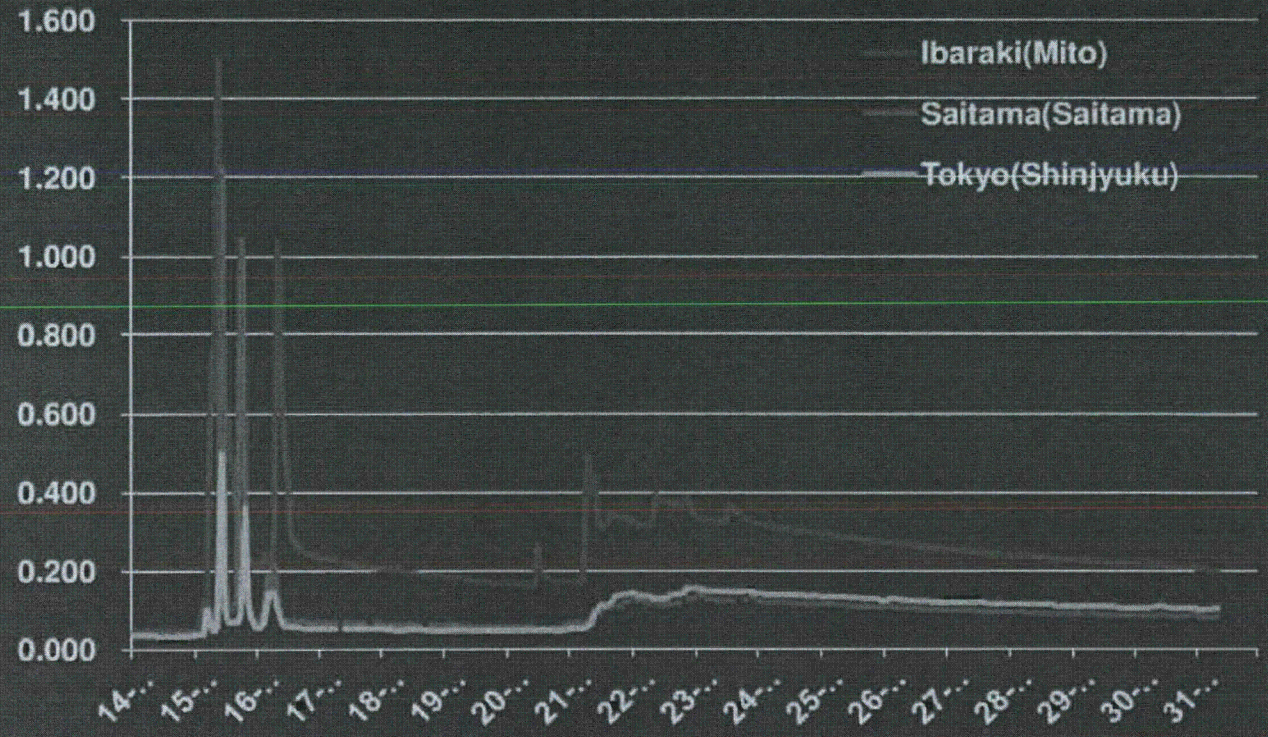
Fukushima Nuclear Accident

Radiological Monitoring and Consequences

April 1, 2011

Gamma Dose Rates in µSv/hour
14-31 March



Natural Background: 0.1 µSv/hour: continue to decrease

Measurements of the IAEA team

March, 31- April 1, Fukushima Team1 and 2

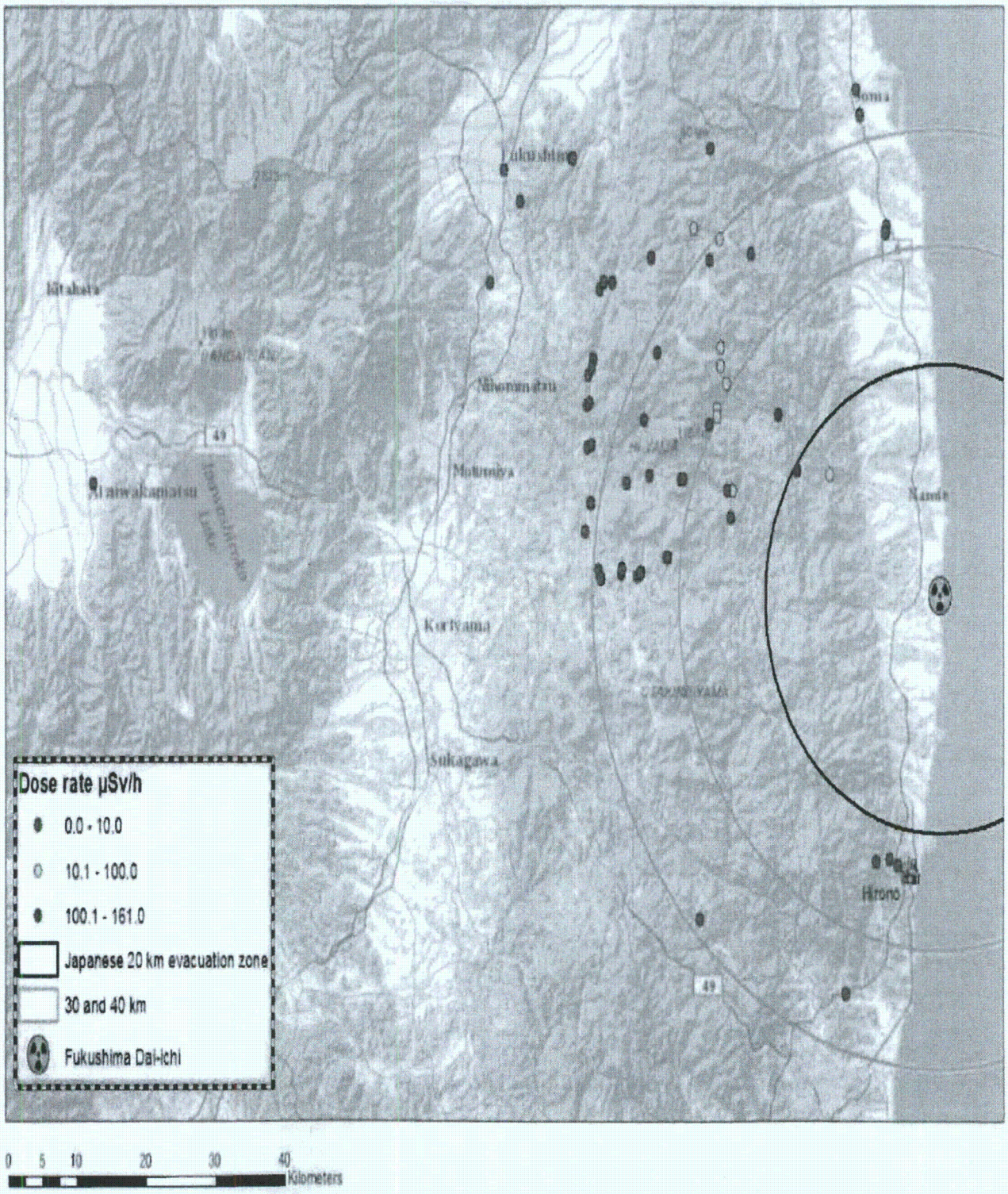
- 1 April, FT2 and FT3 altogether as succession process.
- 7 different points of radius of 23 to 58 km from the Fukushima NPP
- Dose rates: 0.4 to 5 μSv/h
- Beta-gamma contamination: 0.01 to 0.49 MBq/m^2
- Several gamma spectra, air samples and smears collected
- No alpha particles detected in the air.
- 2 April, FT2 back to Tokyo, and then to Vienna

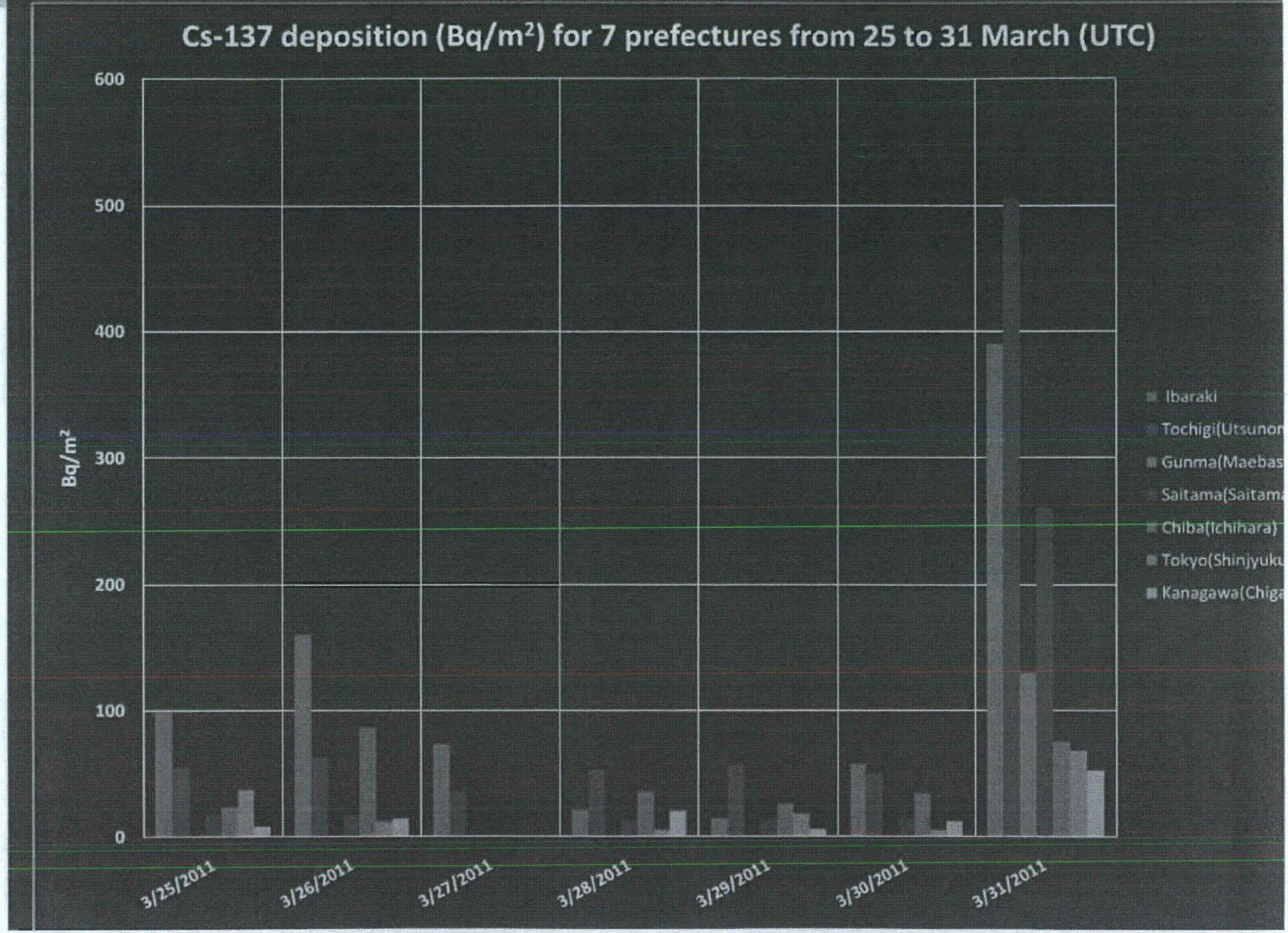
March 31, Tokyo team

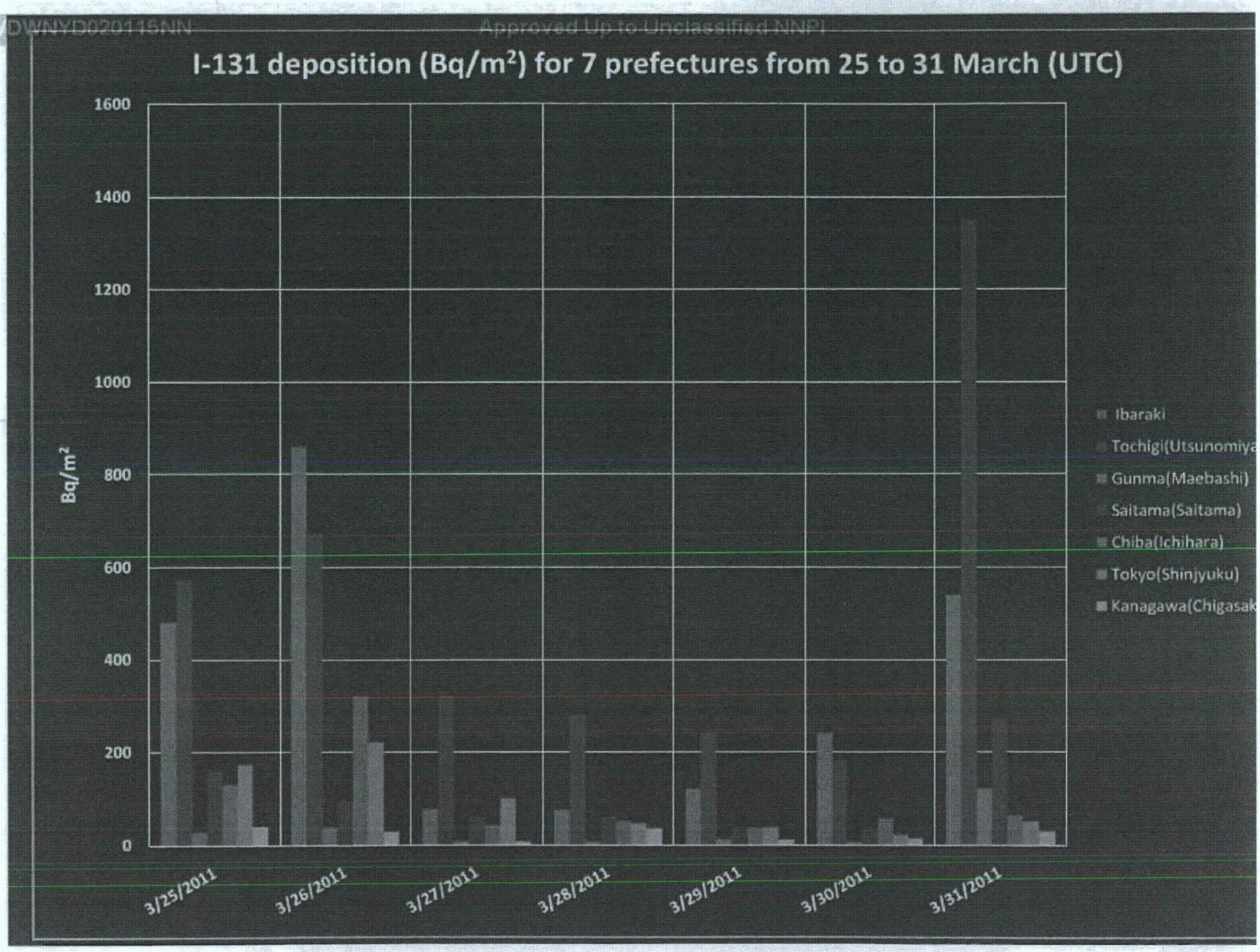
- 31st was the last day for Tokyo-team

IAEA Field Team Measurements up to 2011-03-31

Team Fukushima







Monitoring of Workers 29 March

- **Nuclear and Industrial Safety Agency's report:**
  - 106,095 people in Fukushima
  - 102 above 100,000 counts per minute (cpm)
  - Levels decreased after removal of clothes
  - No cases that may influence health
- Among workers at Fukushima NPP:
  - 20 workers exceeded 100mSv
  - (Dose limit for emergency workers in life saving operation: 250 mSv)

Monitoring of drinking water 28 March

- Recommendations for restrictions on drinking water being lifted in most locations.
- Recommendations for restrictions based on I-131 concentration remain in place in 4 locations of Fukushima prefecture.

Radioactivity in Foodstuffs

- Results reported 31 March by the Japanese Ministry of Health, Labour and Welfare
- 98 of the 111 samples for various vegetables, fruit, seafood, various meats and unprocessed raw milk
- in 8 prefectures (Chiba, Fukushima, Gunma, Ibaraki, Kanagawa, Niigata, Tochigi, and Tokyo),
- I-131, Cs-134 and Cs-137 were either not detected or were below the regulation values set by the Japanese authorities.

Radioactivity in Foodstuffs

- 13 of the 111 samples:
  - for spinach and other leafy vegetables, parsley and beef
  - in Chiba, Fukushima, Ibaraki and Tochigi prefectures indicated that I-131 and/or Cs-134 and Cs-137 exceeded the regulation values set by the Japanese authorities.

Discussion concerning soil

- The Japanese Agriculture Ministry has announced on 30 March the need to establish acceptable levels of radioactive Cs in soils to help farmers to decide whether to plant crops.
- Fukushima prefecture conducted a survey of soil from farmlands on 31 March.

Joint FAO/IAEA Food Safety Assessment Team

- The Joint FAO/IAEA Food Safety Assessment Team has successfully completed its mission.
- The team presented its report to the Japanese Cabinet Office, Ministry of Foreign Affairs, Ministry of Health, Labour and Welfare and the Ministry of Agriculture, Fisheries and Forestry on 31 March.
- The IAEA members of the Team are returning to Vienna today.

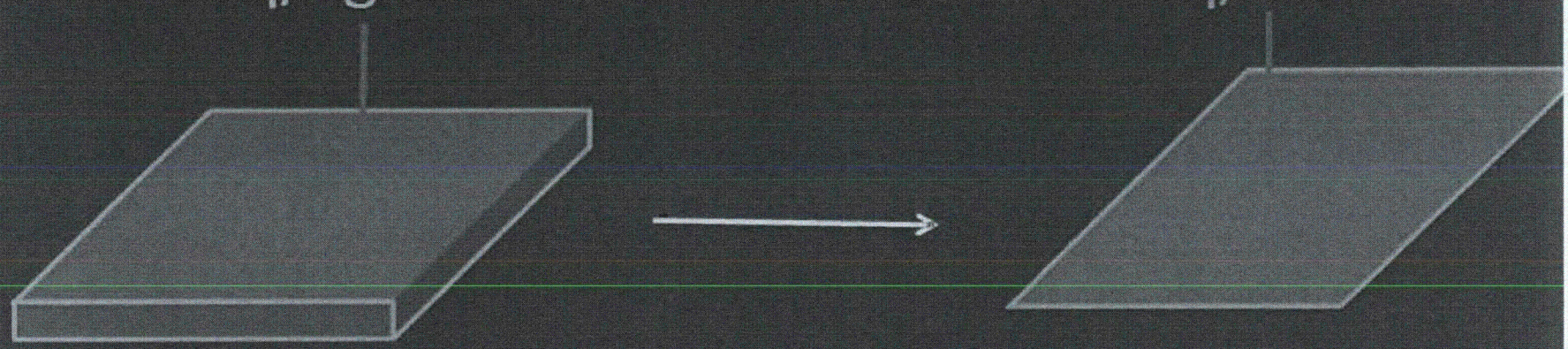
From Bq/kg to Bq/m^2

- Soil sample taken with a device that penetrates the ground at the depth of 5 cm
- Measurement of radioactivitiy within the sample, using a spectrometer
- Result: Radioactivity in Bq/kg
- Conversion from Bq/kg to Bq/m^2 depends on:
  - Radioactivity (Bq/kg)
  - Soil density (kg/m^3)
  - Sample depth (m)

Assuming a homogeneous distribution of radioactivity within tha aera considered

Radioactivity in soil
Bq/kg

Average soil surface contamination
Bq/m^2



Radioactivity (Bq/kg)x Soil density (kg/m^3)x sample depth (m)
= Surface contamination (Bq/m^2)

5/7/11

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[Type text]

Some links on the Fukushima Daiichi #1 crisis

(This post is being updated without warning)

Very developing news:

- Explosion heard in vicinity of one of the Fukushima NPPs [19]
- Concrete walls collapse at NPP; unclear which building [20]
- White smoke observered [21] (attached video is not of NPP)

(earlier content follows)

The biggest crisis supposedly involves Fukushima-Daiichi unit #1 [ref 1]. According to IAEA's CNPP database [ref 2], this is a General Electric **BWR/3** reactor [table, ref 3] (refuting wikipedia [ref 4], which incorrectly thinks it is a BWR/4). Nuclear Tourist [ref 5] says this reactor uses a **Mark I** containment (pictured below). An NRC introduction I found, "Reactor Concepts Manual | Boiling Water Reactor (BWR) Systems" [ref 6], gives a basic overview of the coolant systems which are in the news (RCIC, ECCS). Some more information is in an article by Madgi Ragheb (UIUC) [ref. 7]

There are ongoing press releases from TEPCO with details [11].

Brave New Climate has a very active discussion thread [17]

Developing news:

- Fuel failure suspected as cesium (volatile fission product) detected outside [8] [9]
- Report that fuel rods were uncovered [10]; not corroborated
- Containment building vented to atmosphere at Fukushima Daiichi #1 [8]; limited radiological release
- Dose rate reached 1,000x background in control room (~65 μSv/hr), 8x background on-site outdoors (~0.5 μSv/hr) [14] (cf. radiation sources [15])
- Reports claim Fukushima Daini nos. 1,2,4 control room temperatures exceed 100 °C [8][9]; **probable mistranslation** -- TEPCO says *pressure suppression chambers* exceeded 100 °C at exactly these reactors [12]

- (in the Mark I containment systems, that means the large torus on the diagrams below. Not sure if these reactors have torii)
- Some primary coolant pumps flooded with seawater, nonfunctional [9]
- TEPCO reports trapped worker seriously injured [12]
- TEPCO reports worker overirradiated (106.3 mSv = 10.63 rem) [13] (this is harmful but not acutely fatal)
- TEPCO reports more worker injuries [13]: one broken bone, one unconscious, one with possible heart problem
- Almost 51,000 evacuated over 10 km radius [16]

GE Mark I BWR containment [Magdi Ragheb, U. Illinois at Urbana-Champaign]

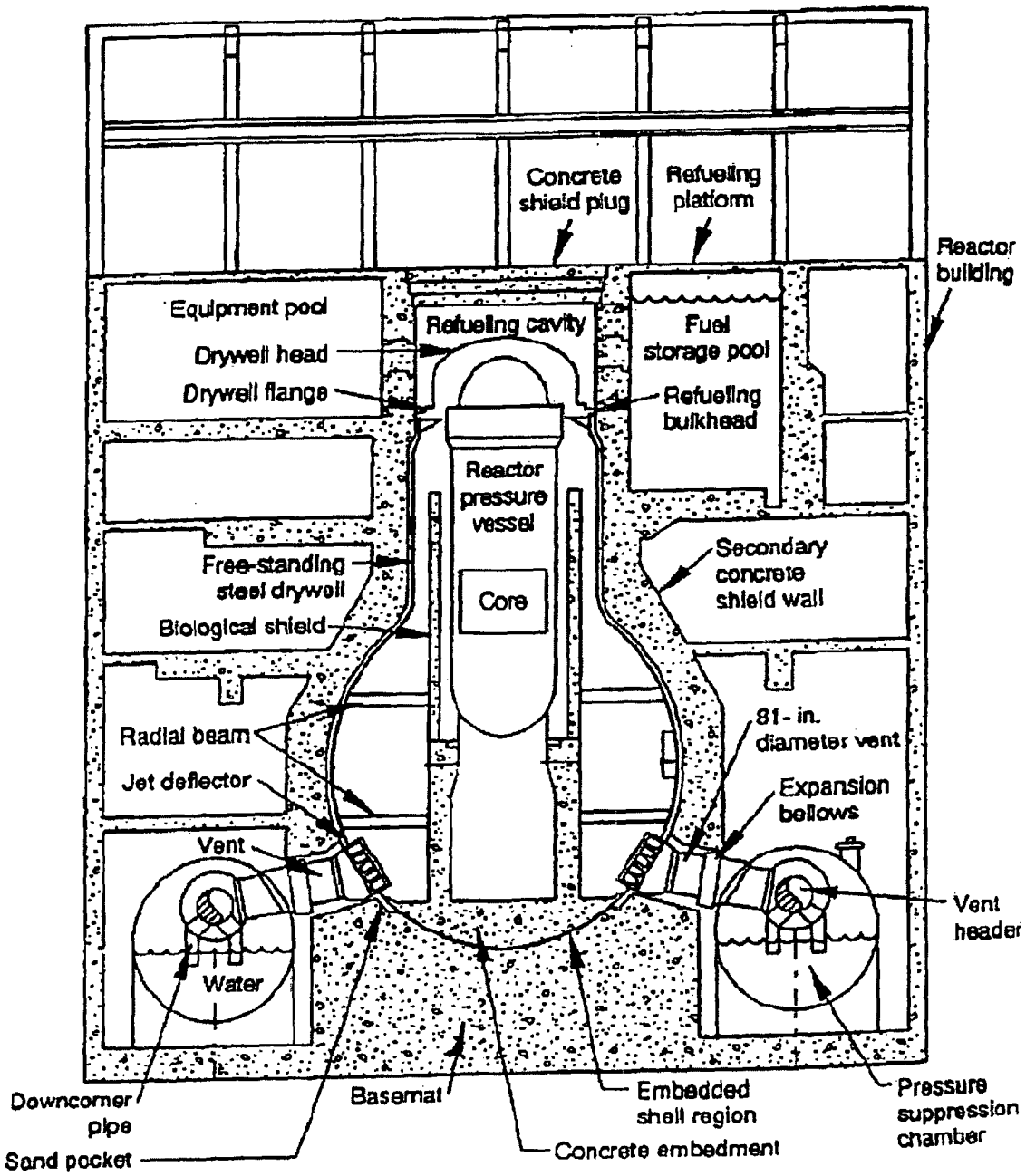
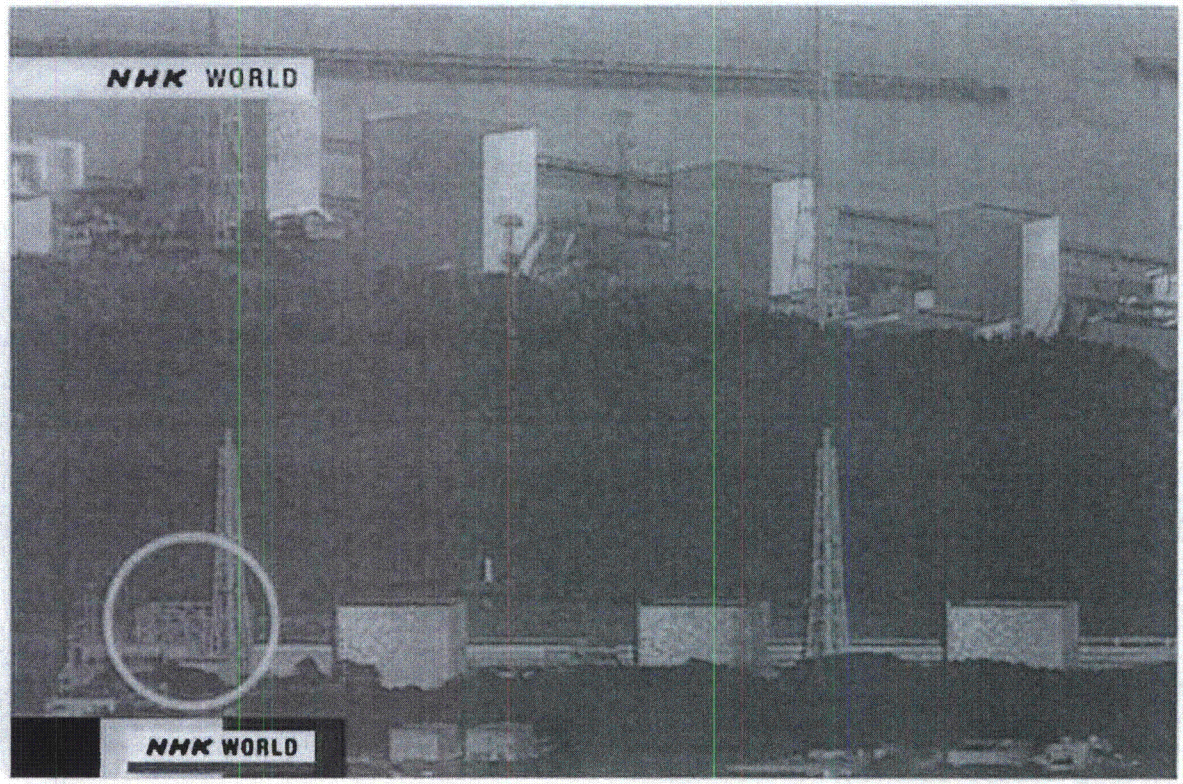


Figure 20. Mark I General Electric,GE BWR Containment.



