From: Adams, Ian
To: Sheron, Brian
Subject: FW: Japan Earthquake 23 March 2011 0600 EDT Situation Report
Date: Wednesday, March 23, 2011 10:39:04 AM
Attachments: Mar 21 Tohoku Pacific Earthquake and the seismic damage to the NPPs.pdf

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-----Original Message-----
From: Adams, Ian
Sent: Wednesday, March 23, 2011 10:25 AM
To: Adams, Ian; Aoki, Steven; Binkley, Steve; Bob Budnitz; Brian Sheron; Brinkman, Bill; Dick Garwin; Dick Garwin; Finck, Phillip; Grossenbacher, John (INL); Hurlbut, Brandon; Kelly, John E (NE); Koonin, Steven; Lyons, Peter; McFarlane, Harold; Owens, Missy; Per Peterson; Rolando Szilard; Steve Fetter
Subject: FW: Japan Earthquake 23 March 2011 0600 EDT Situation Report

Good morning,

Attached is this morning's sit rep from Japan. Also attached is a slide deck from Japan's NISA on the effects of the earthquake on Nuclear Power Plants in Japan.

This information should not be shared or further distributed.

Ian

-----Original Message-----
From: NITOPS
Sent: Wednesday, March 23, 2011 6:10 AM
To: (b)(6)
(b)(

CH/239

(b)(6)

Subject: Japan Earthquake 23 March 2011 0600 EDT Situation Report

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

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

The SITREP will be updated every 12 hours.

Nuclear Incident Team (NIT)
Office of Emergency Response (NA-42)
National Nuclear Security Administration U.S. Department of Energy nitops@nnsa.doe.gov
nit@doe.sgov.gov 202-586-8100

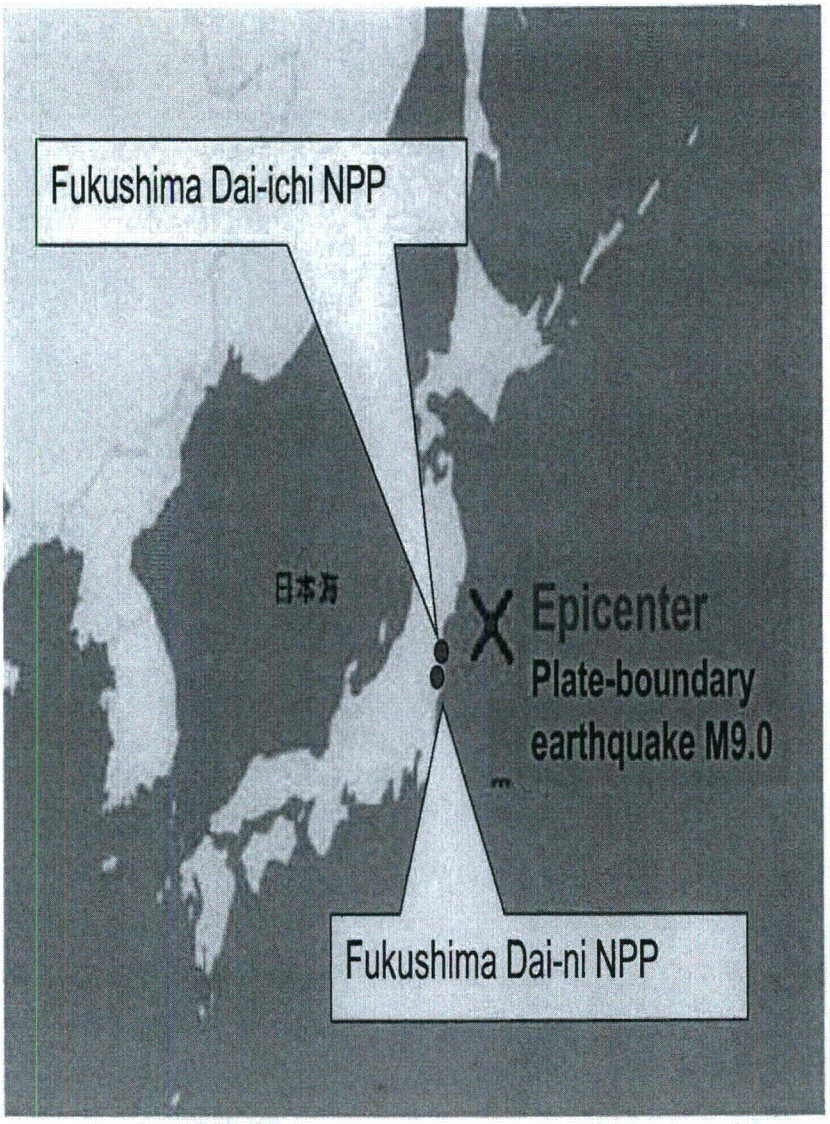
Tohoku Pacific Earthquake and the seismic damage to the NPPs

21 March 2011

Nuclear and Industrial Safety Agency
Japan

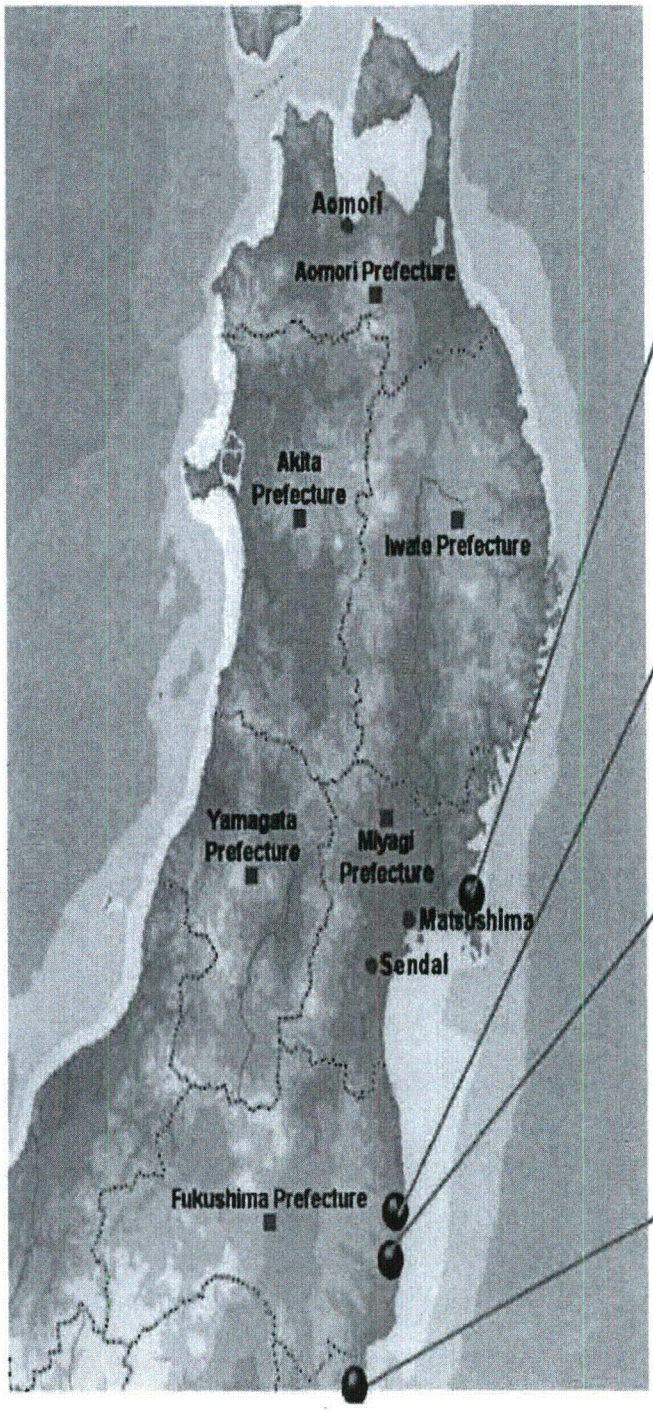
The 2011 off the Tohoku Pacific Earthquake (March 11, 2011)

- Occurred 14:46 March 11, 2011
- Magnitude:9.0 (on the JMA scale)
- Epicenter location:
  38° 6"N and 142° 51"E,
  and 24km in depth



1-1. Earthquake occurrence and automatic shut-down of nuclear reactors

Location of the Nuclear Installations



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

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

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

Tokai Ⅱ (1,100 MW, 1978-)

1-2. Earthquake occurrence and automatic shut-down of nuclear reactors

●11 reactors were automatically shut-down

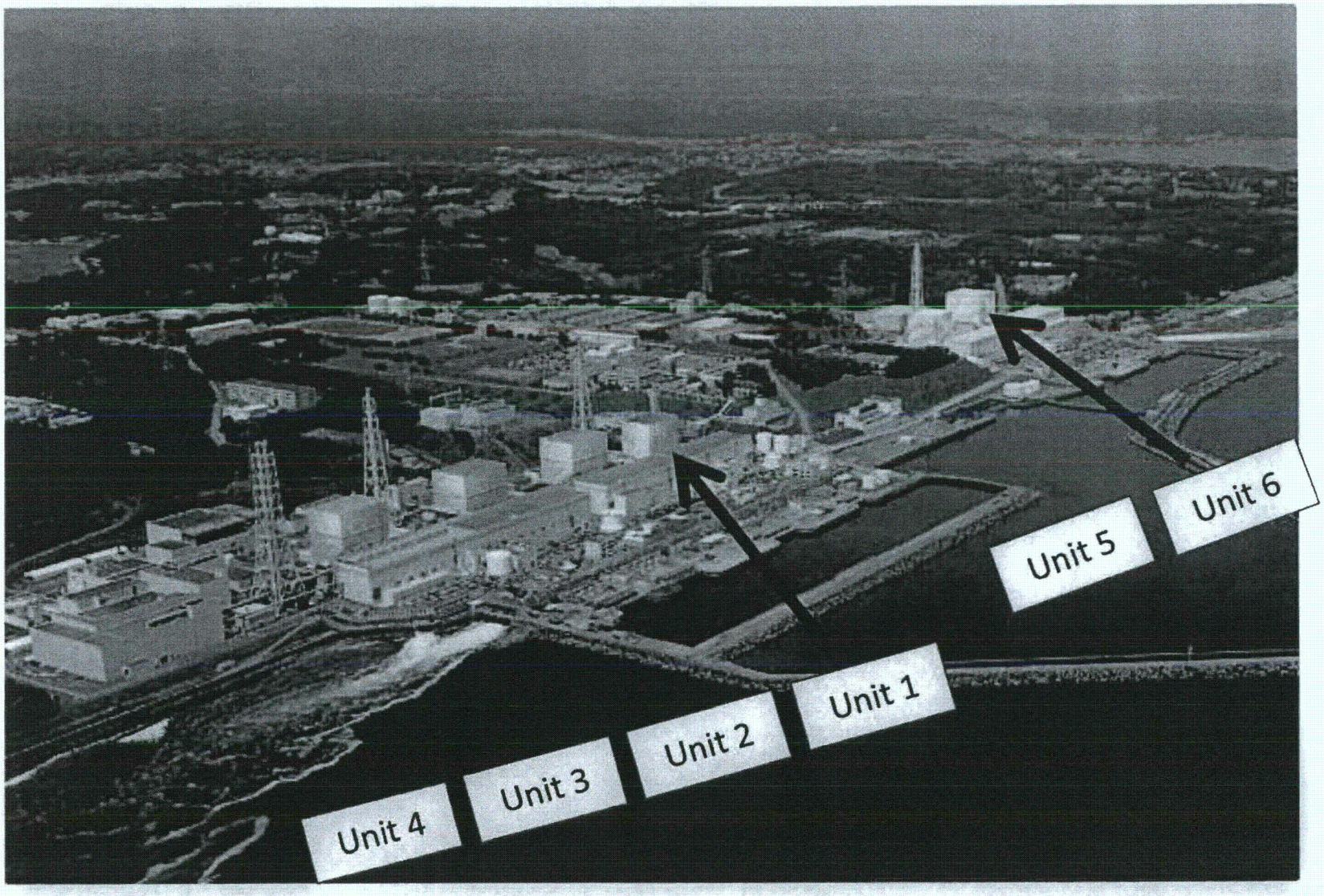
- Onagawa Unit 1,2,3
- Fukushima Dai-ichi (I) Unit 1,2,3
- Fukushima-Dai-ni (II) Unit 1,2,3,4
- Tokai Dai-ni (II)

●3 reactors were under periodic inspection

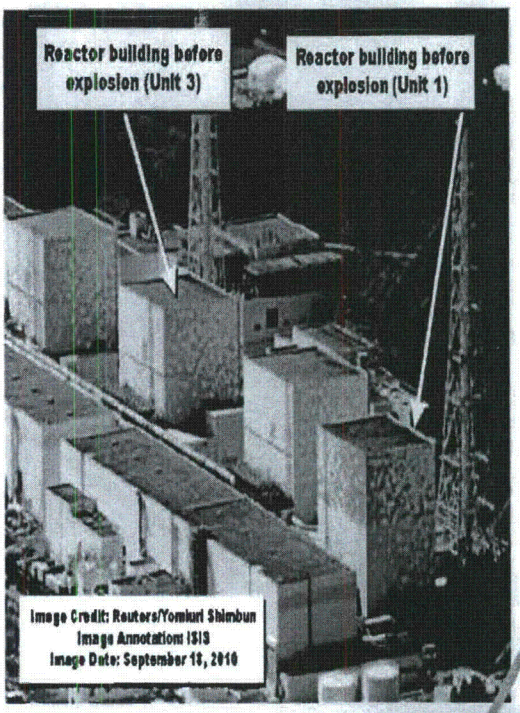
- Fukushima Dai-ichi (I) Unit 4,5,6

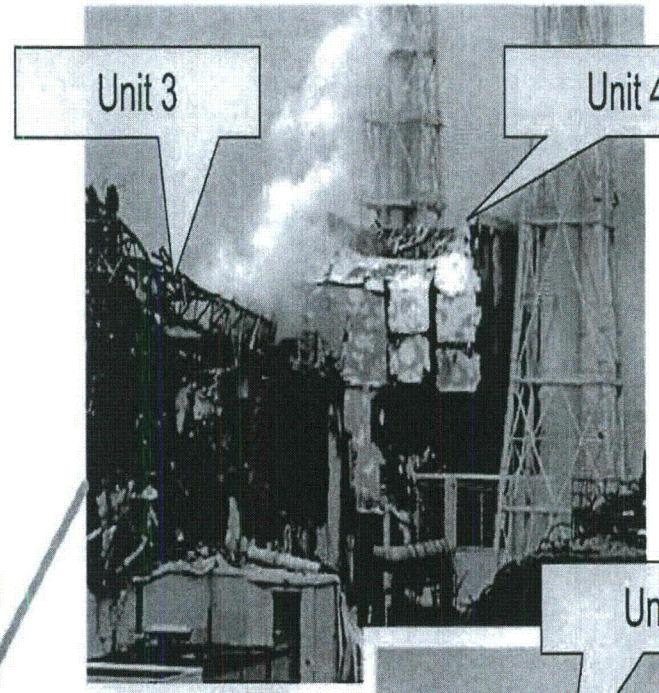
- After the automatic shut-down, the Unit 1-3 at Onagawa Nuclear Power Station, the Unit 3 at Fukushima II Nuclear Power Station, and the Unit at Tokai II Nuclear Power Station have been cold shut down safely.
- As for the unit 1,2,4 at Fukushima II Nuclear Power Station the operator of the station reported NISA nuclear emergency situation, because the temperature of the suppression pools became more than 100 °C, but afterward the three units have been cold shut down.

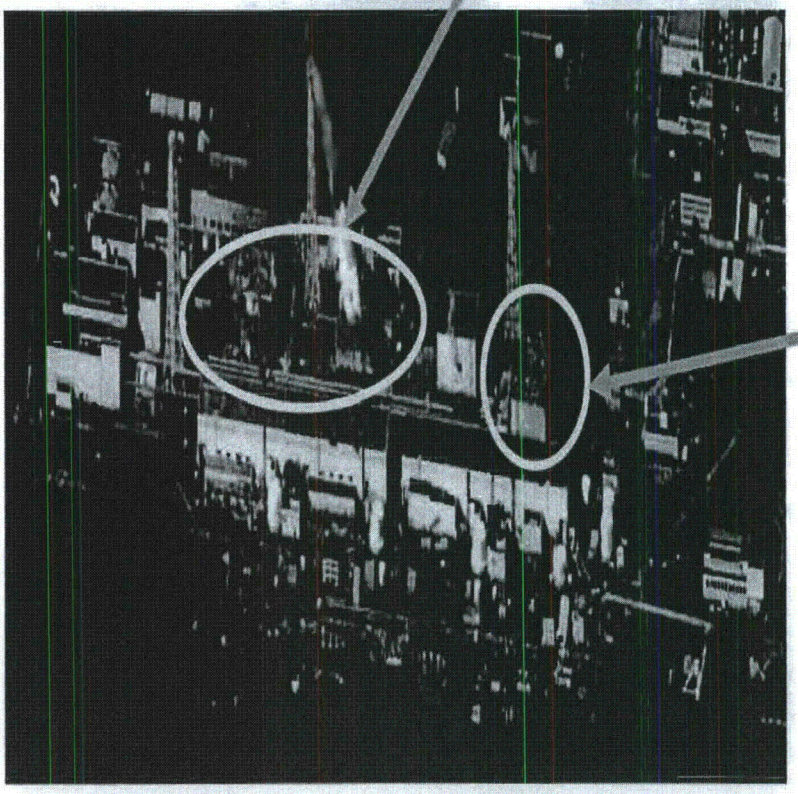
2-1. Outline of the Fukushima Dai-ichi (I) Nuclear Power Station

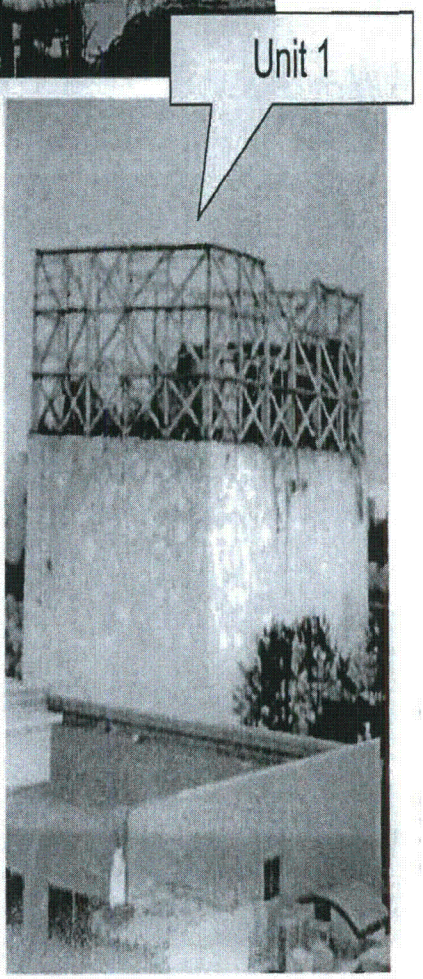


Damages of Fukushima Dai-ichi NPS

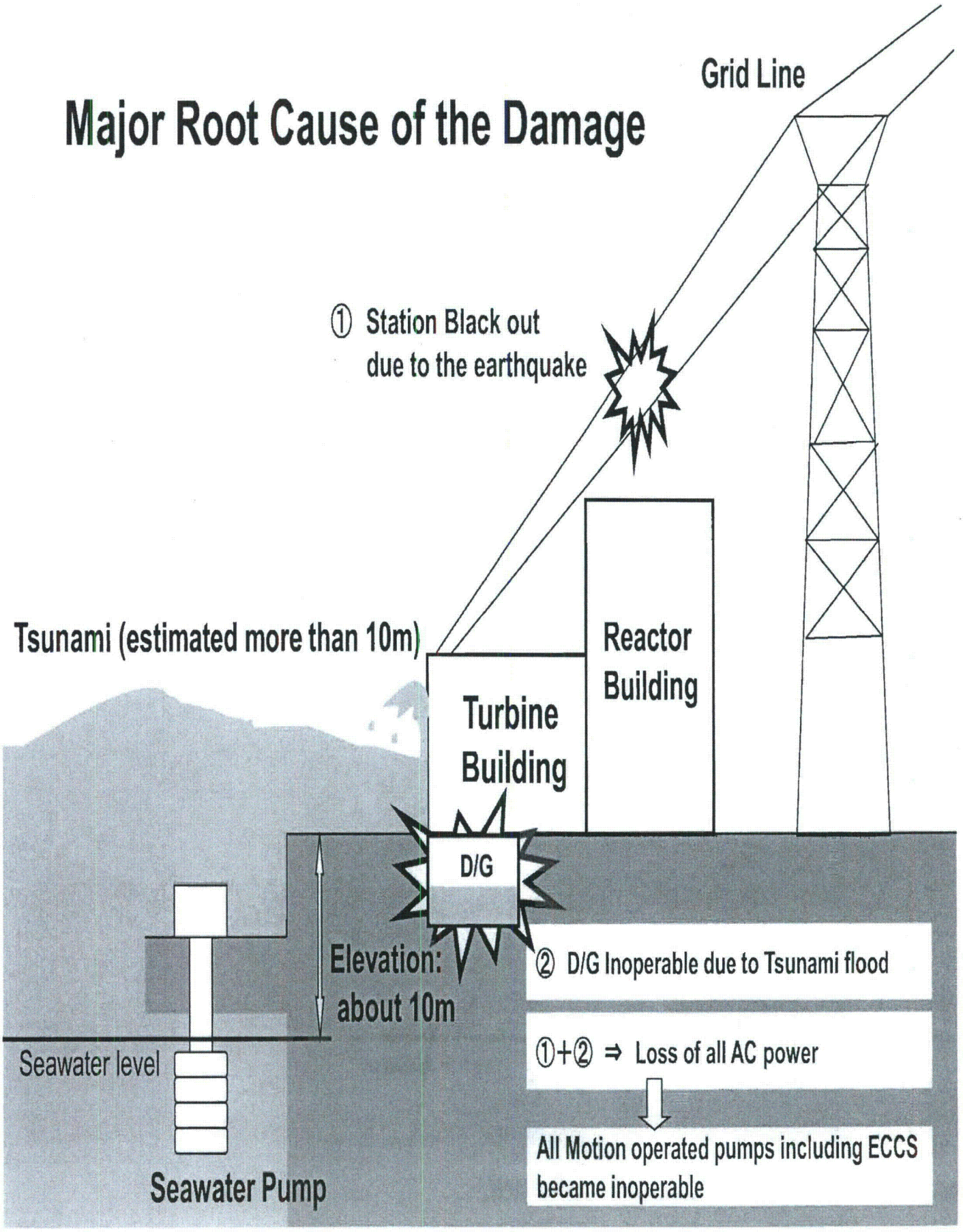








Major Root Cause of the Damage



3-1. Report concerning incidents at Unit1, 2, 3 and 4 at the Fukushima Dai-ichi (I) NPS

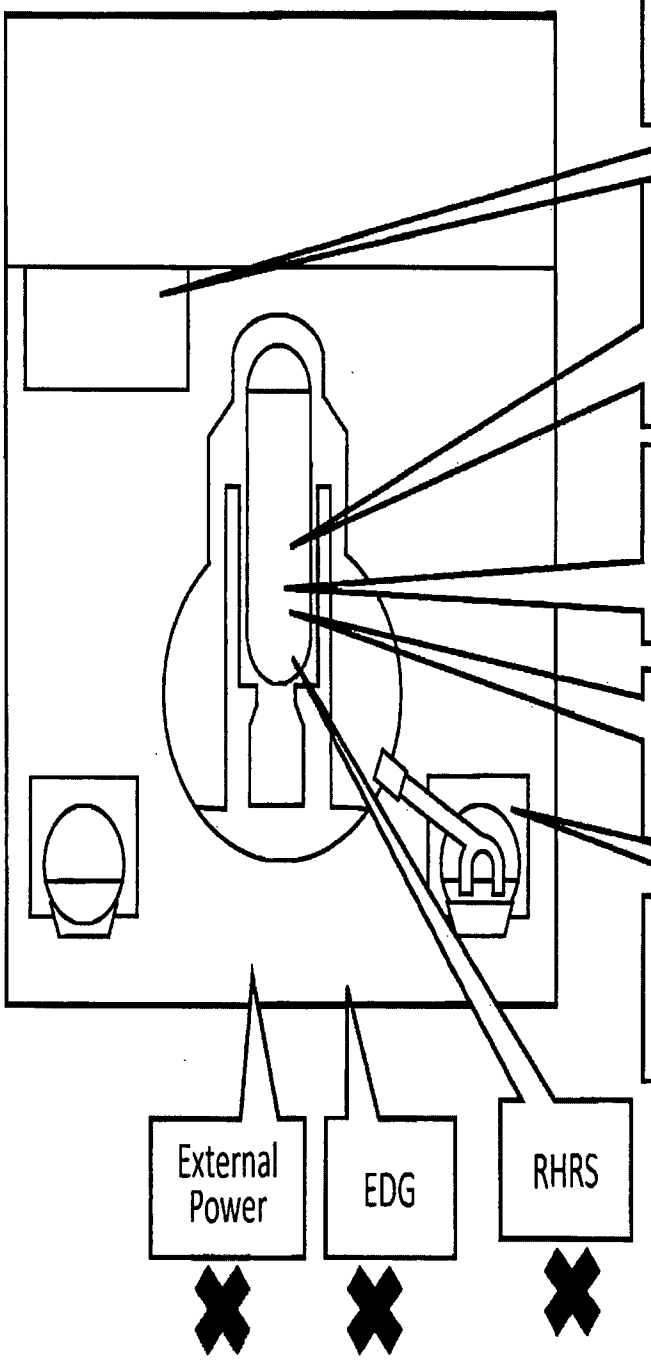
● *Unit 1 Seawater is being injected into the reactor pressure vessel as of 15:30 March 21th.*

- On March 11th, after the automatic shut-down of the reactor, the temperature of the reactor core went up, because the seawater pump which is necessary to operate cooling systems lost its water supply function due to the devastating Tsunami.

- On March 12th, water levels inside the pressure vessel dropped and the reaction of cladding metal of fuel and water generated hydrogen. The hydrogen leaked outside of the containment vessel and caused the explosion at the upper-part of a concrete building housing at 15:36 on March 12,

- Currently, seawater is being injected into the reactor pressure vessel(12:00 March 19th). There is no risk of a hydrogen explosion in the containment vessel because there is no oxygen in it. There is no high probability of leaking large amount of radioactive material currently.

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 1
(As of 15:30 March 21th, 2011)



Spent Fuel Pool Water Temperature – ℃
Condition: No data available

Reactor Water Level A -1750 mm
Reactor Water Level B -1750 mm
Condition: No flooding of top of active fuel until the above level

Reactor Pressure A 0.297 MPa
Reactor Pressure B 0.265 MPa
Condition : No large fluctuation

Reactor Water Temperature – ℃
Condition: No data available

S/P Water Temperature – ℃
Condition : No data available
S/P Pressure 0.16MPa

Time of measurement: 08:00 March 21th

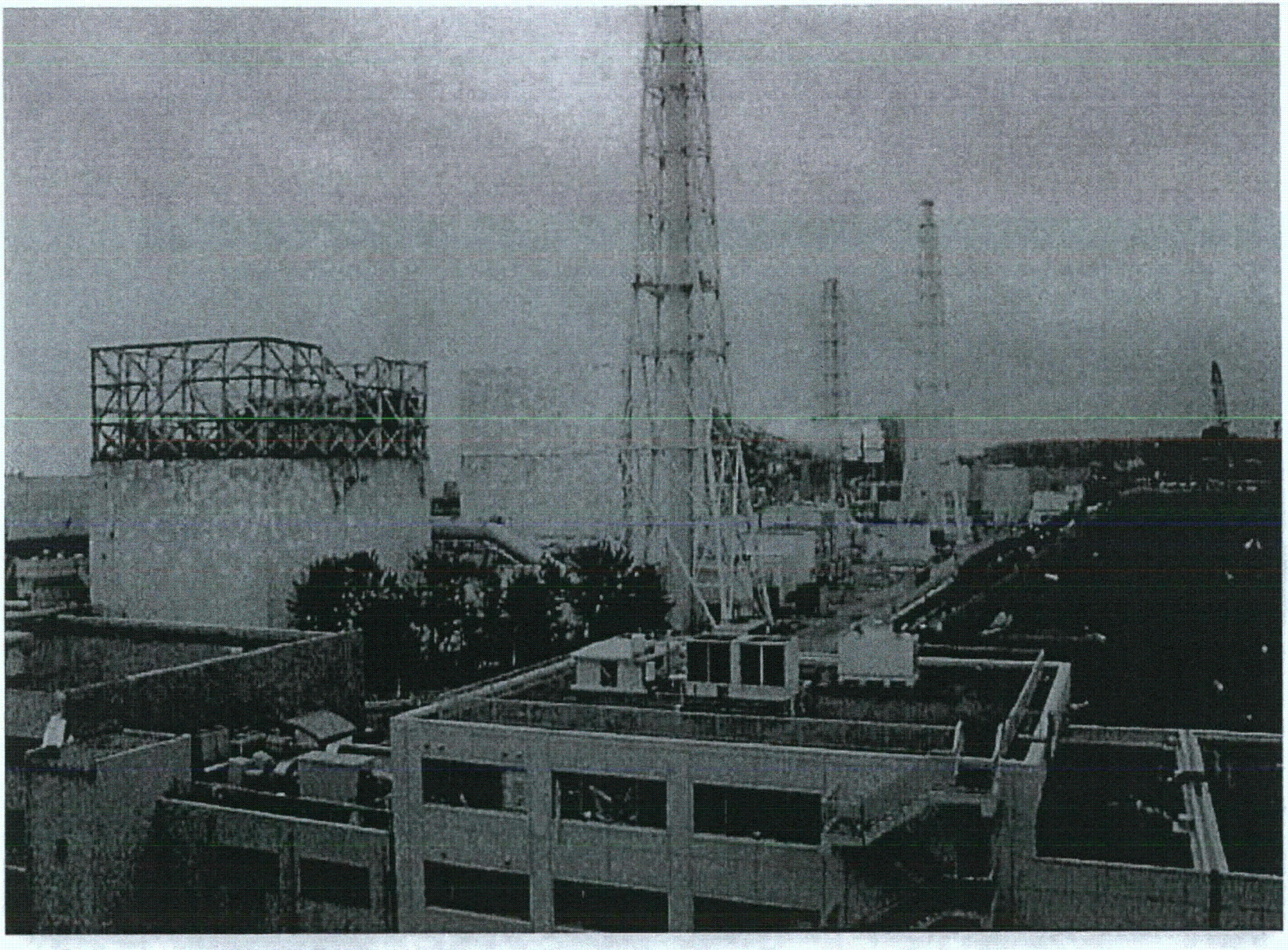
Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 1
(As of 15:30 March 21th, 2011)

Major Events after the earthquake

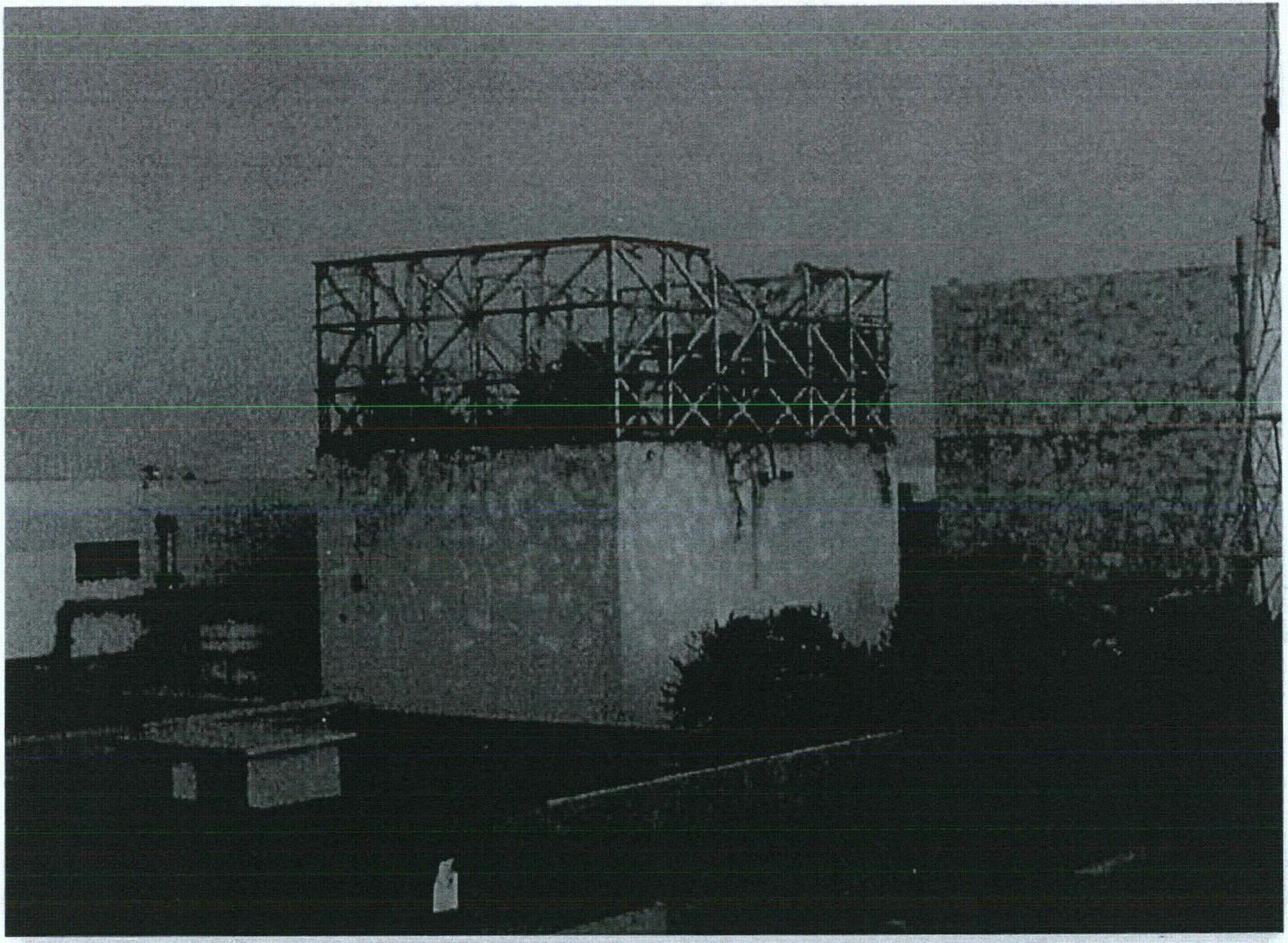
11th 14:46 Under operation, Automatic shutdown by the earthquake
11th 15:42 Report of the Article 10 (loss of A/C power)
11th 16:36 Occurrence of the Article 15 event
(Loss of water injection function)
12th 0:49 Occurrence of the Article 15 event
(unusual increase of PCV pressure)
12th 14:30 Start to vent
12th 15:36 Sound of explosion
12th 20:20 Start of injection of seawater and borated water to the core

Current Conditions : Seawater is being injected

Future Operation: Recovering of power supply and continuous injection of seawater to core. Monitoring of water temperature in the pool and so on.



Fukushima Dai-ichi Unit 1 (airborne picture: TEPCO)



Fukushima Dai-ichi Unit 1 (airborne picture: TEPCO)

3-2. Report concerning incidents at Unit1, 2, 3 and 4 at the Fukushima Dai-ichi (I) NPS

- ***Unit 2 Seawater is being injected into the reactor pressure vessel as of 15:30 March 21th.***

- After the automatic shut-down of the reactor, the water injection function was sustained, but the reactor water level tended to decrease.

- At 6:10 on March 15th, TEPCO reported that there was an explosion sound at Unit 2. Given the fact that the pressure in the suppression chamber of Unit 2 decreased. It is presumed that the possibility of certain damage on the suppression chamber.

