From: Doane, Margaret
To: Hayden, Elizabeth
Cc: Brenner, Eliot
Subject: Fw: Message from Mr. Sogabe
Date: Saturday, March 12, 2011 7:43:46 PM

I received this from Japan this morning in response to our offer of help.
Margie

Sent from an NRC Blackberry
Margaret Doane

----- Original Message -----
From: iwamoto-akiko@jnes.go.jp <iwamoto-akiko@jnes.go.jp>
To: Doane, Margaret
Cc: Jaczko, Gregory; sato-tatsuo@jnes.go.jp <sato-tatsuo@jnes.go.jp>; sogabe-katsuhiro@jnes.go.jp <sogabe-katsuhiro@jnes.go.jp>; tomita-kazuhide@jnes.go.jp <tomita-kazuhide@jnes.go.jp>
Sent: Sat Mar 12 06:24:17 2011
Subject: Message from Mr. Sogabe

Dear Ms. Doane,

President of JNES, Mr. Sogabe, thanks you for your transmitting the warm thoughts and expression from Mr. Jaczko. It is indeed terrible disaster and we are very sorry for the victims of the earthquakes and tsunamis.

We also appreciate your offer of support. For the time being, we feel we grasp well the situation, but it is very encouraging that the experienced American experts are ready to support us.

As for BWR experts, we have already enough support from Japanese BWR vendors, but your kind offer reassures us. In case we will need further expertise, we will let you know.

Right now, we are working hard to have the situation under control. This is the worst event that we ever had in our country, but we hope to get through the challenge.

We will, of course, try to share the information on the event with you as far as we can spare our efforts for that.

With best regards,

****
Akiko Iwamoto
Assistant Director
Office of International Programs
Japan Nuclear Safety Organization (JNES)
Tel. +81-3-4511-1911 (direct)
Fax. +81-3-4511-1998
Email: iwamoto-akiko@jnes.go.jp
****

YY/271

From: Burnell, Scott
To: Harrington, Holly; McIntyre, David; Couret, Ivonne; Brenner, Eliot; Hayden, Elizabeth
Subject: RE: Q&As
Date: Saturday, March 12, 2011 8:08:43 PM

OK, I'll take a look as I'm awake now -- got several hours sleep anyway.

The reason I'm up is that I just had a very productive off-the-record "as a friend" conversation with Joel Achenbach, a really good science-y writer @ the Post. You'll hopefully see his article up soon, and I do think he's approaching things in a sensible way. I also think the conversation will lead to WaPo writers reaching out more through the Ops Ctr, so be aware. Thanks.

From: Harrington, Holly
Sent: Saturday, March 12, 2011 8:00 PM
To: Burnell, Scott; McIntyre, David; Couret, Ivonne
Subject: FW: Q&As

These are good as of 8 p.m. I expect them to evolve . .. Scott - - these are saved to the desktop to the second computer in the Op Center

---

From: Harrington, Holly
Sent: Saturday, March 12, 2011 7:58 PM
To: Jaczko, Gregory
Cc: Brenner, Eliot; Hayden, Elizabeth
Subject: Q&As

These are the current Q&As with both answers suitable for the public and additional technical information. We expect these will continue to evolve.

Holly Harrington

YY/272

Questions and Answers for Chairman Jaczko

March 11, 2011 Japan Earthquake/Tsunami Aftermath
As of 8 p.m., 3/12/2011

1. What is the NRC doing about the emergencies at the nuclear power plants in Japan? Are you sending staff over there?

Public Answer: We are closely following events in Japan, working with other agencies of the federal government, and have been in direct contact with our counterparts in that country. We are ready to provide assistance if there is a specific request. Two NRC staff members knowledgeable about boiling water reactors is participating in the USAID team that has departed for Japan.

Additional technical, non-public information:
We are taking the knowledge that the staff has about the design of the US nuclear plants and we are applying this knowledge to the Japan situation. For example, this includes calculations of severe accident mitigation that have been performed. Tony Ulses has been dispatched to Japan and should arrive Early Sunday.David Jim Trapp left 1600 Saturday should arrive in 20 hours

2. What's going to happen following the steam explosion everyone's seen from the video footage?

Public Answer: If a similar event occurred at a U.S. nuclear power plant, the NRC would be seeking information to answer several questions, including: What's the status of the reactor core, the reactor vessel and the containment building? What radiation measurement equipment is available and what measurements are being reported? What efforts are being taken to keep the public safe? How did the explosion affect efforts to keep the nearby reactors in a safe condition? And most importantly – What can the NRC do to help?

Additional technical, non-public information:

The explosion affected the secondary containment of the reactor plant. The primary containment was not affected by the explosion. The Japanese are taking actions to preserve the primary containment, cool the reactor core, maintain the reactor shut down and limit the spread of radioactive contamination.

The NRC required a back fit to US reactors of the type similar to Fukushima Unit 1 to install a hardened vent line. A hardened vent provides a release path which would prevent an explosion as experienced at Fukushima Unit One.

3. What should done to protect people in Alaska, Hawaii and the West Coast do from radioactive fallout?

Public Answer: The available evidence shows the United States can be expected to avoid any impacts from radioactive material, so no public action is necessary. We believe there is very low risk to the US considering the long distance from the US and the type of event.

Additional technical, non-public information: NRC is working with DHS, EPA and other federal partners to ensure monitoring equipment is properly positioned, based on meteorological and other relevant information.

4. Can this happen here i.e. an earthquake that significantly damages a nuclear power plant? Are the Japanese plants similar to U.S. plants?

Public Answer: All U.S. nuclear power plants are built to withstand environmental hazards, including earthquakes and tsunamis. Even those plants that are located outside of areas with low and moderate seismic activity are designed for safety in the event of such a natural disaster. The NRC requires that safety-significant structures, systems, and components be designed to take into account even very rare and extreme seismic and tsunami events.

The Japanese facilities are similar in design to several US facilities.

Additional technical, non-public information:
Currently operating reactors were designed using a "deterministic" or "maximum credible earthquake" approach. Seismic hazard for the new plants is determined using a much more robust probabilistic seismic hazard assessment approach that explicitly addresses uncertainty, as described in RG1.208. The NRC requires that adequate margin beyond the design basis ground shaking levels is assured. The NRC further enhances seismic safety for beyond-design-basis events through the use of a defense-in-depth approach.

In addition, the NRC periodically reviews the seismic risk at operating reactors when information may have changed. Over the last few years the NRC has undertaken a program called Generic Issue 199, which is focused on assessing hazard for plants in the central and eastern US using the latest techniques and determining the possible risk implications of any increase in the anticipated ground shaking levels. This program will help us assure that the plants are safe under exceptionally rare and extreme ground motions that represent beyond-design-basis events.

5. What would U.S. plants do in this situation?

Public Answer: The NRC requires plant designs to include multiple and diverse safety systems, and plants must test their emergency preparedness capabilities on a regular basis. Plant operators are very capable of responding to significant events. In addition, NRC regulations require plants to have plans in place that would allow them to mitigate even "worst case scenarios".

Since 9/11, we have implemented requirements for licensees to have additional response capabilities for extreme situations.

Additional technical, non-public information:
Our nuclear plants have procedures in place to address a variety of accident scenarios, including abnormal operating procedures, emergency operating procedures, sever accident guidelines and emergency plans.

6. Are U.S. power plants designed to withstand tsunamis?

Public Answer: Yes. Plants are built to withstand a variety of environmental hazards and those plants that might face a threat from tsunami are required to withstand large waves and the maximum wave height at the intake structure (which varies by plant.)

Additional, technical, non-public information:
Tsunami have been considered in the design of US nuclear plants since the publication of Regulatory Guide 1.59 in 1977, although the approaches that were used for design of the existing plants varied significantly. Nuclear plants are designed to withstand flooding from not only tsunami, but also hurricane and storm surge; therefore there is often significant margin against tsunami flooding. However, it should be noted that Japanese experience has shown that drawdown can be a significant problem. Drawdown was not generally analyzed in the past. The particular

Currently the US NRC has a tsunami research program that is focused on developing modern hazard assessment techniques and additional guidance through cooperation with the National Oceanic and Atmospheric Administration and the United States Geological Survey. This has already lead to several technical reports and an update to NUREG 0-800. The NOAA and USGS contractors are also assisting with NRO reviews of tsunami hazard. A new regulatory guide on tsunami hazard assessment is currently planned in the office of research, although it is not expected to be available in draft form until 2012.

7. What happens when/if a plant "melts down"?

Public Answer: In short, nuclear power plants in the United States are designed to be safe. To prevent the release of radioactive material, there are multiple barriers between the radioactive material and the environment, including the fuel cladding, the heavy steel reactor vessel itself and the containment building, usually a heavily reinforced structure of concrete and steel several feet thick.

Additional, technical, non-public information:
The melted core may melt through the bottom of the vessel and flow onto the concrete containment floor. The core may melt through the containment liner and release radioactive material to the environment.

8. Why is KI administered during nuclear emergencies?

Public Answer: KI – potassium iodide – is one of the protective measures that might be taken in a radiological emergency in this country. A KI tablet will saturate the thyroid with non radioactive iodine and prevent the absorption of radioactive iodine that could be part of the radioactive material mix of radionuclides in a release.KI does not prevent exposure from these other radionuclides.

Additional, technical non-public information.
There are a range of protective measures that we use … the most effective is evacuation. Local government officials are responsible for determining the best means to protect their public. KI is another means for protection but evacuation and sheltering are the primary means that are used.

9. Was there any damage to U.S. reactors from either the earthquake or the resulting tsunami?

Public Answer: No

Additional, technical non-public information:
Diablo Canyon Units 1 and 2 declared an "unusual event" based on tsunami warning following the Japanese earthquake. They have since exited the "unusual event" declaration, based on a downgrade to a tsunami advisory.

10. Has this incident changed the NRC perception about earthquake risk?

Public Answer: There has been no change in the NRC's perception of earthquake hazard (i.e. ground shaking levels) for US nuclear plants. As is prudent, the NRC will certainly be looking closely at this incident and the effects on the Japanese nuclear power plant in the future to see if any changes are necessary to NRC regulations.

Additional, technical, non-public information.
We expect that there would be lessons learned, etc.

11. Will this incident affect new reactor licensing?

Public Answer: It is not appropriate to hypothesize on such a future scenario at this point.

Additional, technical non-public information:
This event could potentially call into question the NRC's seismic requirements which could require the staff to re-evaluate the staff's approval of the AP1000 and ESBWR design and certifications.

12. What magnitude earthquake are US plants designed to?

Public Answer: Each plant is designed to a ground-shaking level that is appropriate for its location, given the possible earthquake sources that may affect the site and its tectonic environment. Ground shaking is a function of both the magnitude of and earthquake and the distance from the fault plane to the site. The probabilistic approaches account for a large number of different magnitudes.

Additional, technical non-public information:
In the past, "deterministic" or "scenario based" analyses were used to determine ground shaking (seismic hazard) levels. Now a probabilistic method is used that accounts for all possible earthquakes coming from all possible sources (including background seismicity) and the likelihood that each particular hypothetical earthquake occurs.

13. How many US reactors are located in active earthquake zones (and which reactors)?

Public Answer: Although we often think of the US as having "active" and "non-active" earthquake zones, earthquakes can actually happen almost anywhere. Seismologists typically separate the US into low, moderate, and high seismicity zones. The NRC requires that every plant is designed for site-specific ground motions that are appropriate for their location. In addition, the NRC has specified a minimum ground shaking level to which the plants must be designed.

Additional, technical non-public information: No additional.

14. How many reactors are along coastal areas that could be affected by a tsunami (and which ones)?

Public Answer: Many plants are located in coastal areas that could theoretically be affected by tsunami. Two plants, Diablo Canyon and San Onofre, are on the Pacific Coast, which is known to have tsunami hazard. There are also two plants on the Gulf Coast, South Texas and Crystal River. There are many plants on the Atlantic Coast or on rivers that may be affected by a tidal bore. These include St. Lucie, Turkey Point, Brunswick, Oyster Creek, Millstone, Pilgrim, Seabrook, Calvert Cliffs, Salem/Hope Creek, and Surry. Tsunami on the Gulf and Atlantic Coasts occur, but are very rare. Generally the flooding anticipated from hurricane storm surge exceeds the flooding expected from a tsunami for plants on the Atlantic and Gulf Coast.

Additional, technical non-public information: None

15. How many U.S. plants have designs similar to the affected Japanese reactors (and which ones)

Public Answer: Six of the 104 US reactors are General Electric BWR 3 with Mark 1 containments similar to the design used at Fukushima Unit One.

Additional Information:
The units are: Dresden Units 2 and 3, Monticello unit 1, Pilgrim unit 1, Quad Cities Units 1 and 2.

From: Jaczko, Gregory
To: Harrington, Holly
Cc: Brenner, Eliot; Hayden, Elizabeth; Borchardt, Bill
Subject: Re: Q&As
Date: Saturday, March 12, 2011 8:12:38 PM

Let's delete the non pubic piece related to new reactors. The public statement is all we need for that item at this time

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From: Harrington, Holly
To: Jaczko, Gregory
Cc: Brenner, Eliot; Hayden, Elizabeth
Sent: Sat Mar 12 19:57:42 2011
Subject: Q&As

These are the current Q&As with both answers suitable for the public and additional technical information. We expect these will continue to evolve.

Holly Harrington

From: Harrington, Holly
To: Jaczko, Gregory
Cc: Brenner, Eliot; Hayden, Elizabeth; Borchardt, Bill
Subject: RE: Q&As
Date: Saturday, March 12, 2011 8:16:13 PM
Attachments: boardfile1.docx

This version deletes per below, and adds information to question 7 per Bill Borchardt

---

From: Jaczko, Gregory
Sent: Saturday, March 12, 2011 8:13 PM
To: Harrington, Holly
Cc: Brenner, Eliot; Hayden, Elizabeth; Borchardt, Bill
Subject: Re: Q&As

Let's delete the non pubic piece related to new reactors. The public statement is all we need for that item at this time

---

From: Harrington, Holly
To: Jaczko, Gregory
Cc: Brenner, Eliot; Hayden, Elizabeth
Sent: Sat Mar 12 19:57:42 2011
Subject: Q&As

These are the current Q&As with both answers suitable for the public and additional technical information. We expect these will continue to evolve.

Holly Harrington

YY/273

Questions and Answers for Chairman Jaczko
Sensitive Draft Information/ Not for Public Dissemination

March 11, 2011 Japan Earthquake/Tsunami Aftermath
As of 8 p.m., 3/12/2011

1. What is the NRC doing about the emergencies at the nuclear power plants in Japan? Are you sending staff over there?

Public Answer: We are closely following events in Japan, working with other agencies of the federal government, and have been in direct contact with our counterparts in that country. We are ready to provide assistance if there is a specific request. Two NRC staff members knowledgeable about boiling water reactors is participating in the USAID team that has departed for Japan.

Additional technical, non-public information:
We are taking the knowledge that the staff has about the design of the US nuclear plants and we are applying this knowledge to the Japan situation. For example, this includes calculations of severe accident mitigation that have been performed. Tony Ulses has been dispatched to Japan and should arrive Early Sunday.David Jim Trapp left 1600 Saturday should arrive in 20 hours

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Additional technical, non-public information: NRC is working with DHS, EPA and other federal partners to ensure monitoring equipment is properly positioned, based on meteorological and other relevant information.

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Public Answer: All U.S. nuclear power plants are built to withstand environmental hazards, including earthquakes and tsunamis. Even those plants that are located outside of areas with low and moderate seismic activity are designed for safety in the event of such a natural disaster. The NRC requires that safety-significant structures, systems, and components be designed to take into account even very rare and extreme seismic and tsunami events.

The Japanese facilities are similar in design to several US facilities.

Additional technical, non-public information:
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7. What happens when/if a plant "melts down"?

Public Answer: To prevent the release of radioactive material, there are multiple barriers between the radioactive material and the environment, including the fuel cladding, the heavy steel reactor vessel itself and the containment building, usually a heavily reinforced structure of concrete and steel several feet thick. In a so-called "meltdown," some of the nuclear fuel has melted because of extremely high temperatures caused by a lack of adequate cooling. This does not necessarily mean that radiation is released to the environment. But it could be if other barriers fail.

Additional, technical, non-public information: None.

8. Why is KI administered during nuclear emergencies?

Public Answer: KI – potassium iodide – is one of the protective measures that might be taken in a radiological emergency in this country. A KI tablet will saturate the thyroid with non radioactive iodine and prevent the absorption of radioactive iodine that could be part of the radioactive material mix of radionuclides in a release.KI does not prevent exposure from these other radionuclides.

Additional, technical non-public information.
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Public Answer: No

Additional, technical non-public information:
Diablo Canyon Units 1 and 2 declared an "unusual event" based on tsunami warning following the Japanese earthquake. They have since exited the "unusual event" declaration, based on a downgrade to a tsunami advisory.

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Additional, technical, non-public information.
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Additional, technical non-public information: No additional.

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Additional, technical non-public information: None

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Public Answer: Six of the 104 US reactors are General Electric BWR 3 with Mark 1 containments similar to the design used at Fukushima Unit One.

Additional Information:
The units are: Dresden Units 2 and 3, Monticello unit 1, Pilgrim unit 1, Quad Cities Units 1 and 2.

From: ET02 Hoc
Sent: Tuesday, March 22, 2011 5:21 PM
To: RST01 Hoc; RST12 Hoc
Subject: FW: Unit 3 Reactor Building Photo
Attachments: 3号建屋　真下2.jpg

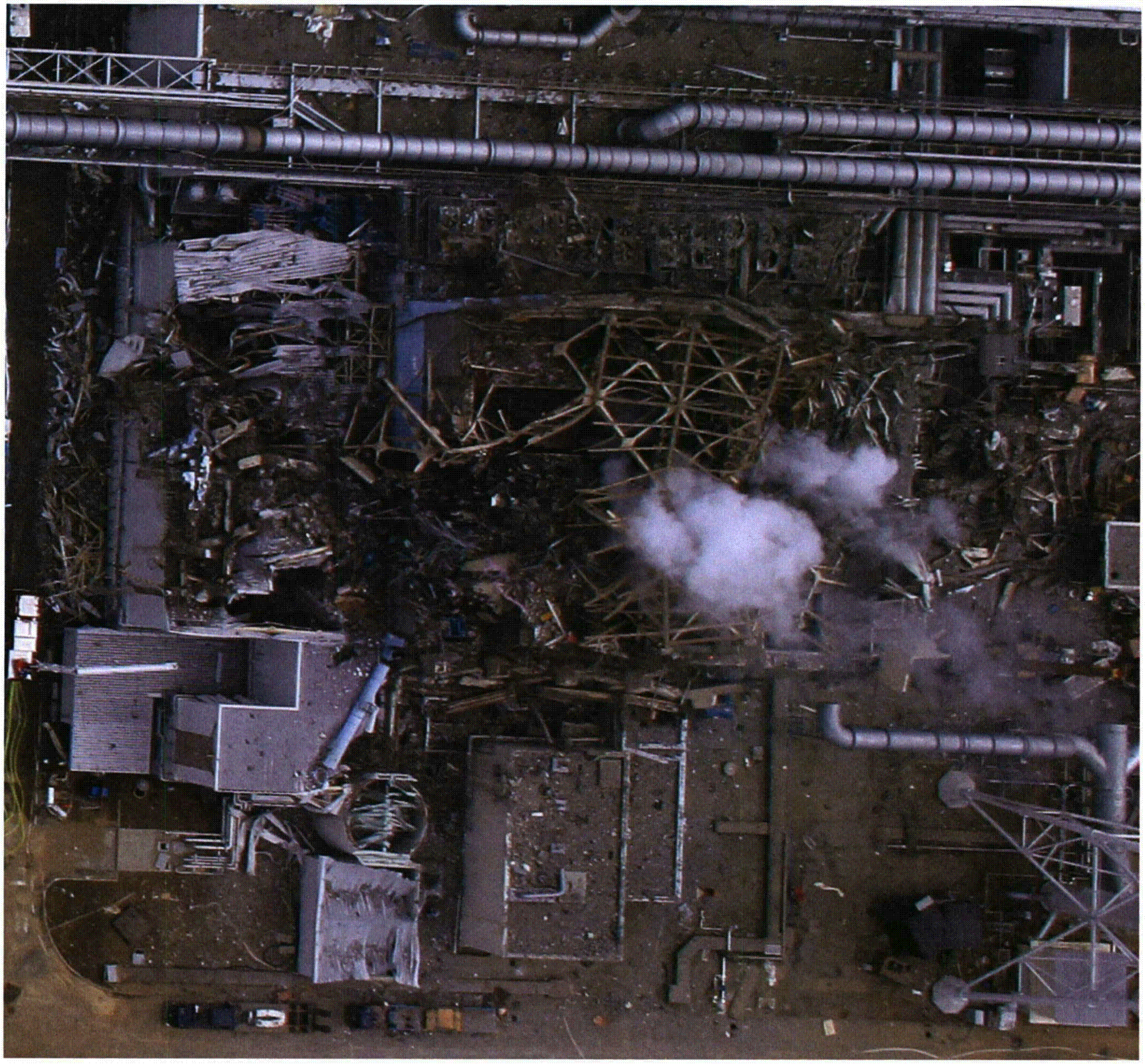
From: Devercelly, Richard
Sent: Tuesday, March 22, 2011 5:20 PM
To: ET02 Hoc
Subject: Unit 3 Reactor Building Photo

North is to the right.

Please confirm receipt.

Rick DeVercelly

YYY/274



From: Google Alerts
To: Hayden, Elizabeth
Subject: Google Alert - Nuclear Regulatory Commission
Date: Saturday, March 12, 2011 9:14:59 PM

News **6** new results for **Nuclear Regulatory Commission**

US **Nuclear Commission** Puts Boots on the Ground in Japan
Forbes Digital Download (blog)
By WILLIAM PENTLAND Two officials from the US **Nuclear Regulatory Commission** with expertise in boiling water nuclear reactors have deployed to Japan as part of a US International Agency for International Development (USAID) team. **...**
See all stories on this topic »

Forbes Digital Download (blog)

Japan Tries to Cool **Nuclear** Reactors, Avert 'Three Mile Island'
BusinessWeek
The "likelihood of success should be fairly high," Dale Klein, a professor of nuclear engineering at the University of Texas at Austin and former chairman of the US **Nuclear Regulatory Commission**, said of the seawater flooding. **...**
See all stories on this topic »

Owner says Calvert Cliffs is safe from earthquakes
Baltimore Sun
Now it's real," Peter Bradford, a former member of the **Nuclear Regulatory Commission**, said during a conference call organized by nuclear opponents. "Having it explode — those can't be good things for an industry that's looking for votes in Congress **...**
See all stories on this topic »

FACTBOX-US **nuclear** plants similar to Japan plant in peril
Reuters
The US **Nuclear Regulatory Commission** said all of the 104 reactors in the United States, including the Mark 1 reactors listed below, were operating safely. The following lists the Mark 1 reactors in the United States, according to data from the **NRC** and **...**
See all stories on this topic »

State monitoring radiation levels to determine if **nuclear** event in Japan poses **...**
Seattle Post Intelligencer (blog)
State health officials are monitoring the events in Japan and are in contact with the federal **Nuclear Regulatory Commission** and US Environmental Protection Agency. An explosion took place at the Japanese reactor site Saturday. **...**
See all stories on this topic »

Japanese **nuclear** plants' operator scrambles to avert meltdowns
Washington Post
"Only the gravest danger would justify an evacuation at such a moment," said Peter Bradford, a former commissioner at the US **Nuclear Regulatory Commission**. The evacuation, wider than announced the day before, followed an explosion Saturday that **...**
See all stories on this topic »

Washington Post

Tip: Use a plus sign (+) to match a term in your query exactly as is. Learn more.

YYY/275

Remove this alert.
Create another alert.
Manage your alerts.

From:	Harrington, Holly
To:	Brenner, Eliot; Hayden, Elizabeth
Subject:	RE: u guys monitoring the jaczko call?
Date:	Saturday, March 12, 2011 9:49:30 PM

We can also bring in Rob Taylor for help, too

From: Brenner, Eliot
Sent: Saturday, March 12, 2011 9:48 PM
To: Harrington, Holly; Hayden, Elizabeth
Subject: RE: u guys monitoring the jaczko call?

Jeez....gonna be another long night and day....and if this turns out as bad as it looks, neil will be visiting us for a while.

From: Harrington, Holly
Sent: Saturday, March 12, 2011 9:43 PM
To: Brenner, Eliot; Hayden, Elizabeth
Subject: RE: u guys monitoring the jaczko call?

Yes. We're here. I've asked Scott to come in sooner rather than later

---

From: Brenner, Eliot
Sent: Saturday, March 12, 2011 9:42 PM
To: Harrington, Holly; Hayden, Elizabeth
Subject: u guys monitoring the jaczko call?

I am on it, but may need your help. Stay put please for now.

YY/276

March 12, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information(the 16th Release)
(As of 20:05 March 12, 2011)

Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Higashidori and Onagawa NPSs, Tohoku Electric Power Co., Inc.
Higashidori, Fukushima Dai-ichi, Fukushima Dai-ni and Kashiwazaki-Kariwa NPSs, Tokyo Electric Power Co., Inc. and electricity, gas, heat supply and complex as follows:

1. Summary of Damage(Earthquake at Sanriku-Oki)

(1) Time of Occurrence: 14:46 (UTC 5:46) March 11, 2011, Friday

(2) Epicenter: Off-Coast of Sanriku (North Latitude: 38; East Longitude: 142.9), 10km deep, M8.8

(3) Seismic Intensity in Japanese Scale
<Area of Seismic Intensity Larger Than and Including 4>
7: Northern Miyagi Prefecture
6+: Northern and southern Ibaraki Prefecture
5+: Sanpachi-Kamikita Aomori Prefecture
5-: Chuetsu, Niigata Prefecture
<Municipality of Seismic Intensity Larger than and Including 4>
6+: Naraha Machi, Tomioka Machi, Ookuma-machi, and Futaba-machi, Fukushima Prefecture
6-: Ishinomaki-city and, Onagawa town (by Seismograph of NPP)of , Miyagi Prefecture and Tokaimura, Ibaraki Pref.
5-: Kariwa-village, Niigata Prefecture
4: Rokkasho-village, Higashidori-village, Aomori Prefecture, Kashiwazaki-city, Niigata Prefecture and Yokosuka-city, Kanagawa Prefecture

YK/277

1: Tomari-village, Hokkaido

2. The status of operation at Power Stations(Number of automatic shutdown(units): 10 (as of 11:00, March12)

a. Onagawa Nuclear Power Station (Onagawa-machi and Ishinomaki–shi, Miyagi Prefecture)

(1) The status of operation

Unit 1 (524MWe): automatic shutdown, cold shut down at 0:58, March 12
Unit 2 (825MWe): automatic shutdown
Unit 3 (825MWe): automatic shutdown, cold shut down at 1:17, March 12

(2) Readings of monitoring post etc.

Variation in the monitoring post readings: No
Variation in the main stack monitor readings: No

(3) Report concerning other malfunction

It is confirmed Smoke in the first basement of the Turbine Building was confirmed the extinguished at 22:55 on March 11th.

b. Fukushima Dai-ichi Nuclear Power Station, Tokyo Electric Power Co.,Inc.(TEPCO)
(Okuma-machi and Futaba-machi, Futaba-gun, Fukushima Prefecture)

(1) The status of operation

Unit 1 (460MWe): automatic shutdown
Unit 2 (784MWe): automatic shutdown
Unit 3 (784MWe): automatic shutdown
Unit 4(784MW): in periodic inspection outage
Unit 5(784MW): in periodic inspection outage
Unit 6(1,100MW): in periodic inspection outage

(2) Readings at monitoring post etc.

The measurement of radioactive materials in the environmental monitoring area near the site boundary by a monitoring car confirmed the increase in the radioactivity compared to the radioactivity at 04:00, March 12 now.

MP4(Moitoring car data at the site boundary, North-west of Unit1):
1015microSv/h
(15:29, March12)

MP6 (at the main gate) 0.07microSv/h ->3.25 micro Sv/h
(04:00, March12->16:40, March 12)

MP8 (at the observation platform) 0.07microSv/h ->2.06 micro Sv/h
(04:00, March 12->16:40, March 12)

(3) Wind direction/wind speed(as of 13:12, March 12)
Wind direction: South East
Wind Speed: 1.8m/s
(4)Report concerning other malfunction
Article 10* of Act on Special Measures Concerning Nuclear Emergency Preparedness (Fukushima Dai-ichi)
(*A heightened alert condition)
Article 15** of Act on Special Measures Concerning Nuclear Emergency Preparedness (Fukushima Dai-ichi, Units 1 and 2)
(** Nuclear emergency situation)
Situation of power source to recover water injection function at the Station.
-Cable from electric power generating cars are under connecting work(as of 15:04, March 12)
-Pressure in the containment vessel has arisen. Steam release is undertaking in order to relieve pressure.(as of 14:40, March 12)
-A radiation level exceeding 500 microSv/h was monitored at the site boundary(15:29, March 12). A large motion occurred due to an earthquake with close epicentre and an large sound was issued near Unit1 and smoke was observed.

c. Fukushima-Daini Nuclear Power Station(TEPCO)
(Naraha-cho/Tomioka-cho, Futaba-gun, Fukushima pref.)
(1) The status of operation
Unit1(1,100MW): automatic shutdown
Unit2(1,100MW): automatic shutdown
Unit3(1,100MW): automatic shutdown, cold shut down at 12:15, March 12
Unit4(1,100MW): automatic shutdown
(2) Readings at monitoring post etc.
Variation in the monitoring post readings: No
Variation in the main stack monitoring readings: No
(3) Direction and velocity of wind (As of 17:43, 12 March)
Direction: South-southeast
Velocity: 5.9m/s

(4) Report concerning other malfunction

No Report of fire, etc.

Article 10* of Act on Special Measures Concerning Nuclear Emergency Preparedness (Fukushima Dai-ni, Unit 1)

(*A heightened alert condition)

Article 15** of Act on Special Measures Concerning Nuclear Emergency Preparedness (Fukushima Dai-ni, Units 1,2 and 4)

(**Nuclear emergency situation)

3. Industrial Safety

○Electricity

* Tokyo Electric Power Co. (as of 18:54, March 12, 2011)

Scale of loss of electrical power: approx. 500 thousand houses

Power loss area:

Ibaraki Pref.: Whole area (approx. 488 thousand houses),

Tochigi Pref.: Mogi-cho, etc. (approx 7 thousand houses)

Chiba Pref.: Shibayama-cho, etc. approx 6 thousand houses)

Saitama Pref: Kuki-shi: appprox 500 houses

* Tohoku Electric Power Co. (as of 18:00, March 12, 2011)

Scale of loss of electrical power: approx.3,150 thousand houses (under investigation)

Power loss area:

Iwate Pref.: Whole area, (approx 725 thousand houses)

Akita Pref: Whole area (approx 353 thousand houses)

Miyagi Pref: whole area (approx 1,351 thousand houses)

Aomori Pref.: Almost whole area (approx 380 thousand houses)

Yamagata Pref: Almost whole area (approx 187 thousand houses)

Fukushima Pref: Some parts of Naka-dori and Hama-dori (approx 151 thousand houses)

Niigata Pref.: All of the power loss area has been recovered(as of 15:51, March 12)

* Hokkaido Electric Power Co. (as of 14:00, March 12, 2011)

All of the power loss area has been recovered.

*Chubu Electric Power Co. (as of 17:11, March 12, 2011)

Nagano Pref: All of the power loss has been recovered.(as of 17:11, March 12)

○General Gas (as of 17:40, March 12)

The Japan Gas Association dispatched its six advance teams of thirty staff (five teams for Sendai and one team for Joban area) at 07:00, 12 March upon request from Sendai-shi.

Sendai-city municipal Gas, Kesennuma-city municipal Gas, Ishinomaki Gas have trouble contacting at 1:00 12 March. The Japan Gas Association confirmed that there are no supply disruption in the supply area of city gas in Hokkaido, Yamagata, and Akita prefecture.

* Tokyo Gas Co. (whole area of Hitachi-shi)

Hitachi branch: 30,007 houses are in supply disruption. There is no damage in equipment, however, equipment in inoperable due to loss of power. Walkdown unit of eight person departed at 18:45, March 11 and already arrived at 06:00, March 12. Recovery plan will be established by 12 afternoon. Time of recovery is not certain.

Eastern part of Joso: 453 houses were in supply disruption in Ushiku (supply restarted at 17:10, March 11)

471 houses were in supply disruption in Ushiku-shi Ushiku- cho(supply restarted at 22:36 March11)

77 houses are in supply disruption in Ryuugasaki(supply restarted at 16:20, March 11)

40 houses are in supply disruption in Nishi-ku, Yokohama-shi(supply restarted at 17:29, March 11)

Gas leaked from a Nozzle of an LNG tank at Sodegaura but no ignition (restored on 02:30, March 12)

*Gas Bureau of Sendai-shi: whole supply disruption (approx.360 thousand houses)

*Shiogama Gas Co.: approx.12,382 houses are in supply disruption. Shiogama-shi, Tagashiro-shi, Nanahama-shi and Rihu-syo are out of service due to no supply from Gas Bureau of Sendai)

*Hachinohe Gas (Several part of Hachinohe-shi): approx.1,300 houses are in supply disruption.
*Kamaishi Gas Co. : approx.10,000 houses are in supply disruption. First floor of this Gas facility sank.

*Hatano Gas Co.: Approx. 380 houses are in supply disruption. Restoration will be expected 13th of March.
*Keiyo Gas Co.: Leakage occurred at 5 locations of middle pressure conduit
Leakage occurred at many parts of Low pressure conduits
5,445 houses in Urayasu-shi are in supply disruption.
Supply to Yachiyo Station stopped.
*Kujukuri choei Gas: Approx 258 houses are in supply disruption.
*Atsugi Gas Co: leakage occurred at 1 location of middle pressure conduit.
*Fukushima Gas Co.: (A part of Fukushima-shi) About 2,726 houses are in supply disruption
*Tohoku Gas (part of Shirakawa-shi): 300 houses are in supply disruption
*Joban kyodo Gas(Iwaki-shi): 14,000 houses (whole customer) are in supply disruption
*Tobu Gas Fukushima-shisya: 7,500 houses are in supply disruption (Koriyama-shi, Iwaki-shi) leakage occurred at 2 locations of middle pressure conduit, leakage occurred at 54 locations of low pressure conduits and another leakage occurred on 85 locations. 39 houses in supply disruption.
*Tobu Gas (a part of Tsuchiura-shi) 7,500 houses in supply disruption
(a part of Mito-shi) 330 houses in supply disruption
*Joban Toshi Gas (Mito-shi) 60 houses in supply disruption
*Tosai Gas(Kasukabe-shi) Gas leakage occurred from conduit. 150 houses in apartment are in supply disruption. Supply restarted in the afternoon 12 March.
*Odawara Gas(Odawara-shi)
leakage occured at 1 locations of low pressure branch conduit and 3 locations of ex-core inner conduit and have restored at 21:30 11 March. Other areas are under investigation.

○Community Gas(as of 15:50, March 12)
Severe damage has not been reported to Japan Community Gas Association

so far. No information is available about the damage in North part of Ibaraki prefecture.

*Tokyo Gas Energy (North part of Ibaraki): Factory stopped supply to 943 houses in Nakago-New Town due to the leakage from pipe.

*Satoh Kosan (based in Iwatsuki-ku, Saitama City) Iwatsuki-housing complex: Gas leakage occurred from conduit. 451 sites are in supply disruption.

*Syutoken Gas (based in Sakura-City) Chitose-housing complex:1,320 houses are in supply disruption

*Kashima Marui Gas (Kamisu-shi):Gas conduit was damaged. 527 houses are in supply disruption. Time of recovery is not certain.

*Nagashima Central Gas (Katori-shi) Tamatsukuri-housing complex, 222 houses are in supply disruption due to short circuit now under recovery works.

*Taihei Sangyo (Takahagi-shi) Hagigaoka-housing complex 112 houses are in supply disruption due to short circuit. Recovery has completed at 21:00 11 March. (Takahagi-shi) Ishidaki-housing complex 648 houses and (Hitachi-shi) Hitachi-Densen Akasaka-housing complex 222 houses are in supply disruption. Under recovery works.

*Imaichi Gas: Gas leakage occurred from conduit at the simple gas complex in Nikko-shi: 240 houses were in gas supply disruption.

*Nihon Gas: Gas leakage occurred from conduit at simple gas complex in the jurisdiction: 76 houses in Nasu-karasuyama-shi, 97 houses in Inashiki-shi, 594 houses in Tokai-mura, Natsu-gun,370 houses in Yaita-shi, and 3,299 houses in Itako-shi were in gas supply disruption.

These areas other than Itako-shi will be restored on March 12. Residents in 1876 houses of Hinode housing complex in Itako-shi evacuated from this region due to liquefaction of the ground. Time of recovery is not certain.

212 houses in Noda-shi were in gas supply disruption. This area has been restored in March 11.

*Horikawa Industry (Bando city, Ibaraki Pref.) : Iwai Greenland Due to liquefaction of the ground, 566 houses are in supply disruption.

*Tajima : 250 houses were in gas supply disruption at the simple gas complex in Hachiooji-city. This area will be restored within March 12.

○Gas conduit Operators (as of 15:50, March12)
*JX Nikko Nisseki Energy: Hachinohe LNG Base
Premise, electric room and in-house electricity generator equipment, were flooded by the 2nd wave of tsunami and the gas supply was stopped.
According to Japan National Gas Association, there are no damage to pipelines of conduit-trans port companies.(as of 23:00, March 11)

○Heat supply (as of 15:50, March12)
West side area at Morioka station: heat supply was stopped due to power failure.
*Yamagata Netsu Kyokyu (Yamagata-shi): Supply was stopped due to emergency shut down condition.

*Onahama Haiyu (Onahama, Iwaki-shi): stopped heat supply due to the breakage of pipe. Heat supply pipes underground might be affected. Time of recovery is not certain.

*"HITACHI NETSU ENERGY"(Hitachi City): stopped heat supply due to the electrical outage at 15:19, March 11.

*"CHIBA NETSU KYOKYU"(Chiba-city): stopped freezer, etc. at 16:19, March 11. Supply was stopped and walkdown is conducted at 16:19, March 11.

*"NISHI-IKEBUKURO NETSU KYOKYU": stopped freezer and boiler at 15:45, March 11.

*"TOKYO NETSU KYOKYU";
-stopped boiler in Takeshiba and Yurakucho areas at 15:20, March 11
-stopped supply to one of the building complex at Hikarigaoka for approx. 3 hours due to the leakage of pipe at 21:35, March 11(Restart supplying at 00:05, March 12)

*"Yokohama Business Park NETSU KYOKYU (Hodogaya-ku, Yokohama city)
15:50 Stopped steam and cold water supply to PREZZO building
16:20 restored by temporary repair

○Complex (as of 11:00, March 12)
*Cosmo Oil factory Chiba branch
A column of Butane Butylene storage tank was broken. Fire occured due to gas leakage. One person suffered serious-injury, 4 persons sufferd minor injury.

*JX Nippon Oil&Energy Corporation Sendai oil factory (sendai-city, Miyagi prefecture)
-Fire occured from an explosion of low temperature LPG tank

4. Action taken by NISA
(March 11)
14:46 Set up of the NISA Emergency Preparedness Headquarters (Tokyo) immediately after the earthquake
15:42: TEPCO reported to NISA in accordance with Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi, Units 1,2 and 3.
16:36: TEPCO judged the event in accordance with Article 15 of the Act for Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi, Units 1 and 2.(notified to NISA at 16:45)
18:08: Unit 1 of Fukushima Dai-ni notified NISA of the situation of the Article 10 of Act on Special Measures Concerning Nuclear Emergency Preparedness.
18:33: Units 1,2 and 4 of Fukushima Dai-ni notified NISA of the situation of

the Article 10 of Act on Special Measures Concerning Nuclear Emergency Preparedness.

19:03 : Government declared the state of nuclear emergency

20:50: Fukushima prefecture's emergency preparedness headquarters - issued a directive regarding the accident occurred at Fukushima-Dai-ichi Nuclear Power Station, TEPCO that the residents living in the area of 2km radius from Unit 1 of the Nuclear Power Station must evacuate.(The population of this area is 1,864)

21:23: Directives from Prime Minister to Governor of Fukushima, Mayor of Ookuma and Mayor of Futaba were issued regarding the accident occurred at Fukushima-Dai-ichi Nuclear Power Station, TEPCO, pursuant to Paragraph 3, Article 15 of the Act for Special Measures Concerning Nuclear Emergency Preparedness as follows:

-Residents living in the area of 3km radius from Unit 1 of the Nuclear Power Station must evacuate.

-Residents living in the area of 10km radius from the Unit 1 must take sheltering.

(March12)

5:22 Unit 1 of Fukushima Dai-ni notified NISA of the situation of the Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness.

5:32 Unit 2 of Fukushima Dai-ni notified NISA of the situation of the Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness.

05:44 Residents living in the area of 10km radius from unit 1 of the Nuclear Power Station must evacuate by the Prime Minister Direction.

06:07 Regarding Units 1,2 and 4 of Fukushima Dai-ni NPS, TEPCO reported NISA in accordance with Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness.

6:50 According to the article 64, 3 of nuclear regulation act, government order to control the internal pressure in Fukushima-daiichi unit No. 1 and 2

7:45 Directives from Prime Minister to Governor of Fukushima, Mayors of Hirono, Naraha, Tomioka, Ookuma and Futaba were issued regarding the accident occurred at Fukushima-Dai-ni Nuclear

Power Station, TEPCO, pursuant to Paragraph 3, Article 15 of the Act for Special Measures Concerning Nuclear Emergency Preparedness as follows:

-Residents living in the area of 3km radius from Fukushima-Dai-ni Nuclear Power Station must evacuate.

-Residents living in the area of 10km radius from Fukushima-Daini NPS must take aheltering

17:00 Notification pursuant to Article 15 of the Act for Special Measure Concerning Nuclear Emergency Preparedness since the radiation level exceeded the acceptable level of Fukushima Dai-ichi Nuclear Power Station.(NPS).

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

19:55 Directives from Prime Minister was issued regarding sea water injection to Unit No.1 of Fukushima Dai-ichi NPS.

20:05 According to the article 64, 3 of nuclear regulation act and concerning to directives from Prime Minister, government ordered to inject sea water Unit No.1 of Fukushima Dai-ichi NPS.

Status of Residents Evacuation
(Information from the Resident Safety Team of OFC at 16:20 March 12)

Resident Safety Team of ERC

Ookuma-cho Approx 3,500 in grasped number approx 4,000 residents completed (refugee: Miyakoji junior high school)
Futaba-cho Approx 1,800 in grasped number approx 2,000 residents completed (refugee: Kawamata elementary school)
Tomioka-cho Approx 15,650 in grasped number approx 16,000 residents completed (refugee: Kawachi village office)
Namie-cho Grasped number approx 17,000 residents completed (refugee: Tsushima Kasseika Center, Tsushima branch)
Naraha-cho Grasped number approx 7,800 residents completed (refugee: Kusano junior high school, Taira Dairoku elementary school)

Among these towns, public announcement are implemented by wireless emergency preparedness radio waves and walk down is also done in these some area.

Residents live in 10km radius

Vicinity of Fukushima Daiichi		Vicinity of Fukushima Daini		
	0-10km		0-3km	0-10km
Tomioka-cho	14,808	Tomioka-cho	6,534	15,961
Ookuma-cho	11,363	Ookuma-cho	-	7,127
Futaba-cho	7,243	Futaba-cho	-	1,238
Namie-cho	17,793	Namie-cho	1,515	8,100
Total	51,207	Total	8,049	32,426

Some area of Fukushima-daiichi 10km area and Fukushima-daini 10 km area are overlapped that cause duplication of resident number.

(Contact Person)
Mr. Toshihiro Bannai
Director, International Affairs Office, NISA/METI
Phone:+81-(0)3-3501-1087

From: Doane, Margaret
To: Hayden, Elizabeth
Subject: Fw: Japan
Date: Saturday, March 12, 2011 7:40:30 PM

This is what I sent to my colleague in Spain.

Sent from an NRC Blackberry
Margaret Doane

----- Original Message -----
From: Doane, Margaret
To: 'arc@csn.es' <arc@csn.es>
Sent: Sat Mar 12 16:46:19 2011
Subject: Re: Japan

Alfredo,
Immediately following the event we staffed our Operations Center. We sent offers of assistance to both NISA and JNES. They have replied very kindly that at this time they are adequately staffed with expertise to address the issues. They appreciate the offer and knowing that we are there if they need anything.
At this time we are not further communicating with them to ensure that we do not cause any distraction.
I will let Chairman Jaczko know that we exchanged notes. He too, is in contact with our Government officials.
Our thoughts are with our counterparts in Japan to continue their efforts under such extreme tragedy and difficulty.

With kind regards,
Margie

Sent from an NRC Blackberry
Margaret Doane

----- Original Message -----
From: DE LOS REYES CASTELO ALFREDO <arc@csn.es>
To: Doane, Margaret
Sent: Sat Mar 12 10:34:53 2011
Subject: Japan

Hi Margie!

How are you dealing all the events in Japan? Is there something we can do? Any important new?

My President is in permanent contact with our Government

Alfredo

YY/278

From: Hayden, Elizabeth
To: Sheehan, Neil; Burnell, Scott; McIntyre, David; Couret, Ivonne; Screnci, Diane; Hannah, Roger; Ledford, Joey; Mitlyng, Viktoria; Chandrathil, Prema; Dricks, Victor; Uselding, Lara; Janbergs, Holly
Subject: NEI has just posted the following fact sheet
Date: Saturday, March 12, 2011 7:23:00 PM

FYI--Summary info on Japan from NEI

Events at the Fukushima Daiichi Nuclear Power Plant in Japan

March 12, 2011 (posted at 4:40 p.m. EST, Saturday, March 12)

Key Facts

The Incident

Unit 1 of the Fukushima Daiichi nuclear power plant was damaged in a magnitude 8.9 earthquake and subsequent tsunami on March 11. The plant is centered along the shore of the Sendai region, which contains the capital Tokyo.

The plant is a General Electric boiling water reactor 3 Mark 1 design, operated by Tokyo Electric Power Company (TEPCO).

Eleven of Japan's 55 nuclear reactors automatically shut down, as they are designed to do, when the earthquake hit.

After the earthquake and tsunami, there were difficulties powering the cooling system for unit 1 of the Fukushima Daiichi plant. After a buildup of hydrogen gas in the secondary containment structure at the plant, there was an explosion at that reactor on March 12.

The explosion caused a breach in the secondary containment. However, the primary containment that houses and protects the reactor vessel and fuel remains intact and is safe. This structure is made of steel and is extremely robust. The primary and secondary containment are designed to prevent radiation from being released into the environment in the case of an accident. However, TEPCO intentionally vented steam from the secondary containment building in an effort to reduce pressure in that building. For a diagram of the reactor type used at Fukushima Daiichi, click here.

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It appears that as the level of coolant in the reactor vessel lowered, a portion of the top of the uranium fuel rods was exposed. This may have caused zirconium cladding of the fuel rods to react with water to create hydrogen. This hydrogen was vented, then somehow ignited, causing the explosion.

As the explosion did not occur inside the reactor core—and the primary containment was not breached—there has not been a significant public health impact from the release of radiation from the containment structure.

Reactors 2 and 3 at Fukushima Daiichi were shut down in response to the earthquake. Units 4, 5 and 6 had been shut down prior to the earthquake for inspections and scheduled outages.

The Response

TEPCO has been pumping seawater, laced with boron, into the reactor core of Unit 1 of the Fukushima-Daiichi plant to cool the fuel.

Backup diesel generators and batteries have arrived at the Fukushima Daiichi plant. They will be used as an emergency source of electric power to pump water into the reactor core or containment of units 2 and 3 to continue cooling the reactor cores.

The Japanese government has expanded the evacuation zone around the facility to 20 kilometers, or about 12 miles.

TEPCO also is preparing to vent the containment structures at Fukushima Daiichi Units 2 and 3 to reduce the pressure inside primary containment in these reactors and maintain the structural integrity of the containment. Venting reduces pressure in the containment, but can be done in a safe manner.

Similar Reactors in the United States

The General Electric BWR 3 Mark 1 reactor design is used in six of 104 reactors in the United States. Every nuclear power plant is designed, built and managed to prevent radioactive releases, even in the event of natural disasters, operational accidents or security threats.

A variety of measures work together to protect public safety: the design and safety features built into nuclear power plants; the multiple layers of physical barriers that protect the reactor; and highly trained, federally certified professionals who operate the plant safely and know how to respond in the event of emergencies.

More information

To learn about boiling water reactors in general, click here.

For more on nuclear reactors and seismic events, click here.

To stay up to date:

See these resources:

- NEI
- TEPCO
- World Nuclear News
- International Atomic Energy Agency

FOLLOW US ON

From: The Washington Post
To: Hayden, Elizabeth
Subject: Breaking News: Partial meltdown likely under way, AP reports
Date: Saturday, March 12, 2011 10:18:30 PM

Breaking News Alert: Partial meltdown likely under way, AP reports
March 12, 2011 10:16:06 PM

Japan's top government spokesman says a partial meltdown is likely under way at a damaged nuclear reactor, the AP reports.

For more information, visit washingtonpost.com

Washington Post Digital
E-mail Customer Care
1150 15th Street NW
Washington, DC 20071

YY4/280

From: OST01 HOC
Sent: Thursday, April 14, 2011 4:29 AM
To: RST01 Hoc
Subject: Comments on Transition Plan?
Attachments: transition plan - LT & PMT comments 4-14-2011.docx

I am working on compiling the comments / changes to the Transition Plan Document to be vetted before the end of shift. Please see the attached file that contains changes from PMT, LT, and one change requested by the ET Director.

Does RST have anything to add? It looks like PMT made a formatting change to the RST section for consistency, but didn't change any content...

Thanks,
-Nick

YYY/281

Operations Center Transition Plan to Reduced Staffing for Fukushima Dai-ichi Event

Based on the Chairman's April 8, 2011 memorandum to the EDO with approval of Operations Center staffing for the Japan event, staff is beginning to transition current staffing levels to a six-person team as described in the memorandum:

"I have been briefed by the staff and understand their proposal recommending a reduction in the Operations Center staffing in response to the event. Provided that adequate support to the site team can be maintained, I approve the staff's recommendation to reduce the Operations Center response team to one team directed by a member of the Executive Team (ET), and consisting of two members from the Reactor Safety Team (RST), one member of the Protective Measures Team (PMT), and one member of the Liaison Team (L T) to provide immediate support to the site team, and one assistant to the ET director. The team should be supplemented as necessary based on workload, and line organizations should be tasked as a high priority for support as needed. The team should be staffed around-the-clock as long as the site team is staffed."

The intent of this document is to detail the actions taken and planned for an orderly transition to the six-person agency watch staff, the associated actions to transfer incoming requests to NRC line organizations, and the subsequent reduction of products delivered by the agency watch team and/or participation in conferences or calls regarding the event. It is expected that each NRC Office will have a central point of contact and a distribution network to properly process and distribute to key available staff members the requests sent by the agency watch team as it continues to support the needs of the Site Team in Japan. The principal roles of the team in the Operations Center are to provide a point of contact for the site team and to ensure that site team needs are met with a similar response time as a fully-staffed Operations Center. The change is that the Operations Center team is not expected to provide support directly, but rather to manage that support from the line organizations. The Operations Center team will provide direct support consistent with the limited resources and available skill sets of the new team size.

Messaging on Transition

NRC is realigning the functions for the Japan Earthquake and Tsunami response to better serve the changing information needs for stakeholders. The following realignment will occur, beginning Monday April 11, 2011:

1. The NRC Site Team in Japan will continue to be staffed at the current level. Additional NRC staff are preparing to depart the U.S. for Japan for turnover to allow some of the current staff to return to the U.S.
2. NRC's line organizations will be leveraged to perform detailed technical analyses previously performed by the full Reactor Support and Protective Measures Teams in the NRC HQ Operations Center.
3. The Headquarters Operations Center will continue to have enhanced staffing around the clock dedicated to this response, but will have fewer individuals per shift in the Operations Center. Their focus will be coordination and communications while shifting

most of the technical work associated with this response to NRC's regular line organizations.

Actions by Team:

Executive Team

~~1. Continue to update the ET one pager.~~
~~2.~~1. Define roles and skills needed for each position.
~~3.~~2. Determine when and if temporary augmentation of the Ops Center staff is needed (when tasks cannot be efficiently or effectively worked through the line organization), which skill sets are needed, and the duration of the augmentation.
~~4.~~3. Change to 2 Commissioners' Assistants (CA) briefings per week starting April 11. Briefings will be Tuesdays and Thursdays at 10 am (CAs notified on 4/10/11 call).
~~5.~~4. Modify Ops Center Status Update as of April 11 to once per day and shorten.
~~6.~~5. Brief TAs on new schedule for status updates. (completed 4/10/11)
~~7.~~6. ~~Determine criteria or date to move team of 6 to the _____ Room?~~
~~8.~~7. Determine staff for the start of the 6 person team on Monday April 11 – April 16 (completed 4/9/11)
~~9.~~8. Develop implementing plan for new staffing starting April 17.
~~10.~~9. Ensure ODs provide a point of contact for Japan-event related tasks coordinated through the Ops Center. (M. Evans sent an email request to ODs on 4/9/11 to provide a POC.)
~~11.~~10. Ensures consistency in document nomenclature for various documents and responses to information requests. Identify reports/documents to be sunsetted, as more global documents are created and kept up-to-date.

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Executive Briefing Team

1. Based on feedback from external stakeholders, the SitRep will continue to be provided in its current format. The update frequency will be reduced to once per day. Obtain input from PMT/RST and issue SitRep daily at NOON EDT.

ET Support Team

1. ~~Update list of calls for ops center.~~Manage updates to the ET one pager.
   ~~1.~~a. Receive updates from each team and vet them through ET Director before end of each shift.
2. Support staff should have appropriate coordination skills to work with the entire team to facilitate the completion of actions and provide support as needed.
3. Teams should provide information so that support staff can be aware of the existence and location and nomenclature of important documents.

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4. Coordinate with the HOOs to schedule and announce non-routine Commissioner Assistance briefings for emergent issues as directed by ET Director (HOOs need 2 hrs to make notifications and setup the voice conferencing system for CA calls).

NSIR Incident Response Staff (weekday dayshift; as part of the line organization)

1. Implement a process for capturing relevant items from various workstations and emails (an auto-forward or bounce-back message may help for emails).
2. Provide SharePoint and WebEOC access and instruction to support staff so that SharePoint can be utilized once the briefing products are consolidated/discontinued.
3. Determine an effective method to track actions, information, and decisions if Chronology is to be discontinued.
4. Address Ops Center operational issues (facility and Ops Center computer system issues)
5. Determine computer work station usage and how to transition to the 6 person team functions.

Protective Measures Team

1. Staff the Protective Measures Team (PMT) with a single individual/shift from the following qualified emergency response organization (ERO) roster positions:
   a. PMT Director
   b. PMT Deputy Director
   c. Protective Action Asst. Director
   d. Radiological Assessment Asst. Director

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2. Responsibilities of the PMT include:
   a. Lead the overall PMT activities for the Japan Event
   b. Lead periodic calls with Japan site team PMT counterparts, PACOM counterpart, and other contacts
   c. Develop assessments on PMT activities for Japan site team and appropriate stakeholders.
   d. Provide recommendation on release of PMT assessments to the ET director.
   e. Develop taskings for line organization to assist site team.

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~~1.~~3. Notify participants on 0930 call – change to weekly. Consider moving to line organizations for conducting weekly calls.

~~2.~~4. Agree with recommendation to go to weekly calls for information exchange on monitoring data (1100).

~~3.~~5. Modify calls with the Japan team to once per day, but team should select the best time.Recommend 0300 EDT.

~~4.~~6. *Maintain 1545 radiological community of interest call with PACOM – done in SCIF*, supported by Whitney, Ulses, and V. Holahan.
~~5.~~7. Modify PACOM J2 calls to on an as-needed basis from 1700 daily.
8. Maintain daily calls w/ V. Holahan, and PACOM.
~~6.~~9. Provide updates to ET One Pager to ET Support (OST01). These will be compiled and vetted with ET Director.
~~7.~~10. ~~Determine computer work station usage and how to transition to person/shift.~~

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Reactor Safety Team

1. Staff the BWR Expert position with a person with the following skills: Strong BWR experience and continuity in the Japan event in RST area. Responsibilities include:
   a. Lead the overall RST activities for the Japan Event
   b. Lead periodic calls with the consortium and Japan site team
   c. Develop assessments on RST activities for Japan site team and appropriate stakeholders.
   d. Provide recommendation on release of RST assessments to the ET director.
   e. Develop taskings for line organization to assist site team.
   ~~2.~~

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2. Staff a Severe Accident/BWR Analyst position with the following skills in priority order: (1) severe accident/PRA, (2) BWR experience, and (3) Ops center function and equipment experience. Responsibilities include:
   a. Provide support to the BWR expert on RST assessments
   b. Provide updates to Fukushima status update chart
   c. Coordinate and track external requests going to line organizations
   d. Maintain RST task tracker
   ~~3.~~

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~~4.~~3. ~~Assign to the BWR expert the primary responsibility to:~~

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~~a.~~4. ~~Lead the overall RST activities for the Japan Event~~

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~~b.~~5. ~~Lead periodic calls with the consortium and Japan site team~~
~~c.~~6. ~~Develop assessments on RST activities for Japan site team and appropriate stakeholders.~~
~~d.~~7. ~~Provide recommendation on release of RST assessments to the ET director.~~
~~e.~~8. ~~Develop taskings for line organization to assist site team.~~
~~5.~~9. ~~Assign to the Severe Accident/BWR analyst the primary responsibility to:~~

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   a. ~~Provide support to the BWR expert on RST assessments~~
   b. ~~Provide updates to Fukushima status update chart~~
   c. ~~Coordinate and track external requests going to line organizations~~
   d. ~~Maintain RST task tracker~~

~~6.~~10. Move responsibility of the UK/Canada/France call to the line organization or discontinue. Notify participants on Monday, 4/11/11.
11. Consolidate two calls with the industry consortium/Japan team (one at 0300, and one at 1700). Include PMT in both calls. Suspend 1100 consortium call on Tuesday.

12. Provide updates to ET One Pager to ET Support (OST01). These will be compiled and vetted with ET Director.
~~7.~~13.

Liaison Team

In addition to site team support, the LT member is responsible for providing liaison support to the Operations Center team consistent with normal Liaison Team responsibilities. The LT member will work with the POCs identified in each supporting office (principally OIP, FSME, and OCA) to ensure that tasks, deliverables, and schedules are understood by the appropriate line organization.

1. The LT member will participate on the following calls:

    1. Calls with the site team.
    2. ~~1100 Emergency Support Function (ESF) 8 call – this occurs on Tuesdays only now (state or OIP and LT Coordinator)~~
    ~~3.~~2. 1400 USAID Congressional call – this call occurs on Tuesdays only now (OCA and LT Coordinator)
    ~~4.~~3. 1700 HHS call with 50 states and federal partners – State Liaison and LT Coordinator participate – now down to Tuesdays and Thursdays only

These calls can be handled by the LT member and, at their judgment, by including appropriate program office staff. These calls may stop altogether in the near future due to diminishing interest by other stakeholders.

2. Maintain the Recurring Actoins and Calls List.

3. Manage resolution of Task Tracker items assigned to the LT.

4. Provide updates to ET One Pager to ET Support (OST01). These will be compiled and vetted with ET Director.

Actions to Implement Prior to Transition

There are no LT calls that need to be cancelled and no actions required to interact with other stakeholders prior to implementing the new ops center staffing plan.

1. *Issue new roster for the revised staffing (Completed 4/9/11 for interim staffing; longer-term staffing will be worked week of April 11).*
2. Brief new team on roles/responsibilities
3. Identify POC's for Offices to provide as "reach-back" access, Brief Offices on transition and implications including need for close communications (M. Evans requested Office POCs by email dated 4/9/11)
    a. FSME – Rich Turtil for State Liaison Functions

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b. NMSS – Doug Weaver
c. NRR – Pat Hiland (backup: Dave Skeen)
d. NSIR – Michael Dudek
e. OPA ~~– ?~~ Holly Harrington
f. OCA - ~~?~~ Amy Powell / David Decker / Tim Riley
g. OIP ~~–Steve Bloom (backup: Danielle EmcheNRO – Jeff Ciocco (backup: Tom Kevern~~ Refer to OPI staffing schedule (extends through May 31, 2011). LT has a copy.
h.

4. Notify stakeholders that the SitRep will be issued once daily.
5. Establish process for transfer of requests from Ops Center staff to line organization. Include instruction for the following:
   a. Documentation of task to be performed (who, what, when)
   b. Identification protocol for contacting the office point of contact
   c. Identification of line organization individual(s) working task and how Ops. Center staff are informed of responsible staff
   d. Feedback process for questions and review,comment of task deliverables
   ~~4.~~

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From: Brenner, Eliot
To: Harrington, Holly; Hayden, Elizabeth
Cc: McIntyre, David
Subject: RE: u guys monitoring the jaczko call?
Date: Saturday, March 12, 2011 10:22:09 PM

I may not make it in until 9. I will be on the 730 call with jazko from home. I will leave an email with dave with instructions for Rob.

From: Harrington, Holly
Sent: Saturday, March 12, 2011 10:16 PM
To: Brenner, Eliot; Hayden, Elizabeth
Subject: RE: u guys monitoring the jaczko call?

Rob will call in at 8 a.m. You can decide then . . .

From: Brenner, Eliot
Sent: Saturday, March 12, 2011 10:01 PM
To: Harrington, Holly; Hayden, Elizabeth
Subject: RE: u guys monitoring the jaczko call?

I think 9 or 10 would be good. Correct me if I am wrong.

From: Harrington, Holly
Sent: Saturday, March 12, 2011 9:59 PM
To: Brenner, Eliot; Hayden, Elizabeth
Subject: RE: u guys monitoring the jaczko call?

What time for rob?

From: Brenner, Eliot
Sent: Saturday, March 12, 2011 9:57 PM
To: Harrington, Holly; Hayden, Elizabeth
Subject: RE: u guys monitoring the jaczko call?

Schedule looks good, include taylor because tomorrow may really go to hell. At GBJ's request I am really pushing the White House to be more public. Right I don't want neil in too much earlier. I will decide in the morning about that.

From: Harrington, Holly
Sent: Saturday, March 12, 2011 9:49 PM
To: Brenner, Eliot; Hayden, Elizabeth
Subject: RE: u guys monitoring the jaczko call?

Should we get Ivonne in here noon tomorrow?
I can come in by 2/3
Bring Neil in by 4/5?

From: Brenner, Eliot
Sent: Saturday, March 12, 2011 9:48 PM
To: Harrington, Holly; Hayden, Elizabeth
Subject: RE: u guys monitoring the jaczko call?

YYY/282

Jeez....gonna be another long night and day....and if this turns out as bad as it looks, neil will be visiting us for a while.

From: Harrington, Holly
Sent: Saturday, March 12, 2011 9:43 PM
To: Brenner, Eliot; Hayden, Elizabeth
Subject: RE: u guys monitoring the jaczko call?

Yes. We're here. I've asked Scott to come in sooner rather than later

---

From: Brenner, Eliot
Sent: Saturday, March 12, 2011 9:42 PM
To: Harrington, Holly; Hayden, Elizabeth
Subject: u guys monitoring the jaczko call?

I am on it, but may need your help. Stay put please for now.

From:	Leeds, Eric
To:	Bahadur, Sher; Blount, Tom; Brown, Frederick; Cheok, Michael; Evans, Michele; Galloway, Melanie; Giitter, Joseph; Givvines, Mary; Hiland, Patrick; Holian, Brian; Howe, Allen; Lee, Samson; Lubinski, John; McGinty, Tim; Nelson, Robert; Quay, Theodore; Ruland, William; Skeen, David
Cc:	Boger, Bruce; Grobe, Jack
Subject:	FW: 0600 EDT (March 14, 2011) USNRC Earthquake/Tsunami SitRep
Date:	Monday, March 14, 2011 7:38:00 AM
Attachments:	USNRC Earthquake-Tsunami Update.031411.0600EDT.docx

WITH HOC

Please read.

Eric J. Leeds, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
301-415-1270

From: LIA07 Hoc
Sent: Monday, March 14, 2011 6:16 AM
To: LIA07 Hoc; Al Coons; Andersen, James; Anderson, Joseph; Barker, Allan; Batkin, Joshua; Bill King; Bill King 2; Brenner, Eliot; Bubar, Patrice; Castleman, Patrick; Charles Donnell; Coggins, Angela; Collins, Elmo; Conrad Burnside; D Feighert; D Hammons; Dean, Bill; Decker, David; DIA; DIA2; Dorman, Dan; DOT; Droggitis, Spiros; DTRA; Dudek; EOP; EPA; EPA2; Franovich, Mike; Hahn, Matthew; Haney, Catherine; Harrington, Holly; Harry Sherwood; HHS; Hipschman, Thomas; HOO Hoc; Howell, Linda; J H-L; Jaczko, Gregory; Jim Kish; Johanna Berkey; Johnson, Michael; Kahler, Robert; L Hammond; Leeds, Eric; Logaras, Harral; Loyd, Susan; Maier, Bill; Marshall, Michael; McCree, Victor; McDermott, Brian; McNamara, Nancy; Michelle Ralston; Miller, Charles; Miller, Chris; Monninger, John; Nan Calhoun; Navy; Nieh, Ho; NOC; Orders, William; Pace, Patti; Pearson, Laura; Peter Lyons; R McCabe; R Thomson; S Horwitz; Satorius, Mark; Schmidt, Rebecca; Seamus O'Boyle; Sharkey, Jeffry; Sheron, Brian; Snodderly, Michael; Sosa, Belkys; Steve Colman; Thomas Zerr; Tifft, Doug; Timothy Greten; Trapp, James; Trojanowski, Robert; Vanessa Quinn; W Webb; Warren, Roberta; Wiggins, Jim; Williams, Kevin; Wittick, Brian; Woodruff, Gena; Schmidt, Rebecca; Powell, Amy; Loyd, Susan; Coggins, Angela; Batkin, Joshua; taskforce-1@state.gov; NOC; Charles Donnell
Cc: LIA09 Hoc; LIA11 Hoc
Subject: RE: 0600 EDT (March 14, 2011) USNRC Earthquake/Tsunami SitRep

Attached, please find a 0600 EDT situation report from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami on March 14, 2011. This Update includes information on the Japanese request for US Assistance in cooling Fukushima Daiichi Units 1, 2, and 3.
Please note that this information is ~~"Official Use Only" and~~ is only being shared within the federal family.
Please call the Headquarters Operations Officer at 301-816-5100 with questions.
-Jim

Jim Anderson
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
james.anderson@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

YYY/293

News Release

経済産業省
Ministry of Economy, Trade and Industry

March 14, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information(the 22th Release)
(As of 07:30 March 14, 2011)

Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa NPS, Tohoku Electric Power Co., Inc; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co., Inc. as follows:

1: The status of operation at Power Stations (Number of automatic shutdown units: 10)

○Fukushima Dai-ichi Nuclear Power Station, Tokyo Electric Power Co., Inc. (TEPCO)
(Okuma-machi and Futaba-machi, Futaba-gun, Fukushima Prefecture)

(1) The status of operation
Unit 1 (460MWe): automatic shutdown
Unit 2 (784MWe): automatic shutdown
Unit 3 (784MWe): automatic shutdown
Unit 4 (784MWe): in periodic inspection outage
Unit 5 (784MWe): in periodic inspection outage
Unit 6 (1,100MWe): in periodic inspection outage

(2) Readings at monitoring posts
The measurement of radioactive materials in the environmental monitoring area near the site boundary by a monitoring car confirmed the increase in the radioactivity compared to the radioactivity at 19:00, March 13.

MP1 (Monitoring at North End of Site Boundary) :
26 microSv/h(18:30 March 13)
→ (Move to MP2)

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MP2 (Monitoring at north- northwest of Unit1 and northwest of the End of Site Boundary for Unit 1):
450 microSv/h(20:10 March 13)
→680 microSv/h(3:50 March 14)
MP4 (Monitoring Car at North West Site Boundary for Unit 1)
44.0 microSv/h(19:33 March 13)
→56.4 microSv/h(04:08 March 14)
(Surveyed by MP2 as MP1 is in the top of the cliff)
MP6 (Monitoring at the Main Gate)
5.2microSv/h(19:00 March 13)
→66.3 microSv/h(02:50 March 14)

(3) Wind direction/wind speed (as of 00:01, March 14)
Wind direction: North North West
Wind Speed: 0.3 m/s

(4) Report concerning other malfunction

- No fire report notified to NISA
- TEPCO reported to NISA in accordance with Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi, Units 1,2 and 3. (15:42 March 11)
- TEPCO report to NISA the event in accordance with Article 15 of the Act for Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi, Units 1 and 2.(notified to NISA at 16:36 March 11)
- For Unit 1: Sea water is being injected to the Primary Containment Vessel (PCV) via the Fire Extinguishing System Line (Start up 11:55 March 13)
  →Interruption of injection (01:10 March 14)
- For Unit 2: Water Injection Function has been sustained. (14:00 March 13)
- For Unit 3: Fresh water is being injected to the PCV via Fire Extinguishing System Line (FESL) (11:55 March 13)
- For Unit 3: Sea water is being injected to the PCV via FESL(13:12 March 13)
- For Unit 1 and Unit 3: Injection of Sea water injection into PCV is

interrupted because of the lack of sea water in pit. (01:10 March 14)

- For Unit 3: Injection of Sea water into PCV is restarted(03:20 March 14)

○ Fukushima Dai-ni Nuclear Power Station (TEPCO)
(Naraha-machi/Tomioka-machi, Futaba-gun, Fukushima pref.)

(1) The status of operation

Unit1 (1,100MWe): automatic shutdown
Unit2 (1,100MWe): automatic shutdown
Unit3 (1,100MWe): automatic shutdown, cold shut down at 12:15, March 12
Unit4 (1,100MWe): automatic shutdown

(2) Readings at monitoring post etc.

MP1 (Monitoring at the North End of Site Boundary)
0.036 microSv/h(19:00 March 13)
→0.038 microSv/h(05:00 March 14)
MP3 (Monitoring at the North/West End of site boundary)
0.038microSv/h(19:00 March 13)
→0.037 microSv/h(05:00 March 14)
MP4 (Monitoring at the North/West End of Site Boundary)
0.036microSv/h(19:00 March 13)
→0.038 microSv/h(05:00 March 14)
MP5 (Monitoring at the West End of Site Boundary)
0.04 microSv/h(19:00 March 13)
→0.042 microSv/h(05:00 March 14)

(3) Direction and velocity of wind (As of 05:00, 14 March)

Direction: South-southwest
Velocity: 0.9 m /s

(4) Report concerning other malfunction

- None of fire report notified to NISA
- TEPCO reported to NISA in accordance with Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ni, Units 1. (18:08 March 11)
- As same as above, TEPCO reported to NISA Fukushima Dai-ni Units 2 and 4.(18:33 March 11)

- For Unit 1: Due to Recovery of Residual Heat Removal System(RHR), water in suppression pool is started to cool for cold shut down.(01:24 March 14)

c. Onagawa Nuclear Power Station (Onagawa-cho, Oga-gun and Ishinomaki–shi, Miyagi Prefecture)

(1) The status of operation
Unit 1 (524MWe): automatic shutdown, cold shut down at 0:58, March 12
Unit 2 (825MWe): automatic shutdown
Unit 3 (825MWe): automatic shutdown, cold shut down at 1:17, March 12

(2) Readings of monitoring post
Reading of monitoring post : Changed
MP2 (Monitoring at the North End of Site Boundary)
Approx. 10,000 nGy/h (as of 13:09 March13)
→7,200 nGy/h (07:20 March 14)

(3) Report concerning other malfunction
- Fire Smoke on the first basement of the Turbine Building was confirmed extinguished at 22:55 on March 11th.
- Article 10* of Act on Special Measures Concerning Nuclear Emergency Preparedness (Unit No. not identified) (13:09 March 13)

2. Action taken by NISA
(March 11)
14:46 Set up of the NISA Emergency Preparedness Headquarters (Tokyo) immediately after the earthquake
15:42: TEPCO reported to NISA in accordance with Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi.
16:36: TEPCO judged the event in accordance with Article 15 of the Act for Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi, Units 1 and 2.(notified to NISA at 16:45)
18:08: Unit 1 of Fukushima Dai-ni notified NISA of the situation of the

Article 10 of Act on Special Measures Concerning Nuclear Emergency Preparedness.

18:33: Units 1,2 and 4 of Fukushima Dai-ni notified NISA of the situation of the Article 10 of Act on Special Measures Concerning Nuclear Emergency Preparedness.

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

20:50: Fukushima Prefecture's Emergency Response Headquarters issued a direction regarding the accident occurred at Fukushima-Dai-ichi Nuclear Power Station, TEPCO, that the residents living in the area of 2km radius from Unit 1 of the Nuclear Power Station must evacuate.(The population of this area is 1,864)

21:23: Directives from Prime Minister to the Governor of Fukushima, Mayor of Ookuma and Mayor of Futaba were issued regarding the accident occurred at Fukushima-Dai-ichi Nuclear Power Station, TEPCO, pursuant to Paragraph 3, Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness as follows:

-Residents living in the area of 3km radius from Unit 1 of the Nuclear Power Station must evacuate.

-Residents living in the area of 10km radius from the Unit 1 must take sheltering.

24:00: Mr. Ikeda, Vice Minister of METI, arrived at the Local Emergency Response Headquarters

(March12)

05:22 Unit 1 of Fukushima Dai-ni notified NISA of the situation of the Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness.

05:32 Unit 2 of Fukushima Dai-ni notified NISA of the situation of the Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness.

05:44 Residents living in the area of 10km radius from unit 1 of the Nuclear Power Station must evacuate by the Prime Minister Direction.

06:07 Regarding of Fukushima Dai-ni NPS, TEPCO reported NISA in accordance with Article 15 of Act for Special Measures Concerning

Nuclear Emergency Preparedness.

06:50 According to the article 64, 3 of the Nuclear Regulation Act, government order to control the internal pressure in Fukushima-dai-ichi Units 1 and 2

07:45 Directives from Prime Minister to Governor of Fukushima, Mayors of Hirono, Naraha, Tomioka, Ookuma and Futaba were issued regarding the accident occurred at Fukushima-Dai-ni Nuclear Power Station, TEPCO, pursuant to Paragraph 3, Article 15 of the Act for Special Measures Concerning Nuclear Emergency Preparedness as follows:

-Residents living in the area of 3km radius from Fukushima Dai-ni Nuclear Power Station (NPS) must evacuate.

-Residents living in the area of 10km radius from Fukushima Dai-ni NPS must take sheltering

17:00 Notification pursuant to Article 15 of the Act for Special Measure Concerning Nuclear Emergency Preparedness since the radiation level exceeded the acceptable level of Fukushima Dai-ichi NPS.

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

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

19:55 Directives from Prime Minister was issued regarding sea water injection to Unit No.1 of Fukushima Dai-ichi NPS.

20:05 Based on the directives form Prime Minister and pursuant to Paragragh 3, Article 64 of the Nuclear Regulation Act, the Government issued an order to inject sea water Unit 1 of Fukushima Dai-ichi NPS.

20:20 Fukushima Dai-chi NPS, Unit1 started sea water injection.

(March 13)

05:38 TEPCO notified NISA of the situation pursuant to the Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness that Unit 3 of Fukushima Dai-ichi NPS is in a loss of all coolant injection function. Recovering efforts of the power source and coolant injection function and work on venting are underway.

09:08 Pressure suppression in the Containment Vessel and fresh water injection started at Unit 3 of Fukushima Daii-chi NPS.

09:20 Opening of Pressure vent valve of Unit 3 of Fukushima Dai-ichi NPS.
09:30 NISA directed the Governor of Fukushima Prefecture, the Mayers of Ookuma-machi, Futaba-machi, Tomioka-machi and Namie-machi based on the Act for Special Measures Concerning Nuclear Emergency Preparedness on radioactivity decontamination screening.
09:38 TEPCO notified NISA that Unit 1 of Fukushima Dai-ichi NPS reached a situation specified in Article 15 of the Act for Special Measures Concerning Nuclear Emergency Preparedness.
13:09 Tohoku Electric notified NISA that Onagawa NPS reached a situation specified in Article 10 of the Act for Special Measures Concerning Nuclear Emergency Preparedness.
13:12 Fresh water injection was switched to sea water injection at Unit 3 of Fukushima Dai-ichi NPS.
14:25 TEPCO notified NISA that Fukushima Dai-ichi NPS reached a situation specified in Article 15 of the Act for Special Measures Concerning Nuclear Emergency Preparedness.

