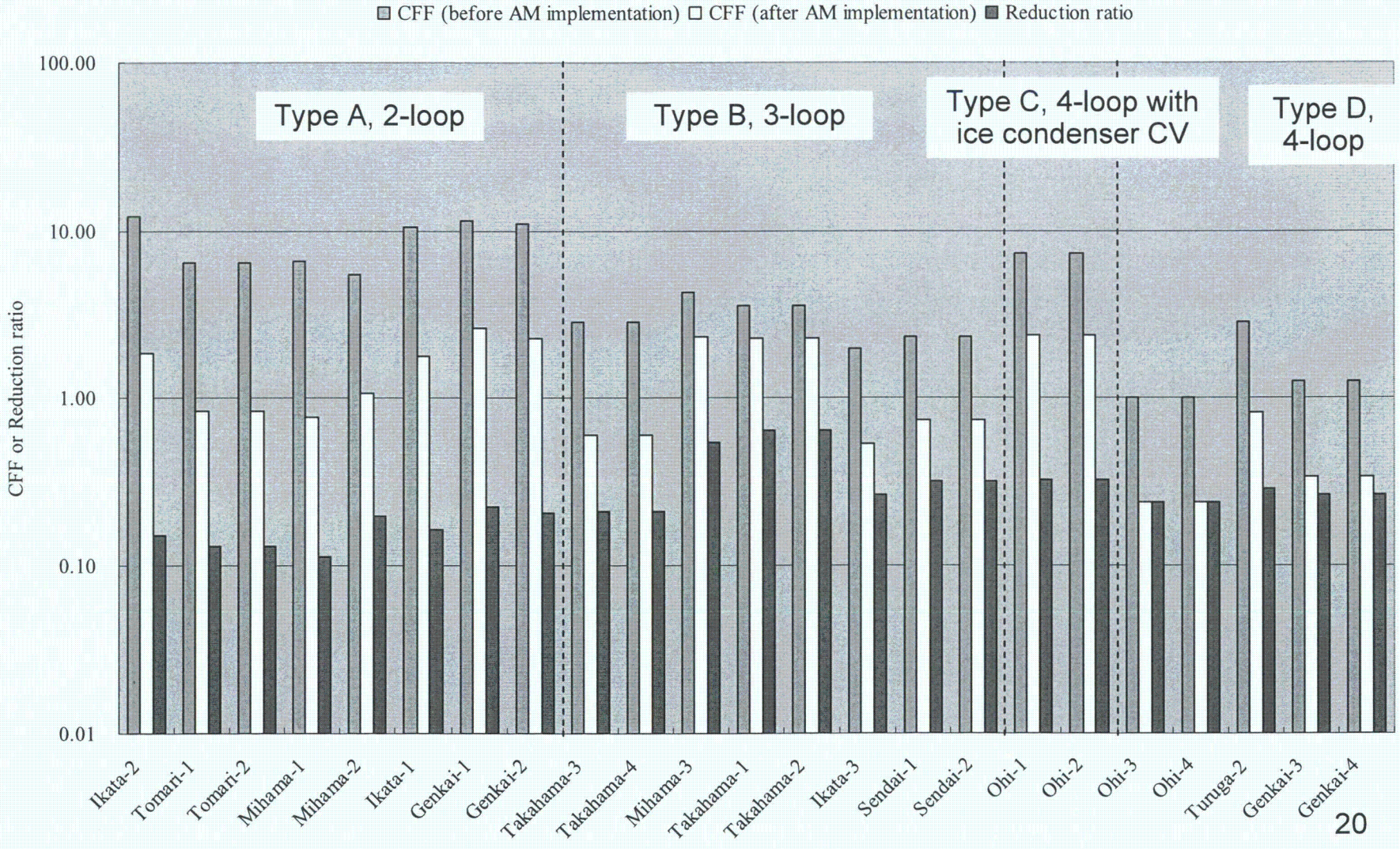


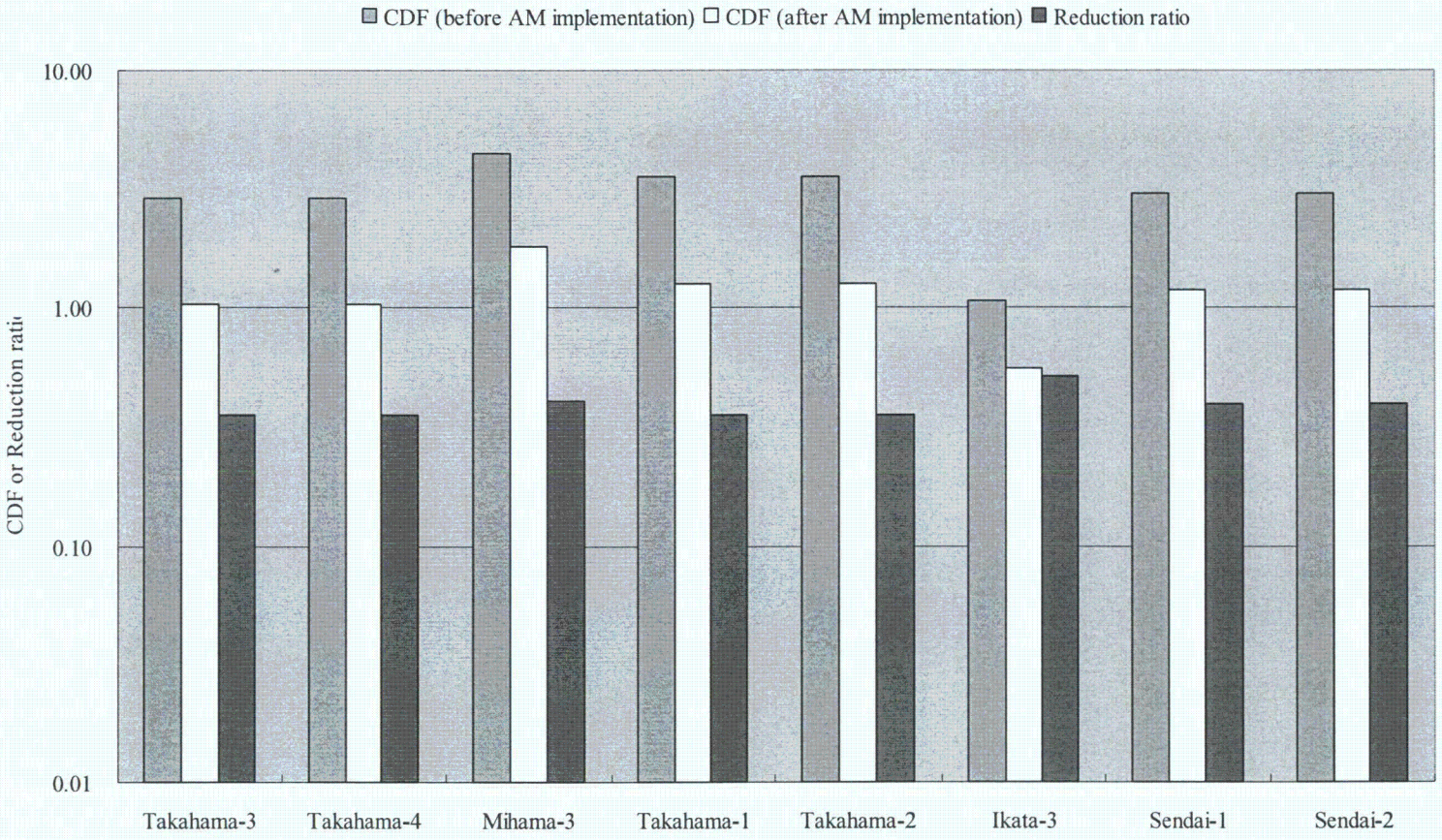
- Some variations of CDFs and CFFs can be found in the same plant type. There are some small differences in the design and operation of plants and AM measures adopted.
  Example: CDF variation due to the design and operation of CCWS in type C plants.

CDF results before and after AM implementation (PWR)



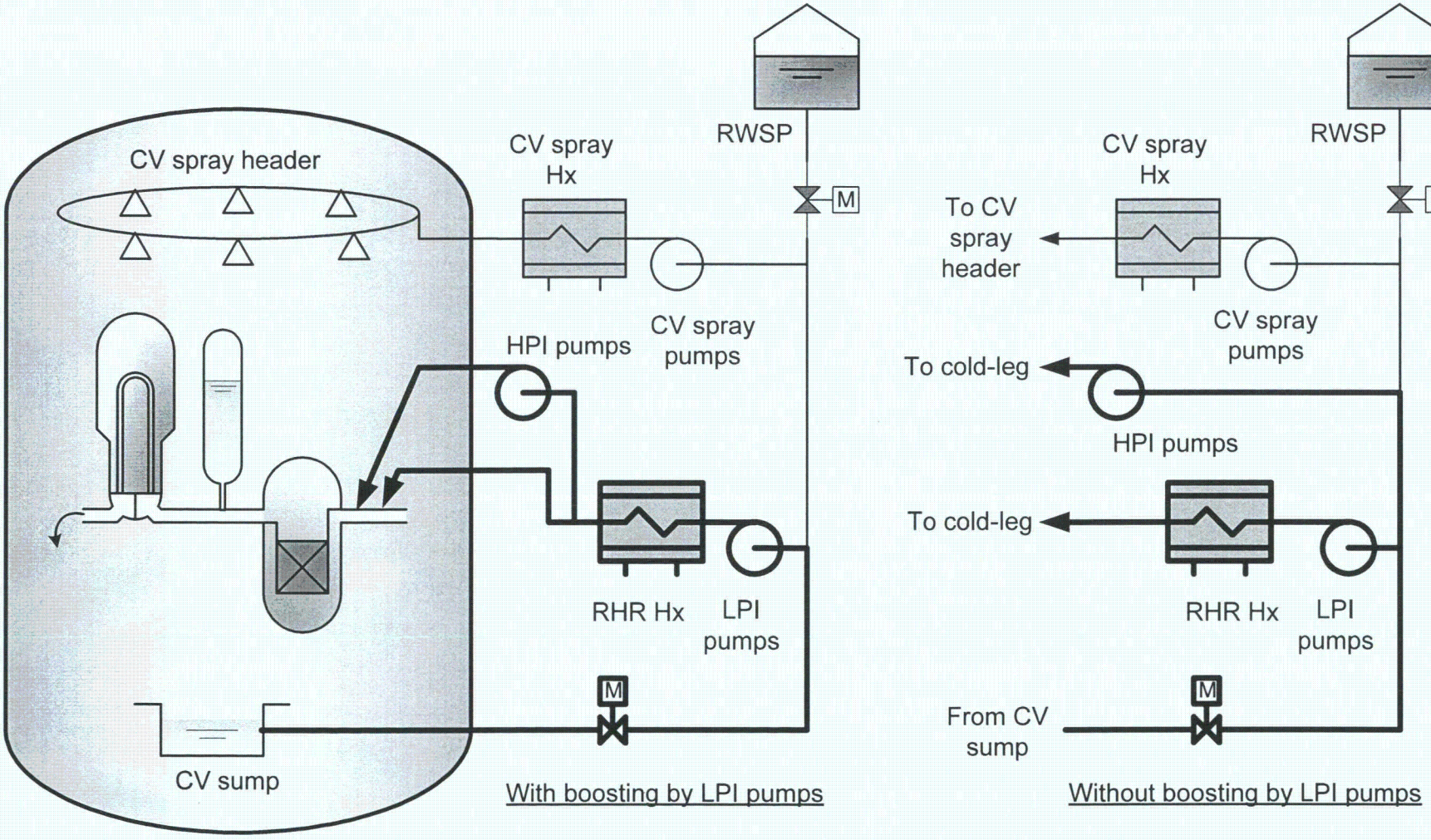
CFF results before and after AM implementation (PWR)