- BWR 'reactor buildings' are the equivalent to our auxiliary building

- The auxiliary building surrounds the containment structure, which houses the reactor.

- One plant is an Isocondenser plant and the other is an RCIC plant. I am not exactly sure what the differences between the two are.

- They now believe that the Reactor Building was destroyed by Hydrogen explosion.

- Vessel is still intact.

- Operators performing the venting operations are receiving 10 rem per venting evolution.

- They are now putting sea water into the building to submerge the vessel.

- NRC is communicating with GE directly.

- Approximately 1 hour after the loss of offsite power, the emergency diesel generators stopped.

- The apparent cause was that their bulk storage tanks are above ground and were swept away in the tsunami and the EDGs ran out of fuel.

- The two plants sat without AC power for at least 12 hours and may still not have any now.

- Some key differences between the Japanese and the US plants:

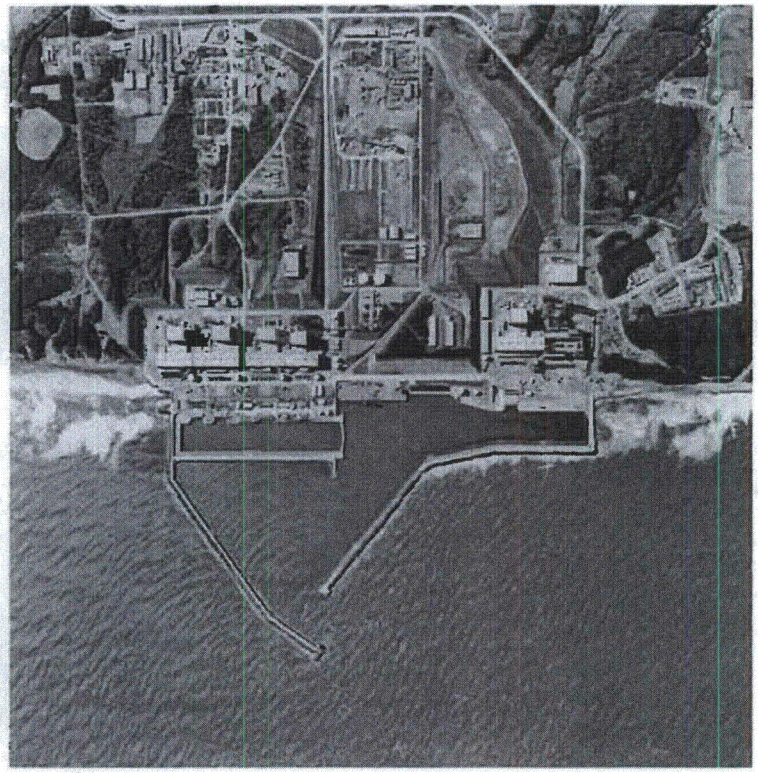
o We have symptom based EOPs. The Japanese still uses the pre-TMI event based EOPs.

o We have Severe Accident Management Guidelines. The Japanese they do not.

o We have the SBOs. The Japanese do not.

o We have the B.5.b contingency pumps.

Unit 1 is a 439 MW boiling water reactor (BWR3) constructed in July 1967. It commenced commercial electrical production March 26, 1971, and was scheduled for shutdown on March 26, 2011. It was damaged during the 2011 Sendai earthquake and tsunami.[5]



After the March 11, 2011, earthquake, Nuclear Engineering International reported that units 1, 2 and 3 were automatically shut down. Units 4, 5 and 6 had already been shut down for maintenance.[8] Major electrical supply failures in the region meant that electric power on site and in particular for the cooling system was only available from the plant itself. After main generation stopped, power supply for cooling was transferred to emergency diesel generators. However, the generators installed to provide backup power for the cooling systems for units 1–3 were damaged by the tsunami;[9] they started up correctly but stopped abruptly about 1 hour later.[10] In Japan a nuclear emergency is declared when a plant experiences cooling problems, so a nuclear emergency was declared when the diesel generators stopped and cooling was interrupted. Cooling is needed to remove residual reactor heat even when a plant has been shut down. Batteries, which last about eight hours, were used to power the reactor controls and valves during the electrical outage.[11][12][13] Japanese ground forces were said to be trucking generators and batteries to the site.[14]

An evacuation order was issued to people living within 3 kilometres (1.9 mi) of the plant, affecting approximately 5,800 residents, but others living less than 10 kilometres (6.2 mi) from the power plant were advised to stay indoors.[15] Later the evacuation was expanded to a 10 kilometres (6.2 mi) radius, and then to 20 kilometres (12 mi).[16][17][18]

On March 12, 2011, after midnight local time, it was reported that the Tokyo Electric Power Company was considering venting hot gas from number 1 reactor vessel into the atmosphere, which could result in the release of radiation.[19] The Tokyo Electric Company reported that radiation levels were rising in the turbine building for reactor 1.[20] At 2:00 JST, the pressure inside the reactor containment was reported to be 600kPa (6 bar or 87 psi), 200 kPa (2 bar or 29 psi) higher than under normal conditions.[10] At 5:30 JST the pressure inside Reactor 1 was reported to be 2.1 times the "design capacity",[21] 820 kPa (8.2 bar or 120 psi).[22] At 6:10 JST, the IAEA reported that unit 2 was also experiencing cooling problems.[23]

Wikinews has related news: ***Earthquake-damaged Fukushima nuclear power plant triggers evacuation***

Potentially radioactive steam was released from the primary circuit into the secondary containment area to reduce mounting pressure.[24] On March 12, 2011, at 6:40 JST, Chief Cabinet Secretary Yukio Edano stated that the amount of potential radiation would be small and that the prevailing winds are blowing out to sea.[25] Radiation levels recorded by the plant control room were reported to be approximately 70 microsieverts (i.e., 7 millirem) per hour.[26] Radiation levels measured at a monitoring post near the plant's main gate were reported to be more than eight times above normal.[27][28] In a press release at 7 am (local) March 12, TEPCO stated, "Measurement of radioactive material (Iodine, etc.) by monitoring car indicates increasing value compared to normal level. One of the monitoring posts is also indicating higher than normal level."[18] At 13:30 local time, radioactive caesium was detected near reactor 1[29][30] and at 15:29 JST (06:43 GMT) TEPCO reported that radiation levels at the site boundary exceeded the regulatory limits.[31] Fuel rods may have been exposed to the air.[32]

The Prime Minister of Japan, Naoto Kan, visited the plant for a briefing on March 12, 2011.[33] The Tokyo fire department sent a special nuclear rescue team to Fukushima.[34]

Over 50,000 have been evacuated during March 12.[35]

An announcement of TEPCO indicated that the gamma ray radiation recorded on the main gate was increased from 69 nanogray/hour (nGy/h) (4:00 local time, 12 March) to 866 nGy/h 40 minutes later and reached the peak of 385.5 microsievert/hour at 10:30am local time.[36]

[edit] Explosion and collapse of the outer structure

NHK Sōgō channel TV program screen shot image depicting before and after a explosion of Fukushima. The collapse is visible from the height difference of the structure behind the tower relative to the tower. I The news was broadcast at 18:00 (JST) 12 March 2011.

At 15:36 JST (7:36 GMT) on March 12, there was an explosion at the plant injuring four workers.[37] The explosion was officially confirmed at 18:43 JST (9:43 GMT).[38] Chief Cabinet Secretary Yukio Edano indicated -according to a Reuters report of 21:36 JST (7:36 ET), that the concrete outer structure had collapsed as a result of a hydrogen explosion. Hydrogen had been produced due to falling water levels in the reactor and leaked into the area between the outer layer and the outer structure and the inner container.[39]At 19:37 JST (10:37 GMT) Reuters reported that Mr Ian Hore-Lacy, communications director at the World Nuclear Association, had suggested the same cause.[40] Edano further indicated that the container of the reactor had remained intact and there had been no large leaks of radioactive material.[39] An increase in radiation levels was confirmed following the explosion.[41][42] ABC (Australia) reported "According to the Fukushima prefectural government, the hourly radiation from the plant reached 1.015 millisievert [0.1015 rem], an amount equivalent to that allowable for ordinary people in one year."[43][44] Yaroslov Shtrombakh, a Russian nuclear expert, said he did not believe that a Chernobyl-style disaster will occur, citing the differences between the designs of the Chernobyl Nuclear Power Plant and the Fukushima I Nuclear Power Plant. He speculated that any nuclear material released during the incident would likely be confined to the grounds in and around the power plant.[45] American nuclear expert Edwin Lyman told Reuters that although he did not have full information about what had happened, "every indication is that the type of event that has occurred there is one of the most serious things that can happen in a nuclear reactor."[46]

At 21:00 JST (12:00 GMT) TEPCO announced that they planned to cool the leaking reactor with sea water (which started at 8:20pm local time), then using boric acid to act as a neutron absorber to prevent a criticality accident.[47][48] The sea water would take five to ten hours to fill the reactor core, after which it would require seawater cooling for around ten days.[39] At 23:00 JST (14:00 GMT) TEPCO announced that due to the quake at 22:15[49] the filling of the reactor with sea water and boric acid had been stopped.[50]

At 01:17 JST on Sunday 13th March (16:17 GMT), the Japan Atomic Energy Agency announced that it was rating the Fukushima accident at 4 (accident with local consequences) on the 0–7

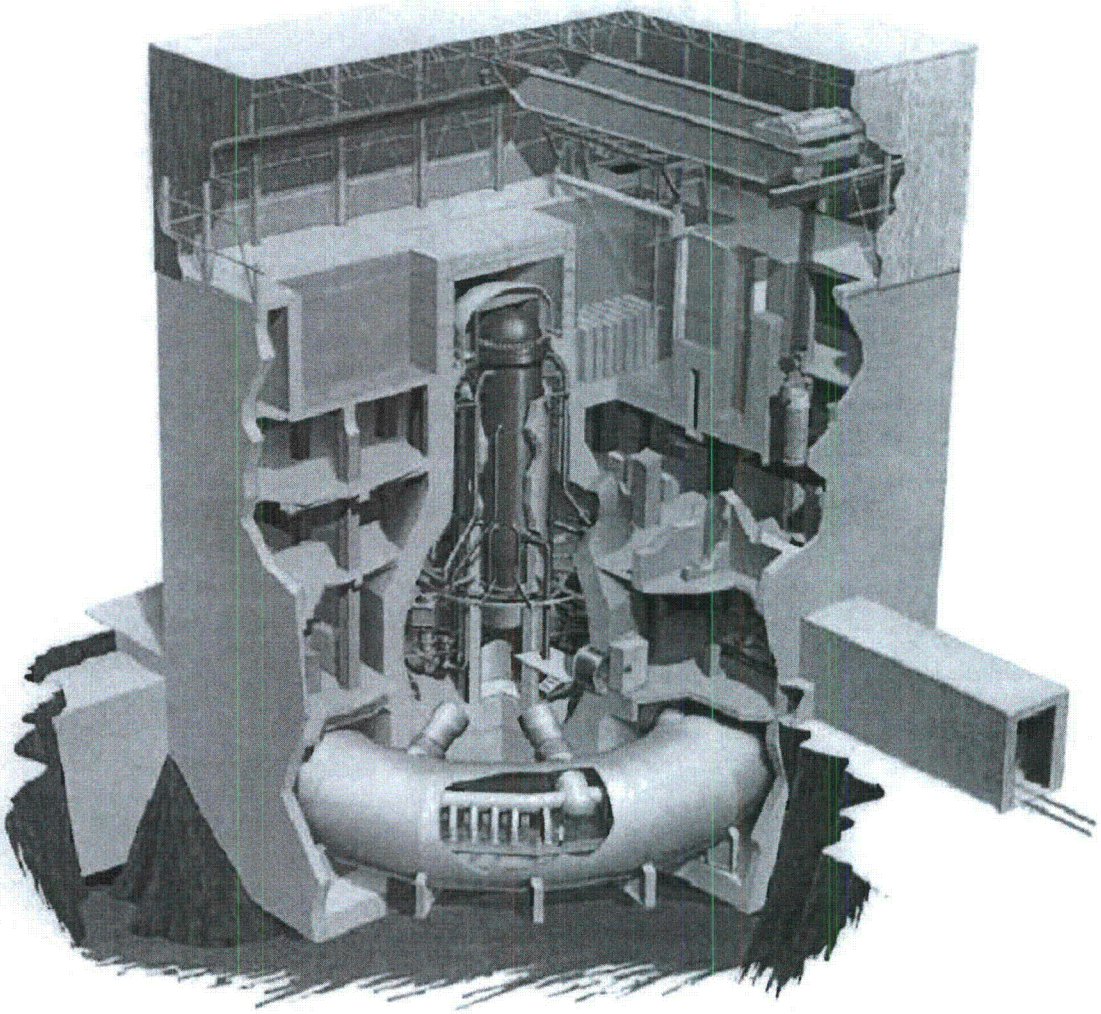
International Nuclear Event Scale (INES), below the Three Mile Island accident in seriousness.[51]

[edit] Effect on employees and residents

The Guardian reported at 17:35 JST (8:35 GMT) on March 12 that NHK advised residents of the Fukushima area "to stay inside, close doors and windows and turn off air conditioning. They were also advised to cover their mouths with masks, towels or handkerchiefs" as well as not to drink tap water.[52] At 19:07 JST (10:07 GMT) Reuters reported that the exclusion zone had been extended to 20 kilometres (12 mi) around the plant.[53] BBC correspondent Nick Ravenscroft was stopped 60 kilometres (37 mi) from the plant by police.[54] Air traffic has been restricted in a 20 kilometres (12 mi) radius around the plant, according to a NOTAM.[55] The BBC has reported as of 22:49 JST (13:49 GMT) "A team from the National Institute of Radiological Sciences has been despatched to Fukushima as a precaution, reports NHK. It was reportedly made up of doctors, nurses and other individuals with expertise in dealing with radiation exposure, and had been taken by helicopter to a base 5 km from the nuclear plant."[38]

The BBC has reported as of 23:27 JST (14:27 GMT) "More than 300,000 people have now been evacuated from homes in northern Japan and that number will rise as the government increases the exclusion zone around the Fukushima nuclear power plant."[38] At 23:43 JST (14:43 GMT) BBC News stated that the four workers that were injured in the blast at the Fukushima No. 1 nuclear plant were conscious and their injuries were not life-threatening.[38] This was followed at 23:59 JST (14:59 GMT) with BBC advising both Kyodo and NHK reporting at least three residents evacuated from a town near quake-hit Fukushima No. 1 plant have been exposed to radiation.[38] According to the World Nuclear Association, a worker operating in a crane on the exhaust stack had died.[56]

At 22:53 JST (13:53 GMT) Tokyo Broadcasting System (TBS), quoting Fukushima representatives, has reported that there was an evacuation of 30 staff members and 60 patients due to the explosion. From those evacuees three patients received a checkup for radiation exposure by the hospital staff at Futaba, a town 3.5 miles from the power plant. One out of three people who received the checkup showed an exposure of "100,000 counts per minute" (about 45 nanocuries) while the other two people showed exposure of 40,000 (≈18 nCi) and 30,000 (≈14 nCi) counts per minute. According to experts, this is a level of radiation from which an individual needs to be decontaminated. While all three patients were decontaminated, they may have contaminated the other individuals who were evacuated and those evacuees may also require decontamination. [57]



DRYWELL TORUS

Purpose

This paper is a response to the actions discussed in NRC IN 2011-05 to address concerns stemming from the recent events at the Fukushima reactor plant in Japan.

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Figure 7.5-1, Exterior Fire Protection System Overall Site Plan.

Kirby, Janice

Subject:	Pulse Check "Brown Bag" Lunch with New Hires (VMM/LW/CAC)
Location:	1486
Start:	Tue 5/3/2011 11:45 AM
End:	Tue 5/3/2011 12:45 PM
Show Time As:	Tentative
Recurrence:	(none)
Meeting Status:	Not yet responded
Organizer:	Miles, Patricia
Required Attendees:	Alexander, Sarah; Bacon, Daniel; Coovert, Nicole; Dumont, Louis; Endress, Matthew; Heath, Shawanna; Huffman, Chad; King, Katrina; Lerch, Andrew; Mathis III, Robert; Oelstrom, Chad; Patterson, Eric; Ponko, Anthony; Pursley, William; Rivera, Jonathan; Smith, Clint; Smith, Steven; Su, Teh-Chiun; Terry-Ward, Denise; Toth, Amanda; Toth, Matthew; Vasquez, Jose; McCree, Victor; Wert, Leonard; Lee, Pamela; Miles, Patricia; R2ORACal Resource; Casto, Chuck; Dubose, Sheila; R2_CCI_Cal Resource

Region II "Pulse Checks"

Weeks ago, if someone had asked for my opinion about what the average person in the U.S. knows about nuclear power and the role of the NRC, I would have answered, "very little". But, now, after a catastrophic earthquake and tsunami devasted parts of Japan and triggered the ongoing nuclear emergency at the Fukishiman Daiichi nuclear station, my answer would be different.

If you want to chat about this issue and/or any other topics, I want to invite you to the next, 1-hour ***"Pulse Checks"*** (bring your own brown bag) ***Lunchtime Discussion***. I envision this to be an informal, open discussion of whatever is of interest to you (e.g., questions, observations, recommendations, etc.). The next lunchtime discussion will be held on May 3, 2011, following Current Events. For your convenience, you will receive a separate appointment invitation from Pat Miles that will identify the meeting time and location.

Please note that your participation in this discussion is completely voluntary. And, because the Pulse Checks will be held monthly following each Current Events meeting, if you're unable to join me in May there will be other opportunities.

Thanks, Vic

p.s., I will supply dessert!

Frequently Asked Questions:
Japanese Nuclear Energy Situation*
Updated 3.25.2011

1. ***What is the nuclear industry doing in the short-term to respond to the accident at the Fukushima nuclear power plant?***

   The nuclear energy industry's top priority remains providing Japan with the support necessary to achieve safe shutdown of the Fukushima reactors. The accident at Fukushima Daiichi was caused, in part, by extraordinary natural forces that were outside the plant's required design parameters. Even though the full extent of damage to these reactors still is unknown, the combination of the earthquake and the tsunami challenged the structural integrity and safety of the plant. As more is learned about the Japanese events, more long-term corrective actions will be developed.

   The U.S. nuclear energy industry has already started an assessment of the events in Japan and is taking steps to ensure that U.S. reactors could respond to events that may challenge safe operation of the facilities. These actions include:

   - Verify each plant's capability to manage major challenges, such as aircraft impacts and losses of large areas of the plant due to natural events, fires or explosions. Specific actions include testing and inspecting equipment required to mitigate these events, and verifying that qualifications of operators and support staff required to implement them are current.

   - Verify each plant's capability to manage a total loss of off-site power. This will require verification that all required materials are adequate and properly staged and that procedures are in place, and focusing operator training on these extreme events.

   - Verify the capability to mitigate flooding and the impact of floods on systems inside and outside the plant. Specific actions include verifying required materials and equipment are properly located to protect them from flood.

   - Perform walk-downs and inspection of important equipment needed to respond successfully to extreme events like fires and floods. This work will include analysis to identify any potential that equipment functions could be lost during seismic events appropriate for the site, and development of strategies to mitigate any potential vulnerabilities.

2. ***How will the U.S. nuclear industry assess the impact of the Fukushima Daiichi accident?***

   Until we understand clearly what has occurred at the Fukushima Daiichi nuclear power plants, and any consequences, it is difficult to speculate about the long-term impact on the U.S. nuclear energy program. The U.S. nuclear industry, the U.S. Nuclear Regulatory Commission, the Institute of Nuclear Power Operations, the World Association of Nuclear Operators and other expert organizations in the United States and around the world will conduct detailed reviews of the accident, identify lessons learned (both in terms of plant operation and design), and we will incorporate those lessons learned into the design and operation of U.S. nuclear power plants. When we

* Developed by the Nuclear Energy Institute

fully understand the facts surrounding the event in Japan, we will use those insights to make nuclear energy even safer.

In the long-term, we believe that the U.S. nuclear energy enterprise is built on a strong foundation:

- reactor designs and operating practices that incorporate a defense-in-depth approach and multiple levels of redundant systems,
- a strong, independent regulatory infrastructure,
- a transparent regulatory process that provides for public participation in licensing decisions, and
- a continuing and systematic process to identify lessons learned from operating experience and to incorporate those lessons.

3. ***Are U.S. emergency planning requirements and practices adequate to deal with a situation like that faced at Fukushima Daiichi?***

Yes. Federal law requires that energy companies develop and perform graded exercises of sophisticated emergency response plans to protect the public in the event of an accident at a nuclear power plant. The U.S. Nuclear Regulatory Commission reviews and approves these plans. In addition, the NRC coordinates approval of these plans with the Federal Emergency Management Agency (FEMA), which has the lead federal role in emergency planning beyond the nuclear plant site. An approved emergency plan is required for the plant to maintain its federal operating license. A nuclear plant's emergency response plan must provide protective measures, such as sheltering and evacuation of communities within a 10-mile radius of the facility. In 2001, the NRC issued new requirements and guidance that focus in part on emergency preparedness at plant sites in response to security threats. The industry has implemented these measures, which address such issues as on-site sheltering and evacuation, public communications, and emergency staffing in the specific context of a security breach. Several communities have used the structure of nuclear plant emergency plans to respond to other types of emergencies. For example, during the 2007 wildfires in California, county emergency officials drew on relationships and communications links they had established during their years of planning for nuclear-related events.

In addition, as part of the emergency plan, nuclear plant operators would also staff Emergency Centers within one hour to provide support to the plant staff during the event. This support would be in the form of:

- Technical expertise (engineering, operations, maintenance and radiological controls)
- Offsite communications and interfaces, (state, local and NRC)
- Security and logistics

4. ***Should U.S. nuclear facilities be required to withstand earthquakes and tsunamis of the kind just experienced in Japan? If not, why not?***

U.S. nuclear reactors are designed to withstand an earthquake equal to the most significant geological event or the maximum projected seismic event and associated tsunami without any breach of safety systems. The lessons learned from events at Fukushima must be reviewed carefully to see whether they apply to U.S. nuclear power plants. It is important not to extrapolate earthquake and tsunami data from one location of the world to another when evaluating these natural hazards, however. These catastrophic natural events are very region- and location-specific, based on tectonic and geological fault line locations.