(March 14)
01:10 Sea water injection at unit 1 and unit 3 of Fukushima Dai-ichi NPS were temporary stopped due to decreasing sea water in pool
03:20 Sea water injection at unit 3 of Fukushima Dai-ichi NPS was restarted.
04:24 TEPCO notified NISA that Fukushima Dai-ichi NPS reached a situation specified in Article 15 of the Act for Special Measures Concerning Nuclear Emergency Preparedness.

<Possible Exposure to Residents>

(1) Case for Travel from Futaba Public Welfare Hospital to Nihonmatsu Man and Woman Symbiosis Center, Fukushima Prefecture

i) No. of persons to be measured: About 60 persons

ii) Measured Result: Not yet

iii) Passage: Exposure could have happened while waiting to be picked up by helicopter at the Futaba high school ground

iv) Other

Prefectural Response Headquarters judged that there were no exposure to 35 persons who traveled from Futaba Public Welfare Hospital to Kawamata Saiseikai Hospital, Kawamata-machi by the private bus provided by Fukushima Prefecture.

(2) Case for Futaba-machi Residents Evacuated by Buses

i) No. of Persons: About 100 persons

ii) Measured Result: 9 persons out of 100 persons

No. of Counts	No. of Persons
18,000cpm	1
30,000-36000cpm	1
40,000cpm	1
little less than 40,000cpm*	1
very small counts	5

*(This results was measured without shoes, though the first measurement exceeded 100,000cpm)

iii) Passage: Under investigation

iV) Other

Though persons evacuated in different location outside of the Prefecture (Miyagi Prefecture), all destinations are under confirmation.

<Status of Evacuation (As of 04:30 March 14)>

Ookuma-machi: Evacuation of subject evacuees (about 11,000 persons) completed. (Area of Refuge: Tamura Comprehensive Gymnasium, etc.)

(Contact Person)
Mr. Toshihiro Bannai
Director, International Affairs Office, NISA/METI
Phone:+81-(0)3-3501-1087

From: OST01 HOC
Sent: Thursday, April 14, 2011 11:03 PM
To: Pace, Patti
Subject: RE: Japan One Pager 1500 EDT 4-14-11

Patti,

Will do. I just arrived for the midnight shift, but I'll let the other staffers know to send it directly to him. I think this was being done earlier in the day. I forwarded a copy of the last One Pager to his regular NRC email address as well.

Thanks,
-Nick

From: Pace, Patti
Sent: Thursday, April 14, 2011 10:47 PM
To: OST01 HOC; HOO Hoc
Subject: Re: Japan One Pager 1500 EDT 4-14-11

Good evening,

Please note, one pager updates should go directly to Chairman Jaczko at gregory.jaczko@nrc.gov That address goes to him personally. The "Chairman resource" email address utilized below is a public address, the incoming correspondence to the address is managed by SECY. The Chairman would prefer to receive Japan update information directly. Could you make a note of this for future shifts?

Thank you very much!!
Patti Pace
U.S. Nuclear Regulatory Commission
(301) 415-1820

From: OST01 HOC
To: CHAIRMAN Resource; Virgilio, Martin; Weber, Michael; Boger, Bruce; Johnson, Michael; Zimmerman, Roy; Uhle, Jennifer; Tracy, Glenn; Wiggins, Jim; Carpenter, Cynthia; Moore, Scott
Cc: Pace, Patti; Batkin, Joshua; Gibbs, Catina; Speiser, Herald; Hipschman, Thomas; Marshall, Michael; Castleman, Patrick; Snodderly, Michael; Franovich, Mike
Sent: Thu Apr 14 22:38:42 2011
Subject: Japan One Pager 1500 EDT 4-14-11

Please note that this information is ~~"Official Use Only."~~

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News Release

経済産業省
Ministry of Economy, Trade and Industry

平成２３年３月１４日
経　済　産　業　省
原子力安全・保安院

地震被害情報（第２２報）
（３月１４日　７時３０分現在）

原子力安全・保安院が現時点で把握している東京電力(株)福島第一原子力発電所、福島第二原子力発電所、東北電力㈱女川原子力発電所、電気、ガス、熱供給、コンビナート被害の状況は、以下のとおりです。

１　発電所の運転状況【自動停止号機数：１０基】

○東京電力(株)福島第一原子力発電所（福島県双葉郡大熊町及び双葉町）

（１）運転状況
　１号機（46 万 kW）（自動停止）
　２号機（78 万 4 千 kW）（自動停止）
　３号機（78 万 4 千 kW）（自動停止）
　４号機（78 万 4 千 kW）（定検により停止中）
　５号機（78 万 4 千 kW）（定検により停止中）
　６号機（110 万 kW）（定検により停止中）

（２）モニタリングの状況
・モニタリングカーにより周辺監視区域境界近傍の放射性物質測定を行ったところ、13 日 19:00 現在と比較した結果は以下のとおり
　MP１付近（敷地最北敷地境界）26μSv／h（13 日 18:30）
　　→（ＭＰ２に測定点移動）
　MP２付近（1 号機北北西敷地最北西敷地境界）450μSv／h（13 日 20:10）
　　→680μSv／h（14 日 3:50）
　（夜間は MP1 は崖の上にあるため、MP2 にて測定：）
　MP４付近（1 号機北西敷地境界ﾓﾆﾀﾘﾝｸﾞｶｰ）44μSv／h（13 日 19:33）
　　→56.4μSv／h（14 日 04:08）
　MP６付近（正門）5.2μSv／h（13 日 19:00）
　　→66.3μSv／h（14 日 2:50）

（３）風向・風速（14 日 0:01 現在）
　風向：北西
　風速：０．３m／s

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（４）その他異常に関する報告

・火災の報告等なし

・原子力災害対策特別措置法第１０条通報（11 日 15:42）

・同第１５条通報（福島第一原子力発電所１、２号機）（11 日 16:36）

・１号機の格納容器内に消火系ラインを用いて海水注入開始(13 日 11:55)
→14 日 01:10 一時中断

・２号機は注水機能を維持（13 日 14:00）

・３号機の格納容器内に消火系ラインにて真水注入開始（13 日 11:55）

・３号機の格納容器内に消火系ラインを用いて海水注入開始(13 日 13:12)

・１号機及び３号機の注入をくみ上げ箇所の海水が少なくなったため停止。
(14 日 1:10)

・３号機の海水注入を再開(14 日 3:20)

○東京電力(株)福島第二原子力発電所（福島県双葉郡楢葉町及び富岡町）

（１）運転状況

１号機（110 万 kW）（自動停止）

２号機（110 万 kW）（自動停止）

３号機（110 万 kW）（自動停止、12 日 12:15 冷温停止）

４号機（110 万 kW）（自動停止）

（２）モニタリングポスト等の指示値

MP１付近（敷地最北敷地境界）0.036μSv／h（13 日 19:00）
→0.038μSv／h（14 日 5:00）

MP３付近（敷地最北西敷地境界）0.038μSv／h（13 日 19:00）
→0.037μSv／h（14 日 5:00）

MP４付近（敷地最西敷地境界）0.036μSv／h（13 日 19:00）
→0.038μSv／h（14 日 5:00）

MP５付近（敷地最西敷地境界）0.04μSv／h（13 日 19:00）
→0.042μSv／h（14 日 5:00）

（３）風向・風速（14 日 05:00 現在）

風向：南南西

風速：0.9m／s

（４）その他異常等に関する報告

・火災の報告等なし

・１号機にて原子力災害対策特別措置法第１０条通報（11 日 18:08）
・１、２、４号機にて同法第１０条通報（11 日 18:33）
・１号機の残留熱除去系（B）が復旧したことから冷温停止に向けてサプレッションプール水の冷却を開始（14 日 01:24）

○東北電力(株)女川原子力発電所（宮城県牡鹿郡女川町、石巻市）
（１）運転状況
１号機（52 万 4 千 kW）（自動停止、12 日 0:58 冷温停止）
２号機（82 万 5 千 kW）（自動停止）
３号機（82 万 5 千 kW）（自動停止、12 日 1:17 冷温停止）
（２）モニタリングポスト等の指示値
MP２付近（敷地最北敷地境界）約 10,000nGy／ｈ（13 日 13:09）
→約 7,200nGy／ｈ（14 日 7:20）
（３）その他異常に関する報告
・タービン建屋地下１階の発煙は消火確認（11 日 22:55）
・原子力災害対策特別措置法第１０条通報（13 日 13:09）

２　産業保安
○電気　3 月 14 日 7:30 現在
・東京電力（３月１４日０７：１９現在）
停電戸数：約１４万戸　（延べ停電戸数　約４０５万戸）
停電地域：　茨城県　ほぼ全域
・東北電力（３月１４日０６：００現在）
停電戸数：約１１４万戸　（延べ停電戸数　約４８３万戸）
停電地域：青森県　三八の一部地域（約５千戸）
岩手県　一部地域（約１５万２千戸）
宮城県　全域（約９３万８千戸）
福島県　中通り、浜通りの一部地域（約４万４千戸）
・北海道電力
停電は１２日１４：００までに復旧済　（延べ停電戸数　約３千戸）
・中部電力
停電（長野県）は１２日１７：１１に復旧済　（延べ停電戸数　約４百戸）

○一般ガス　3 月 13 日 17:50 現在
日本ガス協会が先遣隊を派遣、13 日午後仙台市に到着予定。
気仙沼市営ガス、相馬ガスと連絡不通。

北海道、山形県、秋田県においては、供給停止の連絡はない。

各社の供給停止状況は以下の通り。
・東京ガス（日立市）30,008 戸供給停止
・仙台市営ガス　約 36 万戸供給停止
・塩釜ガス(塩釜市等)　12,382 戸供給停止。
・福島ガス（福島市）1,695 戸供給停止
・東部ガス（土浦市）約 7,500 戸供給停止。
　　　　　（水戸市）約 330 戸供給停止。
・釜石ガス（釜石市）　約 10,000 戸供給停止
・常磐共同ガス（いわき市）約 15,000 戸供給停止
・秦野ガス（秦野市）　163 戸供給停止。
・京葉ガス（浦安市）5,445 戸供給停止
・東北ガス（白河市）約 270 戸供給停止
・八戸ガス（八戸市）　約 1,300 戸供給停止
・常磐都市ガス（水戸市）　約 50 戸供給停止

○簡易ガス（3 月 13 日 17:50 現在）

各社の供給停止状況は以下の通り。
・仙台市ガス局（名取市）1,225 戸供給停止
　　　　　　　（仙台市）114 戸供給停止
　　　　　　　（岩沼市）342 戸供給停止
　　　　　　　（黒川郡富谷町）1,855 戸供給停止
・カメイ（日立市）301 戸供給停止
　　　　（川口市）165 戸供給停止
・東部液化石油（日立市）145 戸供給停止
　　　　　　　（鉾田市）150 戸供給停止
　　　　　　　（水戸市）1,784 戸供給停止
　　　　　　　（土浦市）379 戸供給停止
　　　　　　　（つくば市）444 戸供給停止
　　　　　　　（ひたちなか市）1,985 戸供給停止
　　　　　　　（鹿嶋市）1,369 戸供給停止
　　　　　　　（桜川市）160 戸供給停止
　　　　　　　（小美玉市）306 戸供給停止
　　　　　　　（那珂郡東海村）164 戸供給停止
　　　　　　　（常陸太田市）70 戸供給停止
・堀川産業（宇都宮市）893 戸供給停止
　　　　　（鹿沼市）1,983 戸供給停止

（さくら市）123 戸供給停止
（河内郡上三川町）957 戸供給停止
・フジオックス（宇都宮市）1,067 戸供給停止
・栃木液化ガス（大田原市）153 戸供給停止
・相馬ガス（相馬市）143 戸供給停止
・保原液化ガス（伊達郡保原町）336 戸供給停止
・筑波学園ガス（つくば市）269 戸供給停止
・勝田ガス事業協同組合（ひたちなか市）647 戸供給停止
・帝石プロパンガス（ひたちなか市）774 戸供給停止
（常陸大宮市）258 戸供給停止
（常陸太田市）233 戸供給停止
・東京ガスエネルギー（ひたちなか市）90 戸供給停止
・日本瓦斯（那珂郡東海村）594 戸供給停止
（取手市）636 戸供給停止
（つくばみらい市）238 戸供給停止
（常陸太田市）631 戸供給停止
（稲敷市）97 戸供給停止
（矢板市）370 戸供給停止
（那須烏山市）76 戸供給停止
（鹿沼市）132 戸供給停止
・ケーイージー（成田市）177 戸供給停止
・池辺石油ガス（稲敷市）153 戸供給停止
・斉藤商店（つくばみらい市）110 戸供給停止
・今市ガス（日光市）240 戸供給停止
・大陽日酸エネルギー関東（川口市）169 戸供給停止
・太田ガス事業協同組合（太田市）320 戸供給停止
・館林液化ガス（館林市）233 戸供給停止
・グロリアガス（狭山市）185 戸供給停止
・河原実業（越谷市）153 戸供給停止
・東ガス管興（北杜市）79 戸供給停止
・サイサン（佐久市）153 戸供給停止

○熱供給（3 月 13 日 17:50 現在）
・山形熱供給（山形市）供給停止
・小名浜配湯（いわき市小名浜）供給停止
・日立熱エネルギー（日立市）供給停止

○コンビナート（3 月 13 日 20:30 現在）

・コスモ石油千葉製油所（千葉県市原市）
ブタンブチレン貯槽の支柱が折れ、破損。ガス漏れ火災。
重傷者１名、軽傷４名
・JX 日鉱日石エネルギー(株)仙台製油所（宮城県仙台市）
出荷設備エリアが爆発し、火災が発生。

3　原子力安全・保安院等の対応

【3 月 11 日】

１４：４６　地震発生と同時に原子力安全・保安院に災害対策本部設置
１５：４２　福島第一原子力発電所にて原子力災害対策特別措置法第１０条通報
１６：３６　福島第一原子力発電所１、２号機にて事業者が同法第１５条事象発生判断（１６：４５通報）
１８：０８　福島第二原子力発電所１号機にて原子力災害対策特別措置法第１０条通報
１８：３３　福島第二原子力発電所１、２、４号機にて原子力災害対策特別措置法第１０条通報
１９：０３　緊急事態宣言（政府原子力災害対策本部及び同現地対策本部設置）
２０：５０　福島県対策本部は、福島第一原子力発電所１号機の半径２ｋｍの住人に避難指示を出した。（２ｋｍ以内の住人は１８６４人）
２１：２３　内閣総理大臣より、福島県知事、大熊町長及び双葉町長に対し、東京電力(株)福島第一原子力発電所で発生した事故に関し、原子力災害対策特別措置法第１５条第３項の規定に基づく指示を出した。
・福島第一原子力発電所１号機から半径３ｋｍ圏内の住民に対する避難指示。
・福島第一原子力発電所１号機から半径１０ｋｍ圏内の住民に対する屋内待避指示。
２４：００　池田経済産業副大臣現地対策本部到着

【3 月 12 日】

５：２２　福島第二原子力発電所１号機にて原子力災害対策特別措置法第１５条通報
５：３２　福島第二原子力発電所２号機にて原子力災害対策特別措置法第１５条通報
５：４４　総理指示により福島第一原子力発電所の１０ｋｍ圏内に避難指示
６：０７　福島第二原子力発電所４号機にて原子力災害対策特別措置法第１５条通報
６：５０　原子炉等規制法第６４条第３項の規定に基づき、福島第一原子力発電所第１号機及び第２号機に設置された原子炉格納容器内の圧

力を抑制することを命じた。

7：45　内閣総理大臣より、福島県知事、広野町長、楢葉町長、富岡町長及び大熊町長に対し、東京電力(株)福島第二原子力発電所で発生した事故に関し、原子力災害対策特別措置法第１５条第３項の規定に基づく指示を出した。

・福島第二原子力発電所から半径３ｋｍ圏内の住民に対する避難指示。

・福島第二原子力発電所から半径１０ｋｍ圏内の住民に対する屋内待避指示。

１７：００　福島第一原子力発電所の放射線量の値が制限値を超えたため、原子力災害対策特別措置法第１５条通報

１７：３９　内閣総理大臣が福島第二原子力発電所の避難区域

・福島第二原子力発電所から半径１０ｋｍ圏内の住民に対する避難を指示。

１８：２５　内閣総理大臣が福島第一原子力発電所の避難区域

・福島第一原子力発電所から半径２０ｋｍ圏内の住民に対する避難を指示。

１９：５５　福島第一原子力発電所１号機の海水注入について総理指示

２０：０５　総理指示を踏まえ、原子炉等規制法第６４条第３項の規定に基づき、福島第一原子力発電所第１号機の海水注入等を命じた。

２０：２０　福島第一原子力発電所１号機の海水注入を開始

【3月13日】

５：３８　福島第一原子力発電所３号機の全注水機能喪失のため、原子力災害対策特別措置法第１５条に基づく特定事象と判断した旨の通報受信。

当該サイトについて、東京電力において現在、電源及び注水機能の回復と、ベントのための作業を実施中。

９：０８　福島第一原子力発電所３号機の圧力抑制及び真水注入を開始

９：２０　福島第一原子力発電所３号機の耐圧ベント弁開放

９：３０　福島県知事、大熊町長、双葉町長、富岡町長、浪江町長に対し、原子力災害対策特別措置法に基づき、放射能除染スクリーニングの内容について指示

９：３８　福島第一原子力発電所１号機にて原子力災害対策特別措置法第１５条通報

１３：０９　女川原子力発電所にて原子力災害対策特別措置法第１０条通報

１３：１２　福島第一原子力発電所３号機の注入を真水から海水に切り替え

１４：２５　福島第一原子力発電所にて原子力災害対策特別措置法第１５条通報

【3 月 14 日】

１：１０　福島第一原子力発電所１号機及び３号機の注入をくみ上げ箇所の海水が少なくなったため停止。

３：２０　福島第一原子力発電所３号機の海水注入を再開

４：２４　福島第一原子力発電所にて原子力災害対策特別措置法第１５条通報

<被ばくの可能性（3月14日7:30現在）>

1．住民被ばくの可能性

（１） 双葉厚生病院から二本松市福島県男女共生センターへの移動ケース

① 測定対象人数：約６０名

② 測定結果：測定済（結果は確認中）

③ 経路

双葉高校のグランドで、移動に利用したヘリを待機している際に被ばくした可能性あり

④ その他

この他、福島県が用意した民間バスで、双葉厚生病院から川俣町済生会川俣病院へ移動した３５名については、県対策本部は被ばくしていないと判断。

（２） バスにより避難した双葉町の住民ケース

① 人数：約１００名

② 測定結果（１００名のうち、９名について測定した結果）

カウント数	人数
18,000cpm	１名
30,000～36,000cpm	１名
40,000cpm	１名
40,000cpm弱※	１名
ごく小さい値	５名

※（１回目の測定では100,000cpmを超えたものの、靴を脱いで測定した結果計測されたもの）

③ 経路：調査中

④ その他

現在、県外(宮城県)にバラバラに避難したものの、再び二本松福島男女共生センターへ集合済み。

<住民避難の状況（3月14日4:20現在）>

福島第一原子力発電所２０ｋｍ圏内及び福島第二原子力発電所１０ｋｍ圏内の避難は、病院の患者、福祉施設の入居者などの搬送待ちの方について、バス、自衛隊ヘリ等により搬送対応中。また、複数名が自主的に自宅に屋内待避している模様。それ以外の方々については、おおむね避難を終了。

（本発表資料のお問い合わせ）
原子力安全・保安院
　原子力安全広報課：渡邉、金城
　　電話：０３－３５０１－５８９０（原子力安全広報課）

（参考）

【東北地方太平洋沖地震】

1．災害概要

（１） 発生日時：平成 23 年 3 月 11 日（金） １４：４６発生

（２） 発生場所：震源三陸沖（北緯 38 度、東経 142.9 度）

深さ 10km、マグニチュード 9.0

（３） 各地の震度

○震度４以上の地域

震度７	宮城県北部
震度６強	茨城県北部、茨城県南部
震度５強	青森県三八上北
震度５弱	新潟県中越
震度４	

○震度４以上の市町村

震度６強	福島県楢葉町、富岡町、大熊町、双葉町
震度６弱	宮城県石巻市、女川町（発電所の震度計による）、東海村
震度５弱	新潟県刈羽村
震度４	青森県六ケ所村、東通村、新潟県柏崎市、神奈川県横須賀市
震度１	北海道泊村

From: Haney, Catherine
To: Bailey, Marissa
Subject: RE: Highlights from AO scheduling call
Date: Monday, March 14, 2011 3:37:00 PM

Thanks

From: Bailey, Marissa
Sent: Monday, March 14, 2011 2:30 PM
To: Haney, Catherine; Dorman, Dan
Cc: Tschiltz, Michael; Kinneman, John; Pulliam, Timothy; Kokajko, Lawrence; Ordaz, Vonna
Subject: Highlights from AO scheduling call

1. Op Center Support Priority

   - Asking Offices to support the Op Center, this should be a priority for offices
   - Sending another 6 NRC staff members to Japan today to support the embassy and coordinate with regulators: Chuck Casto, John Monninger, Tim Kolb, Jack Foster, and 2 others whose names I didn't catch. OIP also mentioned that we are also sending 3 OIP staff, for a total of 9 NRC staffs plus the 2 that are already there.
   - Chairman message today
   - Michelle Evans – expect the need to continue to staff the Ops Center at least through Friday
   - Congressional hearing on Wednesday will now focus on Japan event, not the budget. Stay tuned for request for information.
   - Remind staff that if they receive Congressional correspondence, get it to the OEDO and in process ASAP.

2. Strategic Acquisition SRM

   - SRM issued 2/28, both recommendations accepted: Contract authority delegated to EDO, who can re-delegate to head of Contracts and Chairman paper process terminated immediately

3. Profiling OIG Report Recommendation Status Correspondence in ADAMS for public availability

   - Once OIG Report is publicly available, staff response/correspondence should also be profiled in ADAMS as publicly available with the exceptions (i.e., documents containing classified, SGI, OUO, SRI, PII etc.). This will be included in the special instructions to the green ticket.

4. Commission Meeting Presentation Feedback
   - Commission does not like scripted presentations, may get into more technical details, and likes photographs

5. OCFO - e-mail sent to all PBPB directors requesting feedback on FAMIS implementation review.

YYY/287

From: RST01 Hoc
Sent: Friday, April 01, 2011 3:47 PM
To: RST12 Hoc
Attachments: FW: Question from PACOM; FW: Proposed Conference Call ; FW: Coordination of contaminated water cleanup efforts

Y44/288

From: Haney, Catherine
To: Cianci, Sandra
Subject: RE: Rescheduling Prep Meetings with DEDOs for Congressional Hearing
Date: Monday, March 14, 2011 4:05:00 PM

Thanks, I was confused.

From: Cianci, Sandra
Sent: Monday, March 14, 2011 4:03 PM
To: Haney, Catherine
Subject: RE: Rescheduling Prep Meetings with DEDOs for Congressional Hearing

Mike is on day shift tomorrow.

Sandy Cianci
Administrative Assistant to Marty Virgilio, DEDR
Office of the Executive Director for Operations
O-17 H13
301-415-1714
sandra.cianci@nrc.gov

From: Haney, Catherine
Sent: Monday, March 14, 2011 3:59 PM
To: Cianci, Sandra
Subject: RE: Rescheduling Prep Meetings with DEDOs for Congressional Hearing

Is Mike on the shift again tonight? I thought Dan Dorman was the ET rep?

From: Cianci, Sandra
Sent: Monday, March 14, 2011 3:52 PM
To: Walker, Dwight; Casby, Marcia
Cc: Weber, Michael; Miller, Charles; Haney, Catherine; Jacobs-Baynard, Elizabeth; Muessle, Mary; Taylor, Renee
Subject: FW: Rescheduling Prep Meetings with DEDOs for Congressional Hearing
Importance: High

Marcia/Dwight,

Please ensure Charlie and Cathy are available tomorrow to support Bill Borchardt at the Chairman Prep meeting scheduled 9:30am-10:00am – Chairman's Office

Thank you

YYY/289

Sandy Cianci
Administrative Assistant to Marty Virgilio, DEDR
Office of the Executive Director for Operations
O-17 H13
301-415-1714
sandra.cianci@nrc.gov

From: Weber, Michael
Sent: Monday, March 14, 2011 3:26 PM
To: Cianci, Sandra
Cc: Muessle, Mary; Taylor, Renee; Jacobs-Baynard, Elizabeth
Subject: Response - Rescheduling Prep Meetings with DEDOs for Congressional Hearing

Yes, please prepare them to support Bill.

Thanks

From: Cianci, Sandra
To: Weber, Michael
Sent: Mon Mar 14 15:20:10 2011
Subject: FW: Rescheduling Prep Meetings with DEDOs for Congressional Hearing

Mike,

Bill is covering the Chairman prep meeting on your behalf. Would you like Cathy and Charlie to attend as well?

Sandy

From: Pace, Patti
Sent: Monday, March 14, 2011 3:04 PM
To: Belmore, Nancy; Quesenberry, Jeannette; Pulley, Deborah; Mayberry, Theresa; Hudson, Sharon; Ellis, Marv; Taylor, Renee; Garland, Stephanie; Cianci, Sandra; Casby, Marcia; Walker, Dwight
Cc: Coggins, Angela; Batkin, Joshua; Dhir, Neha; Gibbs, Catina
Subject: Rescheduling Prep Meetings with DEDOs for Congressional Hearing
Importance: High

Good afternoon,

I have rescheduled the following briefings for the Chairman in advance of the Congressional hearing on Wednesday morning.

Tuesday March 15th
9:00a – 9:30a
Prep Meeting with Marty Virgilio

Chairman's Conference Room

9:30a – 10:00a
Prep Meeting DEDMRT Areas (Mike Weber not available, will be covered by Mr. Borchardt)
Chairman's Conference Room

As before, OCA, OGC, CFO invited to attend as well as TAs from the Commission offices.

Thanks,

Patti Pace
Assistant to Chairman Gregory B. Jaczko
U.S. Nuclear Regulatory Commission
301-415-1820 (office)
301-415-3504 (fax)

From: Alter, Peter
Sent: Friday, April 01, 2011 7:09 AM
To: ET07 Hoc
Subject: FW: 0430 EDT (March 30, 2011) USNRC Earthquake/Tsunami Status Update
Attachments: NRC Status Update 3.30.11--0430.pdf

EST Status officer,
I don't believe that all the teams understand what Jim Anderson has to say about the **USNRC Emergency Operations Center Status Update** an example of which is attached.
Peter

From: LIA07 Hoc
Sent: Wednesday, March 30, 2011 4:43 AM
Cc: LIA07 Hoc
Subject: 0430 EDT (March 30, 2011) USNRC Earthquake/Tsunami Status Update

Attached, please find a 0430 EDT (March 30, 2011) status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami.

~~Please note~~ that this information is ~~"Official Use Only"~~ and is only being shared within the ~~federal family.~~

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Jim

Jim Anderson
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
LIA07.HOC@nrc.gov (Operations Center)
james.anderson@nrc.gov

YYY/290

From: RST12 Hoc
Sent: Friday, April 01, 2011 6:40 PM
To: RST01 Hoc
Subject: summary of 1700 call with PACOM call
Attachments: Discussion Points for PACOM call 1700 April 1.doc

YYY/291

Summary of PACOM call 1700 April 1, 2011

Introductions

What are NRC's most significant information gaps?

We have no direct communication between our RST staff and TEPCO or real-time plant data. Both of these communication paths would be available during an event in the U.S. What we are doing is based on second-hand data, including the assessments that have been coordinated with DOE, GEH, INPO and other U.S. agencies. As examples, some of these information gaps include: reliable indication of SFP levels for Units 3 and 4, better indications of building accessibility from either radiological or structural damage standpoints, better information on actual releases from site, detailed information on injection/leak flowpaths for Units 1-3 (including nitrogen inerting flowpaths).

To what degree is TEPCO executing a reactor recovery strategy versus reacting/responding to day-to-day events?

Some examples of each case.

Recovery examples: They were early on questioning salt assessment, strategy to bring nitrogen purging back online, partial flooding of primary containment

Reacting/Responding: Turbine Building/trench flooding; dosimeter shortage; hydrogen explosions; also early on in the event, actions we would have expected would have been taken were not.

What information/assessment does NRC have wrt concrete durability under sustained high heat pressure?

In the U.S., we have symptom-based Emergency Operating Procedures as well as Severe Accident Management Guidelines that deal with accidents. Specifically related to concrete durability under high heat and pressure, we recently published the following NUREG/CR:

NUREG/CR-7031, Dec. 2010, A Compilation of Elevated Temperature Concrete Material Property Data and Information for Use in Assessments of Nuclear Power Plant Reinforced Concrete Structures. NRC Contact: Jose Pires, 301-251-7696

What Isotopic Monitoring and Analysis Information Is Available?

- In general, data are limited in quantity and in details about the data.
- Discussed available classified data.
- There was one data set from DOE: isotopic measurements of ground deposition. Several locations, analyses included I-131, Cs-137, and others, and were expressed as a ratio relative to I-131 (absolute values were not determined).

- MEXT data from Japan include some limited measurements reported as Fallout (activity per area) and are analyses for I-131 and Cs-137. Details about these measurements are not available to us.
- U.S. Nuclear Plants are voluntarily reporting measurements of I-131 in air that are deemed to be the result of releases from Fukushima. These data are posted on the EPA RadNet web page as they are posted by the Plants.

Most likely catastrophic events, and their indications

Unit 1 hydrogen deflagration/detonation - no prior warning indications, and we know they are energizing various equipment, which could create an ignition source, but we do not know their schedule. We believe they are doing that in a careful manner and appear to be aware of this concern.

If they elect to do planned venting on Unit 1, as we are recommending in order to prevent a more significant hydrogen detonation, the venting would release a significant radioactive plume.

Discussion of reactor stability and forecasts

Information is in the assessment document. Most significant concern is Unit 1, due to buildup of pressure in RPV and containment and possibility for hydrogen deflagration/detonation.

Items for follow up: When is the next revision to be published?

Working on revision - no current estimate of release time.
Also working on a similar document for the spent fuel pools - schedule not yet determined.

IAEA Safety Standards

for protecting people and the environment

Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency

Jointly sponsored by the
FAO, IAEA, ILO, PAHO, WHO

IAEA WHO

General Safety Guide

No. GSG-2

IAEA
International Atomic Energy Agency

YXY/292

IAEA SAFETY RELATED PUBLICATIONS

IAEA SAFETY STANDARDS

Under the terms of Article III of its Statute, the IAEA is authorized to establish or adopt standards of safety for protection of health and minimization of danger to life and property, and to provide for the application of these standards.

The publications by means of which the IAEA establishes standards are issued in the **IAEA Safety Standards Series**. This series covers nuclear safety, radiation safety, transport safety and waste safety. The publication categories in the series are **Safety Fundamentals**, **Safety Requirements** and **Safety Guides**.

Information on the IAEA's safety standards programme is available at the IAEA Internet site

http://www-ns.iaea.org/standards/

The site provides the texts in English of published and draft safety standards. The texts of safety standards issued in Arabic, Chinese, French, Russian and Spanish, the IAEA Safety Glossary and a status report for safety standards under development are also available. For further information, please contact the IAEA at PO Box 100, 1400 Vienna, Austria.

All users of IAEA safety standards are invited to inform the IAEA of experience in their use (e.g. as a basis for national regulations, for safety reviews and for training courses) for the purpose of ensuring that they continue to meet users' needs. Information may be provided via the IAEA Internet site or by post, as above, or by email to Official.Mail@iaea.org.

OTHER SAFETY RELATED PUBLICATIONS

The IAEA provides for the application of the standards and, under the terms of Articles III and VIII.C of its Statute, makes available and fosters the exchange of information relating to peaceful nuclear activities and serves as an intermediary among its Member States for this purpose.

Reports on safety and protection in nuclear activities are issued as **Safety Reports**, which provide practical examples and detailed methods that can be used in support of the safety standards.

Other safety related IAEA publications are issued as **Radiological Assessment Reports**, the International Nuclear Safety Group's **INSAG Reports**, **Technical Reports** and **TECDOCs**. The IAEA also issues reports on radiological accidents, training manuals and practical manuals, and other special safety related publications. Security related publications are issued in the **IAEA Nuclear Security Series**.

CRITERIA FOR USE IN PREPAREDNESS AND RESPONSE FOR A NUCLEAR OR RADIOLOGICAL EMERGENCY

IAEA SAFETY STANDARDS SERIES No. GSG-2

CRITERIA FOR USE IN PREPAREDNESS AND RESPONSE FOR A NUCLEAR OR RADIOLOGICAL EMERGENCY

GENERAL SAFETY GUIDE

JOINTLY SPONSORED BY THE
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS,
INTERNATIONAL ATOMIC ENERGY AGENCY,
INTERNATIONAL LABOUR OFFICE,
PAN AMERICAN HEALTH ORGANIZATION
AND WORLD HEALTH ORGANIZATION

INTERNATIONAL ATOMIC ENERGY AGENCY
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IAEAL 11–00669

FOREWORD

by Yukiya Amano
Director General

The IAEA's Statute authorizes the Agency to "establish or adopt… standards of safety for protection of health and minimization of danger to life and property" — standards that the IAEA must use in its own operations, and which States can apply by means of their regulatory provisions for nuclear and radiation safety. The IAEA does this in consultation with the competent organs of the United Nations and with the specialized agencies concerned. A comprehensive set of high quality standards under regular review is a key element of a stable and sustainable global safety regime, as is the IAEA's assistance in their application.

The IAEA commenced its safety standards programme in 1958. The emphasis placed on quality, fitness for purpose and continuous improvement has led to the widespread use of the IAEA standards throughout the world. The Safety Standards Series now includes unified Fundamental Safety Principles, which represent an international consensus on what must constitute a high level of protection and safety. With the strong support of the Commission on Safety Standards, the IAEA is working to promote the global acceptance and use of its standards.

Standards are only effective if they are properly applied in practice. The IAEA's safety services encompass design, siting and engineering safety, operational safety, radiation safety, safe transport of radioactive material and safe management of radioactive waste, as well as governmental organization, regulatory matters and safety culture in organizations. These safety services assist Member States in the application of the standards and enable valuable experience and insights to be shared.

Regulating safety is a national responsibility, and many States have decided to adopt the IAEA's standards for use in their national regulations. For parties to the various international safety conventions, IAEA standards provide a consistent, reliable means of ensuring the effective fulfilment of obligations under the conventions. The standards are also applied by regulatory bodies and operators around the world to enhance safety in nuclear power generation and in nuclear applications in medicine, industry, agriculture and research.

Safety is not an end in itself but a prerequisite for the purpose of the protection of people in all States and of the environment — now and in the future. The risks associated with ionizing radiation must be assessed and controlled without unduly limiting the contribution of nuclear energy to equitable and sustainable development. Governments, regulatory bodies and operators everywhere must ensure that nuclear material and radiation sources are used beneficially, safely and ethically. The IAEA safety standards are designed to facilitate this, and I encourage all Member States to make use of them.

PREFACE

In March 2002, the IAEA's Board of Governors approved a Safety Requirements publication, Preparedness and Response for a Nuclear or Radiological Emergency (IAEA Safety Standards Series No. GS-R-2), jointly sponsored by seven international organizations, which establishes the requirements for an adequate level of preparedness for and response to a nuclear or radiological emergency in any State. The IAEA General Conference, in resolution GC(46)/RES/9, encouraged Member States "to implement, if necessary, instruments for improving their own preparedness and response capabilities for nuclear and radiological incidents and accidents, including their arrangements for responding to acts involving the malicious use of nuclear or radioactive material and to threats of such acts", and further encouraged them to "implement the Safety Requirements for Preparedness and Response to a Nuclear or Radiological Emergency".

The Convention on Early Notification of a Nuclear Accident ('the Early Notification Convention') and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency ('the Assistance Convention') (IAEA Legal Series No. 14), adopted in 1986, place specific obligations on the Parties and on the IAEA. Under Article 5a(ii) of the Assistance Convention, one function of the IAEA is to collect and disseminate to States Parties and Member States information concerning methodologies, techniques and available results of research relating to response to such emergencies.

This Safety Guide is intended to assist Member States in the application of the Safety Requirements publication on Preparedness and Response for a Nuclear or Radiological Emergency (IAEA Safety Standards Series No. GS-R-2), and to help in the fulfilment of the IAEA's obligations under the Assistance Convention. It provides generic criteria for protective actions and other response actions in the case of a nuclear or radiological emergency, including numerical values of these criteria. It also presents operational criteria derived from specific generic criteria.

The Food and Agriculture Organization of the United Nations (FAO), the International Labour Office (ILO), the Pan American Health Organization (PAHO) and the World Health Organization (WHO) are joint sponsors of this Safety Guide.

THE IAEA SAFETY STANDARDS

BACKGROUND

Radioactivity is a natural phenomenon and natural sources of radiation are features of the environment. Radiation and radioactive substances have many beneficial applications, ranging from power generation to uses in medicine, industry and agriculture. The radiation risks to workers and the public and to the environment that may arise from these applications have to be assessed and, if necessary, controlled.

Activities such as the medical uses of radiation, the operation of nuclear installations, the production, transport and use of radioactive material, and the management of radioactive waste must therefore be subject to standards of safety.

Regulating safety is a national responsibility. However, radiation risks may transcend national borders, and international cooperation serves to promote and enhance safety globally by exchanging experience and by improving capabilities to control hazards, to prevent accidents, to respond to emergencies and to mitigate any harmful consequences.

States have an obligation of diligence and duty of care, and are expected to fulfil their national and international undertakings and obligations.

International safety standards provide support for States in meeting their obligations under general principles of international law, such as those relating to environmental protection. International safety standards also promote and assure confidence in safety and facilitate international commerce and trade.

A global nuclear safety regime is in place and is being continuously improved. IAEA safety standards, which support the implementation of binding international instruments and national safety infrastructures, are a cornerstone of this global regime. The IAEA safety standards constitute a useful tool for contracting parties to assess their performance under these international conventions.

THE IAEA SAFETY STANDARDS

The status of the IAEA safety standards derives from the IAEA's Statute, which authorizes the IAEA to establish or adopt, in consultation and, where appropriate, in collaboration with the competent organs of the United Nations and with the specialized agencies concerned, standards of safety for protection of health and minimization of danger to life and property, and to provide for their application.

With a view to ensuring the protection of people and the environment from harmful effects of ionizing radiation, the IAEA safety standards establish fundamental safety principles, requirements and measures to control the radiation exposure of people and the release of radioactive material to the environment, to restrict the likelihood of events that might lead to a loss of control over a nuclear reactor core, nuclear chain reaction, radioactive source or any other source of radiation, and to mitigate the consequences of such events if they were to occur. The standards apply to facilities and activities that give rise to radiation risks, including nuclear installations, the use of radiation and radioactive sources, the transport of radioactive material and the management of radioactive waste.

Safety measures and security measures[1] have in common the aim of protecting human life and health and the environment. Safety measures and security measures must be designed and implemented in an integrated manner so that security measures do not compromise safety and safety measures do not compromise security.

The IAEA safety standards reflect an international consensus on what constitutes a high level of safety for protecting people and the environment from harmful effects of ionizing radiation. They are issued in the IAEA Safety Standards Series, which has three categories (see Fig. 1).

Safety Fundamentals

Safety Fundamentals present the fundamental safety objective and principles of protection and safety, and provide the basis for the safety requirements.

Safety Requirements

An integrated and consistent set of Safety Requirements establishes the requirements that must be met to ensure the protection of people and the environment, both now and in the future. The requirements are governed by the objective and principles of the Safety Fundamentals. If the requirements are not met, measures must be taken to reach or restore the required level of safety. The format and style of the requirements facilitate their use for the establishment, in a harmonized manner, of a national regulatory framework. Requirements, including numbered 'overarching' requirements, are expressed as 'shall' statements. Many requirements are not addressed to a specific party, the implication being that the appropriate parties are responsible for fulfilling them.

Safety Guides

Safety Guides provide recommendations and guidance on how to comply with the safety requirements, indicating an international consensus that it is necessary to take the measures recommended (or equivalent alternative measures). The Safety Guides present international good practices, and increasingly they reflect best

[1] See also publications issued in the IAEA Nuclear Security Series.

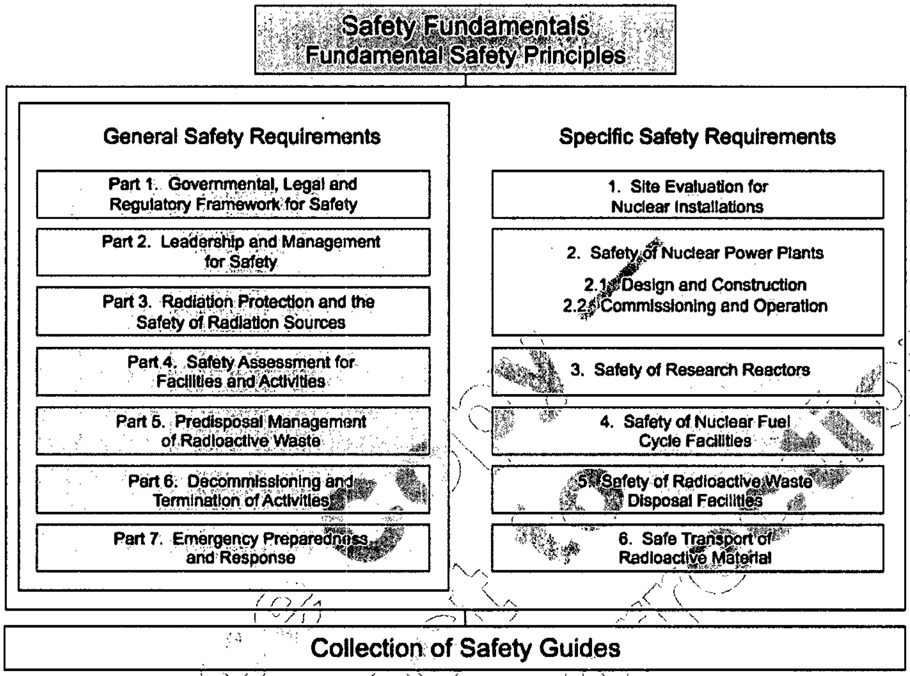

FIG. 1. The long term structure of the IAEA Safety Standards Series.

practices, to help users striving to achieve high levels of safety. The recommendations provided in Safety Guides are expressed as 'should' statements.

APPLICATION OF THE IAEA SAFETY STANDARDS

The principal users of safety standards in IAEA Member States are regulatory bodies and other relevant national authorities. The IAEA safety standards are also used by co-sponsoring organizations and by many organizations that design, construct and operate nuclear facilities, as well as organizations involved in the use of radiation and radioactive sources.

The IAEA safety standards are applicable, as relevant, throughout the entire lifetime of all facilities and activities — existing and new — utilized for peaceful purposes and to protective actions to reduce existing radiation risks. They can be used by States as a reference for their national regulations in respect of facilities and activities.

The IAEA's Statute makes the safety standards binding on the IAEA in relation to its own operations and also on States in relation to IAEA assisted operations.

The IAEA safety standards also form the basis for the IAEA's safety review services, and they are used by the IAEA in support of competence building, including the development of educational curricula and training courses.

International conventions contain requirements similar to those in the IAEA safety standards and make them binding on contracting parties. The IAEA safety standards, supplemented by international conventions, industry standards and detailed national requirements, establish a consistent basis for protecting people and the environment. There will also be some special aspects of safety that need to be assessed at the national level. For example, many of the IAEA safety standards, in particular those addressing aspects of safety in planning or design, are intended to apply primarily to new facilities and activities. The requirements established in the IAEA safety standards might not be fully met at some existing facilities that were built to earlier standards. The way in which IAEA safety standards are to be applied to such facilities is a decision for individual States.

The scientific considerations underlying the IAEA safety standards provide an objective basis for decisions concerning safety; however, decision makers must also make informed judgements and must determine how best to balance the benefits of an action or an activity against the associated radiation risks and any other detrimental impacts to which it gives rise.

DEVELOPMENT PROCESS FOR THE IAEA SAFETY STANDARDS

The preparation and review of the safety standards involves the IAEA Secretariat and four safety standards committees, for nuclear safety (NUSSC), radiation safety (RASSC), the safety of radioactive waste (WASSC) and the safe transport of radioactive material (TRANSSC), and a Commission on Safety Standards (CSS) which oversees the IAEA safety standards programme (see Fig. 2).

All IAEA Member States may nominate experts for the safety standards committees and may provide comments on draft standards. The membership of the Commission on Safety Standards is appointed by the Director General and includes senior governmental officials having responsibility for establishing national standards.

A management system has been established for the processes of planning, developing, reviewing, revising and establishing the IAEA safety standards. It articulates the mandate of the IAEA, the vision for the future application of the

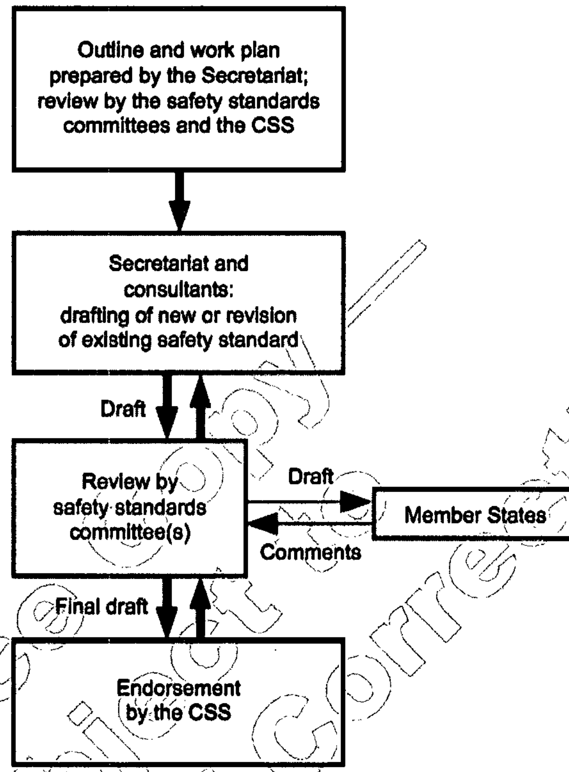

FIG 2. The process for developing a new safety standard or revising an existing standard.

safety standards, policies and strategies, and corresponding functions and responsibilities.

INTERACTION WITH OTHER INTERNATIONAL ORGANIZATIONS

The findings of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and the recommendations of international expert bodies, notably the International Commission on Radiological Protection (ICRP), are taken into account in developing the IAEA safety standards. Some safety standards are developed in cooperation with other bodies in the United Nations system or other specialized agencies, including the Food and Agriculture Organization of the United Nations, the United Nations Environment Programme, the International Labour Organization, the OECD Nuclear Energy Agency, the Pan American Health Organization and the World Health Organization.

INTERPRETATION OF THE TEXT

Safety related terms are to be understood as defined in the IAEA Safety Glossary (see http://www-ns.iaea.org/standards/safety-glossary.htm). Otherwise, words are used with the spellings and meanings assigned to them in the latest edition of The Concise Oxford Dictionary. For Safety Guides, the English version of the text is the authoritative version.

The background and context of each standard in the IAEA Safety Standards Series and its objective, scope and structure are explained in Section 1, Introduction, of each publication.

Material for which there is no appropriate place in the body text (e.g. material that is subsidiary to or separate from the body text, is included in support of statements in the body text, or describes methods of calculation, procedures or limits and conditions) may be presented in appendices or annexes.

An appendix, if included, is considered to form an integral part of the safety standard. Material in an appendix has the same status as the body text, and the IAEA assumes authorship of it. Annexes and footnotes to the main text, if included, are used to provide practical examples or additional information or explanation. Annexes and footnotes are not integral parts of the main text. Annex material published by the IAEA is not necessarily issued under its authorship; material under other authorship may be presented in annexes to the safety standards. Extraneous material presented in annexes is excerpted and adapted as necessary to be generally useful.

CONTENTS

1. INTRODUCTION

BACKGROUND

1.1. Under Article 5a(ii) of the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency ('the Assistance Convention') [1], one function of the IAEA is to "collect and disseminate to States Parties and Member States information concerning … methodologies, techniques and available results of research relating to response to nuclear accidents or radiological emergencies".

1.2. In March 2002, the IAEA's Board of Governors approved a Safety Requirements publication, Preparedness and Response for a Nuclear or Radiological Emergency, which establishes the requirements for an adequate level of preparedness for and response to a nuclear or radiological emergency in any State. This was jointly sponsored by seven international organizations and was issued as IAEA Safety Standards Series No. GS-R-2 [2].

1.3. A rigorous assessment of experience in Member States has shown that there is a need for additional consistent international guidance on taking protective actions and other response actions[1], and for placing this guidance in a context that is comprehensive for decision makers and that can be explained to the public. In 2005, the IAEA issued a publication, jointly sponsored by the World Health Organization (WHO) [3], that presents numerical values for generic criteria for emergency response and provides additional guidance. The criteria are described and needs for their development on the basis of lessons learned from experience and related scientific knowledge are explained. The framework proposed in Ref. [3] was used as the starting point for developing revised international guidance on emergency preparedness and response.

1.4. Principle 9 of the Fundamental Safety Principles establishes that arrangements for emergency preparedness and response include "[c]riteria set in advance for use in determining when to take different protective actions" (Ref. [4], para. 3.36). The present Safety Guide provides recommendations on such criteria.

[1] Examples of other response actions include the provision of public information, medical treatment and long term health monitoring.

1.5. Safety related terms used in this Safety Guide are to be understood as defined in the IAEA Safety Glossary [5].

OBJECTIVE

1.6. The primary objective of this Safety Guide is:

— To present a coherent set of generic criteria (expressed numerically in terms of radiation dose) that form a basis for developing the operational levels needed for decision making concerning protective actions and other response actions necessary to meet the emergency response objectives. The set of generic criteria:
  - Addresses the requirements of Ref. [2] for emergency preparedness and response;
  - Addresses lessons learned from responses to past emergencies;
  - Provides an internally consistent foundation for the application of principles of and insights into radiation protection for the conceivable range of protective actions and other response actions, and of emergency conditions.

— To propose a basis for a plain language explanation of the criteria for the public and for public officials that addresses the risks to human health of radiation exposure and provides a basis for a response that is commensurate with the risks.

1.7. This Safety Guide should be used in conjunction with Ref. [2], which it supports. It provides recommendations on meeting the requirements of Ref. [2] by providing generic criteria, and numerical values for these criteria, for protective actions and other response actions in the event of a nuclear or radiological emergency. This Safety Guide also presents operational criteria derived from specific generic criteria and as such represents the revision of Ref. [6].

SCOPE

1.8. The recommendations presented in this Safety Guide concern the values of the generic criteria needed to develop operational criteria for implementing protective actions and other response actions to protect emergency workers and the public in the event of a nuclear or radiological emergency.

1.9. Examples of default operational criteria for implementing protective actions and other response actions are also provided. The method used for the development of operational criteria is described only in general terms.[2]

1.10. This Safety Guide addresses the criteria for initiating protective actions and other response actions and criteria to support decision making in an emergency.

1.11. This Safety Guide excludes recommendations for actions that might be required in an existing exposure situation.

1.12. This Safety Guide does not provide detailed guidance on the arrangements necessary for developing and maintaining an effective emergency response capability. Detailed recommendations on developing and maintaining an effective emergency response capability are provided in Refs [7–9].

1.13. This Safety Guide cannot take into account all factors that are site specific, local, State specific or specific to a particular type of emergency. Emergency planners should remain flexible in their use of the guidance and should work with interested parties to adapt the recommendations so as to take account of local, social, political, economic, environmental, demographic and other factors.

1.14. Protective actions and other response actions are not based on attributes relating to radiation protection alone. Decision makers should consider various social, economic, environmental and psychological factors before making any final decision on actions to be taken in response to an emergency. However, the recommendations on generic and operational criteria presented in this Safety Guide relate solely to that input into the decision making process that is based on considerations of radiation protection.

1.15. Decision makers in an emergency and the public may have only a limited or no understanding of the principles of radiation protection, the risks associated with radiation exposure and the appropriate actions that can be taken to reduce these risks. This Safety Guide therefore also provides a plain language explanation of the operational criteria, to assist in the communication of the purpose of each of the criteria and the associated protective actions and other response actions.

[2] A manual for assessment of field data in a nuclear or radiological emergency is in preparation.

STRUCTURE

1.16. This Safety Guide has five sections. Section 2 provides a discussion of the basic considerations used in the development of the recommendations. Sections 3 and 4 provide recommendations on emergency response criteria for protective actions and other response actions for protecting the public and on guidance values for emergency workers, respectively. Section 5 discusses operational criteria. The four appendices provide further elaboration on and clarification of the recommendations provided in the main text.

2. BASIC CONSIDERATIONS

2.1. Experience has clearly shown that an internationally endorsed, fully integrated system of guidance is necessary for taking consistent protective actions and other response actions in an emergency that will best ensure public safety. This system should build on existing international guidance and experience, should be based on international consensus and should subsequently be implemented at the national level. Implementing compatible systems at the national level in different States will allow the objectives of emergency response to be met and will contribute towards establishing a harmonized system for emergency preparedness and response worldwide.

2.2. The framework of generic criteria for emergency response presented in this Safety Guide was developed on the understanding that it should be simple and consistent.

2.3. This Safety Guide was developed with due consideration of the relevant international guidance that provides recommendations for the response to a nuclear or radiological emergency [2, 6, 10–15].

2.4. The recommendations presented in the Safety Guide address health consequences due to external exposure and internal exposure of specific target organs, for which the generic criteria were developed. For the recommendations on how to meet the requirements of Ref. [2], thresholds for severe deterministic effects[3] for both external exposure and internal exposure were developed that could be directly related to the full range of important radionuclides.

[3] A deterministic effect is considered to be a severe deterministic effect if it is fatal or life threatening or if it results in a permanent injury that reduces quality of life [2, 5].

2.5. Generic criteria are based on current knowledge of deterministic and stochastic effects (see Ref. [3] for the basis for the numerical values of the criteria addressing deterministic and stochastic effects).

3. FRAMEWORK FOR EMERGENCY RESPONSE CRITERIA

SYSTEM OF PROTECTIVE ACTIONS AND OTHER RESPONSE ACTIONS

3.1. The system of protective actions and other response actions in an emergency (see Table 1) includes numerical values of generic criteria as well as of the corresponding operational criteria that form the basis for decision making in an emergency.

TABLE 1. SYSTEM OF PROTECTIVE ACTIONS AND OTHER RESPONSE ACTIONS IN AN EMERGENCY

Types of possible health consequences of exposure	Basis for implementation of protective actions and other response actions	
	Projected dose	Dose received
Severe deterministic effects[a]	Implementation of precautionary urgent protective actions, even under adverse conditions, to prevent severe deterministic effects	Other response actions[b] for treatment and management of severe deterministic effects
Increase in stochastic effects	Implementation of urgent protective actions and initiation of early protective actions[c] to reduce the risk of stochastic effects as far as reasonably possible	Other response actions[d] for early detection and effective management of stochastic effects

[a] Generic criteria are established at levels of dose that are approaching the thresholds for severe deterministic effects.

[b] Such actions include immediate medical examination, consultation and treatment as indicated, contamination control, decorporation where applicable, registration for long term health monitoring, and comprehensive psychological counselling.

[c] Such actions include relocation and long term restriction of consumption of contaminated food.

[d] Such actions include screening based on individual doses to specific organs, to consider the need for registration for medical follow-up and counselling to allow informed decisions to be made in individual circumstances.

3.2. The following considerations form the basis of this system:

— The following possible outcomes should be considered during the planning and implementation of protective actions and other response actions in an emergency:
  - Development of severe deterministic effects[4];
  - Increase in stochastic effects;
  - Adverse effects on the environment and property;
  - Other adverse effects (e.g. psychological effects, social disorder, economic disruption).

— The following types of exposure should be taken into account in the planning and implementation of protective actions and other response actions in an emergency:
  - The projected dose that could be prevented or reduced by means of precautionary urgent protective actions;
  - The dose that has been received, the detriment due to which may be minimized by, for example, medical actions, as required, and may be addressed by public reassurance or counselling.

— Precautionary urgent protective actions should be implemented before the event (on the basis of a substantial risk of a release or exposure) under any circumstances, in order to prevent the development of severe deterministic effects for very high levels of dose (generic criteria are presented in Table 2).

— If the risk of stochastic effects is the main concern and the risk of the development of severe deterministic effects is negligible, urgent and early protective actions and other response actions, all of which are justified and optimized, should be implemented to reduce the risk of stochastic effects (generic criteria are presented in Table 3).

— If the dose exceeds a particular generic criterion identified in Table 2 or 3, individuals should be provided with appropriate medical attention, including medical treatment[5], long term health monitoring and psychological counselling.

[4] See Appendix I.

[5] Medical actions should be initiated and performed on the basis of medical symptoms and observations. However, dosimetric information (e.g. based on radiation survey data, dose measurements or dose calculations) can provide a valuable input for determining the medical treatment.

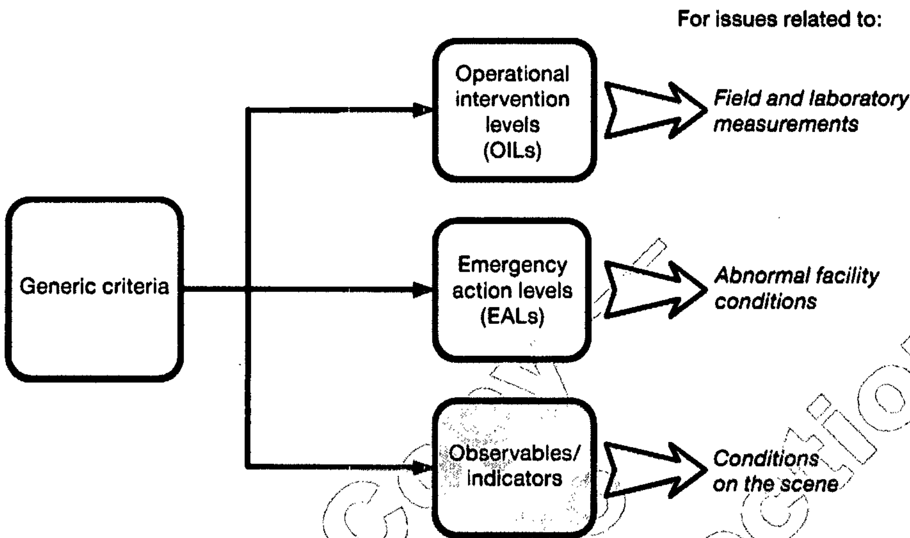

FIG 1. System of generic criteria and operational criteria.

— For all levels of dose that may result in an emergency exposure situation, a plain language explanation of the risks should be provided to decision makers and the public to allow them to make informed decisions about what actions they will take.

3.3. Table 1 summarizes, for different types of possible health consequences of exposure, the basis for implementation of protective actions and other response actions. A summary of the dose concepts and the dosimetric quantities is provided in Appendix I.

3.4. The system of generic criteria and operational criteria is illustrated in Fig. 1. Generic criteria are provided in terms of dose that can be projected or dose that has already been received. The operational criteria[6] are values of measurable quantities or observables that include operational intervention levels (OILs), emergency action levels (EALs), specific observables and other indicators of conditions on the scene that should be used in decision making during an

[6] These operational criteria are used as 'triggers' at the early stage of an emergency, and in some publications the term 'trigger' is used.

emergency. The operational criteria can be used immediately and directly to determine the need for appropriate protective actions and other response actions.

3.5. Generic criteria have been established on the basis of generic optimization in consideration of the range of conditions that prevail in an emergency. Generic criteria are established for urgent protective actions and early protective actions, as well as for other response actions that may be required in an emergency. Urgent protective actions (e.g. evacuation) should be taken promptly (e.g. within hours) to be effective, because their effectiveness will be reduced by delay [6]. Early protective actions should be implemented within days or weeks to be effective. They can be long lasting, even after the emergency (e.g. temporary relocation). In no case should urgent protective actions and early protective actions based on the generic criteria cause more detriment than they avert. Event specific conditions may warrant modification of the generic criteria.

3.6. The generic criteria replace the system of generic intervention levels (GILs) and generic action levels (GALs) that have been described in previous standards [6, 10]. This use of generic criteria meets the need for a common term for the system of values that would be used as the basis for the implementation of protective actions (e.g. evacuation or food replacement) and other response actions (e.g. medical follow-up).

3.7. A protection strategy, comprising specific protective actions and other response actions, should be developed. It should include, but should not be limited to, the following aspects:

— Generic criteria for implementing precautionary urgent protective actions to prevent severe deterministic effects should be established (see Table 2).
— A reference level should be set, typically an effective dose of between 20 and 100 mSv, expressed in terms of residual dose, which includes dose contributions via all exposure pathways. The protection strategy should be optimized to reduce exposures below the reference level.
— On the basis of the outcome of the optimization of the protection strategy, and by using the reference level, generic criteria for particular protective actions and other response actions, expressed in terms of projected dose or dose that has been received, should be developed. If the numerical values of the generic criteria are expected to be exceeded, those actions, either individually or in combination, should be implemented. Table 3 provides a set of generic criteria for use in the protection strategy that are compatible with reference levels within a range of 20–100 mSv, as well as further details for specific actions in different time frames. The implementation of

protective actions and other response actions, given in Table 3, would prevent a significant amount of dose.

— Once the protection strategy has been optimized and a set of generic criteria has been developed, default triggers for initiating the different parts of an emergency response plan, primarily for the early phase, should be derived from the generic criteria. Default triggers, such as conditions on the scene, OILs and EALs, should be expressed in terms of parameters or observable conditions. Arrangements should be established in advance to revise these triggers, as appropriate, in an emergency exposure situation, with account taken of the prevailing conditions as they evolve.

3.8. Table 2 presents generic criteria (expressed in terms of the dose that is projected or dose that has been received) for taking precautionary urgent protective actions under any circumstances to prevent severe deterministic effects.

3.9. Table 3 provides a set of generic criteria expressed in terms of the dose that has been projected or the dose that has been received. The set of generic criteria expressed in terms of the projected dose compatible with reference levels within a range of 20–100 mSv. Taking protective actions at this level of dose will allow the occurrence of all deterministic effects to be avoided and the risk of stochastic effects to be reduced to acceptable levels. If a protective action is implemented effectively, the majority of the projected dose can be averted. The concept of averted dose is therefore useful for the assessment of the efficiency of individual protective actions or their combination. The concept of averted dose represents an important component of the optimization of emergency response planning [15]. In the application of generic criteria for individual protective actions, the process of optimization of emergency response planning should be applied.

3.10. The generic criterion provided in Table 3 for iodine thyroid blocking is applied for an urgent protective action: (a) if exposure due to radioactive iodine is involved, (b) before or shortly after a release of radioactive iodine, and (c) within only a short period after the intake of radioactive iodine. Less disruptive protective actions such as sheltering could be implemented for lower doses.

3.11. In the absence of national guidance, the generic criteria presented in Tables 2 and 3 could be used as a basis for the development of criteria at the national level. If a reference level different from 20–100 mSv is chosen, appropriate scaling of the values of the generic criteria in Table 3 should be carried out, with account taken of the time frame (acute or annual) of the

TABLE 2. GENERIC CRITERIA FOR ACUTE DOSES FOR WHICH PROTECTIVE ACTIONS AND OTHER RESPONSE ACTIONS ARE EXPECTED TO BE TAKEN UNDER ANY CIRCUMSTANCES TO AVOID OR TO MINIMIZE SEVERE DETERMINISTIC EFFECTS

Generic criteria		Examples of protective actions and other response actions
External acute exposure (<10 hours)		If the dose is projected: — Take precautionary urgent protective actions immediately (even under difficult conditions) to keep doses below the generic criteria — Provide public information and warnings — Carry out urgent decontamination
$AD_{\text{Red marrow}}$ [a]	1 Gy	
AD_{Fetus}	0.1 Gy	
AD_{Tissue} [b]	25 Gy at 0.5 cm	
AD_{Skin} [c]	10 Gy to 100 cm^2	
Internal exposure from acute intake (Δ = 30 days) [d]		If the dose has been received: — Perform immediate medical examination, consultation and indicated medical treatment — Carry out contamination control — Carry out immediate decorporation [f] (if applicable) — Carry out registration for long term health monitoring (medical follow-up) — Provide comprehensive psychological counselling
$AD(\Delta)_{\text{Red marrow}}$	0.2 Gy for radionuclides with $Z \geq 90$ [e] 2 Gy for radionuclides with $Z \leq 89$ [e]	
$AD(\Delta)_{\text{Thyroid}}$	2 Gy	
$AD(\Delta)_{\text{Lung}}$ [g]	30 Gy	
$AD(\Delta)_{\text{Colon}}$	20 Gy	
$AD(\Delta')_{\text{Fetus}}$ [h]	0.1 Gy	

[a] $AD_{\text{Red marrow}}$ represents the average RBE weighted absorbed dose to internal tissues or organs (e.g. red marrow, lung, small intestine, gonads, thyroid) and to the lens of the eye from exposure in a uniform field of strongly penetrating radiation.

[b] Dose delivered to 100 cm^2 at a depth of 0.5 cm under the body surface in tissue due to close contact with a radioactive source (e.g. source carried in the hand or pocket).

[c] The dose is to the 100 cm^2 dermis (skin structures at a depth of 40 mg/cm^2 (or 0.4 mm) below the body surface).

[d] $AD(\Delta)$ is the RBE weighted absorbed dose delivered over the period of time Δ by the intake (I_{05}) that will result in a severe deterministic effect in 5% of exposed individuals.

[e] Different criteria are used to take account of the significant difference in the radionuclide specific intake threshold values for the radionuclides in these groups [3].

[f] The generic criterion for decorporation is based on the projected dose without decorporation. Decorporation is the biological processes, facilitated by a chemical or biological agent, by which incorporated radionuclides are removed from the human body.

[g] For the purposes of these generic criteria, 'lung' means the alveolar-interstitial region of the respiratory tract.

[h] For this particular case, Δ' means the period of in utero development.

TABLE 3. GENERIC CRITERIA FOR PROTECTIVE ACTIONS AND OTHER RESPONSE ACTIONS IN EMERGENCY EXPOSURE SITUATIONS TO REDUCE THE RISK OF STOCHASTIC EFFECTS

Generic criteria		Examples of protective actions and other response actions
Projected dose that exceeds the following generic criteria: Take urgent protective actions and other response actions		
$H_{Thyroid}$	50 mSv in the first 7 days	Iodine thyroid blocking
E H_{Fetus}	100 mSv in the first 7 days 100 mSv in the first 7 days	Sheltering; evacuation; decontamination; restriction of consumption of food, milk and water; contamination control; public reassurance
Projected dose that exceeds the following generic criteria: Take protective actions and other response actions early in the response		
E H_{Fetus}	100 mSv per annum 100 mSv for the full period of in utero development	Temporary relocation; decontamination; replacement of food, milk and water; public reassurance
Dose that has been received and that exceeds the following generic criteria: Take longer term medical actions to detect and to effectively treat radiation induced health effects		
E	100 mSv in a month	Screening based on equivalent doses to specific radiosensitive organs (as a basis for medical follow-up), counselling
H_{Fetus}	100 mSv for the full period of in utero development	Counselling to allow informed decisions to be made in individual circumstances

Note: H_T — equivalent dose in an organ or tissue T; E — effective dose.

reference level. In exceptional circumstances, higher values of the generic criteria may be necessary.

3.12. Examples of when such higher values of generic criteria in exceptional circumstances may be warranted include cases in which replacement food or water is not available, cases of extreme weather conditions, natural disasters, the rapid progression of a situation and cases of malicious acts. Generic criteria used in such cases should not exceed those presented in Table 3 by a factor of more than 2–3.

SUBSTANTIAL RISK AS A BASIS FOR OPERATIONAL CRITERIA

3.13. The risk associated with a radioactive release or exposure is considered to be a 'substantial risk' if the release or exposure could result in early deaths or other severe deterministic effects.

3.14. The term 'substantial risk' is the basis for operational criteria for decision makers to take actions to prevent severe deterministic effects by keeping doses below those approaching the generic criteria set out in Table 2. These precautionary urgent protective actions are warranted under any circumstances [2].

3.15. Emergencies can result in early deaths or other severe deterministic effects unless urgent protective actions are taken. Examples include a nuclear emergency in a facility in threat category I [2], such as severe core damage at a nuclear power plant, a criticality accident or a radiological emergency in threat category IV involving a lost or stolen source or the malicious use of radioactive material [16]. For such emergencies, observed conditions indicating a substantial risk associated with a release or exposure that could result in severe deterministic effects should warrant precautionary urgent protective actions.

3.16. Reference [2] addresses this issue by stating that facilities in threat categories I, II and III[7] shall have appropriate arrangements in place for promptly detecting, classifying and responding to emergencies for which precautionary urgent protective actions should be taken to protect workers and the public from severe deterministic effects. Generic criteria, based on projected dose, for precautionary urgent protective actions to prevent severe deterministic effects, as provided in Table 2, should be used as the dosimetric criteria in defining those emergencies that have the potential to result in such health effects.

3.17. For emergencies in threat category IV [2] involving dangerous sources[8], precautionary urgent protective actions should also be undertaken before or shortly after the start of a release or exposure. These include transport and other authorized activities involving dangerous sources such as industrial radiography

[7] Threat categories I, II and III represent decreasing levels of threat at facilities and of the corresponding stringency of requirements for emergency preparedness and response arrangements. See para. 3.6 and table I of Ref. [2] for more details.

[8] A dangerous source is a source that could, if not under control, give rise to exposure sufficient to cause severe deterministic effects. This categorization is used for determining the need for emergency response arrangements and is not to be confused with categorization of sources for other purposes.

sources, nuclear powered satellites or radiothermal generators, as well as events involving possible unauthorized activities. Reference [2] establishes that the operator of a practice using a dangerous source shall make arrangements to respond promptly to an emergency involving the source in order to mitigate any consequences (Ref. [2], para. 4.37). The generic criteria in Table 2 are used as the dosimetric criteria in defining those sources that are considered dangerous [8, 17]. In addition, local officials should develop predetermined criteria for initiating precautionary urgent protective actions upon identifying a situation that could result in severe deterministic effects if no action were taken [18].

PROJECTED DOSE AS A BASIS FOR OPERATIONAL CRITERIA

3.18. The projected dose is the basis for operational criteria for decision makers to take actions that meet the following three objectives [2]:

- To prevent severe deterministic effects by keeping the dose below levels approaching the generic criteria in Table 2 at which urgent protective actions are warranted under any circumstances;
- To take effective protective actions and other response actions to reasonably reduce the risk of stochastic effects by keeping the dose below levels approaching the generic criteria in Table 3;
- To ensure the safety of emergency workers in the tasks being undertaken through the use of the guidance values in Table 4.

3.19. Urgent protective actions should always be introduced to avoid doses approaching levels at which, if received, severe deterministic effects could occur. It should be recognized that the doses received before implementation of the protective action could contribute to the induction of deterministic effects.

3.20. When assessing projected doses, the dose distribution should be considered together with the uncertainty in the dose distribution in the population under consideration. When exposure is being assessed for members of the public, the possibility of the presence of children and pregnant women should be considered.

3.21. The generic criteria in Table 2 are given separately for intake of radioactive material and for external exposure. For external exposure, the threshold for the development of deterministic effects depends on the dose, the dose rate and the relative biological effectiveness (RBE) of the radiation. For internal exposure, the threshold depends on many factors, such as intake activity, half-life, route of intake, the radionuclide emitted and the metabolism of the radionuclide. In order to take all of these factors into account, the threshold for the development of specific deterministic effects following intake is best established in terms of intake activity [3]. However, the thresholds in terms of intake range over six orders of magnitude [3]. Establishing threshold values in terms of the 30 day committed RBE weighted dose relative to the intake thresholds leads to a decrease in the range of threshold values from six orders of magnitude (for the intake) down to a factor of three (for the dose). Therefore, in the case of inhalation or ingestion of radioactive material, a value of the 30 day committed RBE weighted absorbed dose is used to specify the threshold for the possible onset of severe deterministic effects in the organ concerned.

3.22. The RBE weighted averaged absorbed dose in an organ or tissue (RBE weighted absorbed dose) is defined as the product of the averaged absorbed dose in an organ or tissue and the RBE. The unit used to express the RBE weighted absorbed dose is the gray (Gy). For details see Appendix I.

3.23. In the case of combined internal and external exposure, the sum of the RBE weighted absorbed doses for intake of radioactive material and for external exposure may be used as a basis for calculation of OILs for decision making purposes, as discussed in detail in para. II.5 of appendix II of Ref. [3].

3.24. The generic criteria in Table 2 should be used to derive OILs for taking precautionary urgent protective actions and other response actions to prevent severe deterministic effects. For the purpose of taking actions to reduce the risk of stochastic effects, the principles of both justification and optimization require consideration of the benefit that would be achieved by the protective actions and other response actions and of the harm, in its broadest sense, that would result from them. Actions to prevent doses approaching those in Table 2 are always justified.

3.25. Table 3 provides the generic criteria that should be used to derive OILs for taking urgent and early protective actions and other response actions. The protection provided by applying these generic criteria has been optimized on a generic basis for the general population, assuming that other hazardous conditions do not prevail at the time the actions are implemented. The proposed values do not need to be adjusted to take account of any particular members of the population (e.g. children or pregnant women) because protective action taken to avert these doses will satisfy the basic principle for the whole population.

DOSE THAT HAS BEEN RECEIVED AS A BASIS FOR OPERATIONAL CRITERIA

3.26. In describing the dose that has been received, there is a need to distinguish between the planning stage and an actual situation. In the planning stage, the hypothetical dose that will be received falls under the definition of residual dose (the dose expected to be incurred in the future after protective actions have been terminated or a decision has been taken not to implement protective actions). In an actual situation, the dose that has been received is the actual dose received via all exposure pathways.

3.27. The dose that has been received is the basis for operational criteria to support the following actions:

— To provide medical care, as required, when the dose received exceeds the levels in Table 2 (see footnote 3 on page 4);
— To consider the need for medical follow-up for early detection and effective treatment of radiation induced cancers, if the dose received exceeds the levels in Table 3;
— To provide counselling to those exposed, including pregnant women, so that they can make informed decisions concerning the further course of their treatment if the dose received exceeds the levels in Tables 2 and 3;
— To provide a basis for reassuring those who were not exposed above the levels specified in Tables 2 and 3 that there is no need for concern.

3.28. The dose that has been received supports decisions for urgent and longer term medical actions. Examples of urgent actions are medical triage on the scene of an emergency and specialized treatment in hospital shortly after an emergency. These actions are initiated and performed on the basis of medical symptoms and observations. However, in the performance of medical triage on the scene, observables (e.g. radiation signs and placards) and radiation survey data should be taken into account when they become available. Decisions on the implementation of medical actions in the hospital (e.g. the extent of exposed tissue to be excised during surgical treatment for local radiation injury and the efficiency of decorporation for internal contamination) are strongly supported by the dosimetric information. Long term health monitoring of exposed persons starts early during the response and continues for an extended period of time.

3.29. Medical records made during an emergency (especially on the site) should be focused on clinical symptoms and other observed facts, without including assumptions of causal association with radiation exposure. Such assumptions might lead to anxiety and unjustified medical examination. Determining the cause of the symptoms requires analysis by experts.

3.30. There are different reasons to perform long term health monitoring of the persons affected, such as to provide advanced medical care, to reduce their concern with regard to their health status and to advance scientific knowledge. The reason for follow-up studies should be carefully explained to those involved.

3.31. Long term medical follow-up is justified to detect and treat late deterministic effects and their complications as well as radiation induced cancers. Long term health monitoring should be justified on the basis of one of the following levels of exposure:

— Long term health monitoring is always justified at levels of dose above the thresholds for deterministic effects [3].
— Justification of long term health monitoring at levels of dose below the thresholds for deterministic effects requires proper identification of populations at higher risk of developing radiation induced cancers. Medical follow-up should always result in more benefit than harm in terms of public health. One reason for establishing a registry and providing medical follow-up is for the early detection of disease. This is on the basis of the assumption that earlier diagnosis of cancer will result in more efficient treatment and thus in reduced morbidity and mortality. The level of exposure of radiosensitive organs expressed in equivalent dose and the possibility of detecting cancer among the exposed population should be taken into account when establishing the registry.

3.32. Current epidemiological data show that radiation induced cancers (the excess number of cancer cases above background cancer cases) could be statistically detected in large populations exposed at doses above 0.1 Sv delivered at high dose rates. These data are based on epidemiological studies of well defined populations (e.g. the survivors of the atomic bombings in Japan and patients undergoing radiological medical procedures). Epidemiological studies have not demonstrated such effects in individuals exposed at low doses (less than 0.1 Sv) delivered over a period of many years [19]. The inclusion in long term health monitoring programmes of persons who have received very low doses may cause unnecessary anxiety. Moreover, it is not cost effective in terms of public health care.