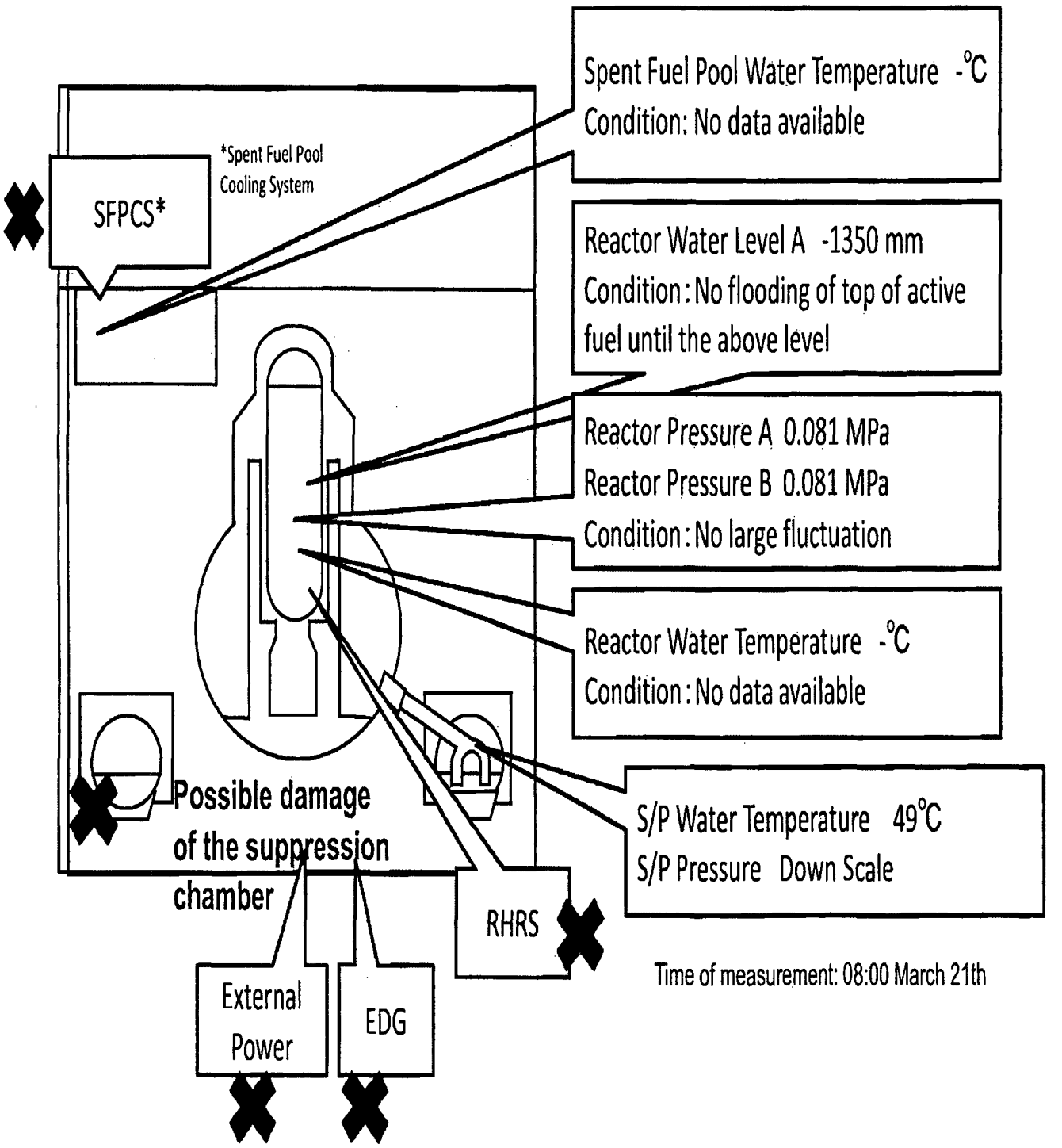
-Currently, seawater is being injected into the reactor pressure vessel. White smoke is running from reactor building through blowout panel.

-Access to the substation for reserve power supply from external transmission line was completed. The work for laying the electric cable from the facility to the load side was carried out.(as of 13:30 March 19th)

-Injection of 40 tons of seawater to the spent fuel pool of Unit 2 was started.(from 15:00 till 17:20 March 20th)

-Power center of Unit 2 received electricity (15:46 March 20th)

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 2
(As of 15:30 March 21th, 2011)



Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 2
(As of 15:30 March 21th, 2011)

Major Events after the earthquake

11th 14:46 Under operation, Automatic shutdown by the earthquake
11th 15:42 Report of the Article 10 (loss of A/C power)
11th 16:36 Occurrence of the Article 15 event (Loss of water injection function)
14th 13:25 Occurrence of the Article 15 event (Loss of water cooling function)
14th 22:50 Occurrence of the Article 15 event (unusual increase of PCV pressure)
15th 6:10 Sound of explosion
15th about 6:20 Possible damage of the suppression chamber
20th 15:00-17:20 Injection of about 40 tons of seawater into SFP through fire extinguishing system.

Current Conditions: Seawater is being injected

Future Operation: Recovering of power supply and continuous injection of seawater to core. Monitoring of water temperature in the pool and so on.

3-3. Report concerning incidents at Unit1, 2, 3 and 4 at the Fukushima Dai-ichi (I) NPS

●*Unit 3 Several counter measures are being used to cool down Unit 3 as of 15:30 March 21.*

-After the automatic shut-down of the reactor, on March 13th fresh water and subsequently seawater were injected into the reactor pressure vessel through the fire extinguishing system line.

- The explosion took place around the reactor building of Unit 3 at 11:01 on March 14th.

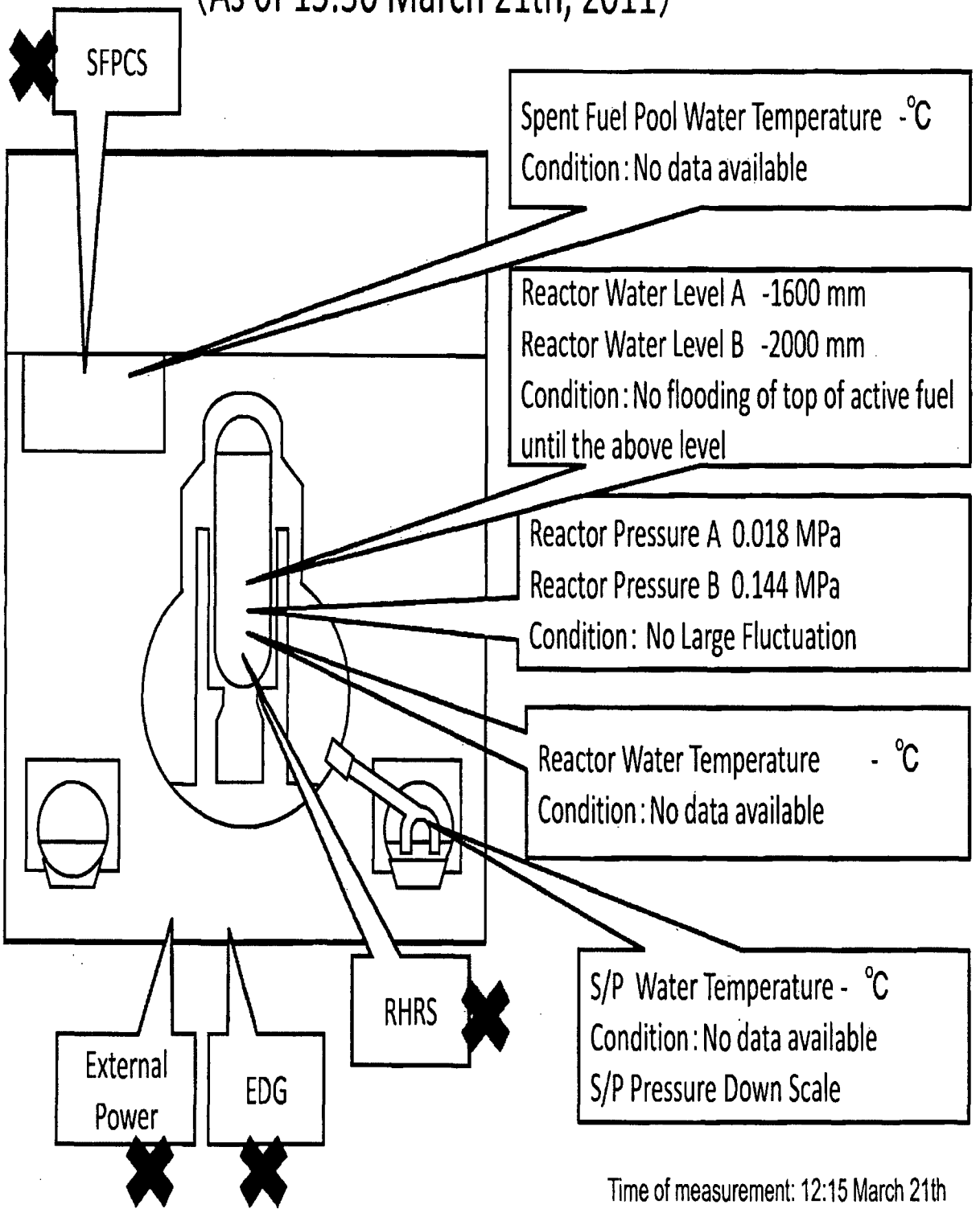
- At 8:30 on March 16th, white smoke like steam was generated from Unit 3. The operators evacuated from the central control room of Unit 3 and 4 at 10:45 on March 16th. Thereafter, the operators returned to the room and restarted the operation for water injection into the reactor pressure vessel at 11:30 on March 16th.

- Helicopters and water cannon trucks of Self Defense Forces discharged water to Unit 3 from sky and ground on March 17th. Riot police also shot water from ground. Currently, seawater is being injected into the reactor pressure vessel.

- Hyper Rescue Unit (14 vehicles) arrived at the Main Gate (23:10 March 18th) and 6 vehicles of them entered the NPS in order to spray water from the ground. (23:30 March 18th)

-Hyper Rescue Unit of Tokyo Fire Department carried out and completed water spray. (finished at 03:40 March 20th). The next spray was started at 21:39 March 20th and finished at 03:58 March 21st.
-The pressure in PCV rose (320kPa as of 11:00 March 20th) and monitoring the pressure continues (120kPa at 12:15 March 21st).

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 3
(As of 15:30 March 21th, 2011)



Time of measurement: 12:15 March 21th

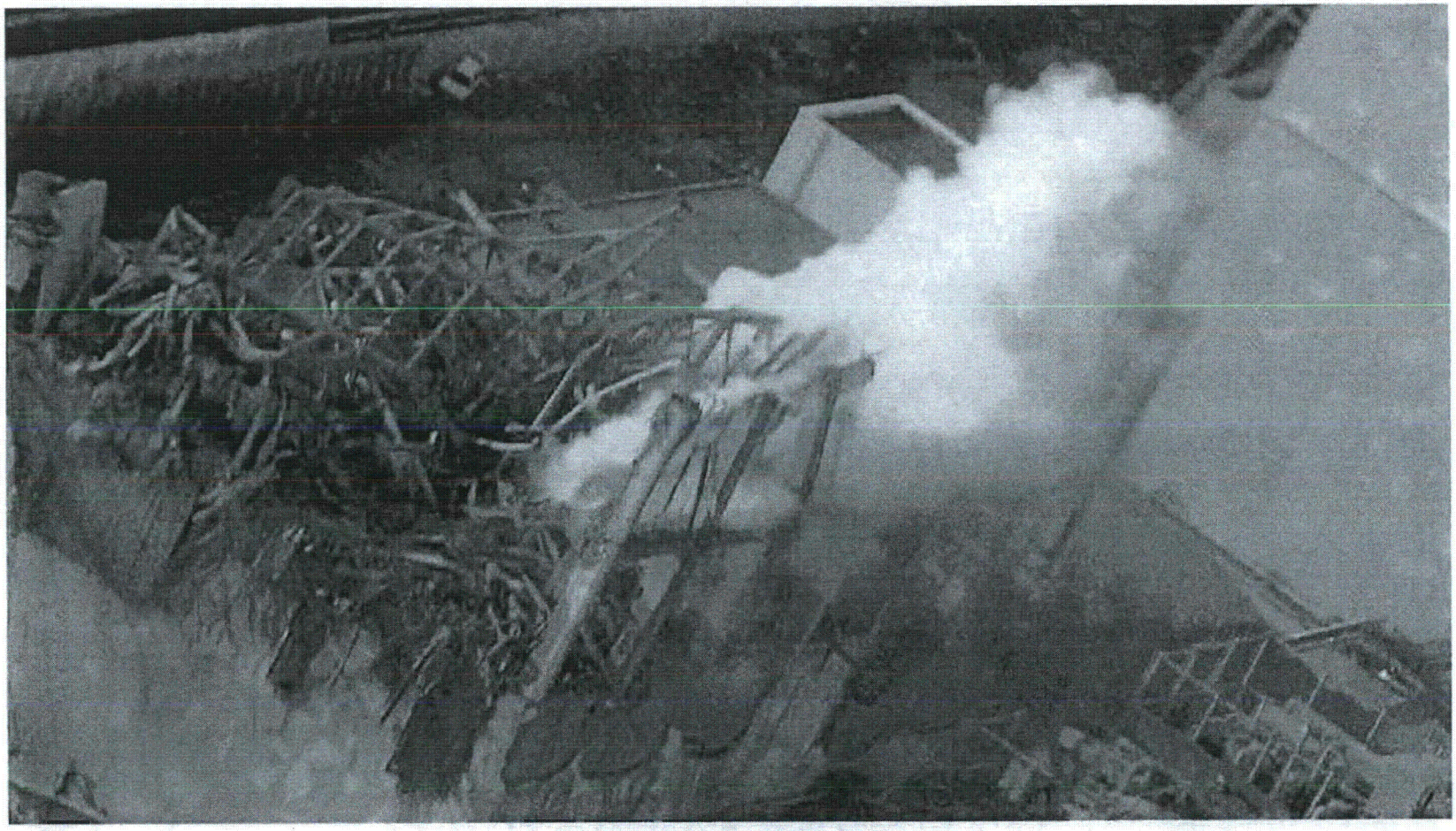
Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 3
(As of 15:30 March 21th, 2011)

Major Events after the earthquake

11th 14:46 Under operation, Automatic shutdown by the earthquake
11th 15:42 Report of the Article 10 (loss of A/C power)
13th 5:10 Occurrence of the Article 15 event (Loss of water injection function)
13th 8:10 Start to bent
14th 7:44 Occurrence of the Article 15 event (unusual increase of PCV pressure)
11:01 Sound of explosion
16th about 8:30 White smoke generated
17th 9:48 - 10:01 Water discharge by the helicopters of Self-Defense Force(4 times)
19:05 - 20:09 Water spray from the ground by High pressure water-cannon trucks (Police: once, Self-Defense Force: 5 times)
18th before 14:00- 14:38 Water spray from the ground by same trucks (Self-Defense Force : 6 times)
- 14:45 Water spray from the ground by US water-cannon trucks (US armed force : 1 time)
19th -03:40 Water spray from the ground by High pressure water-cannon trucks by Hyper Rescue Unit of Tokyo Fire Department.
20th 21:39 - 21th 03:58 Sprayed by Hyper Rescue Unit of Tokyo Fire Department.

Current Conditions: Continuous operations for water spray to the pool and seawater injection to the Reactor Core. Working on recovering power supply.

Future Operation: Recovering of power supply and continuous injection of seawater to core.



Fukushima Dai-ichi Unit 3 (airborne imagery: TEPCO)

3-4. Report concerning incidents at Unit1, 2, 3 and 4 at the Fukushima Dai-ichi (I) NPS

● *Unit 1,2 &3*

-As Cesium and Iodine were detected, it was believed that a part of nuclear fuel was damaged and a small amount of radioactive material was leaked into core cooling water.

3-5. Report concerning incidents at Unit1, 2, 3 and 4 at the Fukushima Dai-ichi (I) NPS

- ***Unit 4 There are no fuel in the reactor pressure vessel due to replacement work of a shroud.***

- It was confirmed that a part of wall of the operation floor of the reactor building of Unit 4 was damaged on March 15th. A fire took place at Unit 4 at 9:38 on March 15th, but the fire was extinguished spontaneously.

- At 5:45 on March 16th, it was reported that a fire occurred at Unit 4; however, no fire was confirmed by TEPCO staff on the ground at 6:15 on March 16th.

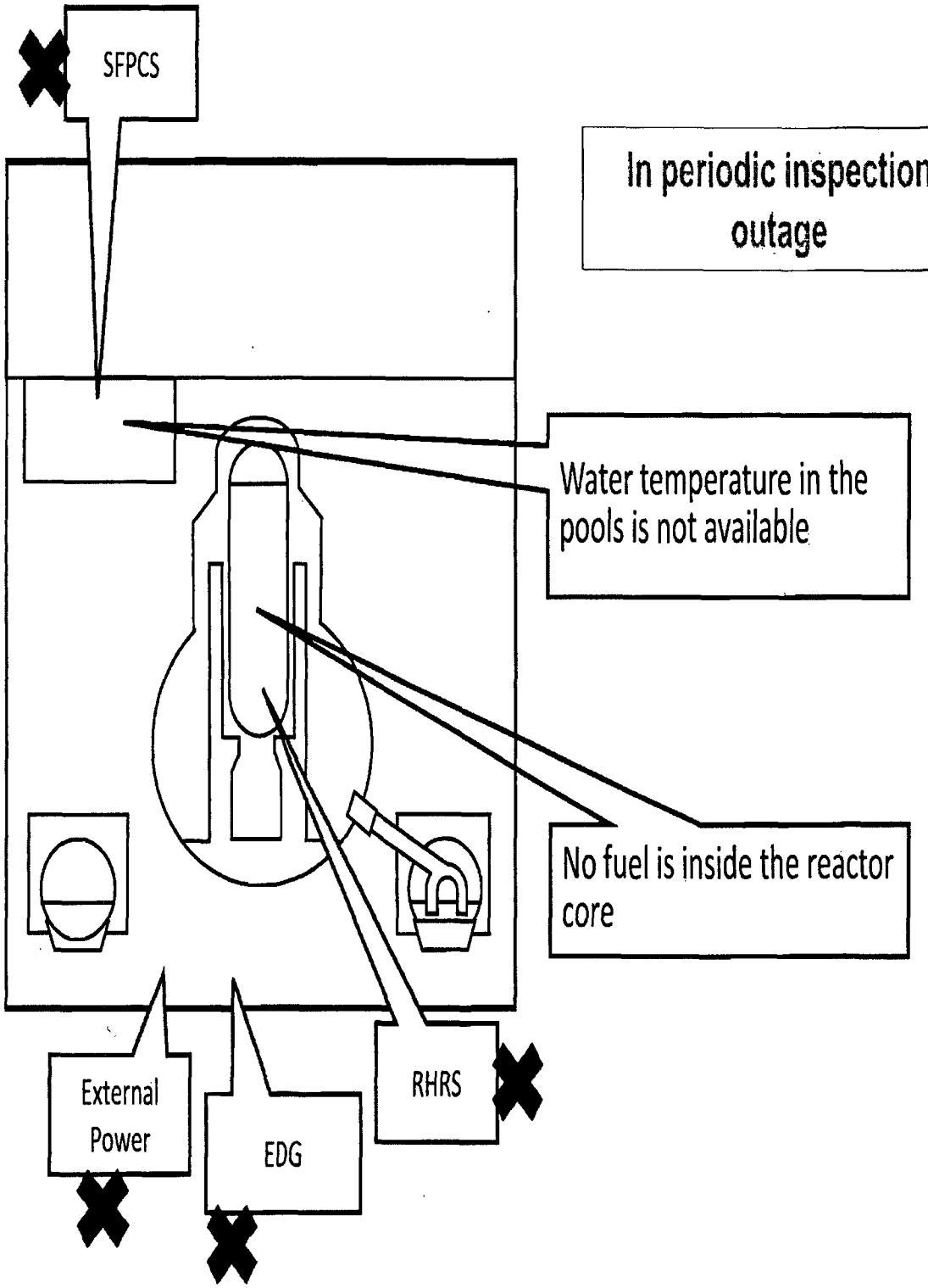
-The temperature of water in the spent fuel storage pool went up.

-Water spray over the spent fuel pool by Self Defence Force was started at around 18:30 March 20th and finished at 19:46 March 20th.

-Water spray over the spent fuel pool by Self Defence Force (13 fire engines) started at 06:37 March 21st and finished at 08:41 March 21st.

-The work for laying the electric cable to the power center has been completed. (around 15:00 March 21th)

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 4
(As of 15:30 March 21th, 2011)



Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 4 (As of 15:30 March 21th, 2011)

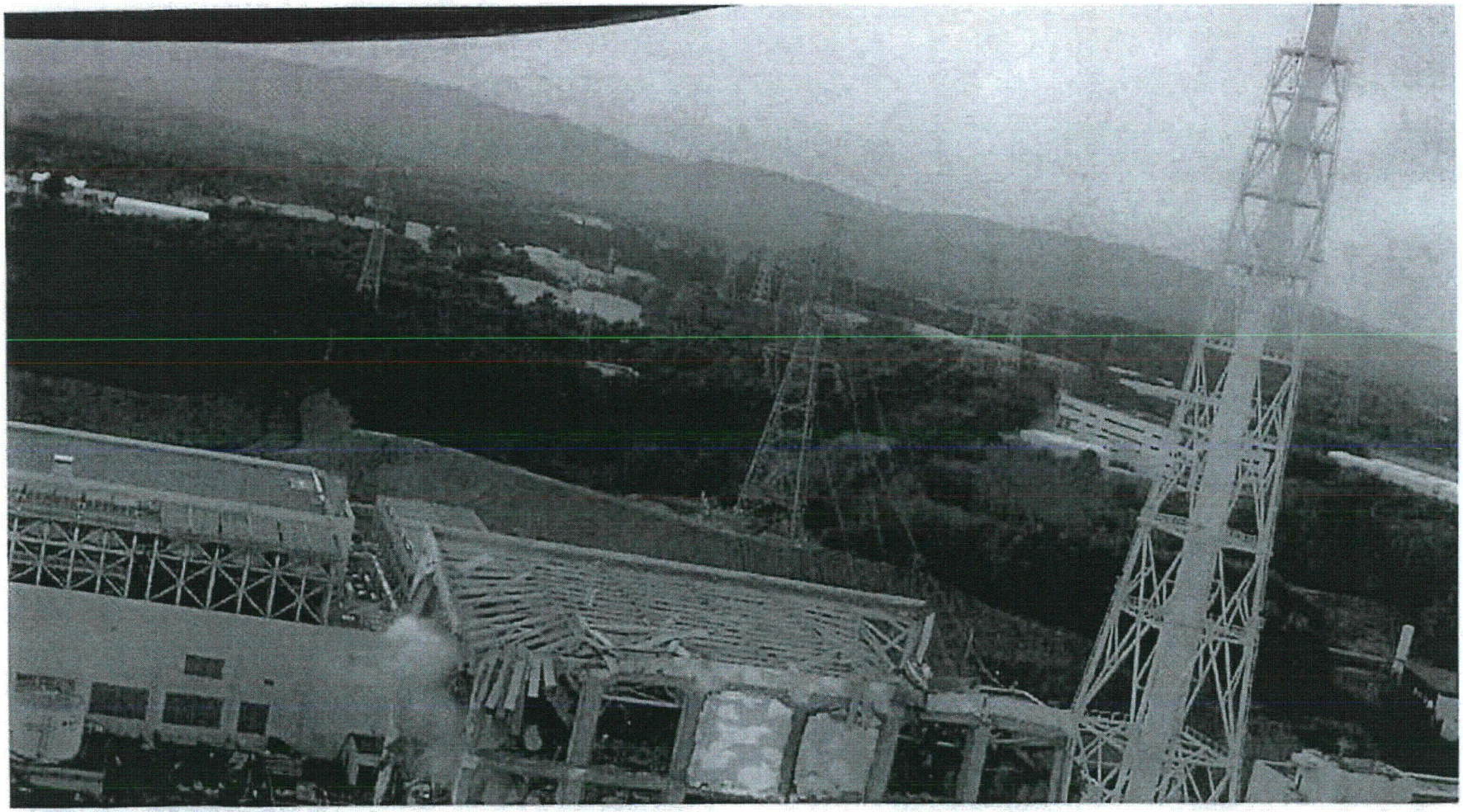
Major events after the earthquake

In periodic inspection outage when the earthquake occurred.

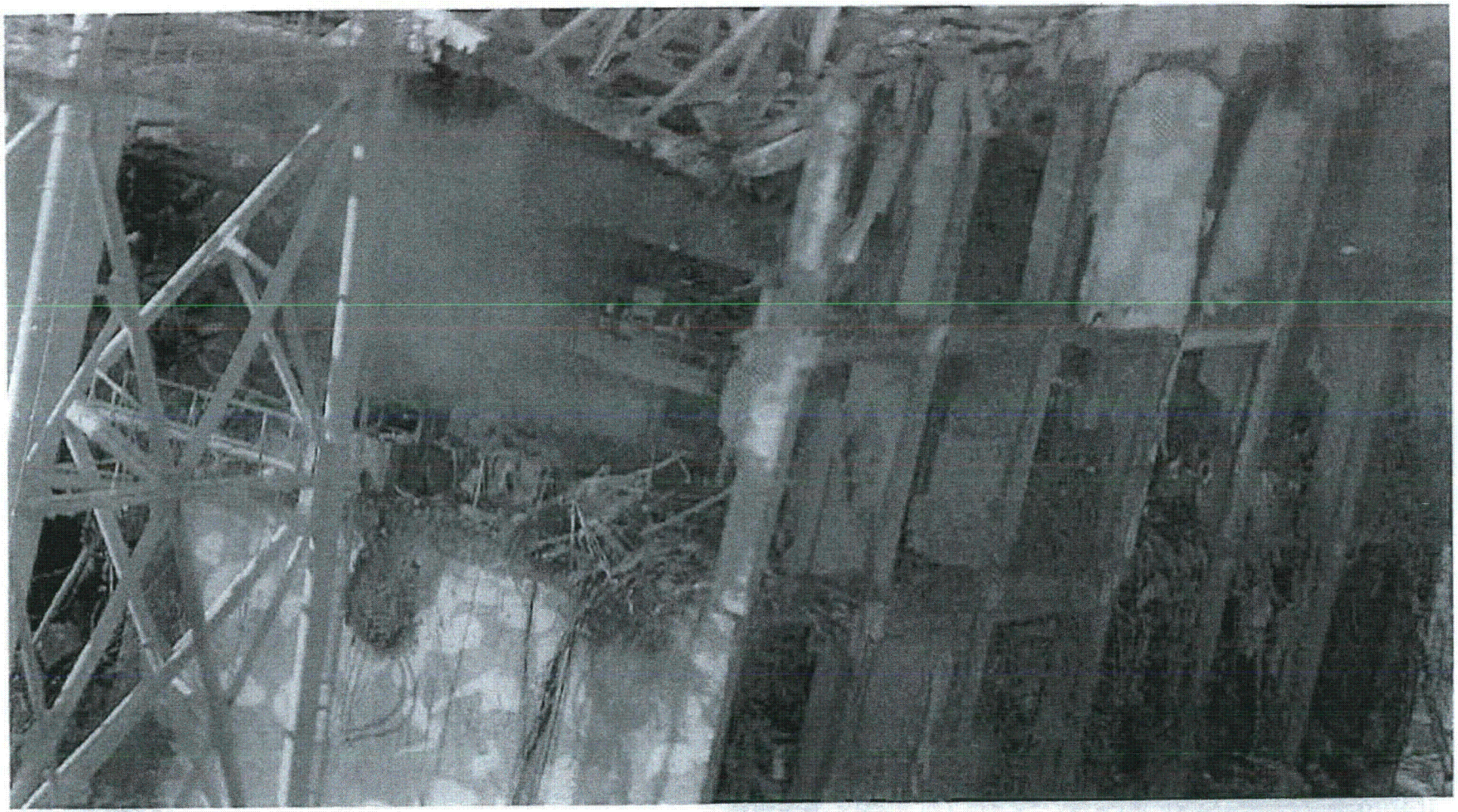
14th 4:08 Water temperature in the Spent Fuel Pool, 84℃
15th 6:14 Damage of wall in the 4th floor confirmed
15th 9:38 Fire occurred in the 3rd floor (12:25 extinguished)
16th 5:45 Fire occurred. TEPCO couldn't confirm any fire on the ground. (7:26 extinguished)
20th around18:30-19:46 Water spray over the spent fuel pool by Self Defence Force
21th h 06:37-08:41 Water spray over the spent fuel pool by Self Defence Force

Current Conditions: No fuel is in the RPV. Water is evaluated to remain in the Pool (TEPCO)

Future Operation: Recovery of power supply



Fukushima Dai-ichi Unit 4 (airborne imagery: TEPCO)



Fukushima Dai-ichi Unit 4, operation floor (airborne imagery: TEPCO)

4. Report concerning incidents at Unit5 and 6 at the Fukushima Dai-ichi (I) NPS

● *Back up power of Unit 6 is in working condition and external power was supplied to Unit 5 as of March 21th*

-Fresh water is being injected into reactor pressure vessels and spent fuel pools by Make-Up Water Condensate system.

- Emergency Diesel Generator (1 unit) for Unit 6 is operable and supplying electricity to Units 5 and 6. Water injection to the PRV and Spent Fuel Pool through MUWC is progressing.

- The second unit of Emergency Diesel Generator (A) for Unit 6 has started up.

-Pump for Residual Heat Removal (RHR)(C) for Unit 5 (05:00 March 19th) and RHR(B) for Unit 6 (22:14 March 19th) started up and cooling of Spent Fuel Storage Pool has started. (Power supply : Emergency Diesel Generator for Unit 6)

-Unit 5 under cold shut down(14:30 March 20th)

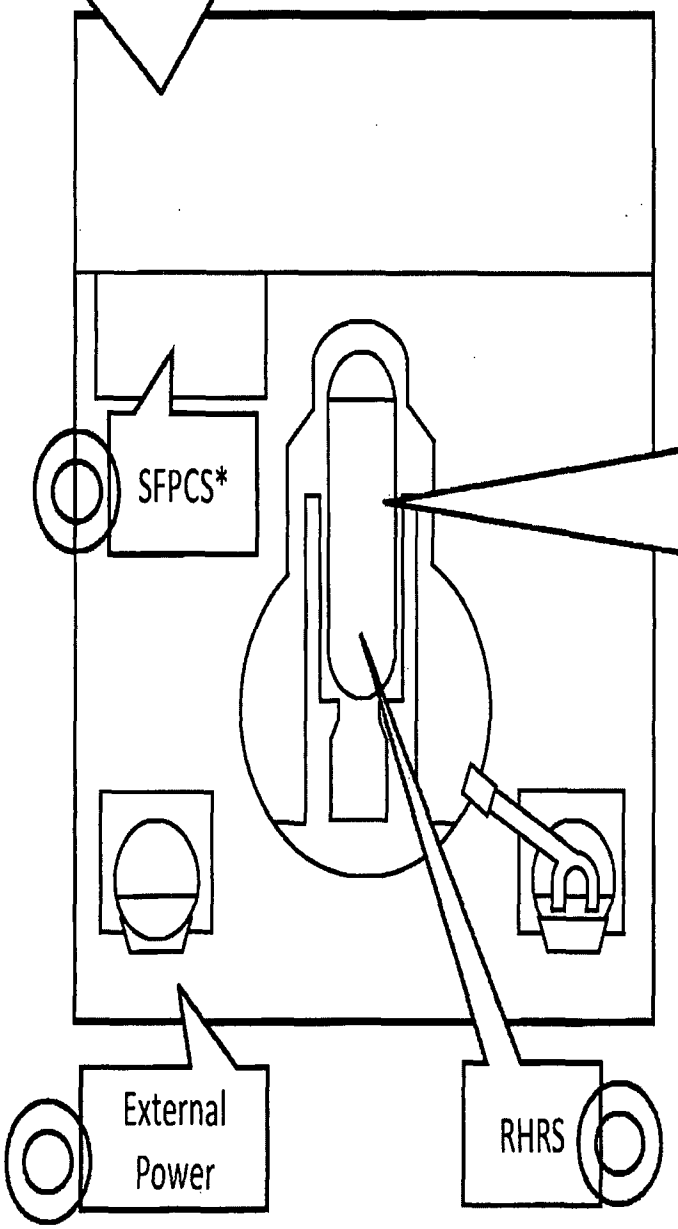
-Unit 6 under cold shut down(19:27 March 20th)

-Unit 5 is supplied electricity by external power. (Changed from EDG of Unit6 at 11:36 March 21th)

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 5
(As of 15:30 March 21th, 2011)

Water Temperature in the Pool: 42.2℃
Condition: Spent fuel pool cooling function has been recovered.

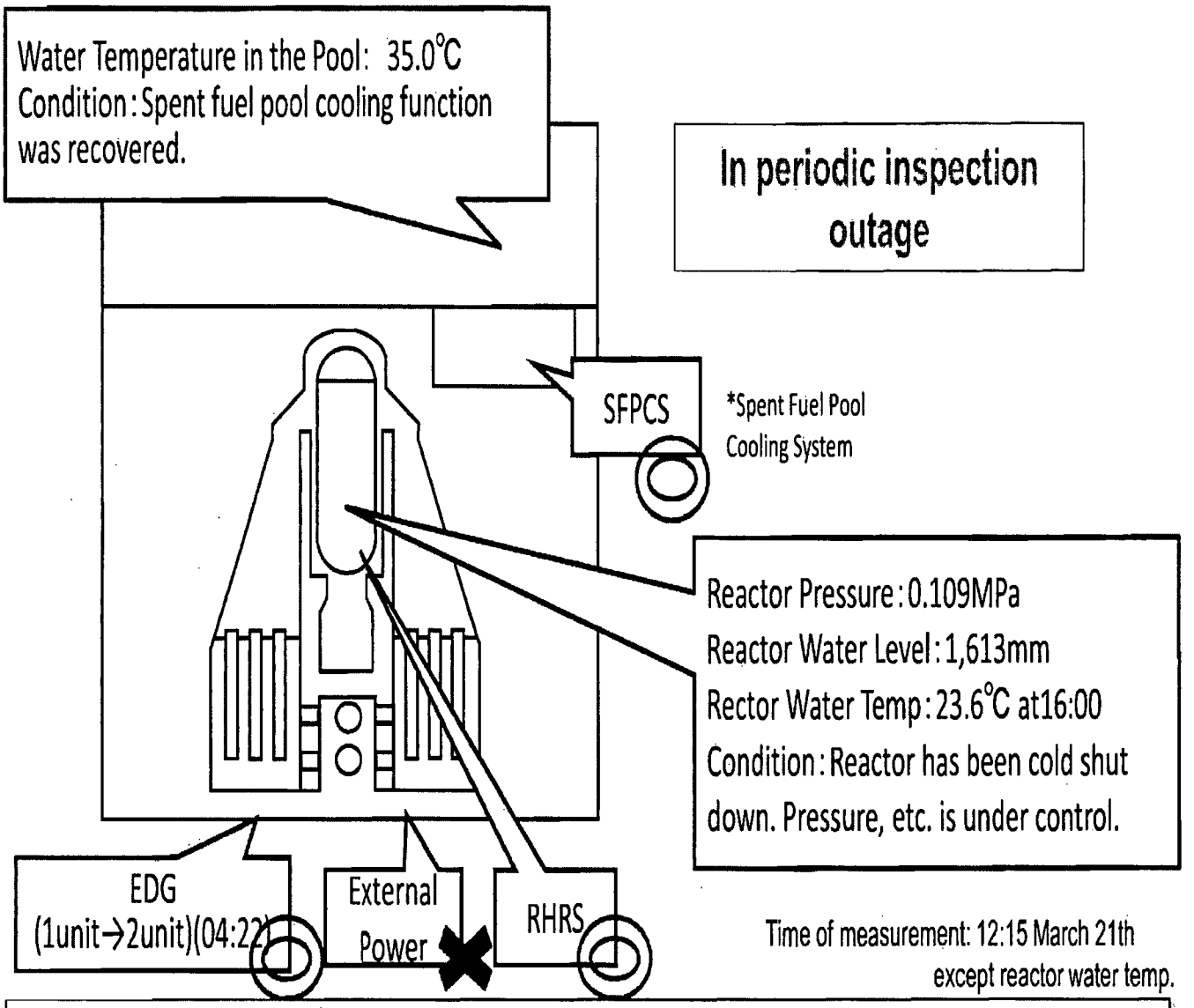
In periodic inspection outage



Reactor Pressure: 0.108MPa
Reactor Water Level: 2,037mm
Reactor Water Temperature: 53.2℃ at16:00
Condition: The reactor has been cold shut down. Pressure, etc. is under control.