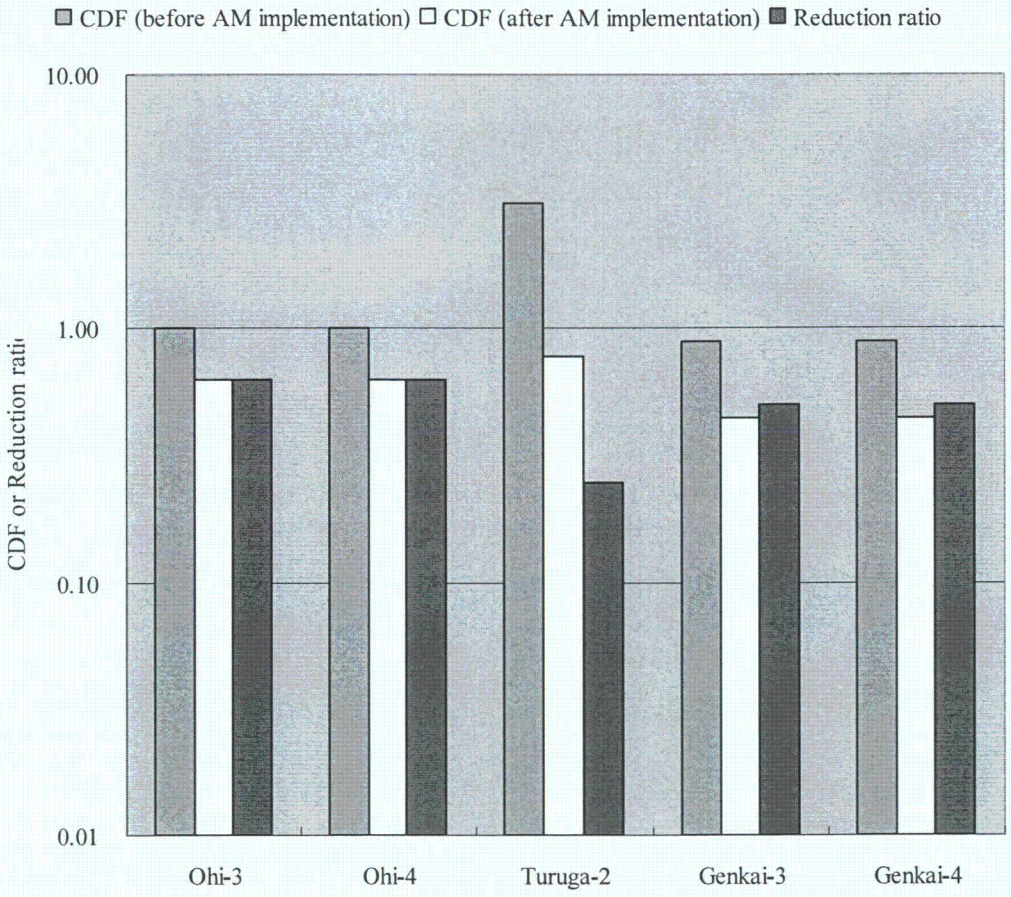




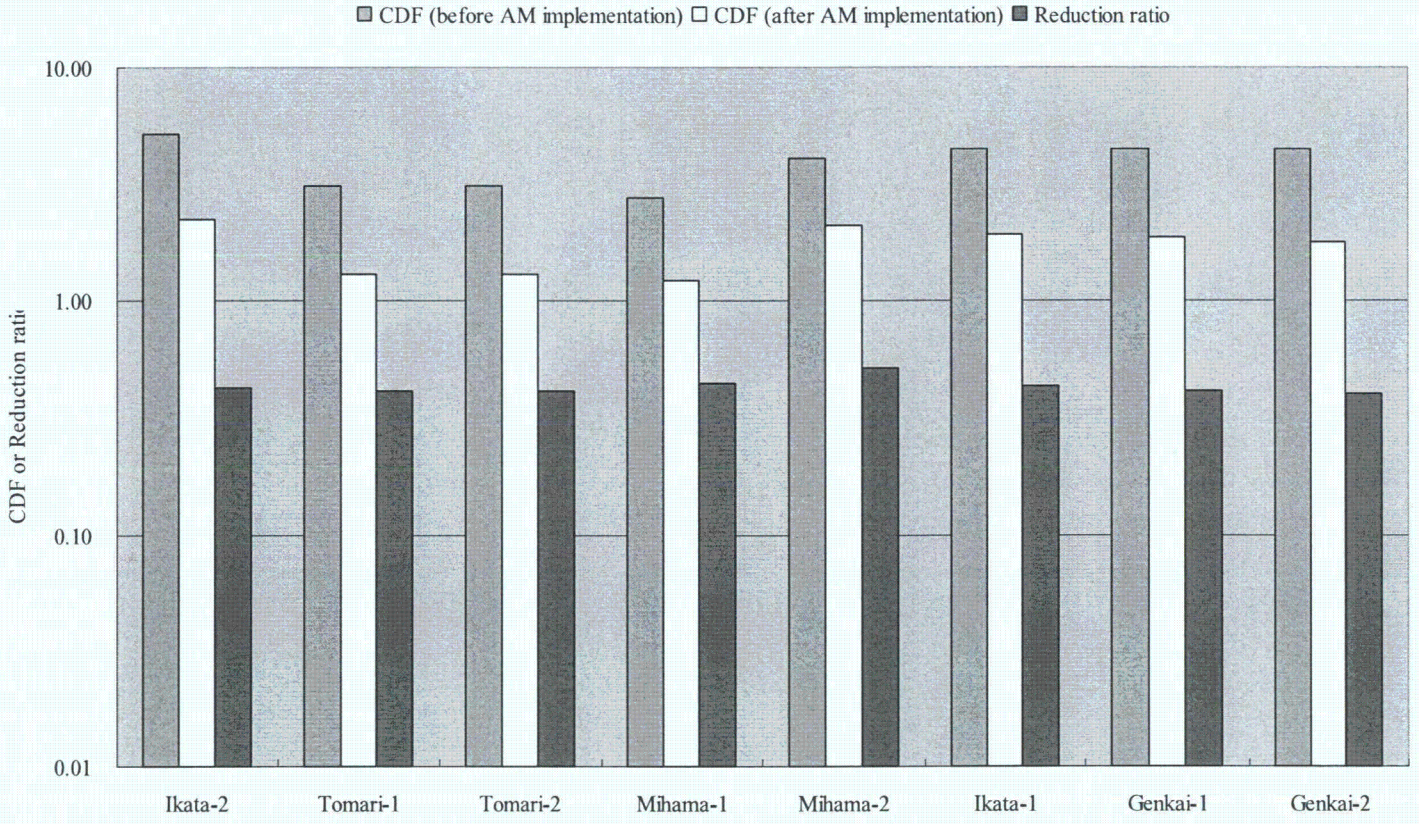
- CDF of Ikata-3 in type B group is much smaller than CDFs of other NPPs in the same group.
- In Ikata-3, the high pressure injection (HPI) pumps do not require boosting by the low pressure injection (LPI) pumps during ECCS recirculation mode while the other NPPs in the same group require boosting by LPI pumps.
- This plant design of Ikata-3 leads to smaller overall unreliability of ECCS during recirculation mode and thus smaller CDF of the plant.

HPI Pump Boosting by LPI Pump (PWR)





- Turuga-2 is the only one plant which needs boosting by LPI pump to HPI pump in type D group, which makes CDF of Turuga-2 before AM implementation greater than the other.
- In contrast, two cross-ties between LPI and CSI are used for Turuga-2, comparing one cross-tie between LPI and CSI for the others, makes small reduction ratio of Turuga-2, i.e. large AM effect.



- Another example can be find in type A group. ECCS switch-over from the injection mode to the recirculation mode is done automatically for Tomari-1 and 2, while this operation is done by operator for other NPPs of type A group. This design difference makes CDFs of Tomari-1 and 2 smaller than CDFs of the other plants in type A group.

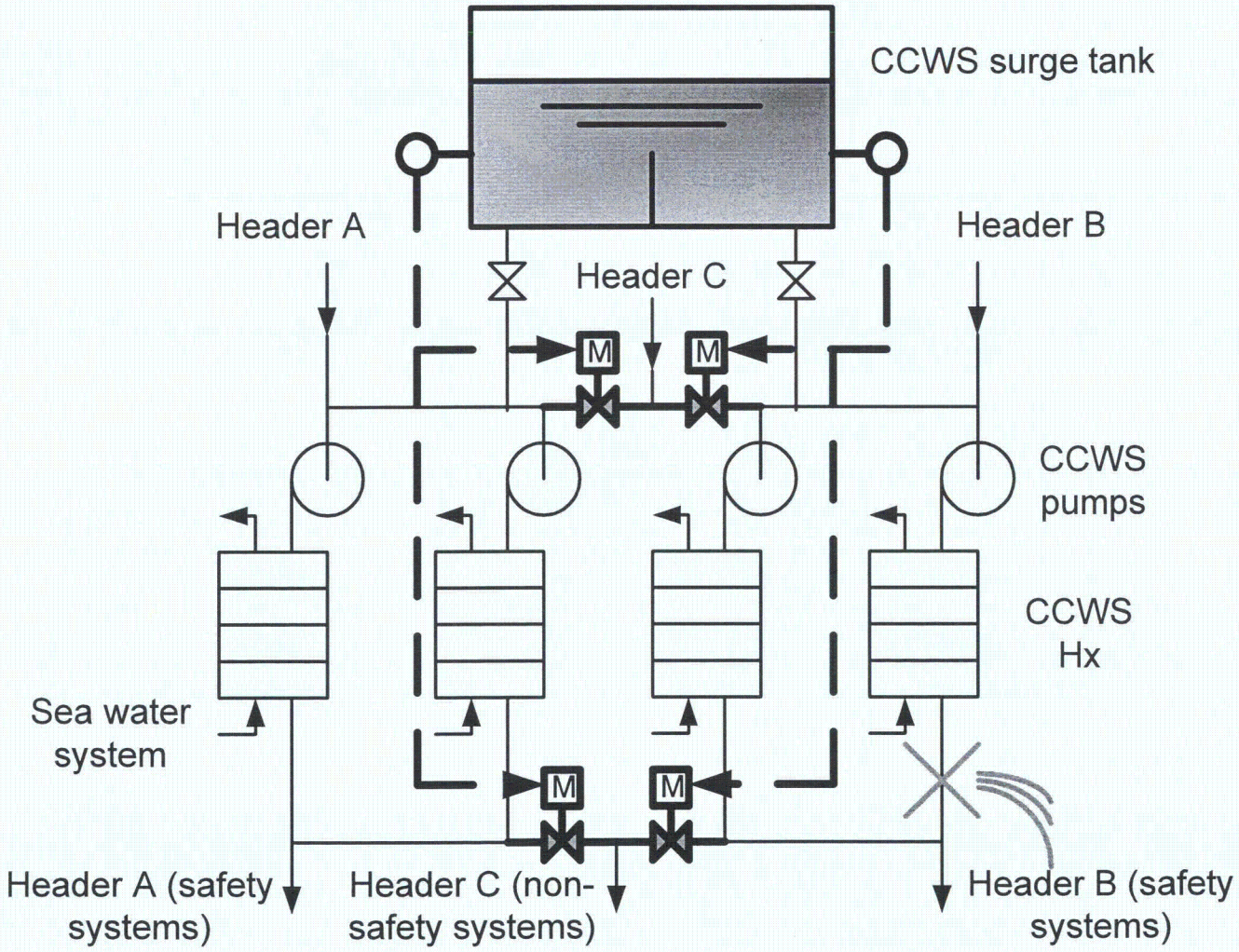
3. Accident management measures implemented to the recent NPPs