3.33. Assessment of long term follow-up after the Chernobyl accident in 1986 revealed that medical follow-up of persons receiving doses below 1 Gy may not be justified, except in the case of absorbed doses to the thyroid. As cited in the WHO Report on Health Effects of the Chernobyl Accident and Special Health Care Programmes [20], cancer screening tests for asymptomatic persons have not been beneficial in terms of improving either survival or quality of life, except screening for breast cancer and cervical cancer through mammography and Pap[9] tests, respectively. Thyroid cancer screening following emergencies involving the release of radioactive isotopes of iodine has proved very effective for earlier diagnosis and treatment of children exposed following the Chernobyl accident.

3.34. Exposed persons should be provided with adequate information about the long term risk due to their radiation exposure, including assurance of no further actions being required.

4. GUIDANCE VALUES FOR EMERGENCY WORKERS

4.1. An emergency worker is a person having specified duties as a worker in response to an emergency, who might be exposed while taking actions in response to the emergency. Emergency workers may include those employed by registrants and licensees as well as personnel from response organizations, such as police officers, firefighters, medical personnel, and drivers and crews of evacuation vehicles.

4.2. Reference [2], para. 4.60, states that

> "National guidance that is in accordance with international standards…shall be adopted for managing, controlling and recording the doses received by emergency workers. This guidance shall include default operational levels of dose for emergency workers for different types of response activities, which are set in quantities that can be directly monitored during the performance of these activities (such as the integrated dose from external penetrating radiation). In setting the default operational levels of dose for emergency workers the contribution to doses via all exposure pathways shall be taken into account."

[9] The Papanicolaou test.

4.3. Table 4 recommends guidance values to be used for the protection of emergency workers responding to an emergency.

4.4. Life saving actions resulting in doses that approach or exceed the threshold for severe deterministic effects should be considered only if (a) the expected benefit to others would clearly outweigh the emergency worker's own risk and (b) the emergency worker volunteers to take the action, and understands and accepts this risk.

4.5. Emergency workers who undertake actions in which the doses received might exceed 50 mSv do so voluntarily and should have been clearly and comprehensively informed in advance of the associated health risks, as well as of available protective measures, and should be trained, to the extent possible, in the actions that they may be required to take. The voluntary basis for response actions by emergency workers is usually covered in the emergency response arrangements.

4.6. Emergency workers should receive medical attention appropriate for the dose they may have received (actions according to Tables 2 and 3). The doses received and information concerning the consequent health risks should be communicated to the workers. Female workers who are aware that they are pregnant should be encouraged to notify the appropriate authority and would typically be excluded from emergency duties.

4.7. In almost all emergencies, at best only the dose from external penetrating radiation will be measured continuously. Consequently, the operational guidance provided to emergency workers should be based on measurements of penetrating radiation (e.g. as displayed on an active or self-reading dosimeter). The dose from intake or skin contamination should be limited by means of the use of protective equipment, the use of stable iodine prophylaxis and the provision of instructions concerning operations in potentially hazardous radiological conditions[10]. Available information about radiation conditions on the site should be used in aiding decisions on the appropriate protection of emergency workers.

[10] Instructions will cover the application of time, distance and shielding principles, the prevention of ingestion of radioactive material and the use of respiratory protection.

TABLE 4. GUIDANCE VALUES FOR RESTRICTING EXPOSURE OF EMERGENCY WORKERS

Tasks	Guidance value[a]
Life saving actions	$H_p(10)$[b] <500 mSv This value may be exceeded under circumstances in which the expected benefits to others clearly outweigh the emergency worker's own health risks, and the emergency worker volunteers to take the action and understands and accepts this health risk
Actions to prevent severe deterministic effects and actions to prevent the development of catastrophic conditions that could significantly affect people and the environment	$H_p(10)$ <500 mSv
Actions to avert a large collective dose	$H_p(10)$ <100 mSv

[a] These values apply only for the dose from exposure to external penetrating radiation. Doses from exposure to non-penetrating external radiation and from intake or skin contamination need to be prevented by all possible means. If this is not feasible, the effective dose and the equivalent dose to an organ that are received have to be limited to minimize the health risk to the individual in line with the risk associated with the guidance values given here.

[b] $H_p(10)$ is the personal dose equivalent $H_p(d)$ where d = 10 mm.

5. OPERATIONAL CRITERIA

5.1. Projected dose and dose that has been received are not measurable quantities and cannot be used as a basis for quick actions in an emergency. There is a need to establish — in advance — operational criteria (values of measurable default quantities or observables) as a surrogate for the generic criteria for undertaking different protective actions and other response actions. Precautionary urgent protective actions and, as applicable, urgent protective actions should be taken on the basis of precalculated default operational criteria. The majority of urgent protective actions and early protective actions are also implemented on the basis of precalculated default operational criteria. However, if the characteristics of an emergency differ from those assumed in the calculations of default operational criteria, the criteria should be recalculated. Methods for the recalculation to address prevailing conditions in an actual emergency should be established during the planning phase.

5.2. The operational criteria[11] are the EALs, OILs, observables and indicators of conditions on the scene.

5.3. The EALs are the specific, predetermined, observable operational criteria used to detect, recognize and determine the emergency class of an event at facilities in threat categories I, II and III [2]. The EALs are used for classification and for decisions on the implementation of precautionary urgent protective actions corresponding to the emergency class. These criteria should be predefined as stated in Ref. [2] and implemented as described in Refs [7, 8]. Appendix III provides a discussion of the EAL development process and gives examples of EALs for the classification of emergencies at a light water reactor nuclear power plant.

5.4. For emergencies in threat category IV [2], the operational criteria for implementing urgent protective actions should be predetermined on the basis of information that will be observable on the scene. Usually observations that indicate a radiation hazard will be made by first responders or operators on the scene (e.g. upon seeing a placard on a vehicle that has been involved in an accident). References [7, 8, 18] provide guidance on the approximate radius of the inner cordoned area in which urgent protective actions would initially be taken on the basis of information observable by responders upon their arrival on the scene. The size of the cordoned area may be expanded on the basis of dose rate OILs and other environmental measurement OILs (see Appendix II) when these data become available. Reference [18] provides a list of observables that can be used by responders to identify a dangerous source, together with the actions to be taken to protect responders and the public. Reference [17] provides guidance on the activity of a radionuclide that, if not controlled, should be considered to constitute a dangerous source.

5.5. The OIL is a calculated quantity that corresponds to one of the generic criteria. The OILs are used with the other operational criteria (EALs and observables) to determine appropriate protective actions and other response actions. If the OILs are exceeded, the appropriate protective action should be promptly invoked. The OILs are typically expressed in terms of dose rates or activity of radioactive material released, time integrated air concentrations, ground or surface concentrations, or activity concentration of radionuclides in the environment, in food, in water or in biological samples. OILs can be measured by

[11] These operational criteria are used as triggers at the early stage of an emergency; in some publications the term 'trigger' is used.

means of instruments in the field or can be determined by means of laboratory analysis or assessment.

5.6. Reference [2], in para. 4.71, states that "arrangements shall be made for promptly assessing the results of environmental monitoring and monitoring for contamination on people in order to decide on or to adapt urgent protective actions to protect workers and the public, including the application of operational intervention levels (OILs) with arrangements to revise the OILs as appropriate to take into account the conditions prevailing during the emergency." In addition, para. 4.89 of Ref. [2] states that default OILs shall be established together with the means to revise the OILs for "environmental measurements (such as dose rates due to deposition and deposition densities) and food concentrations; the means to revise the OILs; timely monitoring...for ground contamination in the field; the sampling and analysis of food and water; and the means to enforce agricultural countermeasures."

5.7. Every effort should be made to keep the system simple by keeping the number of OILs to a minimum. In principle, the default OILs should be a minimum set for each operational quantity (e.g. dose rate due to skin contamination) that, with due consideration of the uncertainties, reasonably encompasses the protective action (e.g. urgent decontamination), applicable generic criteria and associated assumptions (e.g. the type of emergency or the characteristics of the radiological hazard).

5.8. It is possible that, during an emergency, individuals might receive doses that give rise to a high risk of incurring radiation induced cancers. Although it is unlikely, there might be a detectable increase in the incidence of cancers among the population group that has been exposed, owing to radiation induced cases of cancer. Emergencies have occurred for which no criteria for long term health monitoring and treatment had been pre-established. Criteria that have been established after emergencies have occurred have often been set at too low a level of dose received or have not been set on the basis of radiation dose criteria at all. This has led to the designation of groups for follow-up for which it would have been impossible, because of the inherent limitations of epidemiological studies, to detect any increase in the incidence of cancers, owing to the relatively small number of cases of radiation induced cancer to be expected. Default operational criteria are therefore needed for determining whether a person should be considered for long term health monitoring and treatment.

5.9. Reference [2] states a requirement for guidelines relating to the diagnosis and treatment of radiation injuries. These guidelines should include operational criteria used in the dosimetric support of medical management of the patient [21].

5.10. The dosimetric models for developing the OILs should be established during the planning phase. These models should include a full set of parameters important for the purposes of decision making for dose assessment. For internal dose assessment and the development of corresponding OILs, the application of computer codes is necessary.

5.11. The dosimetric models and data should provide reliable assurance that all members of the public, including those that are most sensitive to radiation (e.g. pregnant women), are considered. In the development of the default operational criteria, the public needs to be assured that all groups (e.g. children playing outdoors) have been considered. Consequently, the OILs must be accompanied by a plain language explanation of the situation to which they apply (see Appendix II), the way in which they address a safety or health concern and what their application means in terms of the risk to individuals.

5.12. These default OILs should be developed on the basis of assumptions regarding the emergency, the affected population and the prevailing conditions; these assumptions, however, may not accurately reflect the emergency in question. Consequently, Ref. [2] requires that means be established to revise the default OILs to take into account prevailing emergency conditions. However, revising the OILs during an emergency may be disruptive, and they should therefore only be revised if the situation is well understood and there are compelling reasons to do so. The public should be informed of the reasons for any change in the OILs applied in an actual emergency.

5.13. Appendix II provides selected examples of default OILs for deposition, levels of individual contamination, and contamination levels for food, milk and water, together with a plain language explanation of the OILs.

Appendix I

DOSE CONCEPTS AND DOSIMETRIC QUANTITIES

I.1. There are different dose concepts that are relevant to preparedness for and response to an emergency: projected dose, residual dose and averted dose [5].

I.2. The dosimetric quantities of effective dose, equivalent dose and RBE weighted absorbed dose are used in evaluating radiation induced consequences of a nuclear or radiological emergency. They are listed in Table 5 and illustrated in Fig. 2, and are discussed in the following.

I.3. The RBE weighted averaged absorbed dose in an organ or tissue (RBE weighted absorbed dose, AD_T) is defined as the product of averaged absorbed dose ($D_{R,T}$) of radiation (R) in an organ or tissue (T) and the relative biological effectiveness ($RBE_{R,T}$):

$$AD_{R,T} = \sum_{R} D_{R,T} \times RBE_{R,T} \quad (1)$$

TABLE 5. DOSIMETRIC QUANTITIES USED IN EMERGENCY EXPOSURE SITUATIONS

Dosimetric quantity	Symbol	Purpose
		Radiation protection quantities
RBE weighted absorbed dose	AD_T	For evaluating deterministic effects induced as a result of exposure of an organ or tissue
Equivalent dose	H_T	For evaluating stochastic effects induced as a result of exposure of an organ or tissue
Effective dose	E	For evaluating detriment related to the occurrence of stochastic effects in an exposed population
		Operational quantities
Personal dose equivalent	$H_P(d)$	For monitoring external exposure of an individual
Ambient dose equivalent	$H^*(d)$	For monitoring a radiation field at the site of an emergency

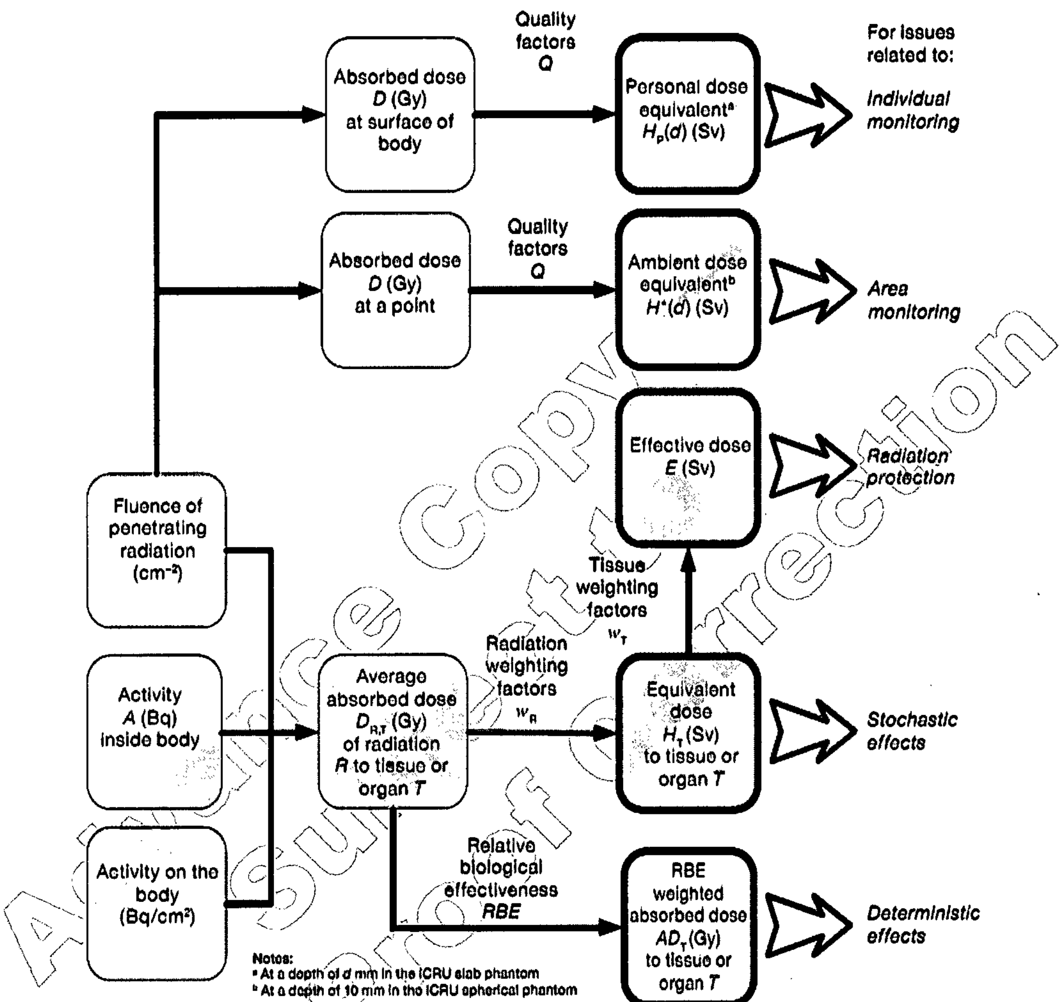

FIG 2. Dosimetric quantities and their application in emergency exposure situations.

I.4. The value of RBE should be selected with account taken of the type of radiation, the dose and the health effects of concern, as shown in Table 6.

I.5. The International System of Units (SI) unit used to express the RBE weighted absorbed dose is $J \cdot kg^{-1}$, which is called the gray (Gy) [14, 22, 23].

TABLE 6. TISSUE SPECIFIC AND RADIATION SPECIFIC VALUES OF RBE FOR THE DEVELOPMENT OF SELECTED SEVERE DETERMINISTIC EFFECTS [3, 17]

Health effect	Critical organ	Exposure[a]	$RBE_{T,R}$
Haematopoietic syndrome	Red bone marrow	External and internal γ	1
		External and internal n	3
		Internal β	1
		Internal α	2
Pneumonitis	Lung[b]	External and internal γ	1
		External and internal n	3
		Internal β	1
		Internal α	7
Gastrointestinal syndrome	Colon	External and internal γ	1
		External and internal n	3
		Internal β	1
		Internal α	0[c]
Necrosis	Soft tissue[d]	External β, γ	1
		External n	3
Moist desquamation	Skin[e]	External β, γ	1
		External n	3
Hypothyroidism	Thyroid	Intake of iodine isotopes[f]	0.2
		Other thyroid seekers	1

[a] External β, γ exposure includes exposure due to bremsstrahlung produced within the material of the source.

[b] Tissue of the alveolar-interstitial region of the respiratory tract.

[c] For alpha emitters uniformly distributed in the contents of the colon, it is assumed that irradiation of the walls of the intestine is negligible.

[d] Tissue at a depth of 5 mm below the skin surface over an area of more than 100 cm^2.

[e] Tissue at a depth of 0.5 mm below the skin surface over an area of more than 100 cm^2.

[f] Uniform irradiation of the tissue of the thyroid gland is considered to be five times more likely to produce deterministic effects than internal exposure due to low energy beta emitting isotopes of iodine, such as ^{131}I, ^{129}I, ^{125}I, ^{124}I and ^{123}I. Thyroid seeking radionuclides have a heterogeneous distribution in thyroid tissue. The isotope ^{131}I emits low energy beta particles, which leads to a reduced effectiveness of irradiation of critical thyroid tissue owing to the dissipation of the energy of the particles within other tissues.

I.6. The weighted averaged absorbed dose (equivalent dose, H_T) is defined as the product of the averaged absorbed dose in the organ or tissue (D) and the radiation weighting factor w_R [11, 24]:

$$H_T = \sum_R D_{R,T} \times w_R \tag{2}$$

I.7. The weighted averaged absorbed dose (equivalent dose, H_T) is expressed in sieverts (Sv) [22, 24]. It is an organ specific quantity that may be used for assessment of the risk of incurring any radiation induced cancer in an organ.

I.8. The effective dose is widely used in justifying and optimizing protective actions [10]. Its unit is the sievert (Sv) [22]. The total effective dose (E) includes the doses due to external penetrating radiation and due to intake:

$$E = \sum_T H_T \times w_T \tag{3}$$

I.9. The quantities used for radiation monitoring are:

— Ambient dose equivalent ($H^*(d)$); that is, the dose equivalent that would be produced by the corresponding aligned and expanded field in the International Commission on Radiation Units and Measurements (ICRU) sphere at a depth d on the radius opposing the direction of the aligned field;

— Personal dose equivalent ($H_p(d)$); that is, the dose equivalent in soft tissue below a specified point on the body at an appropriate depth d.

The SI unit for these quantities is $J \cdot kg^{-1}$, and they are expressed in Sv.

I.10. Ambient dose equivalent and personal dose equivalent are the operational quantities based on the quantity of dose equivalent. The dose equivalent is the product of the absorbed dose at a point in the tissue or organ and the appropriate quality factor (Q_R) for the type of radiation giving rise to the dose [25]:

$$H = \sum_R D_R \times Q_R \tag{4}$$

TABLE 7. CRITICAL RADIATION INDUCED HEALTH EFFECTS IN A NUCLEAR OR RADIOLOGICAL EMERGENCY [3]

Health effect	Target organ or entity
	Deterministic effects
Fatal	
Haematopoietic syndrome	Red marrow[a]
Gastrointestinal syndrome	Small intestine for external exposure[a] Colon for internal exposure[b]
Pneumonitis	Lung[a,c]
Death of embryo/fetus	Embryo/fetus in all periods of gestation
Non-fatal	
Moist desquamation	Skin[d]
Necrosis	Soft tissue[e]
Cataract	Lens of the eye[a,f]
Acute radiation thyroiditis	Thyroid[a]
Hypothyroidism	Thyroid[a]
Permanently suppressed ovulation	Ovaries[a]
Permanently suppressed sperm count	Testes[a]
Severe mental retardation	Embryo/fetus 8–25 weeks of gestation
Verifiable reduction in intelligence quotient (IQ)	Embryo/fetus 8–25 weeks of gestation
Malformation	Embryo/fetus 3–25 weeks of gestation [26]
Growth retardation	Embryo/fetus 3–25 weeks of gestation [26]
	Stochastic effects
Thyroid cancer	Thyroid
All stochastic effects	All organs taken into account in definition of effective dose

[a] External exposure to the red bone marrow, lung, small intestine, gonads, thyroid and lens of the eye as irradiation in a uniform field of strongly penetrating radiation is addressed by $AD_{\text{Red marrow}}$.

[b] Different targets for gastrointestinal syndrome are proposed because of the difference in the dose formation in the small intestine and colon in the case of internal exposure. This is due to differences in the kinetics of ingested material in the gastrointestinal tract, which lead to much higher doses in the colon than in the small intestine after intake.

[c] For the alveolar-interstitial region of the respiratory system.

[d] Skin structures at a depth of 50 mg/cm^2 (or 0.5 mm) below the surface and over an area of 100 cm^2.

[e] To a depth of 5 mm in tissue.

[f] Lens structures at a depth of 300 mg/cm^2 (or 3 mm) below the surface.

I.11. Table 7 presents a list of radiation induced health effects that would be critical during an emergency. Experience and research indicate that evaluation of the dose to the target organs as presented in the table should provide a basis for selecting operational criteria for making decisions that will address the full range of possible health effects.

Appendix II

EXAMPLES OF DEFAULT OILs FOR DEPOSITION, INDIVIDUAL CONTAMINATION AND CONTAMINATION OF FOOD, MILK AND WATER

GENERAL

II.1. In this appendix, examples of default OILs are provided for use in responding to an emergency that results in contamination, together with a plain language explanation of these OILs and guidance on the use of the OILs (see Tables 8–10). The following example default OILs are provided[12,13]:

(1) OIL1 is a measured value of ground contamination calling for:
   - Urgent protective actions (e.g. evacuation) to keep the dose to any person living in a contaminated area below the generic criteria for urgent protective actions provided in Table 3;
   - Medical actions, as required, because the dose received by evacuees may be above the generic criteria for medical actions provided in Table 3.

(2) OIL2 is a measured value of ground contamination calling for early protective actions to keep the dose for one year to any person living in the area below the generic criteria for taking actions to reasonably reduce the risk of stochastic effects provided in Table 3.

[12] OILs for rates or air concentrations in a plume resulting from an ongoing release are not provided because the example criteria are intended to be very general and practical. OILs for air doses or air concentrations from a plume are not included because: (a) in many cases the significant release will be over by the time results of environmental measurements are available; (b) it is difficult to take and analyse air concentrations in a sample in a timely manner; (c) there is a great variation in time and location of the plume concentrations at any location during a release; and (d) OILs of these types are highly dependent on the nature of the release, which makes it very difficult to develop OILs that apply to the full range of possible releases. During the period of significant release, therefore, protective actions (e.g. evacuation or sheltering, to a predetermined distance) are best taken on the basis of observable criteria. Operating organizations of facilities at which there could be emergencies that result in airborne releases of long duration should develop EALs and possibly facility specific OILs for measurements taken in a plume, for possible airborne releases from the facilities. Examples of OILs for dose rates in a release from a light water reactor resulting from core melt are provided in Ref. [27].

[13] OILs for air concentrations arising from resuspension are not provided because doses arising from resuspension have been considered in the deposition OILs.

(3) OIL3 is a measured value of ground contamination calling for immediate restrictions on the consumption of leaf vegetables, milk from animals grazing in the area and rainwater collected for drinking to keep the dose to any person below the generic criteria for taking the urgent protective actions provided in Table 3.

(4) OIL4 is a measured value of skin contamination calling for performing decontamination or providing instructions for self-decontamination and for limiting inadvertent ingestion so as:
   - To keep the dose due to skin contamination to any person below the generic criteria for taking urgent protective action provided in Table 3;
   - To initiate medical treatment or screening, as required, because the dose received by any person may exceed the generic criteria for medical actions provided in Table 3.

(5) OIL5 and OIL6 are measured values of concentrations in food, milk or water that warrant the consideration of restrictions on consumption so as to keep the effective dose to any person below 10 mSv per annum.

II.2. For the purposes of describing the use of the OILs, nuclear or radiological emergencies resulting in contamination can be thought of as being of three types:

(1) A nuclear or radiological emergency resulting in contamination of a large area (hundreds of square kilometres) with the possible involvement of a large number of people; that is, contamination of an area so large that, in order to be effective, implementation of urgent protective actions and early protective actions should be performed in two phases: first, urgent protective actions (e.g. evacuation) are taken, followed by early protective actions (e.g. relocation). An emergency of this type could occur at nuclear facilities such as nuclear power plants that are in threat category I or II [2].

(2) A nuclear or radiological emergency resulting in contamination of a moderate area (tens of square kilometres) with the possible involvement of a large number of people; that is, contamination of an area small enough that urgent protective actions and early protective actions can be effectively performed at the same time without the need for a phased response. An emergency of this type could be the result of the explosion of a radiological dispersal device or could be caused by a damaged dangerous radioactive source [28].

(3) A nuclear or radiological emergency resulting in contamination of small areas and/or with the possible involvement of a small number of people; that is, contamination of small areas that can easily and quickly be isolated, with the involvement of a small number of people who can all be decontaminated and medically assessed by using available resources,

without causing any major disruptions. This type of emergency includes those confined to a single room or a single spill. For this type of emergency, the response involves isolating the potentially contaminated area and decontaminating all those involved without necessarily using the OILs.

RESPONDING TO A NUCLEAR OR RADIOLOGICAL EMERGENCY THAT RESULTS IN CONTAMINATION OF A LARGE AREA

II.3. The process of assessing and responding to an emergency of this type through the implementation of protective actions is shown in Fig. 3. First protective actions should be taken on the basis of conditions observed on the scene [7, 18] or on the basis of an emergency classification (see Appendix III, and appendix IV of Ref. [7]) before data from radiological monitoring become available.

II.4. Within hours, areas where ground deposition levels exceed or are likely to exceed OIL1, the default OIL, should be identified and the appropriate urgent protective actions should be taken, such as evacuation, stopping the consumption of local produce, and medical evaluation of evacuees.

II.5. Within hours, actions should also be taken to reduce the consequences of contamination for those people who were in the area where OIL1 was exceeded. If OIL4 is exceeded, the evacuees should be monitored and decontaminated (if these actions can be carried out promptly). If monitoring and decontamination are not immediately possible, the evacuees should be released and instructed to take actions to reduce inadvertent ingestion, and to shower and change their clothing as soon as possible. OIL4 levels may be very difficult to detect under emergency conditions. Therefore, any person who may have been contaminated, including those who were monitored and had contamination levels below OIL4, should take actions to reduce inadvertent ingestion, and should shower and change their clothing as soon as possible. The dose to evacuees should also be evaluated and the medical actions called for in Tables 2 and 3 should be taken, as appropriate.

II.6. Within a day, the areas where ground deposition levels exceed default OIL2 should be identified and early protective actions should be taken, such as stopping the consumption of locally produced vegetables and milk and commencing the process of implementing temporary relocation. Relocation should be accomplished within a week.

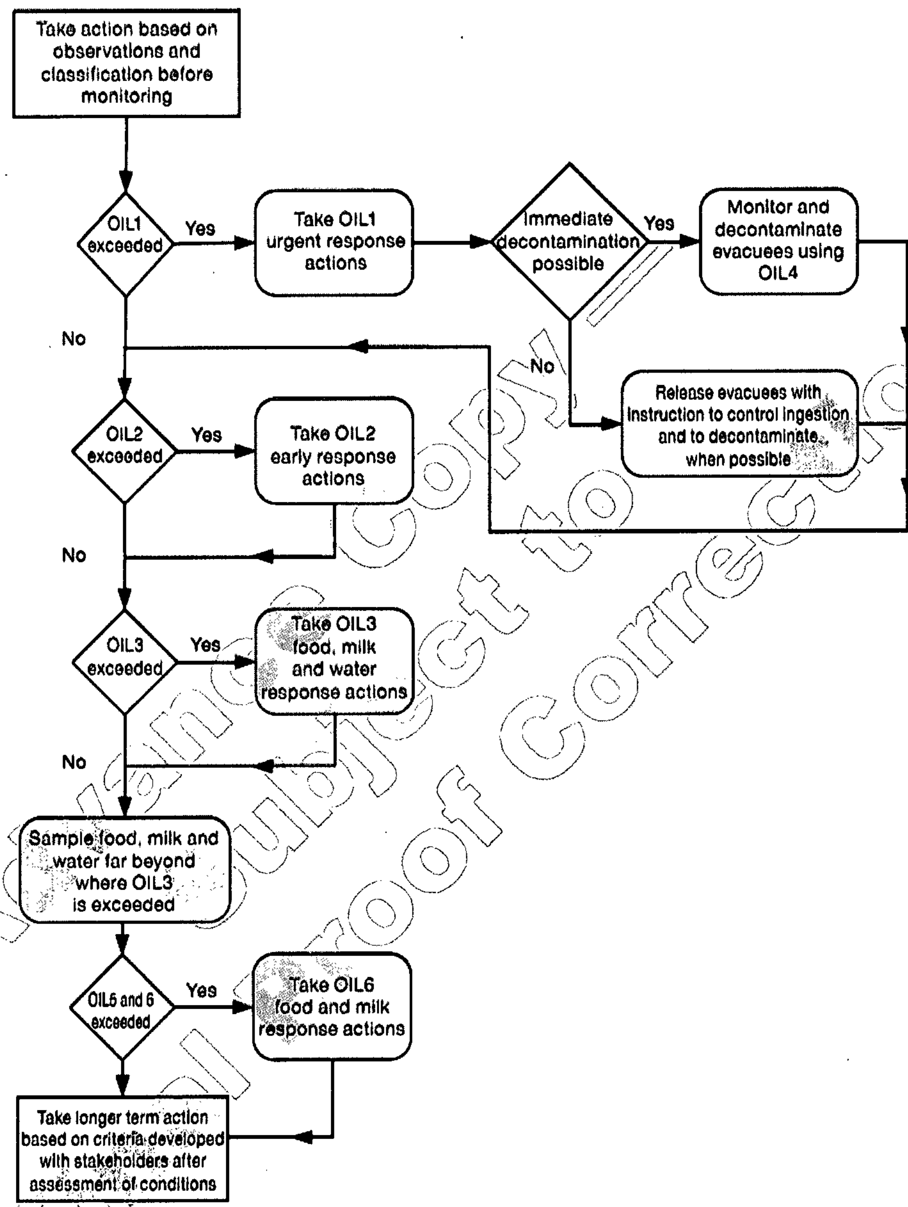

FIG. 3. Process of assessment of a nuclear or radiological emergency resulting in contamination of a large area.

II.7. Within days, the areas where ground deposition levels exceed default OIL3 should be identified and actions should be taken to stop consumption of locally produced vegetables and milk, and of rainwater collected for drinking, until they have been screened and analysed. Within a week, food, milk and water should be screened and analysed, possibly out to a distance of more than 100 km, and actions should be taken to restrict consumption of food, milk and water with concentrations of radionuclides in excess of OIL5 and OIL6.

II.8. Within days, the mixture of the radionuclides over the affected area should be determined and the OILs being used to make decisions should be revised, if warranted.

II.9. Any recommendation to the public to take any protective actions should be accompanied by a plain language explanation of the criteria.

II.10. After the emergency is over, further actions should be taken on the basis of criteria developed after careful assessment of conditions and in consultation with interested parties.

RESPONDING TO A NUCLEAR OR RADIOLOGICAL EMERGENCY RESULTING IN CONTAMINATION OF A MODERATE AREA

II.11. The process of assessing and responding to a nuclear or radiological emergency resulting in contamination of a moderate area through the implementation of protective actions is shown in Fig. 4. First protective actions are taken on the basis of conditions observed on the scene [7, 18] or on the basis of an emergency classification (see Appendix III, and appendix IV of Ref. [7]) before data from radiological monitoring become available.

II.12. Within hours, areas where ground deposition levels exceed default OIL2 should be identified, and the appropriate urgent protective actions and early protective actions should be taken where OIL2 is exceeded. The dose to evacuees should also be evaluated and the medical actions called for in Tables 2 and 3 should be taken.

II.13. Evacuees should be monitored and if OIL4 is exceeded, evacuees should be decontaminated, if this can be done promptly. If monitoring and/or decontamination are not immediately possible, the evacuees should be released

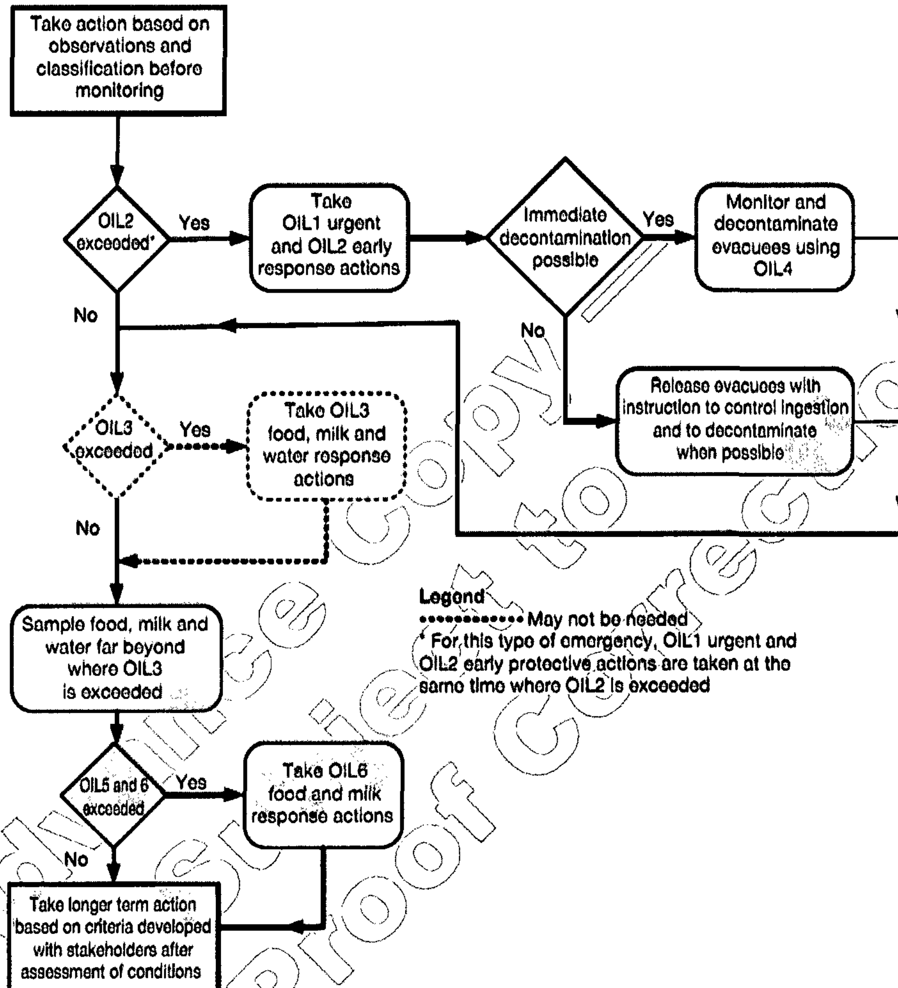

FIG 4. Process of assessment of a nuclear or radiological emergency resulting in contamination of a moderate area.

and should be instructed to take actions to reduce inadvertent ingestion, and to shower and change their clothing as soon as possible. OIL4 levels may be very difficult to detect under emergency conditions. Any person who may have been contaminated, including those who were monitored and had contamination levels below OIL4, should therefore take actions to reduce inadvertent ingestion, and should shower and change their clothing as soon as possible.

II.14. Within days, areas where ground deposition levels exceed default OIL3 should be identified and actions should be taken to stop the consumption of rainwater and locally produced vegetables and milk until they have been screened and analysed. However, if only limited amounts of food (e.g. fruit and vegetables from local gardens) and non-essential food could have been affected, this step may be omitted, and instead restrictions should be placed on the consumption of all the food that could be contaminated until it can be screened and analysed. Finally, food, milk and rainwater should be screened and analysed, out to a distance of several kilometres, and actions should be taken to restrict the consumption of food, milk and rainwater having concentrations of radionuclides in excess of OIL5 and OIL6.

II.15. Within days, the mixture of radionuclides over the affected area should be determined and the OILs being used to make decisions should be revised, if warranted.

II.16. Any recommendations to the public to take any protective actions should be accompanied by a plain language explanation of the criteria.

II.17. After the emergency is over, further actions should be taken on the basis of criteria developed after careful assessment of the conditions and in consultation with the interested parties.

DEFAULT OILs

II.18. Table 8 contains OILs for assessing the results of field monitoring of contamination of the ground, skin and clothing. Three types of OIL are provided in the units measured by field survey instruments: dose rate (OIL(γ)); beta counts per second (counts/s) for beta radiation (OIL(β)); and alpha counts/s for alpha radiation (OIL(α)). An OIL is exceeded if any of its types are exceeded. These OILs apply for emergencies involving all radionuclides, including fission products released by melting reactor fuel.

II.19. The OILs in Table 8 were established for implementing the protective actions and other response actions in a way consistent with the generic criteria in Tables 2 and 3. In the development of these OILs, all members of the population (including children and pregnant women) as well as all usual activities (such as children playing outdoors) were considered. The OILs were calculated to ensure that the protective actions to be taken protect against the most radiotoxic radionuclides. As a result, the OILs are overly conservative for many

TABLE 8. DEFAULT OILs FOR FIELD SURVEY MEASUREMENTS

OIL	OIL value	Response action (as appropriate) if the OIL is exceeded
		Environmental measurements
OIL1	Gamma (γ) 1000 μSv/h at 1 m from surface or a source 2000 counts/s direct beta (β) surface contamination measurement[e] 50 counts/s direct alpha (α) surface contamination measurement[f]	— Immediately evacuate or provide substantial shelter[a] — Provide for decontamination of evacuees[b] — Reduce inadvertent ingestion[c] — Stop consumption of local produce[d], rainwater and milk from animals grazing in the area — Register and provide for a medical examination of evacuees — If a person has handled a source with a dose rate equal to or exceeding 1000 μSv/h at 1 m[e], provide an immediate medical examination
OIL2	Gamma (γ) 100 μSv/h at 1 m from surface or a source 200 counts/s direct beta (β) surface contamination measurement[f] 10 counts/s direct alpha (α) surface contamination measurement[f]	— Stop consumption of local produce[d], rainwater and milk from animals grazing in the area until they have been screened and contamination levels have been assessed using OIL5 and OIL6 — Temporarily relocate those living in the area; before relocation, reduce inadvertent ingestion[c]; register and estimate the dose to those who were in the area to determine if medical screening is warranted; relocation of people from the areas with the highest potential exposure should begin within days — If a person has handled a source with a dose rate equal to or exceeding 100 μSv/h at 1 m[e], provide medical examination and evaluation; any pregnant women who have handled such a source should receive immediate medical evaluation and dose assessment
OIL3	Gamma (γ) 1 μSv/h at 1 m from surface 20 counts/s direct beta (β) surface contamination measurement[f,i] 2 counts/s direct alpha (α) surface contamination measurement[f,i]	— Stop consumption of non-essential[g] local produce[d], rainwater and milk from animals[h] grazing in the area until it has been screened and contamination levels have been assessed using OIL5 and OIL6 — Screen local produce, rainwater and milk from animals[h] grazing in the area out to at least 10 times the distance to which OIL3 is exceeded and assess samples using OIL5 and OIL6 — Consider providing iodine thyroid blocking[j] for fresh fission products[k] and for iodine contamination if replacement for essential[g] local produce or milk is not immediately available — Estimate the dose of those who may have consumed food, milk or rainwater from the area where restrictions were implemented to determine if medical screening is warranted

TABLE 8. DEFAULT OILs FOR FIELD SURVEY MEASUREMENTS (cont.)

OIL	OIL value	Response action (as appropriate) if the OIL is exceeded
		Skin contamination
OIL4	Gamma (γ) 1 μSv/h at 10 cm from the skin 1000 counts/s direct beta (β) skin contamination measurement[f] 50 counts/s direct alpha (α) skin contamination measurement[f]	— Provide for skin decontamination[b] and reduce inadvertent ingestion[c] — Register and provide for a medical examination

Note: The OILs should be revised as soon as it is known which radionuclides are actually involved. The OILs should also be revised, if necessary, as part of the preparedness process, to be more consistent with the instruments to be used during the response. However, the default OILs in this table can be used without revision to make a conservative assessment immediately.

[a] Inside closed halls of large multi-storey buildings or large masonry structures and away from walls or windows.

[b] If immediate decontamination is not practicable, advise evacuees to change their clothing and to shower as soon as possible. Guidance on performing decontamination can be found in Refs [18, 21].

[c] Advise evacuees not to drink, eat or smoke and to keep hands away from the mouth until hands are washed.

[d] Local produce is food that is grown in open spaces that may be directly contaminated by the release and that is consumed within weeks (e.g. vegetables).

[e] This external dose rate criterion applies only to sealed dangerous sources and does not need to be revised in an emergency.

[f] Performed using good contamination monitoring practice.

[g] Restricting essential foods could result in severe health effects (e.g. severe malnutrition), and therefore essential foods should be restricted only if replacement food is available.

[h] Use 10% of OIL3 for milk from small animals (e.g. goats) grazing in the area.

[i] Deposition by rain of short lived naturally occurring radon progeny can result in count rates of four or more times the background count rate. These rates should not be confused with the deposition rates due to the emergency. Count rates due to radon progeny will decrease rapidly after the rain stops and should be back to typical background levels within a few hours.

[j] Only for several days and only if replacement food is not available.

[k] Fission products that were produced within the last month, thus containing large amounts of iodine.

radionuclides and should be revised as soon as it is known which radionuclides are involved.

II.20. As a minimum criterion, a contamination monitoring instrument is considered suitable for applying the OIL if it will provide a response equal to or more conservative than that assumed in development of the OILs. The following procedure may be used for checking whether or not a particular instrument meets the minimum criterion and can be used in applying the operational criteria for OIL1, OIL2 and OIL4 in Table 8:

(1) Ensure that the instrument can display counts/s (or counts/min) over the ranges of the OIL values in Table 8.
(2) For a beta monitor, ensure that it can detect both high (e.g. ^{32}P) and low (e.g. ^{14}C) energy beta emitters. It is not required that very weak emitters (e.g. ^{63}Ni) be detectable.
(3) Calculate the instrument coefficients (ICs) using measured (i.e. derived from the calibration factor) or known 4π efficiencies (e.g. those provided by the manufacturer) for high energy and low energy beta emitting radionuclides and an alpha emitting radionuclide (as applicable) using the formula:

$$IC = W_{monitor} \times \theta_{monitor} \qquad (5)$$

where

IC is the instrument coefficient ((counts/s × cm^2)/Bq);
$W_{monitor}$ is the effective area of the detector window (cm^2);
$\theta_{monitor}$ is the energy dependent efficiency for 4π geometry close to the surface and under ideal conditions (counts/s × Bq^{-1}).

(4) If the calculated IC values are greater than or equal to the following, the instrument is suitable:

— For medium or high energy beta emitters (e.g. ^{36}Cl) — 1;
— For low energy beta emitters (e.g. ^{14}C) — 0.2;
— For alpha emitters — 0.5.

A beta monitor should meet both the high energy and the low energy beta criteria.

These criteria were established so that the majority of commonly available contamination monitoring instruments will give a response that is equal to or higher (i.e. more conservative) than the response assumed in developing the default OILs. However, the response of instruments that meet these minimum criteria may vary by a factor of as much as 20, primarily owing to differences in the effective area of the detector. Therefore, the OILs in Table 8 should be revised, if necessary, to be more consistent with the characteristics of the instruments to be used during the response. This should be done as part of the preparedness process.

II.21. The process of assessing radionuclide concentrations in food, milk and water is shown in Fig. 5. First the potentially contaminated food should be screened over a wide area and analysed to determine the gross alpha and beta concentrations if this can be done more promptly than assessing the concentration of individual radionuclides. If the OIL5 (see Table 9) screening levels are not exceeded, the food, milk and water are safe for consumption during the emergency phase. If an OIL5 level is exceeded, the radionuclide specific concentrations in the food, milk or water should be determined. If the OIL6 levels in Table 10 are exceeded, consumption of non-essential food, milk or water should be stopped, and essential food, milk and water should be replaced or the people should be relocated if replacements are not available. Finally, as soon as possible the guidance in Ref. [29] should be used to determine whether the food, milk or water is suitable for international trade, and national criteria or WHO guidance [30] should be used to determine whether the food, milk or water is suitable for long term consumption after the emergency phase.

II.22. Tables 9 and 10 give OILs for assessing food, milk and water (see also Table 11). These OILs apply to radionuclides in food, milk and water destined for human consumption (they are not applicable for dried food or concentrated food). The food, milk and water OILs in Tables 9 and 10 were calculated on the basis of the following conservative assumptions:

- All of the food, milk and water are initially contaminated and are consumed throughout a full year.
- The most restrictive age dependent dose conversion factors and ingestion rates (i.e. those for infants) are used.

The generic criterion of 10 mSv per year (and not 100 mSv per year, as in Table 3, at which early protective actions are to be taken) was used to ensure that those people in areas from which they were not relocated will not receive a total dose (including the dose from ingestion) greater than 100 mSv per year.

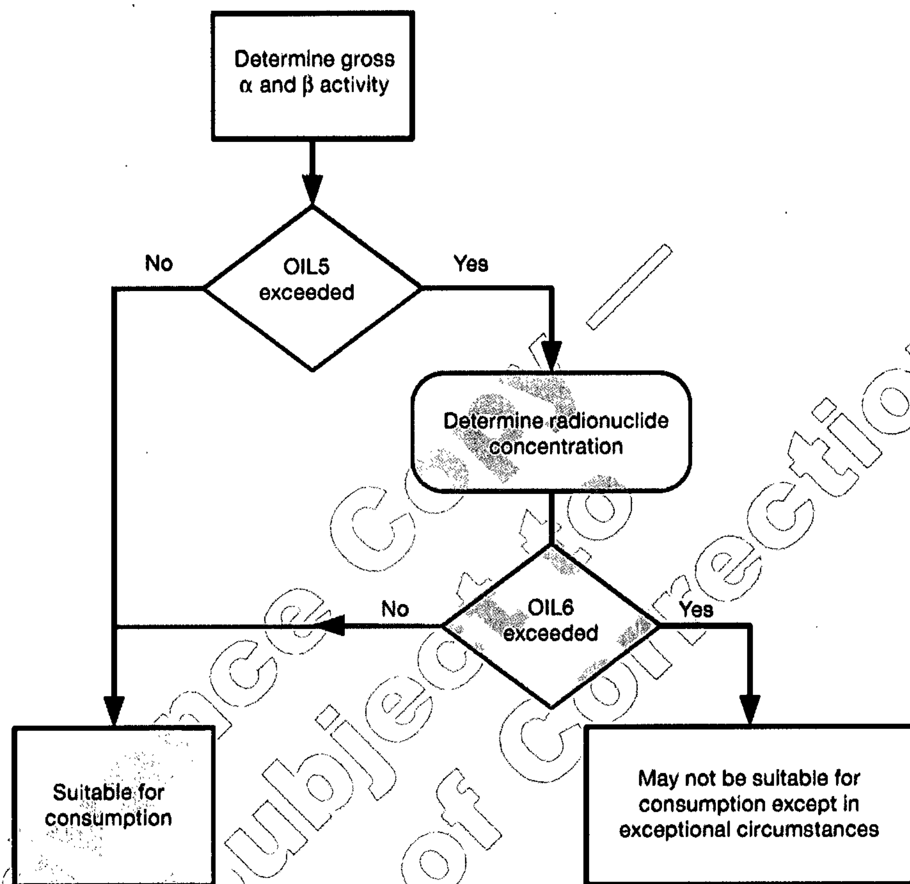

FIG. 5. Process of assessing radionuclide concentrations in food, milk and water.

II.23. Radioactive ^{40}K is commonly found in food and water. It does not accumulate in the body but is maintained at a constant level independent of intake[14] [30]. The contribution of ^{40}K should therefore be subtracted, following a separate determination of total potassium content. The beta activity of the ^{40}K included in natural potassium is 27.6 Bq/g. This is the factor that should be used to calculate the beta activity due to ^{40}K (Ref. [29], para. 9.4.2).

Text cont. on p. 49.

[14] In the response to the Chernobyl accident in 1986, in some cases ^{40}K was confused with ^{137}Cs and produce was discarded even though it contained virtually no radioactive caesium [31].

TABLE 9. DEFAULT SCREENING OILs FOR FOOD, MILK AND WATER CONCENTRATIONS FROM LABORATORY ANALYSIS

OIL	OIL value	Response action if the OIL is exceeded
OIL5	Gross beta (β): 100 Bq/kg	Above OIL5: Assess using OIL6
	or	Below OIL5: Safe for consumption during the emergency phase
	Gross alpha (α): 5 Bq/kg	

TABLE 10. DEFAULT RADIONUCLIDE SPECIFIC OILs FOR FOOD, MILK AND WATER CONCENTRATIONS FROM LABORATORY ANALYSIS

Radionuclide		OIL6 (Bq/kg)	Radionuclide		OIL6 (Bq/kg)
H-3		2×10^5	Sc-44		1×10^7
Be-7		7×10^5	Sc-46		8×10^3
Be-10		3×10^3	Sc-47		4×10^5
C-11		2×10^9	Sc-48		3×10^5
C-14		1×10^4	Ti-44	+	6×10^2
F-18		2×10^8	V-48		3×10^4
Na-22		2×10^3	V-49		2×10^5
Na-24		4×10^6	Cr-51		8×10^5
Mg-28	+[a]	4×10^5	Mn-52		1×10^5
Al-26		1×10^3	Mn-53		9×10^4
Si-31		5×10^7	Mn-54		9×10^3
Si-32	+	9×10^2	Mn-56		3×10^7
P-32		2×10^4	Fe-52	+	2×10^6
P-33		1×10^5	Fe-55		1×10^4
S-35		1×10^4	Fe-59		9×10^3
Cl-36		3×10^3	Fe-60		7×10^1
Cl-38		3×10^8	Co-55		1×10^6
K-40		NA[b,c]	Co-56		4×10^3
K-42		3×10^6	Co-57		2×10^4

[a] '+' indicates radionuclides with progeny listed in Table 11 that are assumed to be in equilibrium with the parent radionuclide and therefore do not need to be considered independently when assessing compliance with OILs.

[b] NA: not applicable.

[c] The dose from ingestion of ^{40}K is considered not to be relevant because ^{40}K does not accumulate in the body and is maintained at a constant level independent of intake [29].

TABLE 10. DEFAULT RADIONUCLIDE SPECIFIC OILs FOR FOOD, MILK AND WATER CONCENTRATIONS FROM LABORATORY ANALYSIS (cont.)

Radionuclide		OIL6 (Bq/kg)	Radionuclide		OIL6 (Bq/kg)
K-43		4×10^6	Co-58		2×10^4
Ca-41		4×10^4	Co-58m		9×10^7
Ca-45		8×10^3	Co-60		8×10^2
Ca-47	+	5×10^4	Ni-59		6×10^4
Ni-63		2×10^4	Sr-89		6×10^3
Ni-65		4×10^7	Sr-90	+	2×10^2
Cu-64		1×10^7	Sr-91		3×10^6
Cu-67		8×10^5	Sr-92		2×10^7
Zn-65		2×10^3	Y-87	+	4×10^5
Zn-69		6×10^8	Y-88		9×10^3
Zn-69m	+	3×10^6	Y-90		9×10^4
Ga-67		1×10^6	Y-91		5×10^3
Ga-68		2×10^8	Y-91m		2×10^9
Ga-72		1×10^6	Y-92		1×10^7
Ge-68	+	3×10^3	Y-93		1×10^6
Ge-71		5×10^6	Zr-88		3×10^4
Ge-77		6×10^6	Zr-93		2×10^4
As-72		4×10^5	Zr-95	+	6×10^3
As-73		3×10^4	Zr-97	+	5×10^5
As-74		3×10^4	Nb-93m		2×10^4
As-76		4×10^5	Nb-94		2×10^3
As-77		1×10^6	Nb-95		5×10^4
Se-75		4×10^3	Nb-97		2×10^8
Se-79		7×10^2	Mo-93		3×10^3
Br-76		3×10^6	Mo-99	+	5×10^5
Br-77		5×10^6	Tc-95m	+	3×10^4
Br-82		1×10^6	Tc-96		2×10^5
Rb-81		8×10^7	Tc-96m		2×10^9
Rb-83		7×10^3	Tc-97		4×10^4
Rb-84		1×10^4	Tc-97m		2×10^4
Rb-86		1×10^4	Tc-98		2×10^3
Rb-87		2×10^3	Tc-99		4×10^3

TABLE 10. DEFAULT RADIONUCLIDE SPECIFIC OILs FOR FOOD, MILK AND WATER CONCENTRATIONS FROM LABORATORY ANALYSIS (cont.)

Radionuclide		OIL6 (Bq/kg)	Radionuclide		OIL6 (Bq/kg)
Sr-82	+	5×10^{3}	Tc-99m		2×10^{8}
Sr-85		3×10^{4}	Ru-97		2×10^{6}
Sr-85m		3×10^{9}	Ru-103	+	3×10^{4}
Sr-87m		3×10^{8}	Ru-105		2×10^{7}
Ru-106	+	6×10^{2}	Sb-126		3×10^{4}
Rh-99		1×10^{5}	Te-121		1×10^{5}
Rh-101		8×10^{3}	Te-121m	+	3×10^{3}
Rh-102		2×10^{3}	Te-123m		5×10^{3}
Rh-102m		5×10^{3}	Te-125m		1×10^{4}
Rh-103m		5×10^{9}	Te-127		1×10^{7}
Rh-105		1×10^{6}	Te-127m	+	3×10^{3}
Pd-103	+	2×10^{5}	Te-129		2×10^{8}
Pd-107		7×10^{4}	Te-129m	+	6×10^{3}
Pd-109	+	2×10^{6}	Te-131		4×10^{8}
Ag-105		5×10^{4}	Te-131m		3×10^{5}
Ag-108m	+	2×10^{3}	Te-132	+	5×10^{4}
Ag-110m	+	2×10^{3}	I-123		5×10^{6}
Ag-111		7×10^{4}	I-124		1×10^{4}
Cd-109	+	3×10^{3}	I-125		1×10^{3}
Cd-113m		4×10^{2}	I-126		2×10^{3}
Cd-115	+	2×10^{5}	I-129		NA[d]
Cd-115m		6×10^{3}	I-131		3×10^{3}
In-111		1×10^{6}	I-132		2×10^{7}
In-113m		4×10^{8}	I-133		1×10^{5}
In-114m	+	3×10^{3}	I-134		2×10^{8}
In-115m		5×10^{7}	I-135		2×10^{6}
Sn-113	+	1×10^{4}	Cs-129		1×10^{7}
Sn-117m		7×10^{4}	Cs-131		2×10^{6}
Sn-119m		1×10^{4}	Cs-132		4×10^{5}
Sn-121m	+	5×10^{3}	Cs-134		1×10^{3}
Sn-123		3×10^{3}	Cs-134m		3×10^{8}

[d] Not a significant source of radiation because of the low specific activity.

TABLE 10. DEFAULT RADIONUCLIDE SPECIFIC OILs FOR FOOD, MILK AND WATER CONCENTRATIONS FROM LABORATORY ANALYSIS (cont.)

Radionuclide		OIL6 (Bq/kg)	Radionuclide		OIL6 (Bq/kg)
Sn-125		2×10^4	Cs-135		9×10^3
Sn-126	+	5×10^2	Cs-136		4×10^4
Sb-122		2×10^5	Cs-137	+	2×10^3
Sb-124		5×10^3	Ba-131	+	1×10^5
Sb-125	+	3×10^3	Ba-133		3×10^3
Ba-133m		9×10^5	Eu-156		2×10^4
Ba-140	+	1×10^4	Gd-146	+	8×10^3
La-137		4×10^4	Gd-148		1×10^2
La-140		2×10^5	Gd-153		2×10^4
Ce-139		3×10^4	Gd-159		2×10^6
Ce-141		3×10^4	Tb-157		9×10^4
Ce-143		5×10^5	Tb-158		3×10^3
Ce-144	+	8×10^2	Tb-160		7×10^3
Pr-142		6×10^5	Dy-159		7×10^4
Pr-143		4×10^4	Dy-165		7×10^7
Nd-147		6×10^4	Dy-166	+	6×10^4
Nd-149		8×10^7	Ho-166		5×10^5
Pm-143		3×10^4	Ho-166m		2×10^3
Pm-144		6×10^3	Er-169		2×10^5
Pm-145		3×10^4	Er-171		6×10^6
Pm-147		1×10^4	Tm-167		1×10^5
Pm-148m	+	1×10^4	Tm-170		5×10^3
Pm-149		3×10^5	Tm-171		3×10^4
Pm-151		8×10^5	Yb-169		3×10^4
Sm-145		2×10^4	Yb-175		4×10^5
Sm-147		1×10^2	Lu-172		1×10^5
Sm-151		3×10^4	Lu-173		2×10^4
Sm-153		5×10^5	Lu-174		1×10^4
Eu-147		8×10^4	Lu-174m		1×10^4
Eu-148		2×10^4	Lu-177		2×10^5
Eu-149		9×10^4	Hf-172	+	2×10^3
Eu-150b		3×10^6	Hf-175		3×10^4

TABLE 10. DEFAULT RADIONUCLIDE SPECIFIC OILs FOR FOOD, MILK AND WATER CONCENTRATIONS FROM LABORATORY ANALYSIS (cont.)

Radionuclide		OIL6 (Bq/kg)	Radionuclide		OIL6 (Bq/kg)
Eu-150a		4×10^3	Hf-181		2×10^4
Eu-152		3×10^3	Hf-182	+	1×10^3
Eu-152m		4×10^6	Ta-178a		1×10^8
Eu-154		2×10^3	Ta-179		6×10^4
Eu-155		1×10^4	Ta-182		5×10^3
W-178	+	2×10^5	Hg-194	+	2×10^2
W-181		1×10^5	Hg-195		2×10^7
W-185		2×10^4	Hg-195m		8×10^5
W-187		1×10^6	Hg-197		1×10^6
W-188	+	3×10^3	Hg-197m		2×10^6
Re-184		2×10^4	Hg-203		1×10^4
Re-184m	+	3×10^3	Tl-200		5×10^6
Re-186		1×10^5	Tl-201		3×10^6
Re-187		5×10^5	Tl-202		2×10^5
Re-188		7×10^5	Tl-204		3×10^3
Re-189		8×10^5	Pb-201		2×10^7
Os-185		2×10^4	Pb-202	+	1×10^3
Os-191		8×10^4	Pb-203		2×10^6
Os-191m		1×10^7	Pb-205		2×10^4
Os-193		7×10^5	Pb-210	+	2.0
Os-194	+	8×10^2	Pb-212	+	2×10^5
Ir-189		2×10^5	Bi-205		7×10^4
Ir-190		6×10^4	Bi-206		8×10^4
Ir-192		8×10^3	Bi-207		3×10^3
Ir-194		6×10^5	Bi-210		1×10^5
Pt-188	+	6×10^4	Bi-210m		2×10^2
Pt-191		9×10^5	Bi-212	+	7×10^7
Pt-193		8×10^4	Po-210		5.0
Pt-193m		3×10^5	At-211	+	2×10^5
Pt-195m		3×10^5	Ra-223	+	4×10^2
Pt-197		2×10^6	Ra-224	+	2×10^3
Pt-197m		1×10^8	Ra-225	+	2×10^2

TABLE 10. DEFAULT RADIONUCLIDE SPECIFIC OILs FOR FOOD, MILK AND WATER CONCENTRATIONS FROM LABORATORY ANALYSIS (cont.)

Radionuclide		OIL6 (Bq/kg)	Radionuclide		OIL6 (Bq/kg)
Au-193		8×10^6	Ra-226	+	2×10^1
Au-194		1×10^6	Ra-228		3.0
Au-195		2×10^4	Ac-225		3×10^3
Au-198		3×10^5	Ac-227	+	5.0
Au-199		5×10^5	Ac-228		7×10^6
Th-227	+	9×10^1	Pu-242		5×10^1
Th-228	+	2×10^1	Pu-244	+	5×10^1
Th-229	+	8.0	Am-241		5×10^1
Th-230		5×10^1	Am-242m	+	5×10^1
Th-231		2×10^6	Am-243	+	5×10^1
Th-232		4.0	Am-244		4×10^6
Th-234	+	8×10^3	Am-241/Be-9		5×10^1
Pa-230		5×10^4	Cm-240		4×10^3
Pa-231		2×10^1	Cm-241		3×10^4
Pa-233		3×10^4	Cm-242		5×10^2
U-230	+	8×10^2	Cm-243		6×10^1
U-232		2×10^1	Cm-244		7×10^1
U-233		1×10^2	Cm-245		5×10^1
U-234		2×10^2	Cm-246		5×10^1
U-235	+	2×10^2	Cm-247		6×10^1
U-236		2×10^2	Cm-248		1×10^1
U-238	+	1×10^2	Bk-247		2×10^1
Np-235		7×10^4	Bk-249		1×10^4
Np-236l	+	8×10^2	Cf-248		2×10^2
Np-236s		4×10^6	Cf-249		2×10^1
Np-237	+	9×10^1	Cf-250		4×10^1
Np-239		4×10^5	Cf-251		2×10^1
Pu-236		1×10^2	Cf-252		4×10^1
Pu-237		2×10^5	Cf-253		3×10^4
Pu-238		5×10^1	Cf-254		3×10^1
Pu-239		5×10^1	Es-253		5×10^3
Pu-240		5×10^1	Pu-239/Be-9		5×10^1
Pu-241		4×10^3			

TABLE 11. EQUILIBRIUM RADIOACTIVE CHAINS

Parent radionuclide	Progeny radionuclides considered in OIL6 assessment as being in equilibrium with the parent
Mg-28	Al-28
Si-32	P-32
Ca-47	Sc-47 (3.8)[a]
Ti-44	Sc-44
Fe-52	Mn-52m
Zn-69m	Zn-69 (1.1)
Ge-68	Ga-68
Sr-90	Y-90
Y-87	Sr-87m
Zr-95	Nb-95 (2.2)
Zr-97	Nb-97m (0.95), Nb-97
Tc-95m	Tc-95 (0.041)
Mo-99	Tc-99m (0.96)
Ru-103	Rh-103m
Ru-106	Rh-106
Pd-103	Rh-103m
Pd-109	Ag-109m
Ag-108m	Ag-108 (0.09)
Ag-110m	Ag-110 (0.013)
Cd-109	Ag-109m
Cd-115	In-115m (1.1)
In-114m	In-114 (0.96)
Sn-113	In-113m
Sn-121m	Sn-121 (0.78)
Sn-126	Sb-126m, Sb-126 (0.14)
Sb-125	Te-125m (0.24)
Te-121m	Te-121
Te-127m	Te-127
Te-129m	Te-129 (0.65)
Te-132	I-132

[a] The value inside the parentheses is the activity of the daughter radionuclide, per unit of the parent, assumed to be present.

TABLE 11. EQUILIBRIUM RADIOACTIVE CHAINS (cont.)

Parent radionuclide	Progeny radionuclides considered in OIL6 assessment as being in equilibrium with the parent
Cs-137	Ba-137m
Ba-131	Cs-131 (5.6)
Ba-140	La-140 (1.2)
Ce-144	Pr-144m (0.018), Pr-144
Pm-148m	Pm-148 (0.053)
Gd-146	Eu-146
Dy-166	Ho-166 (1.5)
Hf-172	Lu-172
Hf-182	Ta-182
W-178	Ta-178a
W-188	Re-188
Re-184m	Re-184 (0.97)
Os-194	Ir-194
Pt-188	Ir-188 (1.2)
Hg-194	Au-194
Pb-202	Tl-202
Pb-210	Bi-210, Po-210
Pb-212	Bi-212, Tl-208 (0.40), Po-212 (0.71)
Bi-210m	Tl-206
Bi-212	Tl-208 (0.36), Po-212 (0.65)
At-211	Po-211 (0.58)
Rn-222	Po-218, Pb-214, Bi-214, Po-214
Ra-223	Rn-219, Po-215, Pb-211, Bi-211, Tl-207
Ra-224	Rn-220, Po-216, Pb-212 , Bi-212, Tl-208 (0.36), Po-212 (0.65)
Ra-225	Ac-225 (3.0), Fr-221 (3.0), At-217 (3.0), Bi-213 (3.0), Po-213 (2.9), Pb-209 (2.9), Tl-209 (0.067), Pb-209 (0.067)
Ra-226	Rn-222, Po-218, Pb-214, Bi-214, Po-214
Ac-225	Fr-221, At-217, Bi-213, Po-213 (0.98), Pb-209, Tl-209 (0.022)
Ac-227	Th-227 (0.99), Ra-223 (0.99), Rn-219 (0.99), Po-215 (0.99), Pb-211 (0.99), Bi-211 (0.99), Tl-207 (0.99), Fr-223 (0.014), Ra-223 (0.014), Rn-219 (0.014), Po-215 (0.014), Pb-211 (0.014), Bi-211 (0.014), Tl-207 (0.014)

TABLE 11. EQUILIBRIUM RADIOACTIVE CHAINS (cont.)

Parent radionuclide	Progeny radionuclides considered in OIL6 assessment as being in equilibrium with the parent
Th-227	Ra-223 (2.6), Rn-219 (2.6), Po-215 (2.6), Pb-211 (2.6), Bi-211 (2.6), Tl-207 (2.6)
Th-228	Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Th-229	Ra-225, Ac-225, Fr-221, At-217, Bi-213, Po-213 (0.98), Pb-209 (0.98), Tl-209 (0.02), Pb-209 (0.02)
Th-234	Pa-234m
U-232	Th-226, Ra-222, Rn-218, Po-214
U-235	Th-231
U-238	Th-234, Pa-234m
Np-237	Pa-233
Pu-244	U-240, Np-240m
Am-242m	Am-242, Cm-242 (0.83)
Am-243	Np-239

II.24. OIL6 is exceeded if the following condition is satisfied:

$$\sum_i \frac{C_{f,i}}{\mathrm{OIL6}_i} > 1 \qquad (6)$$

where

$C_{f,i}$ is the concentration of radionuclide i in the food, milk or water (Bq/kg);
$\mathrm{OIL6}_i$ is the concentration of radionuclide i from Table 10 (Bq/kg).

II.25. If OIL6 is exceeded, the following actions should be taken:

— Stop consumption of non-essential[15] food, milk or water and conduct an assessment on the basis of realistic consumption rates. Replace essential

[15] Restriction of the consumption of essential food could result in severe health effects (e.g. severe malnutrition).

food, milk and water promptly, or relocate people if replacement of essential food, milk and water is not possible.

- — For fission products (e.g. containing iodine) and iodine contamination, consider providing iodine thyroid blocking if replacement of essential food, milk or water is not immediately possible.
- — Estimate the dose to those who may have consumed food, milk or rainwater from the area where restrictions were implemented to determine if medical screening is warranted.

PLAIN LANGUAGE EXPLANATION

II.26. Experience has shown that decision makers take actions and the public follow instructions best when they understand how the actions provide for the safety of the public [32]. The default OILs are therefore supported by a plain language explanation of how criteria and associated actions provide for the safety of all members of the public. In addition, experience shows that use of overly conservative criteria can result in the public taking actions that do more harm than good. The default OILs are developed using realistically conservative assumptions that provide reasonable assurance that all members of the public are safe.

II.27. The development of plain language explanations for the default OILs should be based on the assumption that members of the public living under normal conditions, including those who are more vulnerable to radiation exposure such as children and pregnant women, will achieve a level of protection that meets international standards, provided that during the emergency phase they:

- — Do not receive a dose to any organ approaching that resulting in severe deterministic effects. The thresholds for the onset of severe deterministic effects are listed in Table 2.
- — Do not receive a dose above which the risk of health effects (e.g. cancers) is sufficiently high to justify taking protective actions during an emergency (generic criterion of 100 mSv per annum, as presented in Table 3). Below this generic criterion, protective actions are not always justified and will be taken (if at all) on the basis of justified criteria developed, with interested parties, after careful consideration of the conditions, including the impact of any protective action.

II.28. The plain language communications below provide text that may be given directly to those members of the public to whom the criterion applies.

OIL1 plain language explanation

II.29. Remaining in the area where OIL1 is exceeded may not be safe. Those living in the area should *[insert appropriate recommended actions for OIL1]* to reduce the risk of health effects due to radiation.

OIL2 plain language explanation

II.30. Remaining in the area where OIL2 is exceeded for a short time is possible if the following recommended actions are taken, but staying for longer periods may not be safe. Move out of the area (relocate) within a week and *[insert appropriated recommended actions for OIL2]*.

II.31. The recommended actions for OIL2 take into account those members of the public most vulnerable to radiation exposure (e.g. infants and pregnant women). They also consider all the ways a person can be exposed to radiation from radioactive material deposited on the ground, including inhalation of dust and inadvertent ingestion of dirt (e.g. from dirty hands). For some types of radioactive material this advice may be overly cautious, but it is considered prudent until further analysis is performed. The relocation is likely to be temporary.

OIL3 plain language explanation

II.32. If other food is available in the territories where OIL3 is exceeded, stop consuming local produce (e.g. vegetables), milk from grazing animals and rainwater until they have been screened and declared safe. However, if restriction of consumption is likely to result in severe malnutrition or dehydration because replacement food, milk or water is not available, these items may be consumed for a short time until replacements are available.

II.33. The recommended actions for OIL3 take into account the most vulnerable members of the public (e.g. infants and pregnant women). The actions assume that all the locally produced food and milk is contaminated with radioactive material and that little is done (e.g. washing) to reduce the levels of contamination in the food before consumption. Exceeding OIL3 does not mean that the food or milk produced in the area is not safe; however, it is prudent not to consume local non-essential food until further analysis has been performed.

OIL4 plain language explanation

II.34. Any person who may have radioactive material on the skin or clothing should take actions to prevent inadvertent ingestion of the material (which may not be visible). Appropriate actions include washing the hands before drinking, eating or smoking, and keeping the hands away from the mouth until they have been washed. Further actions include changing clothes as soon as possible and showering before putting on clean clothes. The removed clothing should be put in a bag until it can be dealt with. These recommendations also apply to those people who may have been monitored. The recommended actions for OIL4 take into account the most vulnerable members of the public (e.g. infants and pregnant women). It is assumed that people might eat with contaminated hands and thereby might ingest radioactive material. Timely monitoring and immediate decontamination by experts may not be possible, and the contamination levels may be very difficult to detect under emergency conditions, but potentially contaminated persons can take the effective actions mentioned above to protect themselves.

OIL5 plain language explanation

II.35. Below OIL5: Locally produced food, milk and water have been screened, and all members of the public, including infants, children and pregnant women, can safely drink the milk and water and eat the food during the emergency phase.

OIL6 plain language explanation

II.36. Below OIL6: Locally produced food, milk and water have been screened, and all members of the public, including infants, children and pregnant women, can safely drink the milk and water and eat the food during the emergency phase.

II.37. Above OIL6: Locally produced food, milk and water have been screened and the measurements indicate that further investigation is necessary before unrestricted general consumption of these items is allowed. However, if restriction of consumption is likely to result in severe malnutrition or dehydration, because no replacement food, milk or water is available, then these items may be consumed for a short time until replacements are available.

II.38. The analysis for OIL6 considers the most vulnerable members of the public (e.g. infants and pregnant women), and it assumes that all of the food, milk and water is contaminated. Exceeding the criteria therefore might not mean that the food, water or milk is unsuitable for consumption but might indicate that further investigation, including consideration of actual consumption rates and additional screening, is needed.

Appendix III

DEVELOPMENT OF EALs AND EXAMPLES OF EALs FOR LIGHT WATER REACTORS

III.1. Reference [2], in para. 4.19, requires the operator of a facility or a practice in threat category I, II, III or IV (which includes light water reactors) to implement a system for classifying all potential nuclear and radiological emergencies that would warrant an emergency intervention to protect workers and the public.

III.2. The events considered in the classification system should not be expanded to include all reportable events, but should be limited to alerts and emergencies that require immediate on-site action[16].

III.3. The following classes are defined for facilities in threat categories I and II: general emergency, site area emergency, facility emergency and alert [2].

III.4. Declaration of an emergency in any of these emergency classes should initiate a response that is considerably beyond normal operations. Four is the minimum number of classes. Each class initiates a distinctly different level of response, as shown in Fig. 6.

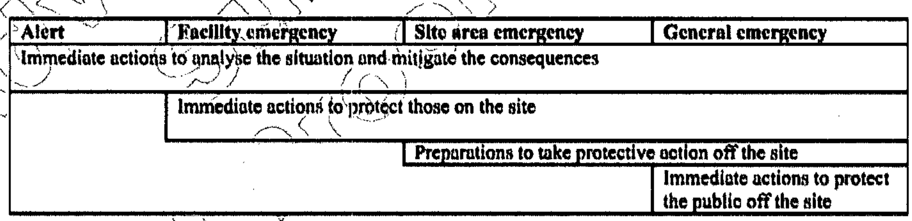

FIG. 6. Relationship of response actions under the classification system. (Note: The actions are not presented in a sequence for implementation.)

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[16] Examples of events that should not be included in the emergency classification system are: technical deficiencies exceeding the limits of in-service inspection codes; equipment failure beyond expected reliability limits; detection of major design deficiencies or of potential accident sequences outside the plant's design basis; symptoms of severe deficiencies in operator training or behaviour; breaches of technical specifications or of transport regulations; and deficiencies in safety culture.

III.5. Reference [2], in para. 4.20, states that "The criteria for classification shall be predefined emergency action levels (EALs) that relate to abnormal conditions for the facility or practice concerned, security related concerns, releases of radioactive material, environmental measurements and other observable indications".

III.6. The following are examples of situations that could lead to a general emergency:

— Actual or projected[17] damage to the reactor core or large amounts of recently discharged fuel in combination with actual damage to barriers or critical safety systems such that a radioactive release becomes highly probable;
— Detection of radiation levels off the site that warrant urgent protective measures;
— A malicious act resulting in an inability to monitor or control critical safety systems that are needed to prevent a release, or in exposures off the site that could result in doses that warrant urgent protective actions.

III.7. The following are examples of situations that could lead to a site area emergency:

— A major decrease in the level of defence in depth provided for the reactor core or actively cooled fuel;
— A major decrease in protection against an accidental criticality;
— Conditions such that any additional failures could result in a general emergency;
— Doses off the site approaching the intervention levels for urgent protective actions;
— A malicious act with the potential to disrupt the performance of critical safety functions or to result in a major release or severe exposures.

III.8. The following are examples of situations that could lead to a facility emergency:

— A fuel handling emergency including the dropping of a fuel transport container[18];

[17] 'Projected damage' is indicated by a loss of critical safety functions necessary to protect the core or large amounts of recently discharged fuel.

[18] The dropping of a fuel transport container and a fuel handling accident are considered facility emergencies because they cannot give rise to doses that warrant protective actions off the site.

— An in-facility fire or other emergency not affecting safety systems;
— A malicious or criminal activity (e.g. extortion or blackmail) leading to hazardous on-site conditions but with no potential to result in a criticality or a release off the site that would warrant urgent protective actions;
— Loss of shielding or control for a large gamma emitter or for spent fuel;
— Rupture of a dangerous source;
— High doses on the site approaching intervention levels for urgent protective actions;
— Doses exceeding established limits for occupationally exposed staff, including workers in transport or handling activities, and including cases of confirmed high values measured by area or process radiation monitors or from contamination measurements;
— Spills of oil or chemicals that constitute a hazard to the environment;
— Civil disturbance (e.g. demonstrations in the vicinity of a nuclear power plant).

III.9. Alerts are events that do not represent an emergency but that warrant prompt activation of parts of the on-site response organization in support of the operating staff.

TECHNICAL BACKGROUND FOR EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS

III.10. This classification was developed to be as independent as possible of light water reactor designs. The aim is to develop a classification that can be considered a useful reference for the various designs of light water reactors used throughout the world. When it is applied, the specific reactor design features available have to be considered.

III.11. The foundation of the classification system is the fact that core damage and failure of confinement are both necessary for a severe release and high on-site doses to occur.

III.12. The classes are associated with increasing probability or confidence that conditions exist that will lead to core damage or to high doses on or off the site. Such a classification system provides the on-site staff with the greatest opportunity to mitigate the consequences of the event and the off-site responders with the greatest opportunity to take effective protective actions for the public.

APPLICATION OF THE EMERGENCY CLASSIFICATION

III.13. The criteria used for classifying the events are called emergency action levels (EALs). An EAL is a predetermined threshold for an observable that places the plant and off-site response organizations in preparedness for an emergency in a given emergency class. There are two fundamentally different types of EAL: symptom based and event based. Symptom based EALs are site specific instrument readings (e.g. reactor coolant system pressure higher than a certain level) or other observable or quantifiable thresholds (e.g. failure of emergency power supply systems as indicated by a specific parameter). Event based EALs are more subjective criteria requiring the judgement of the operating staff. An example of an event based EAL would be 'fire detected in an area containing vital safety systems'.

III.14. When possible, symptom based EALs should be used because they make the classification process more timely and less subject to error. For facilities where safety significant systems are monitored by means of instruments and alarms, a large fraction of the EALs may be symptom based in nature, whereas classification procedures for simple facilities with few instruments will consist almost exclusively of event based EALs.