The U.S. Geological Survey (USGS) conducts continuous research of earthquake history and geology, and publishes updated seismic hazard curves for various regions in the continental US. These curves are updated approximately every six years. NRC identified a generic issue (GI-199) that is currently undergoing an evaluation to assess implications of this new information to nuclear plant sites located in the central and eastern United States. The industry is working with the NRC to develop a methodology for addressing this issue.

5. ***Is this accident likely to result in changes to regulatory requirements for U.S. nuclear plants in seismically active areas? Will those regulatory requirements be revisited and made more robust?***

The nuclear energy industry believes that existing seismic design criteria are adequate. Every U.S. nuclear power plant has an in-depth seismic analysis and is designed and constructed to withstand the maximum projected earthquake that could occur in its area without any breach of safety systems. Each reactor is built to withstand the maximum site-specific earthquake by utilizing reinforced concrete and other specialized materials. Each reactor would retain the ability to safely shut down the plant without a release of radiation. Given the seismic history in California, for example, plants in that state are built to withstand an even higher level of seismic activity than plants in many other parts of the country.

Engineers and scientists calculate the potential for earthquake-induced ground motion for a site using a wide range of data and review the impacts of historical earthquakes up to 200 miles away. Those earthquakes within 25 miles are studied in great detail. They use this research to determine the maximum potential earthquake that could affect the site. Each reactor is built to withstand the respective strongest earthquake. Experts identify the potential ground motion for a given site by studying various soil characteristics directly under the plant. For example, a site that features clay over bedrock will respond differently during an earthquake than a hard-rock site. Taking all of these factors into account, experts determine the maximum ground motion the plant must be designed to withstand. As a result, the design requirements for resisting ground motion are greater than indicated by historical records for that site. It is also important not to extrapolate earthquake and tsunami data from one location of the world to another when evaluating these natural hazards. These catastrophic natural events are very region- and location-specific, based on tectonic and geological fault line locations.

6. ***Do the events indicate that iodine tablets should be made widely available during an emergency?***

The thyroid gland preferentially absorbs iodine. In doing so it does not differentiate between radioactive and nonradioactive forms of iodine. The ingestion of nonradioactive potassium iodide (KI), if taken within several hours of likely exposure to radioactive iodine, can protect the thyroid gland by blocking further uptake of radioactive forms of iodine. KI does not protect any other part of the body, nor does it protect against any other radioactive element.

The NRC has made available KI tablets to states that have requested it for the population within the 10-mile emergency planning zone (EPZ) of a nuclear reactor. If necessary, KI is to be used to supplement other measures, such as evacuation, sheltering in place, and control of the food supply, not to take the place of these actions. The Environmental Protection Agency and the Food and Drug Administration have published guidance for state emergency responders on the dosage and effectiveness of KI on different segments of the population. According to the EPA guidance, "KI provides optimal protection when administered immediately prior to or in conjunction with passage of a radioactive cloud." Populations within the 10-mile emergency planning zone of a nuclear plant are at greatest risk of exposure to radiation and radioactive materials including radioactive iodine. Beyond 10 miles, the major risk of radioiodine exposure is from ingestion of contaminated foodstuffs, particularly milk products. Both the EPA and the FDA have published guidance to protect consumers from contaminated foods.

7. ***Does the NRC rank U.S. nuclear plants by seismic risk?(answer from NRC website)***

"The NRC does not rank nuclear plants by seismic risk. 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) are warranted, consistent with NRC directives. The results of the GI-199 safety risk assessment should not be interpreted as definitive estimates of plant-specific seismic risk because some analyses were very conservative making the calculated risk higher than in reality. The nature of the information used (both seismic hazard data and plant-level fragility information) make these estimates useful only as a screening tool."

8. ***How are decisions made at U.S. nuclear reactors in the event of an accident?***

When an abnormal operating condition occurs at U.S. nuclear plants, the control room shift manager has 15 minutes to classify the severity of the event using regulatory criteria. Once the classification is made, site personnel notify state and local officials within 15 minutes and the NRC within an hour. The control room shift manager then becomes the emergency director for the event and is empowered to make decisions at the site for mitigating actions that maintain safety of the reactor and therefore protect the health and safety of the public. Within about an hour, the full emergency response organization is assembled, including all technical disciplines and communications specialists to ensure state and local officials and the public are receiving information. The Nuclear Regulatory Commission's operations center, in addition to the presence of resident inspectors at the site, will provide independent oversight of the event and will monitor live plant data. If the severity of the event requires protective actions for the public (sheltering, evacuation, potassium iodide, etc.), state officials will make the decisions to implement these measures based on recommendations from the site

emergency director and the NRC. Once a decision to recommend protective action is made, the state officials will notify the public within 15 minutes.

9. ***What are the dangers of radioactive iodine?***

Iodine 131, or radioactive iodine, is a fission product produced in a commercial nuclear reactor and used in medical treatments. It forms a vapor that can be transported in the air. Iodine 131 is released at minute levels from nuclear power facilities during normal operation, but it has been detected in Japan at higher levels after the events at the Fukushima Daiichi plant. There is no health concern for U.S. residents from these releases in Japan. Iodine 131 decays in about two months. When ingested, it is concentrated in the thyroid gland. In high concentrations, the primary health hazard is thyroid cancer, especially in children. Using potassium iodide can decrease the effects of radioactive iodine. Potassium iodide should be taken only after a recommendation from local health officials. The accident at Three Mile Island is believed to have released 17 curies of iodine 131 from the core; however, no iodine was detected in cow or goat milk following the accident. The Chernobyl accident released approximately 7 million curies of iodine 131. Adult consumption of 1,000 picocuries (1 picocurie is one-trillionth of a curie) per liter concentration for 30 days will result in 24 millirem of radiation dose. For comparison, a typical dose from a chest x-ray is 10 millirem.

For additional information from the Nuclear Regulatory Commission regarding seismic qualification of the U.S. nuclear plants:
http://www.nrc.gov/japan/faqs-related-to-japan.pdf

For additional information from the Food and Drug Administration regarding Japanese food products and potassium iodide supply:
http://www.fda.gov/NewsEvents/PublicHealthFocus/ucm247403.htm

For additional information from the Environmental Protection Agency on radiation monitoring in the United States:
http://www.epa.gov/japan2011/japan-faqs.html

Travick, Vanette

From: LIA08 Hoc
Sent: Thursday, April 14, 2011 7:44 PM
To: Liaison Japan
Cc: Boger, Bruce
Subject: FW: daily updates to the US-Japan Nuclear-Related Assistance Tracker
Attachments: Copy of Nuclear Team Asks and Offers Tracker 04-13-2011.xlsx

All,
Attached is the latest copy of the list I was able to find. Having received no confirmation that the Consortium Call is still planned, Bruce Boger and I will proceed under the assumption that the call is ON. We will be working from the attached list.
Thanks,
Rani

From: LIA08 Hoc
Sent: Tuesday, April 12, 2011 9:10 PM
To: Liaison Japan; Carpenter, Cynthia; RST01 Hoc; Hoc, PMT12; OST01 HOC; Al Hochevar; Alice Caponiti; Blamey, Alan; Blount, Tom; Boger, Bruce; Casto, Chuck; Christensen, Harold; Craig Gaddis; DORLCAL Resource; Dorman, Dan; DprNrrCal Resource; Emche, Danielle; ET05 Hoc; ET07 Hoc; FOIA Response.hoc Resource; Giitter, Joseph; Glenn Southern; HOO Hoc; INPO; INPO; INPO; INPO; INPO; INPO; INPO; INPO; LIA01 Hoc; LIA06 Hoc; LIA08 Hoc; LIA11 Hoc; McDermott, Brian; McGinty, Tim; Miller, Chris; Monninger, John; Morris, Scott; NRC Liaison at USAID; OST02 HOC; PACOM Watch Officer; Pentagon Japan Crisis Team J-4 Desk; Peter Lyons; Hoc, PMT12; Rick Nielsen; Robert Gambone; Robert Mercer; Ross-Lee, MaryJane; RST01 Hoc; RST01B Hoc; Sal Golub; Sal Golub; Steve Aoki; Tom Vavoso; Virgilio, Martin; Weber, Michael; Wiggins, Jim; William Webster; Zimmerman, Roy
Subject: daily updates to the US-Japan Nuclear-Related Assistance Tracker

Attached is the updated Tracker based on the 20:00 EDT, April 12, 2011 consortium Call.

Joe Rivers
LT Coordinator

Last update: April 13 - 1000 hrs JST

Equipment/Supplies/Services Requested by GOJ

Emb No.	Equipment/Service Being Requested	Priority (Hi Med Lo)	Date of request	Requesting GOJ Office	GOJ Action Office & POC	USG Action Office & POC	Target Date	Training Needed?	Cost / Reimbursement	Status of Response	Open/ Closed	Comments (for USG use)
	High Priority Requests											
21	Devices for condensing radiation contaminated water & information on evaporation technology	Hi	3/29 draft list	NISA		DOE Cherry, Duncan; DOD Adm. Gregory				Expanded request: On March 28 DCCS Fukuyama asked for information on measures to remove contaminated water.	O	4/9: Items 21-21i: No new information. GoJ needs to provide more information based on Alan Blamey's email request.
21b	Water storage tanks (6) and a trailer (1) for contaminated water at 1F	Hi	4/01, NISA-DOE mtg	NISA, TEPCO	NISA - Oshima;TEPCO - Umino	DOE Cherry, Duncan		No		TEPCO will pay shipping costs, requests estimate for sea & air shipment. NEXT STEPS: DOE/State Embassy Team and NISA/TEPCO had a telecon this morning to discuss options. DOE and SRS evaluated both "by sea" and "by air" freighting options. UPDATE: By air would be ~$1.5mil and available in Japan two days later. By sea, West Coast ~$650k in Japan Port of Onahama 25-35 days. By sea East Coast ~$600k in Japan 45-60 days.	O	GoJ sourcing other donors, cost to ship by air is $1.3M. DOE personnel on the call (Ron Cherry/Alice) will follow-up about cost estimates. Need to determine how quickly these are needed and whether GOJ is interested in paying for additional air expense of shipping by air).
21c	Information on "evaporation technologies"	Hi	3/28 - DCCS Fukuyama	NISA		DOE Cherry, Duncan				DOE in the process of determining appropriate contacts for sources of technology. Additional info from GOJ may be needed.		
21e	Direct request from GOJ to Pacific Northwest Labs for technical assistance with water decontamination and storage issues.	Hi		NISA		DOE Cherry, Duncan				DOE considering Basic Ordering Agreement. GOJ wants to know if there will be a consultation fee. DOE needs to understand scope of work to estimate cost.	C	NEXT STEPS: DOE- Duncan to follow up with NISA to learn potential scope of work.

4	Germanium semiconductor detectors	Hi	3/25 GOJ list	MEXT, NISA, MAFF, TEPCO	MAFF: Y.Yamada MHLW: T.Tokiwa TEPCO: H.Kanehama	DOE Cherry			INPO - US industry does not have spare detectors at this time (3/29). Detectors will be used to test contamination of water and food MHLW to receive 1 loaned detector. Wants to know the weight (already emailed this question to DOE?). NISA requests at least 1; wants to know how many available. Cabinet Secretariat (CAS) to discuss with MAFF and local governments and provide to USG total number requested. MEXT withdrew request for 3 detectors because they lack shielding. Training expense is free of charge (4/1). DOE delivered 2 detectors on 4/05/11. UPDATE 4 more detectors form Naval Research Labs arrived 4/11 at YokotaAB. 4/12 UPDATE Waiting on larger Dewars.	O	DOE - may offer TEPCO 2 units and discuss about not to return the instruments. NEXT STEPS: DOE - Cherry will add POCs for USG. Send to DartDOELiaison1@ofda.gov and request update. DOE has loaned 2 detectors on 4/06/11. 4 additional detector were shipped from Naval Research Laboratory (NRL) and will be received in Yokota AB on April 11. Fedex tracking # 9178 16713088 and # 9178 16713099. 4/9: breaking this down into each requestor: next version will have each of the ministries listed, due to be tested and calibrated. Per PACOM J4 required liquid N2 is available at Yokota AB.
4a	HPGe for NIPH			National Inst. Of Public Health	Koji KOSAKA	DOE Cherry	Yes	none to GOJ	NIPH has requested 1 HPGe to test drinking water samples. DOE has agreed to this request and is currently working on the logistics and timing for delivery.	O	DOE has earmarked 1 of the HPGe's that has been tested to fulfill this requirement. DOE is working with NIPH to confirm delivery details.
4b	HPGe for MHLW			MHLW Food Safety Dept.	Makoto Kanie	DOE Cherry	Yes	none to GOJ	MHLW has requested at least 1 HPGe for their Food Safety Dept. to test food samples.	O	DOE is working to determine the priority of this request before agreeing to it.
4c	HPGe for MAFF			MAFF	Yukiko YAMADA	DOE Cherry	Yes	none to GOJ	MAFF has requested 2 HPGe's to test agricultural samples from potentially affectee areas. DOE has agreed to this request and is currently working on the logistics and timing for delivery.	O	DOE is currently working with MAFF to determine whether to loan 1 of the HPGe's that are currently available, or whether it would be better to wait and deliver a matching pair once they have been tested.

4d	HPGe for TEPCO		TEPCO	Kozue FUSHIMI	DOE Cherry	Yes	TEPCO has requested 2 HPGE's for use at the Fukushima Dai-ni NPS. TEPCO is requesting that the HPGe's be donated with no expectation of returning the devices due to expected contamination	O	DOE tentatively agreed to this request but has not yet made a final determination, based on TEPCO's desire to not return the devices. DOE has not yet asked, and TEPCO has not yet indicated, whether TEPCO could be willing to pay for the detectors. DOE is working to determine the priority of this request before asking for potential payment.
13a	Request for the following: 2,100 units-Rad Survey Meters, 2,600 units-Personal Dosimetery, 5,100 units- iodine absorbent masks, 33,000 units-iodine absorption cans	Hi	NISA, MOD		DART		DART shipped 2,000 dosimeters; will see what it can do further. GOJ is considering allowing residents in the 20km evacuation zone return to their homes to collect belongings. Will need a large number of dosimeters. NISA requests USG inform GOJ how many we can provide. MOFA to provide info on number procured from other donor nations. 4/11 UPDATE: Donors providing masks and protective gear.	O	List provided to Alan Blamey and Al Hochevar for cabinet meeting 4/2/11. Japan still requesting as many dosimeters as possible. Donor's meeting set for 4/11 or 4/12 will give more information on total # needed and coordination of efforts. Received approval for locating fixed monitoring devices.
Other Open Requests									
2a	Loaning ground radiation monitoring devices, mobile and stationary (incl radiation friskers - -20 hand /foot/cloth monitors)	3/25 GOJ list	MEXT, NSC, NISA, MOFA, TEPCO	JAEA: M.Kanamori	DOE Cherry		Mobile ground monitoring began 3/17. Discussions ongoing re fixed ground-based monitors. Need GOJ approval to proceed; MOFA is coordinating. UPDATE: GOJ/MEXT and Japan Nat'l Police Force approved request and 8 locations on 4/11. Installation to begin on or about 4/11.	O	Mobile monitoring is closed. Stationary monitoring is the open item. This was a GoJ request and the idea is to possibly install a system such as the EPA Radnet system DOE currently has operating air samplers on the roof of the US Embassy, at the consequence Management Team HQ in Yokota AB, and occasional field deployments. DOE is working to install 8 "Infield" radiation detection backpacks in "unattended mode" ringing Fukushima NPP from 10 to 30 miles within small police stations (Koban). MEXT has approved the DOE request, and awaiting Japanese National Police Agency (NPA) approval. NPA approval obtained 4/8. Read to ship via air early next week.

2b	(incl radiation friskers --hand //foot monitors)	3/28 Cab mtng	MEXT, NSC, NISA, MOFA	JAEA: M.Kanamori TEPCO: H.Kanehara	NRC Blamey; INPO				Elaborates on request above - 20 hand/foot detectors from Bruce Co., STP, San Onofre Determined to send. Discussing of shipping expense (4/5). The Bruce Power Station in Canada has approx. 20 detectors to send to GOJ. They plan to ship 20 by sea (25 days) or allow the GOJ to pay for air shipment, in which case the detectors can reach the GOJ much sooner.	O	(Commercial to TEPCO) This activity is awaiting authorization of commercial transport for Bruce monitors (U.S. Embassy to advise). INPO to query utility-arranged transport of SONGS and STP equipment. Process of approving transportation needs to be solidified Shipping payments are being investigated as to who will pay for shipments. STP has 1 parcel that is internally contaminated that may be shipped to Bruce Co. to be included in their shipment to Japan. Alan Blaney will attempt to have to moved forward quickly through the DART team. Equipment has no low-level contamination. SONGS and STP items have shipped. Bruce not shipped yet. Wait for information from GoJ as they may want sooner and may pay for it. No change on item: ship by air next week. Mark Scullion (GOC) appears interested in helping to ship. NRC recommends we allow Mr. Scullion time to provide funding for shipping before we discuss with GOJ.
S	Robotic monitoring devices - 1 robot, 3 radiation sensors,5 Radiation-hardened cameras & Gamma Camera, plus extra video link for the iRobot	3/25 list, quantity set 3/26	METI, NISA, TEPCO	METI: Hatada	DOE Cherry, Duncan	Shipment o/a 4/6/11	yes-DOE proposed training through Qinetic Japan office	DOE to pay for equipment and experts	Scheduled to arrive in Japan 4/8/11. NISA to inform USG whether it wants DOE experts (at no cost). DOE coordinates with NRC, DOD/USFJ. U.S confirmed 3/26 Cabinet meeting can provide Qinetic Talon, ~~M2,~~ Radiation-hardened cameras. Per 3-31 WG meeting, DOE will also provide additional radiation sensor kits. UPDATE: M2 will not be repairable. Property title transfer documents completed 4/9. Technical contact for training provided. INL team tentatively set to depart 4/12 from USA, arrive Tokyo 4/14. Arrangements at Tsukuba City and details of training program still being developed. 4/12 UPDATE: So far, only 1 of 4 boxes has made it thru Customs.	O	DOE is handling Ground robotics and hardened cameras only. UAVs and handhelds are separate. DOE islooking to send 1) Robotics expert and 2) cameras expert.NEXT STEP: DOE - check if GOJ needs technical experts. FEDEX Tracking Number (PRO) is 54501824. DOE is awaiting a decision from GOJ this evening. 4/9: equipment expected to arrive imminently. Shipment due at AIST on 4/9. NEXT STEP: schedule technical training.

US-Japan Nuclear-Related Assistance Tracker

5a	Information on Radiation shielding materials for vehicles.	3/26 cabinet meeting; 3/29 list	METI, NISA			NRC provided information on tungsten materials; METI still wants advice on shielding for heavy equipment.	O	Japan provided additional information on 8 April to DOE HQ. 4/12 UPDATE: Ron Cherry to confirm that shielding info received and forwarded to DOE HQ.
~~5b~~	~~Radiation hardened cameras & Gamma Camera~~	~~3/26 cabinet meeting~~	~~METI, NISA~~	~~DOE~~	~~4/6/2011 shipment expected~~	~~US confirmed at 3/26 cabinet meeting that it can provide camera and system for mapping gamma rays. DOE to send five cameras and one gamma cam.~~	~~O~~	~~Tied to Item #5 - this equipment is with the robots.~~
18	Potassium iodide (KI) preparation 1 million 17-dose bottles	3/25 list	NISA, MHLW, MOFA	HHS Dr. Colemanto provide; USAID to transport; Embassy Gabor		MOFA said 3/30 it would accept the 1 million bottles (17 doses each) of liquid KI offered; requested via note vebale to DOS in D.C. (3/30). USG to share grant document text with GOJ before shipping.	O	Industry had tablets available, but HHS had liquid tablets that they were to provide. A. Blamey to verify with GOJ. May be caught up in logistics. Coming from USAID and CDC.Currently tied up within GoJ legal.
24	Medical triage re: exposure to radiation (decontamination capability)	3/25 list	MHLW,NSC, NISA,MEXT, MOD-Col. Towne	DOD; DOE; USAID; NIH Coleman		MOD initially identified as principal action ministry along with MHLW, subsequently changed 3/29. Chem Bio Initial Response Force [CBIRF] provided for this purpose.	O	4/9. Need to clarify with USAID re: CBIRF support.
27	U.S. cooperation in bringing private sector engineers into Shielding WG	3/26 meeting - Nagashima	NISA	NRC		Not included on draft 3/29 request list	O	Items 27, 29 and 29b are interrelated. 4/9: Action for Alan Blamey to coordinate with INPO and deterimine what is meant by shielding.
32	GEH is following up on the Nitrogen purge issue analysis		NISA, TEPCO			GE is following	O	NRC Japan to confirm with GE. 4/9: NRC has analyis for review.

33	Clarify for RST the indications that can be used to assess RPV integrity and location of core. [RST request]		NISA		NRC			ongoing project, comments that shift focus are received during 1100 status call 3/29. 4/12 UPDATE: Working with MELCOR team, including the 2 in-country Sandia Lab personnel.	O	4/9: Ongoing
34	List alternative flowpaths that can be used for purging, given accessibility challenges. [RST request]		NISA		NRC			GE to provide 3/29 list, INPO providing technical review	O	INPO to confirm this was provided. 4/9: NRC RST reviewing.
35	Confirm RST recommendation that RPV injection can be maximized once containment has been purged and vented (RST)		NISA		NRC			Technical: Ongoing project, comments that shift focus are received during 1100 status call 3/29	O	4/9: Ongoing
	Closed Requests									
1	Aerial survey for AMS measurement, data sharing and analysis	3/25 GOJ list	MEXT, NSC, NISA, MAFF	MEXT: N.Akasaka	DOE Cherry, Duncan	N/A		DOE coordinates with MEXT, NSC, NISA, MOFF, MOFA. Daily sharing of AMS data and products. Per 4/4 meeting with GOJ, agreement on joint aerial surveys 4/6-4/12. Joint Staff is sharing U.S. aerial survey info USFJ-Yokota.	C	NRC's PMT provided this info to the white house (NITOPS). The feedback was that NITOPS won't task NARAC to run analysis until approval is received from the White House
3	Conduct simulation by radiation diffusion model (compare with SPEEDI data)		NSC, MEXT		DOE Cherry, Duncan			DOE coordinates with NSC. NSC is the leading POC with the GOJ. GOJ has provided SPEEDI source term to NRC 3/25 and meteorological data with NARAC.	C	DOE coordinates with NSC. NSC is the leading POC with the GOJ. GOJ discussed with NARAC on an idea to estimate the source term from monitoring data. GOJ provided information on meteorological data which is open to public.
5c	Westinghouse working on the UAV request and coordinating with Texas A&M expert		TEPCO					Westinghouse working with Texas A&M University expert.	C	
5d	GOJ request for shielding		INPO					This has been closed out. (Confirm how and by whom?)	C	
6	Robotic debris clearing machines	3/25 list, quantity set 3/26	METI, NISA		DOE Cherry, Duncan	N/A	N/A	DOE coordinates with NRC, DOD/USFJ. Japan dropped request for equipment 3/28. An options paper to mitigate contaminated water was provided to Embassy on 4/7/11.	C	Based on discussions with Embassy, the K-MAX helicopter is not needed, however Per NNSA (Jay Tilden) a whole range of remote heavy equipment will likely be needed. This is an open item being discussed by the Remote Control Project Team.

US-Japan Nuclear-Related Assistance Tracker

7	Provision of data obtained from UAVs		3/25 list	MOD, MOFA		DOD		GOJ is receiving Global Hawk images	C	Follow up action with Japan. Handled separately from Ground robotics and hardened cameras NISA will hold a meeting to discuss and determine needs for vauge items on the lists.
8	Unmanned helicopter - GOJ is looking for helicopter to spray nondispersant.		3/25 list	MOD, NISA, MOFA		DOD DAO		4 T-Hawks on-site. MOD looking into DOD options (KS); repeated by Mr. Nagashima on 3/27 as unmanned helicoper with camera. NRC agreed 3/27 to follow using specs provided by Japan; NISA promised documents stating Japan's needs. MOD is not interested in KMAX.	C	PACOM indicated no longer needed and taken off the table.
9	Transportation of fresh water by barges and delivery of pumps		3/25 list	MOD, NISA		POL-MIL, DAO	(b)(5)	Provided. Arrangement made for three vendor support representatives to stay and train.	C	There is one train that is installed. There is no need for further trains. DOD has the appropriate guidance. Alan Blamey will work with Japanese embassy officials to re-validate the need for this asset. R Neilson says that second train is in Australia. A. Blamey to determine from Embassy if still needed and to share with R. Neilson so that Bechtel and can be advised
9a	Water barges			MOD, NISA		J4, PACOM		Per J4 the barges have been outfitted and tested ~~and are 10 hrs from the NPP site and should arrive Weds. Need ETA~~ Barges are in Fukushima and pumping	C	
9b	Fresh water supply pumps from Bechtel			NISA				First train in Japan	C	
10	High quality pumps and hoses.		3/26 meeting and previous discussion	TEPCO		NRC		CLOSED: NRC rec'd info 3/26 on possible hose and said would investigate further; request withdrawn at 3/29 Cab meeting.	C	
11	High pressure hose (3 x 500 m) and couplers (for cooling reactor)		3/25 list and previous discussion	NISA		NRC; DOD		Hose delivered as part of Australia/Bechtel equipment; in J-Village.	C	
12	Protective body armor	Hi	3/25 list	NISA - Sakuma, MOD	NISA, MOD	NRC - Blamey		INPO provided info on commercial sources. Body Armor Closed.	C	
19	Bottled water for infant formula		3/25 list	MHLW		USAID/OFDA	4/01 - 4/02	USAID and USFJ responsed with initial stocks; paperwork underway at USAID/State for possible delivery April 1-2. Confirmed delivery to Tokyo Met. Gov. warehouse.	C	On the Embassy list for tracking
20	Heat exchanger to be used in spent fuel pool.	Hi	3/27 Nagashima; 3/29 list	NISA		NRC; INPO (Al Hochevar, 678-451-3017 (cell)		TEPCO is trying to get a system design. Placed a design order with Toshiba. INPO can provide info for free. TEPCO may pursue commercial procurement of heat exchanger.	C	NEXT STEPS: Check if Shaw has a commercial contract to do work on this. Closed - TEPCO has contract and is persuing purchase.