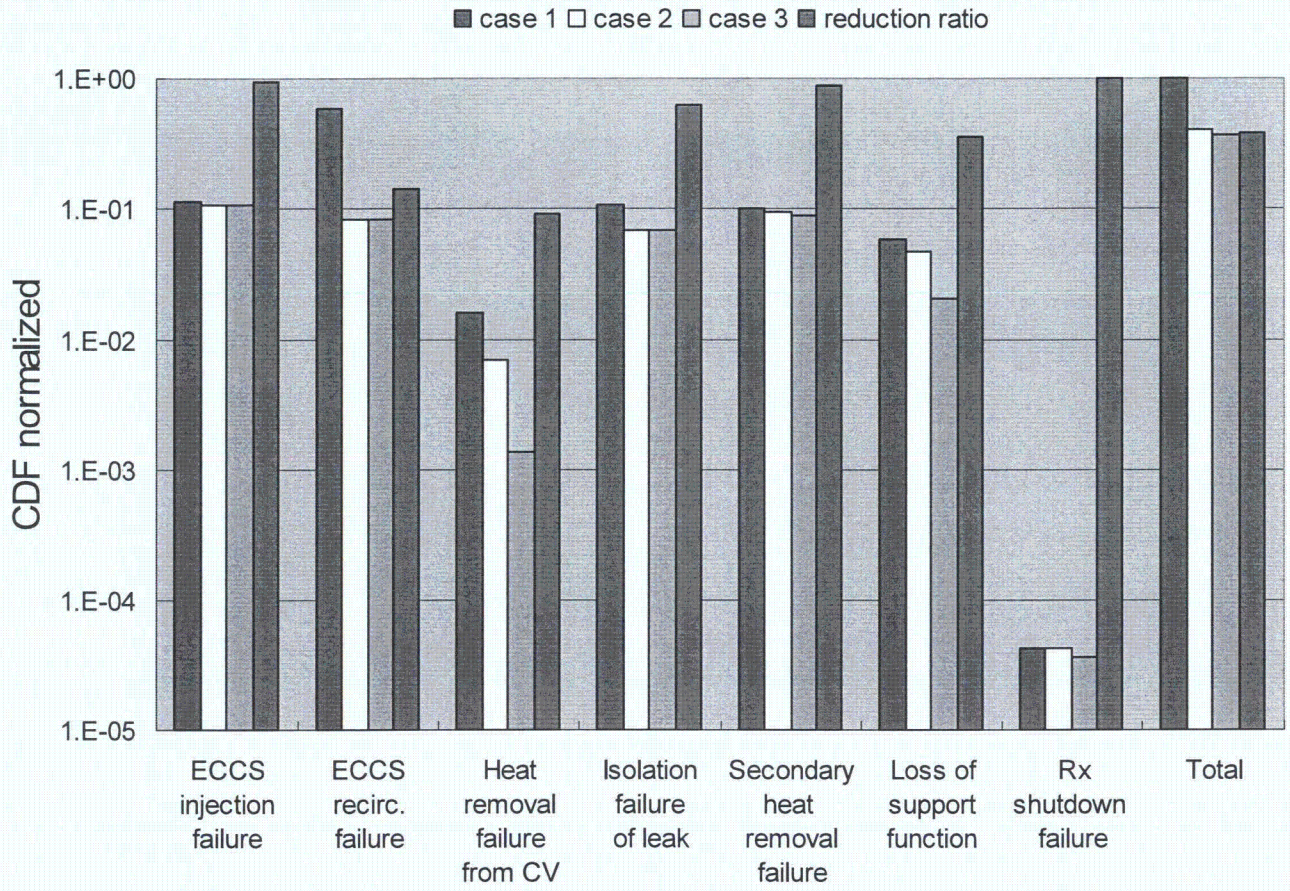
- For the newly constructed NPPs which begin commercial operation in 2002 or later, it is recommended by the NSC to establish an AM implementation plan before the first fuel loading to the core and submit the plan to the regulatory body for review.
- According to this process, AM measures for Higashidori-1, Hamaoka-5, Shika-2, and Tomari-3 have been investigated and reported to NISA until now. The results were reviewed by NISA with technical support of JNES and reported to the NSC.
- Among them, AM implementation plan and evaluation of effectiveness of AM measures for Tomari-3 were reported to NISA last year and they were reviewed by NISA and the NSC until the beginning of this year.
- Similar AM measures to the operating plants are used for Tomari-3, but some of them, i.e. train separation of CCWS actuated by a low CCW surge tank level against loss of CCWS function, and redundant intake lines from CV recirculation sump are incorporated as a part of basic design of the plant.

AM case studied (Tomari-3)

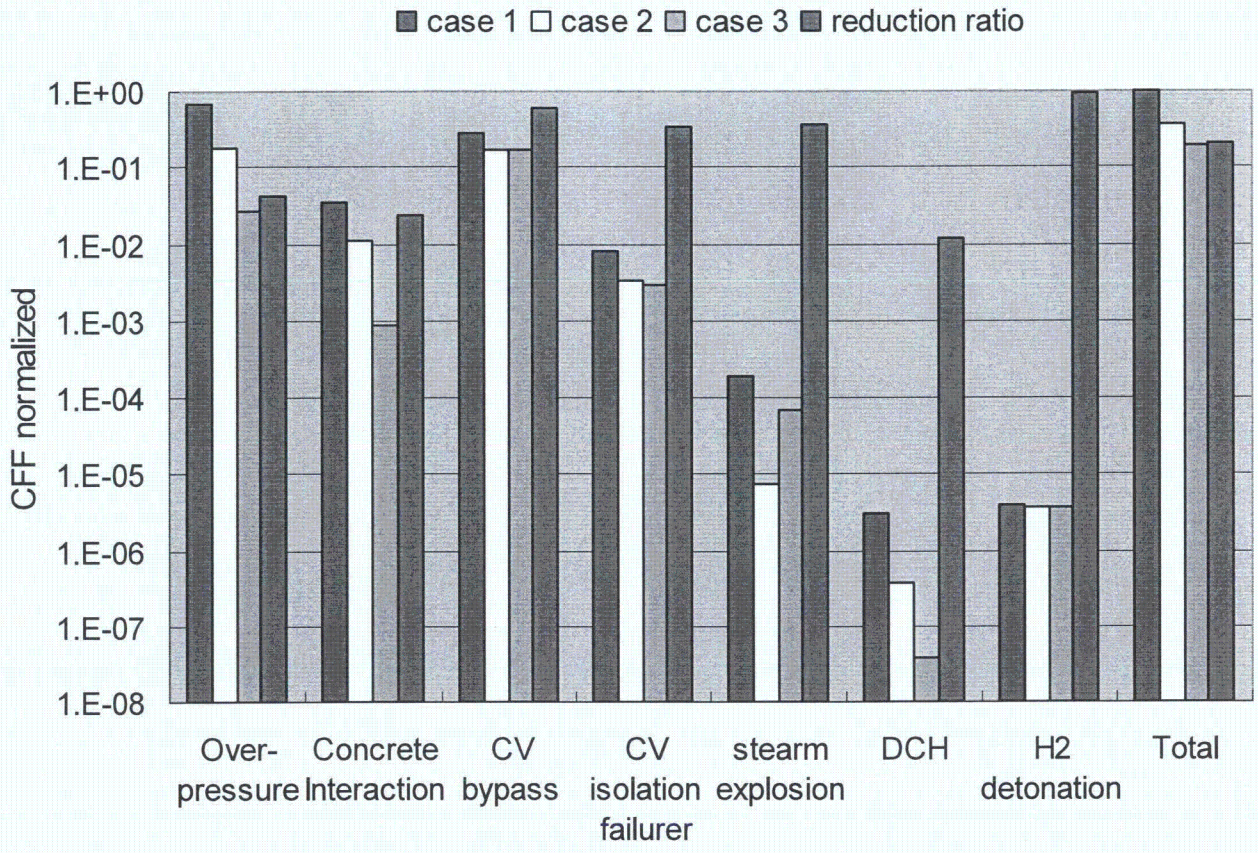
Case		Conditions for analysis
1	Base case	Basic design (without automatic CCWS train separation, alternative recirculation)
2	Basic design with AMs by operation manuals	Basic design (with automatic CCWS train separation, alternative recirculation) AMs by operation manuals (no hardware modifications) ・ Use of turbine bypass system ・ Cooldown and recirculation ・ Forced RCS depressurization
3	All AMs implemented	with AM measures ・ Natural convection cooling in CV ・ Coolant injection to CV ・ Electric power supply from adjacent unit

Component cooling water system automatic isolation





- CDFs are normalized by the total CDF of case 1.
- Overall reduction ratio of CDF, i.e. case 3 vs. case 1, is 0.37, whereas ratio of case 2 vs. case 1 is 0.41. Most of these reduction is accomplished by the adoption of alternative recirculation and automatic CCWS train separation.
- Failure of ECCS recirculation, failure of heat removal from CV, and loss of support function are reduced by the installation of alternative recirculation, natural convection heat removal, and automatic CCWS train separation.



- CFFs are normalized by the total CFF of case 1.
- Overall reduction ratio of CFF, i.e. case 3 vs. case 1, is 0.20, whereas ratio of case 2 vs. case 1 is 0.37. The latter is almost equal to the reduction ratio of CDF.
- Overpressure, Concrete interaction, and DCH are reduced by installation of natural convection heat removal, coolant injection to CV, and forced depressurization.

Basic requirements for AM

AM implementation plan is reviewed from the following points;

- Basic requirements to develop AM measures
  - Organization to execute AM measures
    Organization, Roles of related divisions, Person in charge
  - Development of infrastructure
    Preparation of facilities and equipments used by technical support center, Availability of instrumentations
  - Establishment of knowledge base
    AM manuals for operators and technical support center, Understanding of plant condition, Decision to execute AM measures
  - Communication with the outside of the plant
  - Education and training of the staffs
- Effectiveness of AM measures evaluated by PSA
- Impact to the original safety functions
  No interfering with the intended original safety functions by implementing AM measures

Related future issues to AM

- Reconsideration of the treatment of AM in the nuclear safety regulatory framework
- Efficient way of AM development
- Improvement of quality of PSA used for evaluation of the effectiveness of AM measures
- Characteristics of PSA used for AM development
- Consideration of external events
- Public communication on AM measures

4. Conclusions

- Introduction of AM measures to the Japanese NPPs began with the decision by the NSC issued in 1992, followed by the study of AM measures for the operating plants. Modifications of the plants as well as the establishment of AM execution framework and the preparation of the relevant AM procedures had been completed by 2002. The effectiveness of AM measures was evaluated by utilities and results of these evaluations were reported to the regulatory body. The effectiveness of AM measures was confirmed through the reviews on these reports by the regulatory body.

4. Conclusions (cont'd)

- It was recommended to establish AM measures and to complete installation of AM measures by the first fuel loading to the core for the newly constructed NPPs. Up to now, AM plans for four newly constructed plants were studied and reviewed in this process. In some cases, AM measures were incorporated as a part of basic design of the plant, reflecting the outcomes achieved by the AM studies for the operating plants.
- In the latest AM review, the NSC pointed out some future issues for AM implementation; i.e. reconsideration of the treatment of AM in the nuclear safety regulatory framework, improvement of the quality of PSA, AM measures for external events, and others.

Talking Points on Japan and Evacuation Zone

- TEPCO and the Japanese government are still in the active accident mitigation phase of their activities at the Fukushima Daiichi site. While plant conditions are not stable, we consider them to be static. The containment and spent fuel conditions do not appear to be changing in a way that creates additional concern.

- Some structural conditions have recently been identified that are receiving increased focus and attention. The feed-and-bleed approach that the Japanese are using to control temperature inside the reactor vessels requires considerable, continued attention, constant monitoring and adjustment.

- There are release paths that are continuing at various degrees amongst the Units 1, 2, and 3 that were operating at the time of the event. Our understanding of the plant conditions at any given time is complicated by the reliability of instrumentation.