Time of measurement: 12:00 March 21th
except reactor water temp.

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 6
(As of 15:30 March 21th, 2011)



Current Conditions: Emergency Diesel Generator (1 unit →2 unit) for Unit 6 is being operated. Pump of RHR for Unit 5 and Unit6 started up. Currently Unit 5 is supplied electricity by external power. (Changed from EDG of Unit6 at 11:36 March 21th)
Both reactor have been cold shut down.(Unit 5: 14:30 March 20th, Unit 6: 19:27 March 20th)

Future Operation: Start operating for recovery of external power for Unit 6

Action Taken by NISA

March 11th, 2011

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

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

21:23 Directives from Prime Minister to the Governor of Fukushima Prefecture, the Mayor of Okuma Town and the Mayor of Futaba Town were issued regarding the event occurred at Fukushima Dai-ichi NPS, TEPCO, in accordance with the Paragraph 3, the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness as follows:

- Direction for the residents within 3km radius from Unit 1 to evacuate
- Direction for the residents within 10km radius from Unit 1 to stay in-house

Action Taken by NISA

March 12nd, 2011

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

07:45 Directives from Prime Minister to the Governor of Fukushima Prefecture, the Mayors of Hirono Town, Naraha Town , Tomioka Town and Okuma Town were issued regarding the event occurred at Fukushima Dai-ni NPS, TEPCO, pursuant to the Paragraph 3, the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness as follows:

- Direction for the residents within 3km radius from Fukushima Dai-ni NPS to evacuate
- Direction for the residents within 10km radius from Fukushima Dai-ni NPS to stay in-house 19:03 Government declared the state of nuclear emergency. (Establishment of Government Nuclear Emergency Response Headquarters and Local Emergency Response Headquarters)

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

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

Action Taken by NISA

March 14th, 2011

01:10 Seawater injection at Unit 1 and Unit 3 of Fukushima Dai-ichi NPS were temporarily interrupted due to the lack of seawater in pit

March 15th, 2011

11:00 Prime Minister directed the in-house stay area.

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

March 18th, 2011

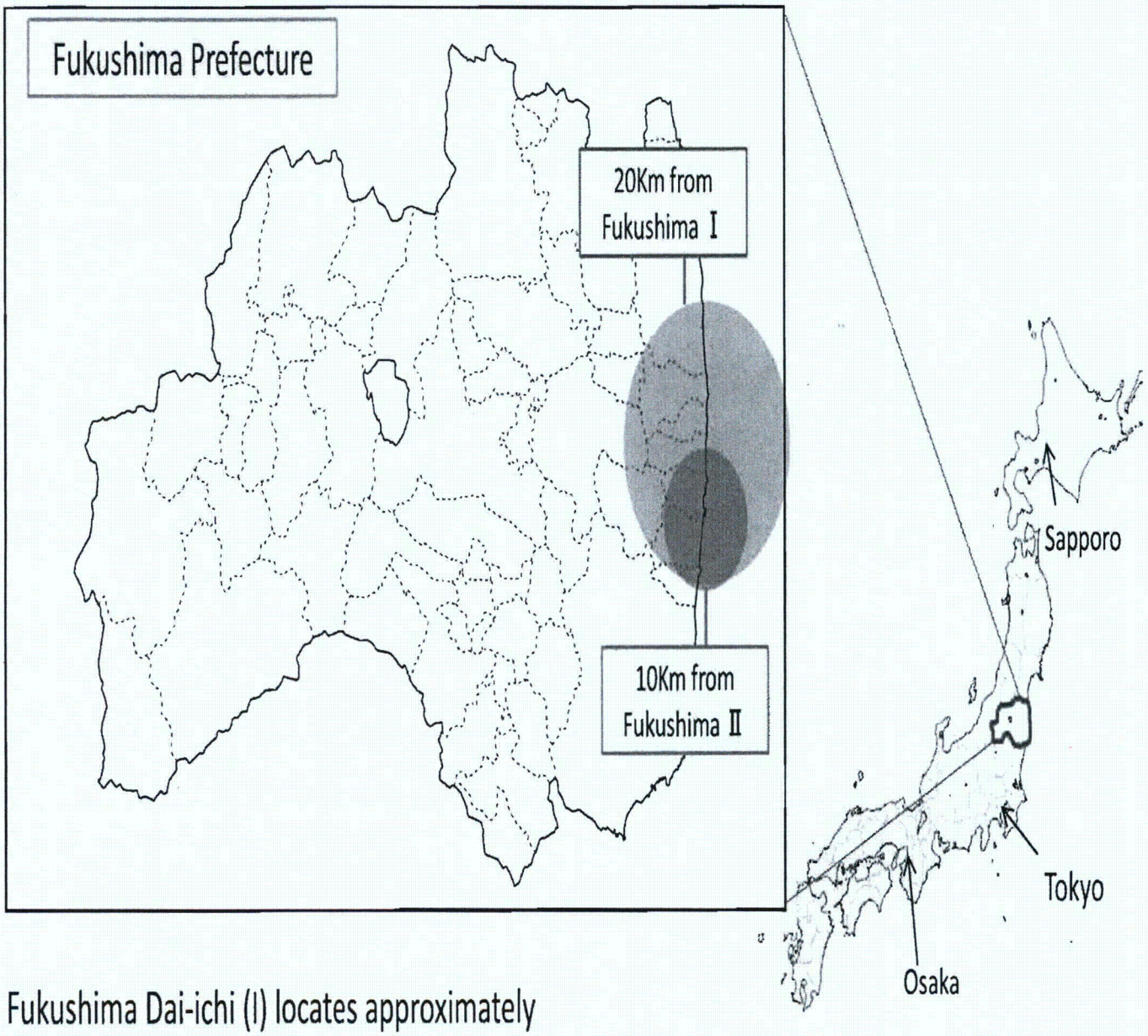
15:55 TEPCO reported to NISA Accidents and Failures with regard to Fukushima Dai-ichi Unit 1,2,3&4 (Leakage of the radioactive materials inside of the reactor building to non-controlled area) pursuant to the Paragraph 3, the Article 62 of the Nuclear Regulation Act.

5-1. Current Situation on Resident Evacuation and Radiation Exposure

- Evacuation as far as 20 kilometers from Fukushima I NPS and 10 kilometers from Fukushima II has been completed. The residents in the areas from 20 kilometers to 30 kilometers radius from Fukushima I NPS are directed to stay in-house.

-On March 16th, the Local Emergency Response Headquarter issued "the direction to administer the stable Iodine during evacuation from the evacuation area (20 km radius)" to the Prefecture Governors and the heads of cities, towns and villages.

5-2. Current Situation



Fukushima Dai-ichi (I) locates approximately

- 230 km from Tokyo
- 580 km from Osaka
- 600 km from Sapporo

Possibility on radiation exposure (As of 15:30 March 21th)

● Exposure of residents

(1) Including the evacuees from Futaba Public Welfare Hospital to Nihonmatsu City Fukushima Gender Equality Centre as the result of measurement of 133 persons at the Centre, 23 persons counted more than 13,000 cpm were decontaminated.

(2) The 35 residents transferred from Futaba Public Welfare Hospital to Kawamata Town Saiseikai Kawamata Hospital by private bus arranged by Fukushima Prefecture were judged to be not contaminated by the Prefectural Response Centre.

(3) As for the about 100 residents in Futaba Town evacuated by bus, the results of measurement for 9 of the 100 residents were as follows. The evacuees were divided into two groups which joined later to Nihonmatsu City Fukushima Gender Equality Centre.

No. of Counts	*No. of Persons*
18,000cpm	1
30,000-36,000cpm	1
40,000cpm	1
little less than 40,000cpm*	1
very small counts	5

*These results were measured without shoes, though the first measurement exceeded 100,000cpm)

Possibility on radiation exposure (As of 15:30 March 21th)

●Exposure of residents

(4) The screening was started at the Off site Center in Okuma Town from March 12th to 15th. 162 people received examination until now. At the beginning, the reference value was set at 6,000cpm. 110 people were at the level below 6,000 cpm and 41 people were at the level of 6,000 cpm or more. When the reference value was increased to 13,000 cpm afterward, 8 people were at the level below 13,000 cpm and 3 people are at the level of 13,000 cpm or more.
The 5 out of 162 people examined were transported to hospital after being decontaminated.

(5) The Fukushima Prefecture carried out the evacuation of patients and personnel of the hospitals located within 10km area. The screening of all the members showed that 3 persons have the high counting rate. These members were transported to the secondary medical institute of exposure. As a result of the screening on 60 fire fighting personnel involved in the transportation activities, the radioactivity higher than twice of the back ground was detected on 3 members even after decontamination and all the 60 members were decontaminated.

●Exposure of workers

•As for the 18 workers conducting operations in Fukushima Dai-ichi NPS, results of measurements are as follows;
One worker: 106.3 mSv. At the level of exposure no internal exposure and medical treatment was not required.
Other workers: No threat of internal exposure and no medical treatment needed.
•The 7 people working at the time of explosion at the Unit 3 of Fukushima Dai-ichi NPS were injured and were conscious. 6 out of 7 people were decontaminated by an industrial doctor of the clinic in Fukushima Dai-ni NPS, and confirmed to have no risk. The other one is having a medical treatment at the clinic after decontaminated.

Reference

Fukushima Dai-ichi NPS, Major Plant Parameters (14:00 March 21th)

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Reactor Pressure*1 [MPa]	0.297(A) 0.265(B)	0.081(A) 0.081(B)	0.018(C) 0.144(B)	–	0.108	0.109
CV Pressure (D/W) [kPa]	160	120	120	–	–	–
Reactor Water Level*2 [Mm]	-1,750(A) -1,750(B)	-1,350(A) Not available(B)	-1,600(A) -2,000(B)	–	2,037	1,613
Suppression Pool Water Temperature (S/C) [°C]	–	–	–	–	–	–
Suppression Pool Pressure (S/C) [kPa]	160	down scale	down scale	–	–	–
Spent Fuel Pool Water Temperature [°C]	–	49	–	Not available*3	42.2	35.0
Time of Measurement	08:00 March 21th	08:00 March 21th	12:15 March 21th		12:00 March 21th	12:00 March 21th

*1: Converted from reading value to absolute pressure

*2: Distance from the top of fuel

*3: As of 04:08 March 14th, 84 ℃

From: Uhle, Jennifer
To: Coyne, Kevin; Coe, Doug; Gibson, Kathy
Cc: Sheron, Brian
Subject: RE: Japan Response Impacts for DRA
Date: Wednesday, March 23, 2011 1:37:12 PM

Can I get an update on Level 3 at 3:00 today. Jennifer

From: Coyne, Kevin
Sent: Wednesday, March 23, 2011 10:54 AM
To: Sheron, Brian
Cc: Uhle, Jennifer; Coe, Doug; Hudson, Daniel; Salley, MarkHenry; Beasley, Benjamin; Stutzke, Martin
Subject: Japan Response Impacts for DRA

Brian –

The biggest impact to DRA in supporting the Japanese response is on the Level 3 SECY paper. Although we can meet the accelerated schedule proposed by the EDO's office, loss of much more of Marty Stutzke's time to addressing GI-199 issues will adversely impact our ability to meet the schedule (Marty has a key role in developing the paper). The information requests on GI-199 and fire have also impacted our fire research and generic issues program, but to a more limited extent. In fact, the fire research staff minimized the impact to core research by working over the weekend to develop Q&A's for the Monday Commission briefing. Obviously, new requests for information or new research needs as a result of the event will add to our work load and have additional impacts.

Let me know if you need any additional information or have questions-

Kevin

OH/240

From: Sheron, Brian
To: Gibson, Kathy; Bush-Goddard, Stephanie
Cc: Uhle, Jennifer
Subject: Fw: Public health: another issue that needs near-term action
Date: Wednesday, March 23, 2011 1:57:29 PM

See below. Any thoughts?

----- Original Message -----
From: Per F. Peterson <peterson@nuc.berkeley.edu>
To: Koonin, Steven <Steven.Koonin@science.doe.gov>; Adams, Ian <Ian.Adams@Hq.Doe.Gov>; Aoki, Steven <Steven.Aoki@nnsa.doe.gov>; Binkley, Steve <Steve.Binkley@science.doe.gov>; Brinkman, Bill <Bill.Brinkman@science.doe.gov>; RJBudnitz@lbl.gov <RJBudnitz@lbl.gov>; SCHU <SCHU@hq.doe.gov>; DAgostino, Thomas <Thomas.DAgostino@nnsa.doe.gov>; (b)(6) (b)(6) Finck, Phillip <phillip.finck@inl.gov>; (b)(6) ; Grossenbacher, John (INL) <john.grossenbacher@inl.gov>; John Holdren (b)(6) Hurlbut, Brandon <Brandon.Hurlbut@hq.doe.gov>; Kelly, John E (NE) <JohnE.Kelly@Nuclear.Energy.Gov>; McFarlane, Harold <harold.mcfarlane@inl.gov>; Owens, Missy <Missy.Owens@hq.doe.gov>; Poneman, Daniel <Daniel.Poneman@hq.doe.gov>; Sheron, Brian; ronaldo.szilard@inl.gov <ronaldo.szilard@inl.gov>; rlg2@us.ibm.com <rlg2@us.ibm.com>; Per F. Peterson <peterson@nuc.berkeley.edu>; Lyons, Peter <Peter.Lyons@Nuclear.Energy.gov>
Sent: Wed Mar 23 13:35:11 2011
Subject: Public health: another issue that needs near-term action

I would like to raise another issue which now merits expeditious, near term action.

There is a short time window now, of about 6 to 8 weeks, during which it will remain possible to use whole-body counting and other methods to measure any I-131 that members of the public may have ingested. There are a number of reasons why collecting this data, from a sufficiently large sample of the public and workers to get statistically strong data, would be very valuable. I have raised this question with other members of the UCB faculty, and there is general agreement that prompt action should be taken in this area. I do understand that the IAEA has been making measurements, but I am not sure what specifically they have been doing and whether this includes whole-body counting (which can measure body burdens of radioactive materials resolved by isotopes).

Below I discuss this issue in greater detail, outline the reasons why prompt action is likely warranted, and discuss what actions DOE could take immediately in this area.

There has been a program at the Carlsbad Environmental Monitoring and Research Center near WIPP, that has been funded by the DOE, that has performed whole body counting:

http://www.cemrc.org/health/liedown.htm

This program at CEMRC has had important and valuable effects in increasing public confidence, since any member of the public with a concern about potential exposures can determine whether any has happened.

In the longer term many cases of thyroid cancer, and other health problems, may end up being attributed to exposures from the Fukushima

CH/241

accident, both in Japan and on the U.S. west coast. Unless statistically strong data is collected in this short time window, it will be difficult to provide a strong and scientifically valid argument about the probability that these diseases have originated from exposures resulting from this accident.

The second reason to collect this data is that it is possible that we will find that some people have received doses of I-131 and other radionuclides that could exceed the levels that current Protective Action Guidelines are designed to prevent. This could provide a basis for immediate action to change PAG's, as well as the ability in the longer term to reassess and improve our approaches to PAGs. Also, the effectiveness of emergency response depends strongly on the level of public confidence that the government has people's best interests in mind; collecting data that shows the effectiveness (or lack of effectiveness) of these efforts could be central to building longer-term confidence and thus incentivizing more people to follow government recommendations in future emergencies of all types.

The third reason to collect this data is that it could identify individuals who have had significant exposure to I-131 or other radionuclides, and alert them and their medical care professionals to monitor for potential health effects. For remaining people, it could provide reassurance that they do not need to worry about long-term health impacts from the accident.

A fourth reason to collect this data is that it could provide a good statistical basis to correlate data taken from hand-held monitors (I presume these exist) that can be used to screen large numbers of people, to actual, isotope-resolved whole-body burdens. It may even make sense to support bringing some people to the CEMRC facility in Carlsbad, since it has extremely high resolution, so that there can be a direct comparison between rapid monitoring methods, conventional whole body counts, and the extremely accurate counts possible at the CEMRC facility.

I should emphasize that substantial care must be taken in organizing any activity to collect data, with respect to public opinion in Japan. There are very strong reasons to gather data, but it must be done in a way that is broadly viewed as being in the interest of the public and the individuals involved. Having some significant role played by universities may be helpful, as well as the IAEA, so that the effort would not be viewed as being a government-directed effort, given current low levels of trust in the government.

There is only a 6 to 8 week window where whole body counting is practical for detecting I-131. I would recommend that we look at making facilities at the national laboratories (LLNL and PNNL both have these capabilities, I believe) available to the public over the next few months. This is an action that DOE could take that could be beneficial. Having the U.S. doing this may also make it easier to have the same thing done in Japan. DOE could also help, as necessary, in transferring equipment to Japan for this purpose, and in making the CEMRC facility in Carlsbad available for high-accuracy counting.

Thoughts?

-Per

--

Per F. Peterson
Professor and Chair
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Berkeley, California 94720-1730
peterson@nuc.berkeley.edu
Office: (510) 643-7749 Fax: (510) 643-9685
http://www.nuc.berkeley.edu/People/Per_Peterson

From: Sheron, Brian
To: Gibson, Kathy
Subject: RE: Impacts
Date: Wednesday, March 23, 2011 2:11:00 PM

Yep. I told Borchardt that the impacts would likely increase.

From: Gibson, Kathy
Sent: Wednesday, March 23, 2011 1:27 PM
To: Armstrong, Kenneth; Sheron, Brian
Cc: Ramirez, Annie
Subject: RE: Impacts

But we expect more as time goes on, most likely in Richard's branch.

Kathy Halvey Gibson
Director
Division of Systems Analysis

Kathy.Gibson@nrc.gov
(301) 251-7499 Work
(b)(6) Cell

From: Armstrong, Kenneth
Sent: Wednesday, March 23, 2011 12:02 PM
To: Sheron, Brian
Cc: Gibson, Kathy; Ramirez, Annie
Subject: RE: Impacts

Brian,

At the present time the only additional impacts to DSA (besides SOARCA) are in the Health Effects Branch:

- FSME Part 20 User need is on hold at the time.
- The Briefing to Marty Virgilio on CRPPH is not getting the required attention it needs but, the due date is still the same.
- The expert group on occupational exposure is delayed.

Thanks,
Kenneth

From: Sheron, Brian
To: Rini, Brett; Case, Michael; Coe, Doug; Correia, Richard; Gibson, Kathy; Richards, Stuart; Scott, Michael; Uhle, Jennifer; Valentin, Andrea
Sent: Wed Mar 23 10:03:49 2011
Subject: Impacts

Bill Borchardt is having a meeting from 12;30 pm to 1:30 pm today with Office Directors and RAs to discuss how the Japanese event is impacting our work. So far, I am aware of the impact on SOARCA, and I am assuming there will be some impact on our seismic work.

CH/242

1.) Mike, can I get a little more detail on what the impact is, if any, on our seismic work because of Annie's and Jon Ake's participation.

2.) Please let me know if there are other areas that are or will be impacted by the Japanese event. I need this by about 11:30 am today. Thanks.

From: Sheron, Brian
To: Gibson, Kathy; Bush-Goddard, Stephanie
Cc: Uhle, Jennifer
Subject: FW: Public health: another issue that needs near-term action; I-131 counting.
Date: Wednesday, March 23, 2011 2:42:00 PM

More.....

-----Original Message-----
From: Per F. Peterson [mailto:peterson@nuc.berkeley.edu]
Sent: Wednesday, March 23, 2011 2:27 PM
To: Richard L Garwin
Cc: Brinkman, Bill; Hurlbut, Brandon; Sheron, Brian; Poneman, Daniel; McFarlane, Harold; Adams, Ian; John Holdren; Kelly, John E (NE); Grossenbacher, John (INL); Owens, Missy; Per F. Peterson; Lyons, Peter; Finck, Phillip; (b)(6) RJBudnitz@lbl.gov; ronaldo.szilard@inl.gov; SCHU; Aoki, Steven; Koonin, Steven; (b)(6) Binkley, Steve; DAgostino, Thomas
Subject: Re: Public health: another issue that needs near-term action; I-131 counting.

Dick,

Good idea.

Also, I just spoke with Jim Conca, who directed the CEMRC facility for many years. He advises that a more accurate, and logistically simpler method to measure I-131 is by collecting urine samples. Collecting a quart or more, recording the time over which the collection occurred, and adding nitric acid to acidify (which prevents precipitation on the container walls and biological action that can pressurize the container), and then performing gamma counting, provides the most sensitive way to assay for I-131. Clearly this is logistically much easier to implement as well.

I'm not sure whether there are hand-held detectors that can give the spectral resolution needed to detect I-131, but since it would be the only source of significant radiation in the chest region, simple counting might suffice. Whole body counts still provide a direct measure of intake, so could be valuable to perform for some fraction of the people. Everyone who goes through a whole-body count should also be counted with a hand-held device and urine assay as well, I would assume.

An important point for doing this in the U.S., and probably in Japan, is that the protocols must receive approval by a Human Subjects Committee.

If one were to initiate an effort to perform whole body counting at LLNL and PNNL, the human subjects review can likely be done faster if it is initially for lab employees who would volunteer to be counted. Screening lab employees could provide baseline data to use in deciding/planning counting for the public as well.

Again, collecting statistically useful data on uptake of I-131 and other radionuclides on the U.S. west coast and in Japan could be very valuable in the longer term, when many people may begin to believe that the Fukushima accident is the cause of a variety of health problems.

-Per

CH/243

>Right on, Per!
>
>But it seems to me that one could promptly validate the use of a
>single counter near the thyroid gland for detecting I-131, in
>comparison to whole body counting, since the thyroid is so efficient
>in concentrating iodine. And if thyroid counting is adequate, the
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--

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http://www.nuc.berkeley.edu/People/Per_Peterson

From:	Gibson, Kathy
To:	Bush-Goddard, Stephanie; Sherbini, Sami
Cc:	Uhle, Jennifer; Sheron, Brian; Wagner, Katie
Subject:	RE: Public health: another issue that needs near-term action; I-131 counting.
Date:	Wednesday, March 23, 2011 3:03:32 PM
Attachments:	Kathy Halvey Gibson.vcf

Please confirm that you are looking at this, and give me and Katie an estimate of when you will have a response.

-----Original Message-----
From: Sheron, Brian
Sent: Wednesday, March 23, 2011 2:42 PM
To: Gibson, Kathy; Bush-Goddard, Stephanie
Cc: Uhle, Jennifer
Subject: FW: Public health: another issue that needs near-term action; I-131 counting.

More.....

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From: Per F. Peterson [mailto:peterson@nuc.berkeley.edu]
Sent: Wednesday, March 23, 2011 2:27 PM
To: Richard L Garwin
Cc: Brinkman, Bill; Hurlbut, Brandon; Sheron, Brian; Poneman, Daniel; McFarlane, Harold; Adams, Ian; John Holdren; Kelly, John E (NE); Grossenbacher, John (INL); Owens, Missy; Per F. Peterson; Lyons, Peter; Finck, Phillip; (b)(6) RJBudnitz@lbl.gov; ronaldo.szilard@inl.gov; SCHU; Aoki, Steven; Koonin, Steven; (b)(6) Binkley, Steve; DAgostino, Thomas
Subject: Re: Public health: another issue that needs near-term action; I-131 counting.

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CH/244

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Again, collecting statistically useful data on uptake of I-131 and other radionuclides on the U.S. west coast and in Japan could be very valuable in the longer term, when many people may begin to believe that the Fukushima accident is the cause of a variety of health problems.

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>in concentrating iodine. And if thyroid counting is adequate, the
>whole process would be quicker and cheaper.
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From: Sheron, Brian
To: HOO Hoc
Subject: FW: HPGe Data sets
Date: Wednesday, March 23, 2011 4:56:00 PM
Attachments: Triage Report - TE-11-0721 Final (OUO).pdf
Triage Report - TE-11-0721 Final (OUO).docx

Please pass on the ET, RST, and PMT Directors. Thanks.

-----Original Message-----
From: Aoki, Steven [mailto:Steven.Aoki@nnsa.doe.gov]
Sent: Wednesday, March 23, 2011 4:38 PM
To: Pitts, William Karl; Bowyer, Theodore W; cjb@lanl.gov; Brinkman, Bill; Hurlbut, Brandon; Sheron, Brian; McFarlane, Harold; Adams, Ian; Kelly, John E (NE); Grossenbacher, John (INL); Owens, Missy; Per Peterson; Finck, Phillip; Dick Garwin; Bob Budnitz; Rolando Szilard; Aoki, Steven; Koonin, Steven; Steve Fetter; Binkley, Steve; Richard L Garwin
Cc: NITOPS; Adams, Ian
Subject: HPGe Data sets

FYI -- just to make sure you are seeing the data.

CH/245

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Triage Event: TE-11-0721

Date(s): 22 Mar 2011
Event Type: Actual
Location: Japan
Submitted by: DOE Consequence Management Field Team
Triage Web: TE-11-0721
Contact(s): A. Aragon (Triage FTL); R. Spanard (Triage FTL)
Responder(s): J. Bounds (LANL), W. Casson (LANL) , S. Myers (LANL), N. Wimer (LLNL)
Report Date: 22 Mar 2011

List of data files used in the analysis.

2011_03_21_12_49_350.spc 2011_03_21_13_25_360.spc 2011_03_21_13_58_490.spc
2011_03_21_14_29_090.spc 2011_03_21_15_01_510.spc 2011_03_21_15_35_350.spc
2011_03_22_22_17_290 BKGD.spc

Summary

These ORTEC Detective-EX HPGe spectra were provided by the DOE Field Monitoring Teams in Japan. Triage analysts were asked to examine these spectra for characterization of reactor damage.

As with other spectra analyzed to date, Triage analysis shows coolant release nuclides only; anticipated since the data was collected at a distance from the reactor site. There were no features in these spectra that would indicate core melting.

Analysis

The spectra are of good quality and well suited for comprehensive nuclide identification; they were collected in uniform fashion across a range of distances from the plant (along three distinct highways). With the understanding the spectra reflected ground deposition of unknown distribution, nuclide identification and relative activities can be reported, while absolute activities cannot.

The spectra were consistent with the suite of radionuclides that had been observed earlier this week. The radionuclides observed are indicative a coolant release only, expected for spectra taken at a distance from the Fukushima plant. No refractory nuclides, indicators of core release, were observed in any of these spectra; spectra from the grounds of the plant would be more definitive. The nuclides present in the spectrum are here listed:

Major Radionuclides	Minor Radionuclides
I-131	Te-129
I-132	Te-129m
Te-132	La-140
I-133	
Cs-134	
Cs-136	
Cs-137	

No other radionuclides were evident in the spectra. The nuclides Mo-99, Zr-95, and Nd-147, all high melting point species and indicators of core melting, were specifically sought and not observed. The spectrum plot below shows the spectrum analyzed, along with a modeled fit which used attenuation through air to fit the full spectrum.

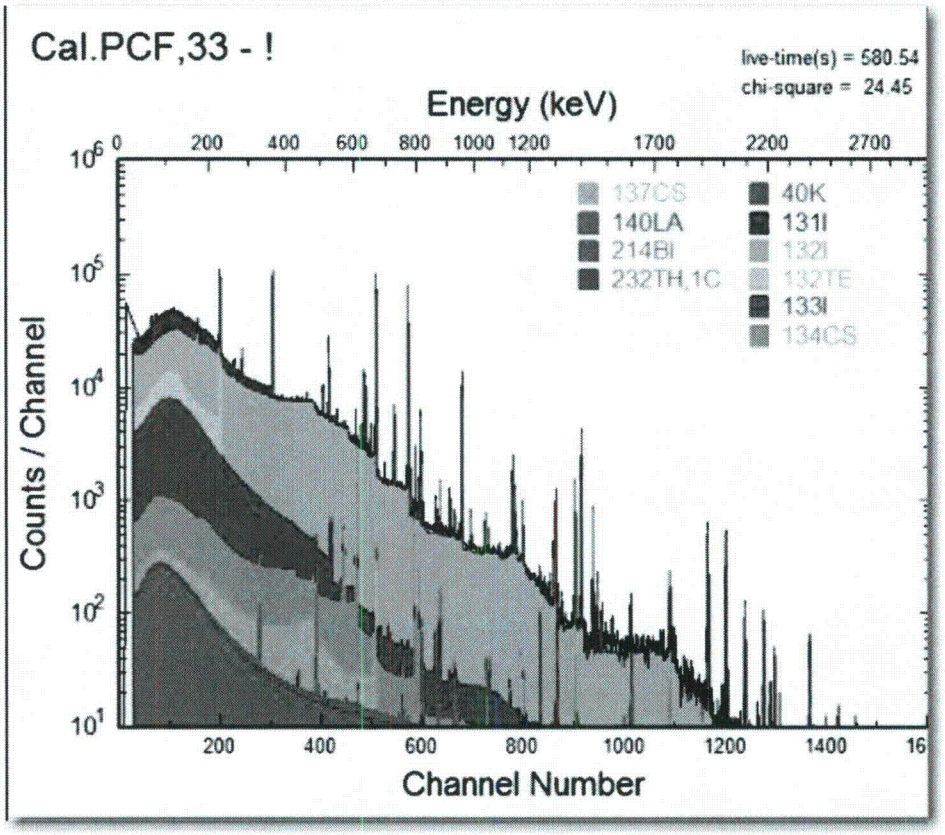

Figure 1. Screen dump of GADRAS fit to one of the spectra for TE-11-0721. All peaks were identified as being from the nuclides listed above. Attenuation through air was used to perform full spectrum fitting.

Ratios may provide some additional information. All spectra were analyzed assuming a Detective EX and a one meter detection distance. However, since the source is distributed over a wide area and is not a point source, absolute activity calculations are not being attempted. Instead, we report the ratios of activities which should be consistent for similar situations. Table 1 shows average values of relative activities. If I-131 has an activity of 1 (arbitrary units), the other detected nuclides had approximate activities in the proportions as given. Ground spectra taken at various times can be compared in this fashion to observe variations in deposition composition and the effect of the various halflives.

Table 1. Relative activities of radionuclides evident in TE-11-0721.

Latitude	37.29076	37.442435	37.590206	36.797261	36.903004	37.001973	37.067582	37.124803	37.235578
Longtitude	140.61472	140.52471	140.41986	140.72635	140.75162	140.81259	140.83824	140.94779	140.98569
Filename	2011_03_22_18_14_120.spc	2011_03_22_17_35_500.spc	2011_03_22_16_43_510.spc	2011_03_21_15_35_350.spc	2011_03_21_15_01_510.spc	2011_03_21_14_29_090.spc	2011_03_21_13_58_490.spc	2011_03_21_13_25_360.spc	2011_03_21_12_49_350.spc
mR/h	**0.090**	**0.148**	**0.605**	**0.329**	**0.696**	**0.98**	**0.446**	**0.56**	**3.0**
Highway	Ban-Etsu Exit 2	Ban-Etsu Exit 3	Tohuku Exit 20	Joban Exit 14	Joban Exit 15	Joban Exit 16	Joban Exit 17	Joban Exit 18	Joban Exit 19
Distance	**40 km**	**45 km**	**58 km**	**74 km**	**62 km**	**50 km**	**42 km**	**33 km**	**20 km**
129Te				0.246	0.474	0.420	0.343	0.130	0.160
129mTe				0.139	0.320	0.241	0.211	0.101	0.100
131I	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
132Te	0.272	0.300	0.516	0.283	0.715	0.573	0.220	0.194	0.092
132I	0.269	0.299	0.387	0.442	0.741	0.762	0.577	0.268	0.257
133I	0.003	0.002	0.000	0.008	0.013	0.013	0.015	0.005	0.007
134Cs	0.145	0.201	0.301	0.034	0.041	0.028	0.020	0.023	0.018
136Cs	0.025	0.030	0.043	0.006	0.006	0.004	0.004	0.003	0.005
137Cs	0.134	0.177	0.240	0.034	0.044	0.034	0.024	0.022	0.020
140La	0.007	0.008	0.010	0.000	0.001	0.001	0.001	0.001	0.001

Comments on distributions:

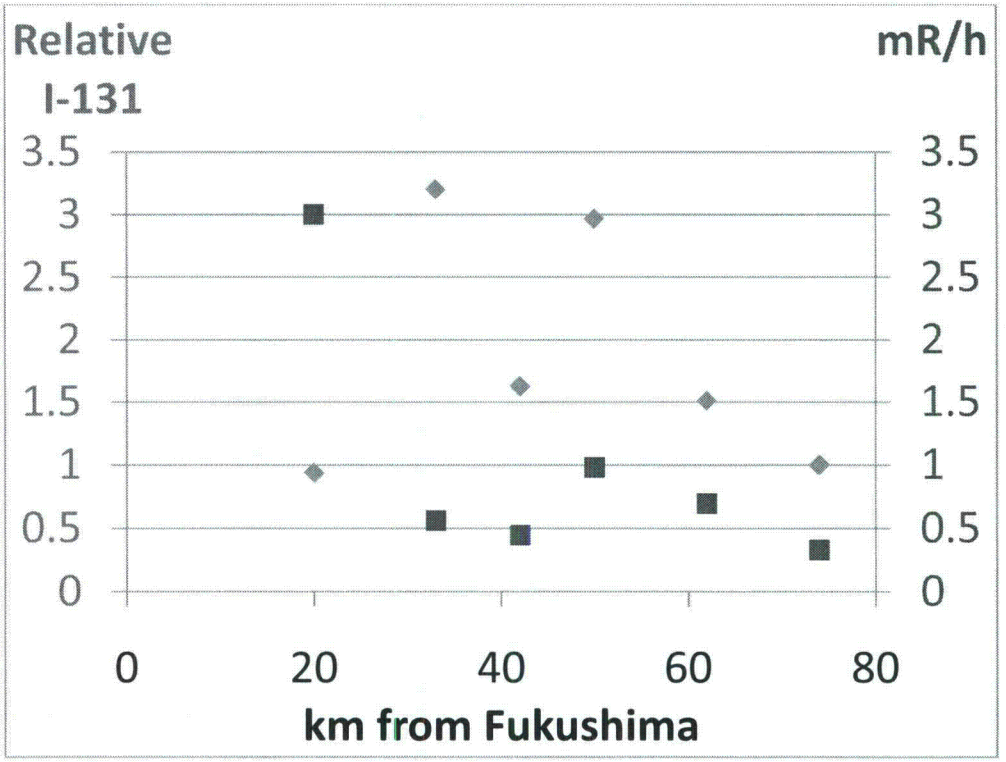

Figure 2. Dose rates and I-131 relative activity versus distance SSW of Fukushima on Joban Expressway. The other Table 1 data sites represent different directions and are not included here.