21a	Assistance in dealing with accumulated radioactive water in turbine buildings	Hi	3/27 meeting	NISA	DOE Cherry, Duncan; DOE HQ Monica Regalbuto; NRC	DOE paper provided to Amb. Roos and Amb Fujisaki on 3/29/11. Management of cont. water. UPDATE: Options Paper to mitigate contaminated water was provided to embassy on 4/7/11. UPDATE: Alieshia Duncan working with TEPCO and Dr. Anisi on review.	C	New paper identifies options for retrieval, storage, treatment, and disposal of waste forms.
21d	Obtain contact info for industry personnel with experience in handling and disposal of open pools/trenches of high dose rate(>100 R/hr) water. Rcvd Mar 29 from Al Hochevar from Hososn	Hi		NISA		Contacts developed and provided through INPO-Al Hochevar	C	
21f	Determine whether temporary radwaste processing skids are available or would be a good idea (for removing contaminated water)	Hi		NISA	INPO		C	Private to Private transfer. Close after passing to TEPCO.
21g	Temporary holding tanks (for removing contaminated water)	Hi		NISA	DOE; DOD; INPO	Need to hold discussions with GOJ at working level.	C	Develop recommendations for removal of water in basements of Units 1,2 and 3 per Task Tracker #3235. The Toshiba Team has investigated the use of large storage bladders to be used as temporary contaminated water storage. These bladders can hold up to 189,000 liters per bladder. Bladders can eventually be handled as a relatively small volume of solid waste. Need to develop a single water management team to handle all water issues once decision is made on how to proceed forward. DOE has been contacted by a private company from New Jersey. WITHDRAWN
21h	Tanker trucks as a temporary holding area (for removing contaminated water)	Hi		NISA	DOE; DOD; INPO	Need to hold discussions with GOJ at working level.	C	Develop recommendations for removal of water in basements of Units 1,2 and 3 per Task Tracker #3235. The Toshiba team is concerned that the relative capacity of tanker trucks is small and that the trucks will have to remain onsite once contaminated. This option should be reserved for special situations.WITHDRAWN
21i	Investigate whether there is a technology that would absorb contaminated materials from water (for removing contaminated water)	Hi		NISA	DOE		C	Secretary Chu reportedly told this to the Japanese. The Toshiba Team has developed draft plans for water treatment with a focus on fission product removal and minimization of solids waste processing. WITHDRAWN

US-Japan Nuclear-Related Assistance Tracker

23	INFO: Technical support on radiation technology, nuclear technology, and health effects	3/25 list	MHLW CAS NSC NISA MEXT MOD		Dr. Coleman (NIH via HHS); USAID			
23a	Information on KI and drinking water						C	
23b	Health cooperation in three areas: environmental monitoring; KI policy; risk communication		CAS	Dr. Akashi	USAID, State, NIH Coleman, CDC, USDA, DOD	Both sides agreed to the recommendations in these three areas.	C	
25	INFO: Extinguishant/coolant	3/25 list	NISA			Request further info from GOJ. We need more information on the specific needs of the GOJ.	C	A. Blamey to Verify with GOJ what is exactly needed in this request
26	Incorporate PNNL into crisis mgmt dialogue/Spent Fuel WG	3/26, 3/28 - DCCS Fukuyama	NISA		DOE Cherry; NRC	PNNL team in Tokyo and providing support.	O	PNNL team in Tokyo and providing support.
28	Assessment of possible fuel damage in units 1, 2, 3	3/27 - Hosono	NISA		NRC	NRC provided brief response at meeting.	C	
29a	Information on shielding for individual rooms and for the facility in general		NISA			Provided to GOJ through INPO-Al Hochevar.	C	
29	Assessment of structural stability of spent fuel pools	3/27 - Naga-shima ; 3/28 - Fukuyama	NISA		NRC reactor Safety Team	In preparation for decisions on shielding. NRC completed assessment of current spent fuel pool weight. Further analysis needed.	C	Need GOJ input
29b	Japan asked for NRC expertise on temporary shielding options, to determine whether the NPP Plant buildings are strong enough to hold up under additional pressure		NISA		NRC	From Cabinet Office Crisis Mgt. Team Meeting notes 3-28-2011. We would like further details into the specific items the GOJ is requesting	C	NRC has completed a gross analysis and does not have sufficient information to perform a detailed analysis for shielding. From Cabinet Office Crisis Management Team Meeting notes, 3/28/11. A. Blamey to discuss further with Japan
30	Information on tools/methods for moving damaged fuel, plus contacts of those with experience at TMI-2 and Chernobyl. From Mr. Hosono.		NISA	Hosono's Office		Provided to GOJ through INPO-Al Hochevar on 3/30.	C	
31	SAMG Technical Document		TEPCO			Guidance has been sent to INPO contact in Japan and is being updated. Includes injection rate and best assessment to plant conditions; TEPCO confirmed receiving info at 4/7 meeting with INPO.	C	TEPCO received.

36	Requests for military air transport	MOD	J4, PACOM	PACOM is involved in review and approval of all requests for miltary airlift to Japan. Requests should include weight and dimensions of the cargo. 1st choice should be commercial carrier for timely delivery; should limit requests to materiel that is difficult for commercial carriers to deliver.	C

Not for Release

Fukushima-Daiichi Current Status and Planned Work

12 April at 22:10 & 13 April at 06:00 (Rev-83)

		1号	2号	3号	4号	5号	6号	Common Pool (Common to 1-4 #s)
Reactivity Control (Shut Reactor)	Current Status	■All CRs are kept inserted in the core	■All CRs are kept inserted in the core	■All CRs are kept inserted in the core	■All fuel assemblies are stored in SFP ■Gate between SFP & reactor cavity closed (For core shroud replacement work during outage)	■Core was loaded with bundles for the start of the next operation cycle ■RPV bolted up (Earthquake occurred after completion of RPV hydrostatic test just before the startup) ■Maintained cold shutdown	■Long term outage (7 month) ■RPV head on ■Cold shutdown (at 19:29 on 20 March)	
		CNMS (at 06:00 on 13 April) D.R. on monitoring S/C [illegible]	CNMS (at 06:00 on 13 April) D.R. [illegible] S/C [illegible]	CNMS (at 22:00 on 12 April) D.R. [illegible] S/C [illegible]				
	Next Works Planned (TEPCO Headquarters decision)	(Long term measure) ☐To add boric acid to fresh coolant before achieving cold shut down (After restoring power) ☐Operating S/C	☐Borated fresh water injection started (at 10:18 on 26 March) (Long term measure) ☐To add boric acid to fresh coolant before achieving cold shut down (After restoring power) ☐ Operating S/C	(Long term measure) ☐To add boric acid to fresh coolant before achieving cold shut down (After restoring power) ☐Operating S/C				
Coolant Supply & Residual Heat Removal (Core cooling)	Current Status	■ECCS unavailable * Reason: loss of function of the auxiliary equipment cooling system (using sea water) ■Fresh water injection through FDW line (Switch to temporary installed motor driven pump was completed) (Flow Rate: [illegible] by interim instrumentation at 17:30 on 3 April) ■Power source of the interim motor driven pump was switched to off-site power (3 April 10:32 -12:02) ■Installing temporary replacement pump for CCW ■Camera to monitor operating conditions of Core cooling water supply pumps was installed (1 on 6 April) ■ Core cooling water supply was stopped due to off-site power shut-off caused by an earthquake (11 April 17:16)[illegible]	■ECCS unavailable * Reason: loss of function of the auxiliary equipment cooling system (using sea water) ■Fresh water injection from RT line to low pressure coolant injection (Switch to temporary installed motor driven pump was completed) (Flow Rate: 7 m³/h by interim instrumentation at 19:00 on 3 April) ■Power source of the interim motor driven pump was switched to off-site power (3 April 10:14 -12:42) ■Installation of the alternate pump for RHRS (29 March) ■Camera to monitor operating conditions of Core cooling water supply pumps was installed (1 on 6 April) ■ Core cooling water supply was stopped due to off-site power shut-off caused by an earthquake	■ECCS unavailable * Reason: loss of function of the auxiliary equipment cooling system (using sea water) ■Fresh water injection from FP line to low pressure coolant injection (Switch to temporary installed motor driven pump was completed) (Flow Rate: 7 m³/h by interim instrumentation at 17:32 on 3 April) ■Power source of the interim motor driven pump was switched to off-site power (3 April 09:54 -12:18) ■Installation of the alternate pump for RHRS (29 March) ■Camera to monitor operating conditions of Core cooling water supply pumps was installed (1 on 6 April) ■ Core cooling water supply was stopped due to off-site power shut-off caused by an earthquake		■Ordinary operation in SHC mode of RHR (3 March 22:35)	■Ordinary operation in SHC mode of RHR (3 March 22:35)	
		■RPV Dome Pressure (at 06:00 on 13 April) 0.[illegible] MPa-g (Gauge A) 0.025 MPa-g (Gauge B) (switching trend continuously) ■Reactor Water Level (at 06:00 on 13 April) TAF+1860 mm (Fuel Range: Gauge A) TAF+1860 mm (Fuel Range: Gauge B) ■RPV Temperature (at 06:00 on 13 April) Feed water nozzle: 208.2℃ Bottom of RPV: 115.6℃ (switching trend continuously)	■RPV Dome Pressure (at 06:00 on 13 April) -0.016 MPa-g (Gauge A) 0.025 MPa-g (Gauge B) ■Reactor Water Level (at 06:00 on 13 April) TAF-1500 mm (Fuel Range: Gauge A) TAF mm (Fuel Range: Gauge B) ■RPV Temperature (at 06:00 on 13 April) Feed water nozzle: 150.1℃ Bottom of RPV: [illegible] (switching trend continuously due to abnormal temperature indication)	■RPV Dome Pressure (at 22:30 on 12 April) -0.016 MPa-g (Gauge A) -0.020 MPa-g (Gauge C) ■Reactor Water Level (at 22:30 on 12 April) TAF-1850 mm (Fuel Range: Gauge A) TAF-2250 mm (Fuel Range: Gauge C) ■RPV Temperature (at 22:30 on 12 April) Feed water nozzle: [illegible] (switching trend continuously due to abnormal temperature indication) Bottom of RPV: [illegible]		■RPV Dome Pressure (at 07:00 on [illegible]) [illegible] MPa-g ■Reactor Water Level (at 07:00 on [illegible]) TAF+[illegible] mm (Shut Down Range: Gauge [illegible]) ■Coolant Temperature (at 07:00 on [illegible]) [illegible]	■RPV Dome Pressure (at 07:00 on [illegible]) 0.014 MPa-g ■Reactor Water Level (at 07:00 on [illegible]) TAF+[illegible] mm ■Coolant Temperature (at 07:00 on [illegible]) [illegible]℃	

	Next Works Planned (Activities of Cooling Water Supply Facsel	☐Installation & injection test of backup line for core cooling water injection (target date: 15 April) ☐Switch the motor driven pump to MDW pump (The work was suspended due to high radiation environment around MDWP in the turbine building) ☐Water flow will be reduced to 4m³ that is commensurate to the decay heat 14 days after shut down (Long Term Cooling Measure) ☐RHR ordinary operation in SHC mode after restoring off-site power & related equipments	☐Installation & injection test of backup line for core cooling water injection (target date: 15 April) ☐Switch the temporary motor driven pump to MDW pump (The work was suspended due to high radiation environment around MDWP in the turbine building) ☐Water flow will be reduced to 3m³ that is commensurate to the decay heat 14 days after shut down (Long Term Cooling Measure) ☐RHR ordinary operation in SHC mode after restoring off-site power & related equipments	☐Installation & injection test of backup line for core cooling water injection (target date: 15 April) ☐Establish remote monitoring measurement of water level in T/B ☐Switch the motor driven pump to MDW pump (The work was suspended because of high radiation environment around MDWP in the turbine building) Preparing to drain the high radiation water ☐Water flow will be reduced to 7m3 that is commensurate to the decay heat 14 days after shut down (Long Term Cooling Measure) ☐RHR ordinary operation in SHC mode after restoring off-site power & related equipments				
Containment Function (Cooling and Containment)	Current Status	■Pressure (at 06:00 on 13 April) D/W: 0.196 MPa-abs S/C: 0.166 MPa-abs ■Started ventilation through hardened line (at 14:30 on 12 March) • PCV design pressure : 384 kPa PCV max pressure for use : 427 kPa Rupture disc working pressure : 310 kPa	■Pressure (at 06:00 on 13 April) D/W: [illegible] MPa-abs S/C: Down Scale (Examining) ■Ready to start ventilation through hardened line (Not executed so far) PCV design pressure : 384 kPa PCV max pressure for use : 427 kPa Rupture disc working pressure : 325 kPa	■Pressure (at [illegible] on 12 April) D/W : [illegible] MPa-abs S/C: [illegible] MPa-abs ■Started ventilation through hardened line (at 9:29 on 13 March) PCV design pressure : 384 kPa PCV max pressure for use : 427 kPa Rupture disc working pressure : 310 kPa		■Negative pressure kept by SGTS	■Negative pressure kept by SGTS	
	Next Works Planned (Target Completion Date)	☐Nitrogen replacement first • Fill PCV and ventilation line with nitrogen • Reinforced monitoring of PCV pressure • Continue to secure ventilation line (After restoring off-site power) ☐Restoring PCV spray function • MDW (Drive) FP system (For installation of equipments) ☐RHR operation in SHC mode ☐Restoring S/P cooling coil ☐Alternative heat removal by CUW	Same as unit 1					

Spent Fuel Pool (SFP) Debris Bed Removal & Water Supply	Current State	■SFP water level uncertain (No water level meter) ■SFP temperature uncertain (Unable to measure because of no power supply) ■Skimmer surge tank level 1500 mm (at 00:00 on 12 April) ■No Roof due to explosion on the operation floor ■Watering by concrete pumping vehicle (Fresh Water) (called the Elephant) ・31 March 12:30-13:47 ・31 March 14:29-16:04 ・1 April 17:16-17:19 The nickname of concrete pumping vehicle for first 1 was changed from "Large Giraffe" to "Elephant" via prompt confirmation on 3 April. ■Preparation for water feeding with electric motor pumps was completed (on 8 April)	■SFP water level uncertain (No water level meter) ■SFP temperature 16.0℃ (at 06:06 on 12 April) ■Skimmer surge tank level 1500mm (at 06:06 on 12 April) ■Roof removal, hoisting blower(s) partly worked ■Fresh water injection to SFP through the existing FPC line and temporary line ・29 March 16:30-19:23 ・30 March 19:05-23:56 (Switched to fire engine pump due to some trouble in electric motor driven pump) ・1 April 14:50-17:08 ・4 April 11:06-13:37 ・7 April 13:29-14:34 ・10 April 10:37-12:08 ■Removal of the existing rotunda in FPC line was completed (31 March) (Scheduled for 31 March)	■SFP water level uncertain (No water level meter) ■SFP temperature uncertain (Unable to measure because of lack of power supply) ■Skimmer surge tank level No measurement ■No roof due to explosion on the operation floor ■Water spray with new special pumping vehicle (Call: Zebra (improved)) ・31 March 16:30-19:33 (Fresh Water) ・2 April 09:52-12:54 (Fresh Water) ・4 April 17:08-19:29 (Fresh Water) ・7 April 09:53-10:53 (Fresh Water) ・8 April 17:06-20:00 (Fresh Water) ・10 April 17:15-19:15 (Fresh Water) ■ Check the condition of FPC lines ・No abnormal condition on the streams ・Piping seems to be stuffed (on 5 April) ■Preparation for water feeding with electric motor pumps was completed (on 9 April) ■The Zebra(improved) was moved for replacement	■SFP water level : Uncertain ■SFP water temperature : gauge out of order (at 11:10 on 24 March and later) ■Skimmer surge tank level 4750 mm (at 00:00 on 12 April) ■No roof due to explosion at the operational floor ■Installation alternation pump for BWR ■Watering by concrete pumping vehicle (called as Giraffe) ・30 March 14:04-18:35 (Fresh water) ・1 April 08:28-11:15 (Fresh Water) ・3 April 17:11-22:28 (Fresh Water) ■ Check the condition of FPC Lines ・No abnormal condition on the streams ・Piping seems to be stuffed (on 5 April) ■The Elephant was moved from Unit 4 to Unit 4 ■Watering with the Elephant ・2 April 17:35-18:22 ・5 April 18:25-19:19 ・8 April 17:07-19:24 ・10 April 17:30-18:23	■Inventory securing ・CST → MUWC → FPC → SFP ■Heat removal ・FPC (Surge Tank) → RHR → S/C ・Heat removal in S/C cooling mode of RHR ■SFP Water level uncertain (Water level alarm has not activated) ■SFP Water temp. 35.0℃ (at 07:00 on 12 April) ■Secondary containment is intact with roof of R/B ■Fresh water is transferred to Fresh water tank (Fresh water tank 2) (on 25 April)	■Inventory securing ・CST → MUWC → FPC → SFP ■Heat removal ・FPC (Surge Tank) → RHR → S/C ・Heat removal in S/C cooling mode of RHR ■SFP Water level uncertain(Water level alarm has not activated) ■SFP Water temp. 35.0℃ (at 07:00 on 12 April) ■Secondary containment is intact with roof of R/B ■Fresh water is transferred to Fresh water tank (Fresh water tank 2) (on 25 April)	■SFP water temperature 35 ℃ (at 06:00 on 12 April) ■Cooling function achieved by air fan coolers (at 18:28 on 24th March) ■Water supply to the common SFP by MUW system (24 March 16:15-19:04) ■FPC(R) started at 18:06 on 24th March
	Planned work (Now Activities of FPC Team)		■Fresh water injection to SFP (from Log-2 pool) is scheduled (17 April)					

High Voltage AC Power Supply	Current Status	■6KV P/C 2C connected to local distribution network of Tohoku EPC (at 18:46 on 20 March) ■Equipments of MCC tested for short circuit and ground but in fail on 21 March ■120V I & C main has powered at 01:40 on 23 March ■Illumination of MCC restored at 11:30 on 21 March ■Monitoring points (MP2-8) were restored.	■6KV P/C 2C connected to local distribution network of Tohoku EPC (at 16:46 on 20 March) ■MCC 2A-1 in the turbine building was powered at 16:40 on 26 March ■Illumination is restored in main control room at 16:40 on 27 March.	■6KV P/C 4B powered through transmission line (at 10:35 on 22nd March) ・Temporary power supply achieved utilizing the non-damaged part of 66kV off-site power transmission line ・Trial electric charge of the motor Center vehicle for Unit3 and Unit4 was completed at 14:28 on 18 March ・Insulation of molded circuit breakers and power cables were completed on 19 March ・Inspection of cable from the breakers and loads was conducted on 20 March ・Insulation of cables were completed on 21 March. ■T/B MCC 3C-2 has been powered at 22:10 on 22 March ■T/B MCC 3C-1 has been powered at 22:21 on 22 March ■120V I & C main has powered at 22:28 on 22 March ■Illumination is restored in main control room at 22:43 on 23 March ■T/B MCC 2B-1 has been powered	■6KV P/C 4B powered through transmission line (at 10:35 on 22nd March) ■120V I & C main has powered at 01:40 on 23 March ■Illumination of MCB restored at 11:30 on 29 March	■Temporary power supply achieved utilizing the non-damaged part of 66kV off-site power transmission line (Tomo-Mori line 1L,2L) ■Non-safety grade buses (5A and 5B) are unavailable ■Temporary pump (RHRS) was installed and connected to the water supply line on 24th March ■Emergency administration building was powered on 24th March ■Water Purification Facility was powered at 9:10 on 24th March ■Investigating cable laying work for monitoring points (MP-1,2,3,4) on 28 March ■T/B MCC 6D-2 has been powered on 31 March	■Temporary power supply achieved utilizing the non-damaged part of 66kV off-site power transmission line (Tomo-Mori line 1L,2L) ■Non-safety grade buses of 6A and 6B are unavailable ■Temporary pump works as a substitute of RHRS) was installed and put in service (Powered by P/C) ■Test run of installed cable was conducted on 29 March ■Monitoring points (MP1-5) were restored.	■Temporary power for common pool was restored at 16:30 on 24th March
	Planned work Plan Activities of Electric Power Supply Team		□Restoration of power for instrumentation	□Restoration work of electricity will be restarted after completing water transfer from T/B		□Laying temporary power cable for SLC (B)	□Investigating cable laying work for monitoring points	□Investigating the power restoration work for I & C and illumination
DC Power Supply	Current Status	■Part of I & C equipments were powered by temporary batteries to monitor plant status	■Part of I & C equipments were powered by temporary batteries to monitor plant status ■Common DC125V Bus has been powered at 16:30 on 31 March	■Part of I & C equipments were powered by temporary batteries to monitor plant status * Batteries for reactor level gauges were replaced by fresh ones at 12:15 on 21st March ■Restoration of DC 125V Charge rectifier (B) (30 March)	■Part of I & C equipments were powered by temporary batteries to monitor plant status	■Part of I & C equipments were powered by temporary batteries to monitor plant status ■DC 24 Charger 6B has been powered on 31 March	■Part of I & C equipments were powered by temporary batteries to monitor plant status	
	Next Works Planned Activities of Electric Power							
Miscellaneous Measures against Hydrogen	Current Status	■Measurement for hydrogen gas accumulating in PCV ・Considering the injection of N2 gas ■Injection of N2 gas is in progress ・(Flow rate: 20m³/h, degree of purity: 98%) 7 April 01:31 - 8 April 03:29 (suspended) due to switch to high degree of purity N2 gas) ・Injection of high degree of purity N2 gas (Flow rate: 20m3/h, degree of purity: 99.92%) 9 April 04:10 - ■Injection of N2 gas was stopped due to an earthquake	■Considering the injection of N2 gas into PCV ■Generation of hydrogen gas at the top part of the reactor building is of concerned * White smoke observed on 21st March was supposed to be the steam from SFP that was leaked through the rain drainage duct It is hoped that this mitigates the concentrated of Hydrogen gas	■Considering the injection of N2 gas into PCV		■3 holes(3×7.5 cm) were drilled on the ceiling panel (250 mm thick) of the reactor building on 18 March to relieve hydrogen gas and to avoid explosion	■3 holes(3×7.5 cm) were drilled on the ceiling panel (250 mm thick) of the reactor building on 18 March to relieve hydrogen gas and to avoid explosion	