- TEPCO has initiated a multi-phase effort and recovery plan. They are working to entomb the units and modify the ventilation to improve conditions inside the plant, installing cooling for the spent fuel pools, and engineering systems around the facility to help contain releases.

- Major challenges for continued operation and recovery activities include the high radiation fields and humidity levels inside the reactor buildings, and the considerable amount of debris in the spent fuel pools and turbine buildings.

- In addition to structural issues, there is the challenge of what to do with the radioactive waste that is being held in tanks and various locations around the plant. The rainy season has begun, so this adds additional complications. The immense cleanup challenge resulting from the tsunami itself only adds to the difficulties of dealing with a radioactive contamination area.

- Overall, the Japanese are making progress on addressing these issues. They have a well-organized plan and are moving forward.

50-mile Recommendation

- The decision to recommend a 50-mile radius evacuation of U.S. citizens near the Fukushima Daiichi site in Japan was based on limited information and our best assessment of conditions as we understood them at the time. We understood that four of the six plants at the site were facing extraordinary challenges, including hydrogen explosions and the possibility of overheating in a spent fuel pool. In addition, radiation monitors were showing very high levels of radiation on the plant site, which would impede workers trying to stabilize the reactors.

- Calculations performed by NRC experts indicated that EPA protective action dose guidelines could be exceeded at a distance of 50 miles from the site if the situation continued to deteriorate – as seemed possible – and a large-scale release occurred. These calculations were considerations in NRC providing prudent, conservative input for a travel advisory, to the White House and Department of State, to evacuate American citizens out to 50 miles from the affected nuclear site.

- The NRC will be systematically and methodically evaluating the lessons learned at Fukushima Daiichi as they apply to the safety of reactors in the United States as well as the adequacy of emergency planning guidance and policy.

- In the United States, a 10-mile radius emergency planning zone (EPZ) is established around every power reactor, within which state, and local officials have detailed plans to determine appropriate measures to protect public health and safety in the event of a radiological release. A 50-mile radius ingestion pathway for emergency planning is also established to protect individuals from radiological material that could be ingested or concentrated in the food chain.

- The 10-mile EPZ was based on research showing the most significant impacts of an accident that would be expected in the immediate vicinity of a plant and therefore the capability for prompt initial protective actions, such as evacuations or sheltering in place, should be focused there.

- The size of the established EPZs are not limits, but provide for an emergency planning framework that would allow expansion or contraction of response efforts based on actual and projected radiological conditions.

- During a radiological event, the NRC resident inspectors onsite and the plant staff would provide information to the NRC on conditions as they evolved. In addition, we'd be able to readily access "live time" plant parameters and radiation monitors. The NRC would analyze release paths including meteorological conditions from a power reactor, and we would provide input to appropriate state and county governments on our assessment results as requested. We have measures and equipment in place to obtain information regarding the licensees that the NRC regulates.

- At this time, the agency considers that the existing emergency preparedness framework and regulations provide reasonable assurance of adequate protection of public health and safety in the event of a radiological emergency at a U.S. power reactor facility. If there are lessons from Japan that indicate we need to make enhancements to our regulations, we will do so.

Merzke, Daniel

From: Merzke, Daniel
Sent: Tuesday, April 12, 2011 2:45 PM
To: Dudek, Michael
Subject: RE: Follow up to Document Request from Commissioner Assistants Briefing on Japan Sunday April 10

Tomorrow should be more than fine. Thanks for the support.

From: Dudek, Michael
Sent: Tuesday, April 12, 2011 2:34 PM
To: Merzke, Daniel
Subject: RE: Follow up to Document Request from Commissioner Assistants Briefing on Japan Sunday April 10

Dan,

Are these ASAP or is tomorrow morning fine?

Michael Dudek | Technical Assistant | NSIR/Division of Preparedness & Response | U.S. NRC
11555 Rockville Pike, Rockville, MD 20852 | ☎ (301) 415-6500 | ✉: Michael.Dudek@nrc.gov

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From: Merzke, Daniel
Sent: Tuesday, April 12, 2011 2:32 PM
To: Dudek, Michael
Subject: FW: Follow up to Document Request from Commissioner Assistants Briefing on Japan Sunday April 10
Importance: High

Michael, if you can get the latest versions of the documents requested below, that would be great. I'm fairly sure they are all still in draft form, but that's ok. The criteria for temporary re-entry and permanent re-entry may be one document. I know I saw Trish working on it this morning. If you have any trouble, let me know. Thanks a lot.

Dan

From: Muessle, Mary
Sent: Tuesday, April 12, 2011 1:57 PM
To: Merzke, Daniel
Cc: Andersen, James
Subject: FW: Follow up to Document Request from Commissioner Assistants Briefing on Japan Sunday April 10
Importance: High

Spoke with Mike on this. We should be able to provide this information. We should also clarify that we will be prepared to brief the Secretary of State should she visit Japan and request it. We are not aware that anything is firmly scheduled.

Mary Muessle
Assistant for Operations - Acting
Office of the Executive Director for Operations
U.S. Nuclear Regulatory Commission
301-415-1703 office
301-415-2700 fax

2/353

From: Vietti-Cook, Annette
Sent: Tuesday, April 12, 2011 10:33 AM
To: Muessle, Mary; ET05 Hoc
Cc: Weber, Michael; Bubar, Patrice
Subject: Follow up to Document Request from Commissioner Assistants Briefing on Japan Sunday April 10

I have been asked by the Commission offices to follow up on a document request from the Subject Commissioner Assistants Briefing on Japan. The Commission offices requested documents that are being shared with other agencies and were referred to on the call:

Global Assessment that will be shared with Secretary Clinton as part of her visit

Criteria for temporary reentry into the evacuation zone

Criteria for permanent reentry into the evacuation zone

Can you please assist in providing this information to the Commission offices?

Andersen, James

From: Andersen, James
Sent: Tuesday, April 12, 2011 2:35 PM
To: Merzke, Daniel
Subject: FW: RESPONSE - Follow up to Document Request from Commissioner Assistants Briefing on Japan Sunday April 10

FYI.

From: Weber, Michael
Sent: Tuesday, April 12, 2011 2:00 PM
To: Vietti-Cook, Annette
Cc: Bubar, Patrice; Muessle, Mary; ET05 Hoc; ET01 Hoc; OST02 HOC; FOIA Response.hoc Resource; Andersen, James; Dyer, Jim
Subject: RESPONSE - Follow up to Document Request from Commissioner Assistants Briefing on Japan Sunday April 10

Mary is working on this with the Ops Center, so we should be able to provide the documents promptly. One clarification that I would offer – Chuck Casto and the Japan Site Team are developing slides on the global assessment. I'm not aware that a "Global Assessment" exists at this time; I understand that it is being developed, but it is quite preliminary. In addition, we do not know whether Chuck and the team will have the opportunity to interact with the Secretary of State, let alone share with her the Global Assessment. Consequently, in response to the first request, we can provide the first draft of slides on the Global Assessment, recognizing that they are quite preliminary and have not been fully vetted. The other two requests should be easily fulfilled.

From: Vietti-Cook, Annette
Sent: Tuesday, April 12, 2011 10:33 AM
To: Muessle, Mary; ET05 Hoc
Cc: Weber, Michael; Bubar, Patrice
Subject: Follow up to Document Request from Commissioner Assistants Briefing on Japan Sunday April 10

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Can you please assist in providing this information to the Commission offices?

2/354

Andersen, James

From: Andersen, James
Sent: Tuesday, April 12, 2011 12:11 PM
To: Brock, Kathryn
Subject: RE: Japan event response staffing - PMT

Lets discuss, you can give me a call whenever you have a free moment.

Jim A.

From: Brock, Kathryn
Sent: Tuesday, April 12, 2011 12:08 PM
To: Andersen, James
Subject: FW: Japan event response staffing - PMT

This request just came in. What do you think?

From: Marshall, Jane
Sent: Tuesday, April 12, 2011 12:06 PM
To: Brock, Kathryn
Subject: Japan event response staffing - PMT

The decision has been made to move to a smaller group of responders for the Operations Center, and to limit the number of folks rotating through each position to enhance continuity. The idea is that responding to the Japanese events will be your primary task for the next 3-4 weeks, at which point we can re-evaluate our staffing, change staff, or if you choose, continue to support the response. Please let me know your interest and availability. Ideally, we would like to start this staffing on April 17. If you need supervisory support let me know and our respective Office Directors can discuss.

This approach has been discussed and approved by the Chairman and EDO.

Thanks,
Jane

Jane E. Marshall
Chief, Coordination Branch
Office of Nuclear Security and Incident Response
U.S. Nuclear Regulatory Commission
301-415-7854
Jane.Marshall@nrc.gov

2355

Satorius, Mark

From: Lynch, James
Sent: Wednesday, March 16, 2011 3:39 PM
To: OST05 Hoc; Barker, Allan; Browder, Rachel; Erickson, Randy; Logaras, Harral; Maier, Bill; McNamara, Nancy; Tifft, Doug; Trojanowski, Robert; Woodruff, Gena
Cc: LIA04 Hoc; Flannery, Cindy; Lukes, Kim; Noonan, Amanda; Rautzen, William; Rivera, Alison; Ryan, Michael; Turtil, Richard; Virgilio, Rosetta; Collins, Elmo; Dean, Bill; McCree, Victor; Satorius, Mark; Boland, Anne; Louden, Patrick
Subject: RE: RASCAL projection

Cindy,

Thanks for getting back to me quickly. I told Cheryl Rogers (Wisconsin) that we could not provide the assumptions to States at this time. She understands but is puzzled that the US is telling Americans in Japan to evacuate to a distance further from the plant than what the Japanese government is telling its citizens. I told Cheryl that I would pass that comment to NRC decisionmakers.

-Jim

Jim Lynch
State Agreements Officer
Nuclear Regulatory Commission
Region III
2443 Warrenville Road
Lisle, IL 60532
630-829-9661
james.lynch@nrc.gov

From: OST05 Hoc
Sent: Wednesday, March 16, 2011 2:59 PM
To: Lynch, James; Barker, Allan; Browder, Rachel; Erickson, Randy; Logaras, Harral; Maier, Bill; McNamara, Nancy; Tifft, Doug; Trojanowski, Robert; Woodruff, Gena
Cc: LIA04 Hoc; Flannery, Cindy; Lukes, Kim; Noonan, Amanda; Rautzen, William; Rivera, Alison; Ryan, Michael; Turtil, Richard; Virgilio, Rosetta; Collins, Elmo; Dean, Bill; McCree, Victor; Satorius, Mark
Subject: RE: RASCAL projection

Jim and RSLOs,

The RASCAL inputs below are for your information. Please do not share this information outside of NRC.
Jim, would you please communicate to Cheryl Rogers that we are not able to share this information outside of the NRC at this time?

I've been advised by the Protective Measures Team that the following assumptions were made in RASCAL:

Unit #2: 33% core damage and containment leakage
Unit #3: damage to the spent fuel pool, 50% of fuel melted
Unit #4: spent fuel pool leaked and all of the fuel melted

I hope this provides the clarification that you were seeking.

2/356

Regards,
Cindy Flannery
State Liaison

-----Original Message-----
From: Lynch, James
Sent: Wednesday, March 16, 2011 3:04 PM
To: OST05 Hoc
Cc: LIA04 Hoc; Logaras, Harral; Barker, Allan
Subject: FW: RASCAL projection

Would you please respond to Wisconsin on this? Thank you.