III.15. This appendix has two tables providing examples of EALs for classifying events[19]. Table 12 is for a reactor in operating, standby or hot shutdown mode. In these modes, all the fission product barriers, instruments and safety systems are in place and operational. Table 13 is for reactors in cold shutdown mode (reactor coolant system closed and reactor coolant system coolant temperature less than 100°C) or in refuelling mode. In these modes the amount of energy in the reactor coolant system, decay heat generation and short lived fission products are greatly reduced. In addition, in these modes the reactor coolant system and containment may not be in place (e.g. the reactor pressure vessel head may have been removed) and fewer safety systems and instruments are required to be operational. The scopes of these two tables, as described, conservatively bound the essential criterion, which is whether the reactor coolant system is sealed or not sealed (i.e. open to the atmosphere).

[19] Examples of EALs for a facility emergency are not included because research and generic studies have not been done to identify the range of possible facility emergencies that could be used as a firm basis for developing such examples. Events that are classified as a facility emergency and EALs for their classification should therefore be based on site specific analysis.

III.16. The criteria in the tables are organized to provide for the earliest possible classification of an event that could result in a severe release. The criteria are provided in the following order: (1) impairment of a critical safety function; (2) loss of fission product barriers; (3) increased radiation levels on the site; (4) increased radiation levels off the site; (5) security events, fires, explosions, releases of toxic gas, natural events and other events; and (6) spent fuel pool events.

III.17. Tables 12 and 13 contain examples of EALs that address the elements of the classification system. The EALs provided in the tables should therefore be replaced with site specific EALs. The following guidance applies for this process:

- It is crucial that the site specific classification procedure be designed for fast (to be completed in a few minutes) and easy use in an event.
- Care should be taken to ensure that the classification procedures are usable under accident conditions, when the workload and stress are very high.
- The performance of instruments in an emergency should also be considered in developing the EALs. Tables 12 and 13 include notes about facts that should be considered when using various instruments in an emergency. Not all instruments are qualified for reliable operation in harsh accident conditions.
- The site specific EALs should use the units of the instruments and the terminology used in the plant.
- Once the site specific EAL system has been developed, it should be tested and/or validated in drills and walk-through sessions to ensure that it is usable by the assigned control room staff in emergency conditions.
- The final step in implementation is to review the classification system with off-site officials. The off-site officials who would be tasked with the implementation of any protective action or other response action called for by a classification should be in agreement with the classification system.
- The EALs and corresponding procedures should be revised on the basis of operating experience and feedback from exercises.

ACCIDENT MANAGEMENT PROCEDURES AND EMERGENCY CLASSIFICATION

III.18. The main objectives of accident management are to prevent the escalation of an event to a severe accident, to mitigate the consequences of a severe accident once it has happened and to achieve a long term safe stable state.

III.19. Emergency operating procedures aimed at preventing a severe accident are used by the main control room staff in events not involving a severe accident. Severe accident management guidelines are developed to deal with a severe accident, should one occur; severe accident management guidelines are used primarily by the operating organization's technical support centre or emergency control centre to advise the main control room staff and off-site emergency groups on mitigatory measures.

III.20. Paragraph 4.19 of Ref. [2] requires that the operator "shall make arrangements for the prompt identification of an actual or potential nuclear or radiological emergency and determination of the appropriate level of response".

III.21. Any conditions that would warrant the use of emergency operating procedures would be classified as constituting an emergency and would trigger a predetermined emergency response on the site. Once conditions of actual or imminent core damage exist, a transition from the domain of emergency operating procedures to the domain of severe accident management guidelines should take place.

III.22. The emergency operating procedures and severe accident management guidelines should be integrated into the organizational structure defined in the plant emergency plan and should be coordinated with the plan to ensure a consistent and coordinated response to severe accident conditions. Plant conditions in the emergency operating procedures and severe accident management guidelines should provide clear inputs for accident entry conditions in the accident classification for declaring appropriate EALs on the site.

III.23. As part of the implementation of the plant specific emergency operating procedures and severe accident management guidelines, the emergency plan should be reviewed with respect to the actions that should be taken following the emergency operating procedures and severe accident management guidelines, to ensure that there are no conflicts. It should be ensured that there are no conflicts with the arrangements made for security, firefighting and support from off the site, such as off-site firefighters or off-site security services.

III.24. Paragraph 4.7 of Ref. [2] requires that it be ensured "that the transition to the emergency response and the performance of initial response actions do not impair the ability of the operational staff (such as the control room staff) to follow the procedures needed for safe operations and for taking mitigatory actions".

TECHNICAL ASSUMPTIONS

III.25. The examples of EALs in Tables 12 and 13 are based on the considerable amount of severe accident research conducted for light water reactors (such as pressurized water reactors, boiling water reactors and water moderated, water cooled reactors). The EALs should cover all possible events at a light water reactor that could result in high doses on the site or in a severe release. However, they should be compared with the results of any available site specific probabilistic safety assessment to ensure that all severe accidents are addressed.

III.26. The three possible levels of emergency in Tables 12 and 13 are defined as follows [27]:

General emergency. Events resulting in an actual release or a substantial risk of a release requiring the implementation of urgent protective actions off the site. This includes (a) actual severe damage[20] or projected severe damage to the core or to large amounts of spent fuel, or (b) releases off the site resulting in a dose exceeding the intervention levels for urgent protective actions. Urgent protective actions should be taken immediately for the public near the plant when this level of emergency is declared.

Site area emergency. Events resulting in a major decrease in the level of protection for on-site personnel or for the public. This includes: (i) a major decrease in the level of protection provided for the core or for large amounts of spent fuel; (ii) conditions in which any additional failures could result in damage to the core or to spent fuel; or (iii) high doses on the site or doses off the site approaching the intervention levels for urgent protective actions. For this class of emergency, actions should be taken to control the dose to on-site personnel and preparations should be made to take protective actions off the site.

Alert. Events involving an unknown or significant decrease in the level of protection for on-site personnel or for the public. For this class of emergency, the state of readiness of the on-site and off-site response organizations is increased and additional assessments are made.

[20] Severe damage resulting in a release of greater than 20% of the gap inventory.

TABLE 12. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN OPERATING, STANDBY OR HOT SHUTDOWN MODE

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Critical safety function impairment			
Failure to stop nuclear reaction[1]	Failure to scram when above 5% power *[or insert site specific power level]*[2] and any of the following: — Pressurized water reactor negative cooling margin on the basis of Fig. 7 or — Vessel water level below top of active fuel or — Major (100–1000 times) increases in multiple radiation monitors or — Other indication of actual or imminent core damage	Failure to scram when above 5% power *[or insert site specific power level]* and abnormal conditions indicate that an automatic or manual scram is necessary	Failure to fully shut down (increasing neutron flux)[3] as part of normal shutdown with sufficient heat removal available (ultimate heat sink available and sufficient)
Inadequate core cooling — vessel level[4]	Vessel water level is, or is projected to be, below top of active fuel for more than 15 min	Vessel water level is or is projected to be below top of active fuel	Vessel water level decreasing over a longer time period than expected while systems are responding as designed

[1] 'Stop nuclear reaction' is a general term that includes 'reactor scram', which is used only for the insertion of control rods into the reactor.

[2] Failure to scram the reactor is usually evaluated if reactor power is greater than 5% and conditions indicate that scram is necessary (safety systems are usually capable of removing heat for the heating rate at less than 5% of nominal power). For some plants, different, plant specific values should be used.

[3] Increasing neutron flux is an explicit symptom that the reactor is not fully shut down.

[4] Inadequate core cooling is characterized by three kinds of entry condition: vessel level, core temperature and decay heat removal capability. These conditions are valid for both pressurized water reactors and boiling water reactors, and are put before the primary system temperature, which is relevant for pressurized water reactors only.

TABLE 12. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN OPERATING, STANDBY OR HOT SHUTDOWN MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Notes about level measurement: — Pressurized water reactor pressurizer levels may not be valid indicators of vessel water level under accident conditions — Pressurized water reactor water levels measured in the vessel can have considerable uncertainties (30%) and should only be used for trend assessment — Boiling water reactor high dry well temperature and low pressure accidents (e.g. LOCAs) can cause the water level to read erroneously high	Vessel water level is or is projected to be below top of active fuel and any of the following: — Vessel injection rate less than *[use Fig. 8 and capacity versus pressure curves of operating pumps]* or — Major (100–1000 times) increases in multiple radiation monitors or — Other indications of imminent or actual core damage Note: Imminent reactor coolant system or containment boundary failure might be considered as additional criteria.[5]		
Inadequate core cooling — core temperature[6]	Core exit thermocouple reading greater than 800°C	Core exit thermocouple reading greater than 650°C	Core exit thermocouple reading greater than 370°C
Inadequate core cooling — decay heat removal (considering the operations of pumps, piping, heat exchangers, heat sinks, power supply, auxiliary fluid)		Actual failure or projected long term failure of the ability to remove decay heat to the environment, potentially affecting the ability to protect the core	Unavailability of the normal feedwater system for decay heat removal[7]

[5] In the event of core damage, the status of the reactor containment system and the containment barriers will greatly affect the magnitude of the release of fission products.

[6] Elevated core exit temperature is a direct symptom of core cooling degradation. Therefore, this symptom is used as an entry condition for inadequate core cooling. The critical water temperature above which liquid water cannot exist irrespective of system pressure is 370°C; 650°C is a value usually used for inadequate core cooling in emergency procedures and indicates that steam–Zr reaction will start to produce hydrogen; 800°C indicates core damage that starts at a core temperature of about 1200°C.

[7] Normal feedwater is used for heat removal in these modes. If normal feedwater is not available, the alternate water sources should be used for steam generator (SG) feeding.

TABLE 12. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN OPERATING, STANDBY OR HOT SHUTDOWN MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Pressurized water reactor — abnormal primary system temperature (inadequate core cooling) Note: Temperature should be measured in the vessel. Most pressurized water reactors have core exit thermocouples to measure temperatures in the vessel. Use the average of the highest four core exit thermocouple readings. If there is water flow, the hot leg temperature (T_{hot}) could be used if core exit thermocouples are not available, although this indication is less prompt.[8] For boiling water reactors there are no instruments that provide a valid reading of core temperature.	Pressurized water reactor — negative cooling margin on the basis of Fig. 7 or primary system temperature exceeds scale for more than 15 min *[or insert site specific time for core damage following a loss of coolant accident]* and any of the following: — Vessel injection rate less than water loss due to decay heat boil-off *[use Fig. 8 and capacity versus pressure curves of operating pumps]*[9] or — Vessel water level below top of active fuel or — Major (100–1000 times) increases in multiple radiation monitors or — Other indications of actual or imminent core damage Note: Imminent reactor coolant system or containment boundary failure might be considered as additional criteria.[10]	Pressurized water reactor — negative cooling margin on the basis of Fig. 7 for more than 15 min *[or insert site specific time that core damage is possible following a loss of coolant accident]*	Pressurized water reactor — primary system pressure and temperature indicate negative cooling margin on the basis of Fig. 7 for more than 5 min Note: Negative cooling margin is read as soon as the system temperature is higher than the saturation temperature at the set pressure of the reactor coolant system safety valves.[11]

[8] T_{hot} provides a backup for the core temperature since the flow through the core cannot readily be confirmed and T_{hot} changes are delayed relative to the core exit temperature.
[9] This provides a more accurate description of the phenomena inside the reactor vessel.
[10] In the event of core damage, the status of the reactor coolant system and containment barriers will greatly affect the magnitude of the release of fission products.
[11] If adequate coolant injection flow cannot be established to restore core heat removal, the reactor coolant system liquid starts to become saturated. If the system temperature is higher than the saturation temperature at the set pressure of the reactor coolant system safety valves, this prevents further pressurization of the reactor coolant system.

TABLE 12. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN OPERATING, STANDBY OR HOT SHUTDOWN MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Loss of AC or DC power sources	Actual or projected loss of all AC or DC power needed for operation of safety systems and their supporting systems is likely for more than 45 min *[or insert site specific time required to uncover core for more than 15 min]* Loss of all AC or DC power needed for safety systems operation and any of the following: — Vessel water level below top of active fuel or — Major (100–1000 times) increases in multiple radiation monitors or — Other indication of actual or imminent core damage	Actual or projected loss of AC or DC power needed for operation of safety systems and their supporting systems for more than 30 min *[or insert site specific time required to uncover the core]*	AC or DC power needed for operation of safety systems and their supporting systems is lost or reduced to a single source
Conditions of an unknown cause affecting safety systems			Conditions which are not understood and which could potentially affect safety systems
- - -	- - -	- - -	- - -

TABLE 12. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN OPERATING, STANDBY OR HOT SHUTDOWN MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Loss of or degraded control of safety systems including post-accident instrumentation[12]	Unavailability of safety system instruments or controls in the control room and remote control locations and any of the following: — Vessel water level below top of active fuel or — Major (100–1000 times) increases in multiple radiation monitors or — Other indications of imminent or actual core damage	Unavailability of safety system instruments or controls in the control room for more than 15 min and major transient in progress potentially affecting the ability to protect the core	Unreliable functioning of several safety system instruments or controls in the control room for more than 15 min
Loss of fission product barriers			
Major increased risk of damage to the core or spent fuel Note: Core damage can occur if the core is uncovered for more than 15 min.	Loss for more than 45 min of all the systems required to protect the core or spent fuel *[or insert site specific time required to uncover core for more than 15 min]*	Failure of an additional safety system component will result in uncovering of the core or spent fuel	Actual or predicted failures leaving only one train to prevent core damage, spent fuel damage or a major release

[12] Safety system control capability can be either degraded or completely lost; both cases are reflected. Unreliable functioning of several safety system instruments or alarms and unavailability of safety system instruments or controls are considered. Post-accident instrumentation provides the essential information to support safety system operation and control and is included.

TABLE 12. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN OPERATING, STANDBY OR HOT SHUTDOWN MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
High ^{131}I concentration in the primary coolant Note: Coolant samples should not be taken if they will result in high individual doses. — Use only concentrations from samples taken after the start of the event — Coolant concentrations may not be representative — Assumes the core may not be coolable after 10% melt	^{131}I concentration is greater than *[insert site specific values for release of 10% of core inventory]*	^{131}I concentration is greater than *[insert site specific value indicating release of 20% of the gap inventory]*	^{131}I concentration is greater than *[insert site specific value 100 times the technical specifications or other operational limits]*
Confirmed core damage	*[Insert site specific readings from post-accident sampling system[13] indicating release of 20% of gap inventory[14]]*	*[Insert site specific readings from post-accident sampling system indicating release of 1% of gap inventory]*	

[13] Reference to a failed fuel monitor in a pressurized water reactor and off-gas monitor in a boiling water reactor is replaced by reference to a post-accident sampling system.

[14] The gap inventory is the amount of fission products in the fuel pin gap during normal operations.

TABLE 12. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN OPERATING, STANDBY OR HOT SHUTDOWN MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Primary system leak	Primary system leak requiring all normal and high pressure emergency core coolant systems to maintain primary system water level[15] and any of the following: — Injection into the vessel less than the rate found from Fig. 8 or — Vessel water level below top of active fuel and decreasing or — Major (100–1000 times) increases in multiple radiation monitors or — Other indications of imminent or actual core damage Note: Imminent containment boundary failure might be considered as an additional criterion[16].	Primary system leak for more than 15 min requiring all normal and high pressure emergency core coolant systems to maintain primary system water level *[insert site specific indicators]*	Primary system leak rate for more than 15 min greater than 2% of normal full power feedwater flow[17] (for boiling water reactor refer to the reactor coolant inventory control system) *[insert site specific indicators — as an alternative, reference to normal charging flow might be made]*

[15] The criterion was replaced by the same requirement used for site area emergency to refer to the leak rate instead of the (previously misleading) operational core cooling system.

[16] In the case of a loss of coolant accident and core damage, the status of the containment barrier will directly affect the magnitude of the fission product release.

[17] Leak rate with respect to normal feedwater flow for normal full power operation is used instead of leak rate with respect to the number of operating pumps. Such leak rate specification better covers the concern during a loss of coolant accident (i.e. to ensure sufficient core cooling). For some plants, the leak rate should also be determined on the basis of the normal charging flow rate.

TABLE 12. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN OPERATING, STANDBY OR HOT SHUTDOWN MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Primary system leak directly to atmosphere, such as: — Pressurized water reactor: steam generator tube rupture — Boiling water reactor: main steam isolation valve failure outside of containment — A leak with a failure of the containment to achieve isolation — A plant with no containment	Primary system leak directly to the atmosphere and any of the following: — Projected or confirmed vessel water level below top of active fuel or — Major (100–1000 times) increases in multiple radiation monitors or — Other indication of actual or imminent core damage	— Primary system leak directly to atmosphere[18] or — Pressurized water reactor: significant leak from the primary to the secondary system[19]	Pressurized water reactor: primary system leak to the secondary system requiring continuous operation of more than the usually operating[20] charging pumps to maintain primary system water level Boiling water reactor: main steam isolation valve failure without loss of integrity of steam piping to turbine and/or condenser[21]
Radiation levels			
Effluent release rates greater than 100 times the release limits	Effluent monitor readings for more than 15 min greater than *[insert site specific list of effluent monitors and readings indicating that in 1 hour the off-site doses will be greater than the intervention levels for urgent protective actions, assuming average meteorological conditions]*	Effluent monitor readings for more than 15 min greater than *[insert site specific list of effluent monitors and readings indicating that in 4 hours the off-site doses will be greater than 0.10 of the intervention levels for urgent protective actions, assuming average meteorological conditions]*	Effluent monitor readings for more than 15 min greater than *[insert site specific list of effluent monitors and readings indicating 100 times the release limits]*

[18] Any significant primary leak directly to the atmosphere will cause releases of fission products to the environment, and it is necessary to take immediate actions to stop the leak.

[19] For pressurized water reactors, a significant primary system to secondary system leak could cause releases of fission products to the environment, and it is necessary to take immediate actions to stop the leak.

[20] For pressurized water reactors, a primary system to secondary system leak at a rate above the normal charging system capability can quickly cause releases of fission products to the environment, and it is necessary to take appropriate actions to stop the leak.

[21] For boiling water reactors, failure of the main steam isolation valve without loss of integrity of steam piping to the turbine and/or condenser could cause early releases of fission products to the environment, and it is necessary to take appropriate actions to stop the leak.

TABLE 12. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN OPERATING, STANDBY OR HOT SHUTDOWN MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
High radiation levels in the control room or other areas requiring continuous access for safety system operation and maintenance Note: Inconsistent monitor readings could result from incomplete mixing, a failed monitor or irradiation from a contaminated system nearby. Monitors may show high, low or centre range if they fail. Readings can be confirmed using hand held monitors outside the area.	Radiation levels greater than 10 mSv/h	Radiation levels greater than 1 mSv/h potentially lasting several hours	Radiation levels greater than 0.10 mSv/h potentially lasting several hours
High radiation levels in areas requiring occasional occupancy to maintain or control safety systems	Radiation levels greater than 100 mSv/h potentially lasting several hours	Radiation levels greater than 10 mSv/h potentially lasting several hours	Radiation levels greater than 1 mSv/h potentially lasting several hours
Elevated containment (for boiling water reactors, dry well)[22] radiation levels Note: Inconsistent monitor readings could result from incomplete mixing or a failed monitor or irradiation from a contaminated system nearby[23]. Monitors may show high, low or centre range if they fail. Readings can be confirmed using hand held monitors outside the containment.	Containment radiation levels greater than 5 Gy/h *[or insert site specific reading indicating release of greater than 20% gap inventory]*	Containment radiation levels greater than 1 Gy/h *[or insert site specific reading indicating release of greater than 1% gap inventory]*	Containment radiation levels increase more than 0.10 mGy/h *[or insert site specific reading indicating release of greater than 10% coolant inventory]*

[22] For boiling water reactors, the dry well instead of the containment is more appropriate.
[23] Radiation from a contaminated system nearby could also affect the radiation monitors inside the containment.

TABLE 12. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN OPERATING, STANDBY OR HOT SHUTDOWN MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Unplanned increase in plant radiation levels	Multiple plant radiation monitors show an unplanned or unpredicted increase by a factor of 100 or more and any other indication of actual core damage	Multiple plant radiation monitors show an unplanned or unpredicted increase by a factor of 100 or more and a major transient is in progress potentially affecting the ability to protect the core	Multiple plant radiation monitors show an unplanned or unpredicted increase by a factor of 100 or more
High ambient dose rates at or beyond[24] the site boundary	Ambient dose rates at or beyond the site boundary greater than 1 mSv/h *[or insert the site specific operational intervention level for evacuation; see Procedure B1 in Ref. [27]]*	Ambient dose rates at or beyond the site boundary greater than 0.1 mSv/h *[or insert one tenth of the site specific operational intervention level for evacuation; see Procedure B1 in Ref. [27]]*	Ambient dose rates at or beyond the site boundary greater than 10 μSv/h *[or insert site specific reading indicating 100 times the background]*
Security events, fires, explosions, toxic gas releases, natural and other events			
Security event (intruder or malicious act)	Security event resulting in loss of the ability to monitor and control safety functions needed to protect the core	Security event resulting in damage or impaired[25] access to safety systems	Security event with potential to affect safety system operation, or uncertain security conditions
Fire or explosion (including turbine failure)			Fire or explosion potentially affecting areas containing safety systems
Toxic or flammable gases including, for boiling water reactors, hydrogen in the dry well[26]		Flammable gas concentrations that prevent control or maintenance of safety systems	Toxic or flammable gases in the plant

[24] Ambient dose rate is usually measured at the site boundary. However, if any measurement of ambient dose rate beyond the site boundary is available, it can be used for the purpose of this EAL.

[25] Wording change to better reflect the intent of the criterion.

[26] For boiling water reactors, hydrogen concentration in the dry well could increase, which can cause significant damage in the event of ignition.

TABLE 12. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN OPERATING, STANDBY OR HOT SHUTDOWN MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Evacuation of the main control room[27]		Neither the main control room nor the emergency control room is habitable	Plant can be controlled from emergency control room
Major natural disaster such as: — Earthquake — Tornado — Flood — High winds — Vehicle or aircraft[28] crash — Hurricane — Tsunami — Storm surge — Low water level — Lightning strike[29]		Major natural events resulting in damage or impaired[30] access to safety systems and/or decay heat removal systems or affecting their long term operation	Major natural events that threaten the plant such as: — Events beyond the design basis of the plant — Events resulting in actual or potential loss of access to the site for a long period of time
Loss of communications[31]			Events resulting in actual or potential loss of communications to the site for a long period of time

[27] New EAL: In the case of the need to evacuate the main control room, the ability to control the plant is affected (the severity of the situation depends on the plant design). If the emergency control room is used for plant control, an alert is the appropriate EAL; if both the main control room and the emergency control room are affected and the plant has to be controlled by alternative means, a site area emergency is the appropriate EAL.

[28] An aircraft crash could also cause severe damage to the plant and reduce plant safety.

[29] Lightning strikes could also cause severe damage to the plant and reduce plant safety.

[30] Wording changed to better reflect the intent of the criterion.

[31] This EAL is new and reflects the items that were deleted from the previous line.

TABLE 12. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN OPERATING, STANDBY OR HOT SHUTDOWN MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Plant shift supervisor's opinion	Conditions that warrant taking urgent protective actions off the site	Conditions that warrant preparing the public to implement urgent protective actions or Conditions that warrant taking protective actions on the site	Abnormal conditions that warrant obtaining immediate additional assistance for the on-site operations staff or Abnormal conditions that warrant increased preparedness on the part of off-site officials
Spent fuel pool events			
Abnormal refuelling or spent fuel conditions	Fully drained pool containing more than one third of a core removed from the reactor within the past 3 years or Radiation level in pool area greater than 3 Gy/h	Water level below top of irradiated fuel or Radiation level in pool area greater than 30 mGy/h	Loss of ability to maintain water level above spent fuel or Damage to spent fuel or Loss of ability to maintain pool water temperature below 80°C[32]

[32] High temperature in the spent fuel pool is a result of the degradation of heat removal from the spent fuel, and this temperature should also be used as an additional symptom of abnormal refuelling conditions or spent fuel conditions.

TABLE 13. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN COLD SHUTDOWN OR REFUELLING MODE

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Critical safety function impairment			
Inability to maintain the plant in a safe shutdown (subcritical) state [a]	Failure to maintain the reactor in a subcritical condition and any of the following: — Vessel injection rate less than shown in Fig. 8 or — Vessel water level below top of active fuel or — Major (100–1000 times) increases in multiple radiation monitors or — Other indications of actual or imminent core damage or spent fuel damage	Failure to maintain the reactor in a subcritical condition	

[a] Inability to maintain the plant in a safe shutdown (subcritical) state is also a concern in the cold shutdown mode and the refuelling mode. Since all control rods are inserted into the core and there is no means for immediate insertion of negative reactivity into the core, the boron dilution in the reactor coolant system could return the reactor to criticality. This would cause the temperature of the reactor coolant system to increase and, because of the negative thermal reactivity coefficient, negative reactivity would be inserted into the core. This process is partly self-controlled. However, in the event of failure to maintain the reactor in a subcritical condition, it is necessary to take immediate action to return the reactor to a subcritical condition. Alert and site area emergency are appropriate EALs in this case, since this process is not so time critical as during power operation, or in the hot standby or the hot shutdown mode.

TABLE 13. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN COLD SHUTDOWN OR REFUELLING MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Pressurized water reactor inadequate core cooling — abnormal primary system temperature[b] Note: Temperature should be measured in the vessel. Most pressurized water reactors have core exit thermocouples to measure temperatures in the vessel. Use the average of the highest four core exit thermocouple readings. The hot leg temperature (T_{hot}) could also be used if no core exit thermocouples are available, although this indication is less prompt.[c]	Pressurized water reactor primary system temperature greater than 90°C and any of the following: — Vessel injection rate less than water loss due to decay heat boil-off *[use Fig. 8 and capacity versus pressure curves of operating pumps]*[d] or — Vessel water level below top of active fuel or — Major (100–1000 times) increases in multiple radiation monitors or — Other indications of imminent core damage or spent fuel damage	Pressurized water reactor primary system temperature greater than 90°C for more than 30 min Note: 90°C limit applies to refuelling mode; for cold shutdown mode it has to be replaced by temperature corresponding to the relieving pressure of the cold overpressure mitigating system.[e]	Pressurized water reactor primary system temperature greater than 80°C

[b] Different temperatures that characterize inadequate core cooling for pressurized water reactors should be used for the cold shutdown and refuelling modes. During refuelling the reactor upper head is removed and the reactor coolant system can only be at atmospheric pressure. The reactor coolant system temperature is maintained at a low level. The reactor coolant system temperature increase is a symptom of inadequate core cooling, and immediate action to restore core cooling should be taken. For temperatures above 80°C, alert is the appropriate EAL. If the reactor coolant system temperature continues to increase, it is a more severe situation and a site area emergency is the appropriate EAL.

[c] T_{hot} provides a backup for core temperature; however, water flow through the core cannot be readily confirmed and changes in T_{hot} occur after the core exit temperature changes.

[d] This is a more accurate description of the phenomena inside the reactor vessel.

[e] If the reactor coolant system is unsealed, 90°C is the appropriate temperature value for this EAL. However, if the reactor coolant system is sealed and the reactor coolant system temperature can increase without loss of subcooling, the temperature corresponding to saturation temperature at the relieving pressure of the cold overpressure mitigating system is the appropriate value.

TABLE 13. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN COLD SHUTDOWN OR REFUELLING MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Abnormal water level in the pressure vessel or in the refuelling area (inadequate core or spent fuel cooling)[f]	Water level is, or is projected to be, below top of active fuel for more than 30 min Water level is, or is projected to be, below top of active fuel and any of the following: — Vessel injection rate less than *[use Fig. 8 and capacity versus pressure curves of operating pumps]*[g] or — Major (100–1000 times) increases in areas or process radiation monitors or — Other indications of imminent core damage	Water level is, or is projected to be, below top of active fuel	Water level is, or is projected to be, below the mid-loop elevation and residual heat removal is interrupted for more than 15 min
Loss of AC or DC power sources	Actual or projected loss of all AC or DC power needed for operation of safety systems and their supporting systems[h] is likely for more than 90 min *[or insert site specific time required to uncover core or spent fuel for more than 30 min]*	Actual or projected loss of all AC or DC power needed for operation of safety systems and their supporting systems for more than 60 min *[or insert site specific time required to uncover the core or spent fuel]*	AC or DC power needed for operation of safety systems and their supporting systems reduced to a single source

[f] Actual or projected abnormal water level in the pressure vessel or the refuelling area is a symptom of inadequate core cooling or spent fuel cooling. The severity of the event increases as the water level decreases. If the water level is lower than is necessary for residual heat removal and cannot be restored, immediate action to restore core cooling should be taken. For this water level, alert is the appropriate EAL.

[g] This is a more accurate description of the phenomena inside the reactor vessel.

[h] Operation of the supporting systems for the safety systems is a necessary condition for operation of the safety systems.

TABLE 13. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN COLD SHUTDOWN OR REFUELLING MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
	Loss of all AC or DC power needed for the operation of safety systems and any of the following: — Vessel water level below top of active fuel or — Major (100–1000 times) increase in multiple radiation monitors or — Other indication of actual or imminent core damage		
Conditions of an unknown cause affecting safety systems			Conditions which are not understood and which could potentially affect safety systems
Loss or degraded control of safety systems including post-accident instrumentation[i]	Unavailability of safety system instruments or controls in the control room and remote control locations and any of the following: — Projected or confirmed vessel water level below top of irradiated fuel or — Major (100–1000 times) increase in multiple radiation monitors or — Other indications of actual or imminent core damage	Unavailability of safety system instruments or controls in the control room for more than 30 min and major transient in progress potentially affecting the ability to protect irradiated fuel	Unreliable functioning of some safety system instruments or controls in the control room for more than 30 min

[i] The control capability for safety systems could be either degraded or lost completely; both are reflected.

TABLE 13. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN COLD SHUTDOWN OR REFUELLING MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Loss of fission product barriers			
Major increased risk of core damage or spent fuel damage	Loss for more than 90 min of all systems required to protect the core *[or insert site specific time required to uncover core for more than 30 min]*	Failure of one or more safety system components will result in uncovering of the core or spent fuel (loss of redundancy in safety systems)	Actual or predicted safety system failures which increase the risk of core damage or spent fuel damage
Confirmed or projected core or spent fuel damage[j]	Confirmed release greater than 20% of gap inventory in the reactor core	Fuel handling accident or confirmed release greater than 1% of gap inventory and incomplete containment isolation (e.g. by ventilation, locks)	Fuel handling accident and containment isolation (e.g. by ventilation, locks)
Primary system coolant fluid leak[k]			Major leak from piping carrying primary system coolant fluid outside the containment (in purification systems, reactor heat removal system, etc.)

[j] A fuel handling accident or confirmed release of a significant amount of the gap inventory can cause release of fission products to the environment. In the cold shutdown and refuelling modes, the containment could be the only intact barrier to a release. In such a case, immediate action should be taken to mitigate or prevent the release. In the event that the containment is isolated, alert is the appropriate emergency class, and site area emergency may be appropriate in the event that the containment is not completely isolated.

[k] Even if a leak is less probable in the cold shutdown and refuelling modes than in the power operation, hot standby and hot shutdown modes, there still exists a possibility of primary system coolant leak. If a leak affecting core cooling occurs, immediate action to stop the leak and to prevent the loss of core cooling should be taken. The alert EAL is appropriate in such cases.

TABLE 13. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN COLD SHUTDOWN OR REFUELLING MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Radiation levels			
Effluent release rates greater than 100 times the release limits	Effluent monitor readings for more than 15 min greater than *[insert site specific list of effluent monitors and readings indicating that in 1 hour the off-site doses will be greater than the intervention levels for urgent protective actions, assuming average meteorological conditions]*	Effluent monitor readings for more than 15 min greater than *[insert site specific list of effluent monitors and readings indicating that in 4 hours the off-site doses will be greater than 0.10 of the intervention levels for urgent protective actions, assuming average meteorological conditions]*	Effluent monitor readings for more than 15 min greater than *[insert site specific list of effluent monitors and readings indicating 100 times the release limits]*
High radiation levels in areas requiring continuous access for operation and maintenance of safety systems Note: Inconsistent monitor readings could result from incomplete mixing, a failed monitor or irradiation from a contaminated system nearby. Monitors may show high, low or centre range if they fail. Readings can be confirmed using hand held monitors outside the area.	Radiation levels greater than 10 mSv/h	Radiation levels greater than 1 mSv/h potentially lasting several hours	Radiation levels greater than 0.10 mSv/h potentially lasting several hours
High radiation levels in areas requiring occasional occupancy to maintain or inspect safety systems	Radiation levels greater than 100 mSv/h potentially lasting several hours	Radiation levels greater than 10 mSv/h potentially lasting several hours	Radiation levels greater than 1 mSv/h potentially lasting several hours

TABLE 13. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN COLD SHUTDOWN OR REFUELLING MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Evaluated containment radiation levels Note: Inconsistent monitor readings could result from incomplete mixing, a failed monitor or irradiation from a contaminated system nearby. Monitors may show high, low or centre range if they fail. Readings can be confirmed using hand held monitors outside the containment.	Containment radiation levels greater than 5 Gy/h *[or insert site specific reading indicating release of greater than 20% of gap inventory]*	Containment radiation levels greater than 1 Gy/h *[or insert site specific reading indicating release of greater than 1% of gap inventory]*	Containment radiation levels increasing faster than 0.10 mGy/h *[or insert site specific reading indicating release of greater than 10% of coolant]*
Unplanned increase in plant radiation levels as indicated by monitors	Multiple plant radiation monitors show an unplanned or unpredicted increase by a factor of 100 or more and any other indication of actual core damage	Multiple plant radiation monitors show an unplanned or unpredicted increase by a factor of 100 or more and a major transient in progress potentially affecting the ability to protect the core	Multiple plant radiation monitors show an unplanned or unpredicted increase by a factor of 100 or more
High ambient dose rates at or beyond[1] the site boundary	Ambient dose rates at or beyond the site boundary greater than 1 mSv/h *[or insert the site specific operational intervention level for evacuation; see Procedure B1 in Ref. [27]]*	Ambient dose rates at or beyond the site boundary greater than 0.1 mSv/h *[or insert one tenth of the site specific operational intervention level for evacuation; see Procedure B1 in Ref. [27]]*	Ambient dose rates at or beyond the site boundary greater than 10 μSv/h *[or insert site specific reading indicating 100 times the dose rate due to background radiation levels]*

[1] Ambient dose rate is usually measured at the site boundary. However, if any measurement of ambient dose rate beyond the site boundary is available, it can be used for the purpose of this EAL.

TABLE 13. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN COLD SHUTDOWN OR REFUELLING MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Security events, fires, explosions, toxic gas releases, natural and other events			
Security event (intruder or malicious act)	Security event resulting in loss of the ability to monitor and control safety functions needed to protect the core	Security event resulting in damage or impaired access to safety systems that are required to be operable[n]	Security event with potential to affect safety system operation, or uncertain security conditions
Fire or explosion[a]			Fire or explosion potentially affecting areas containing safety systems
Toxic or flammable gases			Toxic or flammable gases in plant
A major natural disaster such as: — Earthquake — Tornado — Floods — High winds — Vehicle or aircraft crash[o] — Hurricane — Tsunami — Storm surge — Low water — Lightning strike[p]		Major natural events resulting in damage or impaired access to safety and/or decay heat removal systems or affecting their long term operation[q]	Major natural events that threaten the plant such as: — Events beyond the design basis of the plant — Events resulting in actual or potential loss of access to the site for a long period of time

[n] Formal wording change to better convey the intent of the criterion. Only safety systems that are required to be operable are referenced in this EAL.
[a] Turbine is not in operation in the cold shutdown and refuelling modes.
[o] Aircraft crash can also cause severe damage to the plant and reduce plant safety.
[p] Lightning strikes can cause severe damage to the plant and reduce plant safety.
[q] Wording changed to better convey the intent of the criterion.

TABLE 13. EMERGENCY CLASSIFICATION FOR LIGHT WATER REACTORS IN COLD SHUTDOWN OR REFUELLING MODE (cont.)

For the following entry conditions:	Declare a general emergency if:	Declare a site area emergency if:	Declare an alert if:
Loss of communications[r]			Events resulting in actual or potential loss of communications to the site for a long period of time
Plant shift supervisor's opinion	Conditions that warrant taking urgent protective actions off the site	Conditions that warrant preparing the public to implement urgent protective actions or taking protective actions on the site	Abnormal conditions that warrant immediate additional assistance for the on-site operations staff or increased preparedness of off-site officials
Spent fuel pool events			
Abnormal refuelling or spent fuel conditions	Fully drained pool containing fuel removed from the reactor core within the past 6 months **or** Radiation level in pool area greater than 3 Gy/h	Water level below top of irradiated fuel **or** Radiation level in pool area greater than 30 mGy/h	Loss of ability to maintain water level in pool containing irradiated fuel **or** Damage to irradiated fuel **or** Loss of ability to maintain pool water temperature below 80°C [s]

[r] This EAL is new and reflects items deleted from the previous line.

[s] High temperature in the spent fuel pool is a result of a degradation in heat removal from the spent fuel, and this temperature should also be used as an additional symptom of abnormal refuelling or abnormal spent fuel conditions.

EXAMPLE EALs

III.27. When using Tables 12 and 13, all the abnormal entry conditions in the first column should be reviewed. For each entry condition that applies to a specific case, the class is selected by matching the EAL criteria to the left. The accident is classified at the highest class indicated, the highest class being 'general emergency' and the lowest class being 'alert'.

III.28. These example EALs are based on an example system from Ref. [27]. Changes in the original guidance of Ref. [27] are accompanied by footnotes to explain and distinguish them from the technical comments included in the original guidance in Ref. [33]. This was done to help users of the previous guidance to better understand how to apply the changes. Some of the EALs from the original guidance were removed (this is not noted in the tables).

COOLING MARGIN–SATURATION CURVE

III.29. A primary system temperature equal to or greater than the saturation temperature indicates that the water in the core is boiling. The cooling margin can be approximated (neglecting instrument inaccuracies) by subtracting the coolant temperature from the saturation temperature for the given primary system pressure. For a pressurized water reactor a negative cooling margin indicates that water is boiling in the reactor pressure vessel and that the reactor core may be uncovered [33].

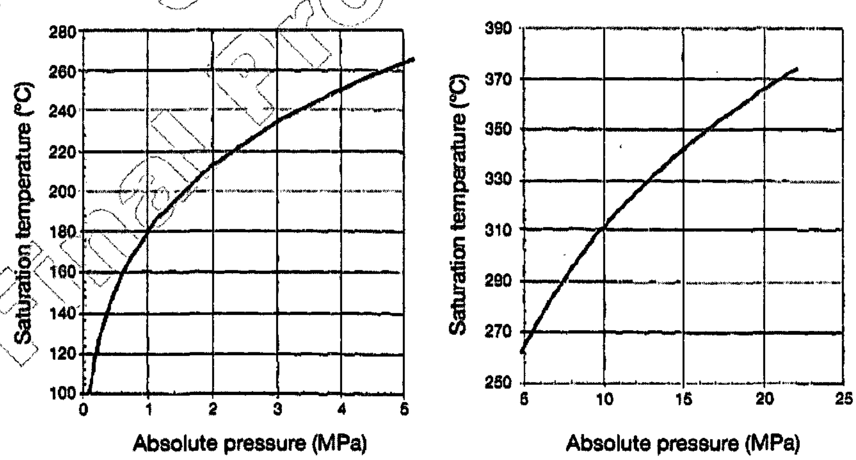

FIG. 7. Cooling margin–saturation curve [27].

How to use Fig. 7:

III.30. Determine the absolute pressure and temperature in the primary system T_{ps}; then use the graphs to determine the saturation temperature T_{sat}, and thus the cooling margin, by using the equation below:

$$\text{Cooling margin} = T_{sat} - T_{ps}$$

where

T_{ps} is the temperature in the primary system;
T_{sat} is the saturation temperature from Fig. 7.

WATER LOST BY BOILING DUE TO DECAY HEAT IN A 3000 MW(th) NUCLEAR POWER PLANT

III.31. The curve in Fig. 8 shows the amount of water that must be injected into the reactor pressure vessel to replace water lost by boiling due to decay heat. This curve is based on a 3000 MW(th) reactor operated at a constant power for a nominally infinite period and then shut down instantaneously. This is the minimum water flow rate that must be injected into a reactor core to cool it once it is shut down [33].

Step 1: Determine the amount of water injection required, from:

$$W_i = W_i^{3000} \frac{P_{plant}\,(\mathrm{MW(th)})}{3000\,(\mathrm{MW(th)})}$$

where

W_i is the water injection required (m^3/h);
W_i^{3000} is the water injection required for a 3000 MW(th) plant (m^3/h), from Fig. 8;
P_{plant} is the power output of the plant in MW(th) (MW(th) = 3 × MW(e)).

Step 2: If the core has been uncovered for more than 15 min, increase the injection rate by a factor of three to accommodate the heat from the Zr–H_2O reaction and built-up (stored) energy.

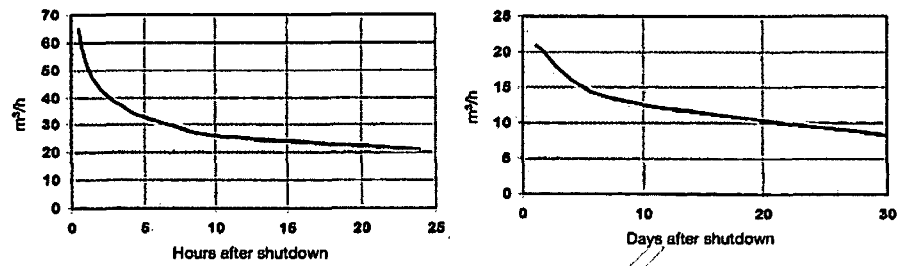

FIG 8. Rate of injection of water required to replace water lost by boiling due to decay heat in a 3000 MW(th) nuclear power plant [27].

Appendix IV

OBSERVABLES ON THE SCENE OF A RADIOLOGICAL EMERGENCY

IV.1. In a radiological emergency, the inner cordoned area is where protective action is implemented to protect responders and the public. Initially the size of the area is determined on the basis of information that can be directly observed (e.g. markings). The size of the area may be expanded on the basis of dose rates and environmental measurement OILs (see Appendix II) when these data become available. Table 14 [7, 17] provides suggestions for the approximate radius of the inner cordoned area. Instruction 1 in Ref. [17] provides a list of observables that can be used by first responders to identify a dangerous source. The actual boundaries of the safety and security perimeters should be defined in such a way that they are easily recognizable (e.g. by roads) and should be secured. However, the safety perimeter should be established at least as far from the source as is indicated in the table until the radiological assessor has assessed the situation.

TABLE 14. SUGGESTED RADIUS OF THE INNER CORDONED AREA (SAFETY PERIMETER) IN A NUCLEAR OR RADIOLOGICAL EMERGENCY

Situation	Initial inner cordoned area (safety perimeter)
Initial determination — Outside	
Unshielded or damaged potentially dangerous source	30 m radius around the source
Major spill from a potentially dangerous source	100 m radius around the source
Fire, explosion or fumes involving a dangerous source	300 m radius
Suspected bomb (possible radiological dispersal device), exploded or unexploded	400 m radius or more to protect against an explosion
Conventional (non-nuclear) explosion or a fire involving a nuclear weapon (no nuclear yield)	1000 m radius
Initial determination — Inside a building	
Damage, loss of shielding or spill involving a potentially dangerous source	Affected and adjacent areas (including floors above and below)
Fire or other event involving a potentially dangerous source that can spread radioactive material throughout the building (e.g. through the ventilation system)	Entire building and appropriate outside distance as indicated above
Expansion based on radiological monitoring	
OIL1 and OIL2 from Table 8	Wherever these levels are measured

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CONTRIBUTORS TO DRAFTING AND REVIEW

Aeberli, W.	Beznau Nuclear Power Plant, Switzerland
Ahmad, S.	Pakistan Atomic Energy Commission, Pakistan
Barabanova, A.	State Research Centre, Institute of Biophysics, Russian Federation
Boecker, B.	Consultant, United States of America
Buglova, E.	International Atomic Energy Agency
Carr, Z.	World Health Organization
Crick, M.	International Atomic Energy Agency
Ford, J.	Health Canada, Canada
Hedemann Jensen, P.	Risø National Laboratory, Denmark
Homma, T.	Japan Atomic Energy Agency, Japan
Hončarenko, R.	Temelin Nuclear Power Plant, Czech Republic
Janko, K.	Nuclear Regulatory Authority of the Slovak Republic, Slovakia
Jaworska, A.	Norwegian Radiation Protection Authority, Norway
Kenigsberg, J.	National Commission on Radiation Protection, Belarus
Kocheyev, V.	World Association for Disaster and Emergency Medicine, United States of America
Kostadinov, V.	Slovenian Nuclear Safety Administration, Slovenia
Kutkov, V.	Russian Research Centre 'Kurchatov Institute', Russian Federation
Lafortune, J.	International Safety Research, Canada
Lee, S.	International Atomic Energy Agency

Lim, S.	Korea Institute of Radiological and Medical Sciences (KIRAMS), Republic of Korea
Martinčič, R.	International Atomic Energy Agency
McClelland, V.	United States Department of Energy, United States of America
McKenna, T.	International Atomic Energy Agency
Miller, C.	Centers for Disease Control and Prevention, United States of America
Nagataki, S.	Japan Radioisotope Association, Japan
Paile, W.	Radiation and Nuclear Safety Authority, Finland
Pellet, S.	OSSKI National Research Institute for Radiobiology and Radiohygiene, Hungary
Perez, M.	World Health Organization
Ricks, R.	Radiation Emergency Assistance Center/Training Site, United States of America
Robinson, J.	Nuclear Safety Directorate, United Kingdom
Rochedo, E.	National Nuclear Energy Commission, Brazil
Scott, B.	Lovelace Respiratory Research Institute, United States of America
Sjöblom, K.	Fortum Power and Heat Oy, Loviisa Power Plant, Finland
Sládek, V.	Nuclear Regulatory Authority of the Slovak Republic, Slovakia
Smith, J.	Centers for Disease Control and Prevention, United States of America
Solomon, S.	Australian Radiation Protection and Nuclear Safety Agency, Australia

Sundnes, K.	World Association for Disaster and Emergency Medicine, Norway
Turai, I.	OSSKI National Research Institute for Radiobiology and Radiohygiene, Hungary
Weiss, W.	Bundesamt für Strahlenschutz, Germany
Whitcomb, R.	Centers for Disease Control and Prevention, United States of America

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From: Leeds, Eric
To: LIA04 Hoc
Cc: Nguyen, Quynh; Evans, Michele; McDermott, Brian; Brenner, Eliot
Subject: RE: ACTION: Do States Require Additional Information?
Date: Tuesday, March 15, 2011 7:47:00 AM

I agree, Sara. NRR is going to set up a SharePoint site where everyone can access the Q&As. The regions are especially interested because of upcoming EOC meetings with the public. NSIR assistance and scrubbing is welcome!

Eric J. Leeds, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
301-415-1270

From: LIA04 Hoc
Sent: Monday, March 14, 2011 6:25 PM
To: Virgilio, Rosetta; LIA06 Hoc; Thaggard, Mark; McGinty, Tim
Cc: Noonan, Amanda; Brenner, Eliot; Mroz (Sahm), Sara; Miller, Charles; Leeds, Eric; Virgilio, Martin
Subject: RE: ACTION: Do States Require Additional Information?

I think it is important to make sure that NSIR/EP is looped in on the development and distribution of any answers. This is for a few reasons: 1) to maintain consistency with existing EP messaging; 2) to ensure consistency with FEMA REPP communications; and 3) to allow for consistency with any future messaging.
-Sara (from the LT room)

Sara Mroz
Outreach and Communications
Office of Nuclear Security and Incident Response
Sara.Mroz@nrc.gov

From: Virgilio, Rosetta
Sent: Monday, March 14, 2011 6:13 PM
To: LIA06 Hoc; Thaggard, Mark; McGinty, Tim
Cc: Noonan, Amanda; LIA04 Hoc; Brenner, Eliot; Mroz (Sahm), Sara; Miller, Charles; Leeds, Eric; Virgilio, Martin
Subject: RE: ACTION: Do States Require Additional Information?

Thank you, Tim. In my conversation with OEDO (just prior to receiving your email) I was informed that NRR/Eric Leeds has taken on the responsibility (Quynh Nguyen is the POC) for the collection of questions and development of answers for responding to our stakeholders on the events involving the earthquake in Japan and the implications for NRC licensees. That being the case, shouldn't we provide the State Qs to NRR to address?

From: LIA06 Hoc
Sent: Monday, March 14, 2011 5:56 PM

YYY/2 93

To: Thaggard, Mark; LIA04 Hoc; Miller, Charles; Virgilio, Rosetta; Brenner, Eliot; Mroz (Sahm), Sara; Noonan, Amanda
Subject: RE: ACTION: Do States Require Additional Information?

This is email is primarily for Charlie and Rosetta, to close the loop. We discussed the need for providing consistent information to the States, via the RSLO's, with the Executive Team and the Chairman a few minutes ago. The Chairman directed us to coordinate with FEMA since they have an established relationship with the States. We settled on working with OPA to provide the information tailored to our best extent to the questions and concerns that would be expressed by the States, and provide to FEMA for awareness and commonality, and then the RSLO's for sharing.

A broad conference call with all States is not currently being contemplated, we'd like to see how providing a common set of information works first. Tim McGinty , LT Director

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From: Tifft, Doug
Sent: Monday, March 14, 2011 3:44 PM
To: McNamara, Nancy; LIA04 Hoc; Woodruff, Gena; Barker, Allan; Logaras, Harral; Maier, Bill; LIA06 Hoc
Cc: Turtil, Richard; Virgilio, Rosetta; Rautzen, William; Lukes, Kim; Flannery, Cindy; Trojanowski, Robert
Subject: RE: ACTION: Do States Require Additional Information?

Amanda,

We just got off a conference call with all the Region 1 state liaison officers and emergency directors. Bill Dean opened the meeting. A strong message the states sent Bill was that they need to be informed before information hits the public.

Here are some of the questions we heard. I broke them into the two categories you requested. I think we need answers to the hypothetical questions ASAP as well. (I know we'll be looking for this for our upcoming annual assessment meetings, that start for Region 1 next week.)

Questions related to event in Japan:
Could this happen at [X plant]?
What is the sequence of events at the Japanese reactors?
What is the magnitude of the release at the Japanese facility? (There are conflicting reports in the press.) (ie, offsite dose rates)
Who are the Federal Contacts (for the state) to get information on what DOE & EPA are doing?
When will the plume hit the US?
What are the environmental consequences to the US?
What dose rates do we expect to see in the US?
How do the Japanese reactor designs compare to the US reactor designs of similar vintage?
When the states receive questions from the public / media that the NRC would be better to answer, where should they direct these calls?

What is the NRC doing to correct misinformation in the public / media?

Hypothetical questions related to US plants:
What would the effect be on [plant X] if a 9.0 earthquake hit?
What would the effect be on [plant X] if a subsequent tsunami hit?
Why is Indian Point safe if there is a fault line underneath it?

-Doug

From: McNamara, Nancy
Sent: Monday, March 14, 2011 1:27 PM
To: LIA04 Hoc; Tifft, Doug; Woodruff, Gena; Barker, Allan; Logaras, Harral; Maier, Bill; LIA06 Hoc
Cc: Turtil, Richard; Virgilio, Rosetta; Rautzen, William; Lukes, Kim; Flannery, Cindy
Subject: RE: ACTION: Do States Require Additional Information?

Absolutely. We are having a conf. call at 1:30 w/all our states to hear their opinions. But the more we can give, the better. We've been getting questions all morning and Bill Dean has a call with a NY congressional arranged through OCA.

From: LIA04 Hoc
Sent: Monday, March 14, 2011 1:24 PM
To: McNamara, Nancy; Tifft, Doug; Woodruff, Gena; Barker, Allan; Logaras, Harral; Maier, Bill; LIA06 Hoc
Cc: Turtil, Richard; Virgilio, Rosetta; Rautzen, William; Lukes, Kim; Flannery, Cindy
Subject: ACTION: Do States Require Additional Information?

Nancy, Doug, Bob, Gena, Alan, Harral, and Bill:

It is our understanding that a few additional questions from SLOs have come in from states following distribution/communication of recent Q&As and Press Releases.

In view of this, we are assessing whether additional information may be needed/if there are additional pressing questions about **the radiological fallout from Japan.**

Currently the Operation Center is responding to an International Emergency and any possible implications from this event that may affect the United States. If States have specific questions about Reactors in the United States they should be answered by the RSLO's if it reasonable. If the questions are regarding hypothetical events at U.S. Reactors these questions can be collected and answered, if possible, at a later date.

BOTTOM LINE: do we sense a need to provide additional Q&As and other information pieces that respond to State needs? We respectfully request that you make this assessment using practical judgment and beg your indulgence in communicating real State needs for additional information.

Amanda Noonan
State Liaison – Liaison Team
Incident Response Center

News Release

経済産業省
Ministry of Economy, Trade and Industry

March 15, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information (the 25th Release)
(As of 23:30 March 15th, 2011)

Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa NPS, Tohoku Electric Power Co., Inc; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co., Inc. Tokai Dai-ni NPS , Japan Atomic Power Co. , Inc, as follows:

New updates are as follows.

1. Nuclear Power Stations (NPS)

- Fukushima Dai-ichi NPS
  - TEPCO confirmed that the fire occurred at Unit 4 was extinguished. (11:00 March 15th)

2. Actions taken by NISA

(March 15th)

07:24 Incorporated Administrative Agency, Japan Atomic Energy Agency (JAEA) reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Nuclear Fuel Cycle Engineering Laboratories, Tokai Research and Development Center.

07:44 JAEA reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Nuclear Science Research Institute.

10:30 According to the Nuclear Regulation Act, Minister of Economy, Trade and Industry issued the directives as follows.

For Unit 4: To extinguish fire and to prevent the occurrence of re-criticality

For Unit 2: To inject water to reactor vessel promptly and to vent Drywell.

10:59 Considering the possibility of lingering situation, it is decided that the

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function of the Local Emergency Response Headquarter is moved to the Fukushima Prefectural Office.

<Situation of the evacuation>

- Prime Minister Kan issued the directive at AM 11:00 this morning for in-house stay in the area from 20-km to 30-km radius from the Fukushima Dai-ichi NPS.
- Regarding the evacuation as far as 20-km from Fukushima Dai-ichi NPS and 10-km from Fukushima Dai-ni, necessary measures have already taken.

(Contact Person)
Mr. Toshihiro Bannai
Director, International Affairs Office, NISA/METI
Phone:+81-(0)3-3501-1087

(Attached sheet)

1. The status of operation at NPS (Number of automatic shutdown units: 10)

- Fukushima Dai-ichi NPS, Tokyo Electric Power Co. Inc. (TEPCO)
  (Okuma-machi and Futaba-machi, Futaba-gun, Fukushima Prefecture)

(1) The status of operation

Unit 1 (460MWe): automatic shutdown
Unit 2 (784MWe): automatic shutdown
Unit 3 (784MWe): automatic shutdown
Unit 4 (784MWe): in periodic inspection outage
Unit 5 (784MWe): in periodic inspection outage
Unit 6 (1,100MWe): in periodic inspection outage

(2) Major Plant Parameters (21:05 March 15th)

	unit	Unit 1	Unit 2	Unit 3
Reactor Pressure	MPa	0.169 (A) 0.166(B)	0.099	0.170 (A) 0.180(A)
CV Pressure	KPa	Not available	250	355
Reactor Water Level*	mm	−1800(A) −1800(B)	−1200(A)	−1900(A) −2300(B)
Suppression Pool Water Temperature	℃	Not available	Not available	Not available
Suppression Pool Pressure	KPa	Not available	down scale	down scale
Measuring time		18:43	18:43*2	21:05

*1: Distance from the top of fuel.

*2: The data of Unit 2 were not available because operators evacuated from the central control room.

(3) Report concerning other incidents

- TEPCO reported to NISA the Event in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi. (15:42 March 11th)

- TEPCO reported to NISA the event in accordance with the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi, Units 1 and 2.(16:36 March 11th)
- For Unit 1: Seawater was injected to the Containment Vessel via the Fire Extinguishing System Line (Started up 11:55 March 13th) →Temporary interruption of the injection (01:10 March 14th)
- For Unit 2: Water injection function was sustained. (14:00 March 13th)
- For Unit 2: Reactor water level was decreasing. (13:18 March 14th)
- For Unit 2: Seawater injection to the Reactor Pressure Vessel (RPV) was ready through the Fire Extinguishing System line. (19:20 March 14th)
- TEPCO evaluated core damage of Unit 2 was "less than 5%" (22:14 March 14th)
- Water level in RPV in Unit 2 is decreasing. (22:50 March 14th)
- A sound of explosion in Unit 2. As the pressure in Suppression Chamber decreased, there was possibility that an incident occurred in this Chamber. (06:20 March 15th)
- For Unit 3: Fresh water was injected to the PCV via the Fire Extinguishing System Line (FESL). (11:55 March 13th)
- For Unit 3: Seawater was injected to the PCV via FESL. (13:12 March 13th)
- Unit 1 and Unit 3: Injection of seawater into PCV was interrupted due to the lack of seawater in pit. (01:10 March 14th)
- For Unit 3: Injection of seawater into PCV was restarted (03:20 March 14th)
- For Unit 3: The pressure increased unusually. (11:45 March 14th)
- For Unit 3: The explosion like Unit 1 occurred around the Reactor Building (11:01 March 14th)
- A sound of explosion was made in Unit 2 and the pressure in Suppression Chamber decreased. (06:10 March 15th) Thereafter it was confirmed that a part of wall in the operation area of Unit 4 was damaged. (06:14 March 15th)
- The fire at Unit 4 occurred. (09:38 March 15th) It was confirmed that the fire was extinguished spontaneously. (11:00 March 15 th)

- The temperature of water in the Spent Fuel Storage Pool at Unit 4 had increased.
  (84 ℃at 04:08 March 14th)

- Fukushima Dai-ni Nuclear Power Station (TEPCO)
  (Naraha-machi/Tomioka-machi, Futaba-gun, Fukushima pref.)

(1) The status of operation

Unit1 (1,100MWe): automatic shutdown, cold shut down at 17:00, March 14th

Unit2 (1,100MWe): automatic shutdown, cold shut down at 18:00, March 14th

Unit3 (1,100MWe): automatic shutdown, cold shut down at 12:15, March 12th

Unit4 (1,100MWe): automatic shutdown, cold shut down at 07:15, March 15th

(2) Major plant parameters (As of 05:00, 15 March)

	unit	Unit 1	Unit 2	Unit 3	Unit 4
Reactor Pressure	MPa	0.13	0.09	0.04	0.13
Reactor water temperature	℃	59.0	56.1	29.1	93.2
Reactor water level*	Mm	11,396	11,296	7,558	8,784
Suppression pool water temperature	℃	43	36	44	72
Suppression pool pressure	KPa	189	163	131	207
Remarks		cold shutdown	cold shutdown	cold shutdown	cold shutdown

*: Distance from the top of fuel

(3) Report concerning other incidents

- TEPCO reported to NISA the event in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ni Unit 1. (18:08 March 11th)

- TEPCO reported to NISA the events in accordance with the Article 10 regarding Units 1, 2 and 4. (18:33 March 11th)

● Onagawa NPS (Tohoku Electric Power Co., Inc.)
(Onagawa-cho, Oga-gun and Ishinomaki–shi, Miyagi Prefecture)

(1) The status of operation

Unit 1 (524MWe): automatic shutdown, cold shut down at 0:58, March 12th
Unit 2 (825MWe): automatic shutdown, cold shut down at earthquake
Unit 3 (825MWe): automatic shutdown, cold shut down at 1:17, March 12th

(2) Readings of monitoring post

Reading of monitoring post:

MP2 (Monitoring at the North End of Site Boundary)
approx. 6,500 nGy/h (19:00 March 14th)
→approx. 5,400 nGy/h (19:00 March 15th)

(3) Report concerning other incidents

- Fire Smoke on the first basement of the Turbine Building was extinguished. (22:55 on March 11th)
- Reported on the Article 10* of the Act on Special Measures Concerning Nuclear Emergency Preparedness (13:09 March 13th)

2. Action taken by NISA

(March 11th)

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

15:42 TEPCO reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

16:36 TEPCO judged the event in accordance with the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS, Units 1 and 2. (reported to NISA at 16:45)

18:08 Regarding Unit 1 of Fukushima Dai-ni NPS, TEPCO reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

18:33 Regarding Units 1,2 and 4 of Fukushima Dai-ni NPS, TEPCO reported to NISA in accordance with the Article 10 of Act on Special Measures Concerning Nuclear Emergency Preparedness.

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

20:50 Fukushima Prefecture's Emergency Response Headquarters issued a direction for the residents within 2 km radius from Unit 1 of Fukushima Dai-ichi NPS to evacuate. (The population of this area is 1,864)

21:23 Directives from Prime Minister to the Governor of Fukushima Prefecture, the Mayor of Ookuma 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.

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

(March12th)

05:22 Regarding Unit 1 of Fukushima Dai-ni NPS, TEPCO reported to NISA in accordance with the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

05:32 Regarding Unit 2 of Fukushima Dai-ni NPS, TEPCO reported to NISA in accordance with the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

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

06:07 Regarding of Unit 4 of Fukushima Dai-ni NPS, TEPCO reported to NISA in accordance with the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

06:50 In accordance with the Paragraph 3, the Article 64 of the Nuclear

Regulation Act, the order was issued to control the internal pressure of the Containment Vessel of Units 1 and 2 of Fukushima Dai-ichi NPS.

07:45 Directives from Prime Minister to the Governor of Fukushima Prefecture, the Mayors of Hirono Town, Naraha Town , Tomioka Town and Ookuma 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 withon 10km radius from Fukushima Dai-ni NPS
to stay in-house

17:00 TEPCO reprted to NISA in accordance with the Article 15 of the Act on Special Measure Concerning Nuclear Emergency Preparedness since the radiation level at Fukushima Dai-ichi NPS exceeded the acceptable limit.

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

19:55 Directives from Prime Minister was issued regarding seawater injection to Unit No.1 of Fukushima Dai-ichi NPS.

20:05 Considering the Directives from Prime Minister and pursuant to the Paragraph 3, the Article 64 of the Nuclear Regulation Act, order was issued to inject seawater to Unit 1 of Fukushima Dai-ichi NPS.

20:20 At Unit 1 of Fukushima Dai-ichi NPS, seawater injection started.

(March 13th)

05:38 TEPCO reported to NISA pursuant to the Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness since Unit 3 of Fukushima Dai-ichi NPS lost total coolant injection function. Recovering efforts by TEPCO of the power source and coolant injection function and work on venting are underway.

09:08 Pressure suppression in the Containment Vessel and fresh water injection started at Unit 3 of Fukushima Dai-ichi NPS.

09:20 Opening of Pressure vent valve of Unit 3 of Fukushima Dai-ichi NPS.

09:30 The order was issued for the Governor of Fukushima Prefecture, the Mayors of Ookuma Town, Futaba Town, Tomioka Town and Namie Town in accordance with the Act on Special Measures Concerning Nuclear Emergency Preparedness on the contents of radioactivity decontamination screening.

09:38 TEPCO reported to NISA that Unit 1 of Fukushima Dai-ichi NPS reached a situation specified in the Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness.

13:09 Tohoku Electric Power Company reported to notified that Onagawa NPS reached a situation specified in the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

13:12 Fresh water injection was switched to seawater injection at Unit 3 of Fukushima Dai-ichi NPS.

14:25 TEPCO reported to NISA that Fukushima Dai-ichi NPS reached a situation specified in the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

(March 14th)

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.

03:20 Seawater injection at Unit 3 of Fukushima Dai-ichi NPS was restarted.

04:24 TEPCO reported to NISA that Fukushima Dai-ichi NPS reached the situation specified in the Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness.

07:53 TEPCO reported to NISA that Fukushima Dai-ichi NPS reached the situation specified in the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

13:25 TEPCO reported to NISA that Fukushima Dai-ichi Unit 2 of NPS reached the situation specified in the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

22:13 TEPCO reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency

Preparedness regarding Fukushima Dai-ni NPS.
22:35 TEPCO reported to NISA in accordance with the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

(March 15th)
00:00 The acceptance of experts from IAEA was decided.
NISA agreed to accept the offer of dispatching of the expert on NPS damage from IAEA considering the intention by Mr. Amano, Director General of IAEA. Therefore, the schedule of expert acceptance will be planned from now on according to the situation.
00:00 NISA also decided the acceptance of experts dispatched from NRC.
07:24 JAEA reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Nuclear Fuel Cycle Engineering Laboratories, Tokai Research and Development Center.
07:44 JAEA reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Nuclear Science Research Institute.
10:30 According to the Nuclear Regulation Act, Minister of Economy, Trade and Industry issued the directives as follows.
For Unit 4: To extinguish fire and to prevent the occurrence of re-criticality
For Unit 2: To inject water to reactor vessel promptly and to vent Drywell.
10:59 Considering the possibility of lingering situation, it is decided that the function of the Local Emergency Response Headquarter is moved to the Fukushima Prefectural Office.
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.

< Possibility on radiation exposure (As of 19:00 March 15th) >
<Exposure of residents>
(1) Including the evacuees from Futaba Public Welfare Hospital to

Nihonmatsu City Fukushima Gender Equality Center as the result of measurement of 133 persons at the Center, 23 persons counted more than 13,000 cpm were decontaminated.

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

(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 Center.

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

*(This results was measured without shoes, though the first measurement exceeded 100,000cpm)

<Exposure of workers>

(1) As for the 18 workers conducting operations in Fukushima Dai-ichi NPS, results of measurements are as follows;
One worker; 106.3 mSv, No threat of internal exposure and no medical treatment needed.
Others; at the level of no impact to health. No exact data was available.

(2) The 6 out of 7 people working at the time of explosion at the Unit 3 of Fukushima Dai-ichi NPS injured and were conscious. The detailed measurement data are not available.

<Others>

(1) Fukushima Prefecture has started the screening from 13 March at two health office in the prefecture. It is undertaken at 12 evacuation sites, 6 health offices, etc. The results of screening are being totalled up.

(2) 5 members of Self-Defence-Force who worked for water supply in Fukushima Dai-ichi NPS were exposed. After the work (March 12th), 30,000 cpm was counted by the measurement at Off site Center. The counts after decontamination were between 5,000 and 10,000 cpm. One member was transferred to National Institute of Radiological Science. No other exposure of the Self-Defence-Force member was confirmed at the Ministry of Defence.

(3) As for policeman, the decontaminations of two policemen were confirmed by the National Police Agency. Nothing unusual was reported.

(4) As for fireman, no contamination was reported to National Firefighting Agency. The confirmation is continued.

<Situation of the injured (As of 19:00 March 15th)>

1. Injury due to earthquake
   - Two employees (slightly)
   - Two subcontract employees (one fracture in both legs)
   - Two missing (in the turbine building of Unit 4)
   - One emergency patient (According to the local prefecture, one patient of cerebral infarction was transported by the ambulance).
   - Ambulance was requested for one employee complaining the pain at left chest outside of control area (conscious).
   - Two employees complaining discomfort wearing full-face mask in the main control room were transported to the industrial doctor of Fukushima Dai-ni NPS.

2. Injury due to the explosion of Unit 1 of Fukushima Dai-ichi NPS
   - Four employees were injured at the explosion and smoke of Unit 1 around turbine building (out of control area). Examined by Kawauchi clinic.

3. Injury due to the explosion of Unit 3 of Fukushima Dai-ichi NPS
   - Four employees
   - Three subcontractor employees

- Four members of Self-Defence-Force (one of them will be transported to National Institute of Radiological Sciences considering internal exposure)

<Situation of Resident Evacuation (As of 19:00 March 15th)>

At 11:00 March 15th, Prime Minister directed in-house stay to the residents in the area from 20 km to 30 km radius from Fukushima Dai-ichi NPS. The directive was conveyed to Fukushima Prefecture and related municipalities.

Regarding the evacuation as far as 20-km from Fukushima Dai-ichi NPS and 10-km from Fukushima Dai-ni, necessary measures have already taken.

- It was reported that all people in Futaba Hospital and Onhuuru Futaba completed the evacuation from the 20 km zone.
- It seems that a plural number of people who were staying in the 20 km zone are in moving gradually.
- The in-house stay in the area from 20 km to 30 km from Fukushima Dai-ichi NPS is made fully known to the residents concerned.

(Contact Person)
Mr. Toshihiro Bannai
Director, International Affairs Office, NISA/METI
Phone:+81-(0)3-3501-1087

From: Haney, Catherine
To: Jacobs-Baynard, Elizabeth
Cc: Weber, Michael; Ordaz, Vonna; Kokajko, Lawrence; Tschiltz, Michael; Walker, Dwight
Subject: Budget brief
Date: Tuesday, March 15, 2011 4:32:03 AM

Liz
I was called back to the ops center before I had the chance to get home last night. I just got home and although exhausted need to relax before I can sleep.

I asked Josh if he thought the Chairman would still have the budget meeting. He thought yes but it was subject to change. He understood that I might not be into the office and was willing to do later if schedule permitted. Here are a few options -
1. I participate by phone. I have info jennifer sent by email.
2. Vonna and Mike/Marrissa brief the chairman
3. We schedule for later but I do need to leave at four.
4. Anything else you can think of.

I will set alarm for 8 and will check emails then.

Thanks
Cathy

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A

Ward, Steven

From: Institute of Nuclear Materials Management [info@inmm.org]
Sent: Monday, March 14, 2011 2:35 PM
To: Ward, Steven
Subject: INMM Asks for Donations to Red Cross in Support of Japan

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Connecting the Leaders in Nuclear Materials Management

Institute of Nuclear Materials Management

INMM

March 14, 2011

INMM Extends Condolences and Support to Japan

The Institute of Nuclear Materials Management wishes to express its condolences and sympathies to the people of Japan, to the government of Japan, and to the members of the INMM Japan Chapter during the aftermath of the earthquake and subsequent tsunami that struck Japan on Friday, March 11.

The loss of life and the physical devastation to Japan are a great tragedy. We offer our support to all those affected directly and indirectly by these disasters and the subsequent crisis at the Fukushima Daiichi nuclear power plant.

The INMM Japan Chapter is one of INMM's most active and largest Regional Chapters, and recently celebrated its 30th Anniversary. The 135 members of the Japan Chapter are not only our respected colleagues but our dear friends, and we offer our support to them during this difficult time.

We encourage anyone wishing to help the victims of the earthquake and tsunami to make a donation to the Red Cross through:

- The American Red Cross Web site
- The Japanese Red Cross Web site
- Or by texting REDCROSS to 90999 to give $10 for Japan Earthquake and Pacific Tsunami relief

Thank you for your generosity.

Sincerely,

Scott Vance
President, Institute of Nuclear Materials Management

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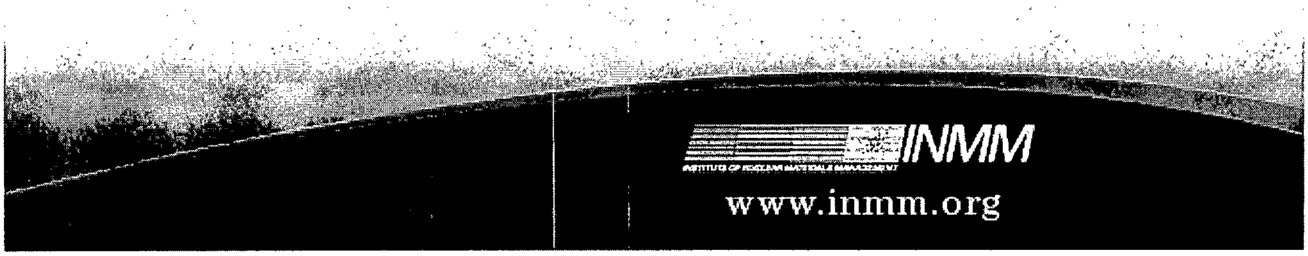

Institute of Nuclear Material Management
111 Deer Lake Road, Suite 100, Deerfield, Illinois 60015
To unsubscribe, please click here

From: Haney, Catherine
To: Doolittle, Elizabeth
Subject: RE: LIST OF PUBLIC MEETINGS THIS WEEK AND NEXT
Date: Tuesday, March 15, 2011 3:05:00 PM

thanks

From: Doolittle, Elizabeth
Sent: Tuesday, March 15, 2011 12:52 PM
To: Haney, Catherine; Dorman, Dan
Cc: Kokajko, Lawrence; Kinneman, John; Ordaz, Vonna
Subject: LIST OF PUBLIC MEETINGS THIS WEEK AND NEXT

1. March 14, 2011, with Nuclear Energy Institute (NEI) to discuss the NRC pilot issue for NEI's Dry Storage Task Force. The pilot issue for the utilizing NEI's Regulatory Issue Resolution Protocol is stress corrosion cracking of storage casks in a marine environment - SFST

2. March 16, 2011, with NAC International to discuss the new application submitted for the Model No. MAGNATRAN transport package - SFST

3. March 17, 2011, with Northern States Power Management (NSPM) and Xcel Energy to discuss the plans of Northern States Power Company, a Minnesota corporation, d/b/a Xcel Energy for submittal of an application to renew the Prairie Island ISFSI site-specific license. SFST

4. March 24, 2011, with Holtec and the NRC staff to discuss the proposed HI-STORM FW dry cask storage system license amendment request No. 1-SFST

5. March 28, 2011 with NEI to obtain external stakeholder feedback regarding regulatory foundation enhancements (inspection, Certificates of Compliance and technical specifications, and NEI 72.48 Guidance Document) SFST

6. March 30, 2011, with Transnuclear, Inc. to discuss TN's proposed new application for the Model No. TN-LC transportation package SFST

7. March 31, 2011, with AREVA to discuss the content and test plan for the Model No. LANL-B transport package - SFST.

8. March 17, 2011, NRC, NEI, Fuel Cycle Licensees and Certificate Holders, Meeting on Fuel Cycle Oversight Enhancements – FCSS.

9. Week of March 21, Bret Leslie moderating - HLWRS

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From: LIA02 Hoc
Sent: Thursday, March 31, 2011 6:36 PM
To: Bernhard, Rudolph
Cc: LIA03 Hoc
Subject: RE: Your BB Number?

Rudy - When you reply with your BB phone number, could you also send "in case of Emergency contact" for you to include:

Name,
Phone #,
Email address
Snail mail address

Thank you.
Mugeh
On behalf of the International Liaison Team

From: Bernhard, Rudolph
Sent: Thursday, March 31, 2011 1:44 PM
To: LIA02 Hoc
Subject: FW: Your BB Number?

From: Bernhard, Rudolph
Sent: Thursday, March 31, 2011 1:43 PM
To: Heard, Robert
Cc: Mayros, Lauren
Subject: FW: Your BB Number?

Rob,
Can you provide when available?
Also copy me so I can tell my wife...
Rudy

From: LIA02 Hoc
Sent: Thursday, March 31, 2011 1:20 PM
To: Bernhard, Rudolph
Subject: Your BB Number?

Hi Rudolph – I forgot to ask you on our phone call to please provide us with your international blackberry number as soon as possible. Thank you!!

Lauren Mayros

YYY/298

From: Holahan, Vincent
Sent: Wednesday, March 30, 2011 4:31 AM
To: Hoc, PMT12
Cc: LIA01 Hoc; PMT03 Hoc
Subject: RE: Coordination with PACOM

Hi Folks,

From: Hoc, PMT12
Sent: Tuesday, March 29, 2011 5:15 PM
To: Holahan, Vincent
Cc: LIA01 Hoc; PMT03 Hoc
Subject: Coordination with PACOM

Vince,

Trish stopped by after your video-conf. The question came up how NRC should best liaise with PACOM. Have you had further comms with Admiral or his staff regarding what type of information and how best to share any information/opinions we may have?

I assume that you get the NRC SITREP updates. Are you also getting the DOE NITOPS SITREPs? Would it be appropriate to funnel information thru **you** (either via emails or tele/video conf)? Would it be better to schedule direct communication between PACOM and PMT/RST?

What's the sense in sunny HI.

Tim Harris
PMT, PAAD

Y/Y/299

From: Emche, Danielle
Sent: Monday, March 28, 2011 10:55 PM
To: 'mrivera@ofda.gov'
Cc: Smith, Brooke; 'DART_PACTSU@ofda.gov'; 'ofdasupport@ofda.gov'; LIA02 Hoc; LIA03 Hoc; Collins, Elmo
Subject: Re: E. Collins blackberry in Japan

Great, thanks Marco. Elmo arrives on 3/31. We'll send him over to you when he gets here.
Danielle
Sent from an NRC BlackBerry.