	Next Works Planned (Near Activities)		□Water jet pump is ready at offsite stock yard, however lifting machine is not available						
Turbine Build -ing Water Draining	Current Status	■Draining water in T/B ・Water level in T/B OP +5100mm (at 07:00 on 23 March) ・ same as 2 April 18:30 ・Water transfer H/B → CST (3 April 13:55- 10 April 09:30) ■Draining water in Trench ・Radiation level of the water surface in the trench 0.4 mSv/h (on 28 March ・Water level (from top edge of grating to water surface) [illegible] ・Remote monitoring measurement of water level in the trench was established (on 2 April)	■Draining water in T/B ・Water level in T/B OP +3600mm (at 07:00 on 13 April) , decreased by 500mm from 12 April (4 cm) ・Water trabefer (H/B → CST) (2 April 17:18 - 9 April 13:10) ・Monitoring camera for water level was installed (on 2 April) ■Draining water in Trench ・Radiation level of the water surface in the trench higher than 1000 mSv/h (on 28 March) ・Water level (from top edge of grating to water surface) [illegible] (at 7:00 on 11 Apr.) ・Remote monitoring measurement of water level in the trench was established (on 2 April) ■Operation "Reason" ・Investigation of water flow route and injection of liquid chemical to prevent leaks was conducted. ・It had been confirmed that the leak was stopped. (at 05:30 on 7 April) ・A rubber board was placed over the crack (at 13:15 on 6 April)	■Draining water in T/B ・Water level in T/B OP +2900mm (at 07:00 on 15 April) , same as 11 April 11:00 ・Water trabefer (CST → SPT surge tank) (28 March 17:40 - 31 March 08:37) (H/B is full. Leak from on-site breaker was confirmed (on 7 April) ■Draining water in Trench ・Radiation level of the water surface in the trench (No measurement due to difficulty in approach by debris) ・Water level (from top edge of grating to water surface) [illegible] cm (at [illegible] on 18 April) ・Remote monitoring measurement of water level in the trench was established (on 2 April)	■Draining water ・Water transfer (Concentrated RW → T/B) (2 April 14:25 - 4 April 09:22, suspended) ・Water transfer pumps were added 1 → 3 pumps: 3 Apr. 10:00 - 4 Apr. 09:22. suspended due to high water level in the trench) ■Work for shutting off the leak in pit ・Concrete was poured (25m³) to plug crack	■Draining water ・Water transfer HDR pump area & CS pump area → S/C (1 April) ■Discharging water in sub-drain of Unit 5 to the sea: 850 m3 (4 April 21:00 - 8 April 12:14)	■Draining water ・Water transfer (RW base floor → H/B) (1 April 13:40 - 2 April 10:00) ・ Suspended by large amount of water. (considering draining water ■Discharging water in sub-drain of Unit 6 to the sea: 572.4 m3 (4 April 21:00 - 9 April 18:52)	■Draining water ・Concentrated RW → sea. 3070 m3 (4 April 19:03 - 10 April 17:40) ■Draining water from main process building was completed. ■Draining water from incinerator building was started (on 6 April) ■Being considered of measures Prevention of leaks from Reactor Buildings before starting highly contaminated water in reactor RW
	Next Works Planned	□Draining water in T/B ・Considering transfering the highly contaminated water to concentrated RW [illegible]		□Water transfer: H/B → CST □Considering transfering the highly contaminated water to concentrated RW	□ Work for shutting off the leak in pit				
Others	Current Status	■Barge ・Water transfer: Barge No.1 → Filtered water tank 1 April 15:58 - 16:25 2 April 18:20 - 18:40 ・Water transfer: Barge No.2 → Barge No.1 (3 April 09:52 - 11:17) ・Barge No.2 arrived at dock (at 12:03 on 4 April) ■Air Borne Contamination Control ・Test sprinkling was conducted at mountain side of the common pool (1 April pm) ・Sprinkling inhibitor around the common pool area (until 10 April 16:00) ■Removal of debris ・Debris removal was conducted with unmanned heavy equipment at Unit 3&4 area (10 April 09:00-17:00) ■T-Hawk project (Wireless-controlled Helicopter) ・Test flight was conducted (10 April 15:59 - 16:28) ■Site Tour (11 April for Japanese news agencies on the spot)							
	Next Works Planned	□T-Hawk project (Wireless-controlled Helicopter) ・Test flight (scheduled for 50 minutes during 07:00-09:00 on 11 April)							

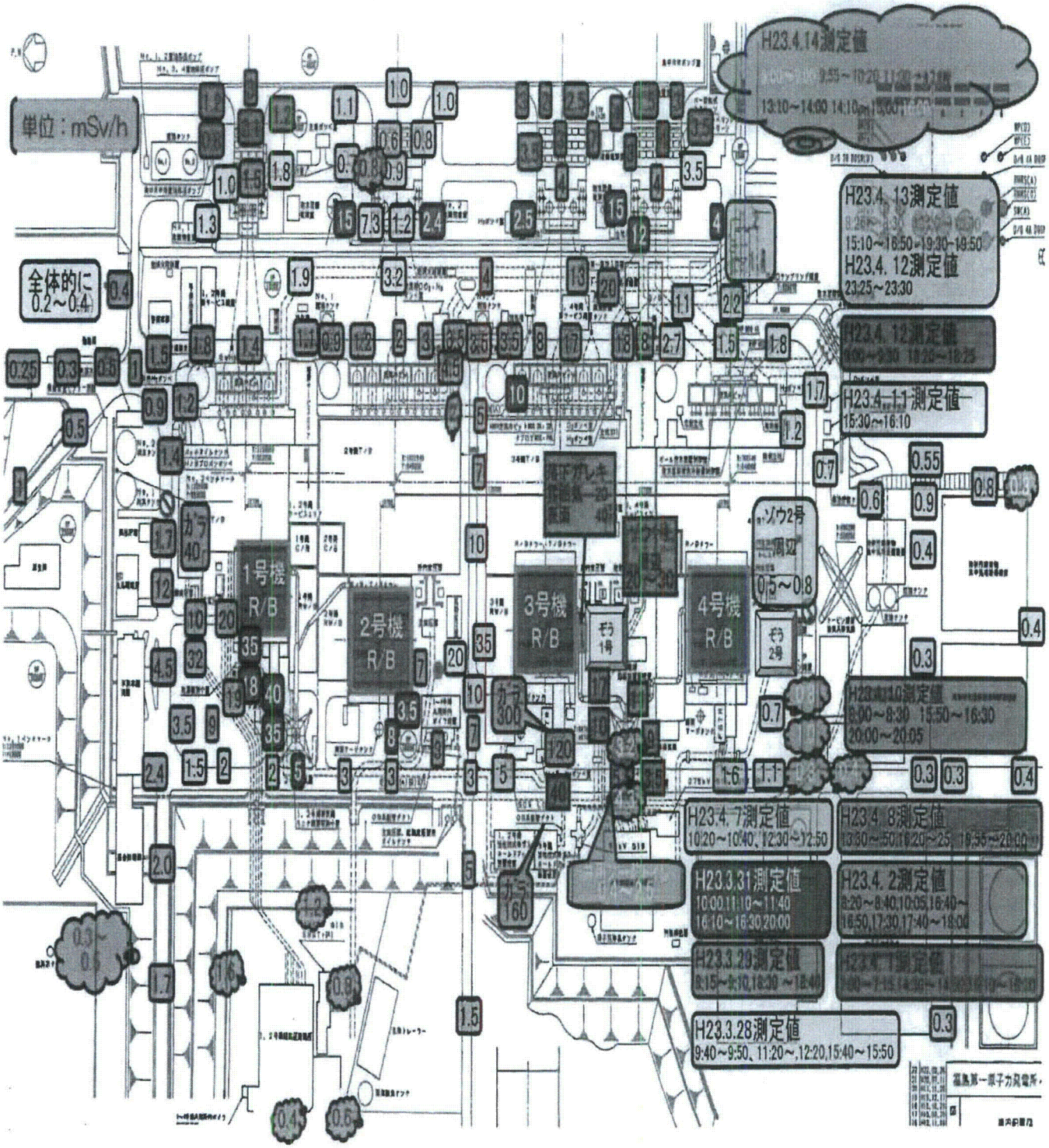
Abbreviations

CAMS :Containment Area radiation Monitor System
CST :Condensate Storage Tank
CUW :Reactor Water Clean Up Water System
D/W :Dry Well
ECCS :Emergency Core Cooling System
FP :Fire Protection
MS :Main Steam
M/C :Major Power Center
MU/WC :Make Up Water Condensate System
P/C :Power Distribution Center
RCIC :Reactor Core Isolation Cooling
RHR :Residual Heat Removal
RPV :Reactor Pressure Vessel
S/C :Suppression Chamber
SDF :Self Defense Force
SFP :Spent Fuel Pool
SGTS :Stand by Gas Treatment System
SRV :Stay Down Cooling
SLC :Stand by Liquid Control

Travick, Vanette

From: Gard, Lee A (INPO) [GardLA@INPO.org]
Sent: Friday, April 15, 2011 5:21 AM
To: Blamey, Alan; Wittick, Brian; Moore, Carl; Casto, Chuck; Collins, Elmo; Gauntt, Randall O; Mitman, Jeffrey; michael.call@nrc.gov; Hay, Michael; Miller, Marie; richard.kondo@crbard.com; Bernhard, Rudolph; Salay, Michael; Garchow, Steve; Steve Reynolds
Subject: FW: April 15 briefing notes, excel spreadsheet and radiation survey map
Attachments: April 14 1600 Facility Area Survey Data[1].pdf; April 15 Ryan 6 pm briefing notes.doc; TEPCO Summary Rev.87 Final April 15.xls

福島第一サーベイマップ（平成23年4月14日 16:00現在）



Unit Status

- In Unit 1, non-borated fresh water injection into the main feedwater line continues at 6 cubic meters/hr. Comments on parameters:
  - Reactor pressure indicator A increased slightly to .428 MPa g, (62 psig). Indicator B is considered to be unreliable.
  - Feedwater nozzle temperature continues to decrease and is reading 197 C (387F). This parameter remains suspect.
  - Reactor vessel lower temperature has remained steady at 119 C (246 F)
  - Drywell and torus pressure remains relatively steady at .185 MPa abs (27.6 psia) and .165 MPa abs (23 psia) respectively.
  - Dose rates in the Torus continue to decrease slightly to 9.7 Sv/hr (970 Rem/hr.)
- In Unit 2, injection of non-borated fresh water using the low pressure coolant injection continues at 7 cubic meters/hr, (= to the goal and equivalent to the decay heat rate 14 days after shutdown.) Comments on parameters:
  - Unit 2 reactor pressures remain fairly stable. TEPCO now considers these measurements to be suspect.
  - Feedwater nozzle temperature continues to decrease slowly to 150 C (302 F)
  - Reactor vessel lower temperature is believed unreliable.
  - Drywell pressure is stable at .090 MPa abs (13.8 psi)
  - Dose rates in the U2 Drywell and Torus continue to decrease. The drywell dose rates are at 27.1 Sv/hr or (2,710 Rem/hr) and the dose rate in the Torus has decreased to .629 Sv/hr or (62.9 Rem/hr.)
- In Unit 3, injection of non-borated fresh water using the low pressure coolant injection line continues at 7 cubic meters/hr (= to the goal and equivalent to the decay heat rate 14 days after shutdown.). Comments on parameters:
  - Unit 3 reactor pressures indicate stable but are considered suspect.
  - Feedwater nozzle temperature is fluctuating day-to-day and is considered to be unreliable.
  - Reactor vessel lower temperature has been steady two days at at 121 C (248 F)
  - Drywell pressure was steady at .104 MPa abs (15 psi). Torus pressure decreased slightly to .166 MPa abs (24 psi).
  - Dose rates in the U3 Drywell and Torus continue to decrease. The drywell is at 16.5 Sv/hr (1,650 Rem/hr) and the dose rate in the Torus is .634 Sv/hr or (63.4 Rem/hr.)

Dose and Dose Rates

- Radioactivity level in underground water around Unit 1 and 2 has increased compared to samples taken last week. Increases observed ranged from 6 to 38 times higher depending on the isotope. Radioactivity levels of groundwater around Units 3 and 4 remained the same or decreased slightly.

- The number of workers who have received greater that 100 mSv (10 Rem) has increased to 28. The highest received was 198 mSv (19.8 Rem). The maximum emergency dose is temporarily set at 250 mSv.

- Overall site dose rates are decreasing. For example:

  - The last reading reported at the main gate was 72 μSv /hr or (7.2 millirem/hour).

  - The side of the administration building facing the units is at 545 μSv/hr or 55 mrem/hr.

  - The dose rate at the west gate is reported to be 37 μSv /hr or (3.7 millirem/hour).

FUKUSHIMA DAIICHI

Status as of 6pm (JST) April 15, 2011- TC Briefing. (All times JST)

All information may be shared

The priorities remain as follows:

- Ensuring fresh water injection and cooling capabilities to the reactors and spent fuel pools. Goal is to reduce and maintain temperature in the reactors and spent fuel pools below 100 degrees centigrade.
- Draining water from the turbine buildings and trenches to reduce the radiation levels so that work can continue.
- Containing the spread of radioactive materials.

Highlights for today include the following:

- N2 purging of Unit 1 continues. Drywell pressure has been steady or slightly decreasing over the past several days.
- The transfer of radioactive water from the Unit 2 trench to the Unit 2 hotwell was completed last night. After an initial decrease, trench level has been increasing.
- Leak checks and seal inspections / repairs are in progress in the Radioactive Waste building in preparation for water transfers from the units.
- To support waste water cleanup TEPCO announced they will install multiple temporary tanks of 27,000 tons capacity by the end of May. They will also deploy a megafloat of 10,000 tons capacity by mid-May.
- 25 tons of water was added to the Unit 3 SFP. Spray of 140 tons into the Unit 4 pool is planned for today.
- Silt screens are in the process of being installed around intake / discharge areas. They are also placing sandbags filled with zeolite in the water around the intake structures to aid in the absorption of cesium.
- The unmanned helicopter is scheduled to fly again today. Videos from previous test flights have not yet been released.
- Debris removal and dust / particle scatter preventive actions are continuing.
- To strengthen electrical power reliability the Tohoku transmission line used as the Unit 1 & 2 power source and the TEPCO power source for Unit 3 & 4 will be cross connected and switchable. The emergency diesel generators for powering injection will be relocated to higher ground (April 15).

Fukushima-Daiichi Current Status and Planned Work

15 April at 08:00 (Rev-87)

		1号	2号	3号	4号	5号	6号	Common Pool (Unit 1 to 4)
Reactivity Control (Unit Reactor)	Current Status	■All CRs are kept inserted in the core	■All CRs are kept inserted in the core	■All CRs are kept inserted in the core	■All fuel assemblies are stored in SFP ■Gate between SFP & reactor cavity closed (For core shroud replacement work during outage)	■Core was loaded with bundles for the start of the next operation cycle ■RPV bolted up (Earthquake occurred after completion of RPV hydraulic test just before the startup) ■Maintaining cold shutdown	■Long term outage (7 month) ■RPV Head on ■Cold shutdown (at 19:29 on 20 March)	
		CAMS (at 03:00 on 13 April) : D/W: no measurement S/C: 9.72×10[illegible] SV/h	CAMS (at 10:00 on 15 April) : D/W: 2.71×10[illegible] SV/h S/C: 6.29×10[illegible] SV/h	CAMS (at 00:00 on 15 April) : D/W: 1.00×10[illegible] SV/h S/C: 6.34×10[illegible] SV/h				
	Next Works Planned (TEPCO Headquarters' Activities)	<Long term measure> □To add boric acid to fresh coolant before acieving cold shut down <After restoring power> □Operating SLC	□Borated fresh water injection started (at 10:10 on 26 March) <Long term measure> □To add boric acid to fresh coolant before acieving cold shut down <After restoring power> □ Operating SLC	<Long term measure> □To add boric acid to fresh coolant before acieving cold shut down <After restoring power> □Operating SLC				
Coolant Supply & Residual Heat Removal (Core cooling)	Current Status	■ECCS unavailable * Reason: loss of function of the auxiliary equipment cooling system (using sea water) ■Fresh water injection through FDW line (Switch to temporary installed motor driven pump was completed) (Flow Rate: 6 m³/h by interim instrumentation at 17:30 on 3 April) ■Power source of the interim motor driven pump was switched to off-site power (3 April 19:32 -12:02) ■Installing temporary replacement pump for CCSW ■Camera to monitor operating conditions of Core cooling water supply pumps was installed. (on 6 April) ■ Core cooling water supply was stopped due to off-site power shut-off caused by an earthquake (11 April 17:17-18:04) Core cooling water supply was restored.	■ECCS unavailable * Reason: loss of function of the auxiliary equipment cooling system (using sea water) ■Fresh water injection from FP line to low pressure coolant injection (Switch to temporary installed motor driven pump was completed) (Flow Rate: 7 m3/h by interim instrumentation at 19:00 on 7 April) ■Power source of the interim motor driven pump was switched to off-site power (3 April 10:14 -12:12) ■Installation of the alternate pump for RHRS (28 March) ■Camera to monitor operating conditions of Core cooling water supply pumps was installed. (on 6 April) ■ Core cooling water supply was stopped due to off-site power shut-off caused by an earthquake	■ECCS unavailable * Reason: loss of function of the auxiliary equipment cooling system (using sea water) ■Fresh water injection from FP line to low pressure coolant injection (Switch to temporary installed motor driven pump was completed) (Flow Rate: 7 m3/h by interim instrumentation at 17:32 on 3 April) ■Power source of the interim motor driven pump was switched to off-site power (2 April 09:56 -12:18) ■Installation of the alternate pump for RHRS (28 March) ■Camera to monitor operating conditions of Core cooling water supply pumps was installed. (on 6 April) ■ Core cooling water supply was stopped due to off-site power shut-off caused by an earthquake		■Ordinary operation in SHC mode of RHR (14 April 10:07)	■Ordinary operation in SHC mode of RHR (14 April 10:19)	
		■RPV Dome Pressure (at 03:00 on 15 April) 0.029 MPa-g (Gauge A) 0.063 MPa-g (Gauge B) (watching trend continuously) ■Reactor Water Level (at 00:00 on 15 April) TAF -1550 mm (Fuel Range: Gauge A) TAF -1550 mm (Fuel Range: Gauge B) ■RPV Temperature (at 03:00 on 15 April) Feed water nozzle: 195.0℃ Bottom of RPV : 119.0℃ (watching trend continuously) ■Backup line for core cooling water injection was installed. (on 14 April)	■RPV Dome Pressure (at 00:00 on 15 April) 0.018 MPa-g (Gauge A) 0.023 MPa-g (Gauge B) ■Reactor Water Level (at 00:00 on 15 April) TAF -1450 mm (Fuel Range. Gauge A) TAF - mm (Fuel Range. Gauge B) ■RPV Temperature (at 00:00 on 15 April) Feed water nozzle: 150.0℃ Bottom of RPV : 116.0℃ (watching trend continuously due to suspected indication problem) ■Backup line for core cooling water injection	■RPV Dome Pressure (at 00:00 on 15 April) 0.019 MPa-g (Gauge A) 0.063 MPa-g (Gauge C) ■Reactor Water Level (at 00:00 on 15 April) TAF-1800 mm (Fuel Range. Gauge A) TAF-2250 mm (Fuel Range: Gauge C) ■RPV Temperature (at 00:00 on 15 April) Feed water nozzle : 91.2 ℃ (watching trend continuously due to suspected indication problem) Bottom of RPV : 121.1 ℃ ■Backup line for core cooling water injection		■RPV Dome Pressure (at 00:00 on 15 April) 0.043 MPa-g ■Reactor Water Level (at 00:00 on 15 April) TAF -1700 mm (Shut Down Range Gauge) ■Coolant Temprature (at 00:00 on 15 April) [illegible] ℃	■RPV Dome Pressure (at 00:00 on 15 April) 0.010 MPa-g ■Reactor Water Level (at 00:00 on 15 April) TAF -2110mm ■Coolant Temprature (at 00:00 on 15 April) 41.1℃	

	Next Works Planned (Activities of Cooling Water Supply Force)	pump (The work was suspended due to high radiation environment around MUWP in the turbine building). ☐Water flow will be reduced to 4m³ that is commensurate to the decay heat 14 days after shut down <Long Term Cooling Measure> ☐RHR ordinary operation in SHC mode after restoring off-site power & related equipments ☐Temporary D/G for core cooling water injection will be moved to high ground (scheduled on 15 April)	MUW pump (The work was suspended due to high radiation environment around MUWP in the turbine building). ☐Water flow will be reduced to 7m³ that is commensurate to the decay heat 14 days after shut down <Long Term Cooling Measure> ☐RHR ordinary operation in SHC mode after restoring off-site power & related equipments ☐Temporary D/G for core cooling water injection will be moved to high ground (scheduled on 15 April)	measurement of water level in T/B ☐Switch the motor driven pump to MUW pump (The work was suspended because of high radiation environment around MUWP in the turbine building). Preparing to drain the high radiation water ☐Water flow will be reduced to 7m3 that is commensurate to the decay heat 14 days after shut down <Long Term Cooling Measure> ☐RHR ordinary operation in SHC mode after restoring off-site power & related equipments ☐Temporary D/G for core cooling water injection will be moved to high ground (scheduled on 15 April)				
Containment Function (Cooling and Confinement)	Current Status	■Pressure (at 03:00 on 13 April) D/W: 0.165 MPa-abs S/C: 0.165 MPa-abs ■Started ventilation through hardened line (at 14:30 on 12 March) * PCV design pressure : 384 kPa PCV max pressure for use : 427 kPa Rapture disc working pressure : 310 kPa	■Pressure (at 00:00 on 15 April) D/W: 0.000 MPa-abs S/C: Down Scale (Examining) ■Ready to start ventilation through hardened line (Not executed so far) PCV design pressure : 384 kPa PCV max pressure for use : 427 kPa Rapture disc working pressure : 325 kPa	■Pressure (at 00:00 on 15 April) D/W : 0.1043 MPa-abs S/C: 0.1064 MPa-abs ■Started ventilation through hardened line (at 9:20 on 13 March) PCV design pressure : 384 kPa PCV max pressure for use : 427 kPa Rapture disc working pressure : 310 kPa		■Negative pressure kept by SGTS	■Negative pressure kept by SGTS	
	Next Works Planned (TEPCO Headquarters' Activities)	☐Hydrogen countermeasure first * Fill PCV and ventilation line with nitrogen * Reinforced monitoring of PCV pressure * Continue to secure ventilation line <After securing off-site power> ☐Restoring PCV spray function * MUWC system, FP system <After restration of equipments> ☐RHR operation in SHC mode ☐Restoring D/W cooling coil ☐Alternative heat removal by CUW	Same as unit 1					
Spent Fuel Pool (SFP) (Decay Heat Removal & Water Supply)	Current State	■SFP water level uncertain (No water level meter) ■SFP temperature uncertain (Unable to measure because of no power supply) ■Skimmer surge tank level 4500 mm (at 06:00 on 15 April) ■No Roof due to explosion on the operation floor ■Watering by concrete pumping vehicle (Fresh Water) (called the Elephant) ・31 March 13:02-13:57 ・31 March 14:29-16:04 ・ 2 April 17:16-17:19 The nickname of concrete pumping vehicle for Unit 1 was changed from "Large Giraffe" to "Elephant" to prevent confusion on 3 April. ■Preparation for water feeding with electric motor pumps was completed. (on 9 April)	■SFP water level uncertain (No water level meter) ■SFP temperature 66.0℃ (at 00:00 on 15 April) ■Skimmer surge tank level 5200mm (at 06:00 on 15 April) ■Roof remained, however blowout panel worked ■Fresh water injection to SFP trough the existing FPC line and temprary line ・26 March 16:30-18:25 ・30 March 19:05-23:50 (Switched to fire engine pump due to some trouble in electric motor driven pump) ・ 1 April 14:56-17:05 ・ 4 April 11:05-13:37 ・ 7 April 13:29-14:34 ・10 April 10:37-12:38 ・13 April 13:15-14:55 ■Removal of the existing strainer in FPC line was completed (31 March). (Scheduled for 31 March)	■SFP water level uncertain (No water level meter) ■SFP temperature uncertain (Unable to measure because of lack of power supply) ■Skimmer surge tank level No measurement ■No roof due to explosion on the operation floor ■Water sprey with new special pumping vehicle (call Zebra-improved) ・31 March 16:30-19:33 (Fresh Water) ・ 2 April 09:52-12:54 (Fresh Water) ・ 4 April 17:03-19:19 (Fresh Water) ・ 7 April 06:53- 08:53 (Fresh Water) ・ 8 April 17:06- 20:00 (Fresh Water) ・10 April 17:15-19:15 (Fresh Water) ■ Check the condition of FPC lines ・No abnormal condition on the strainer ・Piping seems to be stuffed (on 3 April) ■Preparation for water feeding with electric motor pumps was completed. (on 9 April) ■The Zebra-improved was moved for replacement	■SFP water level : Uncertain ■SFP water temperature: gauge out of order (at 11:10 on 24 March and later) ■Skimmer surge tank level 4370 mm (at 00:00 on 15 April) ■No roof due to explosion at the operational floor ■Installation alternation pump for RHRS ■Watering by concrete pumping vehicle (called as Giraffe) ・30 March 14:04-18:33 (Fresh water) ・ 1 April 08:28-14:15 (Fresh Water) ・ 3 April 17:14-22:16 (Fresh Water) ■ Check the condition of FPC lines ・No abnormal condition on the strainer ・Piping seems to be stuffed (on 4 April) ■The Elephant was moved from Unit 1 to Unit 4 ■Watering with the Elephant ・ 5 April 17:35-18:22 ・ 7 April 18:23-19:40 ・ 9 April 17:07-19:24 ・ 13 April 0:30- 6:57 (195 ton) ■Preparation for water feeding with electric motor pumps was completed. (on 9	■Inventory securing * CST -> MUWC -> FPC -> SFP ■Heat removal * FPC (Surge Tank) -> RHR -> S/C * Heat removal in S/C cooling mode of RHR ■SFP Water level: uncertain (Water level alarms were not activated.) ■SFP Water temp. 35.0℃ (at 00:00 on 15 April) ■Secondary containment is intact with roof of R/B ■Fresh water was transferred to fresh water tank #3 by tank lorry (- 1 April)	■Inventory securing * CST -> MUWC -> FPC -> SFP ■Heat removal * FPC (Surge Tank) -> RHR -> S/C * Heat removal in S/C cooling mode of RHR ■SFP Water level: uncertain(Water level alarms were not activated.) ■SFP Water temp. 34.9℃ (at 00:00 on 15 April) ■Secondary containment is intact with roof of R/B ■Fresh water was transferred to fresh water tank #3 by tank lorry (- 1 April)	■SFP water temperature 39.4℃ at 07:20 on 14 April ■Cooling function achieved by air fin coolers (at 16:26 on 24th March) ■Water supply to the common SFP by MUW system (24 March 16:15-18:04) ■FPC(A) started at 18:05 on 24th March
	planned work (Next Activities of FPC Team)				☐Water sprey with the Elephant #2 (18 April 14:00 - 14:00)			