Jim Lynch
State Agreements Officer
Nuclear Regulatory Commission
Region III
2443 Warrenville Road
Lisle, IL 60532
630-829-9661
james.lynch@nrc.gov

From: Rogers, Cheryl K - DHS [Cheryl.Rogers@dhs.wisconsin.gov]
Sent: Wednesday, March 16, 2011 1:31 PM
To: Lynch, James
Subject: RASCAL projection

Jim,
Can you get the inputs for RASCAL outputs?
Cheryl

-----Original Message-----
From: Shober, Megan L - DHS
Sent: Wednesday, March 16, 2011 1:26 PM
To: Rogers, Cheryl K - DHS; Manor, Perry J - DHS
Subject: Did you see?

Cheryl and Perry,
NRC published RASCAL estimates for the Japanese reactor this morning and NRC is recommending the evacuation of US citizens out to 50 miles. They project 9.9 rem EDE at 50 miles and 48 rem thyroid CDE at 50 miles. This seems hard to believe. NRC did not share the input data for the RASCAL estimate.
http://www.nrc.gov/reading-rm/doc-collections/news/2011/11-050.pdf

-Megan

Andersen, James

From: Helton, Shana
Sent: Tuesday, April 12, 2011 12:38 PM
To: Andersen, James
Cc: Bowman, Gregory
Subject: FW: FYI - Stuff to help answer Japan Stuff (NRR Q&A Database)

Jim,

See Quynh's suggestion below to share with Commission and EDO TAs. Rather than passing along directly, I thought I'd run this through you to see how you might want to roll this out to everyone.

Thanks,
Shana

From: Nguyen, Quynh
Sent: Tuesday, April 12, 2011 12:17 PM
To: Helton, Shana
Cc: Nelson, Robert; Markley, Michael; Oesterle, Eric
Subject: FYI - Stuff to help answer Japan Stuff (NRR Q&A Database)

http://portal.nrc.gov/edo/nrr/default.aspx

It links from the NRR Homepage. There's a huge database of questions from Nelson's team. Please share with Commish TAs and EDO TAs as appropriate.

This may help reduce email traffic.

2/357

Andersen, James

From: Muessle, Mary
Sent: Tuesday, April 12, 2011 1:59 PM
To: Vietti-Cook, Annette; ET05 Hoc
Cc: Weber, Michael; Bubar, Patrice; Andersen, James; Merzke, Daniel
Subject: RE: Follow up to Document Request from Commissioner Assistants Briefing on Japan Sunday April 10

Will do Annette. Just a note that that we will be prepared to brief the Secretary of State should she visit Japan and request it. We are not aware that anything is firmly scheduled.

Mary Muessle
Assistant for Operations - Acting
Office of the Executive Director for Operations
U.S. Nuclear Regulatory Commission
301-415-1703 office
301-415-2700 fax

From: Vietti-Cook, Annette
Sent: Tuesday, April 12, 2011 10:33 AM
To: Muessle, Mary; ET05 Hoc
Cc: Weber, Michael; Bubar, Patrice
Subject: Follow up to Document Request from Commissioner Assistants Briefing on Japan Sunday April 10

I have been asked by the Commission offices to follow up on a document request from the Subject Commissioner Assistants Briefing on Japan. The Commission offices requested documents that are being shared with other agencies and were referred to on the call:

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Criteria for permanent reentry into the evacuation zone

Can you please assist in providing this information to the Commission offices?

2/358

Wittick, Brian

From: Wittick, Brian
Sent: Wednesday, April 13, 2011 1:26 AM
To: Call, Michel
Subject: FW: Updated Mr. Nei PMT questions - Please comment
Attachments: Nei san email for PMT discussions Rev3.docx

From: Call, Michel
Sent: Tuesday, April 12, 2011 11:58 PM
To: Collins, Elmo; Casto, Chuck; Hoc, PMT12; Wittick, Brian
Subject: Updated Mr. Nei PMT questions - Please comment

All,

Attached is an updated version of the PMT questions for Mr. Nei. Please provide comments. Previously, the scope was indicated to be overly large and the questions seemed to be too many. I've attempted to consolidate the questions and simplify them while still trying to capture what it is we think we want to find out from the Japanese. I've dropped a lot of the text, with the thought that the removed text could be used in the meeting to clarify our questions as needed.

Let me know what you think.

Thank you.
Mike

2/359

Mr. Nei,

Thank you for considering NRC's request to meet with us again to discuss our questions and interest in Japan's protective action guidance for its citizens and the environment. It is our desire to understand the ,regulations and guidance~~framework~~ that Japan uses to protect its citizens and the environment in the event of an accident, such as the one at the Fukushima Daiichi nuclear station, as well as to offer ~~any~~ assistance to the Japanese government in the area of protective actions ~~that we can~~. We understand that a number of Japanese government agencies and ministries are involved in the complete effort and that you can best communicate our questions to the other agencies. Following is ~~We are providing~~ a description of our areas of interest and ~~the~~ questions ~~that we have~~. We hope that you can help us better understand Japan's practices and the ways that NRC can provide support. ~~We are interested in:~~

1. Which agency (or agencies) provide~~s~~ protective action recommendations (e.g., sheltering-in-place or evacuation)? If multiple agencies do this, how do they coordinate their responses/recommendations?
2. What is the process for determining the needed protective actions, including the criteria and the evaluation method for determining the criteria are met or exceeded?
3. Genericallly, w~~W~~hat is Japan's approach to protective actions early in an event, at intermediate stages and for the longer term? Is there a different approach to protective actions in early event stages versus later stages? How does~~has~~ your approach evolved during an~~the~~ emergency?
4. ~~-~~Are you currently working on or revising any guidance for re-entry/return of people to the areas that have been evacuated? Can we learn more or support you with this activity?
5. Are there any logistical areas, such as continued monitoring, public information and warning, or coordination of environmental sampling where we could be of assistance?
6. Is there a need or plan to interface with public moving back to the evacuation and explain what to expect? Would you be interested in NRC processes related to this activity?~~Could we support such an effort?~~
7. Do you have questions about U.S. protective action criteria for its citizens?
8. Are there already plans or would you like to coordinate the environmental sampling and collection of data to support both of our (U.S., for its citizens, and Japan) decisions for re-entry?

Thank you again for your consideration of NRC's request to meet to discuss these questions. We look ~~-~~forward to our discussion.

Wittick, Brian

From: Wittick, Brian
Sent: Wednesday, April 13, 2011 4:47 AM
To: LIA08 Hoc
Subject: RE: JAPAN TEAM REQUEST: FW: information request

Good stuff. Thanks

From: LIA08 Hoc
Sent: Tuesday, April 12, 2011 8:01 AM
To: Wittick, Brian
Subject: FW: JAPAN TEAM REQUEST: FW: information request

Brian—
Will this help? Let me know if you can't get the web linked references. I think I could scan and email them to you-
Thanks
LisaG

Lisa Gibney Wright
Liaison Team Coordinator
US Nuclear Regulatory Commission
Email: lia08.hoc@nrc.gov
Desk Ph: 301-816-5185

From: Norris, Michael
Sent: Tuesday, April 12, 2011 7:35 AM
To: LIA08 Hoc
Subject: RE: JAPAN TEAM REQUEST: FW: information request

EAL guidance documents are NURAC/NESP-007, NEI 99-01, Revisions 4 and 5. They are located at the following link:
http://www.nrc.gov/about-nrc/emerg-preparedness/regs-guidance-comm.html

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From: LIA08 Hoc
Sent: Tuesday, April 12, 2011 7:26 AM
To: Norris, Michael
Subject: JAPAN TEAM REQUEST: FW: information request
Importance: High

Hey can you help with this? It's for the Japan team...
Thanks!
LisaG

Lisa Gibney Wright
Liaison Team Coordinator
US Nuclear Regulatory Commission
Email: Lia08.hoc@nrc.gov
Desk Ph: 301-816-5185

2/360

From: Wittick, Brian
Sent: Tuesday, April 12, 2011 6:58 AM
To: LIA08 Hoc
Subject: information request

We are looking for a listing of EAL reporting criteria for a project we are working with the GOJ and DOS. Thanks for your help.

Brian Wittick

Merzke, Daniel

From: Merzke, Daniel
Sent: Wednesday, April 13, 2011 8:39 AM
To: Andersen, James
Cc: Landau, Mindy
Subject: RE: Heads up: NRR is prepared Fukushima Presentation
Attachments: Fukushima Daiichi Event.pptx

Jim, I reviewed the presentation, and it appears to reflect current conditions. I made a couple of minor changes, but nothing of substance. I think it's ready to give to the Senator.

Dan

From: Andersen, James
Sent: Wednesday, April 13, 2011 7:33 AM
To: Merzke, Daniel
Cc: Landau, Mindy
Subject: FW: Heads up: NRR is prepared Fukushima Presentation

Dan, can you take a look at the attached and see if it would work if Bill needs to brief Senator Mikulski on Monday. If so, make any minor modifications as needed. Thanks.

Jim A.

From: Landau, Mindy
Sent: Tuesday, April 12, 2011 4:05 PM
To: Andersen, James
Cc: Rihm, Roger
Subject: FW: Heads up: NRR is prepared Fukushima Presentation

NRR prepared this presentation on the Japan event and I think we can modify as needed and use it for Bill's briefing for Senator MIKULSKI. Any comments? Which EA are we assigning to this?

From: Wertz, Trent
Sent: Tuesday, April 12, 2011 4:02 PM
To: Landau, Mindy
Cc: Nelson, Robert
Subject: RE: Heads up: NRR is prepared Fukushima Presentation

Mindy,

Here is the presentation with speaker notes. Eric gave it to the National Governor's Association on 4/4. We also used a portion of it today in a meeting with officials from NYC. Please let me know if you have any questions.

Trent

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Fukushima Daiichi Event

Bill Borchardt

Executive Director for Operations

NRC

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NRC Mission – What Do We Do?

- The mission of the NRC is to license and regulate the Nation's civilian use of byproduct, source, and special nuclear materials in order to **protect public health and safety, promote the common defense and security, and protect the environment.**