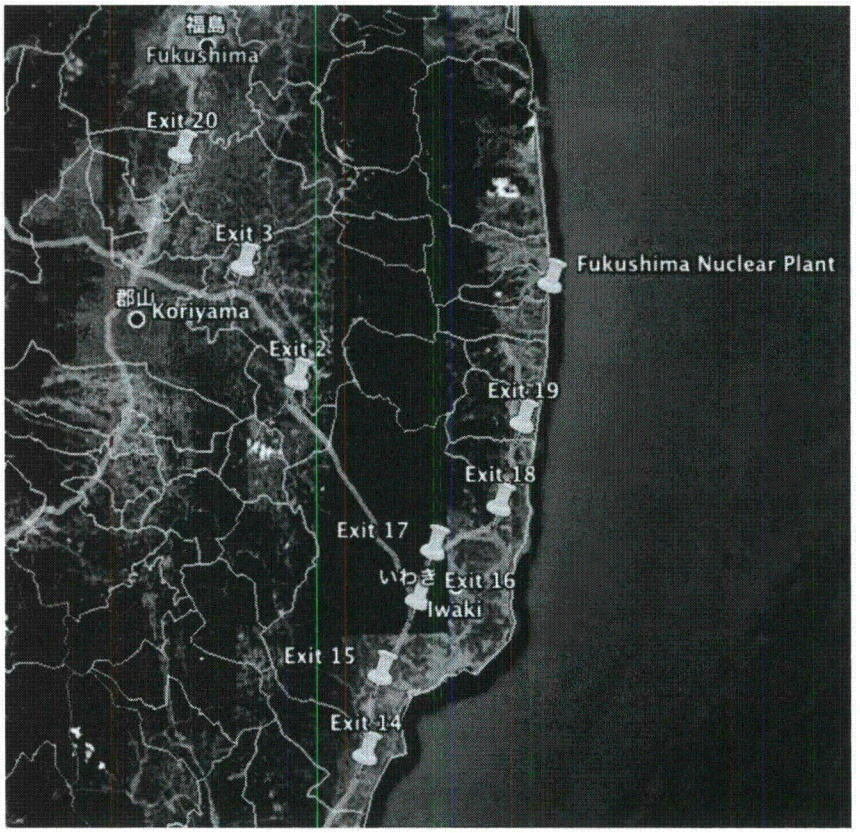

Figure 3. Map of data locations

Figure 3 shows the locations where the data was taken, relative to the Fukushima nuclear plant. Note that exit 20, exits 2 and 3, and exits 14 through 19 are from three different highways. Figure 2 shows the variation of dose rates and iodine intensities on the Joban Expressway SSW of the plant, Exits 14 through 19. Note that the radiation does not fall off linearly with distance, rather it is affected by the local winds and weather patterns.

Recommendations for follow up activities:

Definitive determination of whether core releases have occurred is expected to require HPGe assays from grounds of the plant itself. A spectrum of the quality that was submitted for this report, but taken from an air filter from the Fukushima Daiichi site, would provide the best data for determination of the status of core damage via gamma spectroscopy.

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Triage Event: TE-11-0721

Date(s): 22 Mar 2011
Event Type: Actual
Location: Japan
Submitted by: DOE Consequence Management Field Team
Triage Web: TE-11-0721
Contact(s): A. Aragon (Triage FTL); R. Spanard (Triage FTL)
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Cs-137	

No other radionuclides were evident in the spectra. The nuclides Mo-99, Zr-95, and Nd-147, all high melting point species and indicators of core melting, were specifically sought and not observed. The spectrum plot below shows the spectrum analyzed, along with a modeled fit which used attenuation through air to fit the full spectrum.

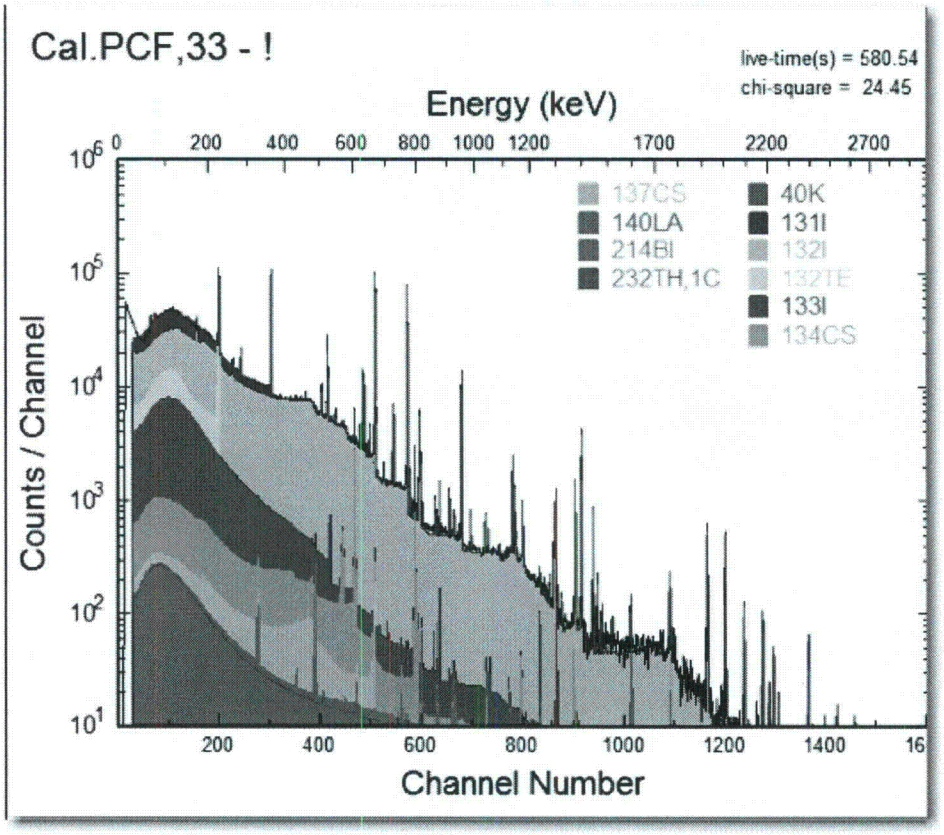


Figure 1. Screen dump of GADRAS fit to one of the spectra for TE-11-0721. All peaks were identified as being from the nuclides listed above. Attenuation through air was used to perform full spectrum fitting.

Ratios may provide some additional information. All spectra were analyzed assuming a Detective EX and a one meter detection distance. However, since the source is distributed over a wide area and is not a point source, absolute activity calculations are not being attempted. Instead, we report the ratios of activities which should be consistent for similar situations. Table 1 shows average values of relative activities. If I-131 has an activity of 1 (arbitrary units), the other detected nuclides had approximate activities in the proportions as given. Ground spectra taken at various times can be compared in this fashion to observe variations in deposition composition and the effect of the various halflives.

Table 1. Relative activities of radionuclides evident in TE-11-0721.

Latitude	37.29076	37.442435	37.590206	36.797261	36.903004	37.001973	37.067582	37.124803	37.235578
Longtitude	140.61472	140.52471	140.41986	140.72635	140.75162	140.81259	140.83824	140.94779	140.98569
Filename	2011_03_22_18_14_120.spc	2011_03_22_17_35_500.spc	2011_03_22_16_43_510.spc	2011_03_21_15_35_350.spc	2011_03_21_15_01_510.spc	2011_03_21_14_29_090.spc	2011_03_21_13_58_490.spc	2011_03_21_13_25_360.spc	2011_03_21_12_49_350.spc
mR/h	**0.090**	**0.148**	**0.605**	**0.329**	**0.696**	**0.98**	**0.446**	**0.56**	**3.0**
Highway	Ban-Etsu Exit 2	Ban-Etsu Exit 3	Tohuku Exit 20	Joban Exit 14	Joban Exit 15	Joban Exit 16	Joban Exit 17	Joban Exit 18	Joban Exit 19
Distance	**40 km**	**45 km**	**58 km**	**74 km**	**62 km**	**50 km**	**42 km**	**33 km**	**20 km**
129Te				0.246	0.474	0.420	0.343	0.130	0.160
129mTe				0.139	0.320	0.241	0.211	0.101	0.100
131I	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
132Te	0.272	0.300	0.516	0.283	0.715	0.573	0.220	0.194	0.092
132I	0.269	0.299	0.387	0.442	0.741	0.762	0.577	0.268	0.257
133I	0.003	0.002	0.000	0.008	0.013	0.013	0.015	0.005	0.007
134Cs	0.145	0.201	0.301	0.034	0.041	0.028	0.020	0.023	0.018
136Cs	0.025	0.030	0.043	0.006	0.006	0.004	0.004	0.003	0.005
137Cs	0.134	0.177	0.240	0.034	0.044	0.034	0.024	0.022	0.020
140La	0.007	0.008	0.010	0.000	0.001	0.001	0.001	0.001	0.001

Comments on distributions:

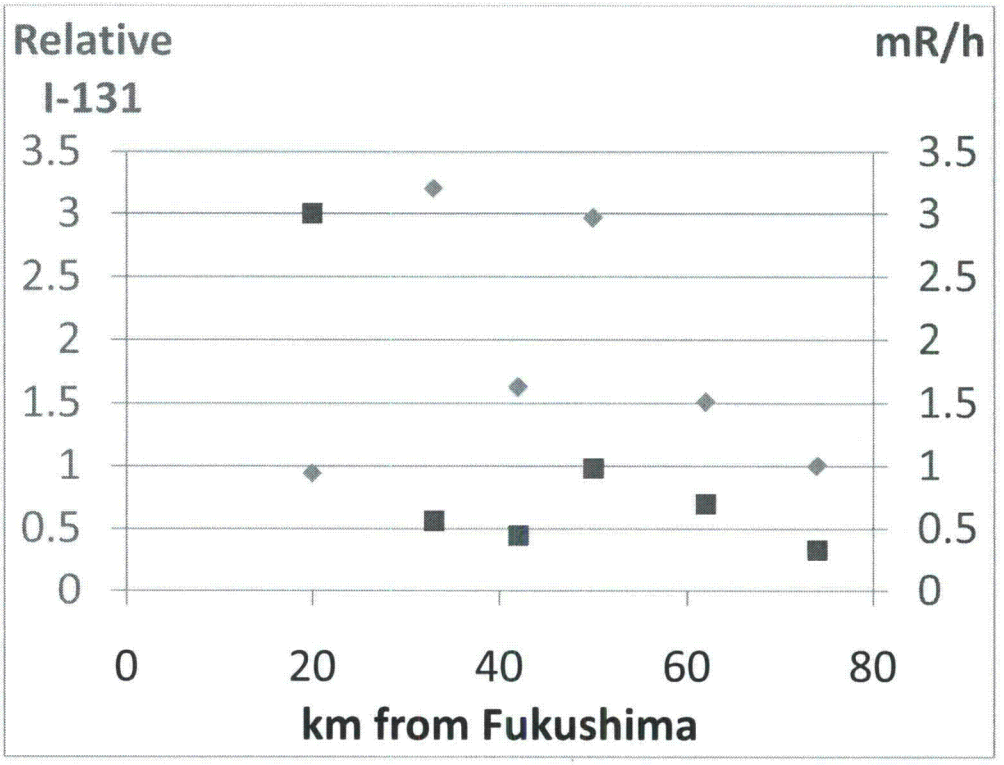


Figure 2. Dose rates and I-131 relative activity versus distance SSW of Fukushima on Joban Expressway. The other Table 1 data sites represent different directions and are not included here.

Figure 3. Map of data locations

Figure 3 shows the locations where the data was taken, relative to the Fukushima nuclear plant. Note that exit 20, exits 2 and 3, and exits 14 through 19 are from three different highways. Figure 2 shows the variation of dose rates and iodine intensities on the Joban Expressway SSW of the plant, Exits 14 through 19. Note that the radiation does not fall off linearly with distance, rather it is affected by the local winds and weather patterns.

Recommendations for follow up activities:

Definitive determination of whether core releases have occurred is expected to require HPGe assays from grounds of the plant itself. A spectrum of the quality that was submitted for this report, but taken from an air filter from the Fukushima Daiichi site, would provide the best data for determination of the status of core damage via gamma spectroscopy.

From: Sheron, Brian
To: Gibson, Kathy
Cc: Uhle, Jennifer
Subject: RE: NEW URGENT REQUEST -- SNL BWR tests - ~~(OUO-Privileged Information)~~
Date: Wednesday, March 23, 2011 5:03:00 PM

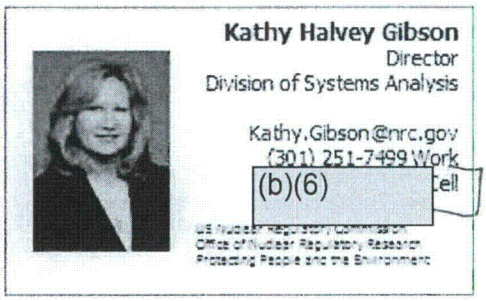
Why are the tests OUO?

From: Gibson, Kathy
Sent: Wednesday, March 23, 2011 4:58 PM
To: Sheron, Brian
Cc: Uhle, Jennifer
Subject: FW: NEW URGENT REQUEST -- SNL BWR tests - (OUO-Privileged Information)

NRR advises that NEI is treated like the public, therefore they cannot be given OUO. We could redact the report which takes time and then it would be useless.

How do you want us to proceed? We can get back to Alex if you prefer.

Thanks



From: Santiago, Patricia
Sent: Wednesday, March 23, 2011 4:27 PM
To: Gibson, Kathy; Elkins, Scott
Cc: Wagner, Katie; Lee, Richard; Ghosh, Tina; Navarro, Carlos
Subject: FW: NEW URGENT REQUEST -- SNL BWR tests - ~~(OUO-Privileged Information)~~

Kathy we evaluated and coordinated with NRR on the request that Brian received to send the SFP document to NEI. The following information supports the recommendation that we **not** provide the document.

NEI Is treated like the public (NRR, Quynh Nguyen). In addition, to redact the report to provide it to NEI will make the report useless. We can send a redacted version but it would likely take 1 month to redact and is a low priority.

Please let us know if Brian requests any additional information or if we can close this action as we don't recommend redaction.

Tina please notify NRR of any final response to NEI.

Thanks

CH/246

From: Zigh, Ghani
Sent: Wednesday, March 23, 2011 3:44 PM
To: Santiago, Patricia; Navarro, Carlos; Ghosh, Tina
Subject: RE: NEW URGENT REQUEST -- SNL BWR tests - ~~(OUO-Privileged Information~~)

What you mention is true.
If the report is redacted, it will become useless.

From: Santiago, Patricia
Sent: Wednesday, March 23, 2011 3:41 PM
To: Navarro, Carlos; Zigh, Ghani; Ghosh, Tina
Subject: FW: NEW URGENT REQUEST -- SNL BWR tests - ~~(OUO-Privileged Information~~)

I believe the answer to sending the report to NEI is:

NEI Is treated like the public (NRR, Quynh Nguyen). Thus to redact the report makes it useless. We can send a redacted version but it would take and is a low priority.

Please confirm and let Kathy/Scott Elkins know this is what we recommend and then let them tell Brian. Keep Katie/Richard Lee/NRR in the loop of any final response.

Thanks

From: Wagner, Katie
Sent: Wednesday, March 23, 2011 3:35 PM
To: Santiago, Patricia
Subject: FW: NEW URGENT REQUEST -- SNL BWR tests - ~~(OUO-Privileged Information)~~

This is part of what I have on this . . .

From: Zigh, Ghani
Sent: Tuesday, March 22, 2011 9:37 AM
To: Santiago, Patricia; Navarro, Carlos
Cc: Lee, Richard; Wagner, Katie; Gibson, Kathy; Elkins, Scott
Subject: RE: NEW URGENT REQUEST -- SNL BWR tests - (~~OUO-Privileged Information~~)

Scott passed by my office and talked to me.
He said that he is going to talk to Brian and see if he wants those numbers in the report taken out.
If he does, then we will take out those numbers on the hard copy and hand it Brian.

From: Santiago, Patricia
Sent: Tuesday, March 22, 2011 9:04 AM
To: Zigh, Ghani; Navarro, Carlos
Cc: Lee, Richard; Wagner, Katie; Gibson, Kathy; Elkins, Scott
Subject: RE: NEW URGENT REQUEST -- SNL BWR tests - (OUO-Privileged Information)

Once the redaction is done, can you provide it to Brian with copy to all.

Can you let Scott know when this will be done so he can let Brian know what to say to NEI.

Thanks Ghani and Carlos!

From: Zigh, Ghani
Sent: Tuesday, March 22, 2011 8:43 AM
To: Santiago, Patricia; Gibson, Kathy; Elkins, Scott
Cc: Navarro, Carlos; Lee, Richard
Subject: RE: NEW URGENT REQUEST -- SNL BWR tests - ~~(OUO-Privileged Information)~~

The document has information that need to be taken out.
That is how we agreed with the OECD partners for the PWR Zirc fire project.
These information include the power used to get zirc fire and the location of the zirc fire for both parts of the experiment.

From: Santiago, Patricia
Sent: Tuesday, March 22, 2011 8:39 AM
To: Gibson, Kathy; Elkins, Scott
Cc: Zigh, Ghani; Navarro, Carlos; Lee, Richard
Subject: RE: NEW URGENT REQUEST -- SNL BWR tests - ~~(OUO-Privileged Information)~~

Thanks

Via this email can I ask ---

Richard Lee – I will ask you to find out from OGC if we can release OUO to NEI unless you already know.

Carlos/Ghani – let me know what you determine on release ~~(Carlos an agr~~eement?) thanks

---

From: Gibson, Kathy
Sent: Tuesday, March 22, 2011 8:37 AM
To: Santiago, Patricia; Elkins, Scott
Cc: Zigh, Ghani; Navarro, Carlos; Lee, Richard
Subject: Re: NEW URGENT REQUEST -- SNL BWR tests - ~~(OUO-Privileged Information)~~

Check with Richard. He has lead for document requests and has been in contact with OGC on this topic.

From: Santiago, Patricia
To: Elkins, Scott; Gibson, Kathy
Cc: Zigh, Ghani; Navarro, Carlos
Sent: Tue Mar 22 08:31:47 2011
Subject: FW: NEW URGENT REQUEST -- SNL BWR tests - (~~OUO-Privileged Information~~)

FYI I believe this is what Brian wants for NEI. It is OUO. I talked to Carlos and he was going to follow with Ghani. Carlos believes we have some agreement or will check to see if we can release OUO to NEI.
thanks

From: Santiago, Patricia
Sent: Friday, March 18, 2011 6:36 PM

To: Tadesse, Rebecca
Cc: Bubar, Patrice; Sheron, Brian; Rini, Brett; Uhle, Jennifer; Gibson, Kathy; Scott, Michael; Bowman, Gregory; Zigh, Ghani; Navarro, Carlos
Subject: NEW URGENT REQUEST -- SNL BWR tests - ~~(OUO-Privileged Information)~~

Rebecca,

I believe the attached report is what you are requesting ---- Final BWR Sandia Fuel Project (SFP) Sandia Report.

We also have a time lapse video (OUO as well) that we can make a copy and provide Monday.

If you have additional questions, Ghani Zigh is the best person to assist.

Thanks
Pat

From:	Ellmers, Glenn
To:	Ellmers, Glenn; Ash, Darren; Boger, Bruce; Boyce, Thomas (OIS); Brenner, Eliot; Brown, Milton; Burns, Stephen; Carpenter, Cynthia; Casto, Chuck; Cohen, Miriam; Collins, Elmo; Dapas, Marc; Dean, Bill; Doane, Margaret; Droggitis, Spiros; Dyer, Jim; Greene, Kathryn; Grobe, Jack; Hackett, Edwin; Haney, Catherine; Hayden, Elizabeth; Holahan, Gary; Howard, Patrick; Johnson, Michael; Kelley, Corenthis; Leeds, Eric; Mamish, Nader; McCrary, Cheryl; McCree, Victor; Miller, Charles; Moore, Scott; Pederson, Cynthia; Plisco, Loren; Poole, Brooke; Powell, Amy; Reyes, Luis; Satorius, Mark; Schaeffer, James; Schmidt, Rebecca; Sheron, Brian; Stewart, Sharon; Uhle, Jennifer; Virgilio, Martin; Weber, Michael; Wiggins, Jim; Williams, Barbara; Zimmerman, Roy; Campbell, Andy; Holahan, Patricia; Dorman, Dan; Muessle, Mary; Wert, Leonard; Tracy, Glenn; Taylor, Renee; Krupnick, David; Evans, Michele
Cc:	Akstulewicz, Brenda; Andersen, James; Bellosi, Susan; Belmore, Nancy; Boyd, Lena; Buckley, Patricia; Casby, Marcia; Cianci, Sandra; Crawford, Carrie; Flory, Shirley; Garland, Stephanie; Higginbotham, Tina; Hudson, Sharon; Landau, Mindy; Matakas, Gina; Miles, Patricia; Pulley, Deborah; Rihm, Roger; Riner, Janet; Ronewicz, Lynn; Ross, Robin; Salus, Amy; Tannenbaum, Anita; Taylor, Renee; Thomas, Loretta; Walker, Dwight; Warner, MaryAnn; Wright, Darlene; Wyatt, Melissa; Cannady, Ashley; Lockhart, Denise; Perez-Ortiz, Aracelis; Riddick, Nicole; King, Shannon; Penny, Melissa; Sprogeris, Patricia; Banks, Eleasah; Nagel, Cheri; Hasan, Nasreen; Call, Michel; Thaggard, Mark; Young, Gary; Holonich, Joseph; Moore, Mary; Daniels, Stanley; Kreuter, Jane; Schumann, Stacy; Rihm, Roger; Schwarz, Sherry
Subject:	Friday"s Monthly Management Meeting - NOTE TIME, LOCATION
Date:	Wednesday, March 23, 2011 5:05:53 PM
Attachments:	March 2011 Monthly EDO MANAGEMENT Meeting agenda.docx

Attached please find the agenda for Friday's meeting, which will be in the OEDO conference room beginning at 9:00 am.

CH/247

MONTHLY EDO MANAGEMENT MEETING AGENDA
MARCH 25, 2011
9:00 – 10:00 EDT
O17B4

9:00 EDO Comments

9:20 Topics of Special Interest
- New Public Website: Jun Lee (15 min.)
- FOIA Update: Steve Burns (10 min.)
- RIC Overview : Eric Leeds (5 min.)
- Federal Employee Viewpoint Survey: Miriam Cohen (5 min.)

(10:00 Office in the Spotlight: NMSS – Postponed)

10:00 Management Crosscutting Issues

OPA

OCA

OGC

ADM

OCFO

OIS/CSO

SBCR

Next meeting scheduled for Friday, April 15, 2011.

01/21/11

From: Droggitis, Spiros
To: Sheron, Brian
Cc: Riley (OCA), Timothy; Shane, Raeann; Flory, Shirley
Subject: Congressional Calls
Date: Wednesday, March 23, 2011 5:07:17 PM

Brian: Thanks for agreeing to take the Friday call as well as tomorrow. I won't be available for the Friday call. Raeann will MC. Here's the calling information:

Dial-in: 1-800-593-7189
Leader passcode: (b)(6)
Participant passcode:

Since we are circulating the reactor status from the sitrep to the oversight and appropriations staffers in advance, maybe you don't need to go in such detail on the status of each plant and stick to significant new information and significant concerns and then open to questions. Thanks again, Spirso

CH/248

From: Gibson, Kathy
To: Sheron, Brian
Subject: Commission meeting on Japan Health Effects
Date: Wednesday, March 23, 2011 6:06:21 PM
Attachments: Kathy Halvey Gibson.vcf
1104xx Japan Rad Consequence Scheduling Noterev2.docx
1104xx Japan Rad Consequence Scheduling Noterev1nonames2.docx

---

Brian,
Below are the relevant comments on who should do the briefing. These are from 3 separate email chains. Attached are two versions of the scheduling note, one without names and one with.

From: Weber, Michael
Sent: Tuesday, March 22, 2011 4:52 PM
To: Sheron, Brian
Subject: RESPONSE - Commission Meeting on Japanese Events

I think it is fine to involve the SLs, but I expect that we'll need an SES division director, who has been active in the response to be the lead presenter. He or she can call on the other SLS and staff as necessary. Rob Lewis would be good to lead this briefing.
****

From: Elkins, Scott
To: Gibson, Kathy
Sent: Wed Mar 23 11:15:46 2011
Subject: Schedule note

Kathy,
Greg Bowman needs to find additional time in the agenda for Q and A. He proposes cutting NR from the agenda and reducing staff presentation time by 20 minutes.

Also, I spoke to Michelle Evans who said that Mike Weber and Charlie Miller want Rob Lewis at the table and to remove all the SLs.

I need to talk with you on this when convenient.

Scott
****

From: Evans, Michele
Sent: Wednesday, March 23, 2011 10:58 AM
To: Gibson, Kathy
Cc: Lewis, Robert
Subject: RE: Upcoming Comm Meeting on Fukushima rad consequences

I just talked to Scott Elkins. Based on a conversation with Mike Weber and Charlie Miller, Rob Lewis should be the SES at the table. The SLS should be in the well to support.

Please contact Rob Lewis regarding which date he can support.
****

C47/249

Kathy Halvey Gibson
Director
Division of Systems Analysis

Kathy.Gibson@nrc.gov
(301) 251-7499 Work
(b)(6) Cell

US Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
Protecting People and the Environment

Draft 3/21/11

SCHEDULING NOTE

Title: **BRIEFING ON THE JAPAN NUCEAR EVENT: RADIOLOGICAL CONSEQUENCES AND POTENTIAL HEALTH EFFECTS (Public)**

Purpose: Provide the Commission an update of the Japan nuclear event with additional focus on radiological consequences and potential health effects and an opportunity to hear a representative sample of external stakeholder viewpoints.

Scheduled: **April TBD**
9:00am

Duration: Approx. 3 hours

Location: Commissioner's Hearing Room, 1st fl. OWFN

Participants:	**Presentation**
NRC Staff	**45 mins.***
Bill Borchardt, Executive Director for Operations Topic: Opening Remarks and Event Status	5 mins.*
TBD, Topic: Overview	5 mins*
Charles Tinkler, SLS, RES Topic: Source Term Determination	10 mins.*
Cynthia Jones, SLS, NSIR Topic: Dose Projections	10 mins.*
Patricia Milligan, SLS, NSIR Topic: Protective Actions and Health Effects	10 mins.*
TBD, Topic: Summary	5 mins*
Commission Q & A	**50 mins.**
BREAK	**5 mins.**
Stakeholder Panel	**30 mins.***
David Bowman, DOE	

Topic: DOE Assets (AMS, NARAC, etc) 10 mins.*

Sarah Decair, EPA
Topic: EPA Protective Action Guidelines, RadNet 10 mins.*

TBD, FDA
Topic: FDA Derived Intervention Levels for Radionuclides in Food 10 mins.*

Commission Q & A **50 mins.**

Discussion – Wrap-up **5 mins.**

*For presentation only and does not include time for Commission Q & A's

Documents:
- TBD
- TBD

Staff background material due to SECY: Ten business days prior to the briefing.
Slides due to SECY: Five business days prior to the briefing.

Draft 3/21/11

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Sarah Decair, EPA	

Topic: EPA Protective Action Guidelines, RadNet 10 mins.*

TBD, FDA
Topic: FDA Derived Intervention Levels for Radionuclides in Food 10 mins.*

Commission Q & A **50 mins.**

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Documents:
- TBD
- TBD

Staff background material due to SECY: Ten business days prior to the briefing.
Slides due to SECY: Five business days prior to the briefing.

From: Gibson, Kathy
To: Sheron, Brian
Cc: Uhle, Jennifer
Subject: FW: Public health: another issue that needs near-term action
Date: Wednesday, March 23, 2011 6:35:13 PM
Attachments: Kathy Halvey Gibson.vcf

Brian,

(b)(5)

Details below.

-----Original Message-----
From: Bush-Goddard, Stephanie
Sent: Wednesday, March 23, 2011 6:12 PM
To: Gibson, Kathy
Subject: RE: Public health: another issue that needs near-term action

(b)(5)

-----Original Message-----
From: Gibson, Kathy
Sent: Wednesday, March 23, 2011 6:07 PM
To: Bush-Goddard, Stephanie
Cc: Sherbini, Sami; Wagner, Katie
Subject: RE: Public health: another issue that needs near-term action

(b)(5)

-----Original Message-----
From: Bush-Goddard, Stephanie
Sent: Wednesday, March 23, 2011 5:54 PM
To: Gibson, Kathy
Cc: Sherbini, Sami; Wagner, Katie
Subject: RE: Public health: another issue that needs near-term action

They are talking about monitoring members of the public in the US.

and transferring equipment to Japan to help them monitor.

CH/250

-----Original Message-----
From: Gibson, Kathy
Sent: Wednesday, March 23, 2011 5:46 PM
To: Bush-Goddard, Stephanie
Cc: Sherbini, Sami; Wagner, Katie
Subject: RE: Public health: another issue that needs near-term action

Are they talking about members of the public in US or Japan? Does it make a difference to your response?

-----Original Message-----
From: Bush-Goddard, Stephanie
Sent: Wednesday, March 23, 2011 4:38 PM
To: Gibson, Kathy
Cc: Sherbini, Sami; Wagner, Katie
Subject: FW: Public health: another issue that needs near-term action

Kathy,

(b)(5)

(b)(5)

-Stephanie

-----Original Message-----

From: Gibson, Kathy
Sent: Wednesday, March 23, 2011 1:59 PM
To: Lee, Richard; Wagner, Katie
Cc: Bush-Goddard, Stephanie
Subject: FW: Public health: another issue that needs near-term action

Assign this one to Stephanie

-----Original Message-----
From: Sheron, Brian
Sent: Wednesday, March 23, 2011 1:57 PM
To: Gibson, Kathy; Bush-Goddard, Stephanie
Cc: Uhle, Jennifer
Subject: Fw: Public health: another issue that needs near-term action

See below. Any thoughts?

----- Original Message -----
From: Per F. Peterson <peterson@nuc.berkeley.edu>
To: (b)(6) ki,
(b)(6)
Sent: Wed Mar 23 13:35:11 2011
Subject: Public health: another issue that needs near-term action

I would like to raise another issue which now merits expeditious, near term action.

There is a short time window now, of about 6 to 8 weeks, during which it will remain possible to use whole-body counting and other methods to measure any I-131 that members of the public may have ingested.
There are a number of reasons why collecting this data, from a sufficiently large sample of the public and workers to get statistically strong data, would be very valuable. I have raised this question with other members of the UCB faculty, and there is general agreement that prompt action should be taken in this area. I do understand that the IAEA has been making measurements, but I am not sure what specifically they have been doing and whether this includes whole-body counting (which can measure body burdens of radioactive materials resolved by isotopes).

Below I discuss this issue in greater detail, outline the reasons why prompt action is likely warranted, and discuss what actions DOE could take immediately in this area.

There has been a program at the Carlsbad Environmental Monitoring and Research Center near WIPP, that has been funded by the DOE, that has performed whole body counting:

http://www.cemrc.org/health/liedown.htm

This program at CEMRC has had important and valuable effects in increasing public confidence, since any member of the public with a concern about potential exposures can determine whether any has happened.

In the longer term many cases of thyroid cancer, and other health problems, may end up being attributed to exposures from the Fukushima accident, both in Japan and on the U.S. west coast. Unless statistically strong data is collected in this short time window, it will be difficult to provide a strong and scientifically valid argument about the probability that these diseases have originated from exposures resulting from this accident.

The second reason to collect this data is that it is possible that we will find that some people have received doses of I-131 and other radionuclides that could exceed the levels that current Protective Action Guidelines are designed to prevent. This could provide a basis for immediate action to change PAG's, as well as the ability in the longer term to reassess and improve our approaches to PAGs. Also, the effectiveness of emergency response depends strongly on the level of public confidence that the government has people's best interests in mind; collecting data that shows the effectiveness (or lack of effectiveness) of these efforts could be central to building longer-term confidence and thus incentivizing more people to follow government recommendations in future emergencies of all types.

The third reason to collect this data is that it could identify individuals who have had significant exposure to I-131 or other radionuclides, and alert them and their medical care professionals to monitor for potential health effects. For remaining people, it could provide reassurance that they do not need to worry about long-term health impacts from the accident.

A fourth reason to collect this data is that it could provide a good statistical basis to correlate data taken from hand-held monitors (I presume these exist) that can be used to screen large numbers of people, to actual, isotope-resolved whole-body burdens. It may even make sense to support bringing some people to the CEMRC facility in Carlsbad, since it has extremely high resolution, so that there can be a direct comparison between rapid monitoring methods, conventional whole body counts, and the extremely accurate counts possible at the CEMRC facility.

I should emphasize that substantial care must be taken in organizing any activity to collect data, with respect to public opinion in Japan. There are very strong reasons to gather data, but it must be done in a way that is broadly viewed as being in the interest of the public and the individuals involved. Having some significant role played by universities may be helpful, as well as the IAEA, so that the effort would not be viewed as being a government-directed effort, given current low levels of trust in the government.

There is only a 6 to 8 week window where whole body counting is practical for detecting I-131. I would recommend that we look at making facilities at the national laboratories (LLNL and PNNL both have these capabilities, I believe) available to the public over the next few months. This is an action that DOE could take that could be beneficial. Having the U.S. doing this may also make it easier to have the same thing done in Japan. DOE could also help, as necessary, in transferring equipment to Japan for this purpose, and in making the CEMRC facility in Carlsbad available for high-accuracy counting.

Thoughts?

-Per

--

Per F. Peterson
Professor and Chair
Department of Nuclear Engineering
University of California
4153 Etcheverry Hall
Berkeley, California 94720-1730
peterson@nuc.berkeley.edu
Office: (510) 643-7749 Fax: (510) 643-9685
http://www.nuc.berkeley.edu/People/Per_Peterson

Attachment Kathy Halvey Gibson_4.vcf (5196 Bytes) cannot be converted to PDF format.

From:	Adams, Ian
To:	Adams, Ian; Aoki, Steven; Binkley, Steve; Bob Budnitz; Sheron, Brian; Brinkman, Bill; Dick Garwin; Dick Garwin; Finck, Phillip; Grossenbacher, John (INL); Hurlbut, Brandon; Kelly, John E (NE); Koonin, Steven; McFarlane, Harold; Owens, Missy; Per Peterson; Rolando Szilard; Steve Fetter
Subject:	FW: Japanese Earthquake 23 March 2011 1800 EDT Situation Report
Date:	Wednesday, March 23, 2011 6:37:10 PM
Attachments:	Japan Earthquake Response 03232011 1800a.pdf SITREP MAR23 1800 final.docx

Attached is this evening's sit rep on Japan.

This information should not be shared or further distributed.

-----Original Message-----
From: NITOPS
Sent: Wednesday, March 23, 2011 6:35 PM
To: (b)(6)
(b)(6)

Subject: Japanese Earthquake 23 March 2011 1800 EDT Situation Report

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

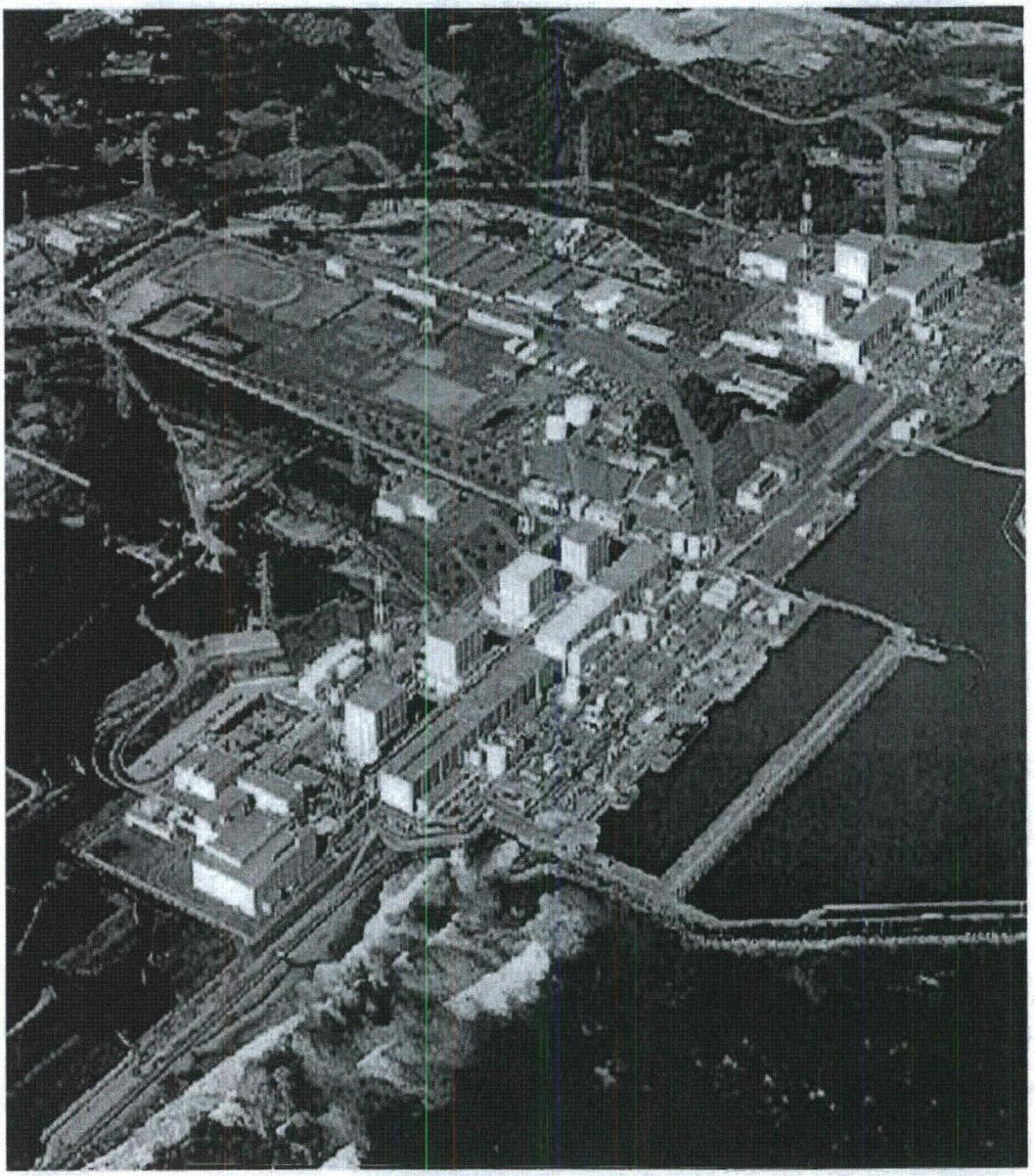
This information is provided for your internal use and should be shared only with those who have a need to know.