High Voltage AC Power Supply	Current Status	network of Tohoku EPC (at 18:46 on 20 March) ■Equipments of MUX tested for short circuit and ground but in fail on 2t March ■120V I & C main bus powered at 01:40 on 23 March ■Illumination of MCR restored at 11:30 on 24 March ■Monitoring posts (MP5-8) were restored.	distribution network of Tohoku EPC (at 15:46 on 20 March) ■MCC 2A-1 in the turbine building was powered at 16:40 on 26 March ■Illumination is restored in main control room at 16:46 on 27 March.	line (at 10:36 on 22nd March) ・Temporary power supply achieved utilising the non-damaged part of 66kV off-site power transmission line ・Trial electric charge of the motor Center vehicle for Unit3 and Unit4 was completed at 14:28 on 18 March ・Instalation of multi circuit breakers and power cables were completed on 19 March ・Inspection of cable from the breakers and loads was conducted on 20 March ・Instalation of cables were completed on 21 March. ■T/B MCC 3C-2 has been powered at 22:10 on 22 March. ■T/B MCC 3C-1 has been powered at 22:21 on 22 March ■120V I & C main bus powered at 22:28 on 22 March ■Illumination is restored in main control room at 22:43 on 23 March. ■T/B MCC 3D-1 has been powered on 29 March. ■T/B MCC 3A-1 has been powered	transmission line (at 10:35 on 22nd March) ■120V I & C main bus powered at 01:40 on 23 March ■Illumination of MCR restored at 11:50 on 29 March	utilising the non-damaged part of 66kV off-site power transmission line (Yono-Mori line 1L,2L) ■Non-safety grade buses of 5A and 5B are unavailable ■Temporary pump (RHRS) was installed and connected to the water supply line on 24th March ■Emergency administration building was powered on 24th March ■Water Purification Facility was powered at 9:10 on 24th March ■Investigating cable laying work for monitoring posts (MP-1/2/3/4) on 26 March. ■T/B MCC 5D-2 has been powered on 31 March	utilising the non-damaged part of 66kV off-site power transmission line (Yono-Mori line 1L,2L) ■Non-safety grade buses of 6A and 6B are unavailable ■Temporary pump (works as a substitute of RHRS) was installed and put in-service (Powered by P/C) ■Test run od installed cable was conducted on 20 March ■Monitoring posts (MP1-4) were restored.	pool was restored at 15:30 on 24th March
	planned work (Next Activities of Electric Power Supply Team)	□Restration work of electricity will be restarted after completing water transfer from T/B	□Restration of power for instrumentation	□Restration work of electricity will be restarted after completing water transfer from T/B		□Laying temporary power cable for SLC (B)	□Investigating cable laying work for monitoring posts	□Investigating the power restoration work for I & C and illumination
DC Power Supply	Current Status	■Part of I & C equipments were powered by temporary battety to monitor plant status	■Part of I & C equipments were powered by temporary battety to monitor plant status ■Common DC125V has been powered at 16:30 on 31 March	■Part of I & C equipments were powered by temporary battety to monitor plant status * Batteries for reactor level guages were replaced by fresh ones at 12:15 on 21st March ■Restration of DC 125V Charge cometr (B) (30 March)	■Part of I & C equipments were powered by temporary battety to monitor plant status	■Part of I & C equipments were powered by temporary battety to monitor plant status ■DC 24 Charger 5B-1has been powered on 31 March	■Part of I & C equipments were powered by temporary battety to monitor plant status	
	Next Works Planned (Activities of Electric Power							
Miscellaneous Measures against Hydrogen	Current Status	■Measurement for hydrogen gas accumulating in PCV ・Considering the injection of N2 gas ■Injection of N2 gas is in progress ・(Flow rate: 28m^3/h, degree of purity: 98%) 7 April 01:31- 9 April 03:29 (suspended due to switch to high degree of purity N2 gas) ・Injection of high degree of purity N2 gas (Flow rate: 28m3/h, degree of purity: 99.92%) 9 April 04:10 - ・Injection of N2 gas was stopped due to an earthquake (11 April 17:16 - 23:19)	■Considering the injection of N2 gas into PCV ■Generation of hydrogen gas at the top part of the reactor building is of concerned * White smoke observed on 21st March was supposed to be the steam from SFP that was leaked through the rain drainage duct. It is hoped that this mitigates the concentrated of Hydrogen gas.	■Considering the injection of N2 gas into PCV		■3 holes(3~7.5 cm) were drilled on the celling panel (250 mm thick) of the reactor building on 18 March to relieve hydrogen gas and to avoid explosion	■3 holes(3~7.5 cm) were drilled on the celling panel (250 mm thick) of the reactor building on 18 March to relieve hydrogen gas and to avoid explosion	
	Next Works Planned (Next Activities)		□Water jet pump is ready at off-site stock yard, however lifting machine is not available					

Turbine Building Water Draining	Current Status	・Water level in T/B OP +510mm (at 07:00 on 15 April) : same as 14 April 18:00 ・Water transfer H/W → CST (3 April 13:55- 10 April 09:30) ■Draining water in trench ・Radiation level of the water surface in the trench: 0.4 mSv/h on 28 March ・Water level (from top edge of grating to water surface) 120 cm (at 7:00 on 15 April) : same as 14 April 18:00 ・Remote monitoring measurement of water level in the trench was established (on 2 April)	・Water level in T/B OP +3050mm (at 07:00 on 15 April) : same as 14 April 18:00 ・Water trabsfer (U/W → CST) (2 April 17:10 - 9 April 13:10) ・Monitoring camera for water level was installed (on 2 April) ■Draining water in Trench ・Radiation level of the water surface in the trench: higher than 1000 mSv/h (on 28 March) ・Water level (from top edge of grating to water surface) 91.0 cm (at 7:00 on 15 April) 20.0cm higher than 14 April 18:00 ・Remote monitoring measurement of water level in the trench was established (on 2 April) ■Operation " Beaver" ・Investigation of water flow route and injection of liquid chemical to prevent leaks was conducted. ・It had been confirmed that the leak was stopped. (at 05:38 on 7 April) ・A rubber board was placed over the crack. (at 13:15 on 6 April) ・Injection of liquid chemical to prevent	・Water level in T/B OP +2900mm (at 07:00 on 15 April) : same as 14 April 18:00 ・Water trabsfer (CST → SPT surge tank) (28 March 17:40 - 31 March 08:37) ・H/W is full. Leak from vacuum breaker was confirmed (on 7 April) ■Draining water in Trench ・Radiation level of the water surface in the trench: (No measurement due to difficulty in approach by debris) ・Water level (from top edge of grating to water surface) 117 cm (at 07:00 on 15 April) : same as 14 April 18:00 ・Remote monitoring measurement of water level in the trench was watablished (on 2 April)	・Water level in T/B OP 2900mm (at 07:00 on 15 April) : same as 14 April 18:00 ・Water transfer (Concentrated RW → T/B) (2 April 14:25 - 4 April 09:22, suspended) ・Water transfer pumps were added (1 → 5 pumps: 3 Apr. 10:00 - 4 Apr. 09:22, suspended due to high water level in the trench) ■Work for shutting off the leak in pit ・Concrete was poured (25m³) to clog cracks	・Water transfer RHR pump area & CS pump area → S/C (4 April) ■Discharging water in sub-drain of Unit 5 to the sea: 950 m3 (4 April 21:00 - 8 April 12:14)	・Water transfer (RW base floor → H/W) (1 April 13:40 - 2 April 10:00) ・Suspended by large amount of water; considering draining water ■Discharging water in sub-drain of Unit 6 to the sea: 372.6 m3 (4 April 21:00 - 9 April 18:52)	・Concentrated RW → sea: 9070 m3 (4 April 19:03 - 10 April 17:40) ■Draining water from main process building was completed. ■Draining water from incinerator building was started (on 6 April) ■Being repaired of boundary / Prevention of leaks from boundary of buildings before storing highly contaminated water in concentrated RW
	Next Works Planned	□Draining water in T/B basement ・Considering transfering draining water in T/B basement to concentrate RW		□Draining water in T/B basement ・Considering transfering draining water in T/B basement to concentrate RW	□Work for shutting off the leak in pit			・Remote monitoring measurement is planned
Others	Current Status	■Barge ・Water transfer: Barge No.1 → Filtered water tank 1 April 15:58 - 16:25 2 April 10:20 - 16:40 ・Water transfer: Barge No.2 → Barge No.1: (3 April 09:52 - 11:15) ・Barge No.2 arrived at dock (at 12:03 on 4 April) ■Air Borne Contamination Control ・Test sprinkling was conducted at mountain side of the common pool (1 April pm) ・Sprinkling inhibitor on around the common pool area (until 10 April 15:00) ・Sprinkling inhibitor was conducted around the common pool (11 April 12:00-13:20) ■Removal of debris ・Debris removal was conducted with unmanned heavy equipment at Unit 3&4 area (10 April 09:00~17:00) ■T-Hawk project (wireless-controlled helicopter) ・Test flight was conducted (10 April 15:59 - 16:28) ・Unmanned flight was conducted (14 April 10:17 - 12:25) ■Silt fence (11 April Two fences were installed on the south) ■Silt fence (13 April Unit 3&4: in front of Screen facilities) ■Silt fence (14 April Unit 1&2: in front of Screen facilities, East & South of Intake) ■Iron plate (13 April Unit 2) ■Nitrogen gas bubling in Filtered water tank (13 April)						
	Next Works Planned	□T-Hawk project (wireless-controlled helicopter) (scheduled on 15 April) ・Pouring of mortarbags of zeolite around intake structure (scheduled on 15 April) ・Sprinkling inhibitor at west side of the common pool (scheduled on 16 April)						

Abbreviations:

CAMS :Containment Area radiation Monitor System
CST :Condensate Storage Tank
CUW :(Reactor Water) Clean Up Water (System)
D/W :Dry Well
ECCS :Emergency Core Cooling System
FP :Fire Protection
MS :Main Steam
M/C :Motor Power Center
RCIC :Reactor Core Isolation Cooling
RHR :Residual Heat Removal
RPV :Reactor Pressure Vessel
S/C :Suppression Chamber
SDF :Self Defense Force
SFP :Spent Fuel Pool
SGTS :Stabd by Gas Treatment System
SHC :Shut Down Cooling

P/C :Power Distribution Center

Fukushima Daiichi Timeline (Time in JST)

Date	Time	Source	Item	U1	U2	U3	U4	U5	U6	Rad Lvl	Emergency Actions
11-Mar	14:46	TEPCO	9.0 magnitude earthquake strikes off the coast of Honshu Island at a depth of 15 miles. Trips Units 1, 2 and 3. Units 4, 5 and 6 already offline for maintenance. The earthquake results in a loss of off-site power. EDG's supply safety system loads.	Trip	Trip	Trip	Offline				
11-Mar	15:41	TEPCO/NEI	EDGs shutdown due to loss of site power (SBO)	SBO	SBO	SBO	SBO			No Increase.	
11-Mar	15:42	NISA	TEPCO reports first level emergency per Article 10 (Total Loss of A/C power) of the Act on Special Measures Concerning Nuclear Emergency Preparedness for U1, U2, and U3.	Article 10 Report	Article 10 Report	Article 10 Report					Report to NISA
11-Mar	16:36	NISA	Occurrence of Article 15 event (inability of ECCS to inject water) in U1	Article 15 Event							
11-Mar	17:07	TEPCO	Occurrence of Article 15 event temporarily cleared for U1 because water level monitoring function restored but re-applied when it was lost again.	Article 15 Event							
11-Mar	17:50	TEPCO	Taking measures to reduce U1 containment pressure.	Preps to Vent							
11-Mar	19:03	NISA/JNES Briefing	Government declares state of nuclear emergency (establishese emergency response centers)								
11-Mar	21:00	BBC	Evacuation order for 3km / Shelter to 10km	P_b 2X "Normal"							Evac Order - 3 km Shelter - 10 km
11-Mar	21:23	FEPC and NISA/JNES Briefing	Japanese government issues evacuation order for 3 km and shelter for 10 km								Evac Order - 3 km Shelter - 10 km
12-Mar	0:00	TEPCO	TEPCO states there is a possible release of radioactive material; therefore evacuation order for < 3 km and shelter order for 3-10 km	Possible Rad Release	Possible Rad Release					No increase	
	0:30	NISA/JNES Briefing	NISA issues temporary INES rating; U1, U2, and U3 - Level 3								U1, U2, and U3 rated Level 3
12-Mar	0:49	JAIF	Abnormal rise in U1 pressure CV	CV Pressure							
12-Mar	1:20	NISA	Occurrence of the Article 15 event (Unusual rise in PCV pressure)in U1	Article 15 Event							
12-Mar	2:03	CNN	Radiation levels at Unit 1 reported to be rising	Rad Lvl increase						Increase (U1)	
12-Mar	3:00	TEPCO	TEPCO states that it will commence containment depressurization for units that it cannot confirm water injection rate through RCIC.								
12-Mar	3:48	TEPCO	Initiated water injection via makeup water condensate system at U1	water injection via makeup water condensate system							

12-Mar	4:50	TEPCO	Initiated water injection via makeup water condensate system at U2		water injection via makeup water condensate system			
12-Mar	5:22	TEPCO	Specific Incident - Unit 1 suppression pool exceeded 100 °C / lost suppression function	Suppression Pool exceeds 100C				
12-Mar	5:32	TEPCO	Specific Incident - Unit 2 suppression pool exceeded 100 °C / lost suppression function		Suppression Pool exceeds 100C			
12-Mar	5:44	NISA/JNES Briefing	Prime Minister order 10 km evacuation					Evac Order - 10 km
12-Mar	6:07	TEPCO	Specific Incident - Unit 3(4 in update) suppression pool exceeded 100C / lost suppression function (no time given for previous alignment of makeup water condensate)			Suppression Pool exceeds 100C		
12-Mar	6:10	IAEA	Decided to vent U1 containment due to increasing pressure.	Preps to Vent				
12-Mar	6:45	CNN/JNIA	Radiation levels at the main gate are 8X normal				8X norm at gate	
12-Mar	7:00	TEPCO	Govt instructs evacuation to 10 km. Rad level increase noted by monitoring car.					Evac Order - 10 km
12-Mar	8:10	BBC	Alarm indicates poisition of one control rod unclear					
12-Mar	9:07	FEPC	Slightly radioactive vapor was passed through a filtration system and emitted outside via a ventilation stack from U1 reactor vessel -NOTE: Unconfirmed GE information may contradict vent path	Venting				
12-Mar	10:17	NISA	U1 vented	Venting				
12-Mar	10:43	BBC	Alarm clears; all Control Rods inserted					
12-Mar	10:58	BBC	U2 vented		Venting			
12-Mar	11:00	TEPCO	Plant Status Update	Venting Cont. / Rx lvl decreasing / RCIC out of service	RCIC/ Preps to Vent/ Rx lvl low but steady	RCIC/ Preps to Vent/		
12-Mar	13:00	TEPCO	Plant Status Update	Venting Cont. / Rx lvl decreasing / RCIC out-of-service	RCIC/ Preps to Vent/ Rx lvl low but steady	RCIC/ Preps to Vent/	> norm at monitoring post	
12-Mar	15:00	TEPCO	Plant Status Update	Rx lvl decreasing / Injecting water	RCIC/ Preps to Vent/ Rx lvl low but steady	RCIC/ Preps to Vent/		

12-Mar	15:36	TEPCO/NISA/BBC	An explosion causes significant structural damage to the secondary containment of U1. (Some reports indicate the TEPCO intentionally vented the containment into the Rx building - other indications seem to sound like it was intended to vent via exh. stack); four workers injured	Explosion in Rx Building.				
12-Mar	16:17	TEPCO/NEI	Specific Incident - Radiation dose at site boundary exceeds ' regulatory limit.'				Rad Dos at boundary > limit - NEI reports 11 mr/hr	
12-Mar	16:19	JNIA	Small amount of cesium has escaped from plant				Cesium detected	
12-Mar	18:25	NISA/JNES Briefing	PM directs evacation of residents within 20 km					Evac - 20 km
12-Mar	18:36	FEPC	Japanese government issues evacuation order for 20 km					Evac - 20 km
12-Mar	18:36	NEI	Rad Lvl Update - 7 mr/hr at site boundary					
12-Mar	19:00	TEPCO	Plant Status Update	Cooled by Isol. Condenser	RCIC	RCIC		
12-Mar	19:11	TEPCO	Japanese Govt increases the evacuation zone to 20 km					Evac - 20 km
12-Mar	20:00	TEPCO	Plant Status Update	Venting Cont.	RCIC shut down/ Preps to Vent/ Rx lvl low but steady	HPCI in service / Preps to vent	Rad lvls at plant and monitoring post > norm	
12-Mar	20:20	TEPCO	Initiated injecting borated seawater into U1 RCS	SW injection to RCS				
12-Mar	20:20	IAEA/NISA	Started injecting borated seawater into U1 reactor containment vessel	SW injection to containment				
12-Mar	22:15	TEPCO	Secured U1 SW injection due to tsunami warning	Secured SW injec.				
12-Mar	22:30	NEI	Update - backup EDG's and batteries have arrived on site.					
12-Mar	23:00	TEPCO	Plant Status Update	Venting Cont.	RCIC shut down/ Preps to Vent/ Rx lvl low but steady	HPCI in service / Preps to vent		
12-Mar		NISA/JNES Briefing	NISA rerates U1 to Level 4					U1 rated Level 4
13-Mar	2:00	TEPCO	Plant Status Update	SW injection to RCS	RCIC shut down/ Preps to Vent/ Rx lvl low but steady	HPCI in service / Preps to vent		

13-Mar	5:10 TEPCO/IAEA/NIS	Occurrence of Article 15 event (inability of ECCS to inject water) at U3; HPCI automatically shutdown. Attempts to start RCIC failed. ECCS flow cannot be confirmed. Commenced containment venting to lower pressure.			Article 15; Loss of HPCI / RCIC failed to start / Venting Cont.	
13-Mar	8:41 TEPCO/BBC/NIS/	Started venting U3 containment			Secured venting	
13-Mar	8:56 TEPCO	Specific Incident - Radiation dose at site boundary exceeds the limiting value.				Rad Dos at boundary > limit
13-Mar	9:00 TEPCO	Plant Status Update	SW injection to RCS	RCIC shut down/ Preps to Vent/ Rx lvl low but steady	Eval alt. means of injection.	
13-Mar	9:25 TEPCO	Completed pressure reduction and commenced SW injection at U3 with fire pump. NOTE: Sources differ for SW injection times.			SW injection to RCS	
13-Mar	11:00 NISA	Started venting U2 containment		Venting		
13-Mar	12:00 TEPCO	Plant Status Update	SW injection to RCS	RCIC in service/ Vented cont. / Rx lvl low but steady	Manually opened SRV to lower Rx press and then commenced SW injection to RCS	
13-Mar	13:10 TEPCO NRC Briefing	Injected borated seawater into U3. NOTE: Sources differ on SW Injection times.			SW injection to RCS	
13-Mar	14:00 TEPCO	Plant Status Update - first mention of discussions to cool down water in SFP's	SW injection to RCS	RCIC in service/ Rx lvl low but steady	SW injection to RCS	
13-Mar	14:15 TEPCO	Specific Incident - Radiation dose at site boundary exceeds the limiting value.				Rad Dos at boundary > limit
13-Mar	15:00 TEPCO	Plant Status Update	SW injection to RCS	RCIC in service/ Preps to Vent/ Rx lvl low but steady	SW injection to RCS / Concern about H2 explosion	Rad lvls at plant and monitoring post > norm
13-Mar	21:00 TEPCO	Plant Status Update	SW injection to RCS	RCIC in service/ Vented cont. / Rx lvl low but steady		Rad lvls at plant and monitoring post > norm

13-Mar	21:12	FEPC	Borated seawater injected into 'primary containment vessel' of U3			SW injection to RCS			
13-Mar	21:15	NEI	Update - Max dose on site 128 mr/hr					Max site dose 128 mr/hr	Preps underway to distribute iodine
13-Mar	21:20	FEPC	Slightly radioactive vapor was passed through a filtration system and emitted outside via a ventilation stack from Unit 3 reactor vessel - NOTE: Unconfirmed GE reports may contradict vent pathway			Venting			
13-Mar		CNN	Potentially radioactive steam was released from the primary circuit into the secondary containment area to reduce mounting pressure.			Venting			
13-Mar	22:09	BBC	TEPCO planning to pump sea water into U2 / First reports of problems with this unit.		Planned SW injection				
14-Mar	0:00	FEPC	Injection of seawater into U1 primary containment vessel continues.	SW inection to RCS					
14-Mar	2:42	NEI	Max dose at site is 155.7 mr/hr and then decreases to 4.4 mr/hr over the next several hours					Max site dose 128 mr/hr	
14-Mar	4:08	NISA	U4 SFP water temperature 84 C				SFP Temp High		
14-Mar	7:44	NISA	Occurrenc of Article 15 event at U3 (Unusual rise of PCV pressure)			Article 15 Event			
14-Mar	8:00	NEI	Update - U3 containment relief valve failed to open but was restored by connecting air line. Officials acknowledge potential for partial meltdown of U1 and U3.			Relief valve failure to open			
14-Mar	11:01	TEPCO/NISA	Explosion in U3 reactor building - TEPCO reports that containment appears intact.			Explosion			
14-Mar	11:44	TEPCO	Rad Lvl Update - 2 mr/hr at site boundary					2 mr/hr at site boundary	
14-Mar	12:00	FEPC	In response to lower water levels, TEPCO began preparations for injecting seawater into U2 reactor core		Planned SW injection				
14-Mar	12:30	TEPCO/NISA	Plant Status	SW injection suspended	RCIC in service/ Preps to Vent/ Rx lvl low but steady	SW injection to RCS			
14-Mar	13:25	TEPCO	Specific Incident - U2 RCIC failed; Occurrence of Article 15 event (inability of ECCS to inject water) in U2		RCIC failed; Article 15				
14-Mar	13:55	JAIF	Rad Lvl Update - 1.5 mr/hr at site boundary					1.5 mr/hr at site boundary	
14-Mar	16:22	FEPC	TEPCO reports that the U2 water level inside the reactor core fell below the lower measuring range of the gauge, leading them to believe that the fuel rods in the reactor core might have been fully exposed.		Low water level				

14-Mar	16:30	TEPCO-NRC Briefing	Initiated seawater injection to U2 RPV		RPV SW injection			
14-Mar	16:34	NISA	Started seawater injection to U2 RPV		RPV SW injection			
14-Mar	18:22	FEPC	Water level inside U2 reactor core fell below the lower measuring range of the gauge (for a 'short time').		RPV water levels low			
14-Mar	20:30	JAIF	Plant Status	SW injection suspended	RPV SW injection	RPV SW injection		
14-Mar	20:37	FEPC	Slightly radioactive vapor was passed through a filtration system and emitted outside via a ventilation stack from U2 reactor vessel.		Venting			
14-Mar	22:50	JAIF/NISA	Report IAW Article 15 (Abnormal rise of pressure in CV)		Abnormal PCV Pressure Rise			
14-Mar	23:00	JAIF/CNN/NEI	Reports indicate that U2 fuel assemblies exposed on two occasions with total uncovery time of 140 minutes.		RPV water levels low			
14-Mar	23:00	NEI	Rad lvls peaked on site at 313 mr/hr coincident with second uncovery					313 mr/hr on site
15-Mar	0:00	JAIF	Start U2 venting		Venting			
15-Mar	0:02	NISA	Started U2 venting		Venting			
15-Mar	4:00	NEI	Worked resumed to pump SW into U2 RCS.		RPV SW injection			
15-Mar	6:00	TEPCO/CNN/JAIF	Explosion; damage and fire in Unit 4 reactor building				Rx bldg damage and fire	
15-Mar	6:00	TEPCO	Abnormal noise emanating from Pressure Suppression Chamber, pressure in chamber decreased (Press Release 7 April)		Noise and pressure drop in S/C			
15-Mar	6:10	JAIF/NISA	U2 explosion, suppression pool damage suspected		Explosion			
15-Mar	6:14	TEPCO/NEI	Explosion in vicinity of U2 suppression pool - potential containment damage. Containment pressure lowered to close to ambient following the blast.		Explosion and possible cont. damage			
15-Mar	6:14	NISA	Partial damage in U4 reactor building; extinguished by 12:25 (Note discrepancy in time and no reference to explosion)				Rx bldg damage and fire	
15-Mar	6:14	FEPC	Smoke emanating from the damaged U3 secondary containment building.			Smoke		
15-Mar	6:20	NISA	U2 Pressure Suppression Chamber damage suspected		SP damage			
15-Mar	7:00	JAIF/TEPCO	Plant Status	SW injection suspended / Cont press stable	SW injection to RCS / cont press near atmosphere	SW injection to RCS / Cont press stable		
15-Mar	8:25	JAIF	White smoke observed to rise from U2		steam/ smoke			