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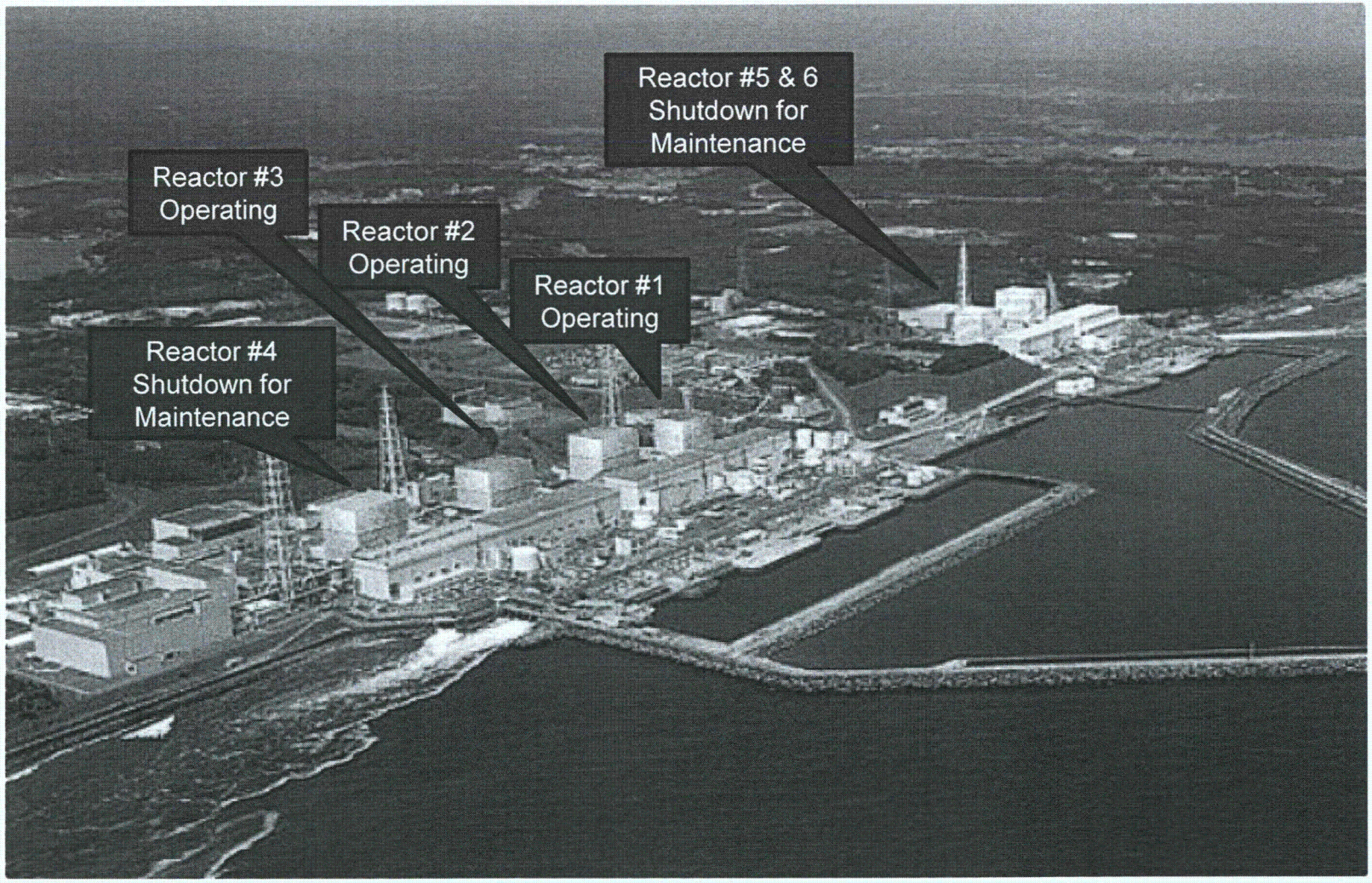
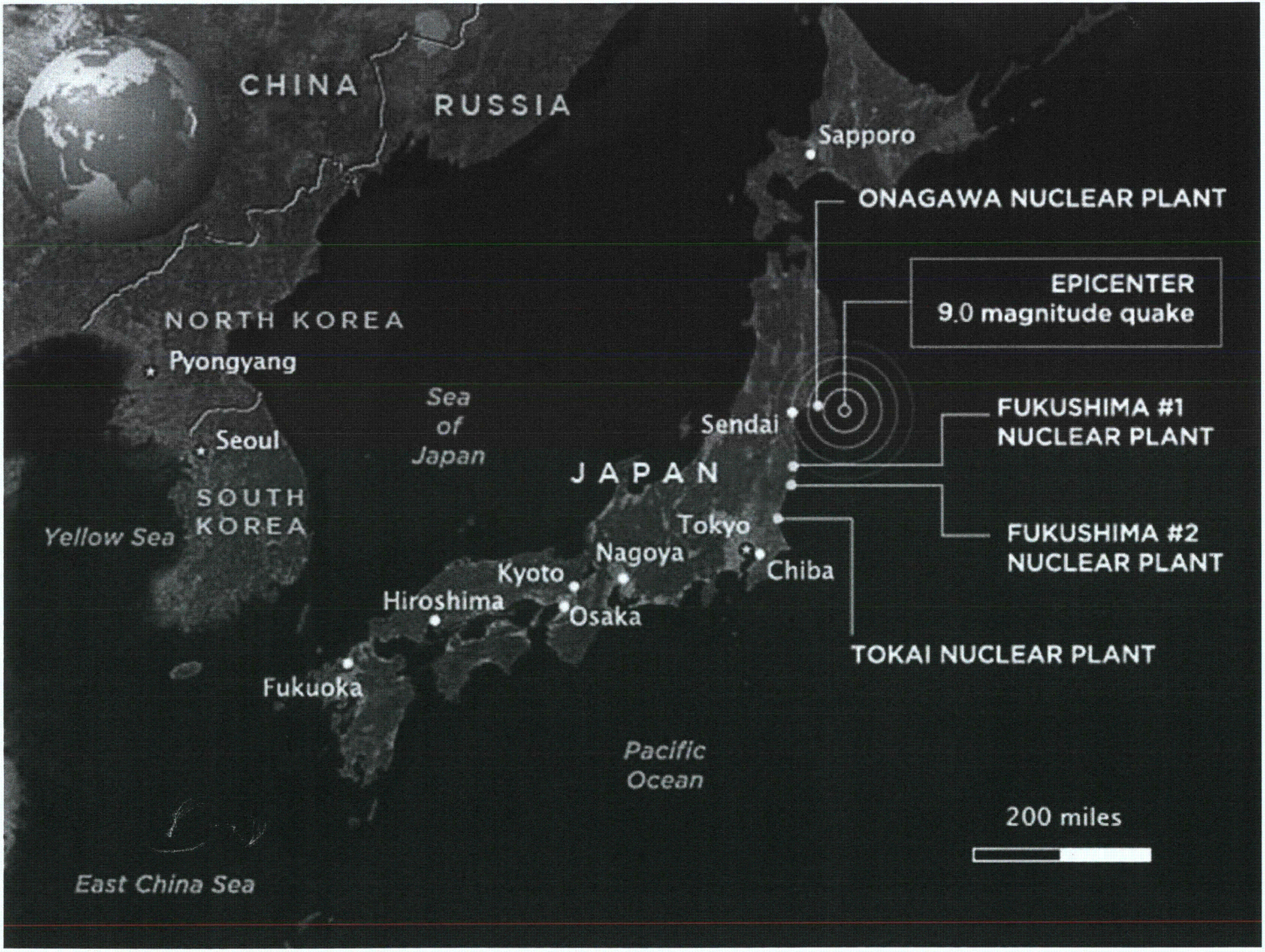
Overview of Fukushima Daiichi Nuclear Power Station




CHINA
RUSSIA
Sapporo
ONAGAWA NUCLEAR PLANT
EPICENTER
9.0 magnitude quake
NORTH KOREA
Pyongyang
Sea
of
Japan
Sendai
FUKUSHIMA #1
NUCLEAR PLANT
Seoul
JAPAN
SOUTH
KOREA
Yellow Sea
Tokyo
FUKUSHIMA #2
NUCLEAR PLANT
Nagoya
Chiba
Kyoto
Hiroshima
Osaka
TOKAI NUCLEAR PLANT
Fukuoka
Pacific
Ocean
200 miles
East China Sea

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Earthquake & tsunami sequence of events

Friday March 11th @ 2:36 pm local

- Magnitude 9.0 earthquake 231 miles northeast of Tokyo.
- Quake is fifth largest in recorded history (since 1900).
- Earthquake generated a 14m Tsunami

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Plant Response

Earthquake

- Earthquake Caused Automatic Shutdown of 3 Operating Units
- Offsite Power Lost
- Initial indications were that Emergency Diesels operated

14m Tsunami (less than 1 hour later)

- All Emergency Back-up Power Lost
- 8-10 hours later Station Batteries Depleted

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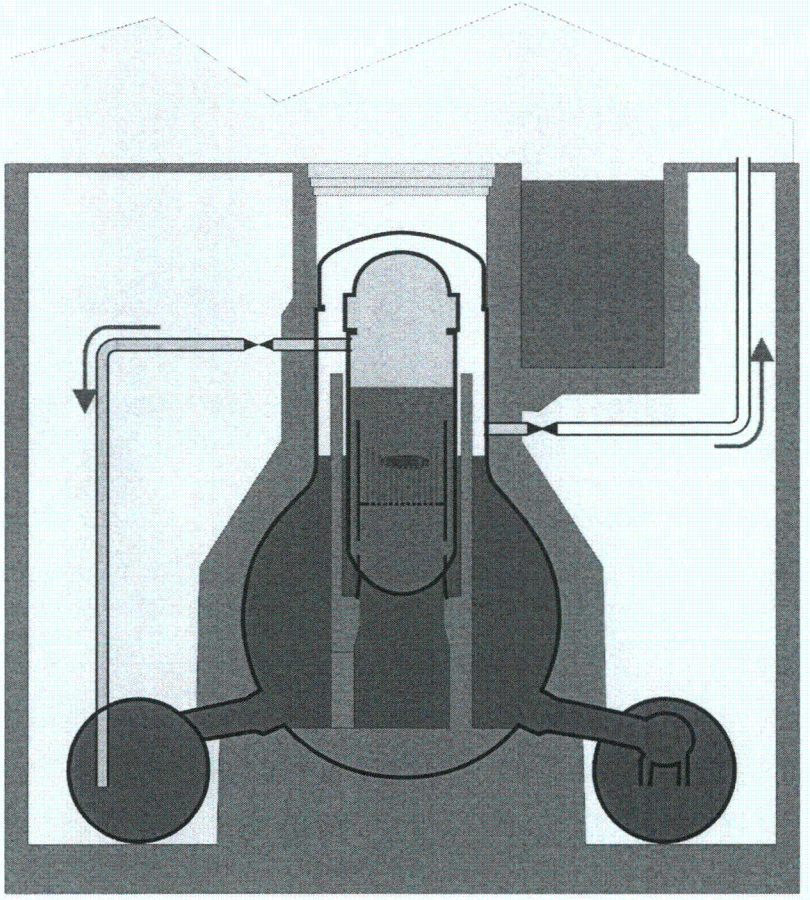
- Current status of the Reactors
  - Core Damage in Unit 1,2, 3
  - Electrical Power Restored
  - Fresh Cooling Water supplied to All Units
- Spent Fuel Pool Status
  - Suspect Fuel Damage in Pools 3 & 4
  - Providing periodic make up water



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NRC Response

- Ops Center 24/7
- Team of experts to Tokyo
- Support to U.S. Ambassador and Japanese
- Coordinating Environmental Monitoring with DOE & EPA

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Domestic Considerations

- Harmful Levels of Radiation Not Expected in the U.S.
- U.S. Plants Designed for External Events
- U.S. Industry Initiated Review
- NRC has initiated additional inspections at all U.S. Plants
- NRC conducting Near-Term and Long-Term Reviews.

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NRC Near Term Actions

- Evaluate Fukushima Daiichi Events
- Domestic Operating Reactors and Spent Fuel Pools
  - External Events
  - Station Blackout
  - Severe Accident Mitigation
  - Emergency Preparedness
  - Combustible Gas Control
- Near Term Review due in 90 days (mid July)

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NRC Longer Term Actions

- Based on Near Term Review and Additional Insights from Fukushima Event
- Identify Potential Technical and Policy Issues
  - Research Activities
  - Generic Issues
  - Reactor Oversight Process
  - Regulatory Framework
  - Interagency Emergency Preparedness