CH/251

The SITREP will be updated every 12 hours.

Nuclear Incident Team (NIT)
Office of Emergency Response (NA-42)
National Nuclear Security Administration U.S. Department of Energy nitops@nnsa.doe.gov
nit@doe.sgov.gov 202-586-8100

Japan Earthquake Response
March 23, 2011 // 1800 EDT



This information is for limited distribution to those with a NEED TO KNOW and should not be forwarded outside your agency or organization without prior clearance from U.S. DOE

Contact: DOE/NNSA Nuclear Incident Team: NITOPS@nnsa.doe.gov

Current Status

- **No major changes in radiation levels at the Fukushimi Daiichi Nuclear Power Plant**
  - Unit 1: Reactor water level stable, core damage est. 70%. Seawater injection is being converted to freshwater. Electrical power line connected (through Unit 2). Radiation level reported by TEPCO at front gate at 0700 JLT
  - Unit 2: Reactor water level stable, core damage est. 33%. Spent fuel pool has been filled. Power restored and electric water pump systems being tested.
  - Unit 3: Seawater injection is being converted to freshwater in reactor; trucks pumping water into spent fuel pools. Water level stable and pressure stabilized. Power restored.
  - Unit 4: Spraying continues periodically for the spent fuel pond. Power restored. Trucks pumping water into spent fuel pools.
  - Units 5 & 6: Diesel generators supplying power to cooling system. Reactors appear stable.
- Elevated levels of radioiodine are being reported in tap water in Tokyo.

DOE/NNSA Response

- **Command, Control, Coordination:**
  - ***Nuclear Incident Team (NIT):*** Coordinating overall emergency response
  - ***Policy Working Group (PWG):*** Coordinating overall policy
  - ***Senior Energy Official:*** Primary Manager of deployed field teams
  - ***Liaisons:*** DART, USPACOM, USAID, NRC
- **Modeling**
  - ***National Atmospheric Release Advisory Center (NARAC):*** conducting predictive radioactive atmospheric dispersion modeling
- **Monitoring and Sampling**
  - ***Consequence Management Response Team (CMRT):*** Conducting ground monitoring, air sampling and initial results analysis
  - ***Aerial Monitoring System (AMS):*** Conducts aerial detection for mapping radiological ground material deposits
- **Assessment**
  - ***Consequence Management Home Team (CMHT):*** Scientific assessment of data updated daily from ground measurements and AMS flights
- **Medical Consultation**
  - ***Radiation Emergency Assistance Center/Training Site (REAC/TS):*** Providing medical advice about radiological exposure

Deployed (41)

Yokota AB

(1) SEO
(28) CMRT
(6) AMS

US Embassy Tokyo

(2) Foreign Service Nationals
(2) Permanent Staff
(1) DART LNO
(1) Nuclear Energy Representative

USPACOM HQ

(1) LNO

Operations Over Past 24 Hrs.

- Modeling
  - NARAC: Developing transpacific runs with new source term (Melcore source term). Produced predictive plume models for next 24 hours including two bounding cases for Tokyo and completion of west coast impacts table
- Field Monitoring
  - AMS: Ongoing surveys – rotary aircraft mission in Ibaraki Prefecture focused on agriculture area near coast; fixed-wing mission north and west of Daiichi to provide plume deposition on land.
  - CMRT: Field Teams conducted monitoring missions south of incident site along Joban Expressway and at US Embassy (Tokyo).
- Assessment
  - CMRT and CMHT compiled DOE, Interagency, and Japan inputs to produce field measurement summary for last 24 hours
- Medical Consult
  - Responded to 7 medical consult RFIs in past 48 hours
- Nuclear Incident Team
  - Supported DOS and NSS Trip Wire Meeting
  - Ongoing evaluation of DOE NR dose model
  - Published two radiological Triage reports

External Data Providers

- **Japan**
  - Ministry of Foreign Affairs (MOFA)
  - Ministry of Education, Culture, Sports, Science, and Technology (MEXT)
  - Tokyo Electric Power Company (TEPCO)
  - Nuclear Safety Technology Center (NUSTEC)

- **United States**
  - Japan Emergency Command Center, US Embassy, Tokyo
  - USAF, BSC Commander
  - Futenma Marine Corps Air Station
  - Nuclear Regulatory Commission
  - Naval Reactors

Guide to Interpretation

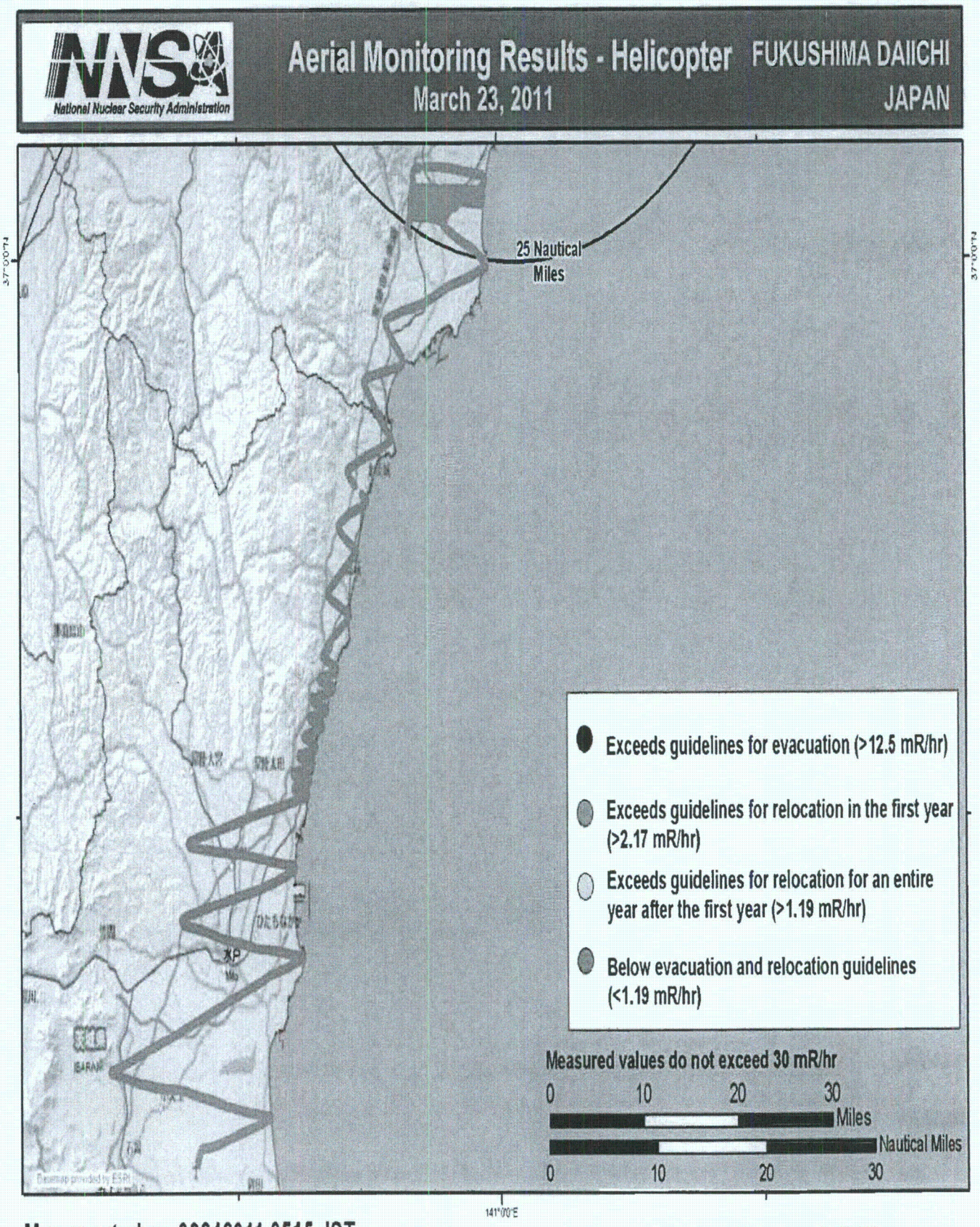
Derived Response Levels (DRL)

- Early Phase DRL
  - If a person is in danger of receiving an external radiation dose of 1 Rem over 4 days, the EPA recommends evacuation until radiation levels decrease. This area is indicated in red.
- First Year DRL

  If a person is in danger of receiving an external radiation dose greater than 2 Rem during the first year, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over a full year. This area is indicated in orange.
- Fifty Year DRL
  - If a person is in danger of receiving an external radiation dose greater than 5 Rem over 50 years, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over fifty years. This area is indicated in yellow.
- Second Year DRL
  - If a person is in danger of receiving an external radiation dose of greater than 0.5 Rem in a the second year (or any subsequent year), the EPA recommends relocation until radiation levels decrease. This area is indicated in green.

These calculations account for multiple variables. For instance, radiation is most intense in the first days following its release therefore dose reduction may be met by evacuating early in the response.

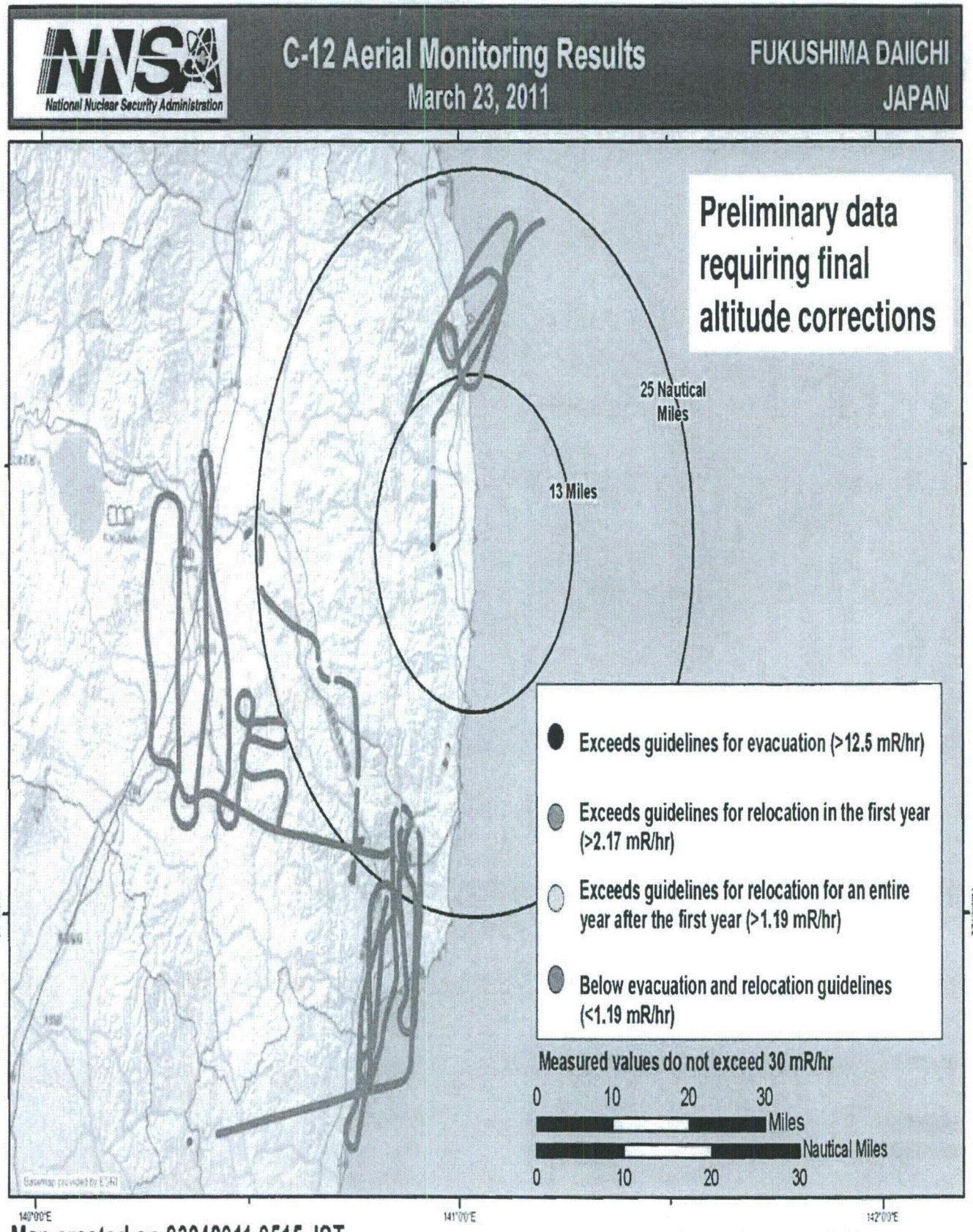
Protective actions are frequently expressed in dose rates. The dose rate is an indicator that residents would accumulate the threshold dose if they stayed in the area the entire time expressed (e.g. 1 year, 2 years, 50 years)



Map created on 03242011 0515 JST

Name: NIT-0 Helo 23Mar2011 v3

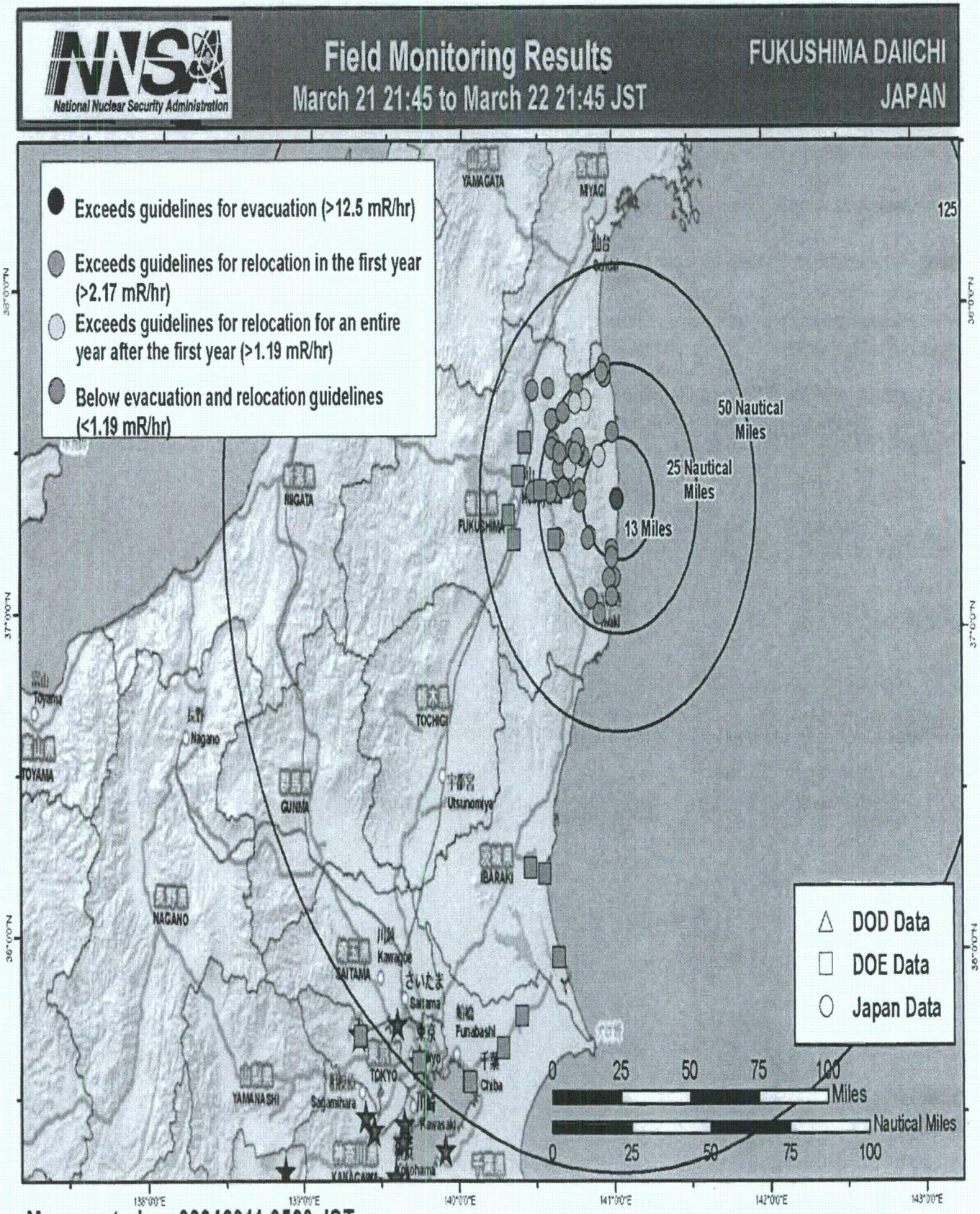
Nuclear Incident Team DOE NIT
Contact (202) 586 - 8100



Map created on 03242011 0515 JST

Name: NI-D C-12 23Mar2011 v3

Nuclear Incident Team DOE NIT
Contact (202) 586 - 8100



Map created on 03242011 0530 JST

Name: NIT-D MonitoringResults 21Mar 2145 to 22Mar 2145 v4

Nuclear Incident Team DOE NIT
Contact (202) 586 - 8100

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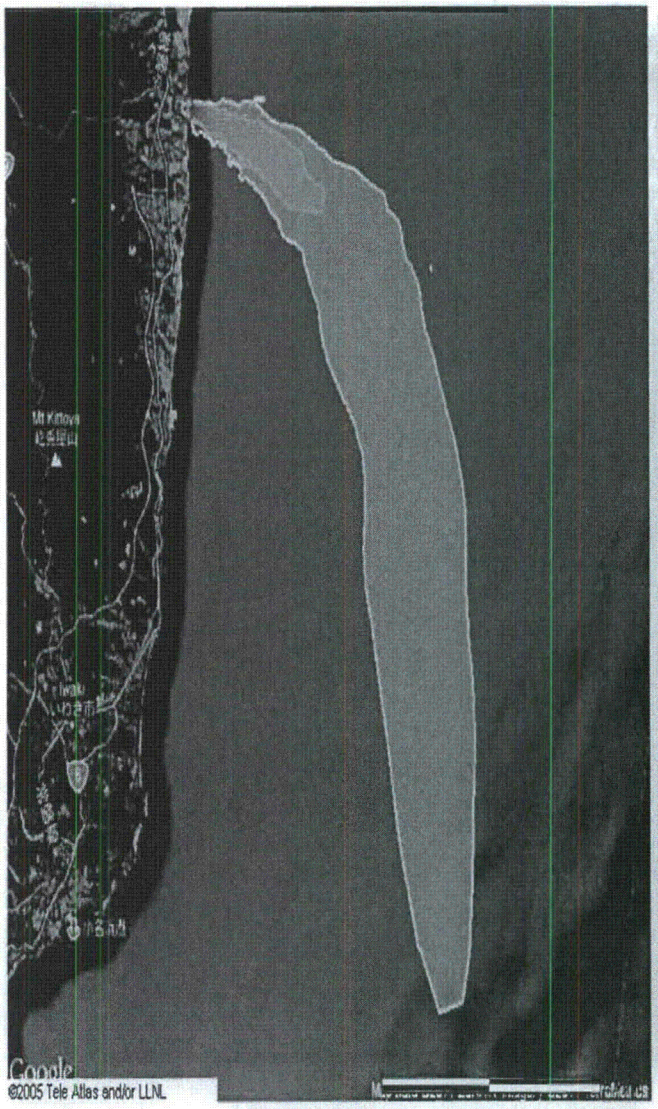
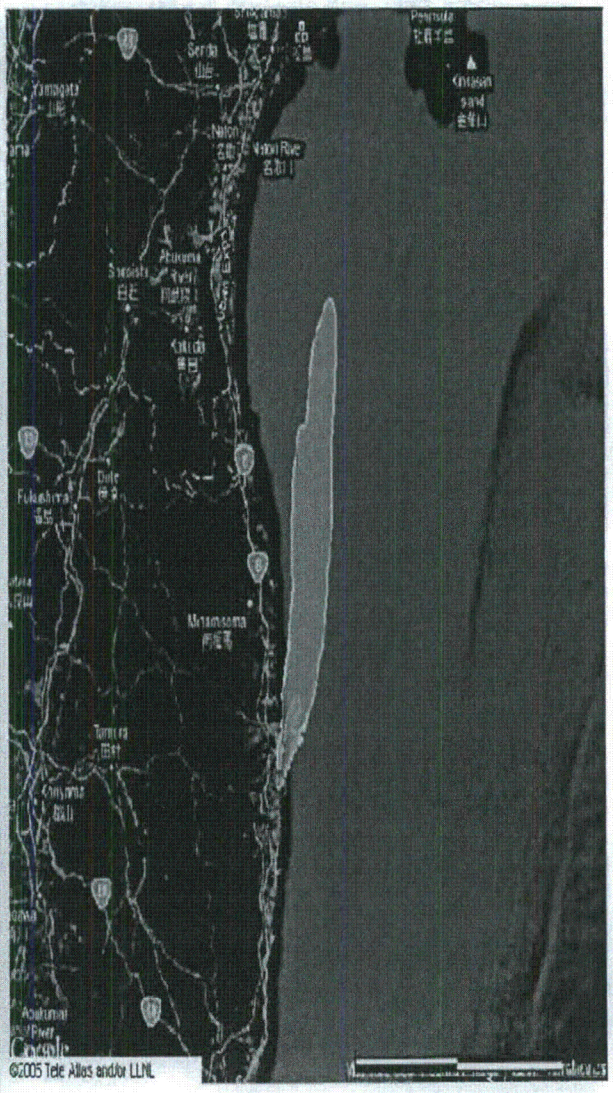
Forecasted Weather
March 23-24

- 03/24/2011 07:00:00 JST



03/24/2011 14:00 JST



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Planned Operations: Next 24 Hrs

- Collocation of AFRAT with CMRT; setting up within 24 hours, lab operational in 36 hours
- Field Monitoring
  - AMS and field monitoring operations will be determined by results of 23 March activities and any changes in priorities.
  - Planned operations for 24 March will be included in 1800 SitRep.

DEPARTMENT OF ENERGY SITUATION REPORT
Earthquake & Tsunami in Japan
23 March 2011
1800 (EDT) UPDATE

POWER PLANT UPDATE AND OTHER NUCLEAR ISSUES

Summary of information received as of 1800 (EDT) 23 March from the NRC, Embassy-Tokyo, IAEA Incident and Emergency Center, TEPCO, METI, NISA, Japan Atomic Industrial Forum, Nuclear Energy Institute, and media outlets. (NOTE: JST = EDT + 13 hours; EDT = GMT/UTC – 4 hours).

Updates on Electrical Power Restoration Efforts:

TEPCO continues work to restore electrical power to all six reactors. External power is available to plant distribution panels for units 1, 2, 3, and 4. Tests to energize existing plant equipment are in progress. Unit 1 and 2 cooling pumps were covered with seawater and maintenance is necessary. Unit 3 main control room recovered power for lighting at 00:43 EDT on March 22. Unit 3 Control Room lights have been restored. Electricity to unit 4 control room is expected to be restored on March 23. Reestablishment of power to the existing receiving equipment in Unit 5 and 6 buildings has been completed. The central control center and Residual Heat Removal system are being energized.

Japan Atomic Industrial Forum (JAIF) report states temperature instruments measuring the surface of reactors 1, 2, and 3 was restored at 15:15 EDT on March 22.

Updates on Cooling Efforts at Dai-ichi:

Water spray using Concrete Pump Truck (50t/h) to the Unit 4 was started.
(10:00 March 23rd)

Per conference call with an NRC representative in Japan at 2200 on 22 March, the Unit 2 SFP has been filled, efforts are being made to connect fresh water to units 1-3 and it is not clear how effective the use of the cement truck is at filling the unit 3 and 4 Spent Fuel Pools.

NHK News reported that TEPCO planned to test-run a cooling pump at Unit 3 on Wednesday, March 23 as part of the cooling restoration effort. Also TEPCO reported reactor temperature instruments for Units 1, 2, and 3 were restored to working order over the weekend. These instruments measure reactor vessel external surface temperature. Temperatures were indicating higher values than normal. Unit 1 vessel surface temperature (feedwater nozzle) was indicating 394^{0}C, and as of 1900 Mar 23 (NISA) lowered to 305^{0}C ; and Unit 3 was indicating 366^{0}C, and as 1900 Mar 23 lowered to 304^{0}C. No information was provided for unit 2. In response, TEPCO increased seawater cooling rates to Unit 1 to cool the reactor down.

On 22 March, the NRC met with TEPCO and NISA to discuss the accumulating salt in the reactors resulting from evaporating sea water being used for cooling and approaches for dealing with this issue. TEPCO is seeking ways to transition to fresh water injection and flushing of the salt from the reactor as quickly as possible, which would require higher injection rates. TEPCO has encountered problems setting up freshwater injection. A complicating factor is that TEPCO currently does not have a fresh water supply at the site. There is a nearby dam which had been connected by a pipe but the pump is off-line. TEPCO is attempting to reestablish this capability, and is also looking at desalination units on site as a backup.

Radiation Detection Update:

At 10:30 a.m. Tuesday March 22, TEPCO reported high levels of radioactive substances have been found in seawater near the damaged Fukushima Daiichi nuclear power plant. Levels of iodine-131 in the seawater were 126.7 times higher than government-set standards, the electric company said on its website. Its monitors detected caesium-134, which has a half-life of about two years, about 24.8 times higher than the government standards. Cesium-137 was found to be 16.5 times higher than the standard. The electric company detected these levels in seawater 100 meters (328 feet) south of the nuclear power plant Monday afternoon. Per JAIF, at 1430 JST on March 21 it was announced that radioactive nuclides had been detected from sampling of seawater near the seawater discharge point of unit 1 to 4 (southside).

To study a larger area, the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) plans to measure radioactivity around the plant from 22-23 March at 8 locations, with results to be provided on 24 March (per the IAEA). The analysis will include radionuclide concentrations found in sea water and dose rate.

As of 1530 22 March, the IAEA reported monitoring of gamma dose rates and beta-gamma contamination has continued over the last 24 hours. This has been carried out together with the Japanese authorities to facilitate the comparison of results. The IAEA took measurements at additional locations between 35 to 68 km from the Fukushima plant. The dose-rate results ranged from 0.8 to 9.1 micro sieverts per hour. The beta-gamma contamination measurements ranged from 0.08 to 0.9 MBq per square metre.

<u>Updates by Reactor Unit</u>

Fukushima Dai-ichi Unit 1 reactor (NRC priority 4):

Increased the amount of water injection (2m3/h→18m3/h) to the Reactor Core by using water supply system in addition to water extraction system. Seawater is being injected into the reactor pressure vessel as of 8:00am March 23rd. The amount of injected water to the reactor core was increased by utilizing Water Supply Line in addition to the Fire Extinguish Line at 2:33am on March 23rd. Also per METI, 0800 JST, 3/23, there is no risk of a hydrogen explosion in

the containment vessel because there is no oxygen in it. There is a low likelihood of leaking a large amount of radioactive material from unit 1.

Per NISA, 1900 JST on March 23, reactor parameters appear stable: pressure - 0.470 MPaG (depressurized); water level - 1.75 meters below the top of the fuel rods; containment vessel – 0.32MPa, spent fuel temperature remains relatively stable at 51° as of 1800 Mar 23.

According to TEPCO press release, seawater was started to be injected to the nuclear reactor through the feed water system at approximately 1330 EDT on March 22rd.

Fukushima Dai-ichi Unit 2 reactor (NRC priority 3):

Seawater is being injected into the reactor pressure vessel as of 8:00 am March23rd.

Per conference call with an NRC representative in Japan at 2200 on 22 March, the Unit 2 SFP has been filled. Power has been provided to the unit 2 control room. Lights were turned on in that control room Tuesday night. (NHK World news). Per NRC EOC status of Mar 23, condition of pump motors and instrumentation is being evaluated.

Per Nuclear and Industrial Safety Agency, 1900 JST on March 23, Reactor parameters appear stable: pressure - 0.13 MPaG (depressurized); water level - 1.3 meters below the top of the fuel rods; containment vessel – 0.10 MPa. Seawater injection to the Reactor Pressure Vessel (RPV) continues.

Fukushima Dai-ichi Unit 3 reactor (NRC priority 1):

Lighting was recovered in the Central Operation Room. (22:43 March 22nd)The seawater is being injected into the reactor pressure vessel as of 8:00am March 23rd. Several counter measures are being used to cool down the spent fuel pool of Unit 3. Injection of 35t of seawater to the SFP via cooling and purification line was carried out.

TEPCO has reported black smoke has been seen emerging from Unit 3 of the crippled nuclear plant in northeastern Japan, prompting a new evacuation of the complex. Officials with Tokyo Electric Power Co. said Wednesday that workers from the entire Fukushima Dai-ichi plant have been temporarily evacuated. **Per NRC EOC status update of 23 Mar, the smoke decreased 2 hours later and news reports indicate that workers returned.** Per NISA, 1900 JST on March 23, reactor parameters appear stable: avg. pressure - 0.11 MPaG (depressurized); water level – 1.80 -2.30 meters below the top of the fuel rods; containment vessel – 0.10 MPa.

The fire department resumed spraying Unit 3 at 1550 JDT on March 22 after smoke ceased. According to TEPCO, the light in the main control room was turned on at approximately 10:45 pm JDT on March 22nd.

Fukushima Dai-ichi Unit 4 reactor (NRC priority 2):
Situation of Water Injection and Water Spray
NISA, 1800 JST on March 23, water spray of around 150t of water using Concrete Pump Truck (50t/h) to the Unit 4 was started.
(10:00 March 23rd). A concrete pumping vehicle sprayed 150 tons of seawater on spent fuel pool at Unit 4, from 5:17 pm to 8:30 pm JDT on March 22. Though they think the concrete pumping vehicle is very effective, they will continue to take all measures to conduct the restoration work with the cooperation of organizations involved. A camera was set at the end of the water spray arm. They will assess the status of the pool after the spray when they retrieve the camera.

Fukushima Dai-ichi Unit 5 reactor (NRC priority 5):

The Nuclear and Industry Safety Agency (NISA) as of March 23 at 1900 (JST): The reactor is in cold shutdown with a pressure in the Reactor vessel of 0.108 MPa. Water level in the reactor is 1.744 meters above the top of the fuel. As a result of restarting the Residual Heat Removal (RHR) pump (C), the Spent Fuel Pool is being maintained at 41.0°C at 1900 JST on March 23.

Fukushima Dai-ichi Unit 6 reactor (NRC priority 6):

The Nuclear and Industry Safety Agency (NISA) as of March 23 at 1900 (JST): The reactor is in cold shutdown with a pressure in the Reactor vessel of 0.109 MPa. Water level in the reactor is 2.701 meters above the top of the fuel. The SFP temperature is currently 19.0°C at 1200 JST on March 23.

Fukushima Dai-ini Units 1-4: TEPCO confirmed cold shutdown and continued cooling of reactor cores.

Updates from the IAEA website:

Joint FAO-IAEA-WHO Statement on Food Safety Issues following the Fukushima Daiichi Nuclear Emergency:

Food safety issues are an additional dimension of the emergency. Some food products sampled at sites both within the Fukushima Prefecture and in adjacent areas have been contaminated by radioactive materials.

Japan has regulations in place relating to provisional regulatory limits of radioactivity in food. Food monitoring is being implemented, measurements of radionuclide concentrations in food are taking place, and the results are being communicated publicly. Japanese authorities are also giving advice to consumers and producers regarding safety measures.

http://www.who.int/hac/crises/jpn/faqs/en/index7.html

Aerial Measurements Update:

DOE Team

- Helo and fixed wing survey operations took place on 23 March (JST).
- NIT produced a composite map of field monitoring data that shows radiation levels as they relate to U.S. guidelines for relocation/evacuation.
- Products have been developed and data has been analyzed for previous operational period through 22 March.
- Products and analysis will continue for operations through 23 March and will be available in 1800 23 March SITREP
- Goal of the helicopter missions is to provide where plume deposition on the land and to support GOJ concerns with area agriculture.
- Goal of fixed wing missions is to provide information on the plume deposition on the land
- AMS and field monitoring operations will be determined by results of 23 March activities and any changes in priorities.
- In total, AMS has flown 13 flights as of 22 March
  - 7 Rotary wing
  - 6 Fixed wing

PETROLEUM Update:

According to a report yesterday (March 22) from Japan's Ministry of Economic, Trade, and Industry (METI), four oil refineries remain suspended. The refineries are JX Sendai (145,000 b/d), JX Kashima (189,000 b/d), Cosmo Chiba (220,000 b/d), and JX Negishi (270,000 b/d). The METI reports, however, that the JX Kashima is slated to restart operations sometime this week. Since the earthquake, two refineries have restarted operations, the Kyokutou (175,000 b/d) and TonenGeneral Kawasaki (335,000 b/d). Yesterday (March 22), Japan released 58 million barrels (22 days worth of demand) of oil from its private sector emergency stockpiles. Last week the country released 8 million barrels of oil from its private sector emergency stockpiles.

News Reports

Embassies closing, moving south of Tokyo, Japan reports

Tokyo (CNN) -- Embassies from more than two dozen countries have either closed down or moved operations to cities south of Tokyo since the March 11 earthquake and the resulting nuclear crisis in northern Japan, the country's Foreign Ministry said Wednesday. "There are 25 embassies which either temporary shut down or moved its function outside of Tokyo," Foreign Ministry spokesman Hidenori Sobashima told CNN. Seven of those 25 have moved to cities such as Osaka, Hiroshima and Kobe, Sobashima said.
Those closing or moving included embassies from five European countries, including Germany and Switzerland; 14 African countries, including Kenya, Nigeria and Ghana; and four from Latin America.

Radioactivity in food, milk and drinking water

New data for radionuclide concentration data for food, milk and drinking water is being accumulated. Sampling is most extensive within Fukushima and Ibaraki prefectures. The sampling frequencies and locations, as well as the type of foodstuff sampled are, by necessity, not uniform. Hence, reporting on radionuclide concentrations in foodstuffs is ad hoc. Since the last report, the following new foodstuff monitoring data is noted:

- In Tokyo, concerns over radiation surged.
  - Government samples taken Tuesday night found 210 becquerels of radioactive iodine per kilogram of water -- two times higher than the limit that the government considers safe for infants.
  - The amount of iodine detected was lower than the level considered safe for adults: 300 becquerels per kilogram.
  - A becquerel is a unit of radioactivity equal to one nuclear decay or other nuclear transformation per second.
- Japan's government expanded food shipment restrictions after the health ministry said tests detected radioactive materials at levels exceeding legal limits in 11 types of vegetables grown near the Fukushima plant.

News reports that GOJ officials said Wednesday March 22 that radioactive material exceeding legal limits for infants was detected in tap water. Tap water tests revealed higher levels of radioactive iodine than government standards.

Japan's Health Ministry reported Tuesday finding radioactive materials at levels "drastically exceeding legal limits" in 11 types of vegetable grown in Fukushima Prefecture, including broccoli and cabbage, according to Kyodo News Agency. NHK News reported strong earthquakes of the Pacific coast of northeastern Japan on Wednesday morning. A quake with a magnitude 6.0 jolted Fukushima Prefecture at around 7:12 AM JST, followed by a magnitude 5.8 tremor about 20 minutes later.