From: Rivera, Marco <mrivera@ofda.gov>
To: Emche, Danielle; tanabexy@state.gov <tanabexy@state.gov>
Cc: Smith, Brooke; DART_PACTSU <DART_PACTSU@ofda.gov>; ofdasupport <ofdasupport@ofda.gov>
Sent: Mon Mar 28 22:29:31 2011
Subject: RE: E. Collins blackberry in Japan

I will get one ready from the cache of black berries in reserve. All I need is for the incoming person to sign the OFDA email user agreement and property receipt. Thanks!

From: Emche, Danielle [mailto:Danielle.Emche@nrc.gov]
Sent: Monday, March 28, 2011 10:24 PM
To: 'tanabexy@state.gov'
Cc: Smith, Brooke; Rivera, Marco
Subject: Re: E. Collins blackberry in Japan

Tanabe,
An NRC staffer, Elmo Collins, arriving soon, is in need of a blackberry. Can the embassy arrange this?
Danielle
Sent from an NRC BlackBerry.

From: LIA02 Hoc
To: Smith, Brooke; Emche, Danielle; Stahl, Eric
Cc: Collins, Elmo; Jackson, Karen; LIA03 Hoc
Sent: Mon Mar 28 11:40:43 2011
Subject: E. Collins blackberry in Japan

Brooke, Danielle and/or Eric,

Elmo Collins has an NRC blackberry that is on Verizon. Karen Jackson tells us that Verizon works only intermittently in Japan. We have not had the time to exchange Elmo's blackberry for an AT&T one prior to his departure. There are two options: He can stay with his blackberry as is (i.e., endure the intermittent coverage via Verizon). He can take a blackberry from a team member returning to the U.S. – if this is the route chosen, he will need to let us know which number he has so OIS can track it.

Cheers,

Karen

YYY/300

Collins, Elmo

From: LIA03 Hoc
Sent: Tuesday, March 29, 2011 1:35 PM
To: Doane, Margaret; Mamish, Nader
Cc: LIA02 Hoc; Liaison Japan
Subject: FW: FYI - REPORT FROM THE DOE EMBEDDED INDIVIDUAL (Bisconti TDY-Tokyo)

Information from DOE/Giulia Bisconti who is at the Embassy with the NRC team and others.

-----Original Message-----
From: OST02 HOC
Sent: Tuesday, March 29, 2011 2:12 PM
To: LIA02 Hoc; LIA03 Hoc
Subject: FW: FYI - REPORT FROM THE DOE EMBEDDED INDIVIDUAL (Bisconti TDY-Tokyo)

-----Original Message-----
From: OST02 HOC
Sent: Tuesday, March 29, 2011 1:51 PM
To: OST01 HOC
Subject: FW: FYI - REPORT FROM THE DOE EMBEDDED INDIVIDUAL (Bisconti TDY-Tokyo)

-----Original Message-----
From: Weber, Michael
Sent: Tuesday, March 29, 2011 1:19 PM
To: RST01 Hoc; LIA06 Hoc; LIA08 Hoc
Cc: ET07 Hoc; ET05 Hoc; OST02 HOC; FOIA Response.hoc Resource; Casto, Chuck; Dorman, Dan
Subject: FYI - REPORT FROM THE DOE EMBEDDED INDIVIDUAL (Bisconti TDY-Tokyo)

Here is a report from one of the DOE staff members who is embedded with the DART Team in Tokyo, along with our team.

-----Original Message-----
From: Bisconti, Giulia [mailto:Giulia.Bisconti@nuclear.energy.gov]
Sent: Tuesday, March 29, 2011 12:26 PM
To: PWG; DL-NITsolutions
Cc: Bisconti, Giulia
Subject: Bisconti TDY-Tokyo

Dear all:

As requested, this is an update of how I am helping in Tokyo for the week. My main duty is to be embedded with the NRC team at the Embassy. I am also performing other duties where I can be helpful to Ron and Aleshia. They have both been very welcoming.

Giulia

Here are some items of interest:

YY/301

--Two PNNL experts to visit Japan (at the request of Japan)to help on water decontamination and storage issues.
--Japanese government is seeking private sector experts on fuel rod/pool issues with hands-on TMI experience (per NRC meetings).
--Japanese government is thrilled with NNSA's airborne monitoring cooperation (I joined MOFA/MEXT meeting with Alan).
--Met with Toshiba and B&W. Toshiba has hundreds of employees at the accident site and the TEPCO emergency control room. Toshiba is deploying equipment and resources. Toshiba and Hitachi are both in the emergency control room, and TEPCO is heavily relying on them. Toshiba offered to be an information resource to our specialists.
--6.3 quake in Northeastern Japan today--no damage reported to facilities.
--Aleshia and I met today with METI Vice Minister Okada (at his invitation). Okada mentioned that Japan is thinking about a "cover" for the Fukushima plants in the coming months. He and his colleagues expressed very deep appreciation for assistance from DOE and its National labs and everyone's hard work and long hours. They appreciated DOE recommendations on the salt/fresh water issue. Okada offered to personally work with DOE on any matter related to the Fukushima response and to help overcome any barrier. Although, he mentioned that information flow is much better now (the government is better organized to receive and respond to inquiries) and the mechanisms seem to be working. He noted that Japan will be looking for assistance-including on the issue of water decontamination (10,000 tons ? of contaminated water). He said that the Japanese government would seek input from DOE and its labs, including PNNL, Idaho, Livermore, others...
--Participated in NRC meeting. Issues: remove heat from the reactor. Structural concerns for the pools. Controlling releases. Water management is a big issue. Are the Japanese workers wearing adequate protective clothing? Flooding--continued leakages? Need to establish the water level of the pools--want to get water above the rods, maybe 3-4 feet above.

From: OST01 HOC
Sent: Thursday, April 28, 2011 5:44 PM
To: Mroz (Sahm), Sara
Subject: RE: Help with EPA request

Sara,

I left a voicemail on your work phone about this. I have obviously figured it out. I talked to Rick and he says he has the answers almost ready. I have created a tasker (#5082) for it. Jeff K will be here in the morning if you have any questions.

Thanks,
Rebecca Stone
EST Coordinator

From: Mroz (Sahm), Sara
Sent: Thursday, April 28, 2011 2:26 PM
To: Dudek, Michael; OST01 HOC
Subject: FW: Help with EPA request

Per our conversation, please put this in the task tracker. I believe Rick Hasselberg will be the POC for answering.
Thanks,
Sara

From: Harrington, Holly
Sent: Thursday, April 28, 2011 1:51 PM
To: Mroz (Sahm), Sara
Subject: Help with EPA request

EPA has requested GIS locational coordinates for NPPs. (See below). This request got forwarded to the Federal Liaison Desk on April 14, but apparently took no action. After EPA complained about the non-response, I sent it to NR. They reviewed and said it's probably an NSIR action. Can someone review this and perhaps get back to EPA directly (even with a "no can do"?_

Holly:

I work in the Office of Ground Water and Drinking Water at Headquarters EPA, and have been assigned a project to analyze the number of persons on public drinking water supplies (PWS) that may be exposed to potential contamination from nuclear power plants as a result of the Japan
earthquake/tsunami event. For these types of analysis using geographic
information systems (GIS) it is very helpful to have the locational coordinates (i.e. latitude and longitude) of the locations.

I request the coordinates of all 65 sites (104 reactors) with plant name either in an Excel or ESRI shape file format that could be used directly
in the GIS analysis. I have copied my two managers in the branch that
approve of this data collection. CNNMoney.com published this information the other week at:
http://money.cnn.com/news/specials/nuclear_power_plants_locations/index.html?hpt=C2

Y4Y/302

The source for the information was NRC below the map, but I believe they must have developed the locations from your List of Power Reactor Units that gives a general direction and distance from a point (city and state). If you have the locations in "decimal degrees" that would be very helpful. \

Thank you very much for your attention to this request.

Roger Anzzolin

Mailing Address:
A. Roger Anzzolin, GISP
GIS Coordinator

U. S. Environmental Protection Agency
Office of Ground Water and Drinking Water (OGWDW) Mail Stop 4606M 1200 Pennsylvania Ave., NW
Washington, DC 20460-0001

Phone: (202) 564-4093
FAX (202) 564-3757.
E-Mail: anzzolin.roger@epa.gov

From: Ake, Jon
To: Burnell, Scott; Munson, Clifford; Bensi, Michelle
Cc: Brenner, Eliot; Hayden, Elizabeth
Subject: RE: Peter Yanev??
Date: Sunday, March 27, 2011 8:16:47 PM

Scott, I have heard the name but I am not familiar with the guy. I'll check around.
Jon

From: Burnell, Scott
Sent: Sunday, March 27, 2011 8:54 AM
To: Munson, Clifford; Ake, Jon; Bensi, Michelle
Cc: Brenner, Eliot; Hayden, Elizabeth
Subject: Peter Yanev??
Importance: High

Cliff, Jon, Michelle;

This is from today's New York Times piece on the tsunami at Fukushima:
http://www.nytimes.com/2011/03/27/world/asia/27nuke.html?_r=1&hp=&pagewanted=all

"They had years to prepare at that point, after Kashiwazaki, and I am seeing the same thing at Fukushima," said Peter Yanev, an expert in seismic risk assessment based in California, who has studied Fukushima for the United States Nuclear Regulatory Commission and the Energy Department.

Do we know this guy? I know we've been very careful to avoid commenting on Fukushima, and certainly not in this way! I'm thinking Yanev overstated his credentials and the reporter didn't check with us.

I'm much less concerned with the article's slam against us for "not going far enough" with risk-based seismic analysis, that's nothing new.

Scott

Y/4/303

From: The Washington Post
To: Hayden, Elizabeth
Subject: Breaking News: Radiation levels at Japanese nuclear plant 100,000 times above normal
Date: Sunday, March 27, 2011 7:30:13 PM

Breaking News Alert: Radiation levels at Japanese nuclear plant 100,000 times above normal
March 27, 2011 7:27:23 PM

Leaked water from the Fukushima Daiichi nuclear plant showed the highest radiation readings yet, compounding the risks for the hundreds of workers trying to repair the facility's cooling system. Seventeen workers have been exposed to high levels of radiation, and airborne radioactivity in the unit 2 building remained so high that a worker there would reach his yearly occupational exposure limit in 15 minutes.

http://link.email.washingtonpost.com/r/JDFA9Q/M9NWIW/9ZOJTC/1QDPMG/T5F5O/82/h

For more information, visit washingtonpost.com

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YY/304

Bano, Mahmooda

From: Scott, Michael
Sent: Saturday, March 26, 2011 8:08 PM
To: 'tdywebsterjm@state.gov'
Subject: FW: Dart Deployment Schedule 3.26.11
Attachments: DART Deployment Schedule 03.26.11.xlsx

From: RMTPACTSU_AC [mailto:RMTPACTSU_AC@ofda.gov]
Sent: Saturday, March 26, 2011 5:12 PM
To: RMT_PACTSU; DART_PACTSU
Subject: Dart Deployment Schedule 3.26.11

Hi Everyone,

Attached is the DART Deployment Schedule for 3/26/11 Washington time. Please let me know if there are any questions or concerns.

Regards,

Ron Mortensen
Acting *Admin Coordinator for 3/26/11*
Pacific Tsunami and Japan Earthquake Response Management Team
USAID/DHCA/OFDA
Rmtpactsu_ac@ofda.gov
703-839-0563

YYY/305

Pacific Tsunami DART
4/26/2011 11:29

DART	Name	Current Location	Departure (Departure times are local)	Arrival (Arrival times are local)	NOTES	Total Days	March Fri 11	Sat 12	Sun 13	Mon 14	Tue 15	Wed 16	Thur 17	Fri 18	Sat 19	Sun 20	Mon 21	Tue 22	Wed 23	Thur 24	Fri 25	Sat 26	Sun 27	Mon 28	Tue 29	Wed 30	Thur 31	April Fri 1	Sat 2	Sun 3	Mon 4	Tue 5	Wed 6	Thur 7	Fri 8	Sat 9	Sun 10
Team Leader	Bill Berger	Tokyo, Japan		BMI 0771 @1610		15		A	x	x	x	x	x	x	x	x	x	x	x	x	x	x															
Admin Coordinator	Natalya Johnson	Tokyo, Japan		UA 897 @1635	ETD 4/2	7											A	x	x	x	x	x							D								
Communications Officer	Marco Rivera	Tokyo, Japan		KE701 @1125	ETD 4/2	14				A	x	x	x	x	x	x	x	x	x	x	x	x							D								
Information Officer	Erin Magee	Tokyo, Japan		GA 884 @0900	ETD 4/2	15			A	x	x	x	x	x	x	x	x	x	x	x	x	x							D								
Deputy Team Leader	Courtney Brown	Tokyo, Japan		TG 676 @1600	ETD 4/2	14				A	x	x	x	x	x	x	x	x	x	x	x	x							D								
Field Officer	Amy Sink	Tokyo, Japan	UA 804 @1600	AA5835 @1605	ETD 3/30	17	A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				D											
DOE Liaison	Alan Remick	Tokyo, Japan		UA 0897 @1635		14			A	x	x	x	x	x	x	x	x	x	x	x	x	x															
DOE Liaison	Deborah Wilber	Tokyo, Japan		UA 0897 @1413		5													A	x	x	x															
DOE Liaison	William Haley	Tokyo, Japan		UA 0804 @1537	ETA 3/29	1																			A												
NRC Emergency Coordinator	Chuck Casto	Tokyo, Japan	AA 176 @1310	AA 0175 @1330	ETD 4/11	12						A	x	x	x	x	x	x	x	x	x	x															
NRC Liaison	Anthony Ulses	Tokyo, Japan	UA 898 @1610	Missawa @1522	ETD 3/26	15			A	x	x	x	x	x	x	x	x	x	x	x	x	x	D														
NRC Liaison	James Trapp	Tokyo, Japan	CO 008 @1645	UA 9681 @2225	ETD 3/25	13			A	x	x	x	x	x	x	x	x	x	x	x	D																
NRC Officer	Brooke Smith	Tokyo, Japan	UA 804 @1600	BA 0005 @0910	ETD 3/31	12						A	x	x	x	x	x	x	x	x	x	x					D										
NRC Officer	Richard Devercelly	Tokyo, Japan	AA 176 @1310	DL 0275 @1615	ETD 3/25	10						A	x	x	x	x	x	x	x	x	D																
NRC Officer	John Monninger	Tokyo, Japan	UA 804 @1600	BA 0005 @0910	ETD 3/29	12						A	x	x	x	x	x	x	x	x	x	x			D												
NRC Officer	Tony Nakanishi	Tokyo, Japan	UA 804 @1600	BA 0005 @0910	ETD 3/27	12						A	x	x	x	x	x	x	x	x	x	x	D														
NRC Officer	Jack Foster	Tokyo, Japan	UA 804 @1600	BA 0005 @0910	ETD 3/27	12						A	x	x	x	x	x	x	x	x	x	x	D														
NRC Officer	William Cook	Tokyo, Japan	AA 176 @1310	BA 0005 @0910	ETD 3/30	12						A	x	x	x	x	x	x	x	x	x	x				D											
NRC Officer	Kirk Foggie	Tokyo, Japan	UA 804 @1600	BA 0005 @0910	ETD 3/29	12						A	x	x	x	x	x	x	x	x	x	x			D												
NRC Officer	Daniel Dorman	Tokyo, Japan		UA 0897 @1635		7										A	x	x	x	x	x	x															
NRC Officer	Alan Blamey	Tokyo, Japan		AA 1673 @1530	ETA 3/23	4													A	x	x	x															
NRC Officer	Michael Scott	Tokyo, Japan		UA 0897 @1635	ETA 3/23	5													A	x	x	x											D				
NRC Officer	Todd Jackson	Tokyo, Japan		AA 0153 @1415	ETA 3/24	4														A	x	x											D				
NRC Officer	Abdul Sheikh	Tokyo, Japan		UA 0897 @1635	ETA 3/25	3															A	x												D			
NRC Officer	Robert Taylor	Tokyo, Japan		UA 0897 @1635	ETA 3/25	3															A	x												D			
NRC Officer	Marie Miller	Tokyo, Japan		AA 153 @1415	ETA 3/25	3															A	x												D			
NRC Officer	Syed Ali	Tokyo, Japan		UA 0897 @1635	ETA 3/25	3															A	x												D			
NRC Officer	Ralph Way	Tokyo, Japan		UA 0897 @1635	ETA 3/25	3															A	x												D			
NRC Officer	Jack Geissner	Tokyo, Japan		AA 0153 @1415	ETA 3/25	3															A	x												D			
NRC Officer	Danielle Emche	Tokyo, Japan		UA 0803 @1322	ETA 3/27	2																	A														
NRC Officer	Eric Stahl	Tokyo, Japan		UA 0803 @1221	ETA 3/29	2																			A												
NRC Officer	Elmo Collins	Tokyo, Japan			ETA 3/29	1																				A											
MLU Officer	Yoni Bock	Yokota AFB, Japan		TK 0050 @1230	ETD 4/2	14				A	x	x	x	x	x	x	x	x	x	x	x	x							D								
MLU Officer	Thomas Frey	Yokota AFB, Japan		UA 0837 @1540	ETD 4/2	12						A	x	x	x	x	x	x	x	x	x	x							D								
MLU Officer	Bill Laspina	Sendai, Japan		UA 0837 @1540	ETD 3/31	9									A	x	x	x	x	x	x	x					D										
Deputy Team Leader for Tech Team and SSO	Joe Hughart	Tokyo, Japan		UA 0881 @1725	ETD 4/2	15			A	x	x	x	x	x	x	x	x	x	x	x	x	x							D								
HHS Officer *	Jana Telfer	Tokyo, Japan				1																x															
HHS Officer *	Thomas Bowman	Tokyo, Japan				1																x															
HHS Officer *	Norman Coleman	Tokyo, Japan				1																x															
					Daily TOTAL DART		1	2	7	10	10	19	19	19	20	21	22	23	25	26	34	33	4	0	4	3	2	0	7	0	0	0	2	6	0	0	0

* Three HHS Officers (not funded by USAID/DCHA/OFDA) working under the DART organization but with full reporting responsibilities to the Department of State

Mon
11
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D05

From: PMT09 Hoc
Sent: Saturday, March 26, 2011 6:23 PM
To: Hoc, PMT12
Subject: RE: Embassy Readings

Thanks
NRC PMT

From: Hoc, PMT12
Sent: Saturday, March 26, 2011 5:31 PM
To: PMT02 Hoc; PMT11 Hoc; PMT09 Hoc; PMT03 Hoc
Subject: FW: Embassy Readings

From: Rothgeb, Jason (TDY/DAO) [mailto:TDYRothgebJ@state.gov]
Sent: Saturday, March 26, 2011 5:11 PM
To: CMHT; CWO2 Johnson; DOE Liaison; Farrell, Michael (TDY/DAO); HM2 Dorris; Foster, Jack; JFLCC COC; Miller, Marie; Mr. Courtney Brown; Hoc, PMT12; Richard Siler; Sorom RD; SSgt McCarty, James; Thomas Murphy
Subject: Embassy Readings

Good Morning Ladies and Gentlemen,

Attached is the latest readings from the United States Embassy Tokyo, Japan.

R/S
Sergeant Rothgeb, Jason A (2100-0900)
Sergeant Ravelo, Jaclyn L (0900-2100)
080-5033-3572

SBU
This email is UNCLASSIFIED.

YY/306

Measurement Date	Measurement Type	Raw Value	Measurement Unit	GRID	Location	Equipment Used
0030 3/25/2011	Beta/Gamma	0.033	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0130 3/25/2011	Beta/Gamma	0.035	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0230 3/25/2011	Beta/Gamma	0.036	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0330 3/25/2011	Beta/Gamma	0.046	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0430 3/25/2011	Beta/Gamma	0.04	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0530 3/25/2011	Beta/Gamma	0.032	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0630 3/25/2011	Beta/Gamma	0.037	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0730 3/25/2011	Beta/Gamma	0.03	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0830 3/25/2011	Beta/Gamma	0.032	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0930 3/25 2011	Beta/Gamma	0.08	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
1030 3/25/2011	Beta/Gamma	0.042	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
1130 3/25/2011	Beta/Gamma	0.04	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
1230 3/25/2011	Beta/Gamma	0.047	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
1330 3/25/2011	Beta/Gamma	0.038	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
1430 3/25/2011	Beta/Gamma	0.043	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
1530 3/25/2011	Beta/Gamma	0.04	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
1630 3/25/2011	Beta/Gamma	0.034	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77

Measurement Date	Measurement Type	Raw Value	Measurement Unit	Location	Grid	Measurement Taken By
0001 3/25/2011	Beta/Gamma	0.023	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0006 3/25/2011	Beta/Gamma	0.029	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0016 3/25/2011	Beta/Gamma	0.038	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0019 3/25/2011	Beta/Gamma	0.029	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0104 3/25/2011	Beta/Gamma	0.019	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0110 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0120 3/25/2011	Beta/Gamma	0.033	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0126 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0212 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0219 3/25/2011	Beta/Gamma	0.036	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0228 3/25/2011	Beta/Gamma	0.035	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0230 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0304 3/25/2011	Beta/Gamma	0.032	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0308 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0314 3/25/2011	Beta/Gamma	0.032	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0317 3/25/2011	Beta/Gamma	0.027	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0403 3/25/2011	Beta/Gamma	0.017	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0407 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0416 3/25/2011	Beta/Gamma	0.029	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0419 3/25/2011	Beta/Gamma	0.031	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0500 3/25/2011	Beta/Gamma	0.023	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0507 3/25/2011	Beta/Gamma	0.027	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0513 3/25/2011	Beta/Gamma	0.028	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0315 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0317 3/25/2011	Beta/Gamma	0.027	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0403 3/25/2011	Beta/Gamma	0.017	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0407 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0416 3/25/2011	Beta/Gamma	0.029	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0419 3/25/2011	Beta/Gamma	0.031	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0500 3/25/2011	Beta/Gamma	0.023	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0507 3/25/2011	Beta/Gamma	0.027	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0513 3/25/2011	Beta/Gamma	0.028	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0515 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93320 34932	AN/PDR-77
0610 3/25/2011	Beta/Gamma	0.045	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0617 3/25/2011	Beta/Gamma	0.031	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0623 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0625 3/25/2011	Beta/Gamma	0.031	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0703 3/25/2011	Beta/Gamma	0.023	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0709 3/25/2011	Beta/Gamma	0.037	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0716 3/25/2011	Beta/Gamma	0.033	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0719 3/25/2011	Beta/Gamma	0.039	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0801 3/25/2011	Beta/Gamma	0.028	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0806 3/25/2011	Beta/Gamma	0.033	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0813 3/25/2011	Beta/Gamma	0.028	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0816 3/25/2011	Beta/Gamma	0.035	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77

0900 3/25/2011	Beta/Gamma	0.036	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0907 3/25/2011	Beta/Gamma	0.039	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0914 3/25/2011	Beta/Gamma	0.037	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0916 3/25/2011	Beta/Gamma	0.044	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
1001 3/25/2011	Beta/Gamma	0.021	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
1005 3/25/2011	Beta/Gamma	0.037	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
1013 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
1015 3/25/2011	Beta/Gamma	0.033	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
1100 3/25/2011	Beta/Gamma	0.023	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
1107 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
1115 3/25/2011	Beta/Gamma	0.035	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
1117 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
1200 3/25/2011	Beta/Gamma	0.033	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
1207 3/25/2011	Beta/Gamma	0.035	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
1213 3/25/2011	Beta/Gamma	0.036	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
1215 3/25/2011	Beta/Gamma	0.039	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
1330 3/25/2011	Beta/Gamma	0.04	mrem	Sendai	54 S VH 93061 34872	AN/PDR-77
1340 3/25/2011	Beta/Gamma	0.035	mrem	Sendai	54 S VH 92587 35100	AN/PDR-77
1356 3/25/2011	Beta/Gamma	0.026	mrem	Sendai	54 S VH 92747 35393	AN/PDR-77
1359 3/25/2011	Beta/Gamma	0.033	mrem	Sendai	54 S VH 93055 35380	AN/PDR-77
1401 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 93064 35571	AN/PDR-77
1407 3/25/2011	Beta/Gamma	0.032	mrem	Sendai	53 S VH 93455 35566	AN/PDR-77
1411 3/25/2011	Beta/Gamma	0.031	mrem	Sendai	54 S VH 93378 35339	AN/PDR-77
1414 3/25/2011	Beta/Gamma	0.033	mrem	Sendai	54 S VH 93400 35135	AN/PDR-77
1418 3/25/2011	Beta/Gamma	0.031	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
1420 3/25/2011	Beta/Gamma	0.032	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
1542 3/25/2011	Beta/Gamma	0.028	mrem	Sendai	54 S VH 93207 34932	AN/PDR-77
1535 3/25/2011	Beta/Gamma	0.029	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
1530 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
1526 3/25/2011	Beta/Gamma	0.026	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
1606 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
1613 3/25/2011	Beta/Gamma	0.048	mrem	Sendai	54 S VH 92670 34884	AN/PDR-77
1621 3/25/2011	Beta/Gamma	0.031	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
1623 3/25/2011	Beta/Gamma	0.037	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
1705 3/25/2011	Beta/Gamma	0.032	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
1706 3/25/2011	Beta/Gamma	0.032	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77

Measurement Date	Measurement Type	Raw Value	Measurement Unit	Latitude *	Longitude *
0001 3/25/2011	gamma/beta	0.041	mrem	MATSUSHIMA (54S WH 19495 51446)	HANGER SS
0007 3/25/2011	gamma/beta	0.032	mrem	MATSUSHIMA (54S WH 19512 51428)	W. GATE
0014 3/25/2011	gamma/beta	0.051	mrem	MATSUSHIMA (54S WH 19613 51690)	LRG BLD NS
0021 3/25/2011	gamma/beta	0.05	mrem	MATSUSHIMA (54S WH 19337 51675)	BB FIELD
0025 3/25/2011	gamma/beta	0.031	mrem	MATSUSHIMA (54S WH 19339 51673)	FL E. SIDE
0100 3/25/2011	gamma/beta	0.045	mrem	MATSUSHIMA (54S WH 19495 51446)	HANGER SS
0105 3/25/2011	gamma/beta	0.029	mrem	MATSUSHIMA (54S WH 19512 51428)	W. GATE
0111 3/25/2011	gamma/beta	0.053	mrem	MATSUSHIMA (54S WH 19613 51690)	LRG BLD NS
0117 3/25/2011	gamma/beta	0.055	mrem	MATSUSHIMA (54S WH 19337 51675)	BB FIELD
0121 3/25/2011	gamma/beta	0.03	mrem	MATSUSHIMA (54S WH 19339 51673)	FL E. SIDE
0200 3/25/2011	gamma/beta	0.053	mrem	MATSUSHIMA (54S WH 19495 51446)	HANGER SS
0206 3/25/2011	gamma/beta	0.033	mrem	MATSUSHIMA (54S WH 19512 51428)	W. GATE
0213 3/25/2011	gamma/beta	0.058	mrem	MATSUSHIMA (54S WH 19613 51690)	LRG BLD NS
0218 3/25/2011.	gamma/beta	0.056	mrem	MATSUSHIMA (54S WH 19337 51675)	BB FIELD
0222 3/25/2011	gamma/beta	0.031	mrem	MATSUSHIMA (54S WH 19339 51673)	FL E. SIDE
0300 3/25/2011	gamma/beta	0.046	mrem	MATSUSHIMA (54S WH 19495 51446)	HANGER SS
0306 3/25/2011	gamma/beta	0.032	mrem	MATSUSHIMA (54S WH 19512 51428)	W. GATE
0312 3/25/2011	gamma/beta	0.054	mrem	MATSUSHIMA (54S WH 19613 51690)	LRG BLD NS
0318 3/25/2011	gamma/beta	0.059	mrem	MATSUSHIMA (54S WH 19337 51675)	BB FIELD
0322 3/25/2011	gamma/beta	0.029	mrem	MATSUSHIMA (54S WH 19339 51673)	FL E. SIDE
0400 3/25/2011	gamma/beta	0.054	mrem	MATSUSHIMA (54S WH 19495 51446)	HANGER SS
0406 3/25/2011	gamma/beta	0.029	mrem	MATSUSHIMA (54S WH 19512 51428)	W. GATE
0412 3/25/2011	gamma/beta	0.056	mrem	MATSUSHIMA (54S WH 19613 51690)	LRG BLD NS
0418 3/25/2011	gamma/beta	0.048	mrem	MATSUSHIMA (54S WH 19337 51675)	BB FIELD
0423 3/25/2011	gamma/beta	0.03	mrem	MATSUSHIMA (54S WH 19339 51673)	FL E. SIDE
0500 3/25/2011	gamma/beta	0.046	mrem	MATSUSHIMA (54S WH 19495 51446)	HANGER SS
0504 3/25/2011	gamma/beta	0.028	mrem	MATSUSHIMA (54S WH 19512 51428)	W. GATE
0510 3/25/2011	gamma/beta	0.052	mrem	MATSUSHIMA (54S WH 19613 51690)	LRG BLD NS
0515 3/25/2011	gamma/beta	0.059	mrem	MATSUSHIMA (54S WH 19337 51675)	BB FIELD
0521 3/25/2011	gamma/beta	0.031	mrem	MATSUSHIMA (54S WH 19339 51673)	FL E. SIDE
0635 3/24/2011	gamma/beta	0.038	mrem	54S UE 57805 24605	Flight Line (South)
0641 3/24/2011	gamma/beta	0.035	mrem	54S UE 57852 24977	West Gate
0645 3/24/2011	gamma/beta	0.047	mrem	54S UE 58779 26057	Navy Exchange
0656 3/24/2011	gamma/beta	0.052	mrem	52S UE 59267 26135	Main Gate
0701 3/24/2011	gamma/beta	0.026	mrem	52S UE 59686 24824	PAX Terminal
0707 3/24/2011	gamma/beta	0.045	mrem	52S UE 59267 26135	Flight Line (North)
0711 3/24/2011	gamma/beta	0.032	mrem	52S UE 59686 24824	CBRN Warehouse
0726 3/24/2011	gamma/beta	0.031	mrem	54S UE 57805 24605	Flight Line (South)
0731 3/24/2011	gamma/beta	0.031	mrem	54S UE 57852 24977	West Gate
0735 3/24/2011	gamma/beta	0.041	mrem	54S UE 58779 26057	Navy Exchange
0740 3/24/2011	gamma/beta	0.03	mrem	52S UE 59267 26135	Main Gate
0745 3/24/2011	gamma/beta	0.029	mrem	52S UE 59686 24824	PAX Terminal
0749 3/24/2011	gamma/beta	0.033	mrem	52S UE 59267 26135	Flight Line (North)
0754 3/24/2011	gamma/beta	0.05	mrem	52S UE 59686 24824	CBRN Warehouse
0819 3/24/2011	gamma/beta	0.032	mrem	54S UE 57805 24605	Flight Line (South)

0824 3/24/2011	gamma/beta	0.038	mrem	54S UE 57852 24977	West Gate
0827 3/24/2011	gamma/beta	0.028	mrem	54S UE 58779 26057	Navy Exchange
0831 3/24/2011	gamma/beta	0.031	mrem	52S UE 59267 26135	Main Gate
0836 3/24/2011	gamma/beta	0.029	mrem	52S UE 59686 24824	PAX Terminal
0841 3/24/2011	gamma/beta	0.042	mrem	52S UE 59267 26135	Flight Line (North)
0847 3/24/2011	gamma/beta	0.043	mrem	52S UE 59686 24824	CBRN Warehouse
0910 3/24/2011	gamma/beta	0.029	mrem	54S UE 57805 24605	Flight Line (South)
0916 3/24/2011	gamma/beta	0.028	mrem	54S UE 57852 24977	West Gate
0920 3/24/2011	gamma/beta	0.035	mrem	54S UE 58779 26057	Navy Exchange
0923 3/24/2011	gamma/beta	0.033	mrem	52S UE 59267 26135	Main Gate
0929 3/24/2011	gamma/beta	0.024	mrem	52S UE 59686 24824	PAX Terminal
0933 3/24/2011	gamma/beta	0.052	mrem	52S UE 59267 26135	Flight Line (North)
0945 3/24/2011	gamma/beta	0.035	mrem	52S UE 59686 24824	CBRN Warehouse
1011 3/24/2011	gamma/beta	0.029	mrem	54S UE 57805 24605	Flight Line (South)
1018 3/24/2011	gamma/beta	0.039	mrem	54S UE 57852 24977	West Gate
1026 3/24/2011	gamma/beta	0.026	mrem	54S UE 58779 26057	Navy Exchange
1030 3/24/2011	gamma/beta	0.022	mrem	52S UE 59267 26135	Main Gate
1039 3/24/2011	gamma/beta	0.03	mrem	52S UE 59686 24824	PAX Terminal
1045 3/24/2011	gamma/beta	0.037	mrem	52S UE 59267 26135	Flight Line (North)
1051 3/24/2011	gamma/beta	0.023	mrem	52S UE 59686 24824	CBRN Warehouse
1115 3/24/2011	gamma/beta	0.03	mrem	54S UE 57805 24605	Flight Line (South)
1123 3/24/2011	gamma/beta	0.031	mrem	54S UE 57852 24977	West Gate
1154 3/24/2011	gamma/beta	0.027	mrem	54S UE 58779 26057	Navy Exchange
1158 3/24/2011	gamma/beta	0.038	mrem	52S UE 59267 26135	Main Gate
1203 3/24/2011	gamma/beta	0.02	mrem	52S UE 59686 24824	PAX Terminal
1209 3/24/2011	gamma/beta	0.031	mrem	52S UE 59267 26135	Flight Line (North)
1215 3/24/2011	gamma/beta	0.022	mrem	52S UE 59686 24824	CBRN Warehouse
1242 3/24/2011	gamma/beta	0.032	mrem	54S UE 57805 24605	Flight Line (South)
1250 3/24/2011	gamma/beta	0.03	mrem	54S UE 57852 24977	West Gate
1254 3/24/2011	gamma/beta	0.03	mrem	54S UE 58779 26057	Navy Exchange
1258 3/24/2011	gamma/beta	0.018	mrem	52S UE 59267 26135	Main Gate
1303 3/24/2011	gamma/beta	0.045	mrem	52S UE 59686 24824	PAX Terminal
1308 3/24/2011	gamma/beta	0.031	mrem	52S UE 59267 26135	Flight Line (North)
1314 3/24/2011	gamma/beta	0.025	mrem	52S UE 59686 24824	CBRN Warehouse
1414 3/24/2011	gamma/beta	0.04	mrem	54S UE 57805 24605	Flight Line (South)
1421 3/24/2011	gamma/beta	0.037	mrem	54S UE 57852 24977	West Gate
1425 3/24/2011	gamma/beta	0.036	mrem	54S UE 58779 26057	Navy Exchange
1430 3/24/2011	gamma/beta	0.022	mrem	52S UE 59267 26135	Main Gate
1442 3/24/2011	gamma/beta	0.034	mrem	52S UE 59686 24824	PAX Terminal
1448 3/24/2011	gamma/beta	0.035	mrem	52S UE 59267 26135	Flight Line (North)
1455 3/24/2011	gamma/beta	0.026	mrem	52S UE 59686 24824	CBRN Warehouse
1538 3/24/2011	gamma/beta	0.037	mrem	54S UE 57805 24605	Flight Line (South)
1545 3/24/2011	gamma/beta	0.035	mrem	54S UE 57852 24977	West Gate
1551 3/24/2011	gamma/beta	0.028	mrem	54S UE 58779 26057	Navy Exchange
1555 3/24/2011	gamma/beta	0.027	mrem	52S UE 59267 26135	Main Gate
1601 3/24/2011	gamma/beta	0.027	mrem	52S UE 59686 24824	PAX Terminal

1607 3/24/2011	gamma/beta	0.024	mrem	52S UE 59267 26135	Flight Line (North)
1612 3/24/2011	gamma/beta	0.031	mrem	52S UE 59686 24824	CBRN Warehouse

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Measurement Date	Measurement Type	Raw Value	Measurement Unit	Latitude *	Longitude *	Measurement Taken By
0003 3/25/2011	Beta/Gamma	0.032	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0016 3/25/2011	Beta/Gamma	0.024	mrem	54S UE 59346 22940	Flight Line (South)	PDR-77
0023 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 57852 23672	West Gate	PDR-77
0026 3/25/2011	Beta/Gamma	0.018	mrem	54S UE 57805 24605	Navy Exchange	PDR-77
0030 3/25/2011	Beta/Gamma	0.018	mrem	54S UE 57862 24977	Main Gate	PDR-77
0035 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0040 3/25/2011	Beta/Gamma	0.027	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0046 3/25/2011	Beta/Gamma	0.015	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0056 3/25/2011	Beta/Gamma	0.03	mrem	54S UE 59346 22940	Flight Line (South)	PDR-77
0103 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 57852 23672	West Gate	PDR-77
0108 3/25/2011	Beta/Gamma	0.035	mrem	54S UE 57805 24605	Navy Exchange	PDR-77
0111 3/25/2011	Beta/Gamma	0.027	mrem	54S UE 57862 24977	Main Gate	PDR-77
0117 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0121 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0127 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0156 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 59346 22940	Flight Line (South)	PDR-77
0202 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 57852 23672	West Gate	PDR-77
0207 3/25/2011	Beta/Gamma	0.016	mrem	54S UE 57805 24605	Navy Exchange	PDR-77
0209 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 57862 24977	Main Gate	PDR-77
0214 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0220 3/25/2011	Beta/Gamma	0.018	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0225 3/25/2011	Beta/Gamma	0.017	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0237 3/25/2011	Beta/Gamma	0.027	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
0243 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 57852 24977	West Gate	PDR-77
0247 3/25/2011	Beta/Gamma	0.024	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
0250 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 57862 24977	Main Gate	PDR-77
0253 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0258 3/25/2011	Beta/Gamma	0.035	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0303 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0346 3/25/2011	Beta/Gamma	0.031	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
0352 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 57852 24977	West Gate	PDR-77
0357 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
0400 3/25/2011	Beta/Gamma	0.026	mrem	54S UE 57862 24977	Main Gate	PDR-77
0409 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0414 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0419 3/25/2011	Beta/Gamma	0.019	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0432 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
0439 3/25/2011	Beta/Gamma	0.014	mrem	54S UE 57852 24977	West Gate	PDR-77
0444 3/25/2011	Beta/Gamma	0.018	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
0448 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 57862 24977	Main Gate	PDR-77
0456 3/25/2011	Beta/Gamma	0.019	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0500 3/25/2011	Beta/Gamma	0.031	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0505 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0618 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
0626 3/25/2011	Beta/Gamma	0.03	mrem	54S UE 57852 24977	West Gate	PDR-77

0700 3/25/2011	Beta/Gamma	0.029	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
0705 3/25/2011	Beta/Gamma	0.027	mrem	54S UE 57862 24977	Main Gate	PDR-77
0712 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0718 3/25/2011	Beta/Gamma	0.029	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0725 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0749 3/25/2011	Beta/Gamma	0.026	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
0757 3/25/2011	Beta/Gamma	0.041	mrem	54S UE 57852 24977	West Gate	PDR-77
0803 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
0809 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 57862 24977	Main Gate	PDR-77
0816 3/25/2011	Beta/Gamma	0.031	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0821 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0829 3/25/2011	Beta/Gamma	0.052	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0859 3/25/2011	Beta/Gamma	0.033	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
0907 3/25/2011	Beta/Gamma	0.041	mrem	54S UE 57852 24977	West Gate	PDR-77
0911 3/25/2011	Beta/Gamma	0.026	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
0919 3/25/2011	Beta/Gamma	0.029	mrem	54S UE 57862 24977	Main Gate	PDR-77
0925 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0933 3/25/2011	Beta/Gamma	0.035	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0940 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
1008 3/25/2011	Beta/Gamma	0.032	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
1024 3/25/2011	Beta/Gamma	0.035	mrem	54S UE 57852 24977	West Gate	PDR-77
1029 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
1035 3/25/2011	Beta/Gamma	0.026	mrem	54S UE 57862 24977	Main Gate	PDR-77
1042 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
1051 3/25/2011	Beta/Gamma	0.032	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
1059 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
1153 3/25/2011	Beta/Gamma	0.024	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
1201 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 57852 24977	West Gate	PDR-77
1204 3/25/2011	Beta/Gamma	0.035	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
1209 3/25/2011	Beta/Gamma	0.026	mrem	54S UE 57862 24977	Main Gate	PDR-77
1217 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
1232 3/25/2011	Beta/Gamma	0.033	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
1237 3/25/2011	Beta/Gamma	0.03	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
1448 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
1455 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 57852 24977	West Gate	PDR-77
1500 3/25/2011	Beta/Gamma	0.021	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
1505 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 57862 24977	Main Gate	PDR-77
1512 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
1520 3/25/2011	Beta/Gamma	0.031	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
1526 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
1605 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
1610 3/25/2011	Beta/Gamma	0.032	mrem	54S UE 57852 24977	West Gate	PDR-77
1614 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
1620 3/25/2011	Beta/Gamma	0.027	mrem	54S UE 57862 24977	Main Gate	PDR-77
1626 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
1632 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77

1638 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
1702 3/25/2011	Beta/Gamma	0.04	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
1709 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 57852 24977	West Gate	PDR-77
1714 3/25/2011	Beta/Gamma	0.018	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
1718 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 57862 24977	Main Gate	PDR-77
1730 3/25/2011	Beta/Gamma	0.019	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
1739 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
1754 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
1820 3/25/2011	Beta/Gamma	0.021	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
1835 3/25/2011	Beta/Gamma	0.033	mrem	54S UE 57852 24977	West Gate	PDR-77
1840 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
1843 3/25/2011	Beta/Gamma	0.024	mrem	54S UE 57862 24977	Main Gate	PDR-77
1850 3/25/2011	Beta/Gamma	0.081	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
1854 3/25/2011	Beta/Gamma	0.026	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
1859 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
1924 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
1929 3/25/2011	Beta/Gamma	0.03	mrem	54S UE 57852 24977	West Gate	PDR-77
1933 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
1935 3/25/2011	Beta/Gamma	0.042	mrem	54S UE 57862 24977	Main Gate	PDR-77
1940 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
1945 3/25/2011	Beta/Gamma	0.046	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
1950 3/25/2011	Beta/Gamma	0.017	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
2008 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
2014 3/25/2011	Beta/Gamma	0.026	mrem	54S UE 57852 24977	West Gate	PDR-77
2017 3/25/2011	Beta/Gamma	0.018	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
2020 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 57862 24977	Main Gate	PDR-77
2025 3/25/2011	Beta/Gamma	0.016	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
2031 3/25/2011	Beta/Gamma	0.021	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
2035 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
2046 3/25/2011	Beta/Gamma	0.011	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
2055 3/25/2011	Beta/Gamma	0.035	mrem	54S UE 57852 24977	West Gate	PDR-77
2059 3/25/2011	Beta/Gamma	0.019	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
2101 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 57862 24977	Main Gate	PDR-77
2107 3/25/2011	Beta/Gamma	0.024	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
2111 3/25/2011	Beta/Gamma	0.034	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
2116 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
2152 3/25/2011	Beta/Gamma	0.015	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
2159 3/25/2011	Beta/Gamma	0.03	mrem	54S UE 57852 24977	West Gate	PDR-77
2203 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
2206 3/25/2011	Beta/Gamma	0.018	mrem	54S UE 57862 24977	Main Gate	PDR-77
2212 3/25/2011	Beta/Gamma	0.024	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
2216 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
2223 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77

Measurement Date	Measurement Type	Raw Value	Measurement Unit	Location	Grid	Equipment Used
0001 03/25/2011	Beta/Gamma	0.018	m/Rem	Yokota	51752 57170	ANPDR-77
0001 03/25/2011	Beta/Gamma	0.017	m/Rem	Yokota	51519 57126	ANPDR-77
0001 03/25/2011	Beta/Gamma	0.014	m/Rem	Yokota	51451 57542	ANPDR-77
0001 03/25/2011	Beta/Gamma	0.02	m/Rem	Yokota	51386 57958	ANPDR-77
0001 03/25/2011	Beta/Gamma	0.022	m/Rem	Yokota	51924 57038	ANPDR-77
0001 03/25/2011	Beta/Gamma	0.017	m/Rem	Yokota	51880 56657	ANPDR-77
0200 03/25/2011	Beta/Gamma	0.008	m/Rem	Yokota	51752 57170	ANPDR-77
0200 03/25/2011	Beta/Gamma	0.024	m/Rem	Yokota	51519 57126	ANPDR-77
0200 03/25/2011	Beta/Gamma	0.018	m/Rem	Yokota	51451 57542	ANPDR-77
0200 03/25/2011	Beta/Gamma	0.023	m/Rem	Yokota	51386 57958	ANPDR-77
0200 03/25/2011	Beta/Gamma	0.02	m/Rem	Yokota	51924 57038	ANPDR-77
0200 03/25/2011	Beta/Gamma	0.011	m/Rem	Yokota	51880 56657	ANPDR-77
0400 03/25/2011	Beta/Gamma	0.019	m/Rem	Yokota	51752 57170	ANPDR-77
0400 03/25/2011	Beta/Gamma	0.021	m/Rem	Yokota	51519 57126	ANPDR-77
0400 03/25/2011	Beta/Gamma	0.014	m/Rem	Yokota	51451 57542	ANPDR-77
0400 03/25/2011	Beta/Gamma	0.018	m/Rem	Yokota	51386 57958	ANPDR-77
0400 03/25/2011	Beta/Gamma	0.021	m/Rem	Yokota	51924 57038	ANPDR-77
0400 03/25/2011	Beta/Gamma	0.015	m/Rem	Yokota	51880 56657	ANPDR-77
0800 03/25/2011	Beta/Gamma	0.011	m/Rem	Yokota	51752 57170	ANPDR-77
0800 03/25/2011	Beta/Gamma	0.02	m/Rem	Yokota	51519 57126	ANPDR-77
0800 03/25/2011	Beta/Gamma	0.017	m/Rem	Yokota	51451 57542	ANPDR-77
0800 03/25/2011	Beta/Gamma	0.022	m/Rem	Yokota	51386 57958	ANPDR-77
0800 03/25/2011	Beta/Gamma	0.017	m/Rem	Yokota	51924 57038	ANPDR-77
1000 03/25/2011	Beta/Gamma	0.012	m/Rem	Yokota	51880 56657	ANPDR-77
1000 03/25/2011	Beta/Gamma	0.018	m/Rem	Yokota	51752 57170	ANPDR-77
1000 03/25/2011	Beta/Gamma	0.024	m/Rem	Yokota	51519 57126	ANPDR-77
1000 03/25/2011	Beta/Gamma	0.018	m/Rem	Yokota	51451 57542	ANPDR-77
1000 03/25/2011	Beta/Gamma	0.023	m/Rem	Yokota	51386 57958	ANPDR-77
1000 03/25/2011	Beta/Gamma	0.015	m/Rem	Yokota	51924 57038	ANPDR-77
1200 03/25/2011	Beta/Gamma	0.01	m/Rem	Yokota	51880 56657	ANPDR-77
1200 03/25/2011	Beta/Gamma	0.019	m/Rem	Yokota	51752 57170	ANPDR-77
1200 03/25/2011	Beta/Gamma	0.027	m/Rem	Yokota	51519 57126	ANPDR-77
1200 03/25/2011	Beta/Gamma	0.014	m/Rem	Yokota	51451 57542	ANPDR-77
1200 03/25/2011	Beta/Gamma	0.022	m/Rem	Yokota	51386 57958	ANPDR-77
1200 03/25/2011	Beta/Gamma	0.014	m/Rem	Yokota	51924 57038	ANPDR-77
1800 03/25/2011	Beta/Gamma	0.015	m/Rem	Yokota	51880 56657	ANPDR-77
1800 03/25/2011	Beta/Gamma	0.025	m/Rem	Yokota	51752 57170	ANPDR-77
1800 03/25/2011	Beta/Gamma	0.02	m/Rem	Yokota	51519 57126	ANPDR-77
1800 03/25/2011	Beta/Gamma	0.011	m/Rem	Yokota	51451 57542	ANPDR-77
1800 03/25/2011	Beta/Gamma	0.012	m/Rem	Yokota	51386 57958	ANPDR-77
1800 03/25/2011	Beta/Gamma	0.013	m/Rem	Yokota	51924 57038	ANPDR-77
2000 03/25/2011	Beta/Gamma	0.012	m/Rem	Yokota	51880 56657	ANPDR-77
2000 03/25/2011	Beta/Gamma	0.009	m/Rem	Yokota	51752 57170	ANPDR-77
2000 03/25/2011	Beta/Gamma	0.007	m/Rem	Yokota	51519 57126	ANPDR-77
2000 03/25/2011	Beta/Gamma	0.019	m/Rem	Yokota	51451 57542	ANPDR-77

2000 03/25/2011	Beta/Gamma	0.018	m/Rem	Yokota	51386 57958	ANPDR-77
2000 03/25/2011	Beta/Gamma	0.018	m/Rem	Yokota	51924 57038	ANPDR-77
2200 03/25/2011	Beta/Gamma	0.017	m/Rem	Yokota	51880 56657	ANPDR-77
2200 03/25/2011	Beta/Gamma	0.014	m/Rem	Yokota	51752 57170	ANPDR-77
2200 03/25/2011	Beta/Gamma	0.013	m/Rem	Yokota	51519 57126	ANPDR-77
2200 03/25/2011	Beta/Gamma	0.004	m/Rem	Yokota	51451 57542	ANPDR-77
2200 03/25/2011	Beta/Gamma	0.001	m/Rem	Yokota	51386 57958	ANPDR-77
2200 03/25/2011	Beta/Gamma	0.016	m/Rem	Yokota	51924 57038	ANPDR-77

Measurement Date	Measurement Type	Raw Value	Measurement Unit	Location	Lat/Lon	Equipment Used
0020 3/25/2011	Beta/Gamma	0.027	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0027 3/25/2011	Beta/Gamma	0.025	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0038 3/25/2011	Beta/Gamma	0.029	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0115 3/25/2011	Beta/Gamma	0.031	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0124 3/25/2011	Beta/Gamma	0.022	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0142 3/25/2011	Beta/Gamma	0.028	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0200 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0211 3/25/2011	Beta/Gamma	0.024	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0232 3/25/2011	Beta/Gamma	0.03	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0300 3/25/2011	Beta/Gamma	0.025	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0312 3/25/2011	Beta/Gamma	0.026	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0342 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0415 3/25/2011	Beta/Gamma	0.03	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0421 3/25/2011	Beta/Gamma	0.025	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0432 3/25/2011	Beta/Gamma	0.028	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0445 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	54 S VH 93749 21182	AN PDR 77
0600 3/25/2011	Beta/Gamma	0.021	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0613 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0623 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0630 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	54 S VH 93749 21182	AN PDR 77
0658 3/25/2011	Beta/Gamma	0.021	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0702 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0706 3/25/2011	Beta/Gamma	0.024	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0719 3/25/2011	Beta/Gamma	0.017	mrem	Sendai Airport	54 S VH 93749 21182	AN PDR 77
0809 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0815 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0821 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0827 3/25/2011	Beta/Gamma	0.018	mrem	Sendai Airport	54 S VH 93836 21142	AN PDR 77
0902 3/25/2011	Beta/Gamma	0.025	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0909 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0915 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
09 24 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	54 S VH 93749 21182	AN PDR 77
1005 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
1016 3/25/2011	Beta/Gamma	0.021	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
1023 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
1035 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	54 S VH 93893 21043	AN PDR 77
1039 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	54 S VH 93749 21182	AN PDR 77
1105 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
1113 3/25/2011	Beta/Gamma	0.021	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
1118 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
1123 3252011	Beta/Gamma	0.016	mrem	Sendai Airport	54 S VH 93893 21043	AN PDR 77
1205 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
1211 3/25/2011	Beta/Gamma	0.018	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
1214 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
1219 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	54 S VH 93893 21043	AN PDR 77

1314 3/25/2011	Beta/Gamma	0.025	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
1321 3/25/2011	Beta/Gamma	0.021	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
1324 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
1329 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	54 S VH 93893 21043	AN PDR 77
1407 3/25/2011	Beta/Gamma	0.018	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
1415 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
1418 3/25/2011	Beta/Gamma	0.022	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
1422 3/25/2011	Beta/Gamma	0.022	mrem	Sendai Airport	54 S VH 93893 21043	AN PDR 77
1505 3/25/2011	Beta/Gamma	0.013	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
1512 3/25/2011	Beta/Gamma	0.018	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
1516 3/25/2011	Beta/Gamma	0.017	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
1522 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	54 S VH 93893 21043	AN PDR 77
1610 3/25/2011	Beta/Gamma	0.015	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
1618 3/25/2011	Beta/Gamma	0.021	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
1623 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
1628 3/25/2011	Beta/Gamma	0.018	mrem	Sendai Airport	54 S VH 93893 21043	AN PDR 77

	New information since last report

Marine Corps Monitoring Equipment					
Measurement Date	Measurement Type	Raw Value	Measurement Unit	Location	Lat/Lon
0930 20110325	Gamma	0.023	mR/h	Embassy Rooftop	35.668 139.743
1130 20110325	Gamma	0.027	mR/h	Embassy Rooftop	35.668 139.743
1343 20110325	Gamma	0.024	mR/h	Embassy Rooftop	35.668 139.743
1530 20110325	Gamma	0.021	mR/h	Embassy Rooftop	35.668 139.743
1742 20110325	Gamma	0.044	mR/h	Embassy Rooftop	35.668 139.743
2000 20110325	Gamma	0.026	mR/h	Embassy Rooftop	35.668 139.743
2200 20110325	Gamma	0.024	mR/h	Embassy Rooftop	35.668 139.743
0001 20110326	Gamma	0.027	mR/h	Embassy Rooftop	35.668 139.743
0200 20110326	Gamma	0.030	mR/h	Embassy Rooftop	35.668 139.743
0400 20110326	Gamma	0.018	mR/h	Embassy Rooftop	35.668 139.743
0600 20110326	Gamma	0.017	mR/h	Embassy Rooftop	35.668 139.743
0800 20110326	Gamma	0.022	mR/h	Embassy Rooftop	35.668 139.743
1020 20110326	Gamma	0.025	mR/h	Embassy Rooftop	35.668 139.743
1200 20110326	Gamma	0.028	mR/h	Embassy Rooftop	35.668 139.743
1400 20110326	Gamma	0.030	mR/h	Embassy Rooftop	35.668 139.743
1600 20110326	Gamma	0.016	mR/h	Embassy Rooftop	35.668 139.743
1800 20110326	Gamma	0.026	mR/h	Embassy Rooftop	35.668 139.743
2000 20110326	Gamma	0.023	mR/h	Embassy Rooftop	35.668 139.743
2200 20110326	Gamma	0.024	mR/h	Embassy Rooftop	35.668 139.743
0001 20110327	Gamma	0.029	mR/h	Embassy Rooftop	35.668 139.743
0200 20110327	Gamma	0.028	mR/h	Embassy Rooftop	35.668 139.743
0400 20110327	Gamma	0.031	mR/h	Embassy Rooftop	35.668 139.743
0600 20110327	Gamma	0.024	mR/h	Embassy Rooftop	35.668 139.743
xxxx 20110327	Gamma		mR/h	Embassy Rooftop	35.668 139.743

DOE Monitoring Equipment					
Measurement Date	Measurement Type	Raw Value	Measurement Unit	Location	Lat/Lon
2240 20110325	Beta	850	CPM	Embassy Rooftop	35.668 139.743
2240 20110325	Gamma	21.4K	CPM	Embassy Rooftop	35.668 139.743
0001 20110326	Beta	835	CPM	Embassy Rooftop	35.668 139.743
0001 20110326	Gamma	25.7K	CPM	Embassy Rooftop	35.668 139.743
0200 20110326	Beta	840	CPM	Embassy Rooftop	35.668 139.743
0200 20110326	Gamma	24K	CPM	Embassy Rooftop	35.668 139.743
0400 20110326	Beta	875	CPM	Embassy Rooftop	35.668 139.743
0400 20110326	Gamma	25.6K	CPM	Embassy Rooftop	35.668 139.743
0600 20110326	Beta	865	CPM	Embassy Rooftop	35.668 139.743
0600 20110326	Gamma	23.3K	CPM	Embassy Rooftop	35.668 139.743
0800 20110326	Beta	880	CPM	Embassy Rooftop	35.668 139.743
0800 20110326	Gamma	23.7K	CPM	Embassy Rooftop	35.668 139.743
1020 20110326	Beta	860	CPM	Embassy Rooftop	35.668 139.743
1020 20110326	Gamma	27.0K	CPM	Embassy Rooftop	35.668 139.743
1200 20110326	Beta	920	CPM	Embassy Rooftop	35.668 139.743
1200 20110326	Gamma	33.9K	CPM	Embassy Rooftop	35.668 139.743
1400 20110326	Beta	910	CPM	Embassy Rooftop	35.668 139.743
1400 20110326	Gamma	33.8K	CPM	Embassy Rooftop	35.668 139.743
1600 20110326	Beta	860	CPM	Embassy Rooftop	35.668 139.743
1600 20110326	Gamma	33.3K	CPM	Embassy Rooftop	35.668 139.743

1800 20110326	Beta	911	CPM	Embassy Rooftop	35.668 139.743
1800 20110326	Gamma	33.4K	CPM	Embassy Rooftop	35.668 139.743
2000 20110326	Beta	820	CPM	Embassy Rooftop	35.668 139.743
2000 20110326	Gamma	33.3K	CPM	Embassy Rooftop	35.668 139.743
2200 20110326	Beta	930	CPM	Embassy Rooftop	35.668 139.743
2200 20110326	Gamma	34.0K	CPM	Embassy Rooftop	35.668 139.743
0001 20110327	Beta	680	CPM	Embassy Rooftop	35.668 139.743
0001 20110327	Gamma	34.8K	CPM	Embassy Rooftop	35.668 139.743
0200 20110327	Beta	615	CPM	Embassy Rooftop	35.668 139.743
0200 20110327	Gamma	33.4K	CPM	Embassy Rooftop	35.668 139.743
0400 20110327	Beta	930	CPM	Embassy Rooftop	35.668 139.743
0400 20110327	Gamma	33.0K	CPM	Embassy Rooftop	35.668 139.743
0600 20110327	Beta	870	CPM	Embassy Rooftop	35.668 139.743
0600 20110327	Gamma	32.6K	CPM	Embassy Rooftop	35.668 139.743
xxxx 20110327	Beta		CPM	Embassy Rooftop	35.668 139.743
xxxx 20110327	Gamma		CPM	Embassy Rooftop	35.668 139.743

iCAM Air Sampler					
Measurement Date	**Alpha Readings/Value**	**Beta Readings/Value**	**Measurement Unit**	**Location**	**Lat/Lon**
2240 20110325	3.34E-13	5.33E-12	uCi/cc	Embassy Rooftop	35.668 139.743
0001 20110326	2.31E-13	-5.31E-12	uCi/cc	Embassy Rooftop	35.668 139.743
0200 20110326	2.61E-13	-1.30E-12	uCi/cc	Embassy Rooftop	35.668 139.743
0400 20110326	-2.99E-13	3.03E-11	uCi/cc	Embassy Rooftop	35.668 139.743
0600 20110326	-8.68E-13	8.65E-12	uCi/cc	Embassy Rooftop	35.668 139.743
0800 20110326	4.31E-13	-5.72E-12	uCi/cc	Embassy Rooftop	35.668 139.743
1020 20110326	-3.86E-13	5.23E-12	uCi/cc	Embassy Rooftop	35.668 139.743
1200 20110326	3.31E-13	6.06E-12	uCi/cc	Embassy Rooftop	35.668 139.743
1400 20110326	-5.29E-13	9.64E-11	uCi/cc	Embassy Rooftop	35.668 139.743
1600 20110326	-4.41E-13	-1.42E-11	uCi/cc	Embassy Rooftop	35.668 139.743
1800 20110326	8.24E-13	-6.38E-12	uCi/cc	Embassy Rooftop	35.668 139.743
2000 20110326	-3.33E-13	6.88E-12	uCi/cc	Embassy Rooftop	35.668 139.743
2200 20110326	6.32E-13	-2.27E-12	uCi/cc	Embassy Rooftop	35.668 139.743
0001 20110327	-1.32E-13	-1.33E-11	uCi/cc	Embassy Rooftop	35.668 139.743
0200 20110327	-4.72E-13	9.20E-13	uCi/cc	Embassy Rooftop	35.668 139.743
0400 20110327	1.09E-12	-9.51E-12	uCi/cc	Embassy Rooftop	35.668 139.743
0600 20110327	4.85E-13	1.68E-12	uCi/cc	Embassy Rooftop	35.668 139.743
xxxx 20110327			uCi/cc	Embassy Rooftop	35.668 139.743

				DOE Low Volume Air Sampler	
Measurement Date	**Measurement Type**	**Raw Value**	**Measurement Unit**	**Location**	**Lat/Lon**
1246 20110326	Gamma	0.023	mR/h	Harris Tower	35.667 139.737
1542 20110326	Gamma	0.016	mR/h	Embassy Rooftop	35.668 139.743

Equipment Used	Remarks
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
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AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	

Equipment Used	Background
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	

DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	34 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	34 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	

Air Flow
1.3 CFM
1.2 CFM
1.2 CFM
1.2 CFM
1.2 CFM
1.2 CFM
1.1 CFM
1.1 CFM
1.2 CFM
1.1 CFM

Equipment Used	Run Time	Air Flow (Start/Stop)	Total Volume
AN/PDR-77	24 hr	.81/1.04 CFM	1484.76 SCF
AN/PDR-77	24 hr 13 min	. 78/.78 CFM	1135.59 SCF

From: Milligan, Patricia
Sent: Friday, March 25, 2011 8:41 AM
To: PMT09 Hoc; Hoc, PMT12
Cc: Blamey, Alan
Subject: RE: Q about shelf-life for KI Tablets - Can you find your document summarizing shelf-life extension for KI
Attachments: FDA shelf life extension.pdf

From: PMT09 Hoc
Sent: Thursday, March 24, 2011 10:07 PM
To: Milligan, Patricia; Hoc, PMT12
Cc: Blamey, Alan
Subject: Q about shelf-life for KI Tablets - Can you find your document summarizing shelf-life extension for KI
Importance: High

Trish-

Alan Blamey from the Japan team called the PMT tonight and asked about the statement that you previous had (I believe you had worked with Ambex) on the extension of the shelf-life for KI.

Can you find that documentation and either provide it to Alan or summarize it in a statement for him to use in his future discussions, should the issue come up? He is working with CDC and accessing their strategic stockpile of KI and it would be good to have that in their back pocket should the KI go to the Japanese.

Thanks
Cyndi Jones
PMT

YYY/307

Guidance for Federal Agencies and State and Local Governments

Potassium Iodide Tablets Shelf Life Extension

U.S. Department of Health and Human Services
Food and Drug Administration
Center for Drug Evaluation and Research (CDER)

March 2004
Procedural

Guidance for Federal Agencies and State and Local Governments

Potassium Iodide Tablets Shelf Life Extension

Additional copies are available from:

Office of Training and Communication
Division of Drug Information, HFD-240
Center for Drug Evaluation and Research
Food and Drug Administration
5600 Fishers Lane
Rockville, MD 20857
(Tel) 301-827-4573
http://www.fda.gov/cder/guidance/index.htm

U.S. Department of Health and Human Services
Food and Drug Administration
Center for Drug Evaluation and Research (CDER)

March 2004
Procedural

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Guidance for Federal Agencies and State and Local Governments[1]

Potassium Iodide Tablets Shelf Life Extension

This guidance represents the Food and Drug Administration's (FDA's) current thinking on this topic. It does not create or confer any rights for or on any person and does not operate to bind FDA or the public. You can use an alternative approach if that approach satisfies the requirements of the applicable statutes and regulations. If you want to discuss an alternative approach, contact the FDA staff responsible for implementing this guidance. If you cannot identify the appropriate FDA staff, call the appropriate number listed on the title page of this guidance.

I. INTRODUCTION

This document is intended to provide guidance to Federal agencies and to state and local governments on testing to extend the shelf life of stockpiled potassium iodide (KI) tablets. The Agency has developed this document in response to several state inquiries on this topic. This guidance discusses FDA recommendations on testing for such shelf life extensions, the qualifications of laboratories suitable to conduct the tests, and issues regarding notification of holders of stockpiled KI tablets as well as end users[2] about changes to batch shelf life once testing has been successfully conducted.

FDA's guidance documents, including this guidance, do not establish legally enforceable responsibilities. Instead, guidances describe the Agency's current thinking on a topic and should be viewed only as recommendations, unless specific regulatory or statutory requirements are cited. The use of the word *should* in Agency guidances means that something is suggested or recommended, but not required.

II. BACKGROUND

A. Regulatory Framework

[1] This guidance has been prepared by the Office of Pharmaceutical Science (OPS) in the Center for Drug Evaluation and Research (CDER) at the Food and Drug Administration.

[2] For purposes of this guidance, *end users* are consumers who have purchased KI, or intermediate holders of KI, such as fire departments, health departments, hospitals, or other entities who store KI for use in emergencies.

FDA has approved two new drug applications (NDAs) for Potassium Iodide Tablets, USP.[3] Both applications[4] were approved prior to 1985 and currently provide for marketing of 130-mg KI tablets over the counter (OTC) (i.e., without a prescription). Potassium iodide tablets manufactured by one or both holders of these NDAs have been stockpiled under controlled conditions for use in a radiation emergency.

An abbreviated new drug application (ANDA)[5] for Potassium Iodide Tablets, USP (65 mg), was approved on September 10, 2002.[6]

B. HHS Role in Radiological Planning and Preparedness Activities

Under 44 CFR 351, the Federal Emergency Management Agency (FEMA) has established roles and responsibilities for Federal agencies in assisting state and local governments in their radiological emergency planning and preparedness activities. The Federal agencies, including the Department of Health and Human Services (HHS), are to carry out these roles and responsibilities as members of the Federal Radiological Preparedness Coordinating Committee (FRPCC). Under § 351.23(f), HHS is directed to provide guidance to state and local governments on the use of radioprotective substances and the prophylactic use of drugs (e.g., KI tablets) to reduce the radiation dose to specific organs, including dosage and projected radiation exposures at which such drugs should be used. As a part of HHS, FDA has been providing relevant guidance to other agencies and the public on KI.

C. FDA Guidance on Safe and Effective Use of KI as a Radioprotective Agent

In November 2001, FDA provided guidance on the safe and effective use of KI tablets as an adjunct to other public health protective measures in the event that radioactive iodine is released into the environment. The guidance *Potassium Iodide as a Thyroid Blocking Agent in Radiation Emergencies* updated FDA's 1982 recommendations for the use of KI tablets to reduce the risk of thyroid cancer in radiation emergencies involving the release of radioactive iodine. The recommendations in that guidance addressed KI dosage and the projected radiation exposure at which the drug should be used. In April 2002, FDA issued another document, *Frequently Asked Questions on Potassium Iodide (KI)*. Additional information was provided for emergency pediatric dosing in *Home Preparation Procedure for Emergency Administration of Potassium Iodide Tablets to Infants and Small Children* (Home Procedures document), updated on July 3, 2002.[7]

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[3] United States Pharmacopeia.

[4] NDAs 18-307 and 18-664.

[5] Application ANDA 76-350.

[6] For an up-to-date listing of all approved KI products, consult the online version of FDA's *Approved Drug Products With Therapeutic Equivalence Evaluations* (Electronic Orange Book) at http://www.fda.gov/cder/ob/default.htm.

[7] These guidances can be found at http:www.fda.gov/cder/guidance/index.htm; http://www.fda.gov/cder/drugprepare/KI_Q&A.htm; and http://www.fda.gov/cder/drugprepare/kiprep.htm, respectively.

D. Shelf Life Extension of KI Tablets

A number of state and local governments maintain stockpiles of KI tablets for use in the event of a radiation emergency involving the release of radioactive iodine. Several states have asked FDA what would be necessary to provide confidence that stockpiled KI tablets have retained their original quality (i.e., purity and potency) after passing the expiration date.

Previously, two approaches have been used to extend the shelf life of expired drug products: (1) the ordinary approach taken by drug manufacturers, and (2) the Department of Defense (DOD) Sponsored Shelf Life Extension Program.

1. Ordinary Shelf Life Extension

In the preferred method of shelf life extension for drug manufacturers, the manufacturer of an approved drug product may propose an extension of the expiration dating period for that product based on acceptable data from full, long-term stability studies on at least three production batches in accordance with a protocol approved in the application. The data can be reported and FDA can be notified of the extension of the expiration dating period in an annual report submitted to the NDA or ANDA if, after obtaining and analyzing the data in accordance with the protocol, the criteria set forth in the approved stability protocol are met.[8]

2. DOD-Sponsored Shelf Life Extension Program

Certain drug products have been qualified for shelf life extension through the Shelf Life Extension Program (SLEP), which is sponsored by the DOD and performed by FDA. The SLEP is sponsored by the DOD because of the substantial savings to the government from extending the shelf life of certain antibiotics and other drug products of strategic importance that are stored in Federal stockpiles in large quantities under controlled conditions.

It is unlikely that any manufacturer of KI tablets would be willing to conduct testing of all of the lots of KI tablets that have already been distributed, and it would be infeasible for FDA to include KI tablets in a DOD-sponsored program. Because several states have inquired about possibly testing stockpiled KI for shelf life extension, the Agency is providing this guidance on testing for such shelf life extensions of KI that is being stockpiled under controlled conditions. The Agency is also providing guidance on how to identify laboratories suitable to conduct the tests, how to notify holders of stockpiled KI tablets and end users about changes in shelf life,[9] and how to distinguish stockpiled batches with different shelf lives.

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[8] In June 1998, the Agency issued a draft guidance on stability testing, *Stability Testing of Drug Substances and Drug Products*. Once finalized, this guidance will represent the Agency's current thinking on this topic.

[9] The shelf life extension testing described in this guidance can provide confidence only that KI that has been stored in accordance with the conditions described in the labeling will retain its potency and quality for an extended period of time.

III. DISCUSSION

Studies conducted during the SLEP program on a variety of drug products have shown that shelf lives of most drug products can be extended well beyond their expiration dates, but the additional stability period for a given drug can be highly variable. It was concluded that, due to lot-to-lot variability, the stability and quality of drug products with extended expiration dates could only be assured by continual testing and systematic evaluation of each lot.[10]

A. Observations About KI Tablet Stability Based on Historical Data

Potassium Iodide Tablets, USP, is a compendial drug product that is manufactured to meet the recommended tests and specifications listed in the USP monograph. Assay and dissolution are the two specifications with potential relevance to stability, assuming identification and content uniformity testing were performed at release.[11] Stability studies over many years have confirmed that none of the components of KI tablets, including the active ingredient, has any significant potential for chemical degradation or interaction with other components or with components of the container closure system when stored according to labeled directions.

To date, the only observed changes during stability testing have been the failure of some batches of KI tablets to meet the USP S_1 dissolution specification, Q=75 percent in 15 minutes. Some tablets tested required slightly longer than the specified time to achieve dissolution, but even in the case of a failure of this sort, the product would remain usable. In such cases, instructions can be provided to crush the tablets and mix them with a juice or other liquid prior to administration as suggested for emergency pediatric dosing (see Home Preparation Procedures document cited above). In any long-term stability evaluation, appearance should be monitored as a matter of course. In the specific case of KI tablets, a yellowish discoloration would be indicative of stability problems. Since pure KI is known to be very stable (as long as it is protected from moist air),[12] ongoing evaluation and testing of each batch is probably unnecessary as long as the market package remains intact and continues to be stored under controlled conditions as described in the labeling.

B. Recommended Protocol for Shelf Life Extension of KI Tablets

An example of a protocol for shelf life extension of KI tablets from a given manufacturer (manufacturer A) of stockpiled KI tablets is illustrated in the table later in this section.

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[10] "Stability Profiles of Drug Products Extended Beyond Labeled Expiration Dates," AAPS Poster Session, November 2001, Center for Drug Evaluation and Research, Office of Pharmaceutical Sciences, Division of Product Quality Research.

[11] The quality control division of the manufacturer performs identification and content uniformity testing before the product can be released for sale.

[12] "Slightly deliquescent in moist air; on long exposure to air becomes yellow due to liberation of iodine, and small quantities of iodate may be formed; light and moisture accelerate the decomposition," *The Merck Index, 12th edition, 7809, Potassium Iodide.*

We recommend that samples of three batches of KI tablets from each manufacturer be selected and stored under controlled conditions of temperature and humidity and that the samples be tested periodically for compliance with the USP assay and dissolution specifications. Each sample should consist of at least 25 tablets per test, but it would be prudent to select larger samples so that sequential testing and extensions can be performed indefinitely. Accelerated stability testing storage conditions are 40°C/75% relative humidity (R.H.). These conditions stress the product and are thought to be conservatively predictive of future stability for a period of time under room temperature conditions. Accelerated data are commonly used to establish initial expiration dates for pharmaceuticals. The expiration dates are confirmed with real time stability data. For KI tablets, results of these tests could support shelf life extensions as follows:

- If the testing results are acceptable after 3 months of storage under accelerated storage conditions, all batches of KI tablets from that manufacturer can be considered to be tentatively qualified for an additional 2 years.
- We recommend that additional samples of the three batches, stored at room temperature in a warehouse or other facility, be tested at the end of 2 years from the date of initial sampling to confirm the shelf life extension tentatively qualified by the accelerated studies.
- After this confirmation, additional shelf life extensions in increments of 2 years can be qualified in the same fashion (i.e., 3 months storage at accelerated conditions followed by confirmatory data from samples stored at room temperature for 2 years).

We recommend that adequate records of the testing be kept even when a batch fails stability testing.

As already mentioned, in any long-term stability evaluation, we recommend that appearance be monitored. Discoloration of the tablets would provide an early indication of stability problems.

Table: Example of a Protocol for Shelf Life Extension

Batch Identification	**Conditions**	**Start date**	**Finish date**	**Tests/Specifications* per USP: Assay: 60.1-69.9 mg Diss.: 75% in 60 min. Appearance**	**Stations Monitored**	**Shelf life**	**Expiry**
Manufacturer A	90 days accelerated.	10/1/02	12/31/02	√ √ √	0, 1, 2, 3 months	5 years (tentative)	10/04 (tentative)
"	24 months long term confirmatory	10/02	ongoing	√ √ √	0, 3, 6, 9, 12, 18, 24 months	5 years (confirmed)	10/04 (confirmed)
"	90 days accelerated	10/1/04	12/31/04	√ √ √	0, 1, 2, 3 months	7 years (tentative)	10/06 (tentative)
"	24 months long term confirmatory	10/02	ongoing	√ √ √	0, 3, 6, 9, 12, 18, 24 months	7 years (confirmed)	10/06 (confirmed)

Test	***USP Specification***
Potassium Iodide (USP method – titration)	60.1– 69.9 mg (92.5% - 107.5%) **(65 mg tablet)**
Dissolution	NLT 75% (Q) of labeled amount in 15 minutes
Appearance (visual) (Not USP)	No appreciable discoloration

C. Identifying a Suitable Laboratory

If the decision is made to contract to have shelf life testing performed, we recommend that a suitable laboratory be identified. The testing suggested in this guidance is uncomplicated, and most laboratories should be capable of performing the tests. General laboratory GMPs are discussed in detail in *Guide to Inspections of Dosage Form Drug Manufacturer's CGMPRs.*[13] The recommended assay test is a titration. Dissolution testing and the requisite apparatus are adequately described in the USP. Because these are compendial tests, the validation of methodology is straightforward (i.e., typical parameters are listed in USP <1225>). Potassium iodide is a very soluble drug substance and will be dissolved in the specified medium upon tablet disintegration, confirmed by measurement of the UV (ultraviolet) absorbance at the specified wavelength using a UV spectrophotometer.

D. Identification of Batches Qualified for Extension and Notification of Expired Batches

Once KI tablets from a given manufacturer have been qualified for shelf life extension by the program described above, we recommend that some provision be made to notify holders of stockpiled KI and end users as to which drug product has been qualified and what the new expiration date should be. The identification and notification procedures should be amenable to additional extensions. Potassium iodide tablets that are centrally stored can be shrink wrapped and marked with the qualified shelf life extension dates to distinguish them from other KI tablets that have different expiry dates. Each individual container need not be relabeled. End users can be notified of the extension of the expiration date using the batch identification number on each bottle.

Due to the inherent stability of KI tablets, stockpiled or distributed batches will probably not need to be replaced frequently. As noted previously, even if a batch fails the dissolution test, instructions for crushing the tablets can be provided with distributed batches.

[13] This document is available at http://www.fda.gov/ora/inspect_ref/igs/dose.html.

From: Hayden, Elizabeth
To: Harrington, Holly
Subject: RE: Pushback to CNN survey on EPZ community awareness
Date: Friday, March 25, 2011 4:47:00 PM

Thanks. Can Trish give you the approximate number of people surveyed?