15-Mar	8:30	JAIF	Rad Lvl Update - 821.7 mr/hr at site boundary					821.7 mr/hr at site boundary	~ All but 50 critical staff evacuated
15-Mar	9:00	UPI	Rad Lvl Update -1193 mr/hr at site boundary					1193 mr/hr at site boundary	
15-Mar	9:38	NEI/FEPC/NISA	Fire reported in 3rd floor of U4 secondary containment building; extinguished by 12:25)				Fire in Rx Bldg		
15-Mar	11:00	NISA/JNES Briefing	PM directs shelter within 30 km						Shelter - 30 km
15-Mar	11:00	IAEA	U4 Rx bldg fire extinguished				Fire extinguished		
15-Mar	11:22	NEI	Rad Lvl Update -821 mr/hr at site boundary, 40 R/hr U3, 10 R/hr U4					821 mr/hr at site boundary, 40 R/hr U3, 10 R/hr U4	
15-Mar	12:29	FEPC	TEPCO confirms U4 secondary containment building fire extinguished				Fire extinguished		
15-Mar	12:38	FEPC	Seawater injection to U3 suspended						
15-Mar	13:35	WIKI	No fly zone established for 30 km						30 km No Fly Zone
15-Mar	14:00	NEI	TEPCO now able to reopen U2 SRVs; seawater injection restarted.		SRV's functional - SW injection to RCS restarted				
15-Mar	15:00	IAEA	Rad Lvl Update -60 mr/hr at site boundary					60 mr/hr at site boundary	
15-Mar	16:09	BBC	Fire reported U4 Rx building				Fire in Rx Bldg		
15-Mar	16:30	JAIF	Rad Lvl Update -49 mr/hr at site boundary					49 mr/hr at site boundary	
15-Mar	17:00	IAEA	U4 Rx bldg fire extinguished				Fire extinguished		
15-Mar	19:00	JAIF	Plant Status	SW injection to RCS and cont.	SW injection	SW injection to RCS and cont.			
15-Mar	23:35	JAIF	Rad Lvl Update - 630.8 mr/hr at site boundary					630.8 mr/hr at site boundary	
16-Mar	5:45	TEPCO/FEPC/NIS	Fire reported in U4 Rx building				Fire in Rx Bldg		
16-Mar	6:15	TEPCO/NISA	No signs of fire in U4 Rx building				Rx Bldg fire out		
16-Mar	7:26	FEPC	Flames/smoke no longer observed in U4 Rx building; concluded that fire extinguished;.				Rx Bldg fire out		

16-Mar	8:00		Plant Status	SW injection to RCS and cont. / Venting cont.	SW injection to RCS	SW injection to RCS and cont. / Venting cont.			
16-Mar	8:30	JAIF/NISA	White smoke from U3 (later determined to be steam, by TEPCO, from U3 SFP evaporation)			Steam rising from SFP			
16-Mar	8:37	FEPC	White smoke from viscinity of U3 secondary containment builiding			White smoke			
16-Mar	8:45	NEI	Fire in U4 Rx Bldg is out				Rx Bldg fire out		
16-Mar	11:00	JAIF	Rad Lvl Update -339.1 mr/hr at site boundary					339.1 mr/hr at site boundary	
16-Mar	11:36	ABC	Remaining 50 workers temporarily evacuated from site due to high rad levels.						Workers temporarily evacuated
16-Mar	12:30	JAIF	Plant Status update	SW injection to RCS and cont. / Venting cont.	RPV SW injection	SW injection to RCS / Venting cont.			
16-Mar	12:35	MSNBC	50 workers return to site						
16-Mar	14:30	JAIF	Rad Lvl Update -193.7 mr/hr at site boundary					193.7 mr/hr at site boundary	
16-Mar	16:20	JAIF	Rad Lvl Update -147.2 mr/hr at site boundary					147.2 mr/hr at site boundary	
17-Mar	9:48	FEPC	JDF helicopter makes 4 drops to add water to U3 SFP (until 10:01)			SFP SW injection			
17-Mar	NA	FEPC	Visual surveys from March 16 helicopter flights confirm that water is present in U4 SFP				Water presence visually confirmed		
17-Mar	12:05	FEPC	Police water cannon shoots water at U4 spent fuel pool until 7:22PM.				SFP SW injection		
17-Mar	19:05	NISA	Water spray from ground by high pressure water-cannon trucks of police (to U3 SFP; until 19:15)			SFP SW injection			
17-Mar	19:35	FEPC/NISA	Five Self Defense Forces emergency fire vehicles shoot water at U3 spent fuel pool, until 8:09PM			SFP SW injection			
18-Mar		NISA/JNES Briefing	NISA rates U1, U2, and U3 as Level 5; U4 rated Level 3						U1, U2, and U3 rated level 5; U4 rated Level 4
18-Mar	14:00	FEPC/NISA	Six Self Defense emergency fire vehicles shoot water aimed at U3 SFP, until 2:38PM (39 tones of water in total).			SFP SW injection			
18-Mar	14:42	FEPC/NISA	TEPCO shoots water aimed at U3 SFP, until 2:45PM, using one US Army high pressure water cannon.			SFP SW injection			
18-Mar	15:00	FEPC	Injection of seawater to U1, U2, and U3 reactor core continues	RPV SW injection	RPV SW injection	RPV SW injection			

19-Mar	0:30	FEPC/NISA	Tokyo Fire Department began to shoot water aimed at U3 SFP, continuously until 01:10AM.			SFP SW injection				
19-Mar	4:22	FEPC	Second unit of emergency diesel generator started up.							
19-Mar	5:00	FEPC	RHR pump started and U5 SFP cooling re-established					SFP cooling via RHR pump		
19-Mar	5:11	FEPC	U6 Fuel Pool Cooling (FPC) pump started to circulate SFP water						SFP cooling via FPC pump	
19-Mar	8:10	JAIF	Rad Lvl Update 83.8 mr/hr							83.8 mr/hr at West Gate
19-Mar	9:15	FEPC	Three holes made in U5 and U6 reactor buildings to preclude H2 accumulation					Holes made in Rx Bldg	Holes made in Rx Bldg	
19-Mar	14:10	NISA	Water spray at U3 SFP by Tokyo Fire Department (until 3:40; March 20)			SFP SW injection				
19-Mar	17:30	FEPC	Tokyo Fire Department shoots water at U3 FFP			SFP SW injection				
19-Mar	21:00	FEPC	Injection of seawater to U1, U2, and U3 reactor core continues							
19-Mar	22:14	FEPC	RHR pump started and U6 SFP cooling re-established						SFP cooling via RHR pump	
19-Mar		Kyodo News	In Maebashi, Gunma, 2.5 Becquerel's (67 pCi) of iodine and 0.38 Becquerel (10 pCi) of cesium were detected Friday per kilogram of water (tap)							
20-Mar	8:20	FEPC/NISA	Self Defense Force vehicles shoot water aimed U4 SFP, until 9:29AM (FEPC) or 9:40 (NISA).				SFP SW injection			
20-Mar	11:00	NISA	U3 PCV pressure rose (320 kPa), then fell.							
20-Mar	14:30	NISA	U5 in cold shutdown					Cold Shutdown		
20-Mar	15:05	FEPC	Initiated injection of seawater into U2 SFP until 5:20PM (total about 40 tons)		SFP SW injection					
20-Mar	18:00	FEPC	Injection of seawater to U1, U2, and U3 reactor core continues	RPV SW injection	RPV SW injection	RPV SW injection				
20-Mar	18:20	FEPC/NISA	10 Self Defense Force vehicles shoot water aimed at U4 SFP, until 7:43PM (FEPC) or 7:46 (NISA); roughly 81 tons in total.				SFP SW injection			
20-Mar	19:27	NISA	U6 cold shutdown						Cold Shutdown	
20-Mar	21:36	FEPC	Tokyo Fire Department shoots water aimed at U3 SFP, continuously until 3:58AM on March 21 (roughly 1,137 tons in total)			SFP SW injection				
21-Mar	6:37	FEPC/NISA	12 SDF vehicles and TEPCO began shoot water aimed at U4 SFP, until 8:41AM (in total about 91 tons). TEPCO used one high pressure water cannon supplied by US Army.				SFP SW injection			
21-Mar	7:45	NISA/JNES Briefing	Government issues directive titled "Administration of stable Iodine"							Guidance on KI

21-Mar	11:36	NISA	External AC power restored to U5					External power restored		
21-Mar	15:55	FEPC/NISA	Gray smoke was emitted from U3 secondary containment building; extinguished by 17:55; 3/21/11			Smoke				
21-Mar	16:00	FEPC	Injection of seawater to U1, U2, and U3 reactor core continues	RPV SW injection	RPV SW injection	RPV SW injection				
21-Mar	16:45	NISA/JNES Briefing	Government issues directive titled, "Ventilation for using heating equipments within the in-house evacuation zone."							Guidance for ventilation systems
21-Mar	16:49	FEPC	Gray smoke emitting from U3 secondary containment building changes to white smoke (but volume remains same).			Smoke				
21-Mar	17:50	NISA/JNES Briefing	Government issues directive related to suspending shipment of spinach, Kakina (a green vegetable) and raw milk							Suspend shipment of selected foods
21-Mar	18:02	FEPC	Smoke emission from U3 secondary containment building ceases			Smoke				
21-Mar	18:22	JAIF/FEPC/NISA	White, steam-like smoke erupted from top of the U2 reactor building; workers temporarily take shelter inside; smoke ceases by 7:20 3/22		steam/ smoke					Worker shelter
21-Mar	20:00	JAIF	Work to restore external AC power interrupted after black smoke rising from U4				black smoke			
22-Mar	10:35	JAIF	External AC power				External AC Power			
22-Mar	11:30	JAIF	U1 RPV temperature increasing (based on TC readings at feedwater nozzle and on vessel bottom head)	RPV Temp Increase						
22-Mar	14:10	FEPC	Tokyo Fire Department began to shoot water aimed at U3 SFP			SFP SW injection				
22-Mar	15:10	NISA	Tokyo Fire Department began to shoot water aimed at U3 SFP (until 16:00; note that this appears as 14:10 in FEPC)			SFP SW injection				
22-Mar	16:00	FEPC	U5 and U6 external power connected. U5 power supply switched from Diesel Generator.					External power connected	External power connected	
22-Mar	16:07	NISA	Injection of seawater to U2 SFP (18 tons)		SFP SW injection					
22-Mar	17:17	FEPC/NISA	TEPCO shoots water at U4 SFP, until 8:32PM, with specialized vehicle normally used for pumping concrete (approximately 150 tons in total).				SFP SW injection			
22-Mar	18:00	FEPC	Injection of seawater to U1, U2, and U3 reactor core continues	RPV SW injection	RPV SW injection	RPV SW injection				
22-Mar	19:17	NISA	U6 receiving external power						External power restored	
22-Mar	19:41	FEPC	U5 and U6 power supply completely switched from diesel generator to external power.							
22-Mar	22:46	FEPC/JAIF/NISA	Lighting restored in U3 Central Control Room			control room lights				

23-Mar	2:30	FEPC/NISA	U1 seawater injection increased by using water supply system in addition to water extinction system (from 2 m^3/hr to 18 m^3/hr)	SFP SW injection				
23-Mar	10:00	FEPC/NISA	TEPCO shoots water at U4 SFP until 1:02 PM with specialized vehicle normally used for pumping concrete (approximately 130 tons in total).				SFP SW injection	
23-Mar	11:03	FEPC/NISA	TEPCO injects seawater into U3 spent fuel pool, until 1:20 PM (approximately 35 tons in total).			SFP SW injection		
23-Mar	14:00	FEPC	Injection of seawater to U1, U2, and U3 reactor core continues	RPV SW injection	RPV SW injection	RPV SW injection		
23-Mar	16:07	FEPC	TEPCO began to inject seawater into U2 spent fuel storage pool, until 5:01PM (approximately 18 tons in total)		SFP SW injection			
23-Mar	16:20	FEPC/JAIF/NISA	Black smoke emitted from U3 secondary containment building. (Under investigation)			black smoke		
23-Mar	17:24	NISA	Pump for U5 RHR Seawater System stopped when power switched from temporary to permanent power)					Permanent external power
23-Mar	23:30	FEPC/NISA	Emission of black smoke from U3 ceased (confirmed again at 4:50 am on March 24, 2011).			Black smoke extinguished		
24-Mar	5:35	FEPC/NISA	TEPCO injects seawater into U3 SFP via cooling and purification line, until at 4:05PM (approximately 120 tons in total).			SFP SW injection		
24-Mar	10:50	JAIF/FEPC	Hazy white steam emitted from top of U1 secondary containment building	steam/ smoke				
24-Mar	11:30	FEPC	Lighting restored to U1 Central Control Room	control room lights				
24-Mar	14:36	FEPC	TEPCO shoots water at the U4 SFP with a specialized vehicle normally used for pumping concrete, until 5:30PM (approximately 150 tons in total).				SFP SW injection	
24-Mar	16:14	NISA	Repair of U5 RHRS pump completed					RHRS pump repaired
24-Mar	16:35	NISA	U5 SFP cooling started					SFP cooling started
24-Mar	19:30	FEPC	Injection of seawater to U1, U2, and U3 reactor core continues	RPV SW injection	RPV SW injection	RPV SW injection		
25-Mar	6:05	FEPC	TEPCO injects seawater into U4 SFP via cooling and purification line, until 10:20 AM.				SFP SW injection	
25-Mar	7:05	FEPC/NISA	TEPCO shoots water at U4 SFP, with a specialized vehicle normally used for pumping concrete				SFP SW injection	
25-Mar	9:00	JAIF	Data indicate that water was transported from the reactor building to 'general drive via carry-in entrance'		R/B leak			
25-Mar	10:30	FEPC/NISA	TEPCO injects seawater into U2 SFP via cooling and purification line (Fuel Pool cooling Line or FPC), until 12:19PM (approximately 38 tons in total).		SFP SW injection			

25-Mar	13:28	FEPC/NISA	Kawasaki City Fire Department began to shoot water at the U3 SFP until 4:00PM (approximately 450 tons in total).			SFP SW injection	
25-Mar	15:37	JAIF/FEPC	Freshwater injection to U1 reactor core initiated.	RPV FW injection			
25-Mar	18:02	JAIF/FEPC/NISA	Freshwater injection to U3 reactor initiated			RPV FW injection	
25-Mar	19:30	FEPC	Injection of seawater to U2 reactor core continues		RPV SW injection		
26-Mar	10:10	JAIF/TEPCO/FEPC	Freshwater injection to U2 started (with boric acid)		RPV FW injection		
26-Mar	16:46	JAIF/FEPC/NISA	Lighting restored to U2 main control room		Control RM Lights		
27-Mar	12:34	FEPC	TEPCO shoots seawater at U3 SFP using concrete pump truck until 2:36PM (approximately 100 tons in total).			SFP SW injection	
27-Mar	16:55	FEPC/NISA	TEPCO shoots water at U4 SFP, with a specialized vehicle normally used for pumping concrete, until 7:25PM (approximately 125 tons in total).				SFP SW injection
27-Mar	18:31	NISA	Switched U2 core water injection using the temporary motor-driven pump		RPV FW injection		
28-Mar	11:45	FEPC	TEPCO announces that plutonium 238, 239 and 240 were detected in the soil sampled on March 21st and 22nd at five spots in Fukushima Daiichi Nuclear Power Station. Concentration of detected plutonium 238, 239 and 240 are the same level of the fallout observed in Japan at the atmospheric nuclear tests in the past and poses no major impact on human health.				
28-Mar	17:40	NISA	Transferred U3 water from CST to SPT (until 8:40, 3-31-11)			Water transfer	
28-Mar	20:30	NISA	Switched U2 core water injection to temporary motor-driven pump		RPV FW injection		
29-Mar	8:32	NISA	Switched U1 core water injection to temporary motor-driven pump	RPV FW injection			
29-Mar	11:50	JAIF/FEPC/NISA	Lighting restored to U4 central control room				Control RM Lights
29-Mar	14:17	NISA	U3 SFP water spray by Concrete Pump Truck (fresh water); periodically until 20:00			SPF SW injection	
29-Mar	16:30	NISA	Switched U2 temporary motor-driven pump injecting fresh water to SFP (until 18:25)		SFP FW injection		
29-Mar	16:45	NISA	Transferred U2 water from CST to SPT (until 11:50, 4-1-11)		Water transfer		
30-Mar	9:25	NISA	U2 SFP freshwater injection until 23:50; interrupted by temporary motor-driven pump and hose failures.		SFP FW injection		
30-Mar	14:04	FEPC/NISA	TEPCO shoots fresh water aimed at U4 spent fuel pool using concrete pump truck (until 18:04)				SFP FW injection
30-Mar	16:00	FEPC	Injection of freshwater into reactor cores of U1, U2, and U3 continues.	RPV FW injection	RPV FW injection	RPV FW injection	

31-Mar	12:00	NISA	Started transferring stagnant water from U1 Condensate Storate Tank (CST) to the Surge Tank of the Suppression Pool (SPT). Completed 15:26, April 2, 2011.	Water transfer		
31-Mar	15:03	FEPC/NISA	Water spray at U1 SFP with Concrete Pump Truck (fresh water)	SFP FW injection		
31-Mar	15:00	FEPC	Injection of freshwater into reactor cores of U1, U2, and U3 continues.	RPV FW injection	RPV FW injection	RPV FW injection	
01-Apr	14:56	NISA	Injection of freshwater from U2 FPC to SFP using temporary motor-driven pump (until 17:05)				
01-Apr	8:28	FEPC/NISA	TEPCO shoots freshwater at U4 SFP with concrete pump truck, until 2:14PM (approximately 180 tons in total).				SFP FW injection
01-Apr	15:30	FEPC	Injection of freshwater into reactor cores of U1, U2, and U3 continues.	RPV FW injection	RPV FW injection	RPV FW injection	
02-Apr		FEPC	Lighting restored to U1 and U2 turbine buildings and part of U3 and U4 turbine buildings				
02-Apr		FEPC	Monitoring cameras set at trench outside U2 turbine building and at basement floor of U2 turbine building to monitor the water levels.		Visual monitoring of turbine bldg		
02-Apr	9:30	FEPC/NISA	Accumulated water found in U2 pit (a vertical portion of an underground structure for housing electric cables) near the seawater intake and radiation level of water was over 1,000 milli Sv/hour. Water was observed entering ocean from a crack (about 20cm = 7.9 inches) on lateral surface of the pit.		U2 water accum. and leakage detected		
02-Apr	9:52	FEPC	TEPCO shoots freshwater at U3 SFP, with a specialized vehicle normally used for pumping concrete, until 12:54PM (approximately 75 tons in total).			SFP FW injection	
02-Apr	16:25	FEPC	Concrete was injected into U2 pit in an attempt to stop water discharge. (injected again at 7:02PM)		Leak mitigation		
02-Apr	17:10	NISA	Started to transfer water from U2 condenser to CST		Water transfer		
03-Apr	12:02	NISA	The power supply to the U1 temporary motor-driven pump switched from temporary power supply to external power supply	pump switched to external power			
03-Apr	12:12	NISA	The power supply to U2 temporary motor-driven pump switched from temporary power supply to external power supply		pump switched to external power		
03-Apr	12:18	NISA	The power supply to the U3 temporary motor-driven pump was switched from the temporary power supply to the external power supply			pump switched to external power	

03-Apr	13:47 FEPC/NISA	Polymer absorber, sawdust, and shredded newspapers were inserted in U2 pit in an attempt to stop the overflow of the discharge of water, until 2:30PM.		Leak mitigation				
03-Apr	13:55 NISA	Started to transfer U1 water from the condenser to the CST	Water transfer					
03-Apr	17:14 NISA	TEPCO shoots freshwater at U4 SFP with concrete pump truck, until 22:16.				SFP FW injection		
04-Apr	7:08 FEPC	Tracer (13 kg white colored bath agent) was inserted into trench outside U2 turbine building to determine route of water leakage		Leak mitigation				
04-Apr	11:05 NISA	Injection of fresh water from U2 FPC to SFP using temporary motor-driven pump.		SFP FW injection				
04-Apr	15:00 FEPC	Injection of freshwater into reactor cores of U1, U2, and U3 continues.	RPV FW injection	RPV FW injection	RPV FW injection			
04-Apr	17:03 FEPC	TEPCO shoots freshwater at U3 SFP, with a specialized vehicle normally used for pumping concrete			SFP FW injection			
04-Apr	17:14 FEPC	TEPCO shoots freshwater at U4 SFP, with a specialized vehicle normally used for pumping concrete, until 10:16PM (approximately 180 tons in total).				SFP FW injection		
04-Apr	21:00 NISA	Started discharging groundwater with low-level radioactivity in U5 and U6 sub drain pit to the sea					Water discharge	Water discharge
05-Apr	6:05 NISA	Seawater injection to U4 SFP via FPC line (until 10:20)				SFP SW injection		
05-Apr	14:15 FEPC	TEPCO announced that tracer (white colored dye) observed entering ocean through a crack on the lateral surface of U2 pit (a vertical portion of an underground structure for housing electric cables) near the seawater intake.		Leak mitigation				
05-Apr	15:00 FEPC	TEPCO begins to install components of a silt barrier near south sea wall of to contain the spread of discharged radioactive water.		Leak mitigation				
05-Apr	15:07 FEPC	TEPCO injecting coagulant into soil around U2 pit in an attempt to stop the discharge of water		Leak mitigation				
05-Apr	17:35 FEPC/NISA	TEPCO shoots freshwater at U4 SFP, with concrete pump truck until 6:22PM.				SFP FW injection		
05-Apr	19:00 FEPC	Injection of freshwater into reactor cores of U1, U2, and U3 continues.	RPV FW injection	RPV FW injection	RPV FW injection			

06-Apr	FEPC/JAIF	TEPCO announced plutonium 238, 239 and 240 were detected in the soil sampled on March 25 and 28 at Fukushima Daiichi Nuclear Power Station. The utility says the radioactive substance was detected on the soil about 500 meters west-northwest of the No.1 reactor and a site near a solid waste storage facility 500 meters north of the reactor. Concentration of detected plutonium 238, 239 and 240 are the same level of fallout observed in Japan at atmospheric nuclear tests in the past, but TEPCO assumes detected plutonium are attributed to Fukushima Daiichi Nuclear Power Station, considering isotope ratio of Plutonium 238 to 239 and 240.				
06-Apr	5:38 FEPC	TEPCO confirms termination of water leakage into the ocean through a crack on U2 pit lateral surface (a vertical portion of an underground structure for housing electric cables) near the seawater intake		Leak mitigation		
06-Apr	14:30 FEPC	Injection of freshwater into reactor cores of U1, U2, and U3 continues.	RPV FW injection	RPV FW injection	RPV FW injection	
07-Apr	1:31 TEPCO/FEDC	Initiated injection of nitrogen into U1 CV	N2 injection to CV			
07-Apr	6:53 FEPC	TEPCO shoots water aimed at U3 SFP, until 8:53AM, with a specialized vehicle normally used for pumping concrete (approximately 70 tons in total).			SFP FW injection	
07-Apr	13:29 NISA/NISA	Freshwater injection to U2 SPF via FPC (until 14:34; around 36 tons)		SFP FW injection		
07-Apr	15:30 FEPC	Injection of freshwater into reactor cores of U1, U2, and U3 continues.	RPV FW injection	RPV FW injection	RPV FW injection	
07-Apr	18:23 FEPC/NISA	TEPCO shoots freshwater at U4 SFP, with concrete pump truck until 19:40.				SFP FW injection
07-Apr	23:32 NISA	Originally rated at 7.1 (downgraded to 6.0) Aftershock; Workers evacuated following a magnitude 6.0 earthquake off the northeastern coast of Japan, 118 kilometers from the plant				
09-Apr	17:07 FEPC	TEPCO shoots freshwater at U4 SFP, with a specialized vehicle normally used for pumping concrete, until 7:24PM (approximately 90 tons in total).				SFP FW injection
10-Apr	10:37 FEPC	TEPCO injects freshwater into U2 SFP, until 12:38PM (approximately 60 tons in total).		SFP FW injection		
10-Apr	17:15 FEPC	TEPCO shoots freshwater at U3 SFP, with a specialized vehicle normally used for pumping concrete, until 7:15PM (approximately 80 tons in total).			SFP FW injection	
		NISA rates U1, U2, and U3 as Level 7				Crisis level raised to 7

11-Apr	8:15 FEPC	TEPCO begins installing double layered silt fence of approximately 120m near the south sea wall of Fukushima Daiichi Nuclear Power Station in order to contain the spread of discharged radioactive water, until 10:45AM			
11-Apr	16:00 FEPC	Injection of N2 into U1 CV continues.	N2 injection to CV		
11-Apr	16:00 FEPC	Injection of freshwater into reactor cores of U1, U2, and U3 continues.	RPV FW injection	RPV FW injection	RPV FW injection
11-Apr	17:16 NHK/JAIF	6.6 Aftershock earthquake. Focus was in Fukushima Prefecture at a depth of 10 kilometers. Outdoor workers had been ordered to temporarily evacuate.			
11-Apr	17:40 FEPC/JAIF	U1 and U2 lost external power supply and pumping of freshwater into the reactor core suspended	External power lost; RPV FW injection suspended	External power lost; RPV FW injection suspended	
11-Apr	17:56 FEPC	U1 and U2 external power supply recovered.	External power recovered	External power recovered	
11-Apr	17:59 FEPC/JAIF	Pumping of freshwater into the reactor core was suspended for U3			RPV FW injection suspended
11-Apr	18:00 FEPC	No abnormality reported in temperature, pressure, or water levels in reactor cores			
11-Apr	18:04 FEPC	Pumping of freshwater into the reactor core for Unit 1, 2 and 3 was resumed.	RPV FW injection	RPV FW injection	RPV FW injection

Travick, Vanette

From: Gard, Lee A (INPO) [GardLA@INPO.org]
Sent: Thursday, April 14, 2011 5:30 AM
To: Blamey, Alan; Wittick, Brian; Moore, Carl; Casto, Chuck; Collins, Elmo; Gauntt, Randall O; Mitman, Jeffrey; michael.call@nrc.gov; Hay, Michael; Miller, Marie; richard.kondo@crbard.com; Bernhard, Rudolph; Salay, Michael; Garchow, Steve; Steve Reynolds
Subject: April 14 briefing notes, excel spreadsheet and radiation survey map
Attachments: April 14 Ryan 6 pm briefing notes.doc; 4 13 Facility Area Survey Data [1].pdf; TEPCO Sumarry Rev.84 April Final 14.xls

Briefing notes and supporting information. Looks likely there is an error on the area survey map. It appears the survey results from April 10th were deleted when yesterday's results were added. Some earlier survey data has reappeared. This is most noteable around the Unit 3 hatch where levels were much lower following debris removal but now the old high values have reappeared. Attempting to clarify.