Extremely high radiation found in soil

(Japanese Broadcasting Corporation (NHK), March 23) Japanese authorities have detected a concentration of a radioactive substance 1,600 times higher than normal in soil at a village, 40 kilometers away from the troubled nuclear power plant in Fukushima Prefecture.

The disaster task force in Fukushima composed of the central and local governments surveyed radioactive substances in soil about 5 centimeters below the surface at 6 locations around the plant from last Friday through Tuesday.

The results announced on Wednesday show that 163,000 becquerels of radioactive cesium-137 per kilogram of soil has been detected in Iitate Village, about 40 kilometers northwest of the plant.

Gakushuin University Professor Yasuyuki Muramatsu, an expert on radiation in the environment, says that normal levels of radioactive cesium-137 in soil are around 100

becquerels at most. The professor says he was surprised at the extremely high reading, which is 1,630 times higher than normal levels.
He warns that since radioactive cesium remains in the environment for about 30 years it could affect agricultural products for a long time. He is calling on the government to collect detailed data and come up with ways to deal with the situation.

Wednesday, March 23, 2011 19:02 +0900 (JST)

High levels of iodine in Tokyo tap water Radioactive iodine has been detected in Tokyo tap water in levels above the safe limit for infants. The Tokyo Metropolitan government says 210 becquerels of iodine-131 were detected on Tuesday in one liter of water at one of its purification plants in northern Tokyo. A sampling on Wednesday also showed roughly 190 becquerels per liter.
These levels are below the 300-becquerel per liter safe limit for adults, but far above the 100-becquerel limit for infants. Tokyo says infants in the central 23 wards, plus 5 adjacent cities, should refrain from drinking tap water.

The Tokyo Metropolitan government is also urging beverage makers in these areas not to use tap water in infants' drinks. Tokyo says the safety level assumes long-term consumption, and that there is no risk to health if tap water is consumed over a short period.

As Reported by NKO on Wednesday, March 23, 2011 15:13 +0900 (JST)

Japan quake costliest ever; radiation in Tokyo water:

TOKYO (Reuters) - Japan estimated the cost of the damage from its devastating earthquake and tsunami could top $300 billion as authorities in Tokyo warned that babies should not be given tap water because of radiation from a crippled nuclear plant.
The first official estimate since the March 11 disaster covers damage to roads, homes, factories and infrastructure, and dwarfs losses from both the 1995 Kobe quake and Hurricane Katrina that swept through New Orleans in 2005, making it the world's costliest natural disaster.

As concern grew over the risk to food safety of radiation from the damaged Fukushima power plant, 250 km (150 miles) north of the Japanese capital, the United States became the first nation to block some food imports from the disaster zone.

Tokyo authorities said on Wednesday that water at a purification plant for the capital of 13 million people had 210 becquerels of radioactive iodine -- more than twice the safety level for infants.

OTHER NUCLEAR ISSUES

No new information in this report.

DOE ASSESSMENT

[Factored into reactor summaries]

REQUESTS FOR US ASSISTANCE

METI was especially interested in the radiation hardened camera, which they said is urgently needed. In general, METI identified remote monitoring and debris removal as priority areas of need. The GOJ will review the report and develop a formal request which will be handled through the Crisis Management Team.

We are looking to OSD to provide a small cell to the DART -- which would have a DOE technical advisor--to help facilitate with any logistics of items that would need to go into Japan or be moved around Japan to deal with the Japanese reactor crisis. Logistical support may be just to facilitate private companies donating/providing items or, in some cases, it may mean USFJ transport assistance or liaison. AID (DART) feels they lack the capacity and technical skills to perform this function and it is clearly not in the comfort zone of NRC.

NRC will continue to follow up with NISA on these requests.

ENERGY INFRASTRUCTURE:

As of March 21st 9:30 PM JST, Japan's Nuclear and Industry Safety Agency reports that of the households that can receive power, 220,000 households remain without electricity in Japan. These customers are all located in Tohoku Electric Power Company's service area. All customers who are able to receive power in Tokyo Electric Power Company's (TEPCO) service area have been restored. Rolling blackouts are still being implemented for select areas in TEPCO's service areas.

CONTACTS WITH JAPANESE OFFICIALS

At 11:30 on March 23, EMIN Marc Wall, Dan Dorman of NRC, and Ron Cherry of DOE Japan Office met with Cabinet Secretariat counselors Mitsugu Saito and Katsuro Nagai to discuss the process for information flow between the U.S. and the GOJ's recently established interagency Crisis Management team. Saito and Nagai agreed that the formation of the Crisis Management team under the leadership of the Cabinet Office is helping improve the flow of information, both between the U.S. and Japan and within the GOJ. Dorman described steps the NRC is taking with GOJ counterparts, particularly TEPCO and NISA, to make information exchanges more routine on a daily basis. The nightly meetings of the Crisis Management team will enable both sides to take stock of developments during the day so that responses can be formulated overnight for discussion at the technical level the following day. During the meeting, Cherry provided a report prepared by DOE on Robotic and Remote Systems Assistance Available to the Government of Japan. The report describes basic performance capabilities of the

equipment and identifies which can be made available immediately, in 1-9 months, and in 9-18 months. The equipment is primarily U.S. Government property but some equipment listed (e.g., automated backhoe) would have to be commercially procured. Equipment that has to be commercially procured is so noted.

The report also identifies available expertise. Cherry also briefly described the activities of the DOE Aerial Monitoring System team in Japan, noting that information about results is being shared with the GOJ through MOFA. Saito and Nagai said they were unaware of the AMS activities and indicated they would follow up with the MOFA point of contact. They indicated it would be useful to include monitoring as an agenda item for Crisis Management meetings.

QUESTIONS BEING WORKED:

The President of MLB Corporation in California sent an email to the NIT offering to donate several small, low cost aircraft that could be outfitted with low cost radiation sensors. The sensor data can be correlated to the aircraft's GPS location to provide a radiation survey map. The aircraft operates autonomously and can cover a distance of 300 linear miles in a single flight.

A concise timeline of events at Fukushima reactors 1-6 is being developed.

CONTACT INFORMATION:

Deborah Wilber arrived in Japan on March 23 to interface with the US DOE and Japanese response organizations to improve coordination.

Giulia Bisconti from DOE's Office of Science is traveling to Tokyo Japan to assist Damian Peko.

Nuclear Incident Team in the Emergency Operations Center (NITOPS@NNSA.DOE.GOV) - 202-586-8100

Office of the Deputy Secretary 202-586-5500

Watch Schedule:

Doug Fremont Ted Wyka Maegon Barlow Craig Welling	1600/23 Mar – 2000 23 Mar
Mark Whitney Alan Felser Dennis Miolta	0400/24 Mar – 0800/24 Mar

Doug Fremont	1600/24 Mar – 2000/24 Mar
Ted Wyka	
Craig Welling	

From: Lee, Richard
To: Sheron, Brian
Cc: Gibson, Kathy; Elkins, Scott
Subject: Confernence call with DOE 6:00-7:00pm
Date: Wednesday, March 23, 2011 7:43:37 PM

Brian:

(b)(5)

I responded that I will conveyed to our management. I expect, he will ask again tomorrow at the conference call. Please advise me what NRC response is.

(b)(5)

Richard.

CH/252

From:	Kelly, John E (NE)
To:	Adams, Ian; Aoki, Steven; Binkley, Steve; Bob Budnitz; Sheron, Brian; Brinkman, Bill; DAgostino, Thomas; Dick Garwin; Dick Garwin; Finck, Phillip; Grossenbacher, John (INL); Hurlbut, Brandon; John Holdren; Koonin, Steven; Lyons, Peter; McFarlane, Harold; Owens, Missy; Per Peterson; Poneman, Daniel; Rolando Szilard; Steve Fetter
Subject:	Spent fuel pool data
Date:	Wednesday, March 23, 2011 10:06:28 PM
Attachments:	Fw Fukushima Daiichi Status on spent fuel pools (as of March 17th at 11AM)..msg

here is the data on the fuel in the spent fuel pools

Dr. John E. Kelly
Deputy Assistant Secretary for Nuclear Reactor Technologies
NE-7
U.S. Department of Energy
1000 Independence Ave. SW
Washington, DC 20585
phone: 202-586-5458
fax: 202-586-0541
mobile (b)(6)

CH/253

From:	Per F. Peterson
To:	Adams, Ian; Aoki, Steven; Binkley, Steve; Bob Budnitz; Sheron, Brian; Brinkman, Bill; Dick Garwin; Dick Garwin; Finck, Phillip; Grossenbacher, John (INL); Hurlbut, Brandon; Kelly, John E (NE); Koonin, Steven; McFarlane, Harold; Owens, Missy; Per Peterson; Rolando Szilard; Steve Fetter
Subject:	Time history of radiation readings from sensors
Date:	Wednesday, March 23, 2011 10:48:35 PM
Attachments:	Dose rate history.ppt

The attached dose rate history figure from NEA is very helpful in seeing when significant releases occurred and what specific events at the plant the releases are linked to. But this plot only goes to March 17. Are there any that go out further in time?

-Per
--

Per F. Peterson
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Department of Nuclear Engineering
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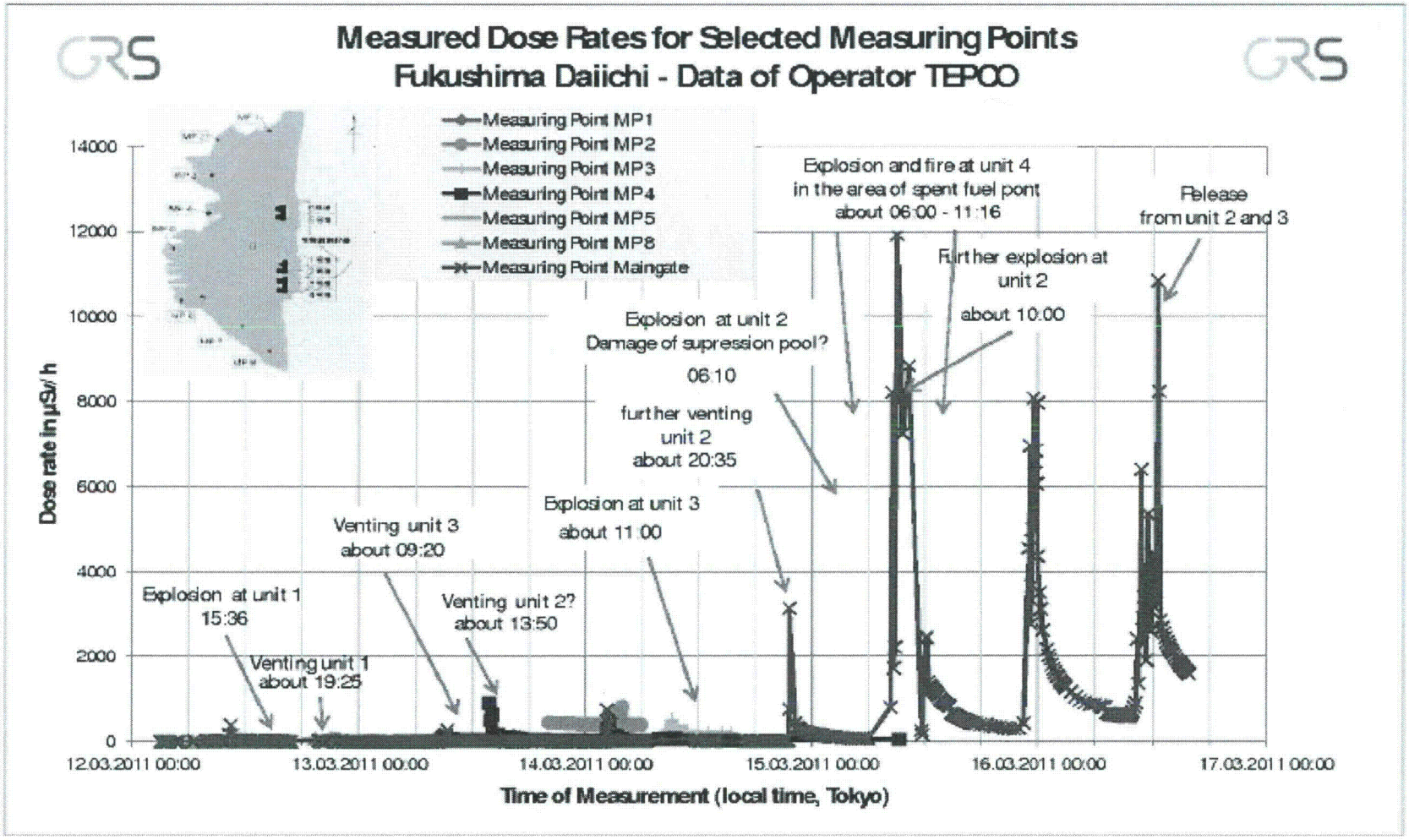
Office: (510) 643-7749 Fax: (510) 643-9685
http://www.nuc.berkeley.edu/People/Per_Peterson

CH/254

Radiation release chronology – Fukushima Dai-ichi



Source: OECD Nuclear Energy Agency

From: Virgilio, Martin
To: Miller, Charles; Grobe, Jack; Holahan, Gary; (b)(6) Sanfilippo, Nathan
Cc: Borchardt, Bill; Weber, Michael; Ash, Darren
Subject: Today"s Kick off Meeting
Date: Thursday, March 24, 2011 5:34:02 AM
Attachments: Task Force Kick Off Meeting.docx

All

Attached is a one pager I developed to help guide today's kick off meeting for Task Force being chartered to respond to the Tasking Memo on actions following the events in Japan.

Marty

CH/255

Task Force Kick Off Meeting

Charter

Near Term Actions

- Establish a group dedicated to communications and coordination with national/international stakeholders
- Identify immediate actions needed
- Identify technical issues requiring additional review and priority (H M L)
- Prepare the 30 day quick look report and Commission Meeting briefing material

Longer Term Actions

Conduct a systematic lessons learned review of the event to refine the list of technical issues

Organize and charter working groups to address one or more technical issues

- SES Leads for each WG who would draw upon technical experts from the line as needed

Estimate resources and impacts on other planned work

Establish a Steering Committee responsible for

- Integration
- Direction and Decision Making;
- Formulation of Policy for Commission Consideration

Technical Issues

SBO duration and coping strategies,
50.54(hh)(2) hardware and strategies, execution of strategies (equipment location, environmental considerations, training),
External and internal flooding,
Combustible gas control
SAMG adequacy and execution of strategies
EP,
Seismic including GSI 199,
Tsunami, Hurricanes, Seismic Events

From: Sheron, Brian
To: HOO Hoc
Subject: FW: Slide deck
Date: Thursday, March 24, 2011 7:26:00 AM
Attachments: 323 Sec Briefing1-2.pptx

Please forward to ET and RST directors. Thx.

From: Adams, Ian [mailto:Ian.Adams@Hq.Doe.Gov]
Sent: Wednesday, March 23, 2011 6:07 PM
To: Adams, Ian; Aoki, Steven; Binkley, Steve; Bob Budnitz; Sheron, Brian; Brinkman, Bill; DAgostino, Thomas; Dick Garwin; Dick Garwin; Finck, Phillip; Grossenbacher, John (INL); Hurlbut, Brandon; John Holdren; Kelly, John E (NE); Koonin, Steven; Lyons, Peter; McFarlane, Harold; Owens, Missy; Per Peterson; Poneman, Daniel; Rolando Szilard; Steve Fetter
Subject: Slide deck

Apologies for the tardiness on this slide deck.

Ian

From: Kelly, John E (NE)
Sent: Wednesday, March 23, 2011 5:41 PM
To: DL-NITsolutions
Cc: Finck, Phillip; 'Lee, Richard'
Subject:

here's the slide deck for the 6pm call.

Dr. John E. Kelly
Deputy Assistant Secretary for Nuclear Reactor Technologies
NE-7
U.S. Department of Energy
1000 Independence Ave. SW
Washington, DC 20585
phone: 202-586-5458
fax: 202-586-0541
mobile: (b)(6)

CH/256

U.S. DEPARTMENT OF ENERGY | Nuclear Energy

Science Council Briefing on Fukushima Nuclear Plant Response

John E. Kelly
Steve Binkley
Steve Aoki

March 23, 2011

1 – Update on Effect of Salt on Coolability

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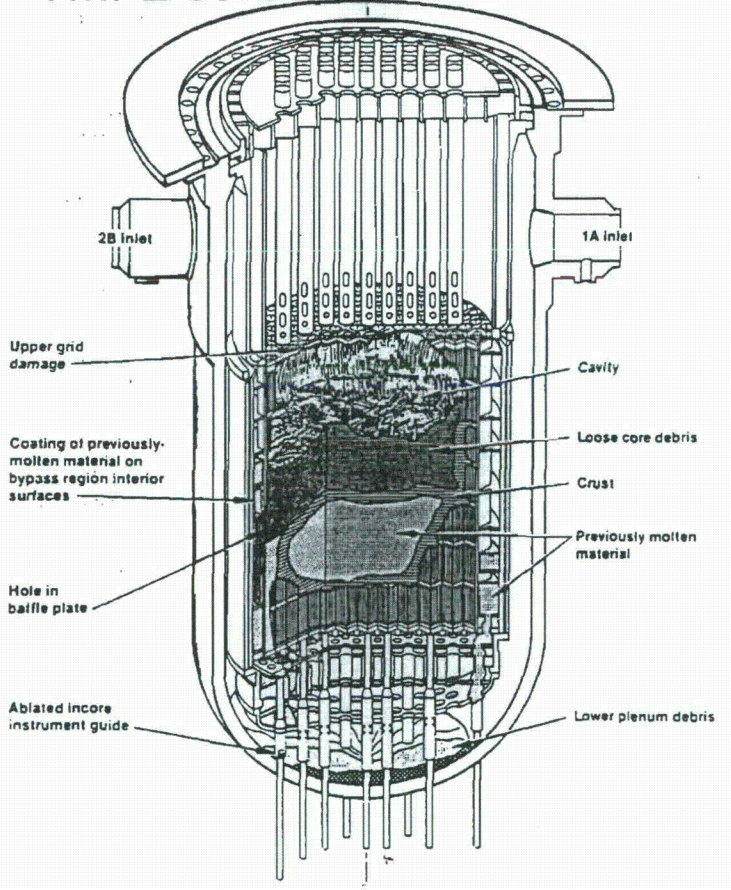
Nuclear Energy

Core Melt Progression and Salt Impact

- Decay heat level now ~ 4 MW for Unit 1 and ~ 6.5 MW for units 2-3.
- If cooling is lost, boildown, dryout and exposure of the fuel will occur, causing core to remelt.
- Maximum adiabatic fuel melting rate is ~ 4.3 kg/sec. Given the fuel inventory of roughly 200 MT, the minimum time to melt the entire core is about 13 hours.
- Including heat sink effects do to residual water and steel structure inside the vessel, a more realistic time is about one day.
- GE and DOE Analyses agree total salt accumulation ~100 Tons of Salt based on solubility assessment – would fill lower plenum
- Also assessing best approach for providing alternate cooling; could take heroic efforts – strategies of labs similar to those of GE
- If melt relocates to lower head, any salt accumulation will be rapidly ablated though (salt melts at 801 C and the boiling point is 1413 C).

TMI-2 core debris distribution



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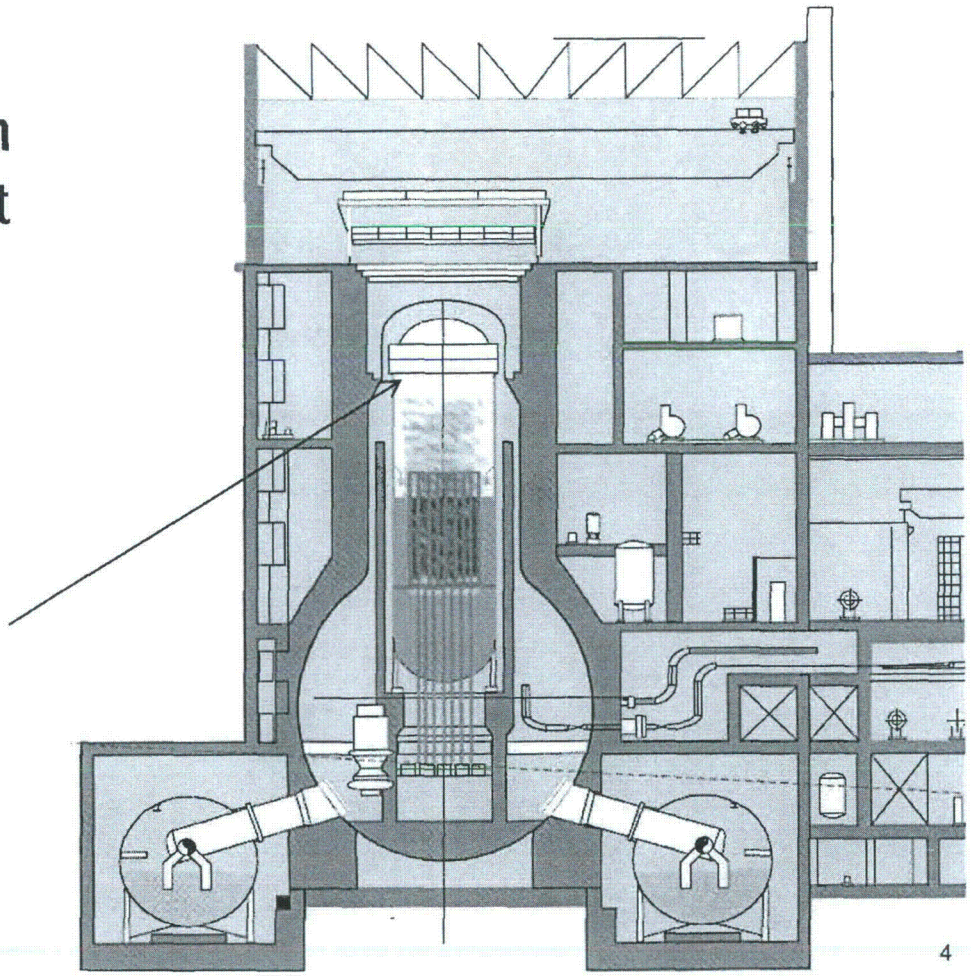
Transition to Fresh Water Cooling is Urgently Needed

- Delivery of fresh water from local reservoir via aqueduct is now available
- Plumbing into local plant system remains to be done



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Seawater is a Complex Environment by Itself

Element	Reactor coolant (BWR, HWC)	Seawater (typical)
Calcium, ppm	0	400
Magnesium, ppm	0	1272
Sodium, ppm	0	10,561
Potassium, ppm	0	380
Lead, ppm	0	0.2
Chloride, ppm	<0.001	18,980
Bicarbonate, ppm	0	132
Fluoride, ppm	0	3.5
Bromide, ppm	0	65
Sulfate, ppm	<0.003	2649
Silica, ppm	0	0.01 to 7.0
Carbon dioxide	0	6
Oxygen, ppm	<0.01	5

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Sea water contains a variety of minerals with different solubility limits

- The solubility of NaCl in water can be up to 35% or 10x what is in typical sea water. While this may change with temperature, solubility is not a strong function over the range of interest.

- Before salt begins to saturate, you may get other elements coming out of solution
  - Calcium sulfates will come out at 2x sea water concentration
  - Gypsum will come out at 5x sea water concentration
  - Other calcium carbonate
  - Other salts

- NaCl is the predominant component of other minerals, but the others may be appreciable in very large volumes.

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Formation of deposits is highly dependent on local conditions

- Given the current assumptions on injection and flow (leaks through the bottom pumps into the torus), it is likely that the minerals in the sea water are concentrating in the reactor vessel as water boils off and condenses outside the vessel in the dry well. How concentrated will depend on lots of information we don't have.

- Salt and other mineral deposits make cake out in lots of forms depending on lots of variables. Local changes in temperature, pressure, flow, etc. will drive things into and out of solution very locally.

- Precipitation will ebb/flow with changes in local conditions.

- There was little concern about plugging of spray nozzles at the in-flow location. Temperatures, concentrations, and flow rates are not conducive to problems at the inlet.

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Nuclear Energy

Formation of deposits is highly dependent on local conditions

- If the reactors are not being vented to the outside, then the vessel is likely filled with concentrated brine solution (and possible salt deposits at the bottom). The torus is likely filled with sea water, but lower salt concentration.

- if the reactors are being vented outside the dry well, the vessel is still likely filled with concentrated brine solution and the torus is filled with brackish water (mix of salt water and fresh water).

- As sea water coolant is sprayed in, it is likely evaporating before reaching the fuel/debris field. This would leave a salt dust that is filtering down to the bottom (and maybe going back into solution).

- Salt is likely deposited on every surface. At points, it may flake off and then filter down to the bottom of the vessel and go back into solution

- If water is still leaking out the seals on the pumps, it's unlikely that anything is currently blocked or packed with salt, although this could change.

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Other Considerations

- Discussions were held on the RHR pumps. There was some caution about turning those on due to concerns about how long those would run in a brine solution that's very radioactive. It may not be worth the risk of flowing that coolant outside containment.

- Large, sudden cooling capacity (i.e., Putting brine solution in a subcooled environment may drive rapid precipitation.).

- Evaporative cooling of the drywell may be better than RHR pumping to mitigate chances of blockages (although this is a slower process for cooling)

- The sea water could have other interactions with fuel and drive formation of U3O8, U6++ (which will create other compounds) or even UF compounds.

2 – Measurement of Containment Water Level

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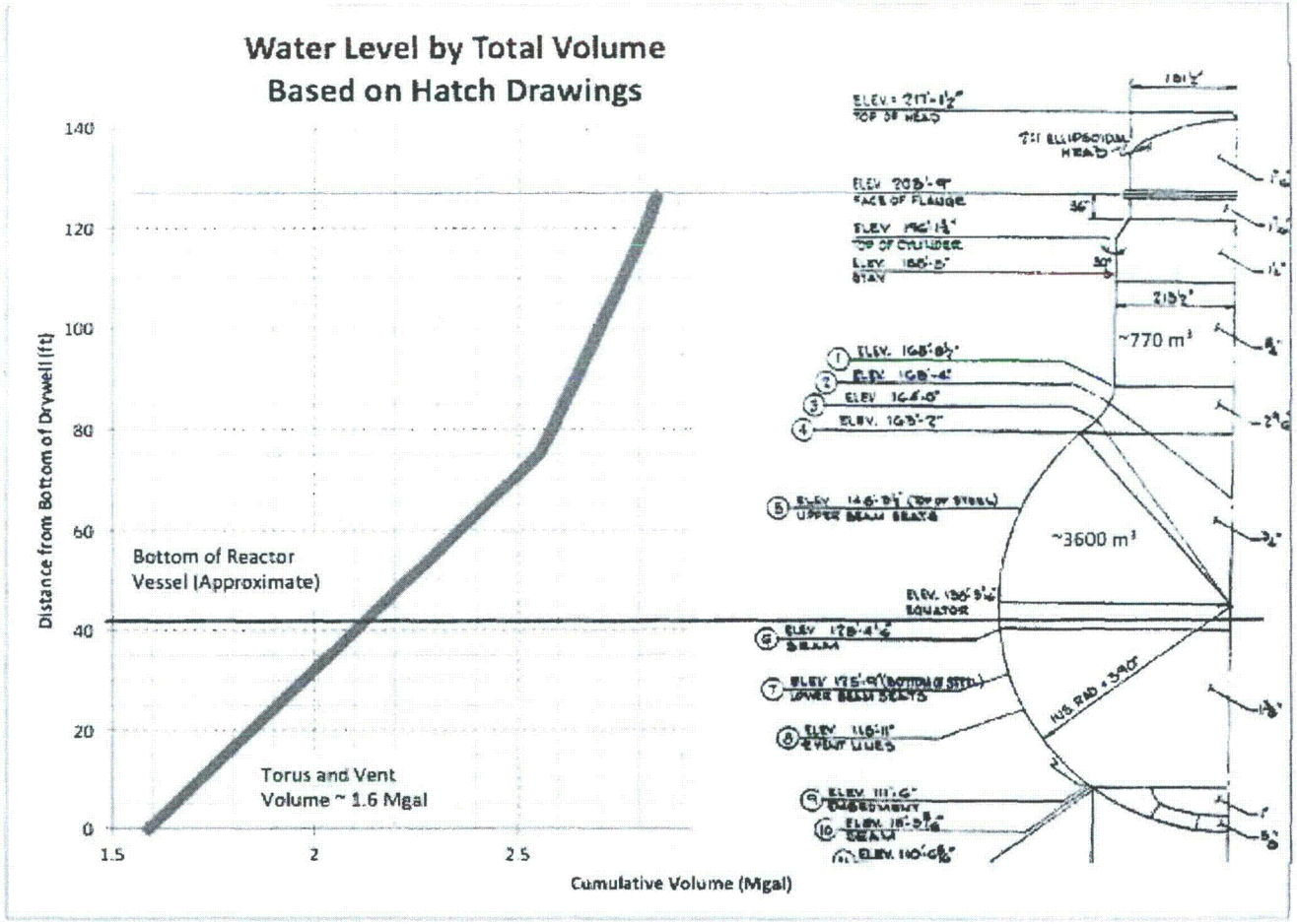
Nuclear Energy

Postulated Vessel Water Levels Based on Hatch NPP



Estimated water level units 2/3

3 – RHR Shielding (Dose)

- The RHR pumps are not salt water pumps, it is the consensus that they will not last long if they are used to pump salt water. In addition, it is the consensus that they cannot take the radiation load.

- Pump bearings and seals could degrade rapidly. This would result in a leak path outside containment. (ORNL)

- Failure mode analysis and dose analysis pending.

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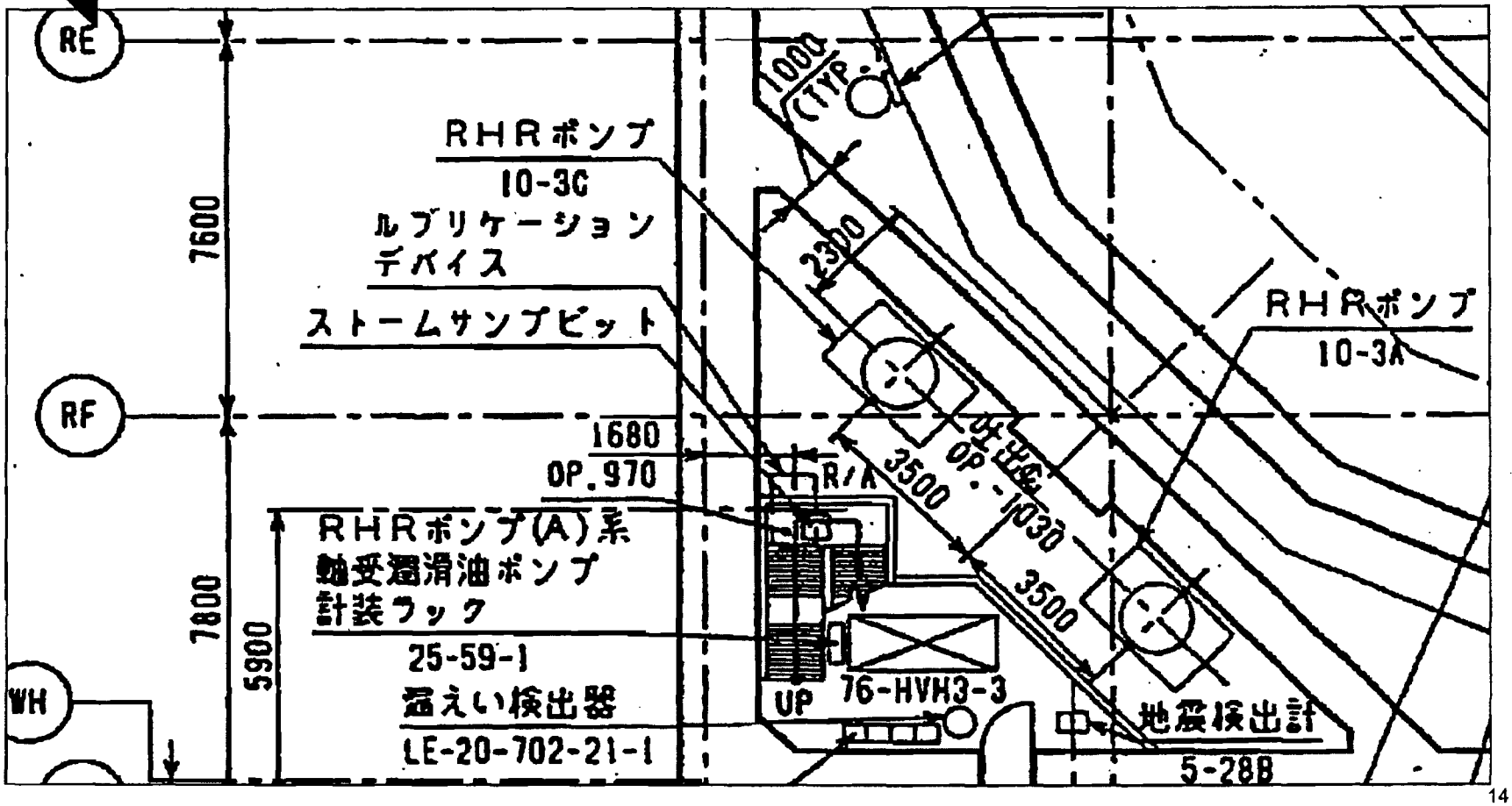
Aerial View



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ENERGY

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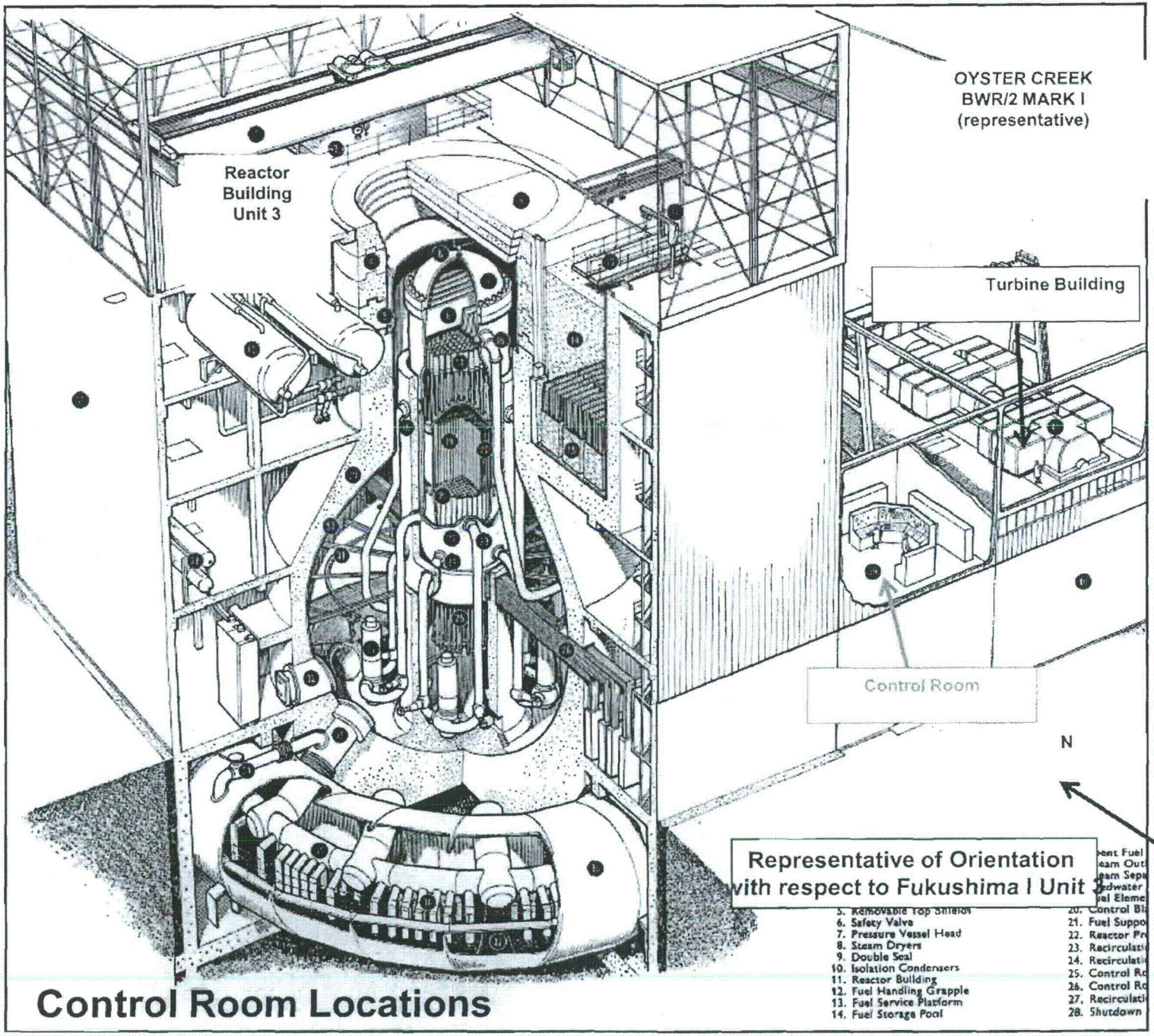
4 – Control Room Shielding/Habitability