Beth

From: Harrington, Holly
Sent: Friday, March 25, 2011 4:28 PM
To: Brenner, Eliot; Burnell, Scott; Couret, Ivonne; Hayden, Elizabeth; McIntyre, David; Chandrathil, Prema; Dricks, Victor; Hannah, Roger; Ledford, Joey; Mitlyng, Viktoria; Screnci, Diane; Sheehan, Neil; Uselding, Lara
Subject: Pushback to CNN survey on EPZ community awareness

Some useful info below related to this: http://politicalticker.blogs.cnn.com/2011/03/25/cnn-poll-most-near-nuclear-plants-not-ready-for-emergency/?hpt=C2 . I also have the entire document if you want it.

A national level public telephone survey was conducted among residents of NPP emergency planning zones (EPZ)1. The survey was designed to support assessment of public response. (It can be analyzed at the NRC regional level but not for detailed analyses at a state
or reactor site level. The survey was conducted in March of 2008.

Survey data indicates the following tendencies among the public residing within EPZs:

Residents are generally well informed about what to do for an NPP emergency;

Most residents remember receiving emergency response information from the NPP and keep it readily accessible;

Most residents recall receiving information regarding evacuation and sheltering;

Most residents would evacuate, shelter or monitor for more information if so directed;

Most residents would support a staged evacuation order, (i.e., shelter while others evacuated);

Many parents will go to schools to pick up children even if told they are already being evacuated; and

Most "special needs" persons, not in special facilities, have not registered for evacuation assistance. :

Most survey respondents believe they are likely to follow evacuation or shelter instructions. This data indicates that compliance with protective actions is likely.

Over 75 percent of respondents remembered receiving emergency planning information, and the majority of these respondents keep the information readily accessible. **Respondents generally expressed that the emergency planning information is easy to understand, clear, and helpful, with 19 percent indicating that not enough information is provided.**

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Twenty percent of all respondents have packed supplies in preparation for an evacuation.

Eight percent of respondents identified that someone in the household would need assistance from outside the home to evacuate, but only about a third of these respondents have registered with local authorities. This data suggests these individuals are not utilizing the registration programs available and that a more proactive means of registering special needs individuals who do not reside in special facilities may be beneficial.

Respondents were asked how likely they were to evacuate if they were not in danger but saw others evacuating, and a majority believed they would evacuate. When informed that sheltering while others evacuated higher risk areas was necessary, a majority believed they would shelter, which is supportive of staged evacuation used as a protective action.

A subsequent question asked of a smaller respondent set showed that 23 percent of respondents had previously evacuated when they were not under evacuation orders. This data provides insights into the potential for a shadow evacuation and emphasizes the need to communicate to the public in non-affected areas.

Most survey respondents believe they would go to a congregate care center if told to do so, while the focus group participants indicated they are not likely to go to these centers.

Yarsky, Peter

From: Gibson, Kathy
Sent: Tuesday, March 15, 2011 8:25 AM
To: RES_DSA
Subject: Fw: 0730 EDT (March 15, 2011) USNRC Earthquake/Tsunami SitRep
Attachments: USNRC Earthquake-Tsunami Update.031511.0730EDT.docx

FYI

From: Sheron, Brian
To: Case, Michael; Coe, Doug; Correia, Richard; Gibson, Kathy; Lui, Christiana; Richards, Stuart; Sangimino, Donna-Marie; Scott, Michael; Uhle, Jennifer; Valentin, Andrea
Sent: Tue Mar 15 07:59:04 2011
Subject: FW: 0730 EDT (March 15, 2011) USNRC Earthquake/Tsunami SitRep

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From: LIA07 Hoc
Sent: Tuesday, March 15, 2011 7:48 AM
To: Al Coons; Appleman Binkert; Bill King; Bill King 2; Charles Burrows; Charles Donnell; Conrad Burnside; Dan Feighert; Darrell Hammons; DOE NIT; DOT; DTRA; dudek; Elmer Naples; EOP; EPA; EPA2; Eric Sinibaldi; Gregory Simonson; Harry Sherwood; HHS; J Szymanski; Jim Kish; Johanna Berkey; John Holdren; K Donald; Karyn Keller; Lisa Hammond; Lukas McMichael; Maceck; Michelle Ralston; Nan Calhoun; Navy; NOC; NOC Duty Director; Nuclear SSA; Peter Lyons; Rebecca Thomson; RMT; Ron McCabe; Seamus O'Boyle; State; Stephen Trautman; Steve Colman; Steve Horwitz; Thomas Conran; Thomas Zerr; Tim Greten; Vanessa Quinn; William Webb; Andersen, James; Anderson, Joseph; Barker, Allan; Batkin, Joshua; Bradford, Anna; Brenner, Eliot; Bubar, Patrice; Castleman, Patrick; Coggins, Angela; Collins, Elmo; Dean, Bill; Decker, David; Dorman, Dan; Droggitis, Spiros; Franovich, Mike; Gibbs, Catina; Hahn, Matthew; Haney, Catherine; Harrington, Holly; Hipschman, Thomas; HOO Hoc; Howell, Art; Howell, Linda; Jaczko, Gregory; Johnson, Andrea; Johnson, Michael; Kahler, Robert; Leeds, Eric; Logaras, Harral; Loyd, Susan; Maier, Bill; Marshall, Michael; McCree, Victor; McDermott, Brian; McNamara, Nancy; Miller, Charles; Miller, Chris; Monninger, John; Nieh, Ho; NSIR_DDSP_ILTAB_Distribution; Orders, William; Ostendorff, William; Pace, Patti; Pearson, Laura; Satorius, Mark; Schmidt, Rebecca; Sharkey, Jeffry; Sheron, Brian; Snodderly, Michael; Sosa, Belkys; Speiser, Herald; Tifft, Doug; Trapp, James; Trojanowski, Robert; Warren, Roberta; Wiggins, Jim; Williams, Kevin; Wittick, Brian; Woodruff, Gena
Cc: LIA07 Hoc; LIA09 Hoc; LIA11 Hoc
Subject: 0730 EDT (March 15, 2011) USNRC Earthquake/Tsunami SitRep

Attached, please find a 0730 EDT situation report from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami on March 15, 2011. This Update includes information on the Fukushima Daiichi Units 2 and 4.

Please note that this information is "~~Official Use Only~~" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.
-Jim

Jim Anderson
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
james.anderson@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

YY/309

From: Haney, Catherine
To: Mohseni, Aby
Subject: FW: 0630 EDT (March 16, 2011) USNRC Earthquake/Tsunami SitRep
Date: Wednesday, March 16, 2011 8:54:00 AM
Attachments: NRC Status Update 3-16.11--0630am.pdf

See below evacuation. Based on where we were on Monday nite/Tuesday am, they haven't evacuated far enough based on this report – assuming winds going back to land vs. water.

From: LIA07 Hoc
Sent: Wednesday, March 16, 2011 6:46 AM
To: Andersen, James; Anderson, Joseph; Ash, Darren; Baggett, Steven; Barker, Allan; Batkin, Joshua; Boger, Bruce; Borchardt, Bill; Bradford, Anna; Brenner, Eliot; Smith, Brooke; Brown, Milton; Bubar, Patrice; Camper, Larry; Carpenter, Cynthia; Castleman, Patrick; Ader, Charles; Casto, Chuck; Coggins, Angela; Collins, Elmo; Correia, Richard; Dapas, Marc; Dean, Bill; Decker, David; Dickman-Disabled-11/14/2010, Paul; Dorman, Dan; Droggitis, Spiros; Dyer, Jim; ET02 Hoc; Evans, Michele; Franovich, Mike; Apostolakis, George; Gibbs, Catina; Giitter, Joseph; Gott, William; Grobe, Jack; Hahn, Matthew; Haney, Catherine; Harrington, Holly; Hipschman, Thomas; Holahan, Gary; Holahan, Patricia; HOO Hoc; Howell, Art; Howell, Linda; Foster, Jack; Jackson, Donald; Jaczko, Gregory; Johnson, Andrea; Johnson, Michael; Kahler, Robert; Foggie, Kirk; Kock, Andrea; Kozal, Jason; Leeds, Eric; LIA01 Hoc; LIA02 Hoc; LIA03 Hoc; LIA06 Hoc; LIA08 Hoc; LIA11 Hoc; Logaras, Harral; Loyd, Susan; Magwood, William; Maier, Bill; Marshall, Jane; Marshall, Michael; McCree, Victor; McDermott, Brian; McNamara, Nancy; Miller, Charles; Miller, Chris; Monninger, John; Morris, Scott; Nieh, Ho; NSIR_DDSP_ILTAB_Distribution; Ordaz, Vonna; Orders, William; Ostendorff, William; Pace, Patti; Pearson, Laura; Pederson, Cynthia; Plisco, Loren; Powell, Amy; R1 IRC; R2 IRC; R3 IRC; R4 IRC; Reddick, Darani; Reyes, Luis; Devercelly, Richard; ROO hoc; Satorius, Mark; Schmidt, Rebecca; Sharkey, Jeffry; Sheron, Brian; Snodderly, Michael; Sosa, Belkys; Speiser, Herald; Svinicki, Kristine; Thoma, John; Tifft, Doug; Kolb, Timothy; Ulses, Anthony; Nakanishi, Tony; Tracy, Glenn; Trapp; Trapp, James; Trojanowski, Robert; Uhle, Jennifer; Virgilio, Martin; Warnick, Greg; Warren, Roberta; Weber, Michael; Westreich, Barry; Wiggins, Jim; Cook, William; Williams, Kevin; Wittick, Brian; Woodruff, Gena; Zorn, Jason
Subject: 0630 EDT (March 16, 2011) USNRC Earthquake/Tsunami SitRep

Attached, please find a 0630 EDT situation report from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami on March 16, 2011. This Update includes information on dose rates near Fukushima Daiichi, Fukushima Daiichi plant parameters, and NRC PMT hypothetical Worst Case Analyses.
~~Please note that this information is "Official Use Only" and is only being shared within the federal family.~~
Please call the Headquarters Operations Officer at 301-816-5100 with questions.

Yen Chen
US Nuclear Regulatory Commission
LIA07.HOC@nrc.gov (Operations Center)

YYY/310

From: Rothgeb, Jason (TDY/DAO) <TDYRothgebJ@state.gov>
Sent: Saturday, March 26, 2011 5:11 PM
To: CMHT; CWO2 Johnson; DOE Liaison; Farrell, Michael (TDY/DAO); HM2 Dorris; Foster, Jack; JFLCC COC; Miller, Marie; Mr. Courtney Brown; Hoc, PMT12; Richard Siler; Sorom RD; SSgt McCarty, James; Thomas Murphy
Subject: Embassy Readings
Attachments: Embassy Rad Readings.xls

Good Morning Ladies and Gentlemen,

Attached is the latest readings from the United States Embassy Tokyo, Japan.

R/S
Sergeant Rothgeb, Jason A (2100-0900)
Sergeant Ravelo, Jaclyn L (0900-2100)
080-5033-3572

SBU
This email is UNCLASSIFIED.

YYY1311

Measurement Date	Measurement Type	Raw Value	Measurement Unit	GRID	Location	Equipment Used
0030 3/25/2011	Beta/Gamma	0.033	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0130 3/25/2011	Beta/Gamma	0.035	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0230 3/25/2011	Beta/Gamma	0.036	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0330 3/25/2011	Beta/Gamma	0.046	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0430 3/25/2011	Beta/Gamma	0.04	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0530 3/25/2011	Beta/Gamma	0.032	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0630 3/25/2011	Beta/Gamma	0.037	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0730 3/25/2011	Beta/Gamma	0.03	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0830 3/25/2011	Beta/Gamma	0.032	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
0930 3/25 2011	Beta/Gamma	0.08	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
1030 3/25/2011	Beta/Gamma	0.042	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
1130 3/25/2011	Beta/Gamma	0.04	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
1230 3/25/2011	Beta/Gamma	0.047	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
1330 3/25/2011	Beta/Gamma	0.038	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
1430 3/25/2011	Beta/Gamma	0.043	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
1530 3/25/2011	Beta/Gamma	0.04	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77
1630 3/25/2011	Beta/Gamma	0.034	mrem	Yamagata	54 S VH 58791 25188	AN/PDR-77

Measurement Date	Measurement Type	Raw Value	Measurement Unit	Location	Grid	Measurement Taken By
0001 3/25/2011	Beta/Gamma	0.023	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0006 3/25/2011	Beta/Gamma	0.029	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0016 3/25/2011	Beta/Gamma	0.038	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0019 3/25/2011	Beta/Gamma	0.029	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0104 3/25/2011	Beta/Gamma	0.019	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0110 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0120 3/25/2011	Beta/Gamma	0.033	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0126 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0212 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0219 3/25/2011	Beta/Gamma	0.036	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0228 3/25/2011	Beta/Gamma	0.035	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0230 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0304 3/25/2011	Beta/Gamma	0.032	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0308 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0314 3/25/2011	Beta/Gamma	0.032	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0317 3/25/2011	Beta/Gamma	0.027	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0403 3/25/2011	Beta/Gamma	0.017	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0407 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0416 3/25/2011	Beta/Gamma	0.029	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0419 3/25/2011	Beta/Gamma	0.031	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0500 3/25/2011	Beta/Gamma	0.023	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0507 3/25/2011	Beta/Gamma	0.027	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0513 3/25/2011	Beta/Gamma	0.028	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0315 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0317 3/25/2011	Beta/Gamma	0.027	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0403 3/25/2011	Beta/Gamma	0.017	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0407 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0416 3/25/2011	Beta/Gamma	0.029	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0419 3/25/2011	Beta/Gamma	0.031	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0500 3/25/2011	Beta/Gamma	0.023	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0507 3/25/2011	Beta/Gamma	0.027	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0513 3/25/2011	Beta/Gamma	0.028	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0515 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93320 34932	AN/PDR-77
0610 3/25/2011	Beta/Gamma	0.045	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0617 3/25/2011	Beta/Gamma	0.031	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0623 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0625 3/25/2011	Beta/Gamma	0.031	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0703 3/25/2011	Beta/Gamma	0.023	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0709 3/25/2011	Beta/Gamma	0.037	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0716 3/25/2011	Beta/Gamma	0.033	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0719 3/25/2011	Beta/Gamma	0.039	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
0801 3/25/2011	Beta/Gamma	0.028	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0806 3/25/2011	Beta/Gamma	0.033	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0813 3/25/2011	Beta/Gamma	0.028	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0816 3/25/2011	Beta/Gamma	0.035	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77

0900 3/25/2011	Beta/Gamma	0.036	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
0907 3/25/2011	Beta/Gamma	0.039	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
0914 3/25/2011	Beta/Gamma	0.037	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
0916 3/25/2011	Beta/Gamma	0.044	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
1001 3/25/2011	Beta/Gamma	0.021	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
1005 3/25/2011	Beta/Gamma	0.037	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
1013 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
1015 3/25/2011	Beta/Gamma	0.033	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
1100 3/25/2011	Beta/Gamma	0.023	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
1107 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
1115 3/25/2011	Beta/Gamma	0.035	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
1117 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
1200 3/25/2011	Beta/Gamma	0.033	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
1207 3/25/2011	Beta/Gamma	0.035	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
1213 3/25/2011	Beta/Gamma	0.036	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
1215 3/25/2011	Beta/Gamma	0.039	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
1330 3/25/2011	Beta/Gamma	0.04	mrem	Sendai	54 S VH 93061 34872	AN/PDR-77
1340 3/25/2011	Beta/Gamma	0.035	mrem	Sendai	54 S VH 92587 35100	AN/PDR-77
1356 3/25/2011	Beta/Gamma	0.026	mrem	Sendai	54 S VH 92747 35393	AN/PDR-77
1359 3/25/2011	Beta/Gamma	0.033	mrem	Sendai	54 S VH 93055 35380	AN/PDR-77
1401 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 93064 35571	AN/PDR-77
1407 3/25/2011	Beta/Gamma	0.032	mrem	Sendai	53 S VH 93455 35566	AN/PDR-77
1411 3/25/2011	Beta/Gamma	0.031	mrem	Sendai	54 S VH 93378 35339	AN/PDR-77
1414 3/25/2011	Beta/Gamma	0.033	mrem	Sendai	54 S VH 93400 35135	AN/PDR-77
1418 3/25/2011	Beta/Gamma	0.031	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
1420 3/25/2011	Beta/Gamma	0.032	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
1542 3/25/2011	Beta/Gamma	0.028	mrem	Sendai	54 S VH 93207 34932	AN/PDR-77
1535 3/25/2011	Beta/Gamma	0.029	mrem	Sendai	54 S VH 92760 34884	AN/PDR-77
1530 3/25/2011	Beta/Gamma	0.03	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
1526 3/25/2011	Beta/Gamma	0.026	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
1606 3/25/2011	Beta/Gamma	0.034	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
1613 3/25/2011	Beta/Gamma	0.048	mrem	Sendai	54 S VH 92670 34884	AN/PDR-77
1621 3/25/2011	Beta/Gamma	0.031	mrem	Sendai	54 S VH 93434 34916	AN/PDR-77
1623 3/25/2011	Beta/Gamma	0.037	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77
1705 3/25/2011	Beta/Gamma	0.032	mrem	Sendai	54 S VH 93202 34932	AN/PDR-77
1706 3/25/2011	Beta/Gamma	0.032	mrem	Sendai	54 S VH 93320 34922	AN/PDR-77

Measurement Date	Measurement Type	Raw Value	Measurement Unit	Latitude *	Longitude *
0001 3/25/2011	gamma/beta	0.041	mrem	MATSUSHIMA (54S WH 19495 51446)	HANGER SS
0007 3/25/2011	gamma/beta	0.032	mrem	MATSUSHIMA (54S WH 19512 51428)	W. GATE
0014 3/25/2011	gamma/beta	0.051	mrem	MATSUSHIMA (54S WH 19613 51690)	LRG BLD NS
0021 3/25/2011	gamma/beta	0.05	mrem	MATSUSHIMA (54S WH 19337 51675)	BB FIELD
0025 3/25/2011	gamma/beta	0.031	mrem	MATSUSHIMA (54S WH 19339 51673)	FL E. SIDE
0100 3/25/2011	gamma/beta	0.045	mrem	MATSUSHIMA (54S WH 19495 51446)	HANGER SS
0105 3/25/2011	gamma/beta	0.029	mrem	MATSUSHIMA (54S WH 19512 51428)	W. GATE
0111 3/25/2011	gamma/beta	0.053	mrem	MATSUSHIMA (54S WH 19613 51690)	LRG BLD NS
0117 3/25/2011	gamma/beta	0.055	mrem	MATSUSHIMA (54S WH 19337 51675)	BB FIELD
0121 3/25/2011	gamma/beta	0.03	mrem	MATSUSHIMA (54S WH 19339 51673)	FL E. SIDE
0200 3/25/2011	gamma/beta	0.053	mrem	MATSUSHIMA (54S WH 19495 51446)	HANGER SS
0206 3/25/2011	gamma/beta	0.033	mrem	MATSUSHIMA (54S WH 19512 51428)	W. GATE
0213 3/25/2011	gamma/beta	0.058	mrem	MATSUSHIMA (54S WH 19613 51690)	LRG BLD NS
0218 3/25/2011.	gamma/beta	0.056	mrem	MATSUSHIMA (54S WH 19337 51675)	BB FIELD
0222 3/25/2011	gamma/beta	0.031	mrem	MATSUSHIMA (54S WH 19339 51673)	FL E. SIDE
0300 3/25/2011	gamma/beta	0.046	mrem	MATSUSHIMA (54S WH 19495 51446)	HANGER SS
0306 3/25/2011	gamma/beta	0.032	mrem	MATSUSHIMA (54S WH 19512 51428)	W. GATE
0312 3/25/2011	gamma/beta	0.054	mrem	MATSUSHIMA (54S WH 19613 51690)	LRG BLD NS
0318 3/25/2011	gamma/beta	0.059	mrem	MATSUSHIMA (54S WH 19337 51675)	BB FIELD
0322 3/25/2011	gamma/beta	0.029	mrem	MATSUSHIMA (54S WH 19339 51673)	FL E. SIDE
0400 3/25/2011	gamma/beta	0.054	mrem	MATSUSHIMA (54S WH 19495 51446)	HANGER SS
0406 3/25/2011	gamma/beta	0.029	mrem	MATSUSHIMA (54S WH 19512 51428)	W. GATE
0412 3/25/2011	gamma/beta	0.056	mrem	MATSUSHIMA (54S WH 19613 51690)	LRG BLD NS
0418 3/25/2011	gamma/beta	0.048	mrem	MATSUSHIMA (54S WH 19337 51675)	BB FIELD
0423 3/25/2011	gamma/beta	0.03	mrem	MATSUSHIMA (54S WH 19339 51673)	FL E. SIDE
0500 3/25/2011	gamma/beta	0.046	mrem	MATSUSHIMA (54S WH 19495 51446)	HANGER SS
0504 3/25/2011	gamma/beta	0.028	mrem	MATSUSHIMA (54S WH 19512 51428)	W. GATE
0510 3/25/2011	gamma/beta	0.052	mrem	MATSUSHIMA (54S WH 19613 51690)	LRG BLD NS
0515 3/25/2011	gamma/beta	0.059	mrem	MATSUSHIMA (54S WH 19337 51675)	BB FIELD
0521 3/25/2011	gamma/beta	0.031	mrem	MATSUSHIMA (54S WH 19339 51673)	FL E. SIDE
0635 3/24/2011	gamma/beta	0.038	mrem	54S UE 57805 24605	Flight Line (South)
0641 3/24/2011	gamma/beta	0.035	mrem	54S UE 57852 24977	West Gate
0645 3/24/2011	gamma/beta	0.047	mrem	54S UE 58779 26057	Navy Exchange
0656 3/24/2011	gamma/beta	0.052	mrem	52S UE 59267 26135	Main Gate
0701 3/24/2011	gamma/beta	0.026	mrem	52S UE 59686 24824	PAX Terminal
0707 3/24/2011	gamma/beta	0.045	mrem	52S UE 59267 26135	Flight Line (North)
0711 3/24/2011	gamma/beta	0.032	mrem	52S UE 59686 24824	CBRN Warehouse
0726 3/24/2011	gamma/beta	0.031	mrem	54S UE 57805 24605	Flight Line (South)
0731 3/24/2011	gamma/beta	0.031	mrem	54S UE 57852 24977	West Gate
0735 3/24/2011	gamma/beta	0.041	mrem	54S UE 58779 26057	Navy Exchange
0740 3/24/2011	gamma/beta	0.03	mrem	52S UE 59267 26135	Main Gate
0745 3/24/2011	gamma/beta	0.029	mrem	52S UE 59686 24824	PAX Terminal
0749 3/24/2011	gamma/beta	0.033	mrem	52S UE 59267 26135	Flight Line (North)
0754 3/24/2011	gamma/beta	0.05	mrem	52S UE 59686 24824	CBRN Warehouse
0819 3/24/2011	gamma/beta	0.032	mrem	54S UE 57805 24605	Flight Line (South)

0824 3/24/2011	gamma/beta	0.038	mrem	54S UE 57852 24977	West Gate
0827 3/24/2011	gamma/beta	0.028	mrem	54S UE 58779 26057	Navy Exchange
0831 3/24/2011	gamma/beta	0.031	mrem	52S UE 59267 26135	Main Gate
0836 3/24/2011	gamma/beta	0.029	mrem	52S UE 59686 24824	PAX Terminal
0841 3/24/2011	gamma/beta	0.042	mrem	52S UE 59267 26135	Flight Line (North)
0847 3/24/2011	gamma/beta	0.043	mrem	52S UE 59686 24824	CBRN Warehouse
0910 3/24/2011	gamma/beta	0.029	mrem	54S UE 57805 24605	Flight Line (South)
0916 3/24/2011	gamma/beta	0.028	mrem	54S UE 57852 24977	West Gate
0920 3/24/2011	gamma/beta	0.035	mrem	54S UE 58779 26057	Navy Exchange
0923 3/24/2011	gamma/beta	0.033	mrem	52S UE 59267 26135	Main Gate
0929 3/24/2011	gamma/beta	0.024	mrem	52S UE 59686 24824	PAX Terminal
0933 3/24/2011	gamma/beta	0.052	mrem	52S UE 59267 26135	Flight Line (North)
0945 3/24/2011	gamma/beta	0.035	mrem	52S UE 59686 24824	CBRN Warehouse
1011 3/24/2011	gamma/beta	0.029	mrem	54S UE 57805 24605	Flight Line (South)
1018 3/24/2011	gamma/beta	0.039	mrem	54S UE 57852 24977	West Gate
1026 3/24/2011	gamma/beta	0.026	mrem	54S UE 58779 26057	Navy Exchange
1030 3/24/2011	gamma/beta	0.022	mrem	52S UE 59267 26135	Main Gate
1039 3/24/2011	gamma/beta	0.03	mrem	52S UE 59686 24824	PAX Terminal
1045 3/24/2011	gamma/beta	0.037	mrem	52S UE 59267 26135	Flight Line (North)
1051 3/24/2011	gamma/beta	0.023	mrem	52S UE 59686 24824	CBRN Warehouse
1115 3/24/2011	gamma/beta	0.03	mrem	54S UE 57805 24605	Flight Line (South)
1123 3/24/2011	gamma/beta	0.031	mrem	54S UE 57852 24977	West Gate
1154 3/24/2011	gamma/beta	0.027	mrem	54S UE 58779 26057	Navy Exchange
1158 3/24/2011	gamma/beta	0.038	mrem	52S UE 59267 26135	Main Gate
1203 3/24/2011	gamma/beta	0.02	mrem	52S UE 59686 24824	PAX Terminal
1209 3/24/2011	gamma/beta	0.031	mrem	52S UE 59267 26135	Flight Line (North)
1215 3/24/2011	gamma/beta	0.022	mrem	52S UE 59686 24824	CBRN Warehouse
1242 3/24/2011	gamma/beta	0.032	mrem	54S UE 57805 24605	Flight Line (South)
1250 3/24/2011	gamma/beta	0.03	mrem	54S UE 57852 24977	West Gate
1254 3/24/2011	gamma/beta	0.03	mrem	54S UE 58779 26057	Navy Exchange
1258 3/24/2011	gamma/beta	0.018	mrem	52S UE 59267 26135	Main Gate
1303 3/24/2011	gamma/beta	0.045	mrem	52S UE 59686 24824	PAX Terminal
1308 3/24/2011	gamma/beta	0.031	mrem	52S UE 59267 26135	Flight Line (North)
1314 3/24/2011	gamma/beta	0.025	mrem	52S UE 59686 24824	CBRN Warehouse
1414 3/24/2011	gamma/beta	0.04	mrem	54S UE 57805 24605	Flight Line (South)
1421 3/24/2011	gamma/beta	0.037	mrem	54S UE 57852 24977	West Gate
1425 3/24/2011	gamma/beta	0.036	mrem	54S UE 58779 26057	Navy Exchange
1430 3/24/2011	gamma/beta	0.022	mrem	52S UE 59267 26135	Main Gate
1442 3/24/2011	gamma/beta	0.034	mrem	52S UE 59686 24824	PAX Terminal
1448 3/24/2011	gamma/beta	0.035	mrem	52S UE 59267 26135	Flight Line (North)
1455 3/24/2011	gamma/beta	0.026	mrem	52S UE 59686 24824	CBRN Warehouse
1538 3/24/2011	gamma/beta	0.037	mrem	54S UE 57805 24605	Flight Line (South)
1545 3/24/2011	gamma/beta	0.035	mrem	54S UE 57852 24977	West Gate
1551 3/24/2011	gamma/beta	0.028	mrem	54S UE 58779 26057	Navy Exchange
1555 3/24/2011	gamma/beta	0.027	mrem	52S UE 59267 26135	Main Gate
1601 3/24/2011	gamma/beta	0.027	mrem	52S UE 59686 24824	PAX Terminal

1607 3/24/2011	gamma/beta	0.024	mrem	52S UE 59267 26135	Flight Line (North)
1612 3/24/2011	gamma/beta	0.031	mrem	52S UE 59686 24824	CBRN Warehouse

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Measurement Date	Measurement Type	Raw Value	Measurement Unit	Latitude *	Longitude *	Measurement Taken By
0003 3/25/2011	Beta/Gamma	0.032	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0016 3/25/2011	Beta/Gamma	0.024	mrem	54S UE 59346 22940	Flight Line (South)	PDR-77
0023 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 57852 23672	West Gate	PDR-77
0026 3/25/2011	Beta/Gamma	0.018	mrem	54S UE 57805 24605	Navy Exchange	PDR-77
0030 3/25/2011	Beta/Gamma	0.018	mrem	54S UE 57862 24977	Main Gate	PDR-77
0035 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0040 3/25/2011	Beta/Gamma	0.027	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0046 3/25/2011	Beta/Gamma	0.015	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0056 3/25/2011	Beta/Gamma	0.03	mrem	54S UE 59346 22940	Flight Line (South)	PDR-77
0103 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 57852 23672	West Gate	PDR-77
0108 3/25/2011	Beta/Gamma	0.035	mrem	54S UE 57805 24605	Navy Exchange	PDR-77
0111 3/25/2011	Beta/Gamma	0.027	mrem	54S UE 57862 24977	Main Gate	PDR-77
0117 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0121 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0127 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0156 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 59346 22940	Flight Line (South)	PDR-77
0202 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 57852 23672	West Gate	PDR-77
0207 3/25/2011	Beta/Gamma	0.016	mrem	54S UE 57805 24605	Navy Exchange	PDR-77
0209 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 57862 24977	Main Gate	PDR-77
0214 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0220 3/25/2011	Beta/Gamma	0.018	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0225 3/25/2011	Beta/Gamma	0.017	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0237 3/25/2011	Beta/Gamma	0.027	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
0243 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 57852 24977	West Gate	PDR-77
0247 3/25/2011	Beta/Gamma	0.024	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
0250 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 57862 24977	Main Gate	PDR-77
0253 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0258 3/25/2011	Beta/Gamma	0.035	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0303 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0346 3/25/2011	Beta/Gamma	0.031	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
0352 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 57852 24977	West Gate	PDR-77
0357 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
0400 3/25/2011	Beta/Gamma	0.026	mrem	54S UE 57862 24977	Main Gate	PDR-77
0409 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0414 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0419 3/25/2011	Beta/Gamma	0.019	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0432 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
0439 3/25/2011	Beta/Gamma	0.014	mrem	54S UE 57852 24977	West Gate	PDR-77
0444 3/25/2011	Beta/Gamma	0.018	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
0448 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 57862 24977	Main Gate	PDR-77
0456 3/25/2011	Beta/Gamma	0.019	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0500 3/25/2011	Beta/Gamma	0.031	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0505 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0618 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
0626 3/25/2011	Beta/Gamma	0.03	mrem	54S UE 57852 24977	West Gate	PDR-77

0700 3/25/2011	Beta/Gamma	0.029	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
0705 3/25/2011	Beta/Gamma	0.027	mrem	54S UE 57862 24977	Main Gate	PDR-77
0712 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0718 3/25/2011	Beta/Gamma	0.029	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0725 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0749 3/25/2011	Beta/Gamma	0.026	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
0757 3/25/2011	Beta/Gamma	0.041	mrem	54S UE 57852 24977	West Gate	PDR-77
0803 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
0809 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 57862 24977	Main Gate	PDR-77
0816 3/25/2011	Beta/Gamma	0.031	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0821 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0829 3/25/2011	Beta/Gamma	0.052	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
0859 3/25/2011	Beta/Gamma	0.033	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
0907 3/25/2011	Beta/Gamma	0.041	mrem	54S UE 57852 24977	West Gate	PDR-77
0911 3/25/2011	Beta/Gamma	0.026	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
0919 3/25/2011	Beta/Gamma	0.029	mrem	54S UE 57862 24977	Main Gate	PDR-77
0925 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
0933 3/25/2011	Beta/Gamma	0.035	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
0940 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
1008 3/25/2011	Beta/Gamma	0.032	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
1024 3/25/2011	Beta/Gamma	0.035	mrem	54S UE 57852 24977	West Gate	PDR-77
1029 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
1035 3/25/2011	Beta/Gamma	0.026	mrem	54S UE 57862 24977	Main Gate	PDR-77
1042 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
1051 3/25/2011	Beta/Gamma	0.032	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
1059 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
1153 3/25/2011	Beta/Gamma	0.024	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
1201 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 57852 24977	West Gate	PDR-77
1204 3/25/2011	Beta/Gamma	0.035	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
1209 3/25/2011	Beta/Gamma	0.026	mrem	54S UE 57862 24977	Main Gate	PDR-77
1217 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
1232 3/25/2011	Beta/Gamma	0.033	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
1237 3/25/2011	Beta/Gamma	0.03	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
1448 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
1455 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 57852 24977	West Gate	PDR-77
1500 3/25/2011	Beta/Gamma	0.021	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
1505 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 57862 24977	Main Gate	PDR-77
1512 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
1520 3/25/2011	Beta/Gamma	0.031	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
1526 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
1605 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
1610 3/25/2011	Beta/Gamma	0.032	mrem	54S UE 57852 24977	West Gate	PDR-77
1614 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
1620 3/25/2011	Beta/Gamma	0.027	mrem	54S UE 57862 24977	Main Gate	PDR-77
1626 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
1632 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77

1638 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
1702 3/25/2011	Beta/Gamma	0.04	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
1709 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 57852 24977	West Gate	PDR-77
1714 3/25/2011	Beta/Gamma	0.018	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
1718 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 57862 24977	Main Gate	PDR-77
1730 3/25/2011	Beta/Gamma	0.019	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
1739 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
1754 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
1820 3/25/2011	Beta/Gamma	0.021	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
1835 3/25/2011	Beta/Gamma	0.033	mrem	54S UE 57852 24977	West Gate	PDR-77
1840 3/25/2011	Beta/Gamma	0.022	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
1843 3/25/2011	Beta/Gamma	0.024	mrem	54S UE 57862 24977	Main Gate	PDR-77
1850 3/25/2011	Beta/Gamma	0.081	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
1854 3/25/2011	Beta/Gamma	0.026	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
1859 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
1924 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
1929 3/25/2011	Beta/Gamma	0.03	mrem	54S UE 57852 24977	West Gate	PDR-77
1933 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
1935 3/25/2011	Beta/Gamma	0.042	mrem	54S UE 57862 24977	Main Gate	PDR-77
1940 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
1945 3/25/2011	Beta/Gamma	0.046	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
1950 3/25/2011	Beta/Gamma	0.017	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
2008 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
2014 3/25/2011	Beta/Gamma	0.026	mrem	54S UE 57852 24977	West Gate	PDR-77
2017 3/25/2011	Beta/Gamma	0.018	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
2020 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 57862 24977	Main Gate	PDR-77
2025 3/25/2011	Beta/Gamma	0.016	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
2031 3/25/2011	Beta/Gamma	0.021	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
2035 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
2046 3/25/2011	Beta/Gamma	0.011	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
2055 3/25/2011	Beta/Gamma	0.035	mrem	54S UE 57852 24977	West Gate	PDR-77
2059 3/25/2011	Beta/Gamma	0.019	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
2101 3/25/2011	Beta/Gamma	0.02	mrem	54S UE 57862 24977	Main Gate	PDR-77
2107 3/25/2011	Beta/Gamma	0.024	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
2111 3/25/2011	Beta/Gamma	0.034	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
2116 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77
2152 3/25/2011	Beta/Gamma	0.015	mrem	54S UE 57805 24605	Flight Line (South)	PDR-77
2159 3/25/2011	Beta/Gamma	0.03	mrem	54S UE 57852 24977	West Gate	PDR-77
2203 3/25/2011	Beta/Gamma	0.025	mrem	54S UE 58779 26057	Navy Exchange	PDR-77
2206 3/25/2011	Beta/Gamma	0.018	mrem	54S UE 57862 24977	Main Gate	PDR-77
2212 3/25/2011	Beta/Gamma	0.024	mrem	54S UE 58779 25057	PAX Terminal	PDR-77
2216 3/25/2011	Beta/Gamma	0.028	mrem	54S UE 59267 26135	Flight Line (North)	PDR-77
2223 3/25/2011	Beta/Gamma	0.023	mrem	54S UE 59686 24824	CBRN Warehouse	PDR-77

Measurement Date	Measurement Type	Raw Value	Measurement Unit	Location	Grid	Equipment Used
0001 03/25/2011	Beta/Gamma	0.018	m/Rem	Yokota	51752 57170	ANPDR-77
0001 03/25/2011	Beta/Gamma	0.017	m/Rem	Yokota	51519 57126	ANPDR-77
0001 03/25/2011	Beta/Gamma	0.014	m/Rem	Yokota	51451 57542	ANPDR-77
0001 03/25/2011	Beta/Gamma	0.02	m/Rem	Yokota	51386 57958	ANPDR-77
0001 03/25/2011	Beta/Gamma	0.022	m/Rem	Yokota	51924 57038	ANPDR-77
0001 03/25/2011	Beta/Gamma	0.017	m/Rem	Yokota	51880 56657	ANPDR-77
0200 03/25/2011	Beta/Gamma	0.008	m/Rem	Yokota	51752 57170	ANPDR-77
0200 03/25/2011	Beta/Gamma	0.024	m/Rem	Yokota	51519 57126	ANPDR-77
0200 03/25/2011	Beta/Gamma	0.018	m/Rem	Yokota	51451 57542	ANPDR-77
0200 03/25/2011	Beta/Gamma	0.023	m/Rem	Yokota	51386 57958	ANPDR-77
0200 03/25/2011	Beta/Gamma	0.02	m/Rem	Yokota	51924 57038	ANPDR-77
0200 03/25/2011	Beta/Gamma	0.011	m/Rem	Yokota	51880 56657	ANPDR-77
0400 03/25/2011	Beta/Gamma	0.019	m/Rem	Yokota	51752 57170	ANPDR-77
0400 03/25/2011	Beta/Gamma	0.021	m/Rem	Yokota	51519 57126	ANPDR-77
0400 03/25/2011	Beta/Gamma	0.014	m/Rem	Yokota	51451 57542	ANPDR-77
0400 03/25/2011	Beta/Gamma	0.018	m/Rem	Yokota	51386 57958	ANPDR-77
0400 03/25/2011	Beta/Gamma	0.021	m/Rem	Yokota	51924 57038	ANPDR-77
0400 03/25/2011	Beta/Gamma	0.015	m/Rem	Yokota	51880 56657	ANPDR-77
0800 03/25/2011	Beta/Gamma	0.011	m/Rem	Yokota	51752 57170	ANPDR-77
0800 03/25/2011	Beta/Gamma	0.02	m/Rem	Yokota	51519 57126	ANPDR-77
0800 03/25/2011	Beta/Gamma	0.017	m/Rem	Yokota	51451 57542	ANPDR-77
0800 03/25/2011	Beta/Gamma	0.022	m/Rem	Yokota	51386 57958	ANPDR-77
0800 03/25/2011	Beta/Gamma	0.017	m/Rem	Yokota	51924 57038	ANPDR-77
1000 03/25/2011	Beta/Gamma	0.012	m/Rem	Yokota	51880 56657	ANPDR-77
1000 03/25/2011	Beta/Gamma	0.018	m/Rem	Yokota	51752 57170	ANPDR-77
1000 03/25/2011	Beta/Gamma	0.024	m/Rem	Yokota	51519 57126	ANPDR-77
1000 03/25/2011	Beta/Gamma	0.018	m/Rem	Yokota	51451 57542	ANPDR-77
1000 03/25/2011	Beta/Gamma	0.023	m/Rem	Yokota	51386 57958	ANPDR-77
1000 03/25/2011	Beta/Gamma	0.015	m/Rem	Yokota	51924 57038	ANPDR-77
1200 03/25/2011	Beta/Gamma	0.01	m/Rem	Yokota	51880 56657	ANPDR-77
1200 03/25/2011	Beta/Gamma	0.019	m/Rem	Yokota	51752 57170	ANPDR-77
1200 03/25/2011	Beta/Gamma	0.027	m/Rem	Yokota	51519 57126	ANPDR-77
1200 03/25/2011	Beta/Gamma	0.014	m/Rem	Yokota	51451 57542	ANPDR-77
1200 03/25/2011	Beta/Gamma	0.022	m/Rem	Yokota	51386 57958	ANPDR-77
1200 03/25/2011	Beta/Gamma	0.014	m/Rem	Yokota	51924 57038	ANPDR-77
1800 03/25/2011	Beta/Gamma	0.015	m/Rem	Yokota	51880 56657	ANPDR-77
1800 03/25/2011	Beta/Gamma	0.025	m/Rem	Yokota	51752 57170	ANPDR-77
1800 03/25/2011	Beta/Gamma	0.02	m/Rem	Yokota	51519 57126	ANPDR-77
1800 03/25/2011	Beta/Gamma	0.011	m/Rem	Yokota	51451 57542	ANPDR-77
1800 03/25/2011	Beta/Gamma	0.012	m/Rem	Yokota	51386 57958	ANPDR-77
1800 03/25/2011	Beta/Gamma	0.013	m/Rem	Yokota	51924 57038	ANPDR-77
2000 03/25/2011	Beta/Gamma	0.012	m/Rem	Yokota	51880 56657	ANPDR-77
2000 03/25/2011	Beta/Gamma	0.009	m/Rem	Yokota	51752 57170	ANPDR-77
2000 03/25/2011	Beta/Gamma	0.007	m/Rem	Yokota	51519 57126	ANPDR-77
2000 03/25/2011	Beta/Gamma	0.019	m/Rem	Yokota	51451 57542	ANPDR-77

2000 03/25/2011	Beta/Gamma	0.018	m/Rem	Yokota	51386 57958	ANPDR-77
2000 03/25/2011	Beta/Gamma	0.018	m/Rem	Yokota	51924 57038	ANPDR-77
2200 03/25/2011	Beta/Gamma	0.017	m/Rem	Yokota	51880 56657	ANPDR-77
2200 03/25/2011	Beta/Gamma	0.014	m/Rem	Yokota	51752 57170	ANPDR-77
2200 03/25/2011	Beta/Gamma	0.013	m/Rem	Yokota	51519 57126	ANPDR-77
2200 03/25/2011	Beta/Gamma	0.004	m/Rem	Yokota	51451 57542	ANPDR-77
2200 03/25/2011	Beta/Gamma	0.001	m/Rem	Yokota	51386 57958	ANPDR-77
2200 03/25/2011	Beta/Gamma	0.016	m/Rem	Yokota	51924 57038	ANPDR-77

Measurement Date	Measurement Type	Raw Value	Measurement Unit	Location	Lat/Lon	Equipment Used
0020 3/25/2011	Beta/Gamma	0.027	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0027 3/25/2011	Beta/Gamma	0.025	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0038 3/25/2011	Beta/Gamma	0.029	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0115 3/25/2011	Beta/Gamma	0.031	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0124 3/25/2011	Beta/Gamma	0.022	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0142 3/25/2011	Beta/Gamma	0.028	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0200 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0211 3/25/2011	Beta/Gamma	0.024	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0232 3/25/2011	Beta/Gamma	0.03	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0300 3/25/2011	Beta/Gamma	0.025	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0312 3/25/2011	Beta/Gamma	0.026	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0342 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0415 3/25/2011	Beta/Gamma	0.03	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0421 3/25/2011	Beta/Gamma	0.025	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0432 3/25/2011	Beta/Gamma	0.028	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0445 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	54 S VH 93749 21182	AN PDR 77
0600 3/25/2011	Beta/Gamma	0.021	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0613 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0623 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0630 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	54 S VH 93749 21182	AN PDR 77
0658 3/25/2011	Beta/Gamma	0.021	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0702 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0706 3/25/2011	Beta/Gamma	0.024	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0719 3/25/2011	Beta/Gamma	0.017	mrem	Sendai Airport	54 S VH 93749 21182	AN PDR 77
0809 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
0815 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
0821 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0827 3/25/2011	Beta/Gamma	0.018	mrem	Sendai Airport	54 S VH 93836 21142	AN PDR 77
0902 3/25/2011	Beta/Gamma	0.025	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0909 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
0915 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
09 24 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	54 S VH 93749 21182	AN PDR 77
1005 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
1016 3/25/2011	Beta/Gamma	0.021	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
1023 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
1035 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	54 S VH 93893 21043	AN PDR 77
1039 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	54 S VH 93749 21182	AN PDR 77
1105 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
1113 3/25/2011	Beta/Gamma	0.021	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
1118 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
1123 3252011	Beta/Gamma	0.016	mrem	Sendai Airport	54 S VH 93893 21043	AN PDR 77
1205 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
1211 3/25/2011	Beta/Gamma	0.018	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
1214 3/25/2011	Beta/Gamma	0.023	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
1219 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	54 S VH 93893 21043	AN PDR 77

1314 3/25/2011	Beta/Gamma	0.025	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
1321 3/25/2011	Beta/Gamma	0.021	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
1324 3/25/2011	Beta/Gamma	0.019	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
1329 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	54 S VH 93893 21043	AN PDR 77
1407 3/25/2011	Beta/Gamma	0.018	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
1415 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
1418 3/25/2011	Beta/Gamma	0.022	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
1422 3/25/2011	Beta/Gamma	0.022	mrem	Sendai Airport	54 S VH 93893 21043	AN PDR 77
1505 3/25/2011	Beta/Gamma	0.013	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
1512 3/25/2011	Beta/Gamma	0.018	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
1516 3/25/2011	Beta/Gamma	0.017	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
1522 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	54 S VH 93893 21043	AN PDR 77
1610 3/25/2011	Beta/Gamma	0.015	mrem	Sendai Airport	N 38 08.481 E 140 56.000	AN PDR 77
1618 3/25/2011	Beta/Gamma	0.021	mrem	Sendai Airport	N 38 07.961 E 140 55.543	AN PDR 77
1623 3/25/2011	Beta/Gamma	0.02	mrem	Sendai Airport	N 38 08.374 E 140 54.942	AN PDR 77
1628 3/25/2011	Beta/Gamma	0.018	mrem	Sendai Airport	54 S VH 93893 21043	AN PDR 77

	New information since last report

Marine Corps Monitoring Equipment

Measurement Date	Measurement Type	Raw Value	Measurement Unit	Location	Lat/Lon
0930 20110325	Gamma	0.023	mR/h	Embassy Rooftop	35.668 139.743
1130 20110325	Gamma	0.027	mR/h	Embassy Rooftop	35.668 139.743
1343 20110325	Gamma	0.024	mR/h	Embassy Rooftop	35.668 139.743
1530 20110325	Gamma	0.021	mR/h	Embassy Rooftop	35.668 139.743
1742 20110325	Gamma	0.044	mR/h	Embassy Rooftop	35.668 139.743
2000 20110325	Gamma	0.026	mR/h	Embassy Rooftop	35.668 139.743
2200 20110325	Gamma	0.024	mR/h	Embassy Rooftop	35.668 139.743
0001 20110326	Gamma	0.027	mR/h	Embassy Rooftop	35.668 139.743
0200 20110326	Gamma	0.030	mR/h	Embassy Rooftop	35.668 139.743
0400 20110326	Gamma	0.018	mR/h	Embassy Rooftop	35.668 139.743
0600 20110326	Gamma	0.017	mR/h	Embassy Rooftop	35.668 139.743
0800 20110326	Gamma	0.022	mR/h	Embassy Rooftop	35.668 139.743
1020 20110326	Gamma	0.025	mR/h	Embassy Rooftop	35.668 139.743
1200 20110326	Gamma	0.028	mR/h	Embassy Rooftop	35.668 139.743
1400 20110326	Gamma	0.030	mR/h	Embassy Rooftop	35.668 139.743
1600 20110326	Gamma	0.016	mR/h	Embassy Rooftop	35.668 139.743
1800 20110326	Gamma	0.026	mR/h	Embassy Rooftop	35.668 139.743
2000 20110326	Gamma	0.023	mR/h	Embassy Rooftop	35.668 139.743
2200 20110326	Gamma	0.024	mR/h	Embassy Rooftop	35.668 139.743
0001 20110327	Gamma	0.029	mR/h	Embassy Rooftop	35.668 139.743
0200 20110327	Gamma	0.028	mR/h	Embassy Rooftop	35.668 139.743
0400 20110327	Gamma	0.031	mR/h	Embassy Rooftop	35.668 139.743
0600 20110327	Gamma	0.024	mR/h	Embassy Rooftop	35.668 139.743
xxxx 20110327	Gamma		mR/h	Embassy Rooftop	35.668 139.743

DOE Monitoring Equipment

Measurement Date	Measurement Type	Raw Value	Measurement Unit	Location	Lat/Lon
2240 20110325	Beta	850	CPM	Embassy Rooftop	35.668 139.743
2240 20110325	Gamma	21.4K	CPM	Embassy Rooftop	35.668 139.743
0001 20110326	Beta	835	CPM	Embassy Rooftop	35.668 139.743
0001 20110326	Gamma	25.7K	CPM	Embassy Rooftop	35.668 139.743
0200 20110326	Beta	840	CPM	Embassy Rooftop	35.668 139.743
0200 20110326	Gamma	24K	CPM	Embassy Rooftop	35.668 139.743
0400 20110326	Beta	875	CPM	Embassy Rooftop	35.668 139.743
0400 20110326	Gamma	25.6K	CPM	Embassy Rooftop	35.668 139.743
0600 20110326	Beta	865	CPM	Embassy Rooftop	35.668 139.743
0600 20110326	Gamma	23.3K	CPM	Embassy Rooftop	35.668 139.743
0800 20110326	Beta	880	CPM	Embassy Rooftop	35.668 139.743
0800 20110326	Gamma	23.7K	CPM	Embassy Rooftop	35.668 139.743
1020 20110326	Beta	860	CPM	Embassy Rooftop	35.668 139.743
1020 20110326	Gamma	27.0K	CPM	Embassy Rooftop	35.668 139.743
1200 20110326	Beta	920	CPM	Embassy Rooftop	35.668 139.743
1200 20110326	Gamma	33.9K	CPM	Embassy Rooftop	35.668 139.743
1400 20110326	Beta	910	CPM	Embassy Rooftop	35.668 139.743
1400 20110326	Gamma	33.8K	CPM	Embassy Rooftop	35.668 139.743
1600 20110326	Beta	860	CPM	Embassy Rooftop	35.668 139.743
1600 20110326	Gamma	33.3K	CPM	Embassy Rooftop	35.668 139.743

1800 20110326	Beta	911	CPM	Embassy Rooftop	35.668 139.743
1800 20110326	Gamma	33.4K	CPM	Embassy Rooftop	35.668 139.743
2000 20110326	Beta	820	CPM	Embassy Rooftop	35.668 139.743
2000 20110326	Gamma	33.3K	CPM	Embassy Rooftop	35.668 139.743
2200 20110326	Beta	930	CPM	Embassy Rooftop	35.668 139.743
2200 20110326	Gamma	34.0K	CPM	Embassy Rooftop	35.668 139.743
0001 20110327	Beta	680	CPM	Embassy Rooftop	35.668 139.743
0001 20110327	Gamma	34.8K	CPM	Embassy Rooftop	35.668 139.743
0200 20110327	Beta	615	CPM	Embassy Rooftop	35.668 139.743
0200 20110327	Gamma	33.4K	CPM	Embassy Rooftop	35.668 139.743
0400 20110327	Beta	930	CPM	Embassy Rooftop	35.668 139.743
0400 20110327	Gamma	33.0K	CPM	Embassy Rooftop	35.668 139.743
0600 20110327	Beta	870	CPM	Embassy Rooftop	35.668 139.743
0600 20110327	Gamma	32.6K	CPM	Embassy Rooftop	35.668 139.743
xxxx 20110327	Beta		CPM	Embassy Rooftop	35.668 139.743
xxxx 20110327	Gamma		CPM	Embassy Rooftop	35.668 139.743

iCAM Air Sampler					
Measurement Date	**Alpha Readings/Value**	**Beta Readings/Value**	**Measurement Unit**	**Location**	**Lat/Lon**
2240 20110325	3.34E-13	5.33E-12	uCi/cc	Embassy Rooftop	35.668 139.743
0001 20110326	2.31E-13	-5.31E-12	uCi/cc	Embassy Rooftop	35.668 139.743
0200 20110326	2.61E-13	-1.30E-12	uCi/cc	Embassy Rooftop	35.668 139.743
0400 20110326	-2.99E-13	3.03E-11	uCi/cc	Embassy Rooftop	35.668 139.743
0600 20110326	-8.68E-13	8.65E-12	uCi/cc	Embassy Rooftop	35.668 139.743
0800 20110326	4.31E-13	-5.72E-12	uCi/cc	Embassy Rooftop	35.668 139.743
1020 20110326	-3.86E-13	5.23E-12	uCi/cc	Embassy Rooftop	35.668 139.743
1200 20110326	3.31E-13	6.06E-12	uCi/cc	Embassy Rooftop	35.668 139.743
1400 20110326	-5.29E-13	9.64E-11	uCi/cc	Embassy Rooftop	35.668 139.743
1600 20110326	-4.41E-13	-1.42E-11	uCi/cc	Embassy Rooftop	35.668 139.743
1800 20110326	8.24E-13	-6.38E-12	uCi/cc	Embassy Rooftop	35.668 139.743
2000 20110326	-3.33E-13	6.88E-12	uCi/cc	Embassy Rooftop	35.668 139.743
2200 20110326	6.32E-13	-2.27E-12	uCi/cc	Embassy Rooftop	35.668 139.743
0001 20110327	-1.32E-13	-1.33E-11	uCi/cc	Embassy Rooftop	35.668 139.743
0200 20110327	-4.72E-13	9.20E-13	uCi/cc	Embassy Rooftop	35.668 139.743
0400 20110327	1.09E-12	-9.51E-12	uCi/cc	Embassy Rooftop	35.668 139.743
0600 20110327	4.85E-13	1.68E-12	uCi/cc	Embassy Rooftop	35.668 139.743
xxxx 20110327			uCi/cc	Embassy Rooftop	35.668 139.743

DOE Low Volume Air Sampler					
Measurement Date	**Measurement Type**	**Raw Value**	**Measurement Unit**	**Location**	**Lat/Lon**
1246 20110326	Gamma	0.023	mR/h	Harris Tower	35.667 139.737
1542 20110326	Gamma	0.016	mR/h	Embassy Rooftop	35.668 139.743

Equipment Used	Remarks
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	
AN/PDR-77 S/N 00463C	

Equipment Used	Background
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	

DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	34 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	34 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	33 CPM
E-600 W/ SSPA-3 S/N 02255/2429	
DT-685/PDQ S/N A01669	
E-600 W/ SSPA-3 S/N 02255/2429	

Air Flow
1.3 CFM
1.2 CFM
1.2 CFM
1.2 CFM
1.2 CFM
1.2 CFM
1.1 CFM
1.1 CFM
1.2 CFM
1.1 CFM

Equipment Used	Run Time	Air Flow (Start/Stop)	Total Volume
AN/PDR-77	24 hr	.81/1.04 CFM	1484.76 SCF
AN/PDR-77	24 hr 13 min	. 78/.78 CFM	1135.59 SCF

From: Loyd, Susan
To: Hayden, Elizabeth
Cc: Brenner, Eliot; Burnell, Scott; Harrington, Holly
Subject: RE: Const_Access_Rule.docx
Date: Friday, March 25, 2011 4:33:34 PM

Beth:
Please put a close hold on this. I will be surprised if we use it....but that's no reflection on the draft release! It's exactly what I asked for. Just think we will decide it's best not to air this. Thanks for the fast turnaround.
Susan

Susan K. Loyd
Communications Director
Office of the Chairman
U.S. Nuclear Regulatory Commission
Tele: 301-415-1838
Susan.Loyd@nrc.gov

From: Hayden, Elizabeth
Sent: Friday, March 25, 2011 2:59 PM
To: Loyd, Susan
Cc: Harrington, Holly; Brenner, Eliot; Burnell, Scott
Subject: Const_Access_Rule.docx

Susan,

Per your request.

Beth

YYY/312

From: Hayden, Elizabeth
Sent: Wednesday, April 06, 2011 10:01 AM
To: Burnell, Scott; RST12 Hoc; RST01 Hoc; ET07 Hoc
Cc: Weber, Michael
Subject: RE: 3/30 RST assessment

Although we can give reporters, embassy and others a quick response saying the 3/26 report was based on our understanding at the time, it begs the question about what we are now saying based on more current information.

Beth Hayden
Senior Advisor
Office of Public Affairs
U.S. Nuclear Regulatory Commission
--- ***Protecting People and the Environment***
301-415-8202
elizabeth.hayden@nrc.gov

From: Burnell, Scott
Sent: Wednesday, April 06, 2011 9:54 AM
To: RST12 Hoc; RST01 Hoc; ET07 Hoc
Cc: Hayden, Elizabeth
Subject: 3/30 RST assessment
Importance: High

All;

Please send the "final" version of the 3/30 assessment, for internal use only, so that OPA can understand the differences from 3/26. Thanks.

Scott

YYY/313

From: Franovich, Mike
Sent: Thursday, April 14, 2011 11:20 AM
To: OST01 HOC; Zimmerman, Roy; RST01 Hoc; Hoc, PMT12; LIA08 Hoc; ET05 Hoc; ET07 Hoc
Cc: Virgilio, Martin; Weber, Michael; Leeds, Eric; Orders, William; Hipschman, Thomas; Snodderly, Michael; Castleman, Patrick; Marshall, Michael; Muessle, Mary; Mamish, Nader; Merzke, Daniel; Bowman, Gregory; Andersen, James; Nieh, Ho
Subject: Suggestion to Improve Fukushima Daiichi Information Flow to Commissioners' Offices

Roy, et al.,

Leveraging IT capabilities to make life a little bit easier, I have a suggestion regarding requested documents that are in the queue to be sent to the Commissioners' offices. It may be more efficient to post these documents and future requested information at a single share point site that the commissioner assistants may then access. Using share point could also help with accounting of information that has been sent previously to Commissioners' offices. If need be, you may institute limited access for control and accounting purposes.

Previously, photos from flyovers were posted at the following share point site that the CAs accessed as needed.

http://portal.nrc.gov/edo/nrr/NRR%20TA/FAQ%20Related%20to%20Events%20Occuring%20in%20Japan/Forms/AllItems.aspx?View=%7b282DC699%2dFA97%2d430B%2dA1F9%2d6008558261C5%7d&RootFolder=%2fedo%2fnrr%2fNRR%20TA%2fFAQ%20Related%20to%20Events%20Occuring%20in%20Japan%2fFukushima%20Daiichi%20Aerial%20Photos

v/r,

Mike Franovich
Technical Assistant for Reactors
Office of Commissioner Ostendorff
301-415-1784

YYY/314

Thomas, George

From: Fuller, Edward
Sent: Wednesday, March 23, 2011 10:00 AM
To: Thomas, George
Subject: FW: ~~FOR OFFICIAL USE ONLY~~ - 0700 EDT (March 23, 2011) USNRC Earthquake/Tsunami SitRep - ~~FOR OFFICIAL USE ONLY~~
Attachments: NRC Status Update 3.23.11--0700 EDT.PDF

From: Schroer, Suzanne
Sent: Wednesday, March 23, 2011 8:33 AM
To: Schroer, Suzanne
Subject: FW: ~~FOR OFFICIAL USE ONLY~~ - 0700 EDT (March 23, 2011) USNRC Earthquake/Tsunami SitRep - FOR ~~OFFICIAL USE ONLY~~

From: McCree, Victor
Sent: Wednesday, March 23, 2011 8:32 AM
To: R2MAIL; R2_RESIDENT SITES
Subject: ~~FOR OFFICIAL USE ONLY~~ - 0700 EDT (March 23, 2011) USNRC Earthquake/Tsunami SitRep - FOR ~~OFFICIAL USE ONLY~~

~~FOR OFFICIAL USE ONLY~~

Attached, for your information, is the 0700, March 23, 2011, NRC situation report regarding the impacts of the earthquake/tsunami event, (yellow) highlighted to show several noteworthy status items. This document is considered **~~FOR OFFICIAL USE ONLY~~** and is <u>not</u> to be distributed outside the agency.

Two other items of interest:

- A Temporary Instruction (TI) will soon be issued with guidance for inspectors to assess the adequacy of actions taken by power reactor licensees in response to the Fukushima Daiichi nuclear station fuel damage event. The TI will require inspectors to evaluate each licensee's readiness to mitigate beyond-design basis events, such as earthquakes, flooding, etc.

- A Task Group is being formed to identify near term actions, using current insights from the Fukushima Daiichi, to further improve NRC and licensee programs to enhance safety. Although the charter for the Task Group is still under development, areas that will likely be reviewed include:
  - the location of equipment, environmental conditions, and personnel available to implement B5b contingency response strategies;
  - the implication of multiple simultaneous beyond design basis accidents;
  - station blackout (SBO) requirements; and,
  - fire coping strategies that include a self-induced SBO.

Vic

444/315

A

Ward, Steven

From: Ward, Steven
Sent: Wednesday, March 16, 2011 10:22 AM
To: Habighorst, Peter
Subject: RE: ACTION BRANCH CHIEFS: Volunteers to Support Agency Response to Japanese Event

Pete,

Please include the following information with my name for request #3. Not sure what they're looking for really short of maybe ex-OIP staffers, but I have done some stuff that I never thought would be relevant to work here.

Experience- Coordinated dose reconstruction project between US and Russia (Mayak NPP), spent two years living in Russia coordinating international humanitarian aid efforts, served on a county council for coordinating disaster response among minority populations in metropolitan areas (addressed topics such as how do you communicate disaster information to people from over 30 countries, speaking over 25 different languages when your primary responders all speak one language, etc.), experience working with IAEA and the World Institute for Nuclear Security (WINS).

Thanks!

Steve

From: Habighorst, Peter
Sent: Wednesday, March 16, 2011 10:04 AM
To: Grice, Thomas; Horn, Brian; Tuttle, Glenn; Pham, Tom; Ward, Steven; Freeman, Eric; Ditto, David; Ani, Suzanne; Aguilar, Santiago
Subject: FW: ACTION BRANCH CHIEFS: Volunteers to Support Agency Response to Japanese Event
Importance: High

See expansion of volunteers for support...

If interested, please provide to me by noon today with requested information. Steve and Eric I have already put your names in the hat for request number 3...

From: Tschiltz, Michael
Sent: Wednesday, March 16, 2011 9:52 AM
To: Smith, Brian; Johnson, Robert; Habighorst, Peter; Campbell, Larry; Silva, Patricia
Cc: Bailey, Marissa; Kinneman, John; Smith, James
Subject: ACTION BRANCH CHIEFS: Volunteers to Support Agency Response to Japanese Event
Importance: High

Branch Chiefs.. we are expected to ensure that the people have appropriate experience for the positions that they are volunteering to fill.

The Division needs to compile a list of volunteers today so please submit to me NLT 2:00 pm this afternoon, if you have any questions about the different positions please discuss with me.

Thanks, Mike

From: NMSSBOX Resource
Sent: Wednesday, March 16, 2011 9:45 AM

YYY/316

To: NMSS Distribution
Subject: Action: Volunteers to Support Agency Response to Japanese Event

Volunteers to Support Agency Response to Japanese Event

Yesterday, I received several requests to identify individuals who would be interested in responding to the Japanese event. Specifically,

1. NSIR has asked for volunteers who would staff selected positions in the Ops Center. These positions are listed below. Obviously, previous Ops Center training and experience is preferred but NSIR is now considering others. Note, you will be volunteering for shift work (either 8 hr or 12 hr) as the Ops Center is being staffed 24/7.
2. NSIR has asked us to identify individuals who will be sent to replace the team that has been deployed to Japan. The qualifications have not been specified but I believe they are looking for individuals with BWR and/or severe accident mitigation experience. The new team is targeted to leave on March 27 and return on April 9.
3. OIP has asked us to identify individuals, who (1) have had desk officer or other international experience and (2) are interested in helping them in the event that current staff cannot meet their work demands. (These individuals could be deployed to Japan with the team under 2 above.)

If you are interested in any of these opportunities and your workload supports this effort, please discuss your interest with your Branch Chief ASAP. I have asked that the Divisions provide me a consolidated list of volunteers by COB today, March 16.

Information needed –

Opportunity 1 – name, current job title, Ops Center Position of interest, previous training/experience in Ops Center or similar position (outside the Agency).
Opportunity 2 – name, current job title, status of passport, brief description of experience/training that supports this type of assignment.
Opportunity 3 – name, current job title, brief description of international experience/training that would support this assignment.

Ops Center Positions currently being staffed as of March 14.

<u>Liaison Team</u>
LT Director
LT Coordinator
LT Federal Liaison (2)
LT Congressional Liaison (2)
LT International Liaison (2)

<u>Protective Measures Team</u>
PMTR Director
PMTR Coordinator
PMTR Protective Actions Assistant Director
PMTR RAAD (Radiological Assessment Assistant Director)
PMTR Dose Assessment (RASCAL)
RASCAL Developer
PMTR GIS Analyst (Geographical Information Systems)
PMTR Meteorologist

<u>Reactor Safety Team</u>
RST Director
RST Coordinator
Severe Accident / PRA
BWR Expert
RST Comm / ERDS Operator
RST Support (Seismology Q&A)

March 16, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information (the 26th Release)
(As of 14:00 March 16th, 2011)

Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa NPS, Tohoku Electric Power Co., Inc; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co., Inc. Tokai Dai-ni NPS , Japan Atomic Power Co. , Inc, as follows:

Major updates are as follows.

1. Nuclear Power Stations (NPS)

- Fukushima Dai-ichi NPS
  - The white smoke like steam generated from Unit 3. (08:30 March 16th)
  - Because of the possibility that the Primary Containment Vessel (PCV) of Unit 3 was damaged, the operators evacuated from the central control room of Unit 3 and 4 (a sheared facility). (10:45 March 16th) Thereafter the operators returned to the room and restarted the operation for water injection. (11:30 March 16th)
  - The fire at Unit 4 occurred. (05:45 March 16th) TEPCO reported that no fire could be confirmed on the ground. (06:15 March 16th)

2. Actions taken by NISA

(March 15th)

22:00 According to the Nuclear Regulation Act, Minister of Economy, Trade and Industry issued the following directive.

For Unit 4: To implement the injection of water to the Spent Fuel Storage Pool.

<Situation of the injured>

- As for the member of Self-Defense Force (a person) who was injured due to the explosion at Unit 3 of Fukushima Dai-ichi NPS and was transported to National Institute of Radiological Sciences, the

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examination resulted in no internal exposure. The member was discharged from the institute on March 16th.

(Contact Person)
Mr. Toshihiro Bannai
Director, International Affairs Office, NISA/METI
Phone:+81-(0)3-3501-1087

(Attached sheet)

1. The status of operation at NPS (Number of automatic shutdown units: 10)

- Fukushima Dai-ichi NPS, Tokyo Electric Power Co. Inc. (TEPCO)
  (Okuma-machi and Futaba-machi, Futaba-gun, Fukushima Prefecture)

(1) The status of operation

Unit 1 (460MWe): automatic shutdown
Unit 2 (784MWe): automatic shutdown
Unit 3 (784MWe): automatic shutdown
Unit 4 (784MWe): in periodic inspection outage
Unit 5 (784MWe): in periodic inspection outage
Unit 6 (1,100MWe): in periodic inspection outage

(2) Major Plant Parameters (14:00 March 16th)

	unit	Unit 1	Unit 2	Unit 3
Reactor Pressure	MPa	0.207 (A) 0.171(B)	Incorrect indication*2	0.059 (A) 0.065(A)
CV Pressure	KPa	Not available	40	230
Reactor Water Level*	mm	−1,750(A) −1,750(B)	−1,400(A) Not available(B)	−1,900(A) −2,300(B)
Suppression Pool Water Temperature	℃	Not available	Not available	Not available
Suppression Pool Pressure	KPa	Not available	down scale	down scale
Measuring time		12:25	12:25	12:40

*1: Distance from the top of fuel.

*2: Due to loss of battery power.

(3) Report concerning other incidents

- TEPCO reported to NISA the Event in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi. (15:42 March 11th)

- TEPCO reported to NISA the event in accordance with the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi, Units 1 and 2.(16:36 March 11th)

<Unit 1>

- Seawater was injected to the Containment Vessel via the Fire Extinguishing System Line (Started up 11:55 March 13th)
  →Temporary interruption of the injection (01:10 March 14th)
- The sound of explosion in Unit 1 occurred. (15:36 March 12nd)
- Seawater is being injected as of 14:00 March 16th.

<Unit 2>

- Water injection function was sustained. (14:00 March 13th)
- Reactor water level was decreasing. (13:18 March 14th)
- Seawater injection to the Reactor Pressure Vessel (RPV) was ready through the Fire Extinguishing System line. (19:20 March 14th)
- TEPCO evaluated core damage of Unit 2 was "less than 5%" (22:14 March 14th)
- Water level in RPV in Unit 2 is decreasing. (22:50 March 14th)
- A sound of explosion was made in Unit 2. As the pressure in Suppression Chamber decreased, there was a possibility that an incident occurred in the Chamber. (06:20 March 15th)
- Seawater is being injected as of 14:00 March 16th.

<Unit 3>

- Fresh water was injected to the PCV via the Fire Extinguishing System Line (FESL). (11:55 March 13th)
- Seawater was injected to the PCV via FESL. (13:12 March 13th)
- Injection of seawater for Unit 1 and Unit 3 into PCV was interrupted due to the lack of seawater in pit. (01:10 March 14th)
- For Unit 3 injection of seawater into PCV was restarted (03:20 March 14th)
- For Unit 3 the pressure increased unusually. (11:45 March 14th)

- For Unit 3 the explosion like Unit 1 occurred around the Reactor Building (11:01 March 14th)
- The white smoke like steam generated from Unit 3. (08:30 March 16th)
- Because of the possibility that the PCV of Unit 3 was damaged, the operators evacuated from the central control room of Unit 3 and 4 (a sheared facility). (10:45 March 16th) Thereafter the operators returned to the room and restarted the operation for water injection. (11:30 March 16th)

<Unit 4>

- It was confirmed that a part of wall in the operation area of Unit 4 was damaged. (06:14 March 15th)
- The fire at Unit 4 occurred. (09:38 March 15th) TEPCO reported that the fire was extinguished spontaneously. (11:00 March 15th)
- The temperature of water in the Spent Fuel Storage Pool at Unit 4 had increased.
  (84 ℃ at 04:08 March 14th)
- The fire occurred at Unit 4. (5:45 March 15th) TEPCO reported that no fire could be confirmed on the ground.(06:15 March 16th)
- The water injection is suspented as of 14:00 March 16th.

● Fukushima Dai-ni Nuclear Power Station (TEPCO)
(Naraha-machi/Tomioka-machi, Futaba-gun, Fukushima pref.)

(1) The status of operation

Unit1 (1,100MWe): automatic shutdown, cold shut down at 17:00, March 14th

Unit2 (1,100MWe): automatic shutdown, cold shut down at 18:00, March 14th

Unit3 (1,100MWe): automatic shutdown, cold shut down at 12:15, March 12th

Unit4 (1,100MWe): automatic shutdown, cold shut down at 07:15, March 15th

(2) Major plant parameters (As of 13:00, 16 March)

	unit	Unit 1	Unit 2	Unit 3	Unit 4
Reactor Pressure	MPa	0.10	0.03	0.04	0.08
Reactor water temperature	℃	55.6	52.3	27.9	55.4
Reactor water level*	mm	10,996	11,396	7,547	8,615
Suppression pool water temperature	℃	39	34	44	56
Suppression pool pressure	kPa	147	137	131	174
Remarks		cold shutdown	cold shutdown	cold shutdown	cold shutdown

*: Distance from the top of fuel

(3) Report concerning other incidents

- TEPCO reported to NISA the event in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ni Unit 1. (18:08 March 11th)
- TEPCO reported to NISA the events in accordance with the Article 10 regarding Units 1, 2 and 4. (18:33 March 11th)

● Onagawa NPS (Tohoku Electric Power Co., Inc.)
(Onagawa-cho, Oga-gun and Ishinomaki–shi, Miyagi Prefecture)

(1) The status of operation

Unit 1 (524MWe): automatic shutdown, cold shut down at 0:58, March 12th
Unit 2 (825MWe): automatic shutdown, cold shut down at earthquake
Unit 3 (825MWe): automatic shutdown, cold shut down at 1:17, March 12th

(2) Readings of monitoring post

Reading of monitoring post:

MP2 (Monitoring at the North End of Site Boundary)
approx. 6,500 nGy/h (19:00 March 14th)
→approx. 5,400 nGy/h (19:00 March 15th)

(3) Report concerning other incidents

- Fire Smoke on the first basement of the Turbine Building was extinguished. (22:55 on March 11th)
- Reported on the Article 10* of the Act on Special Measures Concerning Nuclear Emergency Preparedness (13:09 March 13th)

2. Action taken by NISA

(March 11th)

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

15:42 TEPCO reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

16:36 TEPCO judged the event in accordance with the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS, Units 1 and 2. (reported to NISA at 16:45)

18:08 Regarding Unit 1 of Fukushima Dai-ni NPS, TEPCO reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

18:33 Regarding Units 1,2 and 4 of Fukushima Dai-ni NPS, TEPCO reported to NISA in accordance with the Article 10 of Act on Special Measures Concerning Nuclear Emergency Preparedness.

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

20:50 Fukushima Prefecture's Emergency Response Headquarters issued a direction for the residents within 2 km radius from Unit 1 of Fukushima Dai-ichi NPS to evacuate. (The population of this area is 1,864)

21:23 Directives from Prime Minister to the Governor of Fukushima Prefecture, the Mayor of Ookuma 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.

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

(March12th)

05:22 Regarding Unit 1 of Fukushima Dai-ni NPS, TEPCO reported to NISA in accordance with the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

05:32 Regarding Unit 2 of Fukushima Dai-ni NPS, TEPCO reported to NISA in accordance with the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

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

06:07 Regarding of Unit 4 of Fukushima Dai-ni NPS, TEPCO reported to NISA in accordance with the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

06:50 In accordance with the Paragraph 3, the Article 64 of the Nuclear Regulation Act, the order was issued to control the internal pressure of the Containment Vessel of Units 1 and 2 of Fukushima Dai-ichi NPS.

07:45 Directives from Prime Minister to the Governor of Fukushima Prefecture, the Mayors of Hirono Town, Naraha Town , Tomioka Town and Ookuma 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

17:00 TEPCO reported to NISA in accordance with the Article 15 of the Act on Special Measure Concerning Nuclear Emergency Preparedness since the radiation level at Fukushima Dai-ichi NPS exceeded the acceptable limit.

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

19:55 Directives from Prime Minister was issued regarding seawater injection to Unit No.1 of Fukushima Dai-ichi NPS.

20:05 Considering the Directives from Prime Minister and pursuant to the Paragraph 3, the Article 64 of the Nuclear Regulation Act, order was issued to inject seawater to Unit 1 of Fukushima Dai-ichi NPS.

20:20 At Unit 1 of Fukushima Dai-ichi NPS, seawater injection started.

(March 13th)

05:38 TEPCO reported to NISA pursuant to the Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness since Unit 3 of Fukushima Dai-ichi NPS lost total coolant injection function. Recovering efforts by TEPCO of the power source and coolant injection function and work on venting are underway.

09:08 Pressure suppression in the Containment Vessel and fresh water injection started at Unit 3 of Fukushima Dai-ichi NPS.

09:20 Opening of Pressure vent valve of Unit 3 of Fukushima Dai-ichi NPS.

09:30 The order was issued for the Governor of Fukushima Prefecture, the Mayors of Ookuma Town, Futaba Town, Tomioka Town and Namie Town in accordance with the Act on Special Measures Concerning Nuclear Emergency Preparedness on the contents of radioactivity decontamination screening.

09:38 TEPCO reported to NISA that Unit 1 of Fukushima Dai-ichi NPS reached a situation specified in the Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness.

13:09 Tohoku Electric Power Company reported to notified that Onagawa NPS reached a situation specified in the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

13:12 Fresh water injection was switched to seawater injection at Unit 3 of Fukushima Dai-ichi NPS.

14:25 TEPCO reported to NISA that Fukushima Dai-ichi NPS reached a situation specified in the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

(March 14th)

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.

03:20 Seawater injection at Unit 3 of Fukushima Dai-ichi NPS was restarted.

04:24 TEPCO reported to NISA that Fukushima Dai-ichi NPS reached the situation specified in the Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness.

07:53 TEPCO reported to NISA that Fukushima Dai-ichi NPS reached the situation specified in the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

13:25 TEPCO reported to NISA that Fukushima Dai-ichi Unit 2 of NPS reached the situation specified in the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness.

22:13 TEPCO reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ni NPS.

22:35: TEPCO reported to NISA in accordance with the Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Fukushima Dai-ichi NPS.

(March 15th)

00:00: The acceptance of experts from IAEA was decided.

NISA agreed to accept the offer of dispatching of the expert on NPS damage from IAEA considering the intention by Mr. Amano, Director General of IAEA. Therefore, the schedule of expert acceptance will be planned from now on according to the situation.

00:00: NISA also decided the acceptance of experts dispatched from NRC.

07:24 JAEA reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding, Tokai Research and Development Centre, Nuclear Fuel Cycle Engineering Laboratories.

07:44 JAEA reported to NISA in accordance with the Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness regarding Nuclear Science Research Institute.