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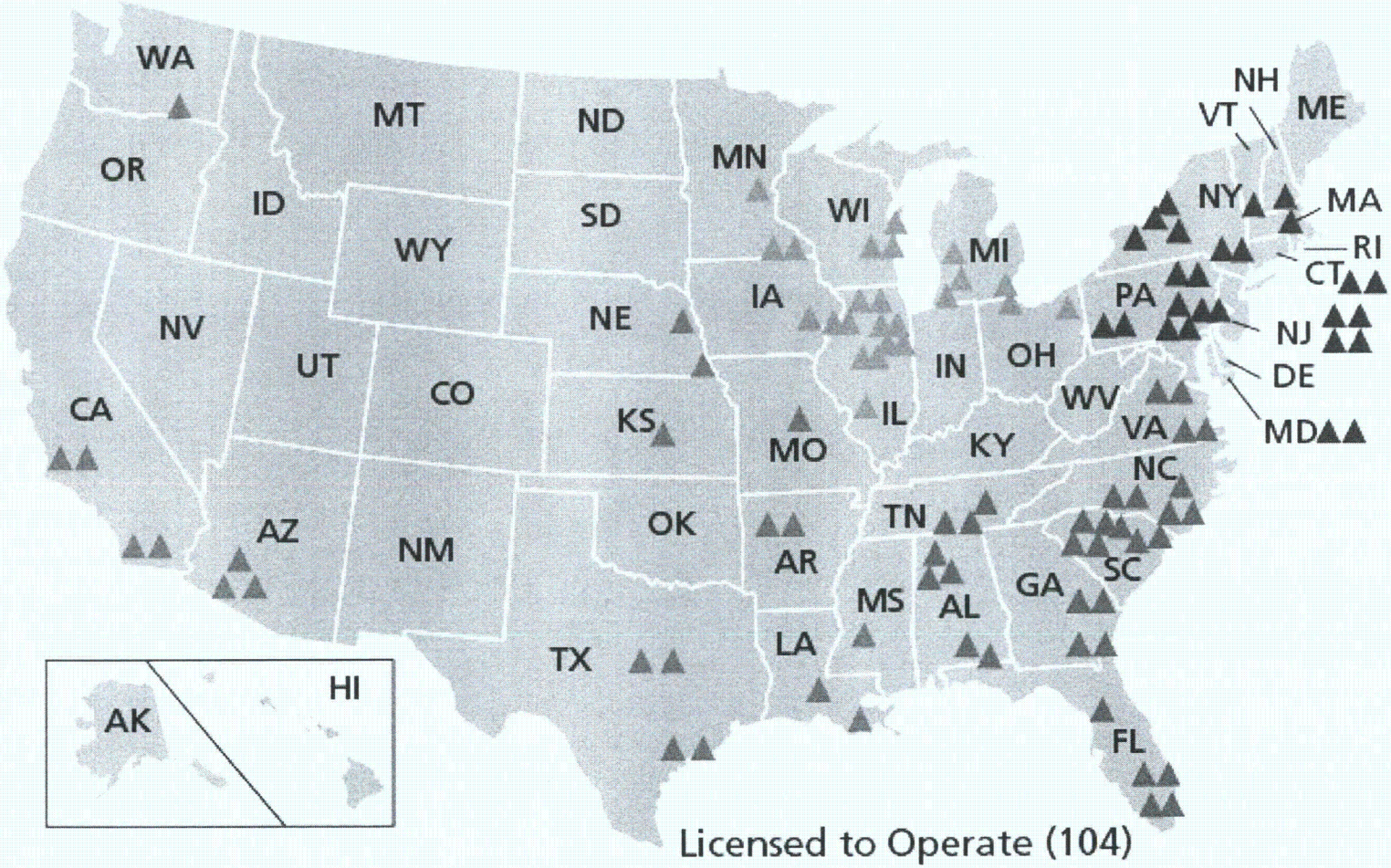
Operating Commercial Power Reactors



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PARS

- NRC Regulations have 2 Emergency Planning Zones (EPZs)10/50 miles
- EPZs are not limits, but frameworks that allow for expansion as needed
- 50 miles in Japan due to extraordinary situation
  - 4 units severely challenged
  - Unclear information as to state of reactors, mitigative strategies, radiological releases
  - Decision to evacuate conservative, better to err on conservative
- Precautionary evacuation occurred days before fuel melt.

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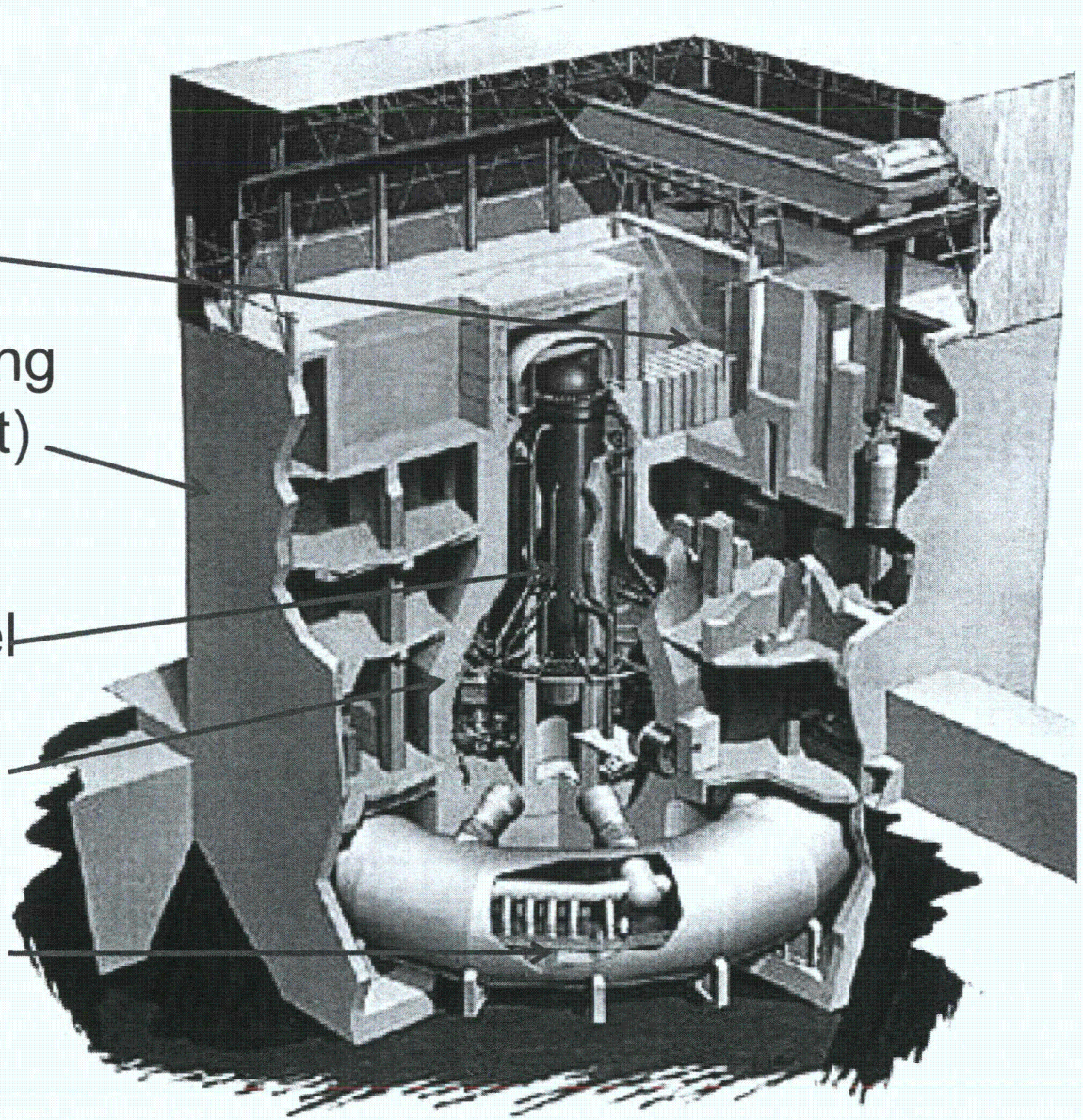
BWR Mark I

- Spent Fuel Pool
- Concrete Reactor Building (secondary Containment)
- Reactor Pressure Vessel
- Containment (Drywell)
- Containment (Wet Well)



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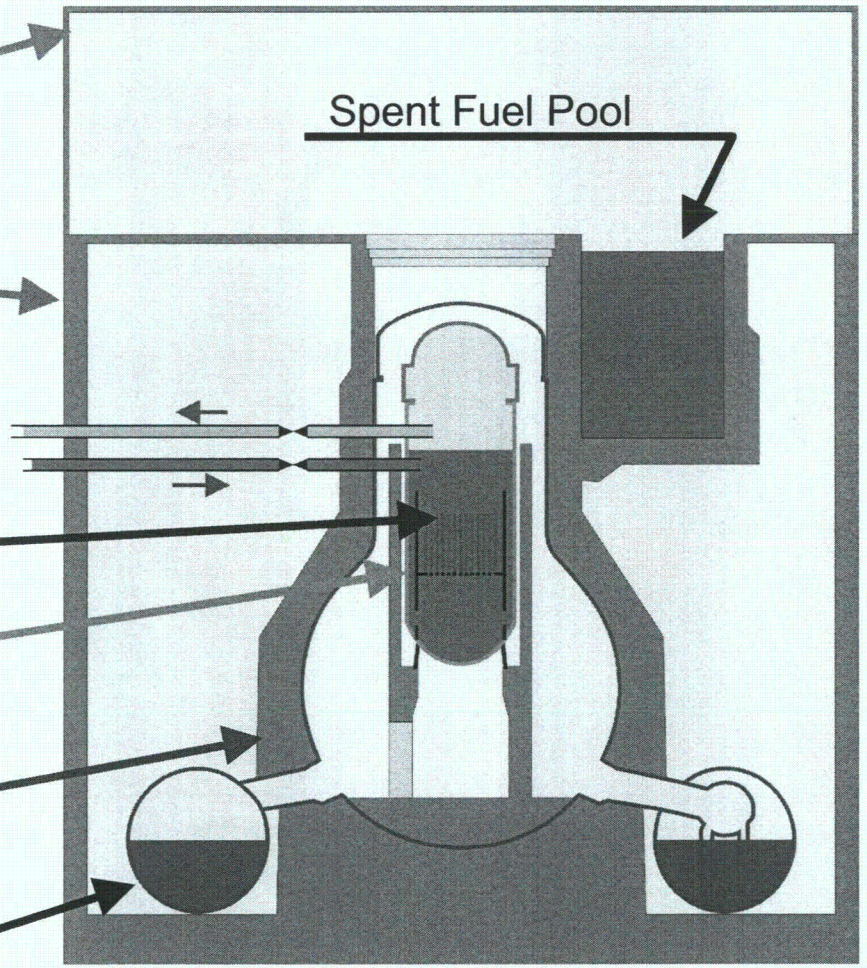
- Reactor Service Floor (Steel Construction)
- Concrete Reactor Building (secondary Containment)
- Reactor Core
- Reactor Pressure Vessel
- Containment (Dry well)
- Containment (Wet Well)