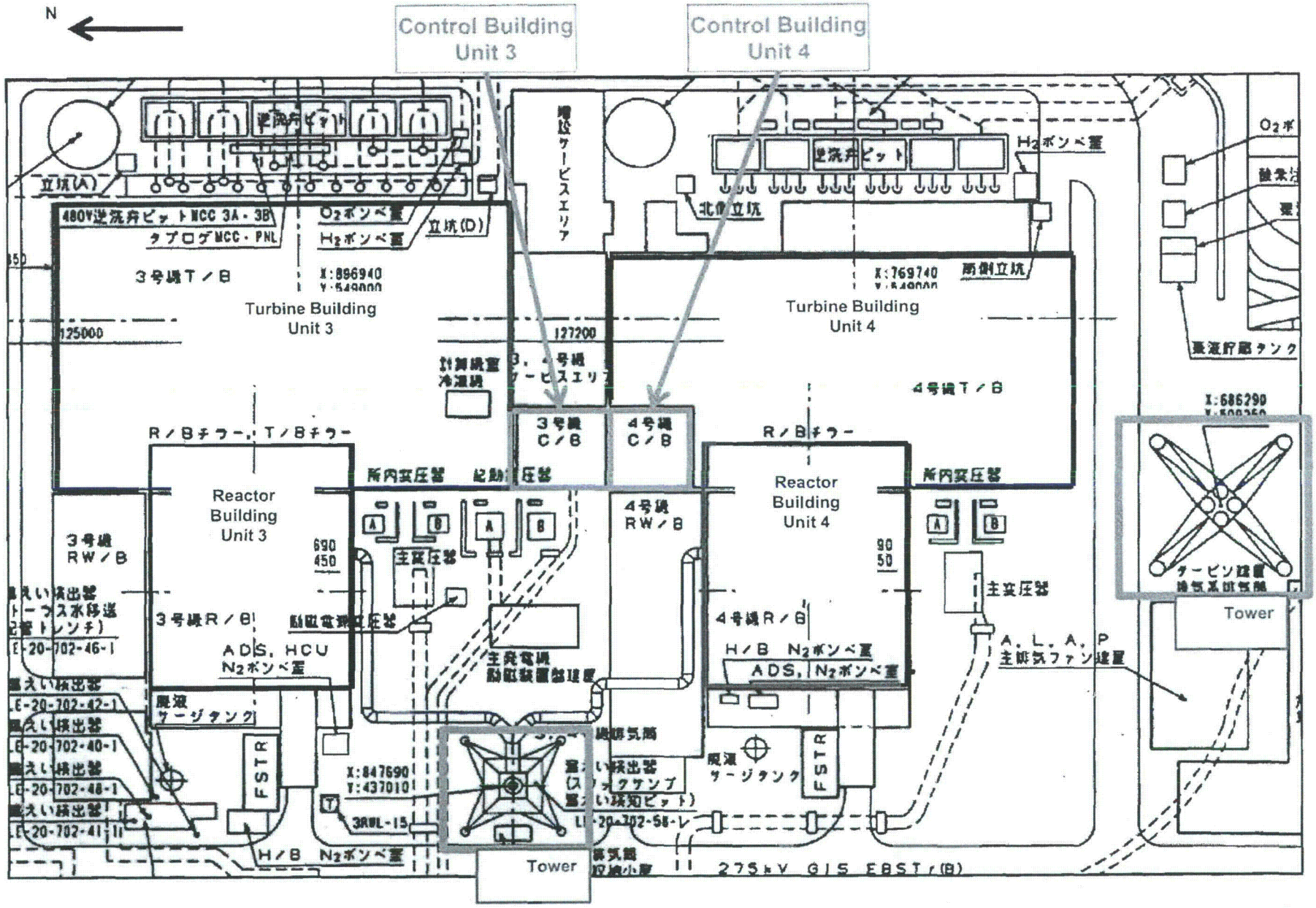
Shielding

- Cs-137 gamma energy 0.662 MeV (actually from Ba-137m)
- Shielding half value thicknesses (Shultis & Faw, 1984, Pg 209) - thickness to reduce gamma intensity by ½
  - Lead 0.65 cm
  - Concrete 4.8 cm
  - Iron 1.6 cm
- Tenth value thicknesses (reduce gamma intensity to 1/10)
  - Lead 21.6 cm
  - Concrete 15.7 cm
  - Iron 5.3 cm
- Cs-134, Cs-137, I-131, I-132 will be dissolved and possibly Sr89 and Te-132. Certainly could be numerous other particulate materials. With similar gamma energies, the half value thicknesses will also be similar.

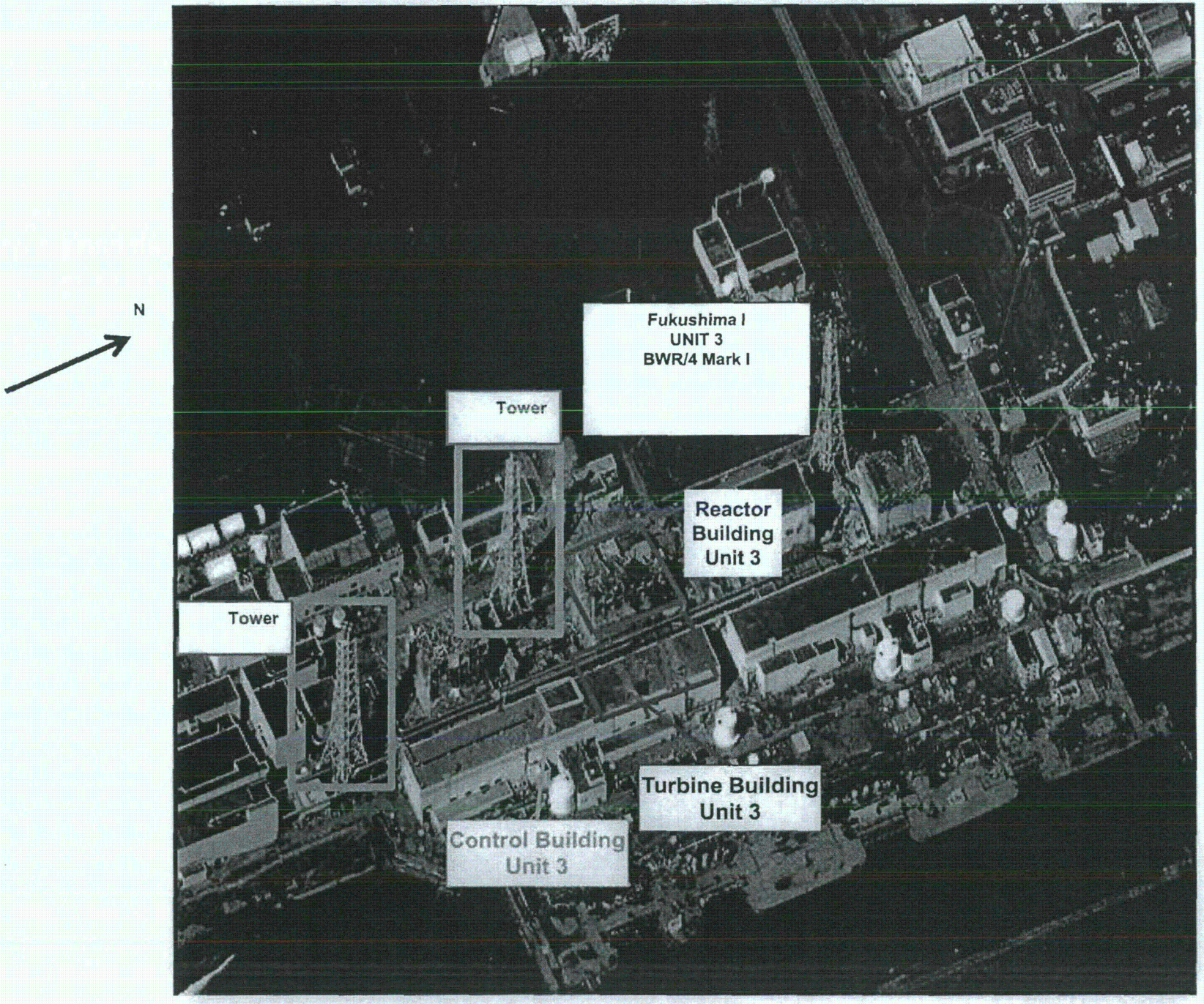
Any procedure to restart RHR will require manual operations in the reactor building and considerations of dose to control room operators .



Control Room Locations



Control Room Locations


N
Fukushima I
UNIT 3
BWR/4 Mark I
Tower
Tower
Reactor
Building
Unit 3
Turbine Building
Unit 3
Control Building
Unit 3

5 – Sensors and Instruments

- The brine may cause degradation on the instruments, thermal couples, pressure sensors and water level indicators. The information on water level in the vessel has indicated no change for several days, since small lines are bled off the manometers to measure water level it is likely these lines are either blocked with debris, salt or steam bubbles.

- There should be bleed locations on these lines near the sensors which could be used to determine if the lines are plugged or have air in them.

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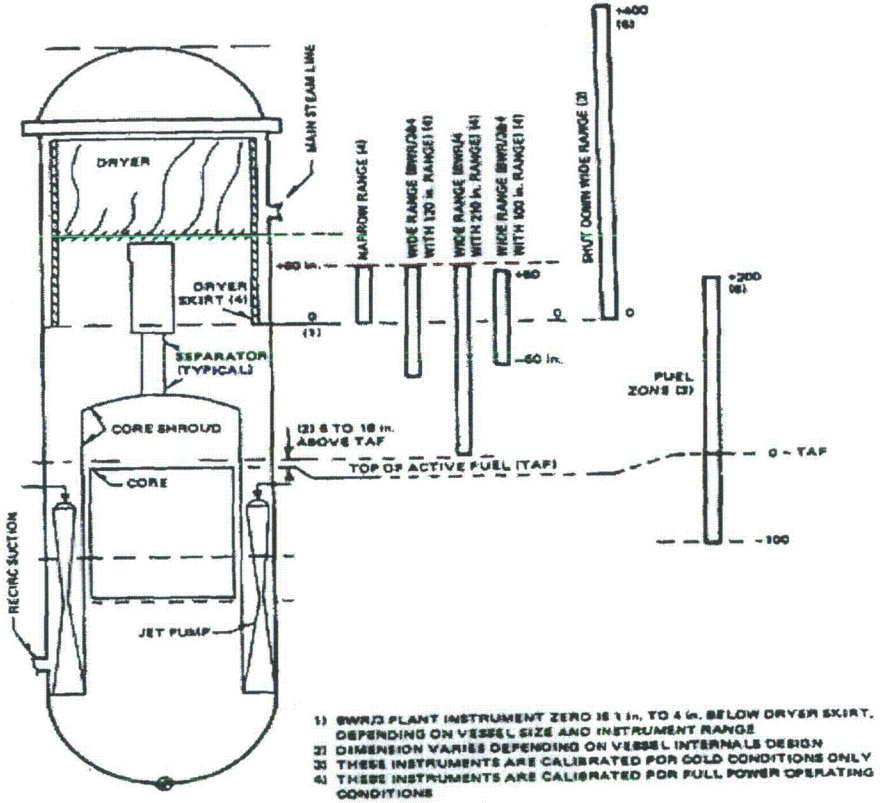
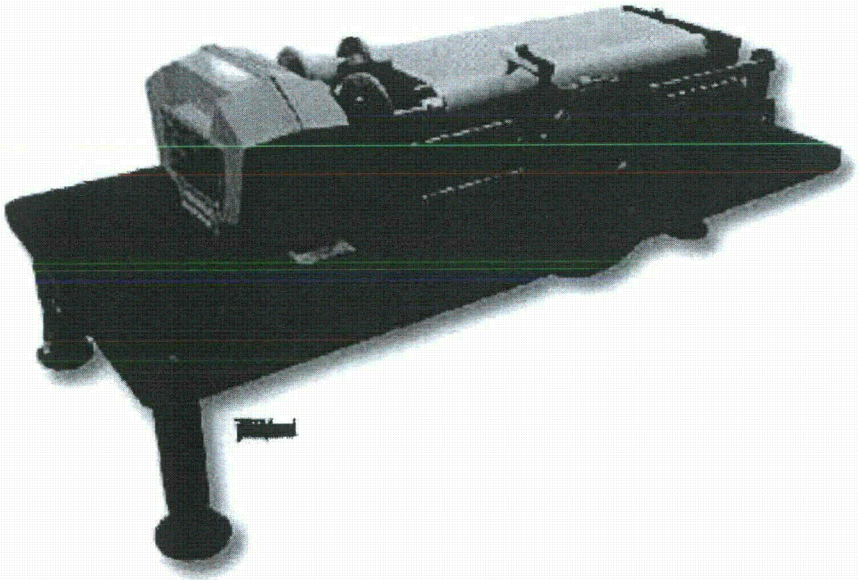
5 – Sensors and Instruments



Typical BWR-4 Water Level Instrumentation Location (NUREG/CR-5640, 1990)



Stevens Water Level Chart Recorder

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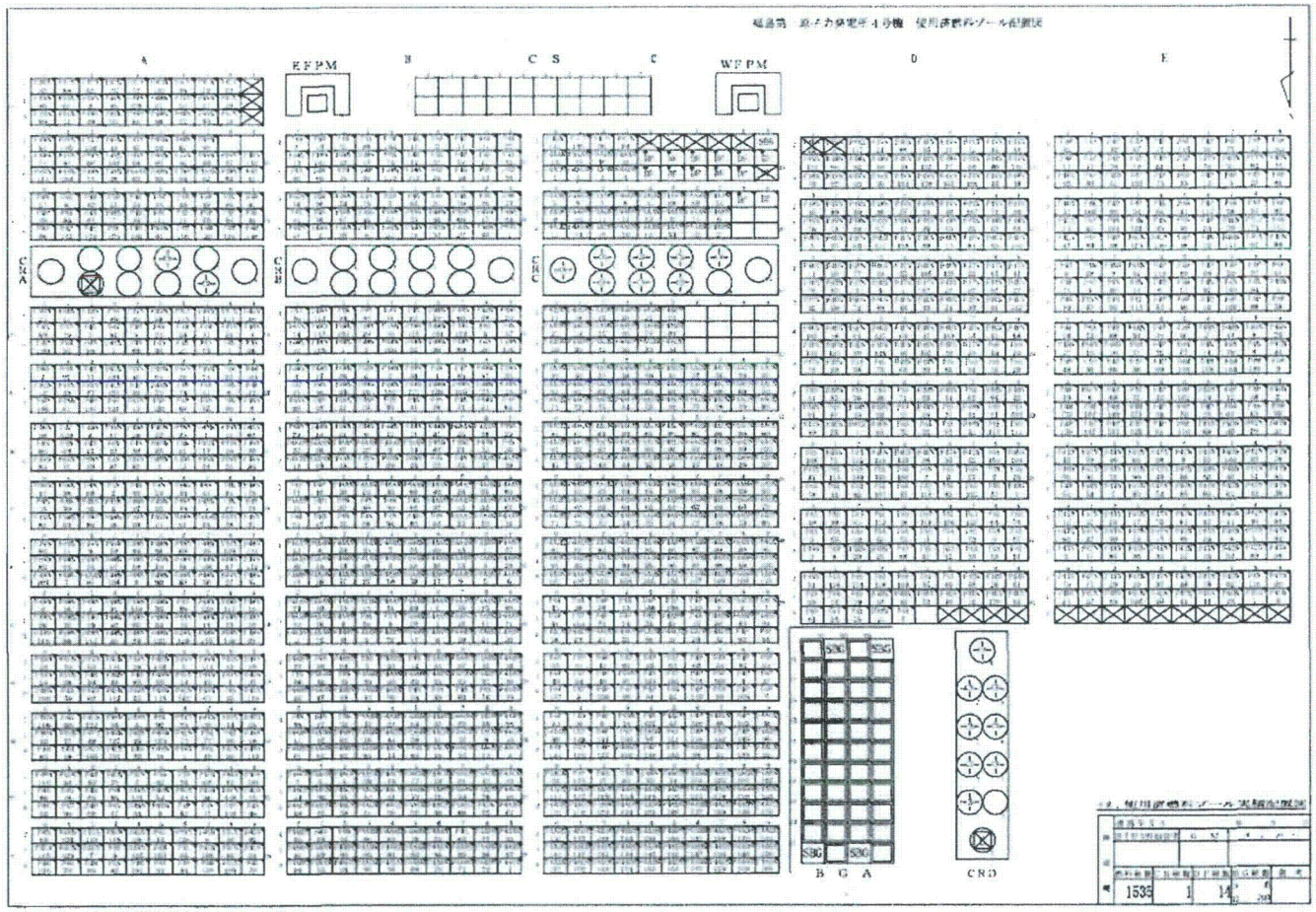
Nuclear Energy

8 – Spent Fuel Pool Quenching



Spent Fuel Pool Loading Information From TEPCO for 1F4

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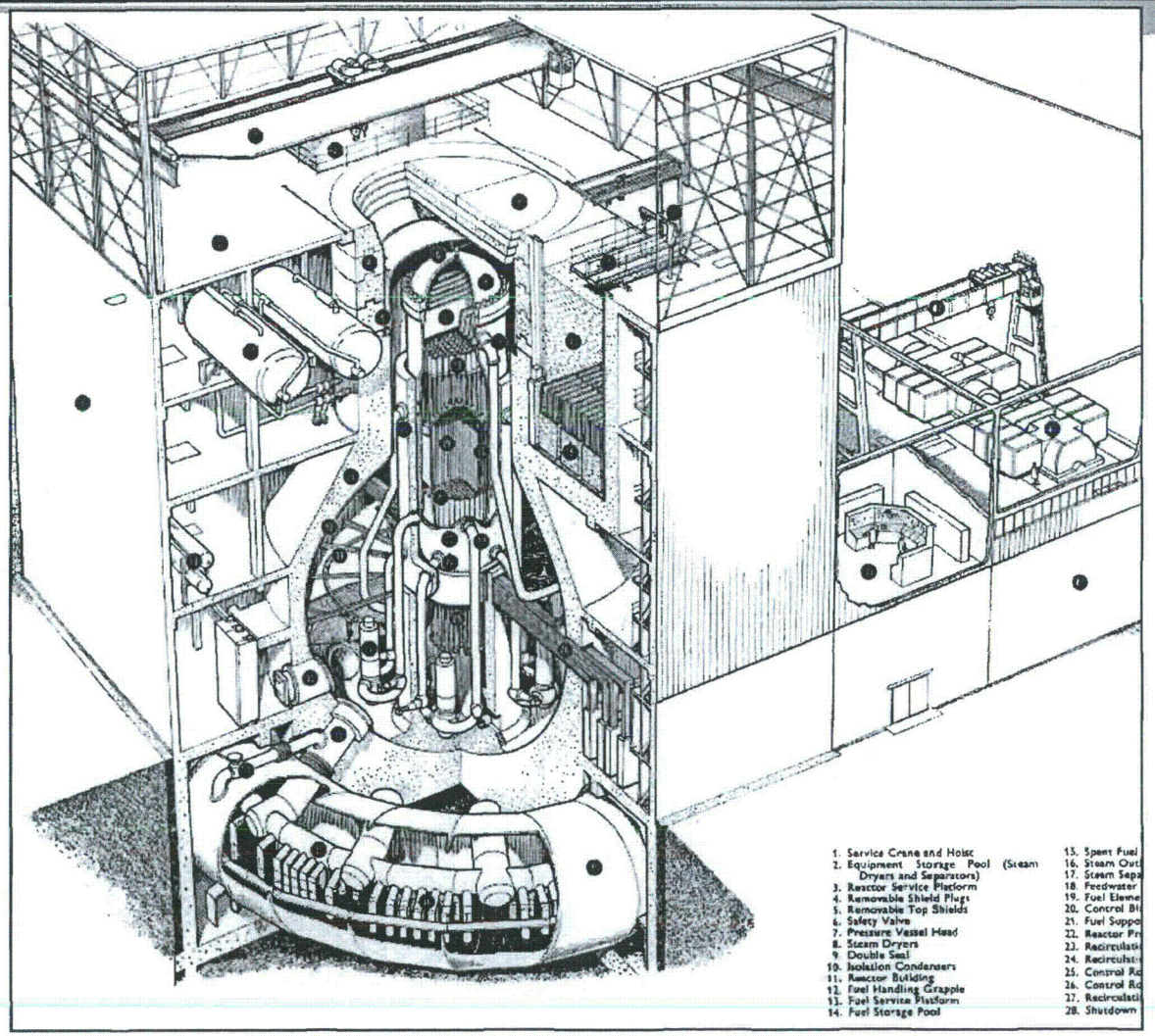
6 – Flooded Reactor Building to Couple Pressure Vessel to Concrete



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7 – Source of Fires

- Most pyrophoric metals like Zr burn with a white smoke.
- White smoke can also be from ordinary cellulosics like paper or wood.
- The black smoke is from oils or cables that have ignited.
- Cables in the primary containment (i.e., drywell) if N2 inertion is lost (there are no cables in the RPV). Cables in the secondary containment (i.e., Rx Bldg)
- Hydraulic and lubricating oils in various motors, pumps and valves in the Rx Bldg.
- Given the right conditions the Zirc clad can be ignited either in the SFP or RPV.
- H2 is a flammable gas that is generated by the Zirc – H2O reaction. That is probably what blew the tops off the Rx Bldgs already.
- Cables fires have two big concerns the first is obvious loss of function of whatever the burning cable(s) is/are used for power or I&C, the second (and this happened at Browns Ferry) is inadvertent operation of the component (e.g., Pumps, valves, instrumentation, etc.). This can be a real challenge in trying to stabilize the plant (as it was in 1975 @ Browns Ferry) coupled with the typical fire hazards that impede operator/maintenance/ repair actions (i.e., smoke, heat reduced visibility, etc.).

Backups

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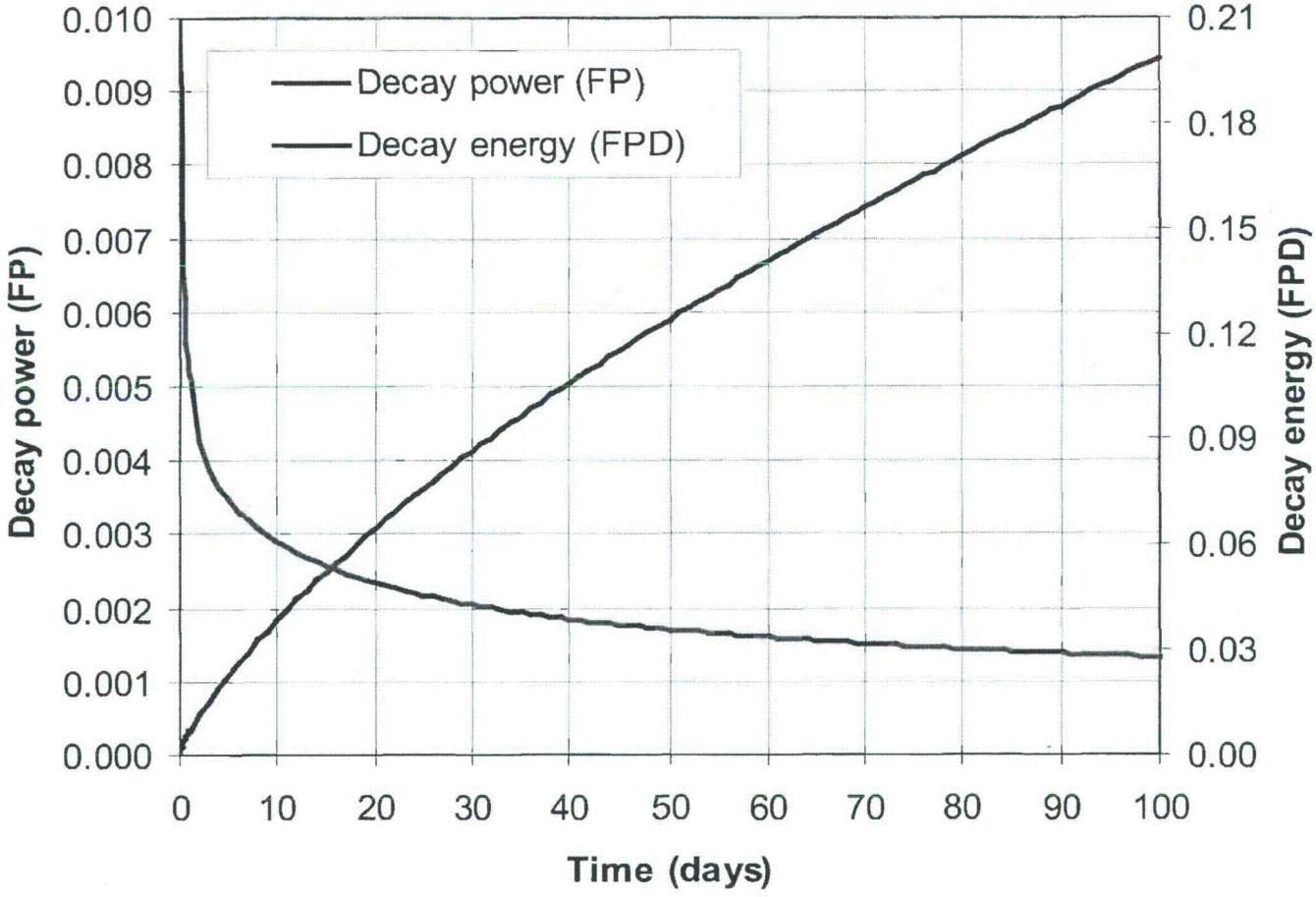
Nuclear Energy

Decay Power/Decay Energy for Units 2-3 (2380 MWt)



U.S. DEPARTMENT OF ENERGY

Nuclear Energy

Formation of deposits is highly dependent on local conditions

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- If water is still leaking out the seals on the pumps, it's unlikely that anything is currently blocked or packed with salt, although this could change.

1 – Control Room Shielding (dose)
2 – RHR Pump Operation and Shielding
3 – Measurement of Containment Water Level
4 – Update on Effect of Salt on Coolability
5 – Sensors (pool level)
6 – Flooded Reactor Building to Couple RPV to Concrete
7 – Source of Fires
8 – Spent Fuel Pool Quenching
9 – Whole Body Counting

From: Sheron, Brian
To: HOO Hoc
Subject: FW: Japanese Earthquake 23 March 2011 1800 EDT Situation Report
Date: Thursday, March 24, 2011 7:31:00 AM
Attachments: Japan Earthquake Response 03232011 1800a.pdf
SITREP MAR23 1800 final.docx

Please forward to ET Director. Thx.

-----Original Message-----
From: Adams, Ian [mailto:Ian.Adams@Hq.Doe.Gov]
Sent: Wednesday, March 23, 2011 6:37 PM
To: Adams, Ian; Aoki, Steven; Binkley, Steve; Bob Budnitz; Sheron, Brian; Brinkman, Bill; Dick Garwin; Dick Garwin; Finck, Phillip; Grossenbacher, John (INL); Hurlbut, Brandon; Kelly, John E (NE); Koonin, Steven; McFarlane, Harold; Owens, Missy; Per Peterson; Rolando Szilard; Steve Fetter
Subject: FW: Japanese Earthquake 23 March 2011 1800 EDT Situation Report

Attached is this evening's sit rep on Japan.

This information should not be shared or further distributed.

-----Original Message-----
From: NITOPS
Sent: Wednesday, March 23, 2011 6:35 PM
To: (b)(6)

(b)(6)

CH/257

(b)(6)

Subject: Japanese Earthquake 23 March 2011 1800 EDT Situation Report

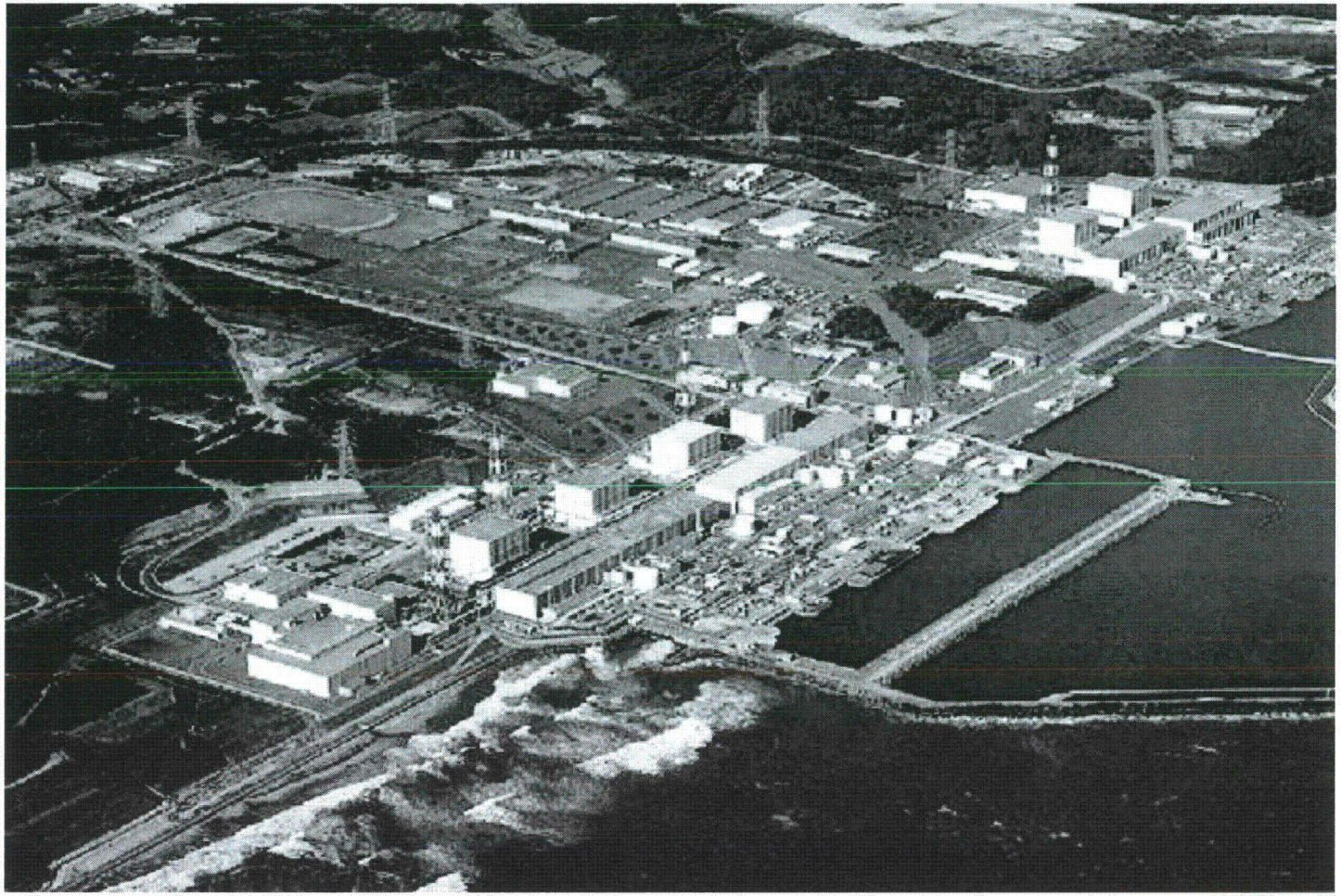
Please find attached the latest DOE SITREP regarding the ongoing earthquake and tsunami response in Japan.

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

The SITREP will be updated every 12 hours.

Nuclear Incident Team (NIT)
Office of Emergency Response (NA-42)
National Nuclear Security Administration U.S. Department of Energy nitops@nnsa.doe.gov
nit@doe.sgov.gov 202-586-8100

Japan Earthquake Response
March 23, 2011 // 1800 EDT



This information is for limited distribution to those with a NEED TO KNOW and should not be forwarded outside your agency or organization without prior clearance from U.S. DOE

Contact: DOE/NNSA Nuclear Incident Team: NITOPS@nnsa.doe.gov

Current Status

- **No major changes in radiation levels at the Fukushimi Daiichi Nuclear Power Plant**
  - Unit 1: Reactor water level stable, core damage est. 70%. Seawater injection is being converted to freshwater. Electrical power line connected (through Unit 2). Radiation level reported by TEPCO at front gate at 0700 JLT
  - Unit 2: Reactor water level stable, core damage est. 33%. Spent fuel pool has been filled. Power restored and electric water pump systems being tested.
  - Unit 3: Seawater injection is being converted to freshwater in reactor; trucks pumping water into spent fuel pools. Water level stable and pressure stabilized. Power restored.
  - Unit 4: Spraying continues periodically for the spent fuel pond. Power restored. Trucks pumping water into spent fuel pools.
  - Units 5 & 6: Diesel generators supplying power to cooling system. Reactors appear stable.
- Elevated levels of radioiodine are being reported in tap water in Tokyo.

DOE/NNSA Response

- **Command, Control, Coordination:**
  - ***Nuclear Incident Team (NIT):*** Coordinating overall emergency response
  - ***Policy Working Group (PWG):*** Coordinating overall policy
  - ***Senior Energy Official:*** Primary Manager of deployed field teams
  - ***Liaisons:*** DART, USPACOM, USAID, NRC
- **Modeling**
  - ***National Atmospheric Release Advisory Center (NARAC):*** conducting predictive radioactive atmospheric dispersion modeling
- **Monitoring and Sampling**
  - ***Consequence Management Response Team (CMRT):*** Conducting ground monitoring, air sampling and initial results analysis
  - ***Aerial Monitoring System (AMS):*** Conducts aerial detection for mapping radiological ground material deposits
- **Assessment**
  - ***Consequence Management Home Team (CMHT):*** Scientific assessment of data updated daily from ground measurements and AMS flights
- **Medical Consultation**
  - ***Radiation Emergency Assistance Center/Training Site (REAC/TS):*** Providing medical advice about radiological exposure

Deployed (41)

Yokota AB
- (1) SEO
- (28) CMRT
- (6) AMS

US Embassy Tokyo
- (2) Foreign Service Nationals
- (2) Permanent Staff
- (1) DART LNO
- (1) Nuclear Energy Representative

USPACOM HQ
- (1) LNO

Operations Over Past 24 Hrs.