10:30 According to the Nuclear Regulation Act, Minister of Economic, Trade and Industry issued the directives as follows.

For Unit 4: To extinguish fire and to prevent the occurrence of re-criticality

For Unit 2: To inject water to reactor vessel promptly and to vent Drywell.

10:59 Considering the possibility of lingering situation, it is decided that the function of the Local Emergency Response Headquarter is moved to the Fukushima Prefectural Office.

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.

22:00 According to the Nuclear Regulation Act, Minister of Economy, Trade and Industry issued the following directive.

For Unit 4: To implement the injection of water to the Spent Fuel Storage Pool.

< Possibility on radiation exposure (As of 14:00 March 16th) >

<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 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)

<Exposure of workers>

(1) 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.

(2) The 6 out of 7 people working at the time of explosion at the Unit 3 of Fukushima Dai-ichi NPS injured and were conscious. The detailed measurement data are not available.

<Others>

(1) Fukushima Prefecture has started the screening from 13 March at two health office in the prefecture. It is undertaken at 12 evacuation sites, 6 health offices, etc. The results of screening are being totalled up.

(2) 5 members of Self-Defence Force who worked for water supply in Fukushima Dai-ichi NPS were exposed. After the work (March 12th), 30,000 cpm was counted by the measurement at Off site Centre. The counts after decontamination were between 5,000 and 10,000 cpm. One member was transferred to National Institute of Radiological Science. No other exposure of the Self-Defence Force member was confirmed at the Ministry of Defence.

(3) As for policeman, the decontaminations of two policemen were confirmed by the National Police Agency. Nothing unusual was reported.

(4) As for fireman, no contamination was reported to National Firefighting Agency. The confirmation is continued.

<Situation of the injured (As of 14:00 March 16th)>

1. Injury due to earthquake
   - Two employees (slightly)
   - Two subcontract employees (one fracture in both legs)
   - Two missing (TEPCO's employee, missing in the turbine building of Unit 4)
   - One emergency patient (According to the local prefecture, one patient of cerebral infarction was transported by the ambulance).
   - Ambulance was requested for one employee complaining the pain at left chest outside of control area (conscious).
   - Two employees complaining discomfort wearing full-face mask in the main control room were transported to the industrial doctor of Fukushima Dai-ni NPS.

2. Injury due to the explosion of Unit 1 of Fukushima Dai-ichi NPS
   - Four employees were injured at the explosion and smoke of Unit 1 around turbine building (out of control area). Examined by Kawauchi clinic.
3. Injury due to the explosion of Unit 3 of Fukushima Dai-ichi NPS
   - Four TEPCO's employees
   - Three subcontractor employees
   - Four members of Self-Defence Force (one of them was transported to National Institute of Radiological Sciences considering internal possible exposure. The examination resulted in no internal exposure. The member was discharged from the institute on March 16th.)

<Situation of Resident Evacuation (As of 14:00 March 16th)>

At 11:00 March 15th, Prime Minister directed in-house stay to the residents in the area from 20 km to 30 km radius from Fukushima Dai-ichi NPS. The directive was conveyed to Fukushima Prefecture and related municipalities.

Regarding the evacuation as far as 20-km from Fukushima Dai-ichi NPS and 10-km from Fukushima Dai-ni, necessary measures have already been taken.

- It seems that a plural number of people who were staying in the 20 km zone are in moving gradually.
- The in-house stay in the area from 20 km to 30 km from Fukushima Dai-ichi NPS is made fully known to the residents concerned.

(Contact Person)
Mr. Toshihiro Bannai
Director, International Affairs Office, NISA/METI
Phone:+81-(0)3-3501-1087

From: HOO Hoc
Sent: Saturday, April 09, 2011 10:23 AM
To: ET07 Hoc
Subject: FW: EPA environmental monitoring data-IAEA
Attachments: image001.jpg

FYI

Headquarters Operations Officer
U.S. Nuclear Regulatory Commission
Phone: 301-816-5100
Fax: 301-816-5151
email: hoo.hoc@nrc.gov
secure e-mail: hoo1@nrc.sgov.gov

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

From: LIA08 Hoc
Sent: Saturday, April 09, 2011 10:20 AM
To: HOO Hoc; LIA02 Hoc; LIA07 Hoc; OST01 HOC; OST02 HOC; OST03 HOC
Cc: PMT02 Hoc; LIA06 Hoc; LIA01 Hoc
Subject: RE: EPA environmental monitoring data-IAEA

Cyndi Jones is our ENAC National officer point of contact. In the meantime, the LT can check with the EPA and see if they have any objection to having IAEA list their websites on the ENAC (Early Notification and Assistance Convention) website. Jeff Temple

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From: HOO Hoc
Sent: Saturday, April 09, 2011 5:27 AM
To: LIA02 Hoc; LIA08 Hoc; LIA07 Hoc; OST01 HOC; OST02 HOC; OST03 HOC
Cc: PMT02 Hoc
Subject: FW: EPA environmental monitoring data-IAEA

IAEA request for review.

Headquarters Operations Officer
U.S. Nuclear Regulatory Commission
Phone: 301-816-5100
Fax: 301-816-5151
email: hoo.hoc@nrc.gov
secure e-mail: hoo1@nrc.sgov.gov

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

YYY/318

From: IEC6@iaea.org [mailto:IEC6@iaea.org]
Sent: Saturday, April 09, 2011 5:17 AM

To: HOO Hoc; HOO2 Hoc; Huffman, William
Subject: EPA environmental monitoring data

Dear Sir / Madam,

The IEC is currently collating information provided by Member States on environmental monitoring data after the Fukushima NPP accident.

Two public EPA websites containing relevant information have been brought to our attention:
http://www.epa.gov/japan2011/rert/radnet-data-map.html
http://www.epa.gov/japan2011/rert/radnet-sampling-data.html

I'm writing to you, as an official ENAC Contact Point, to confirm whether we can post these two links in the ENAC website, and by extension include the USA on the list of Member States which have provided or made accessible monitoring data.

Could you please confirm whether this is acceptable?

Best regards
Lea Ruscio
Liaison Officer
IAEA IEC
Tel. +43-1-2698846
Tel. +43-1-2600-2203

Ramsey, Kevin

From: Johnson, Robert
Sent: Tuesday, March 22, 2011 12:30 PM
To: NMSS_FCSS_FMB
Subject: FW: 1800 EDT (March 21, 2011) USNRC Earthquake/Tsunami Status Update
Attachments: USNRC Earthquake-Tsunami Update.032111.1800EDT.pdf

All,
Additional status update on events in Japan. Missed it earlier and wanted to makes sure that you all had it, if interested.
Thanks,
Robert

From: Bailey, Marissa
Sent: Tuesday, March 22, 2011 8:58 AM
To: Hiltz, Thomas; Habighorst, Peter; Smith, James; Smith, Brian; Damon, Dennis; Silva, Patricia; Campbell, Larry; Johnson, Robert
Subject: FW: 1800 EDT (March 21, 2011) USNRC Earthquake/Tsunami Status Update

Please share with your staff.

From: Haney, Catherine
Sent: Tuesday, March 22, 2011 4:59 AM
To: Kinneman, John; Tschiltz, Michael; Bailey, Marissa; Pulliam, Timothy; Ordaz, Vonna; Weaver, Doug; Mohseni, Aby; Davis, Jack; Kokajko, Lawrence
Subject: Fw: 1800 EDT (March 21, 2011) USNRC Earthquake/Tsunami Status Update

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From: LIA07 Hoc
Sent: Mon Mar 21 18:16:05 2011
Subject: 1800 EDT (March 21, 2011) USNRC Earthquake/Tsunami Status Update

Attached, please find an 1800 EDT (March 21, 2011) status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami.

Please note that this information is "Official Use Only" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Sara

Sara K. Mroz
Communications and Outreach
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
Sara.Mroz@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

YYY/319

Ghosh, Tina

From: Short, Steve M [steve.short@pnl.gov]
Sent: Thursday, April 14, 2011 9:54 PM
To: Ghosh, Tina
Cc: Coles, Garill A; Gallucci, Ray
Subject: Proposal to Review SAMA info for input to the NRC 90-day Review
Attachments: WhitePaper_ReviewofBeyondDesign-BasisSafetyAnalysis_LeveragingSAMAs 12April20011 Clean.pdf

ii Tina:

iow are you doing and how is SOARCA going? I hope all is well with you and your family.

i wanted to get your thoughts on a white paper we have developed that we feel could provide useful insight into the NRC review of ie safety of U.S. plants in response to the recent events in Japan. The white paper is attached. Basically the white paper proposes iat the severe accident information provided with the license renewal SAMA analyses provides significant insight into both the iternal and external risk at 4/5 of nuclear power plants in the U.S and that this risk information would have value to the NRC review iat the NRC commission initiated a couple of weeks ago. A couple of years ago Bob Palla and I discussed the potential for ompiling this information and I believe he discussed doing something along these lines with you. The attached white paper proposes an expanded version of what we had previously discussed. I would appreciate your thoughts on the white paper proposal and whether you consider it is worth pressing forward with. Any comments/thoughts you have would be much appreciated.

FYI. We have provided this to Ray Gallucci and Donnie Harrison. We've updated it to include Ray's comments but unfortunately we have not been able to get any feedback from Donnie (it is my understanding he has been busy working at the NRC emergency control center). However, we also recognize that this proposal is more likely to be of interest to RES than to NRR so I'm hoping you will give me your thoughts.

Thanks much.

Steve

Steven Short, P.E.
Staff Engineer
Energy and Environment Directorate
Pacific Northwest National Laboratory
902 Battelle Boulevard
P.O. Box 999, MSIN K6-52
Richland, WA 99352 USA
Tel: 509-375-2868
Fax: 509-372-4995
steve.short@pnl.gov
www.pnl.gov

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Review of Beyond Design Basis Safety Analysis at U.S. Nuclear Power Plants in Light of the Japanese Incident: Leveraging SAMA Information

A draft white paper by Garill Coles, Pacific Northwest National Laboratories (PNNL)

Line of Reasoning

The core-damage event at the Fukushima Daiichi nuclear power station due to a beyond-design-basis seismic event and subsequent tsunami is the most significant nuclear power plant accident since the Chernobyl accident in 1986 (although many consider the severe reactor head degradation event at Davis Besse in 2002 a significant near-miss). As a result of this event safety of nuclear power plants world-wide and in the U.S. are being re-assessed. Within one week of the March 11th Fukushima Daiichi nuclear power station event the nuclear industry began a formal process of data gathering, analysis and reassessment[1]. The Nuclear Regulatory Commission also began its assessment of lessons learned from the incident with Task Force reports due back to the Commission in the form of a 30-day quick-look report, a near term 60-day review, and a 90 day culminating report[2]. It is also worth noting that Secretary of Energy Steven Chu issued a safety bulletin[3] dated March 24th requiring, among other actions, the review of how beyond design basis events have been considered or analyzed within DOE's Nuclear Safety Regulations at its Hazard 1 and 2 nuclear facilities. This white paper discusses the need for review of what is known about the beyond design basis risk associated with externally initiated events such as seismic events and external flooding for the currently licensed fleet of U.S. nuclear power plants.

While much remains to be learned about the Japanese incident, it seems clear at this point that power station nuclear safety was impacted by factors outside of the design basis for the facility. The Nuclear Energy Institute (NEI) in response to questions about the Japanese incident explains that the Fukushima Daiichi nuclear power plants were designed to withstand peak ground accelerations (PGA) of 0.45g. The event was estimated to reach a PGA of 0.51g[1] at the Fukushima Daiichi site. AREVA identifies the design-basis tsunami for these plants, in a presentation by Dr. Matthias Braun dated March 24, 2011[4], to be 6.5 m and the tsunami at the site to have been > 7m in height. World Nuclear News puts the design

[1] Nuclear Energy Institute. "U.S. Nuclear Power Plants Reconfirming Safety, Response Programs in Light of Japan Situation." Accessed April 5, 2011: http://resources.nei.org/documents/japan/FactSheet_US_Nuclear_Plant_Enhancements_4-4-11.pdf.

[2] Nuclear Regulatory Commission. Memorandum from Chiarman Jaczko to Commissioners Svinicki, Apostolakis, Magwood, and Ostendorff. COMGBJ-11-0002, NRC actions Following the Events in Japan. March 21, 2011. Accessed April 5, 2011: http://www.nrc.gov/reading-rm/doc-collections/commission/comm-secy/2011/2011-0002comgbj.pdf - 2011-03-23.

[3] Department of Energy Office of Health, Safety and Security (DOE HSS). Safety Bulletin 2011-01, Events Beyond Design Safety Basis Analysis. Accessed March 5, 2011: http://www.hss.doe.gov/csa/bulletins.html.

[4] AREVA North America: Next Energy Blog. "The Fukushima Daiichi Incident, Dr. Matthias Braun." Accessed April 5, 2011: http://resosol.org/InfoNuc/seismes/Japon2011/Fukuchima_AREVA-0325.ppt.

shortfall even greater, identifying the design basis tsunami to be 5.7m and the tsunami to be 14m[5]. Considering that this nuclear accident happened in the context of a disaster on such a massive scale that it involved not only the nuclear plant and utility plant operators, but the entire country, it is probably safe to say the this type of event was beyond the anticipation of plant operators and regulators.

A question worth asking is whether significant damage to a nuclear plant like was seen in Japan could happen in the U.S. due to a seismic event or a seismically induced tsunami. In a direct response to this question NRC explains that: "*All US nuclear plants are built to withstand environmental hazards, including earthquakes and tsunamis. Even those nuclear plants that are located within areas with low and moderate seismic activity are designed for safety in the event of such a natural disaster. The NRC requires that safety-significant structures, systems, and components be designed to take into account even rare and extreme seismic and tsunami events*."[6] Never-the-less, the NRC is currently in the process of conducting an assessment of the resistance of U.S. nuclear power plants to seismic events to address updated U.S. Geologic Survey seismic hazard curves. Also, probabilistic risk assessments (PRAs), which specifically address the risk from beyond design basis events, have focused primarily on internal events (and now more recently on fire events) but for the most part (with some significant exceptions) do not address seismic or external flooding initiating events. Moreover, the use of PRA standards, such as ASME/ANS RA-Sa-2009[7], for external events is relatively recent when compared to PRA standards for internal events.

Based on these recent events, we suggest that a review and compilation of what is known (and not known) about beyond design basis risk, specifically for external events such as seismic events, tsunamis, and external flooding, for the existing fleet of U.S. nuclear power plants is warranted. What is known is that the degree of information on external event risk varies depending on the nuclear power station. While many plants such as the Seabrook Nuclear Power Station maintain a plant specific seismic PRA, most plants do not. Also, while many plants developed fire PRAs in response to Supplement 4 of Generic Letter 88-20[8] (i.e., individual plant examination for external events or IPEEE), these have been maintained to varying degrees. In addition, while some plant PRAs address other specific external events of concern (i.e., the Davis Besse nuclear power station PRA specifically models the tornado hazard), but again most plant-specific PRAs do not. In general the degree to which external events PRA has been developed is typically less than for the internal events. We propose that the current best compilation of beyond design basis analysis for most nuclear power plants is the analysis of Severe Accident Mitigation Alternatives (SAMA). The SAMA analysis has been provided with the Environmental Report, and in response to requests for additional information, for a majority of nuclear power plants as part of their

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[5] World Nuclear News. "Fukushima faced 14-metre Tsunami, March 23, 2011" Access April 11: http://www.world-nuclear-news.org/RS_Fukushima_faced_14-metre_tsunami_2303113.html.

[6] Nuclear Regulatory Commission. "NRC frequently asked questions related to the March 11, 2011 Japanese Earthquake and Tsunami." http://www.nrc.gov/japan/faqs-related-to-japan.pdf.

[7] American Society of Mechanical Engineers (ASME). "Addenda to ASME RA-S-2008 Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications." ASME RA-Sa-2009, February 2, 2009. New York, NY.

[8] Nuclear Regulatory Commission. June 1991. Generic Letter No. 88-20, Supplement 4, *Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE)*, NUREG-1407.

operating license renewal process. We submit that the individual plant SAMAs represent a rich source of beyond-design-basis information that can be leveraged during the review of U.S. nuclear power plants in the wake of the Japanese incident.

What Can be Learned from SAMAs?

NRC license renewal environmental regulations require a SAMA evaluation. The purpose of a SAMA evaluation is to identify severe accident mitigation alternative candidates that have the potential to reduce severe accident risk and to determine whether implementation of individual SAMA candidates would be cost beneficial. 10 CDR Part 51, Subpart A, Appendix B, Table B-1, Issue 76 states that "...*The probability weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to ground water, and societal and economic impacts from severe accidents are small for all plants. However, alternatives to mitigate severe accidents must be considered for all plants that have not considered such alternatives*...." The SAMA evaluations have required power plants operators to expand on the PRA models used to perform Individual Plant Examinations (IPEs) and Individual Plant Examinations of External Events (IPEEEs) analyses of the 1990s. Many plants were in the position to be able to incorporate significantly updated PRA models in their SAMA evaluations. In some cases this expansion included improved external events PRAs. In all cases a Level 3 PRA was performed for the range of potential severe accidents that could occur. This Level 3 PRA effort consists of the calculation of expected population dose from severe accidents and was not performed for the IPEs and IPEEEs.

We propose that compilation of germane information contained in the SAMA and the SAMA evaluation reports would help to characterize what is known about severe accidents initiated by both internal and external events. Including internally-initiated events in this review is critical because 1) random failures are a potentially a significant contributor to external event CDF and 2) prevention/mitigation of core damage from external events generally relies on the same systems/components to prevent/mitigate core damage from internal events. The kind of information that could be distilled from these reports includes (but is not confined to) the following:

- The core damage frequency (CDF) of internally initiated events, by initiating event.
- Characterization of the extent to with external events has modeled in nuclear power plant PRAs, including which external events.
- The CDF of external events, by initiating event, to the degree that they have been modeled.
- The expected population dose and off-site economic cost (i.e., Level 3 analysis results) from both internal and external events, by containment release mode.
- Severe Accident Mitigation Alternatives related to external events.
- Identification of aging and non-aging-related cost-beneficial Severe Accident Mitigation Alternatives related to both internal and external events.

- Identification of dominant internal and external event failures that contribute to the CDF based on Level 1 PRA results.
- Identification of dominant internal and external event failures that contribute to the accident release frequency based on Level 2 PRA results.
- Identification of dominant internal and external event failures that contribute to the accident release frequency CDF based on Level 1 and 2 PRA results.
- Characterization of "important" Level 3 analysis assumptions, including population distribution within the emergency planning zone (EPZ) and within a 50-mile radius of the plant.
- Estimated present dollar value of the benefit of eliminating internal and external severe accident risk.

We propose that compilation of beyond design basis accident risk information contained in SAMA analyses would provide a fairly comprehensive characterization of what is known about severe accident risk from external events at nuclear power plants in the U.S. We acknowledge that external events PRAs across the industry exist at different levels of completeness and that information from SAMAs about external event risk will not be complete. However, we maintain that understanding what is not known about severe accident risk at nuclear power plants, as well as what is known, will provide valuable insight to the NRC Task Force tasked with assessing the implications of the recent events in Japan on U.S. nuclear regulatory processes and lead to the potential identification of gaps in desired information.

OIP_ITServices Resource

From: LIA02 Hoc
Sent: Friday, April 15, 2011 2:06 PM
To: Bloom, Steven
Subject: FW: TEPCO Earthquake Information Update on April 15 (2): Result of discharge of low level radioactive water to the sea

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From: Michael W. Chinworth[SMTP:MICHAEL-CHINWORTH@JNES-USA.ORG]
Sent: Friday, April 15, 2011 2:05:28 PM
To: LIA02 Hoc
Cc: yamachika-hidehiko@jnes-usa.org; aono-kenjiro@jnes-usa.org
Subject: Fwd: TEPCO Earthquake Information Update on April 15 (2): Result of discharge of low level radioactive water to the sea
Auto forwarded by a Rule

-------- Original Message --------
Subject: [Spam] TEPCO Earthquake Information Update on April 15 (2): Result of discharge of low level radioactive water to the sea
Date: Fri, 15 Apr 2011 17:28:28 +0000
From: matsuo.kenji@tepco.co.jp <matsuo.kenji@tepco.co.jp>
To: matsuo.kenji@tepco.co.jp <matsuo.kenji@tepco.co.jp>

Dear Friends,

TEPCO has announced the result of discharge of low level radioactive water to the sea.
Please see details below.

Contacts:
TEPCO Washington Office 202-457-0790
Kenji Matsuo, Director and General Manager
Yuichi Nagano, Deputy General Manager,
Masayuki Yamamoto, Manager, Nuclear Power Programs

Result of discharge of low level radioactive water to the sea

As to the low level radioactive wastewater stored at the Central Radioactive Waste Treatment Facility, we began discharging at 7:03PM, April 4th to the south of the water discharge channel and finished at 5:40PM, April 10th.
At 9:55AM, April 11th, we confirmed that the wastewater in the building had been discharged sufficiently so that the preparation work to accept high level radioactive wastewater in the building could be done.
In relation to the low level radioactive water in sub-drain pits of Units 5 and 6, we began discharging from 9 PM, April 4th via the water discharge channel of Units 5 and 6 and finished by 6:52PM, April 9th.

In terms of the discharge of low level radioactive water to the sea, as instructed by NISA, we have been conducting ocean monitoring in a steadfast manner. We have been increasing the number of monitoring points and the frequency to investigate and confirm the influence of the dispersion of radioactive substances and have been notifying the result.

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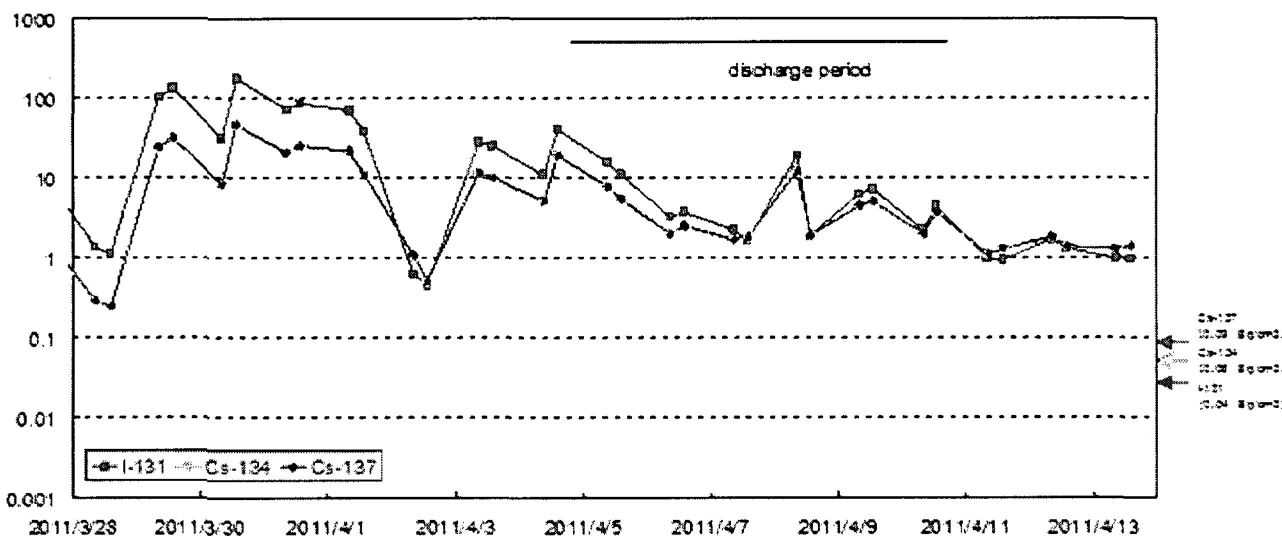
The radioactive density monitored at the measurement points including near the power station did not indicate significant fluctuation in comparison with the trend one week before the discharge.

The amount of low level radioactive wastewater discharged to the sea this time was approx 9,070 tons from the Central Radioactive Waste Treatment Facility and approx 1,323 tons from the sub-drain pits of Units 5 and 6 (Unit 5: approx 950 tons, Unit 6: approx 373 tons). The total radiation discharged was approx 1.5 x 10^{11} Bq.

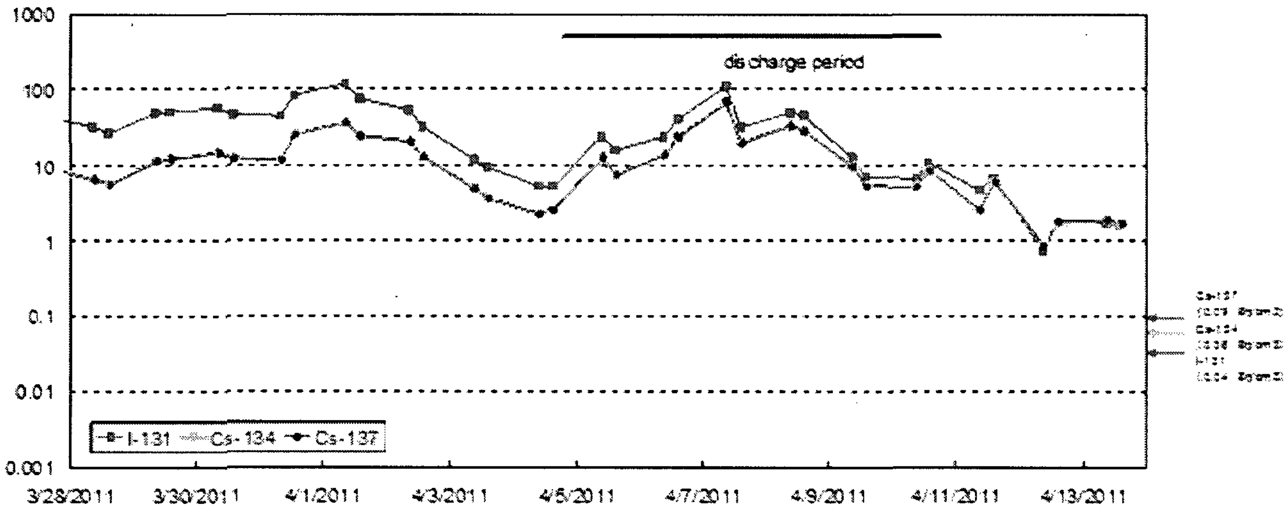
We evaluate approximately 0.6 mSv of effective radioactive doses per year for adults as the impact on the discharge of the low radioactive wastewater to the sea if they eat adjacent fish and seaweeds every day. The amount (0.6 mSv of effective radioactive doses per year) is one-forth of annual radioactive dose to which the general public is exposed in nature. The level is similar to the evaluation we made before the discharge to the sea.

With the completion of discharge, as soon as the preparation work completed to accept high level radioactive wastewater at the Central Radioactive Waste Treatment Facility, we will transfer the extremely highly radioactive wastewater in the turbine building of Unit 2 to the Central Radioactive Waste Treatment Facility and store under stable conditions.
Also, from now on, as to the low level radioactive water in sub-drain pits of Units 5 and 6, we will transfer to a temporary outdoor tank and consider an appropriate radiation mitigation plan.

Radioactivity Density of Seawater at South Discarge Channel of 1F (Bq/cm3)



Radioactivity Density of Seawater at North of 1F 5 - 6 Discharge Channel
(approx. 30 m north of 5-6u discharge channel) (Bq/cm3)



[Estimation of Discharged Radioactivity]

Nuclide analysis of accumulated water and sub-drain water, Fukushima Daiichi NPS

Time and Date of sample collection	15:30, Mar 28th, 2011	16:00, March 28th, 2011	10:30, March 30th, 2011	10:40, March 30th, 2011
Place of sampling	Accumulated water, Centralized Radiation Waste Treatment Facility (non RCA)	Accumulated water, Centralized Radiation Waste Treatment Facility (RCA)	Sub-drain pit water, Unit 5	Sub-drain pit water, Unit 6
Detected Nuclides (Half-life)	**Density of Sample (Bq/cm3)**			
I-131 (approx 8 days)	***6.3E+00***	8.7E-01	***1.6E+00***	***2.0E+01***
Cs-134 (approx 2 years)	2.7E+00	***4.4E+00***	***2.5E-01***	***4.7E+00***
Cs-137 (approx 30 years)	2.8E+00	***4.4E+00***	***2.7E-01***	***4.9E+00***

※I-131,Cs-134,Cs-137 are fixed figures. Data of other nuclides are under evaluation.

Radioactive Materials Density (***Bold italic*** number (Bq/cm3) in above Table is used,)

	Radioactive Material Density (Bq/cm3)			
	I-131	Cs-134	Cs-137	Total
Central R/W Treatment	6.3×10^{0}	4.4×10^{0}	4.4×10^{0}	1.5×10^{1}
Sub-Drain unit 5	1.6×10^{0}	2.5×10^{-1}	2.7×10^{-1}	2.1×10^{0}

Sub-Drain unit 6	2.0×10^{1}	4.7×10^{0}	4.9×10^{0}	3.0×10^{1}

Discharged Radioactivity

	Discharged Radioactivity (Bq)			
	I-131	Cs-134	Cs-137	Total
Central R/W Treatment	5.7×10^{10}	4.0×10^{10}	4.0×10^{10}	1.4×10^{11}
Sub-Drain unit 5	1.5×10^{9}	2.4×10^{8}	2.6×10^{8}	2.0×10^{9}
Sub-Drain unit 6	7.5×10^{9}	1.8×10^{9}	1.8×10^{9}	1.1×10^{10}
Total	6.6×10^{10}	4.2×10^{10}	4.2×10^{10}	**1.5×10^{11}**

[Calculation of Effective Radioactive Dose]

--Annual Effective Dose (Whole Body) per 1 Bq/cm3 is based on "Regulatory Guide for the Annual Dose Target for the Public in the Vicinity of Light Water Nuclear Power Reactor Facilities"
I-131 : 2.42 x E+0 mSv/yr
Cs-134 : 4.99 x E+1 mSv/yr
Cs-137 : 3.41 x E+1 mSv/yr

--Sea water flow rate near Fukushima Daiichi NPS is 10 cm/sec. In this case, sea water radioactive density is diluted to 1/10 at 1 km down stream. Since discharge period was 5 days, annual average radioactive density in the ocean areas is estimated by (radioactive density at discharge point) x (1/10) x (5/365).

--Conclusion
I-131 : (1/10) x (5/365) x 2.42 (mSv/yr) x 20 (Bq/cm3) = 0.066 mSv/yr
Cs-134 : (1/10) x (5/365) x 49.9 (mSv/yr) x 4.7 (Bq/cm3) = 0.321 mSv/yr
Cs-137 : (1/10) x (5/365) x 34.1 (mSv/yr) x 4.9 (Bq/cm3) = 0.229 mSv/yr
Total dose = 0.066 + 0.321 + 0.229 = <u>0.616 mSv/yr</u>

From: info@ecologicalinternet.org on behalf of Terry Brooks <terrybrookspen@googlemail.com>
Sent: Wednesday, March 16, 2011 11:43 PM
To: FOIA Resource
Subject: Please follow Europe and China's leads and inspect old nuclear plants and delay new starts

Dear U.S. Nuclear Regulatory Commission,

Given the worsening Japanese nuclear disaster, I am writing to demand immediate closure of U.S. nuclear energy facilities that remain operational after having exceeded their engineered operable life. Please immediately close these facilities for inspection in an orderly manner as is occurring in Europe. It is the prudent thing to do given many older reactors in the U.S. are of similar design as those melting down in Japan.

Japan is facing the worst nuclear crisis since the atomic bombing of Hiroshima and Nagasaki. Multiple explosions have hit the Fukushima Daiichi nuclear plant, several reactors have lost their cooling systems, raising fears of meltdown(s). Radiation levels have been detected as far as
100 miles away. Many people have tested positive for radiation exposure, and hundreds of thousands of have been evacuated, with the numbers expected to rise.

In the United States, some reactors which have recently had their licenses extended are nearly 40 years old, and their owners are asking the Nuclear Regulatory Commission for approval to extend their lives further. No additional extensions should be granted, and these older reactors that have been extended must be taken off line immediately and inspected given recent happenings in Japan. Clearly these 1970s vintage era systems were not adequately engineering for infrequent but large natural disasters and increasingly human exacerbated events.

Further, it is presumptuous for the federal government to be planning to provide for $36 billion in loan guarantees to build still more nuclear plants, when we do not yet have a permanent waste repository, or even a plan. We are dooming civilizations for hundreds of thousands of years to having to protect and maintain enclosure upon our nuclear waste. Nuclear waste stored on site has caught fire in Japan, and the current on site storage across America is completely unacceptable. It is not a matter of if, it is only one of when will there be a nuclear disaster in America.

All existing nuclear energy plants, waste and weapons are accidents waiting to happen. Nuclear complexity, ecological costs, natural disasters and a conflict ridden world show nukes can never be safe. The price of nuclear fission is potentially enormous when even one accident happens, must less several as now with our Japanese brothers and sisters.
In a continually more disorderly world, it is clear that no nuclear materials are secured, and that developing countries embracing nuclear energy will lead to weapon proliferation and yet more great loss of life from accidents and war. But we could choose to ban nuclear materials in their entirety.

It is time for humanity to choose which technologies they allow based upon full preponderance of the evidence - and as an ecologist I would predict all but certain similar impacts no matter the effort from the introduction of geo-engineering, genetically modified organisms (particularly food), nanotech, etc. Nuclear fission has been shown to be deadly in the field of battle, along Japan's coastal plains, it's unsecured wastes are growing, and through terrorist and militaristic rhetoric regarding their use in an increasingly unstable world.

Please immediately cease extending the licenses of old nuclear power plants, and shut down for inspection those which have been extended. We will be calling upon President Obama to convene an urgent summit to begin fully dismantling

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global nuclear weaponry. Some technologies such as splitting the atom at their root are anti-human and Earth. Let's get it done, ban the bomb, ban nuclear energy, and commit to climate and energy solutions that are serious and include life-saving energy conservation, efficiency, carbon taxes & using only true renewables. This will soon be the only energy at our disposal if we desire a habitable Earth, and we must transform our society accordingly.

With grave concern,

Terry Brooks
United Kingdom
terrybrookspen@googlemail.com

cc:
President Obama; EPA Administrator, Lisa P. Jackson; Secretary of Agriculture, Tom Vilsack; Secretary of Energy, Steven Chu; Secretary of Interior, Ken Salazar; NOAA Administrator, Jane Lubchenco; President's Science Advisor, Dr. John Holden; NRC Contacts for Open Government

WITH HOC

From: LIA07 Hoc
To: Borchardt, Bill; Bradford, Anna; Cohen, Shari; Cooper, LaToya; Dyer, Jim; Flory, Shirley; Gibbs, Catina; Haney, Catherine; Hudson, Sharon; Jaczko, Gregory; Johnson, Michael; Leeds, Eric; Loyd, Susan; Pace, Patti; Schwarz, Sherry; Sheron, Brian; Speiser, Herald; Sprogeris, Patricia; Taylor, Renee; Virgilio, Martin; Walls, Lorena; Weber, Michael
Subject: Update for Go Books - 0600 EDT, March 25, 2011
Date: Friday, March 25, 2011 6:25:06 AM
Attachments: NRC Status Update 3.25.11--0430.pdf
TEPCO Press Release 149.pdf
TEPCO Press Release 150.pdf
TEPCO Press Release 151.pdf
TEPCO Press Release 152.pdf
TEPCO Press Release 146.pdf
TEPCO Press Release 147.pdf
TEPCO Press Release 148.pdf
ET Chronology 3-25-11 0600.pdf
March 25 0600 EDT one pager 3 .pdf

Please find attached updated information for the "Go Books".

The updates include:

- The 0430 EDT, 03/25/11 Status Update – **Please note that the time of publication for this has moved to 0430 to better serve the needs of the team in Japan.**
- The latest ET Chronology
- The latest TEPCO Press Releases (Numbers 146-152)
- "One Pager" (0600 EDT, 03/25/11)

-

Please let me know if you have any questions or concerns.

-Jim

Jim Anderson
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
James.anderson@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

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Press Releases

Press Release (Mar 25,2011)
Result of the investigation on exposure to radiation of workers from cooperative companies at Unit3 in Fukushima Daiichi Nuclear Power Station(March 25, 2011)

This nuclear power station has been shut down because of Tohoku-Chiho Taiheiyou-Oki Earthquake.
On March 24, 2011, it was confirmed that 3 workers from cooperative companies who were in charge of cable laying work in the 1st floor and the underground floor of turbine building were exposed to the radiation dose of more than 170mSv.2 of them were confirmed that their leg skins were contaminated. Although they were decontaminated by laundering, they were transferred to Fukushima Medical University hospital because there is possibility that they get a burn injury by beta ray. After medical examination at Fukushima Medical University Hospital, they were transferred to National Institute of Radiological Sciences in Chiba Prefecture on March 25 and stay for around four days to survey the situation. Investigation result of the water that the workers stepped in would be announced when it is reported. (previously announced)

We announce the investigation result of their working surroundings as mentioned bellow.

Radiation dose rate of surface of the water is approximately 400mSv/h.

Result of gamma-ray nuclide analyses based on sampling of puddle

location	Puddle in underground floor of turbine building of Unit 3
Name of nuclide	Concentration of sample(Bq/cm^3)
Cobalt60	Approximately 7.0×10^2
Technetium99m	Approximately 2.5×10^3
Iodine131	Approximately 1.2×10^6
Cesium134	Approximately 1.8×10^5
Cesium136	Approximately 2.3×10^4
Cesium137	Approximately 1.8×10^5
Barium140	Approximately 5.2×10^4
Lanthanum140	Approximately 9.4×10^3
Cerium144	Approximately 2.2×10^6
total	Approximately 3.9×10^6

We are assessing radiation dose of 2 worker's leg skin by beta ray.

We guess that this incident was caused because the workers regarded radiation dose of working area as low from survey result of radiation dose on March 23 and continued working without recognizing change of working conditions of the day although alarm of their dosemeter rang.

We thoroughly instruct our employees and workers of cooperative companies to recognize alarm of their dosemeter and evacuate when the alarm rings.

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Press Releases

Press Release (Mar 25,2011)
March 25th(Fri):Group2(Original Schedule 18:20-22:00)

-Blackout Period: Approximately 3 hours (18:20 -22:00)
-Expected Number of Customers: Approximately 2,970,000
-Applicable Region: Saitama pref., Chiba pref., Kanagawa pref., Tokyo, Tochigi pref., Yamanashi pref., Shizuoka pref.

No.A
Sayama City, Sakado City, Kawagoe City, Tsurugashima City, Hidaka City, Ogose Town, Moroyama Town, Iruma City, Hanno City, Tokigawa Town

No.B
Sakura City, Narashino City, Yachiyo City

No.C
Sagamihara City (Chuo Ward, Midori Ward), Kawasaki City (Asao Ward), Machida City

No.D
Hanyu City, Okegawa City, Kazo City, Kuki City, Kumagaya City, Satte City, Gyoda City, Kounosu City, Ageo City, Kitamoto City

No.E
Inagi City, Komae City, Mitaka City, Koganei City, Tama City, Chofu City, Fuchu City

No.F
Iwafune Town, Nogi Town, Kanuma City, Oyama City, Tochigi City

No.G
Saitama City (Urawa Ward, Omiya Ward, Chuo Ward, Minami Ward, Midori Ward), Koshigaya City, Yoshikawa City, Misato City, Kasukabe City, Kawaguchi City, Soka City, Matsubushi Town, Warabi City

No.H
Mishima City, Gotemba City, Susono City, Nagaizumi Town

No.I
Ichikawa City, Matsudo City, Funabashi City

No.J
Chigasaki City, Samukawa Town, Hiratsuka City

No.K
Ichikawa City, Narashino City, Chiba City (Hanamigawa Ward, Wakaba Ward, Mihama Ward), Funabashi City, Yachiyo City

No.L
Hino City, Hachioji City

No.M
Akishima City, Hino City, Hachioji City

No.N
Saitama City (Urawa Ward, Iwatsuki Ward, Minami Ward, Midori Ward), Koshigaya City, Kuki City, Satte City, Kasukabe City, Kawaguchi City, Miyashiro Town, Shiraoka Town, Sugito Town

No.O
Kofu City, Ichikawamisato Town, Chuo City, Fuefuki City, Minami-Alps City, Fujikawa Town

No.P
Numazu City, Atami City, Mishima City, Susono City, Kannami Town, Shimizu Town, Nagaizumi Town

No.Q
Yokohama City (Asahi Ward, Seya Ward, Tsuzuki Ward, Midori Ward)

No.R
Kunitachi City, Tama City, Machida City, Hino City, Hachioji City, Fuchu City

* No.is based on each substation's coverage area.

•Start time and end time may slightly differ in each Group.
•Depending upon the demand-supply conditions during the designated day, additional blackout may occur at other than the scheduled time.
•We will continue maximum efforts to continue supplying electricity to the railroad services and may not carry out the rolling blackout to them.
•The blackout may not be carried out for all the customers in the appointed regions.

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Press Releases

Press Release (Mar 25,2011)
The results of nuclide analyses of radioactive materials in the air at the site of Fukushima Daiichi Nuclear Power Station(4th release)

On March 22nd 2011, as part of monitoring activity of the surrounding environment, we conducted nuclide analysis of radioactive materials contained in the air which were collected on March 20th and 21st 2011 at the site of Fukushima Daiichi Nuclear Power Station, which was damaged by Tohoku-Chihou-Taiheiyo-Oki Earthquake. As a result, radioactive materials were detected as shown in the attachment. Therefore, we summarized the results and reported them to Nuclear and Industry Safety Agency as well as to the government of Fukushima Prefecture today. (previously announced)

On March 24th, 2011, we conducted nuclide analysis of radioactive materials contained in the air which were collected on March 24th, 2011 at the site of Fukushima Daiichi Nuclear Power Station. As a result, radioactive materials were detected as shown in the attachment. Therefore, we summarized the results and reported them to Nuclear and Industry Safety Agency as well as to the government of Fukushima Prefecture today.

We will continue the sampling survey same as this one.

attachment1:The result of the nuclide analysis of radioactive materials in the air at the site of Fukushima Daiichi Nuclear Power Station(PDF 64.0KB)
attachment2:The result of the nuclide analysis of radioactive materials in the air at the site of Fukushima Daini Nuclear Power Station(PDF 54.0KB)
attachment3:Nuclide analysis of radioactive materials in the air Fukushima Daiichi uclear Power Station(Main Gate) (PDF 10.5KB)
attachment4:Nuclide analysis of radioactive materials in the air Fukushima Daini Nuclear Power Station(MP-1)(PDF 12.8KB)

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Press Releases

Press Release (Mar 25,2011)
Plant Status of Fukushima Daini Nuclear Power Station (as of 9:00 am March 25th)

[No update from the last release issued at 9:00 pm, March 24th]

Unit	Status
1	· Reactor cold shutdown, stable water level, offsite power is available. · No reactor coolant is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the Pressure Suppression Chamber.
2	· Reactor cold shutdown, stable water level, offsite power is available. · No reactor coolant is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the Pressure Suppression Chamber.
3	· Reactor cold shutdown, stable water level, offsite power is available. · No reactor coolant is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the Pressure Suppression Chamber.
4	· Reactor cold shutdown, stable water level, offsite power is available. · No reactor coolant is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the Pressure Suppression Chamber.
Other	N.A.

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Press Releases

Press Release (Mar 24,2011)
Detection of trace amounts of radioactive iodine around an exhaust stack and others of Kashiwazaki-Kariwa Nuclear Power Station

TEPCO has measured exhaust air from an exhaust stack and vent of each building of Kashiwazaki-Kariwa nuclear power station with a filter for a week, and detected iodine 131 up to 2.4 X 10^{-8} (becquerel/cm^3) at the exhaust stacks of all buildings, the exhaust vents of service buildings and auxiliary buildings (Arahama-side) of Unit 3, 5 and 6.

It slightly exceeded the upper limit (please refer to the attachment for more information).

Therefore, TEPCO checked operation conditions and works of all units, readings of high sensitivity off gas monitor*1, a periodical analysis result of iodine 131 contained in reactor water of Unit 1, 5, 6 and 7 in operation. However, any abnormality was detected.

It is presumed that iodine 131 released into the atmosphere from Fukushima Daiichi Nuclear Power Station was collected and detected in Kahiwazaki-Kariwa Nuclear Power Station, since iodine 131 was detected in radioactivity measurement of the exhaust air of some units and no abnormality of iodine 131 in nuclear water was detected.

Readings of monitoring posts and dust radiation monitors are within the normal range and have little environmental impact.The monitoring posts are located at boundary of the station and measure an ambient dose rate. The dust radiation monitors*2 are located beside the monitoring posts.

Attachment: :measurement result of iodine 131 in
Kashiwazaki-Kariwa Nuclear Power Station

*1: High sensitivity off gas monitor
Measurement equipment installed in an off-gas treatment system to detect minimal leakage of radioactive materials from fuel rods to the nuclear water early

*2: Dust radiation monitor
Measurement equipment to monitor radioactivity contained in dust which is collected around boundary of the nuclear power station. Three dust radiation monitors are installed beside the monitoring posts.

attachment1:measurement result of iodine 131 in
Kashiwazaki-Kariwa Nuclear Power Station
attachment2:Detection of trace amounts of radioactive iodine around an exhaust stack and others of Kashiwazaki-Kariwa Nuclear Power

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Press Releases

Press Release (Mar 25,2011)
Plant Status of Fukushima Daiichi Nuclear Power Station (as of 10:00 PM Mar 24th)

*new items are underlined

All 6 units of Fukushima Daiichi Nuclear Power Station have been shut down.

Unit 1(Shut down)
- Reactor has been shut down. However, the explosive sound and white smoke were confirmed after the big quake occurred at 3:36 pm Mar 12th. It was assumed to be hydrogen explosion.
- At approximately 2:30 am on March 23rd, seawater was started to be injected to the nuclear reactor through the feed water system.
- At approximately 10:50 am on March 24th, white fog-like steam arising from the roof part of the reactor building was observed.
- At approximately 11:30 am on March 24th, lights in the main control room was restored.
- We have been injecting sea water into the reactor pressure vessel.

Unit 2(Shut down)
- At approximately 6:00 am on March 15th, an abnormal noise began emanating from nearby Pressure Suppression Chamber and the pressure within this chamber decreased.
- At 6:20 pm on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm
- We have been injecting sea water into the reactor pressure vessel.

Unit 3(Shut down)
- Reactor has been shut down. However, the explosive sound and white smoke were confirmed at 11:01am Mar 14th. It was assumed to be hydrogen explosion.
- At 8:30am on March 16th, fog like steam was confirmed arising from the reactor building.
- At approximately 6:15 am on March 17th the pressure of the Suppression Chamber has temporarily increased. We were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside now. We will continue to monitor the status of the pressure of the reactor containment vessel.
- At approximately 4:00 pm, March 21st, light gray smoke was confirmed arising from the floor roof of the Unit 3 building. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.
- At approximately 10:45 pm on March 22nd, the light in the main control room was turned on.
- At around 4:20 pm on March 23rd, our staff confirmed light black smoke belching from the Unit 3 building. At approximately 11:30 pm on March 23rd and 4:50 am on March 24th, our employee found no signs of smoke.
- We have been injecting sea water into the reactor pressure vessel.

Unit 4(outage due to regular inspection)
- Reactor has been shut down. However, at approximately 6 am on March 15th. We have confirmed the explosive sound and the sustained damage around the 5th floor rooftop area of the Nuclear Reactor Building.
- On March 15th and 16th, we respectively confirmed the outbreak of fire at the 4th floor of the northwestern part of the Nuclear Reactor Building. We immediately reported this matter to the fire department and the related authorities. TEPCO employees confirmed that each fire had already died down by itself.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.

Unit 5(outage due to regular inspection)
- Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
- At 5 am, March 19th, we started the Residual Heat Removal System Pump (C) in order to cool the spent fuel pool.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
- At 2:30 pm, March 20th, the reactor achieved reactor cold shutdown. At around 5:24 pm on March 23rd, when we switched the temporary Residual Heat Removal System Seawater Pump, it has stopped automatically. At around 4:14 pm, March 24th, we started replaced pump and at around 4:35 pm, cooling of reactor has restarted.

Unit 6(outage due to regular inspection)
- Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
- We are working on receiving external power supply to Units 5 and 6. We completed the repair work on the emergency diesel generator (A).
- At 10:14 pm, March 19th, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
- At 7:27 pm, March 20th, the reactor achieved reactor cold shutdown.

Today's work for cooling the spent fuel pools

- At approximately 5:35 am, we started injecting seawater into the fuel spent pool of Unit 3, using Fuel Pool Cooling and Filtering(clean up) system (FPC) and finished at 4:05 pm.
- At around 2:35 pm, spraying to unit 4 by concrete pump track and finished at around 5:30 pm.
- We are considering further spraying at other units and others subject to the conditions of spent fuel pools.

Casualty

- 2 workers of cooperative firm were injured at the occurrence of the earthquake, and were transported to the hospital on March 11th.
- 4 workers were injured and transported to the hospital after explosive sound and white smoke were confirmed around the Unit 1on March 11th.
- Presence of 2 TEPCO employees at the site is not confirmed on March 11th.
- 1 TEPCO employee who was not able to stand by his own holding left chest with his hand, was transported to the hospital by an ambulance on March 12th.
- 1 subcontract worker at the key earthquake-proof building was unconscious and transported to the hospital by an ambulance on March 12th.
- The radiation exposure of 1 TEPCO employee, who was working inside the reactor building, exceeded 100mSv and he was transported to the hospital on March 12th.
- 2 TEPCO employees felt bad during their operation in the central control rooms of Unit 1 and 2 while wearing full masks, and were transferred to Fukushima Daini Nuclear Power Station for consultation with a medical advisor on March 13th.
- 11 workers were injured and transported to Fukushima Daini Nuclear Power Station etc. after explosive sound and white smoke were confirmed around the Unit 3. One of the workers was transported to the FUKUSHIMA Medical University Hospital on March 14th.
- At approximately 10 pm on March 22nd, 1 worker who had been working on setting up a temporary power panel in the common pool was injured and transported to Fukushima Daini Nuclear Power Station where the industrial doctor is.
- At approximately 1 am on March 23rd, 1 worker who had been working on transporting a temporary power panel in the common pool was injured and transported to Fukushima Daini Nuclear Power Station where the industrial doctor is.
- On March 24th, it was confirmed that 3 workers from cooperative companies who were in charge of cable laying work in the 1st floor and the underground floor of turbine building were exposed to the radiation dose of more than 170 mSv. 2 of them were confirmed that their leg skin were contaminated. Although they were decontaminated, since it is judged that there is possibility of beta ray burn injury, they were transferred to Fukushima Medical University Hospital. After medical examination at Fukushima Medical University Hospital, they will be transferred to National Institute of Radiological Sciences in Chiba Prefecture today (March 25) and stay for around four days to survey the situation. Inspection result of the water that the workers stepped in will be announced when it is reported.

Others

- We measured radioactive materials (iodine etc.) inside of the nuclear power station area (outdoor) by monitoring car and confirmed that radioactive materials level is getting higher than ordinary level. As listed below, we have determined that specific incidents stipulated in article 15, clause 1 of Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) have occurred.
  - ·Determined at 4:17 pm Mar 12th (Around Monitoring Post 4)
  - ·Determined at 8:56 am Mar 13th (Around Monitoring Post 4)
  - ·Determined at 2:15 pm Mar 13th (Around Monitoring Post 4)
  - ·Determined at 3:50 am Mar 14th (Around Monitoring Post 6)
  - ·Determined at 4:15 am Mar 14th (Around Monitoring Post 2)
  - ·Determined at 9:27 am Mar 14th (Around Monitoring Post 3)
  - ·Determined at 9:37 pm Mar 14th (Around main entrance)
  - ·Determined at 6:51 am Mar 15th (Around main entrance)
  - ·Determined at 8:11 am Mar 15th (Around main entrance)
  - ·Determined at 4:17 pm Mar 15th (Around main entrance)
  - ·Determined at 11:05 pm Mar 15th (Around main entrance)
  - ·Determined at 8:58 am Mar 19th (Around MP5)

From now on, if the measured figure fluctuates and goes above and below 500 micro Sv/h, we deem that as the continuous same event and will not regard that as a new specific incidents stipulated in article 15, clause 1 of the Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) has occurred. In the interim, if we measure a manifestly abnormal figure and it is evident that the event is not the continuous same event, we will determine and notify.

- The national government has instructed evacuation for those local residents within 20km radius of the periphery and evacuation to inside for those residents from 20km to 30km radius of the periphery, because it's possible that radioactive materials are discharged.
- At approximately 10am on March 15th, we observed 400mSv/h at the inland side of the Unit 3 reactor building and 100mSv/h at the inland side of the Unit 4 reactor building.
- At around 10:37 am March 21st, water spraying to common spent fuel pool and finished at 3:30 pm (conducted by TEPCO).
- At around 3:37 pm, March 24th, electricity supply to common spent fuel pool has started from external power source. At around 6:05 pm, fuel pool cooling pump was started to cool the pool.
- We found no signs of abnormal situation for the casks by visual observation during the patrol activity. A detailed inspection is under preparation.

- At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit.
- In total 12 fire engines are lent for the water spraying to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department. Also, instruction regarding the setting and operation of large scale decontamination system was provided by Niigata City Fire Headquarter and Hamamatsu City Fire Headquarter.
  - *: Koriyama Fire Department, Iwaki Fire Brigade Headquarters, Fire Headquarters of Sukagawa District Wide Area Fire-fighting Association, Yonezawa City Fire Headquarters, Utsunomiya City Fire Headquarters, Fire Headquarters of Aizu-Wakamatsu wide area municipal association, Saitama City Fire Bureau, and Niigata City Fire Bureau.
- Until March 22nd, Units 1 through 6 were started to be energized from the external power source.
- We will continue to take all measures to ensure the safety and to

continue monitoring the surrounding environment around
the Power Station.

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Press Releases

Press Release (Mar 25,2011)
Status of TEPCO's Facilities and its services after Tohoku-Taiheiyou-Oki Earthquake (as of 9:00AM)

Due to the Tohoku-Taiheiyou-Oki Earthquake which occurred on March 11th 2011, TEPCO's facilities including our nuclear power stations have been severely damaged. We deeply apologize for the anxiety and inconvenience caused.

Below is the status of TEPCO's major facilities.
*new items are underlined

[Nuclear Power Station]
Fukushima Daiichi Nuclear Power Station:
Units 1 to 3: shutdown due to earthquake
(Units 4 to 6: outage due to regular inspection)

* The national government has instructed to evacuate for those local residents within 20km radius of the site periphery and to remain indoors for those local residents between 20km and 30km radius of the site periphery.

*Off-site power was connected to Unit 1 to 6.

*Unit 1
The explosive sound and white smoke was confirmed near Unit 1 when the big quake occurred at 3:36pm, March 12th.
We have started injection of sea water at 8:20 pm, March 12th, and then boric acid which absorbs neutron into the reactor afterwards.

At approximately 2:30 am, March 23rd, we have started the injection of sea water into the reactor from feed water system.

At approximately 10:50 on March 24th, white smoke was confirmed arising from the top of the reactor building.

At approximately 11:30 am, March 24th, lights in the main control room were restored.

*Unit 2
At 1:25 pm, March 14th, since the Reactor Core Isolation Cooling System has failed, it was determined that a specific incident stipulated in Clause 1, Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness occurred (failure of reactor cooling function).

At 5:17 pm, March 14th, while the water level in the reactor reached the top of the fuel rod, we have restarted the water injection with the valve operation.

At approximately 6:14 am, March 15th, the abnormal sound was confirmed near the suppression chamber and the pressure inside the chamber decreased afterwards. It was determined that there is a possibility that something happened in the suppression chamber. While sea water injection to the reactor continued, TEPCO employees and workers from other companies not in charge of injection work started tentative evacuation to a safe location. Sea water injection to the reactor continued.

On March 18th, power was delivered up to substation for backup power through offsite transmission line. We completed laying cable further to unit receiving facility in the building, and at 3:46 pm, March 20th the load-side power panel of the receiving facility started to be energized.

From 3: 05 pm to 5: 20 pm on March 20th, 40 tons of seawater was injected into Unit 2 by TEPCO employees.

At 6:20 on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm.

From around 4 pm to 5 pm on March 22nd, approximately 18 tons of sea water was injected into the spent fuel pool by TEPCO employees.

*Unit 3
At 6:50 am, March 14th, while water injection to the reactor was under operation, the pressure in the reactor containment vessel increased to 530 kPa. As a result, at 7:44 am, it was determined that a specific incident stipulated in article 15, clause 1 occurred (abnormal increase of the pressure of reactor containment vessel). Afterwards, the pressure has gradually decreased (as of 9:05 am, 490 kPa).

At approximately 11:01 am, March 14th, an explosion followed by white smoke occurred near Unit 3. 4 TEPCO employees and 3 workers from other companies (all of them are conscious) have sustained injuries and they were already taken to the hospital by ambulances.
As the temperature of water in the spent fuel pool rose, spraying water by helicopters with the support of the Self Defense Force was considered, however the operation on March 16th was cancelled.

At 6:15 am, March 17th, the pressure of the Suppression Chamber temporarily increased, but currently it is stable in a certain range.
On March 20th, we were preparing to implement a measurement to reduce the

pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside. We will continue to monitor the status of the pressure of the reactor containment vessel. Monitoring will be continued.

In order to cool spent fuel pool, water was sprayed by helicopters on March 17th with the cooperation of Self-Defense Forces.

At approximately past 7:00 pm, March 17th, Self-Defense Forces and the police had started spraying water by water cannon trucks upon our request for the cooperation. At 8:09 pm, March 17th, they had finished the operation.

At 2:00 pm, March 18th, spraying water by fire engines was started with the cooperation of Self-Defense Forces and the United States Armed Forces. At 2:45 pm, March 18th, they had finished the operation.

At approximately 0:30 am, March 19th, spraying water was started with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department started spraying water. At approximately 1:10 am, March 19th, they finished the operation. They resumed spraying water at 2:10 pm. At approximately 3:40 am, March 20th, they finished the operation.

At approximately 9:30 pm, March 20th, spraying water was started with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department. At approximately 3:58 am, March 21th, they finished the operation.

At approximately 3:55 pm, March 21st, light gray smoke was confirmed arising from the southeast side of the 5th floor roof of the Unit 3 building, and the situation was reported to the fire department at approximately 4:21 pm. The parameters of reactor pressure vessel, reactor containment vessel, and monitored environmental data remained at the same level. However, employees working around Unit 3 evacuated to a safe location. It is observed the smoke has been decreasing. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.

At approximately 3:10 pm on March 22nd, water discharge into Unit 3 by Tokyo Fire Department's Hyper Rescue and Osaka City Fire Department was conducted and completed at approximately 4:00 PM on the same day.

At approximately 10:45 pm on March 22nd, lights in the main operation room were restored.
At 11:00 am on March 23rd, the injection of sea water to spent fuel pool was conducted, and finished approximately at 1:20 pm on the same day.

At 4:20 pm on March 23rd, light gray smoke was observed belching from Unit 3 building. The situation was reported to the fire department at 4:25 pm on March 23rd.
The parameters of the reactor, the reactor containment vessel of Unit 3, and monitored figures around the site's immediate surroundings remained stable without significant change. To be safe, workers in the main control room of Unit 3 and around Unit 3 evacuated to a safe location.

At approximately 11:30 pm on March 23rd and 4:50 am on March 24th, TEPCO employees confirmed the smoke has disappeared. Accordingly, workers evacuation was lifted.

At approximately 5:35 am on March 24th, sea water injection through Fuel Pool Cooling and Filtering System was initiated.

* Unit 4
At approximately 6:00 am, March 15th, an explosive sound was heard and the damage in the 5th floor roof of Unit 4 reactor building was confirmed. At 9:38 am, the fire near the north-west part of 4th floor of Unit 4 reactor building was confirmed. At approximately 11:00 am, TEPCO employees confirmed that the fire was off.

At approximately 5:45 am on March 16th, a TEPCO employee discovered a fire at the northwest corner of the Nuclear Reactor Building. TEPCO immediately reported this incident to the fire department and the local government and proceeded with the extinction of fire.
At approximately 6:15 am, TEPCO staff confirmed at the site that there are no signs of fire.

At approximately 8:21 am on March 20th, spraying water by fire engines was started with the cooperation of Self-Defense Forces and they finished the operation at approximately 9:40 am. At approximately 6:45 pm spraying water was started by Self-Defenses' water cannon trucks and finished at approximately 7:45 pm.

At approximately 6:30 am, March 21st, spraying water by fire engines was started with the cooperation of Self-Defense Forces and the United States Armed Forces. At approximately 8:40 am, March 21, they had finished the operation.
On March 21st, cabling has been completed from temporary substation to the main power center.

From approximately 5:20 pm on March 22nd, water discharge from the concrete pumping vehicle was conducted and ended at approximately 8:30 pm on the same day.

From approximately 10:00 am on March 23rd, water discharge from the concrete pumping vehicle was conducted and ended at approximately 1:00 pm on the same day.

*Unit 5 and 6
At 5 am on March 19th, we started the Residual Heat Removal System Pump (C) of Unit 5 in order to cool the spent fuel pool. At 10:14 pm, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.

Unit 5 has been in reactor cold shutdown since 2:30 pm on March 20th.
Unit 6 has been in reactor cold shutdown since 7:27 pm on March 20th.

At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit

At approximately 5:24 pm on March 23rd, the temporary Residual Heat Removal System Seawater Pump automatically stopped when its power source was switched. We plan to repair the pump while maintaining the appropriate the water level and the temperature in the reactor. At around 4:14 pm, March 24th, we started replaced pump and at around 4:35 pm, cooling of reactor has restarted.

•On March 18th, regarding the spent fuel in the common spent fuel pool, we have confirmed that the water level of the pool is secured. At around 10:37 am March 21st, water spraying to common spent fuel pool and finished at 3:30 pm. At around 6:05 pm, fuel pool cooling pump was started to cool the pool.
*common spent fuel pool: a spent fuel pool for common use set in a separate building in a plant site in order to preserve spent fuel which are transferred from the spent fuel pool in each Unit building.

•On March 17th, we patrolled buildings for dry casks and found no signs of abnormal situation for the casks by visual observation. A detailed inspection is under preparation.
*dry cask: a measure to store spent fuel in a dry storage casks in storages. Fukushima Daiichi Nuclear Power Station started to utilize the measure from August 1995.

•In total 13 fire engines are lent for spraying water to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department. Also, instruction regarding the setting and operation of large scale decontamination system was provided.

•On March 24, 2011, it was confirmed that 3 workers from cooperative companies who were in charge of cable laying work in the 1st floor and the underground floor of turbine building were exposed to the radiation dose of more than 170mSv.2 of them were confirmed that their leg skins were contaminated. Although they were decontaminated by laundering, they were transferred to Fukushima Medical University hospital because there is possibility that they get a burn injury by beta ray. After medical examination at Fukushima Medical University Hospital, they were transferred to National Institute of Radiological Sciences in Chiba Prefecture on March 25 and stay for around four days to survey the situation. We are assessing radiation dose of 2 worker's leg skin by beta ray. We thoroughly instruct our employees and workers of cooperative companies to recognize APD alarm and evacuate when the alarm rings.

•On March 21st and 23rd, we detected cobalt, iodine and cesium from the seawater around discharge canal of Unit 1, 2, 3 and 4.

•On March 20th,21st and 23rd, we detected iodine, cesium and tellurium in the air collected at the site of Fukushima Daiichi Nuclear Power Station.

•We will continuously endeavor to securing safety, and monitoring of the surrounding environment.

Fukushima Daini Nuclear Power Station:
Units 1 to 4: shutdown due to earthquake
•The national government has instructed evacuation for those local residents within 10km radius of the periphery.

•In order to achieve cold shutdown, reactor cooling function was restored and cooling of reactors was conducted. As a result, all reactors achieved cold shutdown: Unit 1 at 5:00 pm, March 14th, Unit 2 at 6:00 pm, March 14th, Unit 3 at 0:15 pm, March 12th, Unit 4 at 7:15 am, March 16th.

•Since March 12th, we had been preparing measures for reducing the pressure of reactor containment vessels (partial discharge of air containing radioactive materials to outside), but on March 17th, we released such preparation in all Units.

•(Unit 1)
As it is confirmed that the temperature of the Emergency Equipment Cooling Water System *1 has increased, at 3:20 pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 4:25 pm, March 15th, after replacing the power facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

•(Unit 4)
As it is confirmed that the pressure at the outlet of the pumps of the Emergency Equipment Cooling Water System*1 has been decreased, at 8:05 pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 9:25 pm, March 15th, after replacing the relevant facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

*1:emergency water system in which cooling water (pure water) circulates which exchanged the heat with sea water in order to cool down bearing pumps and/or heat exchangers etc.

Kashiwazaki Kariwa Nuclear Power Station:
Units 1, 5, 6, 7: normal operation
(Units 2 to 4: outage due to regular inspection)

[Thermal Power Station]
Hirono Thermal Power Station Units 2 and 4: shutdown due to earthquake
Hitachinaka Thermal Power Station Unit 1: shutdown due to earthquake
Kashima Thermal Power Station Units 2, 3, 5, 6: shutdown due to earthquake
Higashi-Ohgishima Thermal Power Station Unit 1: restarted generation at 13:42 PM on March 24th

[Hydro Power Station]
• All the stations have been restored.
(Facilities damaged by the earthquake are now properly under consideration)

[Transmission System, etc.]
All substation failed due to the earthquake have been restored.

[Blackout in TEPCO's Service Area]
All the blackouts are resolved.

[Supply and Demand Status within TEPCO's Service Area to Secure Stable Power Supply]
Backup supply from Shinshinano Conversion Station: 600MW
Backup supply from Sakuma Conversion Station: 300MW
Backup supply from Higashi Shimizu Conversion Station: 100MW
Backup supply from Hokkaido-Honshu Interconnection Facilities: 600MW

Considering the critical balance of our power supply capacity and expected

power demand forward, in order to avoid unexpected blackout, TEPCO has been implementing rolling blackout (planned blackout alternates from one area to another) since Mar 14th. We will make our utmost to secure the stable power supply as early as possible.
For customers who will be subject to rolling blackout, please be prepared for the announced blackout periods. Also for customers who are not subject to blackouts, TEPCO appreciates your continuous cooperation in reducing electricity usage by avoiding using unnecessary lighting and electrical equipment.

[Others]
Please do NOT touch cut-off electric wires.
In order to prevent fire, please make sure to switch off the electric appliances such as hair drier and to shut down the breaker of distribution board when you leave your house.
For the customer who has in-house power generation, please secure fuel for generator.

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From: Google Alerts
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Date: Friday, March 25, 2011 4:38:15 PM

News **3** new results for **Nuclear Regulatory Commission**

Southern's two new nuke reactors pass enviro review: **NRC**
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By Tom Doggett WASHINGTON (Reuters) - Southern Co passed the environmental review for the two nuclear reactors it wants to build at its Vogtle nuclear station in Georgia. the US **Nuclear Regulatory Commission** said on Friday, suggesting Japan's crisis is **...**
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Chicago Tribune
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Reuters
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Sent: Friday, March 25, 2011 10:09 PM
To: RST01B Hoc
Subject: FW: youtube video closeup new today

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Sent: Friday, March 25, 2011 9:57 PM
To: RST01A Hoc
Subject: FW: youtube video closeup new today

From: ET02 Hoc
Sent: Friday, March 25, 2011 9:55 PM
To: RST01 Hoc; RST12 Hoc; RST09 Hoc; ET02 Hoc
Subject: youtube video closeup new today

http://www.youtube.com/watch?v=ulho3Ogc5Pk

Y44/325

Ani, Suzanne

From: NEIGA@nei.org
Sent: Wednesday, March 16, 2011 2:01 PM
To: Ani, Suzanne
Subject: **Update 1:15pm March 16** Information on the Japanese Earthquake and Reactors in that Region

NEI
NUCLEAR ENERGY INSTITUTE

UPDATE AS OF 1:15 P.M. EDT, WEDNESDAY, MARCH 16:

NEI has posted an updated version of the fact sheet Used Nuclear Fuel Storage at the Fukushima Daiichi Nuclear Power Plant. Also available is a new fact sheet called Industry Taking Action to Ensure Continued Safety at U.S. Nuclear Energy Plants.

As always, please go to http://resources.nei.org/japan for the latest updates.

YYY/326

Schaperow, Jason

From: Schaperow, Jason
Sent: Friday, March 25, 2011 12:56 PM
To: Bush-Goddard, Stephanie
Subject: FW: RASCAL Runs justifying U.S. PARs
Attachments: RASCAL Run of 03152011_0251AM (used in 03162011 NRC Press Release).pdf; RASCAL Run of 03162011_1224PM (used in 03162011 NRC Press Release).pdf

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From: Tinkler, Charles
Sent: Thursday, March 17, 2011 11:34 AM
To: Schaperow, Jason
Subject: FW: RASCAL Runs justifying U.S. PARs

Where is the source term?

From: Lee, Richard
Sent: Thursday, March 17, 2011 11:21 AM
To: Tinkler, Charles; Salay, Michael
Subject: FW: RASCAL Runs justifying U.S. PARs

fyi

From: Hoc, PMT12
Sent: Thursday, March 17, 2011 11:05 AM
To: Gibson, Kathy
Cc: Lee, Richard
Subject: FW: RASCAL Runs justifying U.S. PARs

Hi Kathy.

FYI - Here are the full RASCAL runs from the press release. We now have Richard's name and can contact him as necessary. ~~This info can't be shared outside NRC~~. The ET confirmed for us that MACCS code will not be used to benchmark RASCAL and that RES staff should not engage further efforts to use MACCS for this event.

K. Brock

YY/327

Re-run of 3/15/11 2:51 run found in press release. Ignore run date/time on this copy.

Summary Report

Case description: Fukushima Unit 2 mid night release 14MAR
Run date/time: 2011/03/15 03:04

Maximum Dose Values (rem) - Close-In

Dist from release miles (kilometers)	0.5 (0.8)	1. (1.61)	1.5 (2.41)	2. (3.22)	3. (4.83)	5. (8.05)	7. (11.27)	10. (16.09)
Total EDE	5.4E+03	2.0E+03	1.2E+03	8.2E+02	4.8E+02	2.4E+02	1.6E+02	9.5E+01
Thyroid CDE	2.8E+04	1.1E+04	6.2E+03	4.3E+03	2.5E+03	1.3E+03	8.4E+02	5.1E+02
Inhalation CEDE	3.7E+03	1.4E+03	8.0E+02	5.6E+02	3.3E+02	1.7E+02	1.1E+02	6.7E+01
Cloudshine	1.9E+01	9.3E+00	5.8E+00	4.1E+00	2.5E+00	1.4E+00	9.7E-01	6.2E-01
4-day Groundshine	1.7E+03	6.5E+02	3.8E+02	2.6E+02	1.5E+02	7.3E+01	4.6E+01	2.8E+01
Inter Phase 1st Yr	2.4E+04	9.3E+03	5.4E+03	3.8E+03	2.2E+03	1.0E+03	6.6E+02	3.9E+02
Inter Phase 2nd Yr	1.1E+04	4.4E+03	2.6E+03	1.8E+03	1.0E+03	4.9E+02	3.1E+02	1.8E+02

Notes:
- Doses exceeding PAGs are underlined.
- Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
- Intermediate-Phase EPA PAGs: 1st year - 2 rem, 2nd year - 0.5 rem
- *** indicates values less than 1 mrem
- To view all values - use Detailed Results | Numeric Table
- Total EDE = Inhalation CEDE + Cloudshine + 4-Day Groundshine

Maximum Dose Values (rem) - To 50 mi

Dist from release miles (kilometers)	15 (24.1)	20 (32.2)	30 (48.3)	40 (64.4)	50 (80.5)
Total EDE	8.6E+01	6.3E+01	3.7E+01	1.8E+01	8.1E+00
Thyroid CDE	3.3E+02	2.7E+02	1.3E+02	5.9E+01	2.5E+01
Inhalation CEDE	3.9E+01	3.1E+01	1.3E+01	4.4E+00	1.3E+00
Cloudshine	4.5E-01	3.8E-01	1.7E-01	7.4E-02	2.9E-02
4-day Groundshine	4.7E+01	3.2E+01	2.4E+01	1.3E+01	6.7E+00
Inter Phase 1st Yr	7.1E+02	4.7E+02	3.8E+02	2.2E+02	1.3E+02
Inter Phase 2nd Yr	3.4E+02	2.3E+02	1.8E+02	1.1E+02	6.9E+01

Notes:
- Doses exceeding PAGs are underlined.
- Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
- Intermediate-Phase PAGs: 1st year - 2 rem, 2nd year - 0.5 rem
- *** indicates values less than 1 mrem
- To view all values - use Detailed Results | Numeric Table
- Total EDE = CEDE Inhalation + Cloudshine + 4-Day Groundshine
- Total Acute Bone = Bone Inhalation + Cloudshine + Period Groundshine

Case Summary

Event Type Nuclear Power Plant

Location
Name: Fukushima Unit 2
City, county, state: <undefined>, <undefined>, <undefined>
Lat / Long / Elev: 37.4214° N, 141.0325° E, 0 m
UTC Offset: 9 hours
Population: not available

Reactor Parameters

Summary Report

Reactor power:	2350 MWt
Average fuel burn-up:	30000 MWD / MTU
Containment type:	BWR Mark I
Containment volume:	2.50E+05 ft³
Design pressure:	60 lb/in²
Design leak rate:	0.54 %/d
Coolant mass:	1.25E+05 kg
Assemblies in core:	550

Source Term

Type:	Time Core Is Uncovered
Shutdown:	2011/03/11 14:46
Core uncovered:	2011/03/15 00:00
Core recovered:	No

Release Pathway

Type:	BWR - Release Through Dry Well via direct, unfiltered pathway
Description:	Unit 2 mid-night release 3-14-11
Release height:	10. m

Release events

2011/03/15 00:00	Sprays Off
2011/03/15 00:00	Leak rate (% vol) Total failure

Meteorology

Type:	Actual Observations
Dataset name:	Fukushima 2011 03-14 1600
Dataset desc:	Obs/fcsts for Fukushima Unit 1

Summary of data at release point:	Type	Dir deg	Speed m/s	Stab class	Precip	Temp °C
2011/03/12 14:00	Obs	265	1.0	B	?	
2011/03/12 15:00	Obs	265	1.0	B	?	
2011/03/12 16:00	Obs	277	1.3	B	?	
2011/03/12 17:00	Obs	260	2.4	B	?	
2011/03/12 18:00	Obs	241	1.4	E	?	
2011/03/12 19:00	Obs	236	2.1	E	?	
2011/03/12 20:00	Obs	239	2.1	E	?	
2011/03/12 21:00	Obs	229	3.8	E	?	
2011/03/12 22:00	Obs	224	5.1	E	?	
2011/03/12 23:00	Obs	226	3.9	E	?	
2011/03/13 00:00	Obs	228	4.1	E	?	
2011/03/13 01:00	Obs	235	2.6	E	?	
2011/03/13 02:00	Obs	233	3.9	E	?	
2011/03/13 03:00	Obs	225	1.8	E	?	
2011/03/13 04:00	Obs	225	1.3	E	?	
2011/03/13 05:00	Obs	225	2.2	E	?	
2011/03/13 06:00	Obs	225	2.2	E	?	
2011/03/13 07:00	Obs	248	2.7	E	?	
2011/03/13 08:00	Obs	248	2.7	E	?	
2011/03/13 09:00	Obs	270	3.1	E	?	
2011/03/13 12:00	Obs	271	7.4	D	?	
2011/03/13 13:00	Obs	276	6.2	D	?	
2011/03/13 14:00	Obs	312	2.8	B	?	
2011/03/14 18:00	Obs	258	4.8	unk	?	
2011/03/14 19:00	Obs	268	5.0	unk	?	