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FUKUSHIMA DAIICHI

Status as of 6pm (JST) April 14, 2011- TC Briefing. (All times JST)

The priorities remain as follows:

- Ensuring fresh water injection and cooling capabilities to the reactors and spent fuel pools. Goal is to reduce and maintain temperature in the reactors and spent fuel pools below 100 degrees centigrade.
- Draining water from the turbine buildings and trenches to reduce the radiation levels so that work can continue.
- Containing the spread of radioactive materials.

Highlights for today include the following:

- Trails of white vapor were observed from Units 2 and 3 today.
- N2 purging of Unit 1 continues. Drywell pressure has been steady or slightly decreasing over the past 96 hours.
- Transfer of 660 tons of radioactive water from the Unit 2 trench to the Unit 2 hotwell was completed last night. An initial decrease in trench and Unit 2 turbine building water level was noted. However, after termination of transfer trench level again increased. After line flush and inspection today the transfer will continue.
- Leak checks and seal inspections / repairs are in progress in Radioactive Waste building in preparation for water transfers from the units.
- Unit 4 SFP radionuclide preliminary analyses indicated only minor fuel damage.
- 60 tons of water was added to the Unit 2 SFP. Spray into the Unit 3 pool is planned for today.
- Silt screens are in the process of being installed around intake / discharge areas.
- The unmanned helicopter flew for approximately 2 hours. Videos have not yet been released.

Unit Status

- In Unit 1, non-borated fresh water injection into the main feedwater line continues at 6 cubic meters/hr. Comments on parameters:
  - Reactor pressure indicator A was stable at .420 MPa g, (61 psig). Indicator B is considered to be unreliable.
  - Feedwater nozzle temperature continues to decrease and is reading 200 C (392 F). Because of recent fluctuations this parameter is suspect.
  - Reactor vessel lower temperature has remained steady at 119 C (246 F)
  - Drywell and torus pressure remains relatively steady at .190 MPa abs (27.6 psia) and .165 MPa abs (23 psia) respectively.

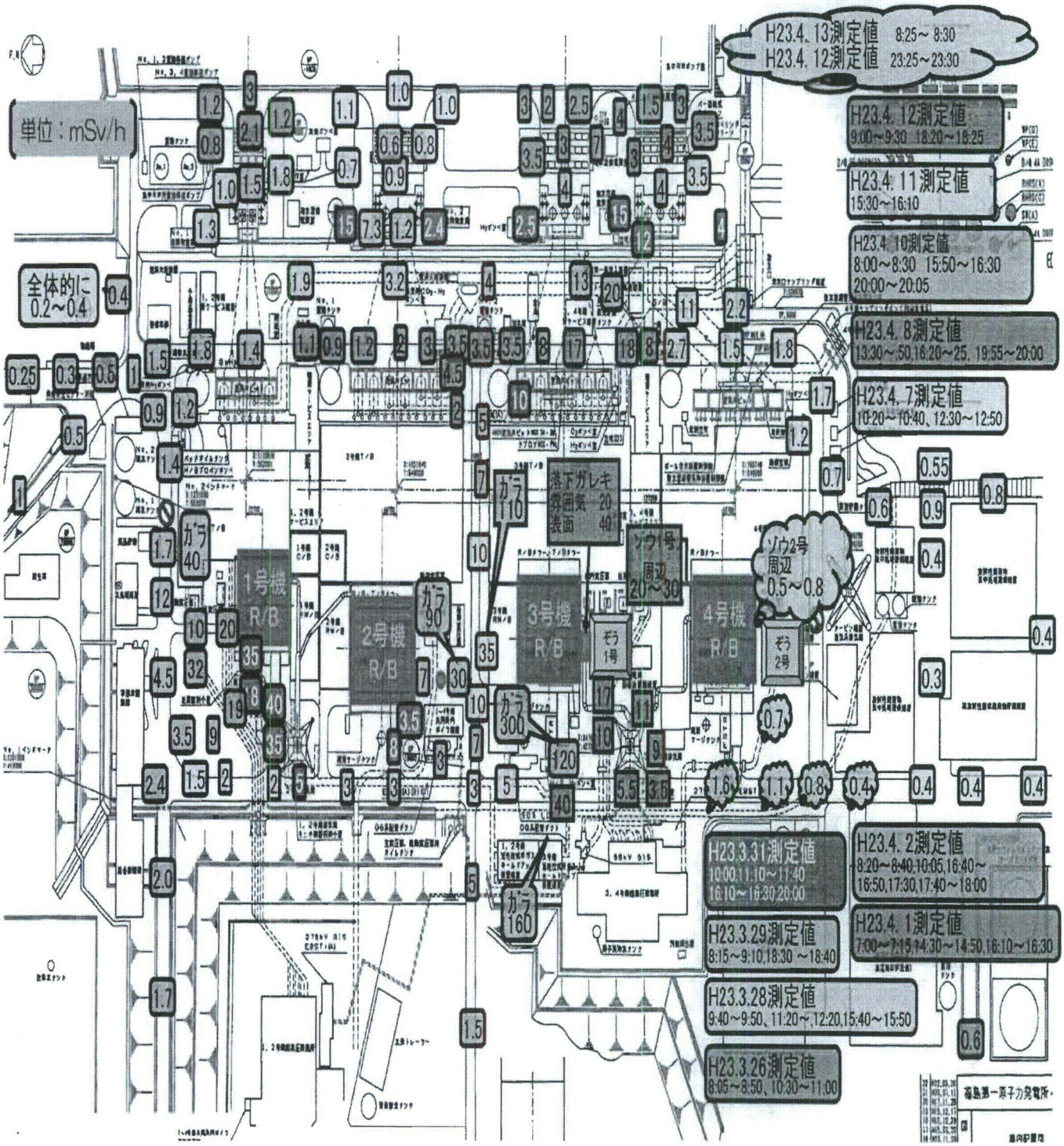
- Dose rates in the Torus continue to decrease slightly to 10. Sv/hr (1,000 Rem/hr.)

- In Unit 2, injection of non-borated fresh water using the low pressure coolant injection continues at 7 cubic meters/hr, (= to the goal and equivalent to the decay heat rate 14 days after shutdown.) Comments on parameters:
  - Unit 2 reactor pressures remain fairly stable. TEPCO now considers these measurements to be suspect.
  - Feedwater nozzle temperature decreased to 154 C (309 F)
  - Reactor vessel lower temperature is believed unreliable.
  - Drywell pressure is stable at .090 MPa abs (13.8 psi)
  - Dose rates in the U2 Drywell and Torus continue to decrease. The drywell dose rates are at 27.4 Sv/hr or (2,740 Rem/hr) and the dose rate in the Torus has decreased to .637 Sv/hr or (63.7 Rem/hr.)
- In Unit 3, injection of non-borated fresh water using the low pressure coolant injection line continues at 7 cubic meters/hr (= to the goal and equivalent to the decay heat rate 14 days after shutdown.). Comments on parameters:
  - Unit 3 reactor pressures are stable but are now considered suspect.
  - Feedwater nozzle temperature is fluctuating day-to-day and has decreased to 90 C (194 F). As previously noted, this indicator is questionable.
  - Reactor vessel lower temperature has continued to increase slightly and is at 121.7 (251 F)
  - Drywell pressure decreased slightly and is at .104 MPa abs (15 psi). Torus pressure also decreased slightly to .167 MPa abs (24.4 psi).
  - Dose rates in the U3 Drywell and Torus continue to decrease. The drywell is at 16.6 Sv/hr (1,600 Rem/hr) and the dose rate in the Torus is .640 Sv/hr or (64 Rem/hr.)
- Preparations are continuing to transfer water from the Unit 3 condenser hotwell to the CST.

Dose Rates

- Overall site dose rates are decreasing. For example:
  - The last reading reported at the main gate was 73 μSv /hr or (7.3 millirem/hour).
  - The side of the administration building facing the units is at 555 μSv/hr or 57 mrem/hr.
  - The dose rate at the west gate is reported to be 38 μSv /hr or (3.8 millirem/hour).

福島第一サーベイマップ（平成23年4月１３日　8:30現在）



	Next Works Planned (Activities of Cooling Water Supply Force)	line for core cooling water injection (target date: 14 April) ☐Switch the motor driven pump to MUW pump (The work was suspended due to high radiation environment around MUWP in the turbine building). ☐Water flow will be reduced to 4m³ that is commensurate to the decay heat 14 days after shut down (Long Term Cooling Measure) ☐RHR ordinary operation in SHC mode after restoring off-site power & related equipments	line for core cooling water injection (target date: 14 April) ☐Switch the temporary motor driven pump to MUW pump (The work was suspended due to high radiation environment around MUWP in the turbine building). ☐Water flow will be reduced to 7m³ that is commensurate to the decay heat 14 days after shut down (Long Term Cooling Measure) ☐RHR ordinary operation in SHC mode after restoring off-site power & related equipments	line for core cooling water injection (target date: 14 April) ☐Establish remote monitoring measurement of water level in T/B ☐Switch the motor driven pump to MUW pump (The work was suspended because of high radiation environment around MUWP in the turbine building). Preparing to drain the high radiation water ☐Water flow will be reduced to 7m3 that is commensurate to the decay heat 14 days after shut down (Long Term Cooling Measure) ☐RHR ordinary operation in SHC mode after restoring off-site power & related equipments				
Containment Function (Cooling and Confinement)	Current Status	■Pressure (at 06:00 on 14 April) D/W: 0.190 MPa-abs S/C: 0.165 MPa-abs ■Started ventilation through hardened line (at 14:30 on 12 March) * PCV design pressure : 384 kPa PCV max pressure for use : 427 kPa Rupture disc working pressure : 310 kPa	■Pressure (at 06:00 on 14 April) D/W: 0.095 MPa-abs S/C: Down Scale (Examining) ■Ready to start ventilation through hardened line (Not executed so far) PCV design pressure : 384 kPa PCV max pressure for use : 427 kPa Rupture disc working pressure : 325 kPa	■Pressure (at 06:00 on 14 April) D/W : 0.0043 MPa-abs S/C: 0.0073 MPa-abs ■Started ventilation through hardened line (at 9:20 on 13 March) PCV design pressure : 384 kPa PCV max pressure for use : 427 kPa Rupture disc working pressure : 310 kPa		■Negative pressure kept by SGTS	■Negative pressure kept by SGTS	
	Next Works Planned (TEPCO Headquarters' Activities)	☐Hydrogen countermeasure first * Fill PCV and ventilation line with nitrogen * Reinforced monitoring of PCV pressure * Continue to secure ventiation line (After securing off-site power) ☐Restoring PCV spray function * MUWC system, FP system (After restration of equipments) ☐RHR operation in SHC mode ☐Restoring D/W cooling coil ☐Alternative heat removal by CUW	Same as unit 1					
Spent Fuel Pool (SFP) (Decay Heat Removal & Water Supply)	Current State	■SFP water level uncertain (No water level meter) ■SFP temperature uncertain (Unable to measure because of no power supply) ■Skimmer surge tank level 4500 mm (at 06:00 on 14 April) ■No Roof due to explosion on the operation floor ■Watering by concrete pumping vehicle (Fresh Water) (called the Elephant) ・31 March 13:03-13:57 ・31 March 14:29-16:04 ・2 April 17:16-17:19 The nickname of concrete pumping vehicle for Unit 1 was changed from "large Giraffe" to "Elephant" to prevent confusion on 3 April. ■Preparation for water feeding with electric motor pumps was completed (on 9 April)	■SFP water level uncertain (No water level meter) ■SFP temperature 71.0℃ (at 06:00 on 14 April) ■Skimmer surge tank level 6500mm (at 06:00 on 14 April) ■Roof remained, however blowout panel worked ■Fresh water injection to SFP trough the existing FPC line and temprary line ・29 March 16:30-18:25 ・30 March 19:05-23:50 (Switched to fire engine pump due to some trouble in electric motor driven pump) ・1 April 14:56-17:05 ・4 April 11:05-13:37 ・7 April 13:29-14:34 ・10 April 10:37-12:38 ・13 April 13:15-14:53 ■Removal of the existing strainer in FPC line was completed (31 March). (Scheduled for 31 March)	■SFP water level uncertain (No water level meter) ■SFP temperature uncertain (Unable to measure because of lack of power supply) ■Skimmer surge tank level No measurement ■No roof due to explosion on the operation floor ■Water spray with new special pumping vehicle (call Zebra-improved) ・21 March 16:30-19:33 (Fresh Water) ・2 April 08:52-12:54 (Fresh Water) ・4 April 17:03-19:19 (Fresh Water) ・7 April 06:53- 08:53 (Fresh Water) ・8 April 17:06- 20:00 (Fresh Water) ・10 April 17:15-19:15 (Fresh Water) ■ Check the condition of FPC lines ・No abnormal condition on the strainer ・Piping seems to be stuffed (on 3 April) ■Preparation for water feeding with electric motor pumps was completed (on 9 April) ■The Zebra-improved was moved for replacement	■SFP water level : Uncertain ■SFP water temparature: gauge out of order (at 11:10 on 24 March and later) ■Skimmer surge tank level 4850 mm (at 06:00 on 14 April) ■No roof due to explosion at the operational floor ■Installation alternation pump for RHRS ■Watering by concrete pumping vehicle (called as Giraffe) ・30 March 14:04-18:33 (Fresh water) ・1 April 08:28-14:15 (Fresh Water) ・3 April 17:14-22:16 (Fresh Water) ■ Check the condition of FPC lines ・No abnormal condition on the strainer ・Piping seems to be stuffed (on 4 April) ■The Elephant was moved from Unit 1 to Unit 4 ■Watering with the Elephant ・5 April 17:35-18:22 ・7 April 18:23-19:40 ・9 April 17:07-19:24 ・13 April 0:30- 6:57 (105 ton) ■Preparation for water feeding with electric motor pumps was completed. (on 9	■Inventory securing * CST -> MUWC -> FPC -> SFP ■Heat removal * FPC (Surge Tank) -> RHR -> S/C * Heat removal in S/C cooling mode of RHR ■SFP Water level: uncertain (Water level alarms were not activated.) ■SFP Water temp: 30.1℃ (at 06:00 on 14 April) ■Secondary containment is intact with roof of R/B ■Fresh water was transferred to fresh water tank #3 by tank lorry (~ 1 April)	■Inventory securing * CST -> MUWC -> FPC -> SFP ■Heat removal * FPC (Surge Tank) -> RHR -> S/C * Heat removal in S/C cooling mode of RHR ■SFP Water level: uncertain(Water level alarms were not activated.) ■SFP Water temp. 29.0℃ (at 06:00 on 14 April) ■Secondary containment is intact with roof of R/B ■Fresh water was transferred to fresh water tank #3 by tank lorry (~ 1 April)	■SFP water temperature 29 ℃ at 06:00 on 14 April ■Cooling function achieved by air fin coolers (at 16:26 on 24th March) ■Water supply to the common SFP by MUW system (24 March 16:15-18:04) ■FPC(A) started at 18:05 on 24th March

	planned work (Next Activities of FPC Team)			April 10:00 to 30				
High Voltage AC Power Supply	Current Status	■480V P/C 2C connected to local distribution network of Tohoku EPC (at 15:46 on 20 March) ■Equipments of MOV tested for short circuit and ground but in fail on 21 March ■120V I & C main bus powered at 01:40 on 23 March ■Illumination of MCR restored at 11:30 on 24 March ■Monitoring posts (MP5-8) were restored.	■480V P/C 2C connected to local distribution network of Tohoku EPC (at 15:46 on 20 March) ■MCC 2A-1 in the turbine building was powered at 16:40 on 26 March ■Illumination is restored in main control room at 16:46 on 27 March.	■480V P/C 4D powered through transmission line (at 10:35 on 22nd March) ・Temporary power supply achieved utilising the non-damaged part of 66kV off-site power transmission line ・Trial electric charge of the motor Center vehicle for Unit3 and Unit4 was completed at 14:28 on 18 March ・Instalation of multi circuit breakers and power cables were completed on 19 March ・Inspection of cable from the breakers and loads was conducted on 20 March ・Instalation of cables were completed on 21 March. ■T/B MCC 3C-2 has been powered at 22:10 on 22 March. ■T/B MCC 3C-1 has been powered at 22:21 on 22 March ■120V I & C main bus powered at 22:28 on 22 March ■Illumination is restored in main control room at 22:43 on 23 March. ■T/B MCC 3D-1 has been powered on 29 March. ■T/B MCC 3A-1 has been powered	■480V P/C 4D powered through transmission line (at 10:35 on 22nd March) ■120V I & C main bus powered at 01:40 on 23 March ■Illumination of MCR restored at 11:50 on 29 March	■Temporary power supply achieved utilising the non-damaged part of 66kV off-site power transmission line (Yono-Mori line 1L,2L) ■Non-safety grade buses of 5A and 5B are unavailable ■Temporary pump (RHRS) was installed and connected to the water supply line on 24th March ■Emergency administration building was powered on 24th March ■Water Purification Facility was powered at 9:10 on 24th March ■Investigating cable laying work for monitoring posts (MP-1/2/3/4) on 26 March ■T/B MCC 5D-2 has been powered on 31 March	■Temporary power supply achieved utilising the non-damaged part of 66kV off-site power transmission line (Yono-Mori line 1L,2L) ■Non-safety grade buses of 6A and 6B are unavailable ■Temporary pump (works as a substitute of RHRS) was installed and put in-service (Powered by P/C) ■Test run od installed cable was conducted on 28 March ■Monitoring posts (MP1-4) were restored	■Temporary power for common pool was restored at 15:30 on 24th March
	planned work (Next Activities of Electric Power Supply Team)	□Restration work of electricity will be restarted after completing water transfer from T/B	□Restration of power for instrumentation	□Restration work of electricity will be restarted after completing water transfer from T/B		□Laying temporary power cable for SLC (B)	□Investigating cable laying work for monitoring posts	□Investigating the power restoration work for I & C and illumination
DC Power Supply	Current Status	■Part of I & C equipments were powered by temporary battety to monitor plant status	■Part of I & C equipments were powered by temporary battety to monitor plant status ■Common DC125V has been powered at 16:30 on 31 March	■Part of I & C equipments were powered by temporary battety to monitor plant status * Batteries for reactor level gauges were replaced by fresh ones at 12:15 on 21st March ■Restration of DC 125V Charge cenetr (B) (30 March)	■Part of I & C equipments were powered by temporary battety to monitor plant status	■Part of I & C equipments were powered by temporary battety to monitor plant status ■DC 24 Charger 5B-1has been powered on 31 March	■Part of I & C equipments were powered by temporary battety to monitor plant status	
	Next Works Planned (Activities of Electric Power							

CE 1218 of 1220

Miscellaneous Measures against Hydrogen	Current Status	accumulating in PCV ・Considering the injection of N2 gas ■Injection of N2 gas is in progress ・ (Flow rate: 28m³/h, degree of purity: 99%) 7 April 01:31- 9 April 03:29 (suspended due to switch to high degree of purity N2 gas) ・ Injection of high degree of purity N2 gas (Flow rate: 28m3/h, degree of purity: 99.92%) 9 April 04:10 - ■Injection of N2 gas was stopped due to an earthquake (11 April 17:16 - 23:19)	PCV ■Generation of hydrogen gas at the top part of the reactor building is of concerned * White smoke observed on 21st March was supposed to be the steam from SFP that was leaked through the rain drainage duct. It is hoped that this mitigates the concentrated of Hydrogen gas.	PCV		the ceiling panel (250 mm thick) of the reactor building on 18 March to relieve hydrogen gas and to avoid explosion	the ceiling panel (250 mm thick) of the reactor building on 18 March to relieve hydrogen gas and to avoid explosion	
	Next Works Planned (Next Activities)		□Water jet pump is ready at off-site stock yard, however lifting machine is not available					
Turbine Building Water Draining	Current Status	■Draining water in T/B ・Water level in T/B OP +5100mm (at 07:00 on 11 April) : same as 10 April 11:00 ・Water transfer H/W → CST (3 April 13:55- 10 April 09:20) ■Draining water in Trench ・Radiation level of the water surface in the trench. 0.4 mSv/h on 28 March ・Water level (from top edge of grating to water surface) (29 cm (at 7:00 on 14 April) ・Remote monitoring measurement of water level in the trench was established (on 2 April)	■Draining water in T/B ・Water level in T/B OP +3050mm (at 07:00 on 14 April) : same as 13 April 11:00 ・Water transfer (H/W → CST) (2 April 17:10 - 9 April 13:10) ・Monitoring camera for water level was installed (on 2 April) ■Draining water in Trench ・Radiation level of the water surface in the trench: higher than 1000 mSv/h (on 28 March) ・Water level (from top edge of grating to water surface) 40.5 cm (at 7:00 on 14 April) ・Remote monitoring measurement of water level in the trench was established (on 2 April) ■Operation "Beaver" ・Investigation of water flow route and injection of liquid chemical to prevent leaks was conducted. ・It had been confirmed that the leak was stopped. (at 05:38 on 7 April) ・A rubber board was placed over the crack. (at 13:15 on 6 April) ・Injection of liquid chemical to prevent leaks	■Draining water in T/B ・Water level in T/B OP +2900mm (at 07:00 on 14 April) : same as 13 April 11:00 ・Water transfer (CST → SPT surge tank) (28 March 17:40 - 31 March 08:37) ・H/W is full. Leak from vacuum breaker was confirmed (on 7 April) ■Draining water in Trench ・Radiation level of the water surface in the trench: (No measurement due to difficulty in approach by debris) ・Water level (from top edge of grating to water surface) 117 cm (at 07:00 on 14 April) ・Remote monitoring measurement of water level in the trench was established (on 2 April)	■Draining water ・Water transfer (Concentrated RW → T/B) (2 April 14:23 - 4 April 09:22; suspended) ・Water transfer pumps were added (1 → 5 pumps: 3 Apr. 10:00 - 4 Apr. 09:22, suspended due to high water level in the trench) ■Work for shutting off the leak in pit ・Concrete was poured (25m³) to clog cracks	■Draining water ・Water transfer RWR pump area & CS pump area → S/C (4 April) ■Discharging water in sub-drain of Unit 5 to the sea: 350 m3 (4 April 21:00 - 8 April 12:14)	■Draining water ・Water transfer (RWR base floor → H/W) (1 April 13:40 - 2 April 10:00) ・ Suspended by large amount of water: considering draining water ■Discharging water in sub-drain of Unit 6 to the sea: 372.6 m3 (4 April 21:00 - 9 April 18:52)	■Draining water ・Concentrated RW → sea: 9070 m3 (4 April 19:03 - 10 April 17:40) ■Draining water from main process building was completed. ■Draining water from incinerator building was started (on 6 April) ■Being repaired of boundary / Prevention of leaks from boundary of buildings before storing highly contaminated water in concentrated RW
	Next Works Planned	Draining water in T/B basement ・Considering transferring draining water in T/B basement to concentrate RW	Draining water in T/B basement ・Considering transferring draining water in T/B basement to concentrate RW (Target date: April 15)					Confirm the level monitoring is planned
Others	Current Status	■Barge ・Water transfer: Barge No.1 → Filtered water tank 1 April 15:58 - 16:25 2 April 10:20 - 16:40 ・Water transfer: Barge No.2 → Barge No.1: (3 April 09:52 - 11:15) ・Barge No.2 arrived at dock (at 12:03 on 4 April) ■Air Borne Contamination Control ・Test sprinkling was conducted at mountain side of the common pool (1 April pm) ・Sprinkling inhibitor around the common pool area (until 10 April 16:00) ■Removal of debris ・Debris removal was conducted with unmanned heavy equipment at Unit 3&4 area (10 April 09:00-17:00) ■T-Hawk project (wireless-controlled helicopter) ・Test flight was conducted (10 April 15:59 - 16:28) ■Silt fence (11 April Two fences were installed on the south) ■Silt fence (13 April Unit 3&4) ■Iron plate (13 April Unit 2) ■Nitrogen gas bubbling in Filtered water tank (12 April)						

Next Works Planned	* Test flight (scheduled for 60 minutes during 07:00-09:00 on 11 April) >Will Power (11 April) Unit 25

Abbreviations:

CAMS :Containment Area radiation Monitor System
CST :Condensate Storage Tank
CUW :(Reactor Water) Clean Up Water (System)
D/W :Dry Well
ECCS :Emergency Core Cooling System
FP :Fire Protection
MS :Main Steam
M/C :Motor Power Center
MUWC :Make Up Water Condensate (system)
P/C :Power Distribution Center
RCIC :Reactor Core Isolation Cooling
RHR :Residual Heat Removal
RPV :Reactor Pressure Vessel
S/C :Suppression Chamber
SDF :Self Defense Force
SFP :Spent Fuel Pool
SGTS :Stabd by Gas Treatment System
SHC :Shut Down Cooling
SLC :Stand by Liquid Control