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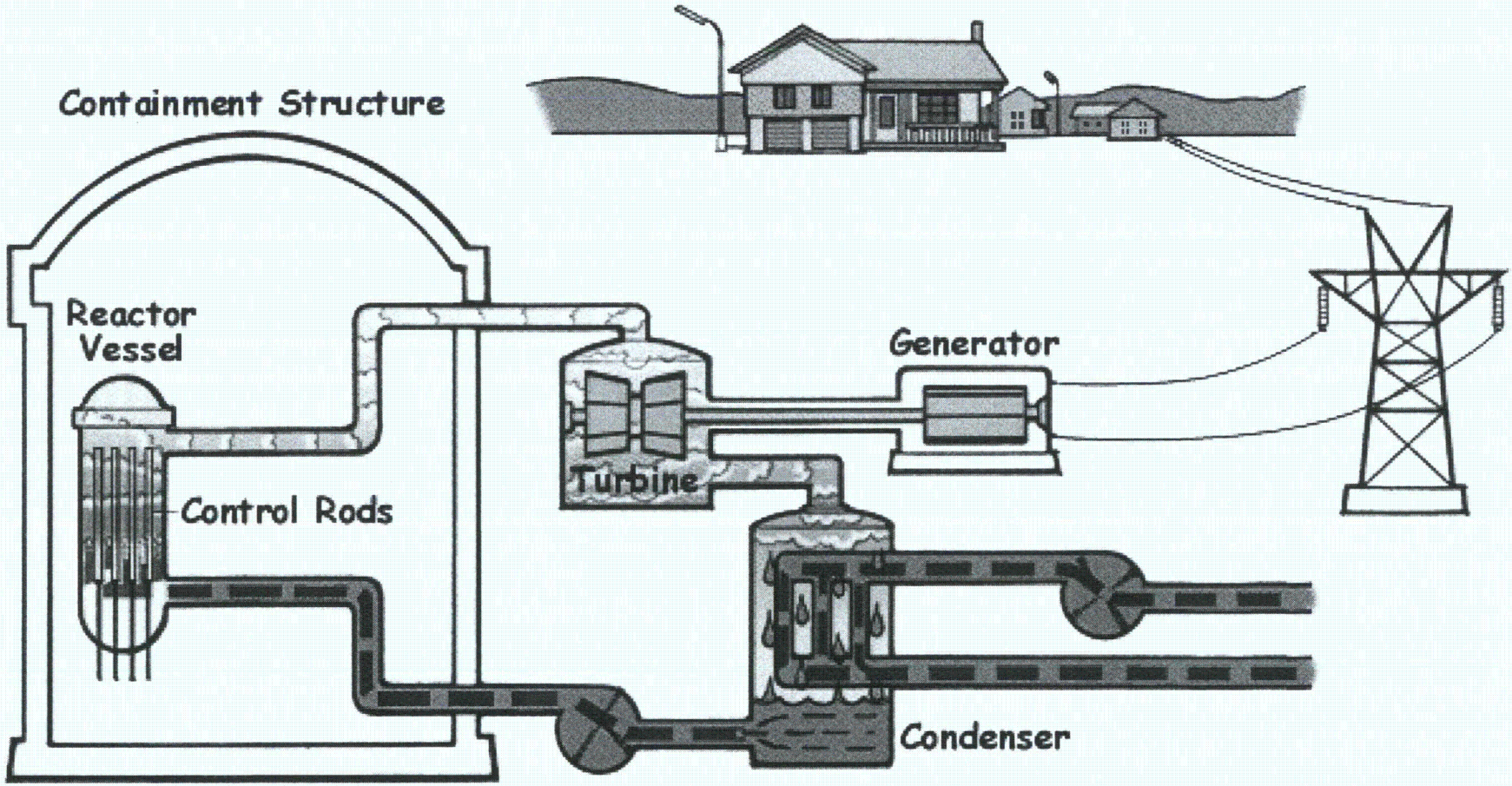
Generic BWR



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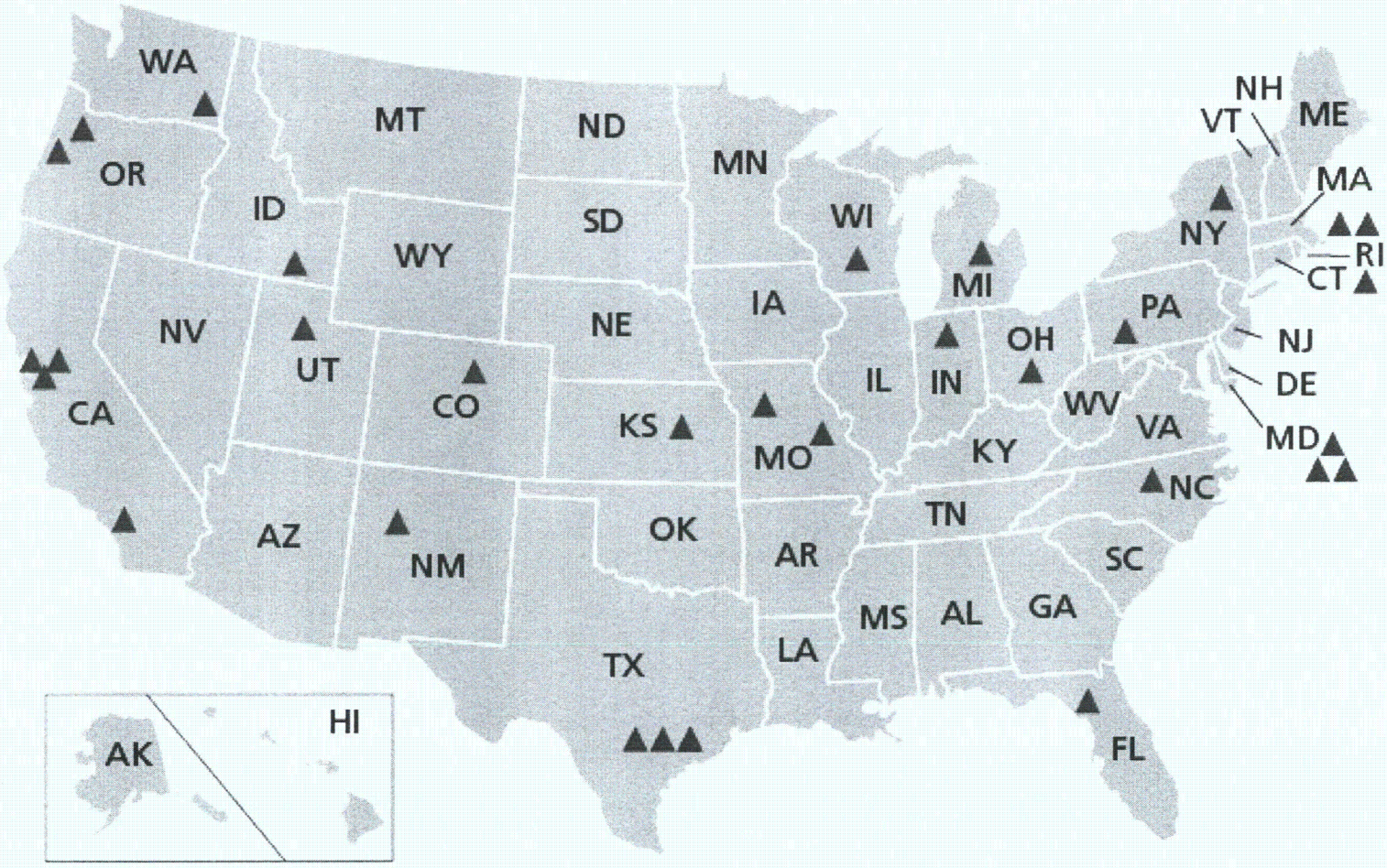
Research and Test Reactors



▲ Licensed/Currently Operating (31)

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Questions?

Merzke, Daniel

From: Merzke, Daniel
Sent: Wednesday, April 13, 2011 11:09 AM
To: Virgilio, Martin
Subject: RE: Request from Commissioner Magwood

This is the first I've heard of this request, Marty. I don't have the schedule of meetings. I'll try to get an answer to them ASAP.

Dan

From: Virgilio, Martin
Sent: Wednesday, April 13, 2011 10:59 AM
To: Merzke, Daniel
Subject: FW: Request from Commissioner Magwood

Dan

What is your understanding on schedules for future meetings?

From: Bubar, Patrice
Sent: Wednesday, April 13, 2011 9:37 AM
To: Vietti-Cook, Annette; Muessle, Mary; Andersen, James
Cc: Borchardt, Bill; Virgilio, Martin; Weber, Michael; Bates, Andrew; Hart, Ken; Laufer, Richard; Bavol, Rochelle
Subject: RE: Request from Commissioner Magwood

Annette, Mary and Jim – any update on when we will get a response?

Patty Bubar
Chief of Staff
Office of Commissioner William D. Magwood
U.S. Nuclear Regulatory Commission
301-415-1895

From: Vietti-Cook, Annette
Sent: Wednesday, April 06, 2011 8:03 AM
To: Muessle, Mary; Andersen, James
Cc: Borchardt, Bill; Virgilio, Martin; Weber, Michael; Bubar, Patrice; Bates, Andrew; Hart, Ken; Laufer, Richard; Bavol, Rochelle
Subject: FW: Request from Commissioner Magwood

Commissioner Magwood is requesting the information on the meetings NRC is being asked to participate in with other federal agencies and the office of the President – relating to Protective Action Guidelines and cleanup levels in the U.S. as well as re-entry guidance for U.S. citizens in Japan.

Can you help in providing a response or point me in the right direction?

From: Bubar, Patrice
Sent: Tuesday, April 05, 2011 6:22 PM
To: Vietti-Cook, Annette; Hart, Ken; Bates, Andrew
Cc: Sosa, Belkys; Nieh, Ho; Sharkey, Jeffry; Batkin, Joshua; Tadesse, Rebecca
Subject: Request from Commissioner Magwood

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SECY – Commissioner Magwood requests that Commission offices be provided information on the meetings that NRC is being asked to participate in with other federal agencies as well as the Office of the President – relating to Protective Action Guidelines and cleanup levels in this country as well as re-entry guidance for US citizens in Japan.

Thank you and let me know if you have any questions.

Patty Bubar
Chief of Staff
Office of Commissioner William D. Magwood
U.S. Nuclear Regulatory Commission
301-415-1895

Merzke, Daniel

From: Merzke, Daniel
Sent: Wednesday, April 13, 2011 12:32 PM
To: Dudek, Michael
Subject: RE: Release of Global Assessment to the CAs

I saw Mike's e-mail yesterday, too. The way I interpreted it, we should be able to release the draft, recognizing it's a work in progress. Perhaps the site team will be able to work on it when they start work again. Since both Marty and Mike seem to think it would be ok to share the draft document, I should think we would be able to. Let's try again tomorrow; I'm sure they can wait until then. Thanks for trying.

Dan

From: Dudek, Michael
Sent: Wednesday, April 13, 2011 11:44 AM
To: Merzke, Daniel
Subject: RE: Release of Global Assessment to the CAs

Dan,

There seems to be a lot of confusion regarding the "Global Assessment" document. It appears that this document is not ready for distribution. The Japan Team (who is asleep right now) has the document and has the tasking of updating it in accordance with senior management's comments. Please see Mr. Weber's e-mail below about the document.

Thoughts?

Michael Dudek | Technical Assistant | NSIR/Division of Preparedness & Response | U.S. NRC
11555 Rockville Pike, Rockville, MD 20852 | ☎ (301) 415-6500 | ✉: Michael.Dudek@nrc.gov

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From: Dyer, Jim
Sent: Tuesday, April 12, 2011 3:07 PM
To: Weber, Michael
Subject: RE: RESPONSE - Follow up to Document Request from Commissioner Assistants Briefing on Japan Sunday April 10

Mike,

I listed these activities as those that we were working on; most aren't ready for release. jim

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From: Weber, Michael
Sent: Tuesday, April 12, 2011 2:00 PM
To: Vietti-Cook, Annette
Cc: Bubar, Patrice; Muessle, Mary; ET05 Hoc; ET01 Hoc; OST02 HOC; FOIA Response.hoc Resource; Andersen, James; Dyer, Jim
Subject: RESPONSE - Follow up to Document Request from Commissioner Assistants Briefing on Japan Sunday April 10

Mary is working on this with the Ops Center, so we should be able to provide the documents promptly. One clarification that I would offer – Chuck Casto and the Japan Site Team are developing slides on the global assessment. I'm not aware that a "Global Assessment" exists at this time; I understand that it is being developed, but it is quite preliminary. In addition, we do not know whether Chuck and the team will have the opportunity to interact with the Secretary of State, let alone share with her the Global Assessment. Consequently, in response to the first request, we can provide the first

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draft of slides on the Global Assessment, recognizing that they are quite preliminary and have not been fully vetted. The other two requests should be easily fulfilled.

From: Vietti-Cook, Annette
Sent: Tuesday, April 12, 2011 10:33 AM
To: Muessle, Mary; ET05 Hoc
Cc: Weber, Michael; Bubar, Patrice
Subject: Follow up to Document Request from Commissioner Assistants Briefing on Japan Sunday April 10

I have been asked by the Commission offices to follow up on a document request from the Subject Commissioner Assistants Briefing on Japan. The Commission offices requested documents that are being shared with other agencies and were referred to on the call:

Global Assessment that will be shared with Secretary Clinton as part of her visit

Criteria for temporary reentry into the evacuation zone

Criteria for permanent reentry into the evacuation zone

Can you please assist in providing this information to the Commission offices?