- Modeling
  - NARAC: Developing transpacific runs with new source term (Melcore source term). Produced predictive plume models for next 24 hours including two bounding cases for Tokyo and completion of west coast impacts table
- Field Monitoring
  - AMS: Ongoing surveys – rotary aircraft mission in Ibaraki Prefecture focused on agriculture area near coast; fixed-wing mission north and west of Daiichi to provide plume deposition on land.
  - CMRT: Field Teams conducted monitoring missions south of incident site along Joban Expressway and at US Embassy (Tokyo).
- Assessment
  - CMRT and CMHT compiled DOE, Interagency, and Japan inputs to produce field measurement summary for last 24 hours
- Medical Consult
  - Responded to 7 medical consult RFIs in past 48 hours
- Nuclear Incident Team
  - Supported DOS and NSS Trip Wire Meeting
  - Ongoing evaluation of DOE NR dose model
  - Published two radiological Triage reports

External Data Providers

- **Japan**
  - Ministry of Foreign Affairs (MOFA)
  - Ministry of Education, Culture, Sports, Science, and Technology (MEXT)
  - Tokyo Electric Power Company (TEPCO)
  - Nuclear Safety Technology Center (NUSTEC)

- **United States**
  - Japan Emergency Command Center, US Embassy, Tokyo
  - USAF, BSC Commander
  - Futenma Marine Corps Air Station
  - Nuclear Regulatory Commission
  - Naval Reactors

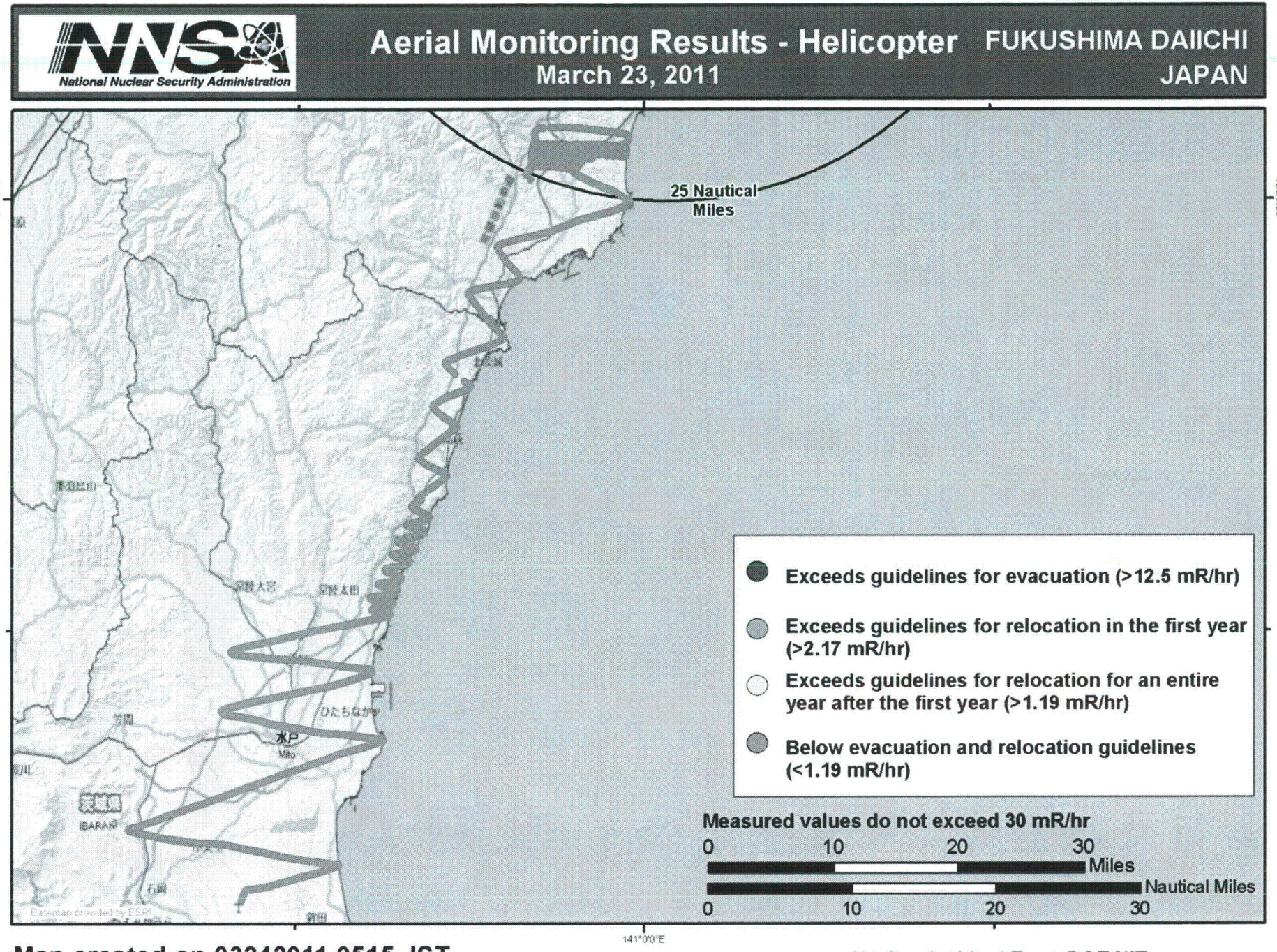
Guide to Interpretation

Derived Response Levels (DRL)

- Early Phase DRL
  - If a person is in danger of receiving an external radiation dose of 1 Rem over 4 days, the EPA recommends evacuation until radiation levels decrease. This area is indicated in red.
- First Year DRL
  - If a person is in danger of receiving an external radiation dose greater than 2 Rem during the first year, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over a full year. This area is indicated in orange.
- Fifty Year DRL
  - If a person is in danger of receiving an external radiation dose greater than 5 Rem over 50 years, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over fifty years. This area is indicated in yellow.
- Second Year DRL
  - If a person is in danger of receiving an external radiation dose of greater than 0.5 Rem in a the second year (or any subsequent year), the EPA recommends relocation until radiation levels decrease. This area is indicated in green.

These calculations account for multiple variables. For instance, radiation is most intense in the first days following its release therefore dose reduction may be met by evacuating early in the response.

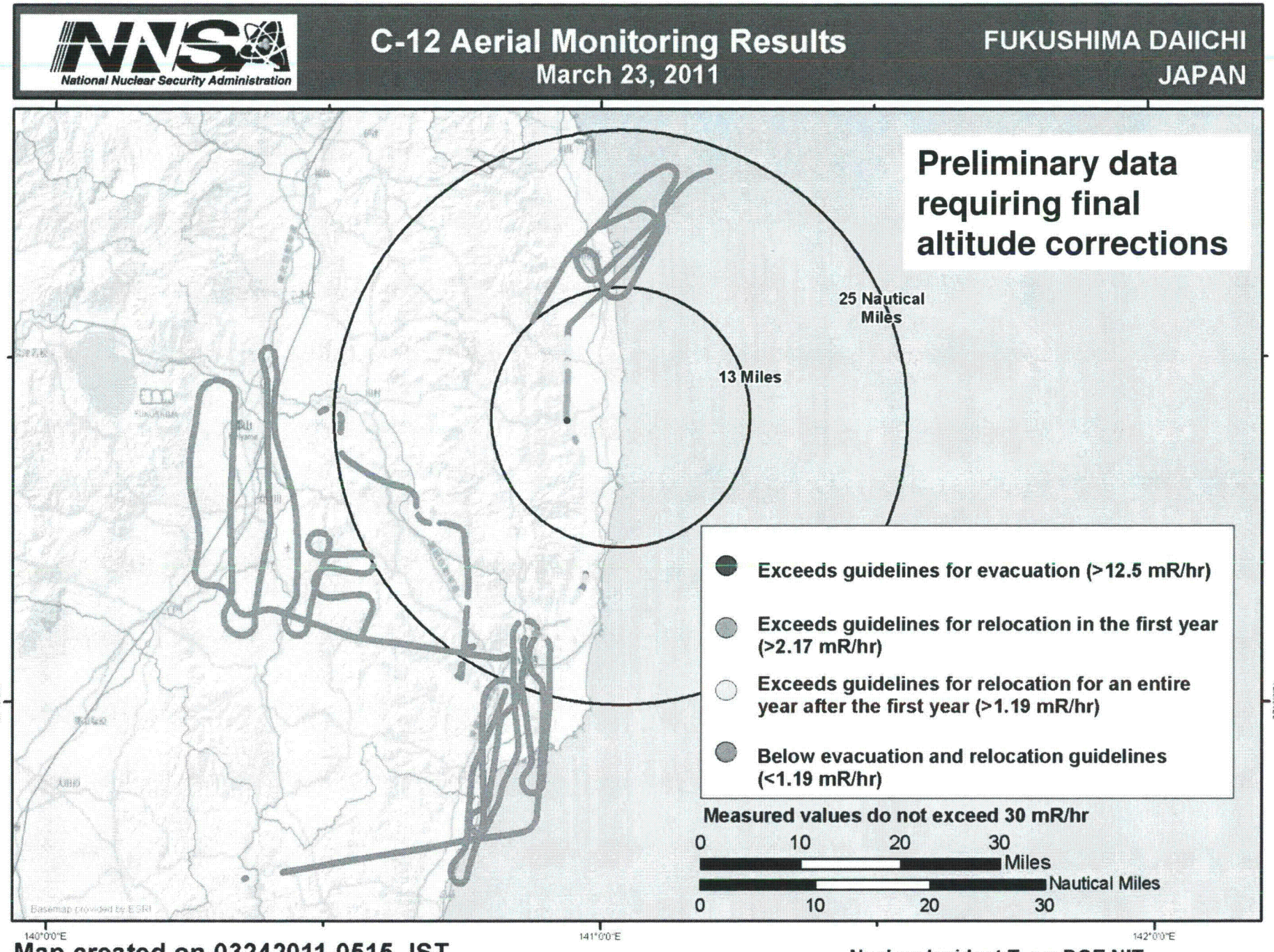
Protective actions are frequently expressed in dose rates. The dose rate is an indicator that residents would accumulate the threshold dose if they stayed in the area the entire time expressed (e.g. 1 year, 2 years, 50 years)



Map created on 03242011 0515 JST

Name: NIT-D Helo 23Mar2011 v3

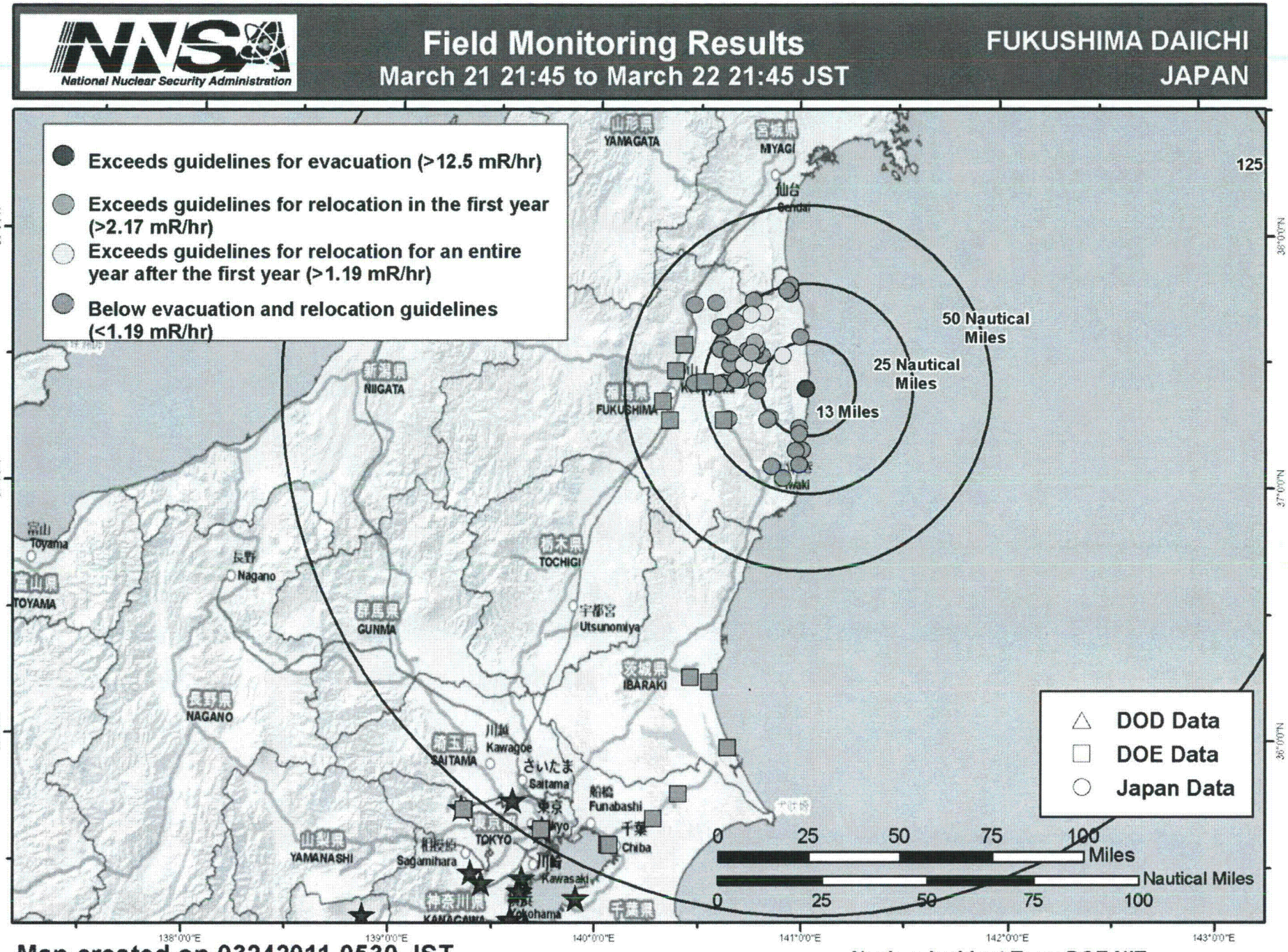
Nuclear Incident Team DOE NIT
Contact (202) 586 - 8100



Map created on 03242011 0515 JST

Name: NI-D C-12 23Mar2011 v3

Nuclear Incident Team DOE NIT
Contact (202) 586 - 8100



Map created on 03242011 0530 JST

Name: NIT-D MonitoringResults 21Mar 2145 to 22Mar 2145 v4

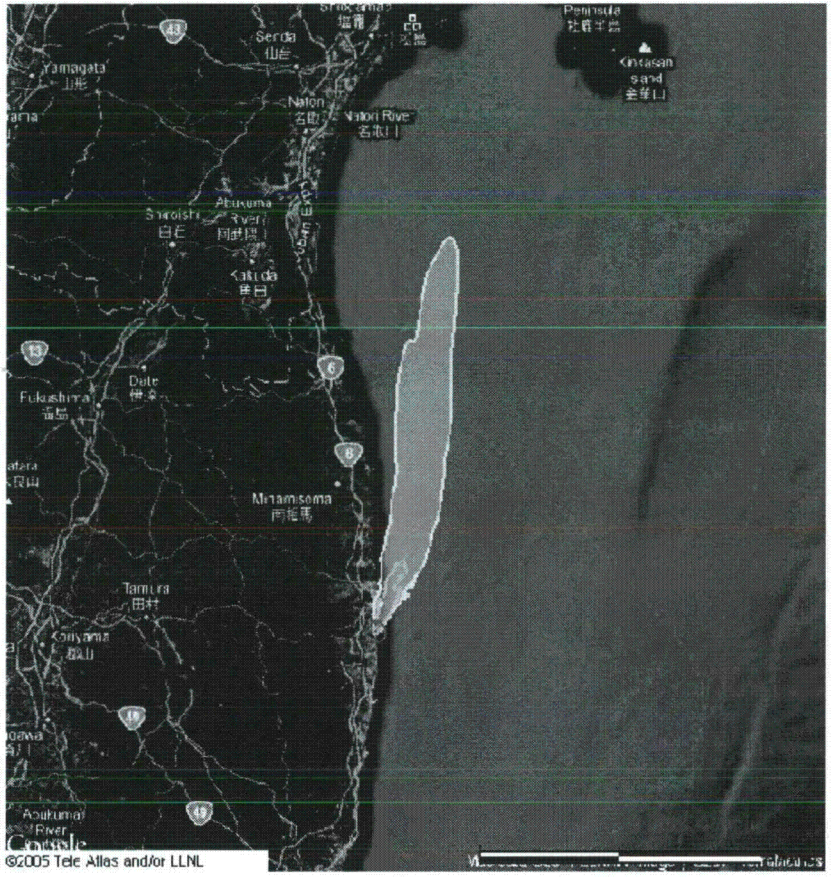
Nuclear Incident Team DOE NIT
Contact (202) 586 - 8100

~~Official Use Only~~

Forecasted Weather March 23-24

- 03/24/2011 07:00:00 JST

03/24/2011 14:00 JST



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Planned Operations: Next 24 Hrs

- Collocation of AFRAT with CMRT; setting up within 24 hours, lab operational in 36 hours
- Field Monitoring
  - AMS and field monitoring operations will be determined by results of 23 March activities and any changes in priorities.
  - Planned operations for 24 March will be included in 1800 SitRep.

DEPARTMENT OF ENERGY SITUATION REPORT
Earthquake & Tsunami in Japan
23 March 2011
1800 (EDT) UPDATE

POWER PLANT UPDATE AND OTHER NUCLEAR ISSUES

Summary of information received as of 1800 (EDT) 23 March from the NRC, Embassy-Tokyo, IAEA Incident and Emergency Center, TEPCO, METI, NISA, Japan Atomic Industrial Forum, Nuclear Energy Institute, and media outlets. (NOTE: JST = EDT + 13 hours; EDT = GMT/UTC – 4 hours).

Updates on Electrical Power Restoration Efforts:

TEPCO continues work to restore electrical power to all six reactors. External power is available to plant distribution panels for units 1, 2, 3, and 4. Tests to energize existing plant equipment are in progress. Unit 1 and 2 cooling pumps were covered with seawater and maintenance is necessary. Unit 3 main control room recovered power for lighting at 00:43 EDT on March 22. Unit 3 Control Room lights have been restored. Electricity to unit 4 control room is expected to be restored on March 23. Reestablishment of power to the existing receiving equipment in Unit 5 and 6 buildings has been completed. The central control center and Residual Heat Removal system are being energized.

Japan Atomic Industrial Forum (JAIF) report states temperature instruments measuring the surface of reactors 1, 2, and 3 was restored at 15:15 EDT on March 22.

Updates on Cooling Efforts at Dai-ichi:

Water spray using Concrete Pump Truck (50t/h) to the Unit 4 was started.
(10:00 March 23rd)

Per conference call with an NRC representative in Japan at 2200 on 22 March, the Unit 2 SFP has been filled, efforts are being made to connect fresh water to units 1-3 and it is not clear how effective the use of the cement truck is at filling the unit 3 and 4 Spent Fuel Pools.

NHK News reported that TEPCO planned to test-run a cooling pump at Unit 3 on Wednesday, March 23 as part of the cooling restoration effort. Also TEPCO reported reactor temperature instruments for Units 1, 2, and 3 were restored to working order over the weekend. These instruments measure reactor vessel external surface temperature. Temperatures were indicating higher values than normal. Unit 1 vessel surface temperature (feedwater nozzle) was indicating 394^{0}C, and as of 1900 Mar 23 (NISA) lowered to 305^{0}C ; and Unit 3 was indicating 366^{0}C, and as 1900 Mar 23 lowered to 304^{0}C. No information was provided for unit 2. In response, TEPCO increased seawater cooling rates to Unit 1 to cool the reactor down.

On 22 March, the NRC met with TEPCO and NISA to discuss the accumulating salt in the reactors resulting from evaporating sea water being used for cooling and approaches for dealing with this issue. TEPCO is seeking ways to transition to fresh water injection and flushing of the salt from the reactor as quickly as possible, which would require higher injection rates. TEPCO has encountered problems setting up freshwater injection. A complicating factor is that TEPCO currently does not have a fresh water supply at the site. There is a nearby dam which had been connected by a pipe but the pump is off-line. TEPCO is attempting to reestablish this capability, and is also looking at desalination units on site as a backup.

Radiation Detection Update:

At 10:30 a.m. Tuesday March 22, TEPCO reported high levels of radioactive substances have been found in seawater near the damaged Fukushima Daiichi nuclear power plant. Levels of iodine-131 in the seawater were 126.7 times higher than government-set standards, the electric company said on its website. Its monitors detected caesium-134, which has a half-life of about two years, about 24.8 times higher than the government standards. Cesium-137 was found to be 16.5 times higher than the standard. The electric company detected these levels in seawater 100 meters (328 feet) south of the nuclear power plant Monday afternoon. Per JAIF, at 1430 JST on March 21 it was announced that radioactive nuclides had been detected from sampling of seawater near the seawater discharge point of unit 1 to 4 (southside).

To study a larger area, the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) plans to measure radioactivity around the plant from 22-23 March at 8 locations, with results to be provided on 24 March (per the IAEA). The analysis will include radionuclide concentrations found in sea water and dose rate.

As of 1530 22 March, the IAEA reported monitoring of gamma dose rates and beta-gamma contamination has continued over the last 24 hours. This has been carried out together with the Japanese authorities to facilitate the comparison of results. The IAEA took measurements at additional locations between 35 to 68 km from the Fukushima plant. The dose-rate results ranged from 0.8 to 9.1 micro sieverts per hour. The beta-gamma contamination measurements ranged from 0.08 to 0.9 MBq per square metre.

Updates by Reactor Unit

Fukushima Dai-ichi Unit 1 reactor (NRC priority 4):

Increased the amount of water injection (2m3/h→18m3/h) to the Reactor Core by using water supply system in addition to water extraction system. Seawater is being injected into the reactor pressure vessel as of 8:00am March 23rd. The amount of injected water to the reactor core was increased by utilizing Water Supply Line in addition to the Fire Extinguish Line at 2:33am on March 23rd. Also per METI, 0800 JST, 3/23, there is no risk of a hydrogen explosion in

the containment vessel because there is no oxygen in it. There is a low likelihood of leaking a large amount of radioactive material from unit 1.

Per NISA, 1900 JST on March 23, reactor parameters appear stable: pressure - 0.470 MPaG (depressurized); water level - 1.75 meters below the top of the fuel rods; containment vessel – 0.32MPa; spent fuel temperature remains relatively stable at 51° as of 1800 Mar 23.

According to TEPCO press release, seawater was started to be injected to the nuclear reactor through the feed water system at approximately 1330 EDT on March 22rd.

Fukushima Dai-ichi Unit 2 reactor (NRC priority 3):

Seawater is being injected into the reactor pressure vessel as of 8:00 am March23rd.

Per conference call with an NRC representative in Japan at 2200 on 22 March, the Unit 2 SFP has been filled. Power has been provided to the unit 2 control room. Lights were turned on in that control room Tuesday night. (NHK World news). Per NRC EOC status of Mar 23, condition of pump motors and instrumentation is being evaluated.

Per Nuclear and Industrial Safety Agency, 1900 JST on March 23, Reactor parameters appear stable: pressure - 0.13 MPaG (depressurized); water level - 1.3 meters below the top of the fuel rods; containment vessel – 0.10 MPa. Seawater injection to the Reactor Pressure Vessel (RPV) continues.

Fukushima Dai-ichi Unit 3 reactor (NRC priority 1):

Lighting was recovered in the Central Operation Room. (22:43 March 22nd)The seawater is being injected into the reactor pressure vessel as of 8:00am March 23rd. Several counter measures are being used to cool down the spent fuel pool of Unit 3. Injection of 35t of seawater to the SFP via cooling and purification line was carried out.

TEPCO has reported black smoke has been seen emerging from Unit 3 of the crippled nuclear plant in northeastern Japan, prompting a new evacuation of the complex. Officials with Tokyo Electric Power Co. said Wednesday that workers from the entire Fukushima Dai-ichi plant have been temporarily evacuated. **Per NRC EOC status update of 23 Mar, the smoke decreased 2 hours later and news reports indicate that workers returned.** Per NISA, 1900 JST on March 23, reactor parameters appear stable: avg. pressure - 0.11 MPaG (depressurized); water level – 1.80 -2.30 meters below the top of the fuel rods; containment vessel – 0.10 MPa.

The fire department resumed spraying Unit 3 at 1550 JDT on March 22 after smoke ceased. According to TEPCO, the light in the main control room was turned on at approximately 10:45 pm JDT on March 22nd.

Fukushima Dai-ichi Unit 4 reactor (NRC priority 2):
Situation of Water Injection and Water Spray
NISA, 1800 JST on March 23, water spray of around 150t of water using Concrete Pump Truck (50t/h) to the Unit 4 was started.
(10:00 March 23rd). A concrete pumping vehicle sprayed 150 tons of seawater on spent fuel pool at Unit 4, from 5:17 pm to 8:30 pm JDT on March 22. Though they think the concrete pumping vehicle is very effective, they will continue to take all measures to conduct the restoration work with the cooperation of organizations involved. A camera was set at the end of the water spray arm. They will assess the status of the pool after the spray when they retrieve the camera.

Fukushima Dai-ichi Unit 5 reactor (NRC priority 5):

The Nuclear and Industry Safety Agency (NISA) as of March 23 at 1900 (JST): The reactor is in cold shutdown with a pressure in the Reactor vessel of 0.108 MPa. Water level in the reactor is 1.744 meters above the top of the fuel. As a result of restarting the Residual Heat Removal (RHR) pump (C), the Spent Fuel Pool is being maintained at 41.0°C at 1900 JST on March 23.

Fukushima Dai-ichi Unit 6 reactor (NRC priority 6):

The Nuclear and Industry Safety Agency (NISA) as of March 23 at 1900 (JST): The reactor is in cold shutdown with a pressure in the Reactor vessel of 0.109 MPa. Water level in the reactor is 2.701 meters above the top of the fuel. The SFP temperature is currently 19.0°C at 1200 JST on March 23.

Fukushima Dai-ini Units 1-4: TEPCO confirmed cold shutdown and continued cooling of reactor cores.

Updates from the IAEA website:

Joint FAO-IAEA-WHO Statement on Food Safety Issues following the Fukushima Daiichi Nuclear Emergency:

Food safety issues are an additional dimension of the emergency. Some food products sampled at sites both within the Fukushima Prefecture and in adjacent areas have been contaminated by radioactive materials.

Japan has regulations in place relating to provisional regulatory limits of radioactivity in food. Food monitoring is being implemented, measurements of radionuclide concentrations in food are taking place, and the results are being communicated publicly. Japanese authorities are also giving advice to consumers and producers regarding safety measures.

http://www.who.int/hac/crises/jpn/faqs/en/index7.html

Aerial Measurements Update:

DOE Team

- Helo and fixed wing survey operations took place on 23 March (JST).
- NIT produced a composite map of field monitoring data that shows radiation levels as they relate to U.S. guidelines for relocation/evacuation.
- Products have been developed and data has been analyzed for previous operational period through 22 March.
- Products and analysis will continue for operations through 23 March and will be available in 1800 23 March SITREP
- Goal of the helicopter missions is to provide where plume deposition on the land and to support GOJ concerns with area agriculture.
- Goal of fixed wing missions is to provide information on the plume deposition on the land
- AMS and field monitoring operations will be determined by results of 23 March activities and any changes in priorities.
- In total, AMS has flown 13 flights as of 22 March
  - 7 Rotary wing
  - 6 Fixed wing

PETROLEUM Update:

According to a report yesterday (March 22) from Japan's Ministry of Economic, Trade, and Industry (METI), four oil refineries remain suspended. The refineries are JX Sendai (145,000 b/d), JX Kashima (189,000 b/d), Cosmo Chiba (220,000 b/d), and JX Negishi (270,000 b/d). The METI reports, however, that the JX Kashima is slated to restart operations sometime this week. Since the earthquake, two refineries have restarted operations, the Kyokutou (175,000 b/d) and TonenGeneral Kawasaki (335,000 b/d). Yesterday (March 22), Japan released 58 million barrels (22 days worth of demand) of oil from its private sector emergency stockpiles. Last week the country released 8 million barrels of oil from its private sector emergency stockpiles.

News Reports

Embassies closing, moving south of Tokyo, Japan reports

Tokyo (CNN) -- Embassies from more than two dozen countries have either closed down or moved operations to cities south of Tokyo since the March 11 earthquake and the resulting nuclear crisis in northern Japan, the country's Foreign Ministry said Wednesday. "There are 25 embassies which either temporary shut down or moved its function outside of Tokyo," Foreign Ministry spokesman Hidenori Sobashima told CNN. Seven of those 25 have moved to cities such as Osaka, Hiroshima and Kobe, Sobashima said.
Those closing or moving included embassies from five European countries, including Germany and Switzerland; 14 African countries, including Kenya, Nigeria and Ghana; and four from Latin America.

Radioactivity in food, milk and drinking water

New data for radionuclide concentration data for food, milk and drinking water is being accumulated. Sampling is most extensive within Fukushima and Ibaraki prefectures. The sampling frequencies and locations, as well as the type of foodstuff sampled are, by necessity, not uniform. Hence, reporting on radionuclide concentrations in foodstuffs is ad hoc. Since the last report, the following new foodstuff monitoring data is noted:

- In Tokyo, concerns over radiation surged.
    - Government samples taken Tuesday night found 210 becquerels of radioactive iodine per kilogram of water -- two times higher than the limit that the government considers safe for infants.
    - The amount of iodine detected was lower than the level considered safe for adults: 300 becquerels per kilogram.
    - A becquerel is a unit of radioactivity equal to one nuclear decay or other nuclear transformation per second.
- Japan's government expanded food shipment restrictions after the health ministry said tests detected radioactive materials at levels exceeding legal limits in 11 types of vegetables grown near the Fukushima plant.

News reports that GOJ officials said Wednesday March 22 that radioactive material exceeding legal limits for infants was detected in tap water. Tap water tests revealed higher levels of radioactive iodine than government standards.

Japan's Health Ministry reported Tuesday finding radioactive materials at levels "drastically exceeding legal limits" in 11 types of vegetable grown in Fukushima Prefecture, including broccoli and cabbage, according to Kyodo News Agency. NHK News reported strong earthquakes of the Pacific coast of northeastern Japan on Wednesday morning. A quake with a magnitude 6.0 jolted Fukushima Prefecture at around 7:12 AM JST, followed by a magnitude 5.8 tremor about 20 minutes later.

Extremely high radiation found in soil

(Japanese Broadcasting Corporation (NHK), March 23) Japanese authorities have detected a concentration of a radioactive substance 1,600 times higher than normal in soil at a village, 40 kilometers away from the troubled nuclear power plant in Fukushima Prefecture.

The disaster task force in Fukushima composed of the central and local governments surveyed radioactive substances in soil about 5 centimeters below the surface at 6 locations around the plant from last Friday through Tuesday.

The results announced on Wednesday show that 163,000 becquerels of radioactive cesium-137 per kilogram of soil has been detected in Iitate Village, about 40 kilometers northwest of the plant.

Gakushuin University Professor Yasuyuki Muramatsu, an expert on radiation in the environment, says that normal levels of radioactive cesium-137 in soil are around 100

becquerels at most. The professor says he was surprised at the extremely high reading, which is 1,630 times higher than normal levels.
He warns that since radioactive cesium remains in the environment for about 30 years it could affect agricultural products for a long time. He is calling on the government to collect detailed data and come up with ways to deal with the situation.

Wednesday, March 23, 2011 19:02 +0900 (JST)

High levels of iodine in Tokyo tap water Radioactive iodine has been detected in Tokyo tap water in levels above the safe limit for infants. The Tokyo Metropolitan government says 210 becquerels of iodine-131 were detected on Tuesday in one liter of water at one of its purification plants in northern Tokyo. A sampling on Wednesday also showed roughly 190 becquerels per liter.
These levels are below the 300-becquerel per liter safe limit for adults, but far above the 100-becquerel limit for infants. Tokyo says infants in the central 23 wards, plus 5 adjacent cities, should refrain from drinking tap water.

The Tokyo Metropolitan government is also urging beverage makers in these areas not to use tap water in infants' drinks. Tokyo says the safety level assumes long-term consumption, and that there is no risk to health if tap water is consumed over a short period.

As Reported by NKO on Wednesday, March 23, 2011 15:13 +0900 (JST)

Japan quake costliest ever; radiation in Tokyo water:

TOKYO (Reuters) - Japan estimated the cost of the damage from its devastating earthquake and tsunami could top $300 billion as authorities in Tokyo warned that babies should not be given tap water because of radiation from a crippled nuclear plant.
The first official estimate since the March 11 disaster covers damage to roads, homes, factories and infrastructure, and dwarfs losses from both the 1995 Kobe quake and Hurricane Katrina that swept through New Orleans in 2005, making it the world's costliest natural disaster.

As concern grew over the risk to food safety of radiation from the damaged Fukushima power plant, 250 km (150 miles) north of the Japanese capital, the United States became the first nation to block some food imports from the disaster zone.

Tokyo authorities said on Wednesday that water at a purification plant for the capital of 13 million people had 210 becquerels of radioactive iodine -- more than twice the safety level for infants.

OTHER NUCLEAR ISSUES

No new information in this report.

DOE ASSESSMENT

[Factored into reactor summaries]

REQUESTS FOR US ASSISTANCE

METI was especially interested in the radiation hardened camera, which they said is urgently needed. In general, METI identified remote monitoring and debris removal as priority areas of need. The GOJ will review the report and develop a formal request which will be handled through the Crisis Management Team.

We are looking to OSD to provide a small cell to the DART -- which would have a DOE technical advisor--to help facilitate with any logistics of items that would need to go into Japan or be moved around Japan to deal with the Japanese reactor crisis. Logistical support may be just to facilitate private companies donating/providing items or, in some cases, it may mean USFJ transport assistance or liaison. AID (DART) feels they lack the capacity and technical skills to perform this function and it is clearly not in the comfort zone of NRC.

NRC will continue to follow up with NISA on these requests.

ENERGY INFRASTRUCTURE:

As of March 21st 9:30 PM JST, Japan's Nuclear and Industry Safety Agency reports that of the households that can receive power, 220,000 households remain without electricity in Japan. These customers are all located in Tohoku Electric Power Company's service area. All customers who are able to receive power in Tokyo Electric Power Company's (TEPCO) service area have been restored. Rolling blackouts are still being implemented for select areas in TEPCO's service areas.

CONTACTS WITH JAPANESE OFFICIALS

At 11:30 on March 23, EMIN Marc Wall, Dan Dorman of NRC, and Ron Cherry of DOE Japan Office met with Cabinet Secretariat counselors Mitsugu Saito and Katsuro Nagai to discuss the process for information flow between the U.S. and the GOJ's recently established interagency Crisis Management team. Saito and Nagai agreed that the formation of the Crisis Management team under the leadership of the Cabinet Office is helping improve the flow of information, both between the U.S. and Japan and within the GOJ. Dorman described steps the NRC is taking with GOJ counterparts, particularly TEPCO and NISA, to make information exchanges more routine on a daily basis. The nightly meetings of the Crisis Management team will enable both sides to take stock of developments during the day so that responses can be formulated overnight for discussion at the technical level the following day. During the meeting, Cherry provided a report prepared by DOE on Robotic and Remote Systems Assistance Available to the Government of Japan. The report describes basic performance capabilities of the

equipment and identifies which can be made available immediately, in 1-9 months, and in 9-18 months. The equipment is primarily U.S. Government property but some equipment listed (e.g., automated backhoe) would have to be commercially procured. Equipment that has to be commercially procured is so noted.

The report also identifies available expertise. Cherry also briefly described the activities of the DOE Aerial Monitoring System team in Japan, noting that information about results is being shared with the GOJ through MOFA. Saito and Nagai said they were unaware of the AMS activities and indicated they would follow up with the MOFA point of contact. They indicated it would be useful to include monitoring as an agenda item for Crisis Management meetings.

QUESTIONS BEING WORKED:

The President of MLB Corporation in California sent an email to the NIT offering to donate several small, low cost aircraft that could be outfitted with low cost radiation sensors. The sensor data can be correlated to the aircraft's GPS location to provide a radiation survey map. The aircraft operates autonomously and can cover a distance of 300 linear miles in a single flight.

A concise timeline of events at Fukushima reactors 1-6 is being developed.

CONTACT INFORMATION:

Deborah Wilber arrived in Japan on March 23 to interface with the US DOE and Japanese response organizations to improve coordination.

Giulia Bisconti from DOE's Office of Science is traveling to Tokyo Japan to assist Damian Peko.

Nuclear Incident Team in the Emergency Operations Center (NITOPS@NNSA.DOE.GOV) - 202-586-8100

Office of the Deputy Secretary 202-586-5500

Watch Schedule:

Doug Fremont	1600/23 Mar – 2000 23 Mar
Ted Wyka	
Maegon Barlow	
Craig Welling	
Mark Whitney	0400/24 Mar – 0800/24 Mar
Alan Felser	
Dennis Miolta	

Doug Fremont	1600/24 Mar – 2000/24 Mar
Ted Wyka	
Craig Welling	