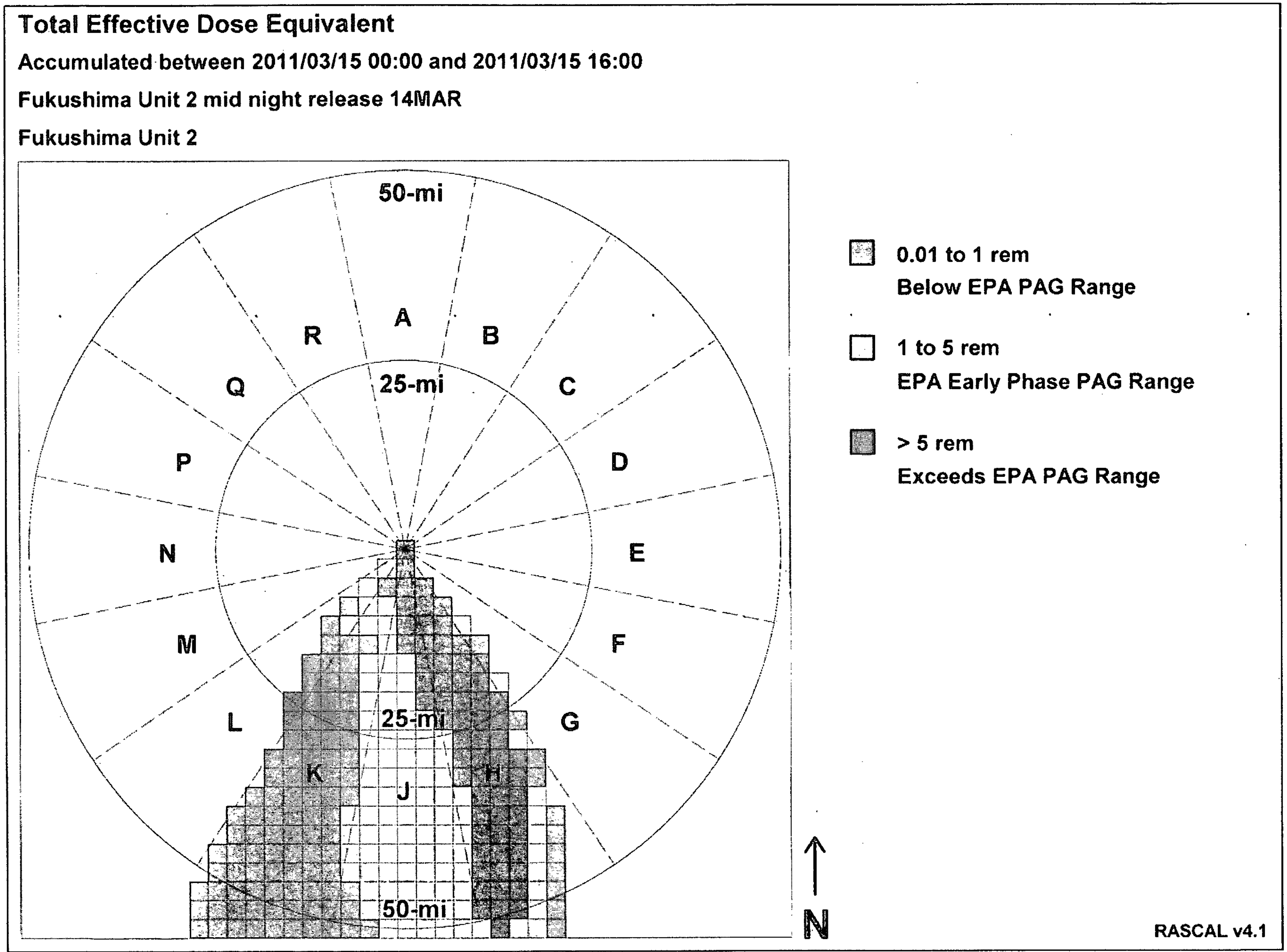
Summary Report

2011/03/14 20:00	Obs	330	2.2	unk	?
2011/03/14 21:00	Fcst	337	4.6	unk	?
2011/03/14 22:00	Fcst	323	7.2	unk	?
2011/03/14 23:00	Fcst	305	6.6	unk	?
2011/03/15 00:00	Fcst	015	8.6	unk	?
2011/03/15 02:00	Fcst	002	7.5	unk	?
2011/03/15 03:00	Fcst	347	5.2	E	None
2011/03/15 04:00	Fcst	332	5.6	E	None
2011/03/15 05:00	Fcst	332	4.0	E	None
2011/03/15 06:00	Fcst	344	3.5	E	Lgt rain
2011/03/15 07:00	Fcst	026	3.8	E	Lgt rain
2011/03/15 08:00	Fcst	044	4.4	E	Lgt rain
2011/03/15 09:00	Fcst	020	4.2	E	Lgt rain
2011/03/15 10:00	Fcst	010	3.4	E	None
2011/03/15 11:00	Fcst	030	3.5	D	Lgt rain
2011/03/15 12:00	Fcst	027	3.0	D	Lgt rain
2011/03/15 13:00	Fcst	037	3.4	D	Lgt rain
2011/03/15 14:00	Fcst	053	3.7	B	None
2011/03/15 15:00	Fcst	058	3.7	B	None
2011/03/15 16:00	Fcst	067	3.2	C	Lgt rain
2011/03/15 17:00	Fcst	081	3.9	C	Lgt rain
2011/03/15 18:00	Fcst	089	4.7	B	None
2011/03/15 19:00	Fcst	085	4.4	B	None
2011/03/15 20:00	Fcst	083	4.4	B	Lgt rain
2011/03/15 21:00	Fcst	074	4.6	C	Lgt rain
2011/03/15 22:00	Fcst	054	5.0	D	Lgt rain
2011/03/15 23:00	Fcst	029	5.6	D	Rain
2011/03/16 00:00	Fcst	011	5.1	D	Lgt rain
2011/03/16 01:00	Fcst	346	4.3	C	Lgt rain
2011/03/16 02:00	Fcst	350	5.3	D	Lgt rain
2011/03/16 03:00	Fcst	323	5.6	D	Lgt rain
2011/03/16 04:00	Fcst	316	5.4	D	None
2011/03/16 05:00	Fcst	298	4.8	D	None
2011/03/16 06:00	Fcst	314	5.6	D	None
2011/03/16 07:00	Fcst	312	4.7	D	None
2011/03/16 08:00	Fcst	331	4.9	D	None
2011/03/16 09:00	Fcst	353	4.1	D	None

Dataset options: Est. missing stability using: Wind speed, time of day, etc.
Adjust stability for consistency: No
Modify winds for topography: Yes

Calculations

Case description: Fukushima Unit 2 mid night release 14MAR
End of calculations: 2011/03/15 16:00
Start of release to atmosphere + 16 h
Distance of calculation: Close-in + to 50 miles
Close-in distances: 0.5, 1.0, 1.5, 2.0, 3.0, 5.0, 7.0, 10.0 miles



Total Effective Dose Equivalent
Accumulated between 2011/03/15 00:00 and 2011/03/15 16:00
Fukushima Unit 2 mid night release 14MAR
Fukushima Unit 2
50-mi
25-mi
A
B
C
D
E
F
G
H
J
K
L
M
N
P
Q
R
25-mi
50-mi
0.01 to 1 rem
Below EPA PAG Range
1 to 5 rem
EPA Early Phase PAG Range
> 5 rem
Exceeds EPA PAG Range
N
RASCAL v4.1

Ex 5

Re-run of 3/16/11 run @ 12:24pm found in press release. Ignore run date/time on this copy

Summary Report

Case description: Fukushima U2, U3 and U4 SFP approximate site release
Run date/time: 2011/03/17 08:48

Maximum Dose Values (rem) - Close-In

Dist from release miles (kilometers)	0.5 (0.8)	1. (1.61)	1.5 (2.41)	2. (3.22)	3. (4.83)	5. (8.05)	7. (11.27)	10. (16.09)
Total EDE	5.4E+03	1.5E+03	6.7E+02	3.9E+02	1.8E+02	7.5E+01	4.0E+01	1.4E+01
Thyroid CDE	2.9E+04	7.9E+03	3.6E+03	2.1E+03	9.6E+02	4.0E+02	2.1E+02	7.5E+01
Inhalation CEDE	3.8E+03	1.0E+03	4.8E+02	2.8E+02	1.3E+02	5.4E+01	2.9E+01	1.0E+01
Cloudshine	2.2E+01	8.0E+00	3.9E+00	2.3E+00	8.0E-01	2.6E-01	2.1E-01	1.1E-01
4-day Groundshine	1.5E+03	4.1E+02	1.9E+02	1.1E+02	5.0E+01	2.1E+01	1.1E+01	4.4E+00
Inter Phase 1st Yr	2.6E+04	7.0E+03	3.2E+03	1.9E+03	8.5E+02	3.5E+02	1.9E+02	7.5E+01
Inter Phase 2nd Yr	1.3E+04	3.5E+03	1.6E+03	9.2E+02	4.2E+02	1.8E+02	9.5E+01	3.8E+01

Notes:
- Doses exceeding PAGs are underlined.
- Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
- Intermediate-Phase EPA PAGs: 1st year - 2 rem, 2nd year - 0.5 rem
- *** indicates values less than 1 mrem
- To view all values - use Detailed Results | Numeric Table
- Total EDE = Inhalation CEDE + Cloudshine + 4-Day Groundshine

Maximum Dose Values (rem) - To 50 mi

Dist from release miles (kilometers)	15 (24.1)	20 (32.2)	30 (48.3)	40 (64.4)	50 (80.5)
Total EDE	1.5E+01	1.3E+01	1.1E+01	1.0E+01	9.9E+00
Thyroid CDE	8.6E+01	7.0E+01	5.2E+01	4.9E+01	4.8E+01
Inhalation CEDE	1.1E+01	9.2E+00	7.7E+00	7.6E+00	7.3E+00
Cloudshine	1.2E-01	9.7E-02	7.3E-02	7.0E-02	6.6E-02
4-day Groundshine	4.1E+00	3.4E+00	2.8E+00	2.7E+00	2.5E+00
Inter Phase 1st Yr	7.1E+01	6.0E+01	4.7E+01	4.5E+01	4.3E+01
Inter Phase 2nd Yr	3.6E+01	3.0E+01	2.3E+01	2.2E+01	2.1E+01

Notes:
- Doses exceeding PAGs are underlined.
- Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
- Intermediate-Phase PAGs: 1st year - 2 rem, 2nd year - 0.5 rem
- *** indicates values less than 1 mrem
- To view all values - use Detailed Results | Numeric Table
- Total EDE = CEDE Inhalation + Cloudshine + 4-Day Groundshine
- Total Acute Bone = Bone Inhalation + Cloudshine + Period Groundshine

Case Summary

Event Type Nuclear Power Plant

Location

Name: Fukushima U4
City, county, state: <undefined>, <undefined>, <undefined>
Lat / Long / Elev: 37.4214° N, 141.0325° E, 0 m
UTC Offset: 9 hours
Population: not available

Reactor Parameters

Summary Report

Reactor power:	3760 MWt
Average fuel burn-up:	30000 MWD / MTU
Containment type:	BWR Mark I
Containment volume:	2.50E+05 ft³
Design pressure:	60 lb/in²
Design leak rate:	0.54 %/d
Coolant mass:	1.25E+05 kg
Assemblies in core:	917

Source Term

Type:	Time Core Is Uncovered
Shutdown:	2011/03/11 14:46
Core uncovered:	2011/03/16 19:50
Core recovered:	No

Release Pathway

Type:	BWR - Release Through Dry Well via direct, unfiltered pathway
Description:	Fukushima - U2, U3 and U4 SFP release approximation
Release height:	10. m

Release events

2011/03/16 19:50	Leak rate (% vol) Total failure
2011/03/16 19:50	Sprays Off

Meteorology

Type:	Actual Observations
Dataset name:	Fukushima 2011-03-16 0935
Dataset desc:	Obs/fcsts for Fukushima Unit 1

Summary of data at release point:	Type	Dir deg	Speed m/s	Stab class	Precip	Temp °C
2011/03/12 14:00	Obs	265	1.0	B	?	
2011/03/12 15:00	Obs	265	1.0	B	?	
2011/03/12 16:00	Obs	277	1.3	B	?	
2011/03/12 17:00	Obs	260	2.4	B	?	
2011/03/12 18:00	Obs	241	1.4	E	?	
2011/03/12 19:00	Obs	236	2.1	E	?	
2011/03/12 20:00	Obs	239	2.1	E	?	
2011/03/12 21:00	Obs	229	3.8	E	?	
2011/03/12 22:00	Obs	224	5.1	E	?	
2011/03/12 23:00	Obs	226	3.9	E	?	
2011/03/13 00:00	Obs	228	4.1	E	?	
2011/03/13 01:00	Obs	235	2.6	E	?	
2011/03/13 02:00	Obs	233	3.9	E	?	
2011/03/13 03:00	Obs	225	1.8	E	?	
2011/03/13 04:00	Obs	225	1.3	E	?	
2011/03/13 05:00	Obs	225	2.2	E	?	
2011/03/13 06:00	Obs	225	2.2	E	?	
2011/03/13 07:00	Obs	248	2.7	E	?	
2011/03/13 08:00	Obs	248	2.7	E	?	
2011/03/13 09:00	Obs	270	3.1	E	?	
2011/03/13 12:00	Obs	271	7.4	D	?	
2011/03/13 13:00	Obs	276	6.2	D	?	
2011/03/13 14:00	Obs	312	2.8	B	?	
2011/03/14 18:00	Obs	258	4.8	unk	?	
2011/03/14 19:00	Obs	268	5.0	unk	?	

Summary Report

2011/03/14 20:00	Obs	330	2.2	unk	?
2011/03/14 21:00	Fcst	337	4.6	unk	?
2011/03/14 22:00	Fcst	323	7.2	unk	?
2011/03/14 23:00	Fcst	305	6.6	unk	?
2011/03/15 00:00	Fcst	015	8.6	unk	?
2011/03/15 02:00	Fcst	002	7.5	unk	?
2011/03/15 03:00	Fcst	347	5.2	E	None
2011/03/15 04:00	Fcst	332	5.6	E	None
2011/03/15 05:00	Fcst	332	4.0	E	None
2011/03/15 06:00	Fcst	344	3.5	E	Lgt rain
2011/03/15 07:00	Fcst	026	3.8	E	Lgt rain
2011/03/15 08:00	Fcst	044	4.4	E	Lgt rain
2011/03/15 09:00	Fcst	020	4.2	E	Lgt rain
2011/03/15 10:00	Fcst	010	3.4	E	None
2011/03/15 11:00	Fcst	030	3.5	D	Lgt rain
2011/03/15 12:00	Fcst	027	3.0	D	Lgt rain
2011/03/15 13:00	Fcst	037	3.4	D	Lgt rain
2011/03/15 14:00	Fcst	053	3.7	B	None
2011/03/15 15:00	Fcst	058	3.7	B	None
2011/03/15 16:00	Fcst	067	3.2	C	Lgt rain
2011/03/15 17:00	Fcst	081	3.9	C	Lgt rain
2011/03/15 18:00	Fcst	089	4.7	B	None
2011/03/15 19:00	Fcst	085	4.4	B	None
2011/03/15 20:00	Fcst	083	4.4	B	Lgt rain
2011/03/15 21:00	Fcst	074	4.6	C	Lgt rain
2011/03/15 22:00	Fcst	054	5.0	D	Lgt rain
2011/03/15 23:00	Fcst	029	5.6	D	Rain
2011/03/16 00:00	Fcst	011	5.1	D	Lgt rain
2011/03/16 01:00	Fcst	346	4.3	C	Lgt rain
2011/03/16 02:00	Fcst	350	5.3	D	Lgt rain
2011/03/16 03:00	Fcst	323	5.6	D	Lgt rain
2011/03/16 04:00	Fcst	316	5.4	D	None
2011/03/16 05:00	Fcst	298	4.8	D	None
2011/03/16 06:00	Fcst	314	5.6	D	None
2011/03/16 07:00	Fcst	312	4.7	D	None
2011/03/16 08:00	Fcst	331	4.9	D	None
2011/03/16 09:00	Fcst	299	4.2	D	None
2011/03/16 10:00	Fcst	312	5.4	C	None
2011/03/16 11:00	Fcst	309	7.5	C	None
2011/03/16 12:00	Fcst	304	7.2	C	None
2011/03/16 13:00	Fcst	314	8.8	C	None
2011/03/16 14:00	Fcst	325	10.4	C	None
2011/03/16 15:00	Fcst	324	12.3	C	None
2011/03/16 16:00	Fcst	304	14.7	D	None
2011/03/16 17:00	Fcst	299	14.2	D	None
2011/03/16 18:00	Fcst	297	11.3	D	None
2011/03/16 19:00	Fcst	316	9.8	D	None
2011/03/16 20:00	Fcst	309	9.4	D	None
2011/03/16 21:00	Fcst	294	9.5	D	None
2011/03/16 22:00	Fcst	299	7.6	D	None
2011/03/16 23:00	Fcst	300	9.7	D	None
2011/03/17 00:00	Fcst	294	5.0	D	None
2011/03/17 01:00	Fcst	286	7.0	D	None
2011/03/17 02:00	Fcst	287	6.6	D	None
2011/03/17 03:00	Fcst	293	6.5	D	None
2011/03/17 04:00	Fcst	300	6.3	D	None
2011/03/17 05:00	Fcst	311	5.9	D	None
2011/03/17 06:00	Fcst	295	7.4	D	None

Summary Report

2011/03/17 07:00	Fcst	303	8.4	C	None
2011/03/17 08:00	Fcst	333	4.8	C	None
2011/03/17 09:00	Fcst	321	5.9	C	None
2011/03/17 10:00	Fcst	307	5.0	C	None
2011/03/17 11:00	Fcst	292	8.4	C	None
2011/03/17 12:00	Fcst	315	9.3	C	None
2011/03/17 13:00	Fcst	299	11.1	C	None
2011/03/17 14:00	Fcst	292	11.8	C	None
2011/03/17 15:00	Fcst	286	10.7	C	None
2011/03/17 16:00	Fcst	298	9.3	D	None
2011/03/17 17:00	Fcst	286	8.5	D	None
2011/03/17 18:00	Fcst	285	10.6	D	None
2011/03/17 19:00	Fcst	288	11.1	D	None
2011/03/17 20:00	Fcst	301	11.3	D	None
2011/03/17 21:00	Fcst	311	10.1	D	None
2011/03/17 22:00	Fcst	307	8.4	D	None
2011/03/17 23:00	Fcst	303	8.7	D	None
2011/03/18 00:00	Fcst	311	7.1	D	None
2011/03/18 01:00	Fcst	316	3.4	D	None
2011/03/18 02:00	Fcst	310	6.0	D	None
2011/03/18 03:00	Fcst	319	7.4	D	None
2011/03/18 04:00	Fcst	316	6.3	D	None
2011/03/18 05:00	Fcst	307	4.9	D	None
2011/03/18 06:00	Fcst	311	4.4	D	None
2011/03/18 07:00	Fcst	326	5.1	C	None
2011/03/18 08:00	Fcst	343	5.4	C	None
2011/03/18 09:00	Fcst	344	6.1	C	None

Dataset options: Est. missing stability using: Wind speed, time of day, etc.
Adjust stability for consistency: No
Modify winds for topography: Yes

Calculations

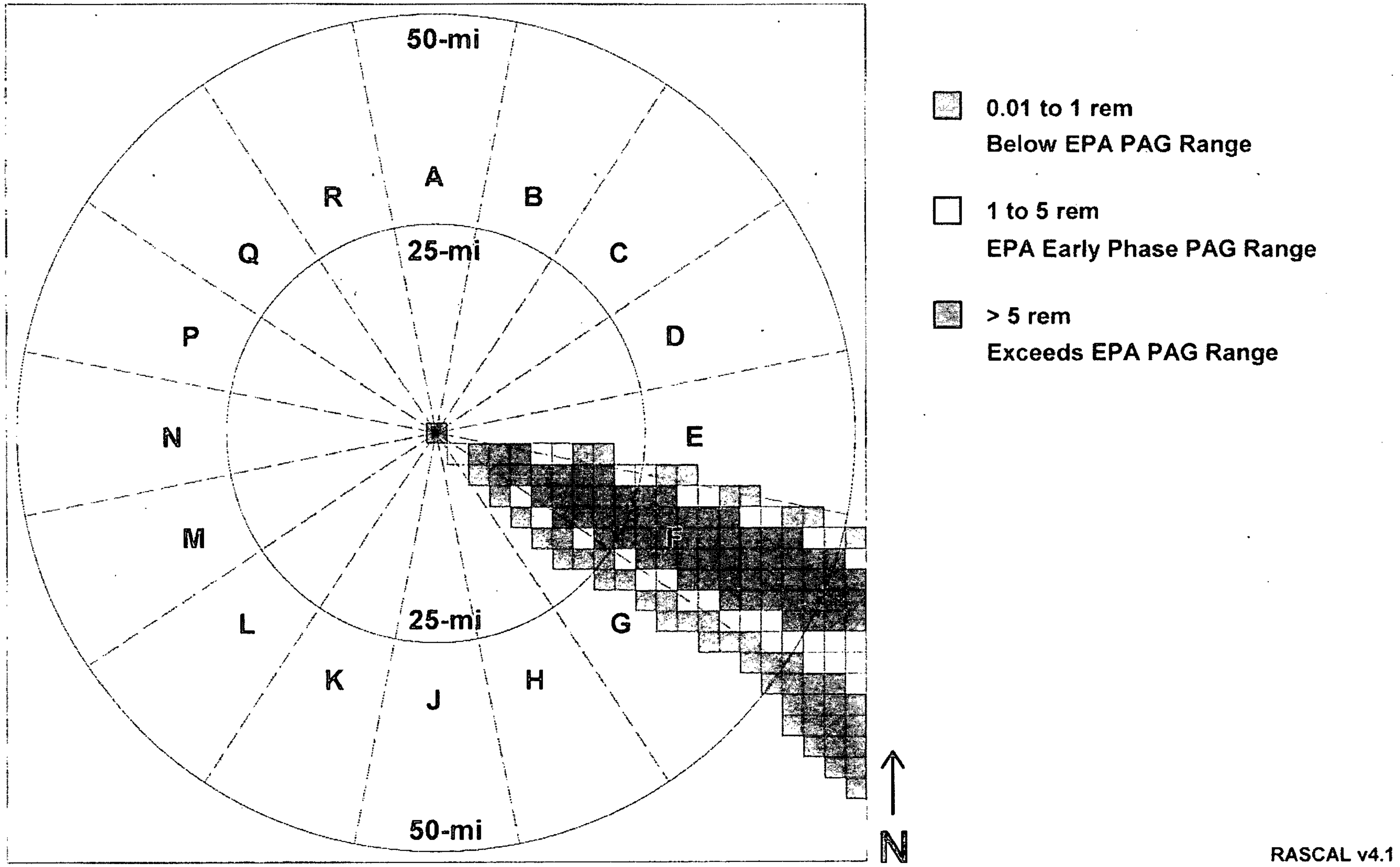
Case description: Fukushima U2, U3 and U4 SFP approximate site release
End of calculations: 2011/03/17 10:50
Start of release to atmosphere + 15 h
Distance of calculation: Close-in + to 50 miles
Close-in distances: 0.5, 1.0, 1.5, 2.0, 3.0, 5.0, 7.0, 10.0 miles

Total Effective Dose Equivalent

Accumulated between 2011/03/16 19:50 and 2011/03/17 10:50

Fukushima U2, U3 and U4 SFP approximate site release

Fukushima U4



From: PMT03 Hoc
Sent: Thursday, March 24, 2011 8:58 PM
To: LIA06 Hoc
Subject: RE: Reoccurring Daily Calls Rev 6 (3).docx
Attachments: Reoccurring Daily Calls Rev 6 (3).docx

FYI.. There is a new call being added at 1400 (call with WhiteHouse).

From: LIA06 Hoc
Sent: Thursday, March 24, 2011 4:12 PM
To: PMT01 Hoc; Hoc, PMT12; PMT03 Hoc
Subject: FW: Reoccurring Daily Calls Rev 6 (3).docx

Note call at 1500 with HHS and States.

Liaison Team Director
U.S. Nuclear Regulatory Commission
Operations Center

From: LIA11 Hoc
Sent: Thursday, March 24, 2011 2:57 PM
To: LIA08 Hoc; LIA06 Hoc
Subject: FW: Reoccurring Daily Calls Rev 6 (3).docx

From: RST01 Hoc
Sent: Thursday, March 24, 2011 10:03 AM
To: LIA01 Hoc; LIA11 Hoc
Subject: Reoccurring Daily Calls Rev 6 (3).docx

YY/328

From: OST01 HOC
Sent: Thursday, March 24, 2011 7:25 PM
To: LIA07 Hoc; OST04 Hoc
Subject: FW: 1800 EDT (March 24, 2011) USNRC Earthquake/Tsunami Status Update
Attachments: USNRC Earthquake-Tsunami Update.032411.1800EDT.pdf

Thanks! Are you going to update the SITREP/SPOTREP Log in WebEOC? Thanks again!

EST Coordinator

From: HOO Hoc [mailto:HOO.Hoc@nrc.gov]
Sent: Thursday, March 24, 2011 6:19 PM
To: LIA07 Hoc; OST01 HOC; OST02 HOC; OST03 HOC
Subject: FW: 1800 EDT (March 24, 2011) USNRC Earthquake/Tsunami Status Update

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From: NITOPS[SMTP:NITOPS@NNSA.DOE.GOV]
Sent: Thursday, March 24, 2011 6:18:47 PM
To: DL-Policy Working Group; Blumenthal, Daniel; Brown, Courtney M (NST); Buntman, Steven; dartdoeliaison1@ofda.gov; dblumenthal@ofda.gov; Debbie Wilber; DOE LNO to USAID; Froh, William; Haley, Billy; McClelland, Vince; Johnson, Steven; Thompson, Roger (NEV); wafroh@gmail.com; Wilber, Deborah; CMHT; HOO Hoc; NARAC; PMT01 Hoc; PMT02 Hoc; Hoc, PMT12
Subject: FW: 1800 EDT (March 24, 2011) USNRC Earthquake/Tsunami Status Update
Auto forwarded by a Rule

From: LIA07 Hoc [mailto:LIA07.Hoc@nrc.gov]
Sent: Thursday, March 24, 2011 6:00 PM
Subject: 1800 EDT (March 24, 2011) USNRC Earthquake/Tsunami Status Update

Attached, please find an 1800 EDT (March 24, 2011) status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami.

Please note that this information is "~~Official Use Only~~" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Sara

Sara K. Mroz
Communications and Outreach
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
Sara.Mroz@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

YXY/329

From: OST01 HOC
Sent: Wednesday, April 13, 2011 12:19 AM
To: LIA08 Hoc
Subject: RE: Thoughts on the Transition

Thanks!

From: LIA08 Hoc
Sent: Wednesday, April 13, 2011 12:17 AM
To: OST01 HOC
Subject: RE: Thoughts on the Transition

It is becoming less productive to have someone staff the LT on the 2300 to 0700 shift. Most LT "business" is generated by the site team, who can get their business done through an OIP on call person. Jeff Temple

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From: OST01 HOC
Sent: Tuesday, April 12, 2011 11:32 PM
To: LIA08 Hoc; RST09 Hoc; RST08 Hoc; Hoc, PMT12
Cc: FOIA Response.hoc Resource
Subject: Thoughts on the Transition

Good Evening All,

NSIR is trying to figure out how everything is working in the new 6-person configuration. Now that we are a couple days into it, could you please think about the following questions:

1. What is going well?
2. What needs to be improved about the transition?

When you have time tonight, if you could send me your thoughts, I would greatly appreciate it.

Thanks,
Rebecca Stone
EST Coordinator

Y/44/330

From: Schwartzman, Jennifer
To: Moore, Scott; HOO Hoc
Cc: Miller, Charles; Cool, Donald
Subject: Re: Message sent on behalf of the Japanese Delegation to the OECD
Date: Wednesday, March 16, 2011 5:21:26 PM

We have translators now.
Sent from an NRC Blackberry

From: Moore, Scott
To: HOO Hoc
Cc: Miller, Charles; Cool, Donald; Schwartzman, Jennifer
Sent: Wed Mar 16 17:20:43 2011
Subject: FW: Message sent on behalf of the Japanese Delegation to the OECD

See following, regarding doses in Japan. I am not sure if the Protective Measures Team (or others) have seen this info. The attachment is in Japanese. We just received it. Several NRC staff were on distribution.

Scott W. Moore, Acting Deputy Director
Office of Federal and State Materials and
Environmental Management Programs
301-415-7875
Scott.Moore@nrc.gov

From: Serge.GAS@oecd.org [mailto:Serge.GAS@oecd.org]
Sent: Wednesday, March 16, 2011 4:56 PM
To: dewi-vande.weerd@minbuza.nl; ses@nuclear.ntua.gr; stratfordrj@state.gov; martina.palm@bmu.bund.de; massimo.garribba@ec.europa.eu; mhchang@kaeri.re.kr; giuseppe.montesano@enel.it; Miller, Charles; michael.pflugradt@diplo.de; toshihiko.kamada@mofa.go.jp; marc.huebsch@mae.etat.lu; kjell.bendiksen@ife.no; Cool, Donald; mikulas.turner@ujd.gov.sk; roberto.ranieri@isprambiente.it; arc@csn.es; mperez@delegamexocde.org; zafer.alper@taek.gov.tr; petr_martinek@mzv.cz; ryan.gilchrist@dfat.gov.au; slozoya@delegamexocde.org; wpjung@konicof.or.kr; anne-laure.rebus@diplomatie.gouv.fr; patrick.blake@dfat.gov.au; chris.hoornaert@diplobel.fed.be; tom.eischen@eco.etat.lu; jmredondo@mityc.es; rafal.frac@oecd-poland.org; communications.centre@mae.etat.lu; anne.vaatainen@tem.fi; clappermx@state.gov; mirko.zambelli@eda.admin.ch; gvarkonyi@kum.hu; ron.hutchings@ansto.gov.au; shimomura.kazuo@jaea.go.jp; jeanpaul.decaestecker@consilium.europa.eu; gornjm@state.gov; tripputi@sogin.it; franco.malerba@esteri.it; riku.huttunen@tem.fi; ansi.gerhardsson@environment.ministry.se; dominique.ristori@ec.europa.eu; euk@um.dk; peter.faross@ec.europa.eu; katrin.einarsdottir@utn.stjr.is; martina.petrovicova@mzv.sk; frederic.mondoloni@cea.fr; sano-takiko@meti.go.jp; steve.chandler@decc.gsi.gov.uk; daniel.iracane@cea.fr; douglas.forsythe@international.gc.ca; cfranco@delegamexocde.org; rene.mctaggart@decc.gsi.gov.uk; Hanjo-de.Kuiper@minbuza.nl; sguindon@nrcan.gc.ca; pierre.multone@bfe.admin.ch; theofiel.vanrentergem@economie.fgov.be; ronaky@haea.gov.hu; smm@gr.is; mjlopez@magic.fr; ece.teams@fco.gov.uk; pedrovaz@itn.pt; pedro.liberato@ocde-portugal.com; v.manavi@greece-oecd.org; willy.deroovere@fanc.fgov.be; olivier.aubourg@developpement-durable.gouv.fr; aldo.flores@energia.gob.mx; markus.pfaff@bmu.bund.de; james.wiblin@dfat.gov.au; stefni@um.dk; pape@bmwi.bund.de; peter_rice@environ.ie; cathy.fievet@diplobel.fed.be; koyama-masaomi@meti.go.jp; bannai-toshihiro@meti.go.jp; colin.sykes@fco.gov.uk; elif.atalay@mfa.gov.tr; fennel.waters@fco.gov.uk; fjar ana@mityc.es; stefano.monti@enea.it; marta.ziakova@ujd.gov.sk; katarina.isaksson@foreign.ministry.se; ugo.bollettini@sviluppoeconomico.gov.it; jacques.sturm@diplomatie.gouv.fr; tania.constable@ret.gov.au; ssimon@kum.gov.hu; m.bermudez-

YYY/331

samiei@iaea.org; jwill@nrcan.gc.ca; fujino-h@mext.go.jp; elo@haea.gov.hu; maurice.biggar@dfa.ie; lars.ekecrantz@environment.ministry.se; lucky@kaeri.re.kr; zates@mfa.gov.tr; roberto.zangrandi@enel.com; una_nidhubhghaill@environ.ie; daniel-yves.taupenas@diplomatie.gouv.fr; sswkang@mest.go.kr; minerpar@magic.fr; andreas.molin@bmlfuw.gv.at; m.m.g.hoedemakers@minez.nl; pascal.previdoli@bfe.admin.ch; marcel.reimen@mae.etat.lu; thzorbak@eeae.gr; sajuria@energia.gob.mx; je@cnsns.gob.mx; v.cserveny@iaea.org; jms@itn.pt; louise.fell@berr.gsi.gov.uk; Schwartzman, Jennifer; hubacek@mpo.cz; francois.bonino@cea.fr; matti.oivukkamaki@formin.fi; mathieu.remond@fco.gov.uk
Subject: Message sent on behalf of the Japanese Delegation to the OECD

Please find below a message sent on behalf of the Japanese Delegation to the OECD

Wednesday, 15 March – 19:28

-

The attached file is the result of the measurement of the Environmental Radioactivity Level in Japan.(Measured at every prefecture in Japan between 17:00 15th - 9:00 16th March) The figures are showed by "µGy/h", and the figures in the far right column show the average level of the observation points in the normal situation.

These prefectures orders from the north side to the south side of Japan *[NB: the names of prefectures are only in Japanese]*. (Tokyo- No13, Nagoya-No23, Osaka-No27, Ibaraki-No.8) Fukushima prefecture (where Fukushima Dai-ichi Nuclear Power Station locates) is No. 7, and the data is blank in this paper.

But, we measure it more precisely in Fukushima (including the level near Fukushima Dai-ichi NPS) and I think it was (is, will be) announced in various ways.

Best regards,
Toshihiko KAMADA

Complement to the previous message of Tuesday, 15 March – 20:14

-

We are able to see the following information at the website of "IAEA Update on Japan Earthquake" (www.iaea.org/newscenter/news/tsunamiupdate01.html).

The time the explosion occurred at Fukushima Dai-ichi, Unit 2 and Unit 4 was considered around 21:00 on 14th March (UTC).

-

Extract from the IAEA report:

Japanese Earthquake Update (15 March 11:25 UTC) Fukushima Daiichi Nuclear

Power Plant Update Radiation Dose Rates Observed at the Site

The Japanese authorities have informed the IAEA that the following radiation dose rates have been observed on site at the main gate of the Fukushima Daiichi Nuclear Power Plant.

At 00:00 UTC on 15 March a dose rate of 11.9 millisieverts (mSv) per hour was observed. Six hours later, at 06:00 UTC on 15 March a dose rate of 0.6 millisieverts (mSv) per hour was observed.

These observations indicate that the level of radioactivity has been decreasing at the site.

As reported earlier, a 400 millisieverts (mSv) per hour radiation dose observed at Fukushima Daiichi occurred between units 3 and 4. This is a high dose-level value, but it is a local value at a single location and at a certain point in time. The IAEA continues to confirm the evolution and value of this dose rate. It should be noted that because of this detected value, non-indispensible staff was evacuated from the plant, in line with the Emergency Response Plan, and that the population around the plant is already evacuated.

Best regards,

Toshihiko KAMADA
First Secretary (Science and Technology)
Permanent Delegation of Japan to the OECD
Tel.: +33 (0)1 53 76 61 81
Fax: +33 (0)1 45 63 05 44
E-mail: toshihiko.kamada@mofa.go.jp

環境放射能水準調査結果

（μGy/h（マイクログレイ毎時））

	都道府県名	3月15日							3月16日									
		17-18	18-19	19-20	20-21	21-22	22-23	23-24	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	過去の平常値の範囲
1	北海道(札幌市)	0.028	0.028	0.028	0.028	0.027	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.029	0.029	0.028	0.028	0.02～0.105
2	青森県(青森市)	0.021	0.022	0.023	0.024	0.024	0.025	0.025	0.026	0.026	0.027	0.029	0.026	0.023	0.021	0.021	0.020	0.017～0.102
3	岩手県(盛岡市)	0.045	0.042	0.040	0.043	0.043	0.041	0.040	0.041	0.041	0.041	0.040	0.039	0.037	0.036	0.035	0.034	0.014～0.084
4	宮城県(仙台市)	0.083	0.113	0.180	0.199	0.184	0.172	0.179	0.194	0.193	0.190	0.183	0.174	0.167	0.165	0.162	0.161	0.0176～0.0513
5	秋田県(秋田市)	0.036	0.036	0.036	0.037	0.037	0.037	0.037	0.037	0.036	0.036	0.035	0.035	0.035	0.035	0.035	0.035	0.022～0.086
6	山形県(山形市)	0.040	0.043	0.051	0.062	0.073	0.078	0.099	0.107	0.110	0.114	0.104	0.096	0.090	0.083	0.078	0.073	0.025～0.082
7	福島県(双葉郡)																	0.037～0.071
8	茨城県(水戸市)	0.280	0.253	0.239	0.229	0.223	0.218	0.214	0.214	0.214	0.241	0.235	0.218	0.218	0.320	1.035	0.962	0.036～0.056
9	栃木県(宇都宮市)	0.388	0.375	0.321	0.305	0.293	0.272	0.286	0.281	0.299	0.322	0.309	0.312	0.310	0.308	0.335	0.337	0.030～0.067
10	群馬県(前橋市)			0.389	0.406	0.398	0.358	0.480	0.501	0.498	0.361	0.250	0.170	0.146	0.158	0.140	0.127	0.017～0.045
11	埼玉県(さいたま市)	1.039	0.986	0.169	0.111	0.076	0.068	0.069	0.065	0.078	0.101	0.167	0.188	0.155	0.208	0.141	0.094	0.031～0.060
12	千葉県(市原市)	0.253	0.103	0.055	0.039	0.034	0.034	0.033	0.033	0.032	0.031	0.032	0.033	0.042	0.053	0.066	0.097	0.022～0.044
13	東京都(新宿区)	0.094	0.200	0.361	0.123	0.089	0.066	0.056	0.054	0.055	0.067	0.101	0.141	0.143	0.142	0.104	0.089	0.028～0.079
14	神奈川県(茅ヶ崎市)	0.061	0.061	0.062	0.069	0.074	0.070	0.062	0.092	0.089	0.078	0.108	0.127	0.152	0.152	0.153	0.139	0.035～0.069
15	新潟県(新潟市)	0.050	0.051	0.052	0.055	0.055	0.058	0.056	0.053	0.053	0.053	0.053	0.055	0.056	0.055	0.052	0.058	0.031～0.153
16	富山県(射水市)	0.063	0.063	0.062	0.067	0.065	0.062	0.059	0.052	0.052	0.051	0.049	0.050	0.051	0.049	0.049	0.054	0.029～0.147
17	石川県(金沢市)	0.054	0.059	0.066	0.067	0.064	0.068	0.065	0.057	0.051	0.048	0.048	0.053	0.051	0.048	0.048	0.051	0.0291～0.1275
18	福井県(福井市)	0.052	0.053	0.053	0.056	0.059	0.059	0.060	0.049	0.049	0.046	0.052	0.052	0.048	0.049	0.049	0.047	0.032～0.097
19	山梨県(甲府市)	0.053	0.051	0.050	0.050	0.050	0.049	0.050	0.049	0.047	0.046	0.046	0.046	0.046	0.046	0.045	0.045	0.040～0.064
20	長野県(長野市)	0.040	0.041	0.043	0.061	0.094	0.107	0.102	0.099	0.096	0.095	0.094	0.095	0.096	0.096	0.098	0.098	0.0299～0.0974
21	岐阜県(各務原市)	0.061	0.061	0.061	0.062	0.061	0.061	0.063	0.062	0.061	0.061	0.061	0.061	0.061	0.061	0.063	0.065	0.057～0.110
22	静岡県(静岡市)	0.054	0.053	0.051	0.050	0.048	0.047	0.045	0.045	0.045	0.044	0.044	0.043	0.041	0.040	0.040	0.041	0.0281～0.0765
23	愛知県(名古屋市)	0.040	0.039	0.039	0.040	0.040	0.040	0.040	0.040	0.040	0.039	0.040	0.040	0.041	0.040	0.040	0.040	0.035～0.074
24	三重県(四日市市)	0.046	0.046	0.046	0.047	0.048	0.049	0.050	0.060	0.066	0.054	0.049	0.049	0.052	0.050	0.048	0.047	0.0416～0.0789
25	滋賀県(大津市)	0.033	0.033	0.033	0.038	0.046	0.047	0.047	0.041	0.035	0.034	0.033	0.033	0.034	0.034	0.033	0.033	0.031～0.061
26	京都府(京都市)	0.038	0.038	0.038	0.039	0.044	0.047	0.044	0.041	0.039	0.039	0.039	0.039	0.038	0.038	0.038	0.039	0.033～0.087
27	大阪府(大阪市)	0.042	0.043	0.043	0.043	0.044	0.047	0.045	0.044	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.042～0.061
28	兵庫県(神戸市)	0.037	0.037	0.038	0.040	0.044	0.042	0.039	0.038	0.038	0.038	0.038	0.038	0.037	0.037	0.037	0.037	0.035～0.076
29	奈良県(奈良市)	0.047	0.048	0.048	0.048	0.049	0.053	0.053	0.052	0.049	0.048	0.048	0.048	0.048	0.048	0.047	0.048	0.046～0.08
30	和歌山県(和歌山市)	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.031～0.056
31	鳥取県(東伯郡)	0.074	0.067	0.065	0.064	0.064	0.068	0.066	0.068	0.066	0.070	0.071	0.068	0.066	0.067	0.067	0.072	0.036～0.11
32	島根県(松江市)	0.044	0.043	0.039	0.038	0.038	0.038	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.043	0.046	0.033～0.079
33	岡山県(岡山市)	0.049	0.052	0.055	0.051	0.049	0.049	0.049	0.049	0.049	0.049	0.048	0.048	0.048	0.049	0.049	0.049	0.043～0.104
34	広島県(広島市)	0.047	0.047	0.046	0.047	0.047	0.047	0.048	0.047	0.048	0.048	0.047	0.047	0.047	0.048	0.047	0.048	0.035～0.069
35	山口県(山口市)	0.092	0.092	0.092	0.092	0.092	0.093	0.093	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.084～0.128
36	徳島県(徳島市)	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.037	0.037	0.037	0.037	0.037～0.067
37	香川県(高松市)	0.052	0.052	0.052	0.054	0.059	0.055	0.054	0.053	0.053	0.052	0.052	0.051	0.052	0.052	0.052	0.052	0.051～0.077
38	愛媛県(松山市)	0.047	0.048	0.048	0.048	0.048	0.048	0.048	0.049	0.048	0.048	0.048	0.048	0.048	0.048	0.047	0.048	0.045～0.074
39	高知県(高知市)	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.024	0.024	0.023～0.076
40	福岡県(太宰府市)	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.036	0.034～0.079
41	佐賀県(佐賀市)	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.039	0.039	0.039	0.039	0.039	0.037～0.086
42	長崎県(大村市)	0.029	0.029	0.029	0.029	0.029	0.029	0.030	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.028	0.027～0.069
43	熊本県(宇土市)	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.026	0.026	0.026	0.021～0.067
44	大分県(大分市)	0.050	0.050	0.049	0.049	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.049	0.049	0.049	0.049	0.049	0.048～0.085
45	宮崎県(宮崎市)	0.026	0.027	0.027	0.027	0.026	0.026	0.026	0.027	0.027	0.027	0.026	0.026	0.026	0.026	0.026	0.026	0.0243～0.0664
46	鹿児島県(鹿児島市)	0.035	0.035	0.034	0.034	0.035	0.035	0.035	0.035	0.035	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.0306～0.0943
47	沖縄県(うるま市)	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.022	0.021	0.021	0.021	0.021	0.022	0.021	0.0133～0.0575

*空欄は機器点検等のための欠測等
*1μGy/h(マイクログレイ毎時)≒1μSv/h(マイクロシーベルト毎時)
*文部科学省が各都道府県等からの報告に基づき作成

WITH HOC

From:	LIA07 Hoc
To:	Borchardt, Bill; Virgilio, Martin; Weber, Michael; Pace, Patti; Speiser, Herald; Gibbs, Catina; Leeds, Eric; Haney, Catherine; Walker, Dwight; Sheron, Brian; Johnson, Michael
Subject:	Updates for the "Go Books", 2030 EDT, March 16 2011
Date:	Wednesday, March 16, 2011 8:39:52 PM
Attachments:	Talking Points Two Pager.031611.1900EDT.DOCX NRC Status Update 3-16.11--1900pm.pdf Talking Points 8.pdf Press Release 9.pdf TEPCO Press Release 34.pdf TEPCO Press Release 35.pdf TEPCO Press Release 36.pdf TEPCO Press Release 31.pdf TEPCO Press Release 32.pdf TEPCO Press Release 33.pdf ET Chronology 3-16-11 5.39pm.pdf From US Embassy Tokyo 3.16.11.pdf TEPCO Press Release 37.pdf

Please find attached updated information for the "Go Books" provided earlier today.

The updates include:

- The 1900, 3/16/11 Status Update
- The 19400, 3/16/11 Talking Points Two-Pager
- The latest ET Chronology
- The latest NRC Press Release (11-050)
- The latest NRC OPA Talking Points
- The latest TEPCO Press Releases
- Statement from US Embassy Tokyo re: protective actions for American citizens in Japan

We are working on pulling together a few other items that were requested, including the Chairman's prepared statement for today's hearing and a set of briefing slides. We will send those out once we have them.

Please let me know if you have any questions or concerns.

-Sara

Sara Mroz
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
sara.mroz@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

YYY/332

NRC "Talking Points" – Current as of March 16, 2011, 1900 EDT

Reactor Status

- Fukushima Daiichi Units 1 - 6

Unit 1

- Core damage occurred due to insufficient cooling water caused by loss of offsite power and onsite diesel generators following the tsunami
- As of 2200 JST (0900 EDT) on March 14, it is reported that sea water is being injected with reported stable cooling
- Containment described as "functional"
- Hydrogen explosion from overheated fuel-water reaction has damaged reactor building (secondary containment)
- The spent fuel pool level is unknown
- High radiation levels reduced to 600 μSv/hour (60 mrem/hour) at 0200 EDT on March 15, 2011, at site gate. (Site gate is same for each unit.)

Unit 2

- Core damage occurred due to insufficient cooling water caused by loss of offsite power and onsite diesel generators following the tsunami
- Reactor Core Isolation Cooling (RCIC) has failed
- Hydrogen explosion from overheated fuel-water reaction damaged the reactor building
- Secondary containment: Cut hole to reduce likelihood of hydrogen gas buildup
- Sea water injection restarted with core cooling reported as not stable
- <u>Primary containment is intact.</u>
- High radiation levels reduced to 600 μSv/hour (60 mrem/hour) at 0200 EDT on March 15, 2011, at site gate. (Site gate is same for each unit.)
- The spent fuel pool level is unknown. <u>Some water is available as evidenced by steam emanating from hole.</u>

Unit 3

- Core damage due to insufficient cooling water caused by loss of offsite power and onsite diesel generators following the tsunami
- Sea water is being injected with reported stable cooling
- Hydrogen explosion from overheated fuel-water reaction has damaged reactor building (secondary containment)
- Primary containment described as "functional"
- The spent fuel pool level is <u>possibly drained – some evidence of steam.</u>
- High radiation levels reduced to 600 μSv/hour (60 mrem/hour) at 0200 EDT on March 15, 2011, at site gate. (Site gate is same for each unit.)

Unit 4

- First fire in the reactor building was a small generator lube oil fire. IAEA reports that fire was put out at 2200 EDT, March 14.
- High radiation levels reduced to 600 μSv/hour (60 mrem/hour) at 0200 EDT on March 15, 2011, at site gate. (Site gate is same for each unit.)
- Second fire began at 1645 EDT, March 15, 2011 in reactor building. Reports indicate that this fire is not yet contained. Fuel reported to be uncovered.
- Radiation level outside Unit 4 reported to be 30R/hour following second fire.
- High radiation dose rates measured between Units 3 and 4, source is suspected to be the partially uncovered Unit 4 spent fuel pool.
- The spent fuel pool's ability to retain water is in doubt, <u>no steam – likely dry</u>.

Unit 5

- The reactor is defueled.
- Spent fuel pool is reported to be heating up.
- A/C power available from Unit 6 diesel generator.

Unit 6

- The reactor is defueled.
- Spent fuel pool is reported to be heating up.
- A/C power available from diesel generator.

Other Japanese Nuclear Sites:

- Fukushima Daini Units 1 - 4: As of 7:15 am on March 15 (Japan), Tepco press release reports reactors in cold shutdown and offsite power available.
- Onagawa Units 1 - 3: shutdown, stable, turbine building basement fire extinguished.
- Kashiwazaki Kariwa Nuclear Power Station (Advanced Reactors): Units 1, 5, 6, 7: normal operation / Units 2 to 4: regular outage

Protective Action Recommendations

- For Fukushima Daiichi site, Japanese national government issued a protective action recommendation that instructed evacuation for local residents within a 20km radius of the site boundary and sheltering in place out to 30km for residents who stayed behind
- Japan has imposed no-fly zone (30km radius, altitude unlimited) over Daiichi plants.
- A RASCAL run at 06:54AM (EDT) on March 16, 2011 for hypothetical combined core based on the following assumptions: Units 2 & 3 each, 33% core melt & no containment; Unit 4, full core offload 100% melt in the Spent Fuel Pool (SFP) with no roof; wind direction from West Northwest blowing out to the ocean. Results: PAG exceded at 50 miles (80.5 km) with TEDE of 24.0 rem, and CDE thyroid of 130 rem.

Meteorological Conditions:

As of 1100 EDT, March 16, wind direction is from the West and wind speed is between 10-20 mph. This wind direction not expected to change significantly until the next front comes through over the weekend.

General Talking Points

- Based upon the degrading situation at the Daiichi plant, the US NRC recommends that Americans within 50 miles of the Daiichi plant to evacuate the area.
- 6.1 Aftershock near Hamaoka: no damage to reactors
  - 5 reactors: 2 are decommissioned; 1 shutdown; 2 operating
- TEPCO and US Forces in Japan (USFJ) are working together to allocate firefighting and heavy equipment capable of pumping seawater from the ocean into containment.
  - A list of additional equipment to provide for accident mitigation has been developed by NRC and provided to USAID.
- Disaster Assistance Response Team arrived Sunday:
  - 11 NRC staff are in Tokyo with the Ambassador and getting information from Japanese officials.
- NRC continues to develop projections of the accident's progression, dose estimates and Q&As, including those addressing the safety of reactors in operation in the US.
- Government of Japan has accepted US offer to conduct aerial/ground monitoring and also requested potassium iodide tablets. DOE Aerial Measurement Teams are expected to fly over the Daiichi site on March 17 at around 0900 local time (2000 EDT).
- The NRC has been asked to provide recommendations for solutions to the spent fuel pool issues during conference call with NISA and TEPCO.

OPA

TALKING POINTS

JAPAN NUCLEAR SITUATION

As of 3/16/2011 7:15 p.m. EDT

Update: Addition of bullet on status of SFPs

- Based on calculations performed by NRC experts, we now believe that it is appropriate for U.S. residents within 50 miles of the Fukushima reactors to evacuate. Our recommendation is based on NRC guidelines for public safety that would be used in the United States under similar circumstances.

- Given the results of the monitoring and distance between Japan and Hawaii, Alaska, U.S. Pacific Territories and the U.S. West Coast, the NRC expects the U.S. to avoid any harmful levels of radioactivity. The NRC is aware of various internet postings depicting modeled radiation plumes for the ongoing events at the nuclear power plants in Japan. All of the models the NRC has seen are based on generic assumptions regarding the potential radiation release from the plants and as such are unable to predict actual radiation levels away from the site. The NRC is working closely with our federal partners to monitor radiation releases from the Japanese nuclear power plants.

- The NRC continues to believe, based on all available information, that the type and design of the Japanese reactors, combined with how events have unfolded, will prevent radiation at harmful levels from reaching U.S. territory.

- [Status as of 7:00pm on 3/16] The NRC is closely monitoring the condition of the spent fuel pools at the Japanese nuclear power plants. Our current understanding, which is based on the best available information provided to NRC reactor experts in Japan, is the following:

  - Unit 4 – The SFP is likely dry and the integrity of the spent fuel pool is in question.
  - Units 2 & 3 – Steam is escaping which indicates that boiling is likely occurring in the spent fuel pool. The current water level of the pool is uncertain.
  - Unit 1 – The status of the SFP is unknown.

- In accordance with established protocols, U.S. Customs and Border Protection (CBP) employs several types of radiation detection equipment in its operations at both air and sea ports, and uses this equipment, along with specific operational protocols, to resolve any security or safety risks that are identified with inbound travelers and cargo. Out of an abundance of caution, CBP has issued field guidance reiterating its operational protocols and directing field personnel to specifically monitor maritime and air traffic from Japan. CBP will continue to evaluate the potential risks posed by radiation contamination on inbound travelers and cargo and will adjust its detection and response protocols, in coordination with its interagency partners, as developments warrant.

- The Japanese government has formally asked for U.S. assistance in responding to nuclear power plant cooling issues triggered by an earthquake and tsunami on March 11. The NRC has eleven staff on the ground in Japan as part of the USAID team.

- The NRC is coordinating its actions with other federal agencies as part of the U.S. government response. The NRC's headquarters Operations Center was activated at the beginning of the event and has been monitoring the situation on a 24-hour basis ever since.

- The NRC is always looking to learn information that can be applied to U.S. reactors and we will analyze the information that comes from this incident.

- The NRC is working with other U.S. agencies to monitor radioactive releases from Japan and to predict their path.

- U.S. nuclear power plants are built to withstand environmental hazards, including earthquakes. Even those plants that are located outside of areas with extensive seismic activity are designed for safety in the event of such a natural disaster.

- The NRC requires that safety-significant structures, systems, and components be designed to take into account the most severe natural phenomena historically reported for the site and surrounding area. The NRC then adds a margin for error to account for the limitations on historical data. In other words, U.S. nuclear power plants are designed to be safe based on historical data to predict the area's maximum credible earthquake.

NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION

Office of Public Affairs Telephone: 301/415-8200
Washington, D.C. 20555-0001
E-mail: opa.resource@nrc.gov Site: www.nrc.gov
Blog: http://public-blog.nrc-gateway.gov

No. 11-050 March 16, 2011

NRC PROVIDES PROTECTIVE ACTION RECOMMENDATIONS BASED ON U.S. GUIDELINES

Under the guidelines for public safety that would be used in the United States under similar circumstances, the NRC believes it is appropriate for U.S. residents within 50 miles of the Fukushima reactors to evacuate.

Among other things, in the United States protective actions recommendations are implemented when projected doses could exceed 1 rem to the body or 5 rem to the thyroid. A rem is a measure of radiation dose. The average American is exposed to approximately 620 millirems, or 0.62 rem, of radiation each year from natural and manmade sources.

In making protective action recommendations, the NRC takes into account a variety of factors that include weather, wind direction and speed, and the status of the problem at the reactors.

Attached are the results of two sets of computer calculations used to support the NRC recommendations.

In response to nuclear emergencies, the NRC works with other U.S. agencies to monitor radioactive releases and predict their path. All the available information continues to indicate Hawaii, Alaska, the U.S. Territories and the U.S. West Coast are not expected to experience any harmful levels of radioactivity.

###

15 March 2010 02:51am (EDT), NRC Operations Center, Protective Measures Team

This data is based on system condition estimates for a hypothetical, single reactor site, 2350 MWt, Boiling Water Reactor. Model results are projections only and may **not** be representative of an actual release. This projection uses modeled forecast meteorological conditions and is subject to change.

Maximum Dose Values (rem) - Close-In

Dist from release miles (kilometers)	0.5 (0.8)	1. (1.61)	1.5 (2.41)	2. (3.22)	3. (4.83)	5. (8.05)	7. (11.27)	10. (16.09)
Total EDE	5.4E+03	2.0E+03	1.2E+03	8.2E+02	4.8E+02	2.4E+02	1.6E+02	9.5E+01
Thyroid CDE	2.8E+04	1.1E+04	6.2E+03	4.3E+03	2.5E+03	1.3E+03	8.4E+02	5.1E+02
Inhalation CEDE	3.7E+03	1.4E+03	8.0E+02	5.6E+02	3.3E+02	1.7E+02	1.1E+02	6.7E+01
Cloudshine	1.9E+01	9.3E+00	5.8E+00	4.1E+00	2.5E+00	1.4E+00	9.7E-01	6.2E-01
4-day Groundshine	1.7E+03	6.5E+02	3.8E+02	2.6E+02	1.5E+02	7.3E+01	4.6E+01	2.8E+01
Inter Phase 1st Yr	2.4E+04	9.4E+03	5.4E+03	3.8E+03	2.2E+03	1.1E+03	6.6E+02	3.9E+02
Inter Phase 2nd Yr	1.1E+04	4.4E+03	2.6E+03	1.8E+03	1.0E+03	4.9E+02	3.1E+02	1.8E+02

Notes:
- Doses exceeding PAGs are underlined.
- Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
- Intermediate-Phase EPA PAGs: 1st year - 2 rem, 2nd year - 0.5 rem
- *** indicates values less than 1 mrem
- To view all values - use Detailed Results | Numeric Table
- Total EDE = Inhalation CEDE + Cloudshine + 4-Day Groundshine

Maximum Dose Values (rem) - To 50 mi

Dist from release miles (kilometers)	15 (24.1)	20 (32.2)	30 (48.3)	40 (64.4)	50 (80.5)
Total EDE	8.6E+01	6.3E+01	3.7E+01	1.8E+01	8.1E+00
Thyroid CDE	3.3E+02	2.7E+02	1.3E+02	5.9E+01	2.3E+01
Inhalation CEDE	3.9E+01	3.1E+01	1.3E+01	4.4E+00	1.3E+00
Cloudshine	4.5E-01	3.8E-01	1.7E-01	7.4E-02	2.7E-02
4-day Groundshine	4.7E+01	3.2E+01	2.4E+01	1.3E+01	6.7E+00
Inter Phase 1st Yr	7.2E+02	4.8E+02	3.8E+02	2.2E+02	1.3E+02
Inter Phase 2nd Yr	3.4E+02	2.3E+02	1.8E+02	1.1E+02	6.9E+01

Notes:
- Doses exceeding PAGs are underlined.
- Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
- Intermediate-Phase PAGs: 1st year - 2 rem, 2nd year - 0.5 rem
- *** indicates values less than 1 mrem
- To view all values - use Detailed Results | Numeric Table
- Total EDE = CEDE Inhalation + Cloudshine + 4-Day Groundshine
- Total Acute Bone = Bone Inhalation + Cloudshine + Period Groundshine

16 March 2010 12:24pm (EDT), NRC Operations Center, Protective Measures Team

This data is based on system condition estimates for a hypothetical, four reactor site. Model results are projections only and may **not** be representative of an actual release. This projection uses modeled forecast meteorological conditions and is subject to change.

Maximum Dose Values (rem) - Close-In

Dist from release miles (kilometers)	0.5 (0.8)	1. (1.61)	1.5 (2.41)	2. (3.22)	3. (4.83)	5. (8.05)	7. (11.27)	10. (16.09)
Total EDE	5.4E+03	1.5E+03	6.7E+02	3.9E+02	1.8E+02	7.5E+01	4.0E+01	1.4E+01
Thyroid CDE	2.9E+04	7.9E+03	3.6E+03	2.1E+03	9.6E+02	4.0E+02	2.1E+02	7.5E+01
Inhalation CEDE	3.8E+03	1.0E+03	4.8E+02	2.8E+02	1.3E+02	5.4E+01	2.9E+01	1.0E+01
Cloudshine	2.2E+01	8.0E+00	3.9E+00	2.3E+00	8.0E-01	2.6E-01	2.1E-01	1.1E-01
4-day Groundshine	1.5E+03	4.1E+02	1.9E+02	1.1E+02	5.0E+01	2.1E+01	1.1E+01	4.3E+00
Inter Phase 1st Yr	2.6E+04	7.0E+03	3.2E+03	1.9E+03	8.5E+02	3.6E+02	1.9E+02	7.5E+01
Inter Phase 2nd Yr	1.3E+04	3.5E+03	1.6E+03	9.2E+02	4.2E+02	1.8E+02	9.5E+01	3.8E+01

Notes:
- Doses exceeding PAGs are underlined.
- Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
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Maximum Dose Values (rem) - To 50 mi

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Total EDE	1.5E+01	1.3E+01	1.1E+01	1.0E+01	9.9E+00
Thyroid CDE	8.6E+01	7.0E+01	5.2E+01	4.9E+01	4.8E+01
Inhalation CEDE	1.1E+01	9.2E+00	7.7E+00	7.6E+00	7.3E+00
Cloudshine	1.2E-01	9.7E-02	7.3E-02	7.0E-02	6.6E-02
4-day Groundshine	4.1E+00	3.4E+00	2.8E+00	2.6E+00	2.5E+00
Inter Phase 1st Yr	7.1E+01	6.0E+01	4.7E+01	4.5E+01	4.3E+01
Inter Phase 2nd Yr	3.6E+01	3.0E+01	2.3E+01	2.2E+01	2.1E+01

Notes:
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- To view all values - use Detailed Results | Numeric Table
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- Total Acute Bone = Bone Inhalation + Cloudshine + Period Groundshine

T EDE - Total Effective Dose Equivalent
CDE - Committed Dose Equivalent
CEDE - Committed Effective Dose Equivalent
PAGs – Protective Action Guidelines
EPA – Environmental Protection Agency

Press Releases

Press Release (Mar 16,2011)
Wednesday (March 16th): Group 3 (Original Scheduled Time:18:20PM - 22:00PM)

-Blackout Period: Approximately 3 hours (18:20PM - 22:00PM)
-Expected Number of Blackouts: Approximately 2,620,000 customers
-Targeted Region: Saitama pref., Tokyo, Chiba pref., Tochigi Pref., Gunma pref., Yamanashi pref., Kanagawa pref.

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Press Releases

Press Release (Mar 16,2011)
Impact to TEPCO's Facilities due to Tohoku-Taiheiyou-Oki Earthquake (as of 10:00PM)

Due to the Tohoku-Taiheiyou-Oki Earthquake which occurred on March 11th 2011, TEPCO's facilities including our nuclear power stations have been severely damaged. We deeply apologies for the anxiety and inconvenience caused.

Below is the status of TEPCO's major facilities.
*new items are underlined

[Nuclear Power Station]
Fukushima Daiichi Nuclear Power Station:
Units 1 to 3: shutdown due to earthquake
(Units 4 to 6: outage due to regular inspection)

* The national government has instructed to evacuate for those local residents within 20km radius of the site periphery and to remain indoors for those local residents between 20km and 30km radius of the site periphery.

* Unit 1
The explosive sound and white smoke was confirmed near Unit 1 when the big quake occurred at 3:36pm, March 12th. We have started injection of sea water at 8:20 pm and then boric acid into the reactor afterwards.

* Unit 2
At 1:25 pm, March 14th, since the Reactor Core Isolation Cooling System has failed, it was determined that a specific incident stipulated in article 15, clause 1 occurred (failure of reactor cooling function). At 5:17 pm, while the water level in the reactor reached the top of the fuel rod, we have restarted the water injection with the valve operation.
At approximately 6:14 am, March 15th, the abnormal sound was confirmed near the suppression chamber and the pressure inside the chamber decreased afterwards. It was determined that there is a possibility that something happened in the suppression chamber. While sea water injection to the reactor continued, TEPCO employees and workers from other companies not in charge of injection work started tentative evacuation to a safe location.
Sea water injection to the reactor is still under operation.

* Unit 3
At 6:50 am, March 14th, while water injection to the reactor was under operation, the pressure in the reactor containment vessel increased to 530 kPa. As a result, at 7:44 am, it was determined that a specific

Press Releases

Press Release (Mar 16,2011)
Implementation plan of rolling blackout on and after Thurs, March 17, 2011

Due to the power supply-demand balance, TEPCO has been implementing rolling blackout on and after Monday, March 14. We sincerely regret to cause the anxiety and inconvenience to our customers and the society. We appreciate your cooperation in conserving electricity consumption.

○Implementation plan of rolling blackout on Thurs, March 17
Regional block and time periods planned to have rolling blackout based on electricity supply-demand today are as follows.The actual extension of blackout for each block are planned to be up to approximately 3 hours each.
For customers who will be subject to rolling blackout, please be prepared for the announced blackout periods. Also for customers who are not subject to blackouts, TEPCO appreciates your continuous cooperation in reducing electricity usage by avoiding using unnecessary lighting and electrical equipment.

[Expected rolling blackout time periods in each region]
Block 5: 6:20 - 10:00
Block 1: 9:20 - 13:00
Block 2: 12:20 - 16:00
Block 5: 13:50 - 17:30
Block 3: 15:20 - 19:00
Block 1: 16:50 - 20:30
Block 4: 18:20 - 22:00

- Please refer to the attachment1 for the detailed region of the blocks. (The website of TEPCO provides information including "Chome". http://www.tepco.co.jp/index-j.html)
- Starting and ending time of blackout periods may slightly differ.
- Depending on supply and demand conditions on the actual days, planned blac kouts may not been carried out. In addition, in case electricity supply and demand exceeds our forecast, we will reconsider the rolling blackout plan and inform you before we implement the revised planned blackouts.
- The blackout may occur in the adjacent areas where the planned blackouts are carried out.

○Implementation plan of rolling blackout from Fri, March 18 to Tue, March 22 Please refer to the attachment2 for the detailed plan.

- Please refer to the attachment1 for the detailed region of the blocks.
- The rolling blackout will be changed every day. Starting and ending time of blackout periods may slightly differ.

- Depending on supply and demand conditions on the actual days, planned blackouts may not been carried out. Also, in case supply and demand exceeds our forecast, we will reconsider planned blackouts and inform you before we implement the new planned blackouts.

[Others]

- In order to prevent fire, please make sure to switch off the electric appliances such as hair drier and to shut down the breaker of distribution board when you leave your house.
- For the customer who has in-house power generation, please secure fuel for generator.

[Improvement for implementing planned blackouts]

- We are basically carrying out the existing plans, but realize that they have problems. We will consider and improve implementation plans from the customers' point of view.

<Reference>

○Prediction of Demand and Supply on March 16

Estimated Demand	35,000 MW(18:00~19:00)
Supply Capacity	33,000 MW

○Expected demand and supply on March 17

Estimated Demand	38,000 MW(18:00~19:00)
Supply Capacity	33,500 MW

Appendices:

attachment1:Group1(PDF 9.35KB)
:Group2(PDF 10.1KB)
:Group3(PDF 9.81KB)
:Group4(PDF 10.0KB)
:Group5(PDF 12.7KB)
attachment2:Weekly Schedule of Rolling Blackout (planned)(PDF 18.1KB)

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Press Releases

Press Release (Mar 16,2011)
Fire occurrence at Fukushima Daiichi Nuclear Power Station Unit 4

At approximately 5:45 am, a TEPCO employee discovered a fire at the northwest corner of the Nuclear Reactor Building while transporting a battery to the central control room of Unit 4 of Fukushima Daiichi Nuclear Power Station.
TEPCO immediately reported this incident to the fire department and the local government. In addition, TEPCO also contacted related parties about this incident and began immediate preparations to extinguish the fire.

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Press Releases

Press Release (Mar 16,2011)
Fire occurrence at Fukushima Daiichi Nuclear Power Station Unit 4 (2nd Release)

At approximately 5:45 am, a TEPCO employee discovered a fire at the northwest corner of the Nuclear Reactor Building while transporting a battery to the central control room of Unit 4 of Fukushima Daiichi Nuclear Power Station.
TEPCO immediately reported this incident to the fire department and the local government. In addition, TEPCO also contacted related parties about this incident and began immediate preparations to extinguish the fire. (previously announced)

However, during an inspection at approximately 6:15 am, TEPCO staff found no signs of fire. The area will be kept under strict surveillance.

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Press Releases

Press Release (Mar 16,2011)
Wednesday (March 16th): Group 3 (Original Scheduled Time:18:20PM - 22:00PM)

-Blackout Period: Approximately 3 hours (18:20PM - 22:00PM)
-Expected Number of Blackouts: Approximately 2,620,000 customers
-Targeted Region: Saitama pref., Tokyo, Chiba pref., Tochigi Pref., Gunma pref., Yamanashi pref., Kanagawa pref.

WITH HOC

From: LIA07 Hoc
To: Borchardt, Bill; Bradford, Anna; Cohen, Shari; Cooper, LaToya; Dyer, Jim; Flory, Shirley; Gibbs, Catina; Haney, Catherine; Hudson, Sharon; Jaczko, Gregory; Johnson, Michael; Leeds, Eric; Loyd, Susan; Pace, Patti; Schwarz, Sherry; Sheron, Brian; Speiser, Herald; Taylor, Renee; Virgilio, Martin; Walls, Lorena; Weber, Michael
Cc: LIA07 Hoc
Subject: Update for "Go Books," 0600 3/24/11
Date: Thursday, March 24, 2011 6:24:09 AM
Attachments: TEPCO Press Release 132.pdf
March 24 0600EDT one pager.pdf
ET Chronology 3-24-11 0600.pdf
NRC Status Update 3.24.11--0600 EDT.pdf

Please find attached updated information for the "Go Books".

The updates include:

- The 0600 EDT, 03/24/11 Status Update
- The 0600 EDT, 03/24/11 One Page Briefing Sheet
- The latest ET Chronology
- The latest TEPCO Press Release (Number 132)

Please let me know if you have any questions or concerns.

-Jim

Jim Anderson
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
James.anderson@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

YX4/333

Search

Press Releases

Press Release (Mar 24,2011)
Plant Status of Fukushima Daiichi Nuclear Power Station (as of 7:00 AM Mar 24th)

*new items are underlined

All 6 units of Fukushima Daiichi Nuclear Power Station have been shut down.

Unit 1(Shut down)
-Reactor has been shut down. However, the explosive sound and white smoke were confirmed after the big quake occurred at 3:36 pm Mar 12th. It was assumed to be hydrogen explosion.
-At approximately 2:30 am on March 23rd, seawater was started to be injected to the nuclear reactor through the feed water system.
-We have been injecting sea water into the reactor pressure vessel.

Unit 2(Shut down)
-Reactor has been shut down and the level of reactor coolant had dropped and the reactor pressure had increased because the Reactor Core Isolation Cooling System stopped. Measures were taken to lower the pressure within the Reactor Containment Vessel and to inject sea water into the Reactor while carefully confirming safety. The level of reactor coolant and the pressure of the Reactor resumed.
-At approximately 6:00 am on March 15th, an abnormal noise began emanating from nearby Pressure Suppression Chamber and the pressure within this chamber decreased.
-At 6:20 pm on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm
-We have been injecting sea water into the reactor pressure vessel.

Unit 3(Shut down)
-Reactor has been shut down. However, the explosive sound and white smoke were confirmed at 11:01am Mar 14th. It was assumed to be hydrogen explosion.
-At 8:30am on March 16th, fog like steam was confirmed arising from the reactor building.
-At approximately 6:15 am on March 17th the pressure of the Suppression Chamber has temporarily increased. We were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside now. We will continue to monitor the status of the pressure of the reactor containment vessel.
-At approximately 4:00 pm, March 21st, light gray smoke was confirmed arising from the floor roof of the Unit 3 building. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.
-At approximately 10:45 pm on March 22nd, the light in the main control room was turned on.
-At around 4:20 pm on March 23rd, our staff confirmed light black smoke belching from the Unit 3 building. <u>At approximately 11:30 pm on March 23rd and 4:50 am on March 24th, our employee found no signs of smoke.</u>
-We have been injecting sea water into the reactor pressure vessel.

Unit 4 (outage due to regular inspection)
-Reactor has been shut down. However, at approximately 6 am on March 15th.
We have confirmed the explosive sound and the sustained damage around the 5th floor rooftop area of the Nuclear Reactor Building.
-On March 15th and 16th, we respectively confirmed the outbreak of fire at the 4th floor of the northwestern part of the Nuclear Reactor Building. We immediately reported this matter to the fire department and the related authorities. TEPCO employees confirmed that each fire had already died down by itself.
-At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.

Unit 5 (outage due to regular inspection)
-Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
-At 5 am, March 19th, we started the Residual Heat Removal System Pump (C) in order to cool the spent fuel pool.
-At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
-At 2:30 pm, March 20th, the reactor achieved reactor cold shutdown. At around 5:24 pm on March 23rd, when we switched the temporary Residual Heat Removal System Seawater Pump, it automatically stopped. We will repair the pump and maintain the reactor water level and the temperature in the reactor properly.

Unit 6 (outage due to regular inspection)
-Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
-We are working on receiving external power supply to Units 5 and 6. We completed the repair work on the emergency diesel generator (A).
-At 10:14 pm, March 19th, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.
-At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
-At 7:27 pm, March 20th, the reactor achieved reactor cold shutdown.

Today's work for cooling the spent fuel pools

-At approximately 5:35 am, we started injecting seawater into the fuel spent pool of Unit 3, using Fuel Pool Cooling and Filtering(clean up) system (FPC).
-We are considering further spraying at other units and others subject to the conditions of spent fuel pools.

Casualty

-2 workers of cooperative firm were injured at the occurrence of the earthquake, and were transported to the hospital on March 11th.
-4 workers were injured and transported to the hospital after explosive sound and white smoke were confirmed around the Unit 1on March 11th.
-Presence of 2 TEPCO employees at the site is not confirmed on March 11th.
-1 TEPCO employee who was not able to stand by his own holding left chest with his hand, was transported to the hospital by an ambulance on March 12th.
-1 subcontract worker at the key earthquake-proof building was unconscious and transported to the hospital by an ambulance on March 12th.
-The radiation exposure of 1 TEPCO employee, who was working inside the reactor building, exceeded 100mSv and he was transported to the hospital on March 12th.
-2 TEPCO employees felt bad during their operation in the central control rooms of Unit 1 and 2 while wearing full masks, and were transferred to Fukushima Daini Nuclear Power Station for consultation with a medical advisor on March 13th.
-11 workers were injured and transported to Fukushima Daini Nuclear Power Station etc. after explosive sound and white smoke were confirmed around the Unit 3. One of the workers was transported to the FUKUSHIMA Medical University Hospital on March 14th.
-At approximately 10 pm on March 22nd, 1 worker who had been working on setting up a temporary power panel in the common pool was injured and transported to Fukushima Daini Nuclear Power Station where the industrial doctor is.
-At approximately 1 am on March 23rd, 1 worker who had been working on transporting a temporary power panel in the common pool was injured and transported to Fukushima Daini Nuclear Power Station where the industrial doctor is.

Others

-We measured radioactive materials (iodine etc.) inside of the nuclear power station area (outdoor) by monitoring car and confirmed that radioactive materials level is getting higher than ordinary level. As listed below, we have determined that specific incidents stipulated in article 15, clause 1 of Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) have occurred.
·Determined at 4:17 pm Mar 12th (Around Monitoring Post 4)
·Determined at 8:56 am Mar 13th (Around Monitoring Post 4)
·Determined at 2:15 pm Mar 13th (Around Monitoring Post 4)
·Determined at 3:50 am Mar 14th (Around Monitoring Post 6)
·Determined at 4:15 am Mar 14th (Around Monitoring Post 2)
·Determined at 9:27 am Mar 14th (Around Monitoring Post 3)
·Determined at 9:37 pm Mar 14th (Around main entrance)
·Determined at 6:51 am Mar 15th (Around main entrance)
·Determined at 8:11 am Mar 15th (Around main entrance)
·Determined at 4:17 pm Mar 15th (Around main entrance)
·Determined at 11:05 pm Mar 15th (Around main entrance)
·Determined at 8:58 am Mar 19th (Around MP5)
From now on, if the measured figure fluctuates and goes above and below 500 micro Sv/h, we deem that as the continuous same event and will not regard that as a new specific incidents stipulated in article 15, clause 1 of the Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) has occurred. In the interim, if we measure a manifestly abnormal figure and it is evident that the event is not the continuous same event, we will determine and notify.

-The national government has instructed evacuation for those local residents within 20km radius of the periphery and evacuation to inside for those residents from 20km to 30km radius of the periphery, because it's possible that radioactive materials are discharged.
-At approximately 10am on March 15th, we observed 400mSv/h at the inland side of the Unit 3 reactor building and 100mSv/h at the inland side of the Unit 4 reactor building.
-We checked the status of spent fuel in the common pool, and confirmed that the water level secured. We are planning to conduct a detailed inspection.
-We found no signs of abnormal situation for the casks by visual observation during the patrol activity. A detailed inspection is under preparation.
-At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit.
-In total 12 fire engines are lent for the water spraying to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department.
*: Koriyama Fire Department, Iwaki Fire Brigade Headquarters, Fire Headquarters of Sukagawa District Wide Area Fire-fighting Association, Yonezawa City Fire Headquarters, Utsunomiya City Fire Headquarters, Fire Headquarters of Aizu-Wakamatsu wide area municipal association, Saitama City Fire Bureau, and Niigata City Fire Bureau.
-On March 21st and 22nd, we detected cobalt, iodine and cesium from the seawater around discharge canal of Units 1, 2, 3 and 4.
-We detected iodine, cesium and tellurium in the air collected at the site of Fukushima Daiichi Nuclear Power Station on March 20th, 21st and 22nd.
-Until March 22nd, Units 1 through 6 were started to be energized from the external power source.
-We will continue to take all measures to ensure the safety and to continue monitoring the surrounding environment around the Power Station.

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From: OST01 HOC
Sent: Thursday, March 24, 2011 7:54 PM
To: LIA07 Hoc
Subject: RE: 1800 EDT (March 24, 2011) USNRC Earthquake/Tsunami Status Update

Lol! Thanks!

From: LIA07 Hoc
Sent: Thursday, March 24, 2011 7:54 PM
To: OST01 HOC
Subject: RE: 1800 EDT (March 24, 2011) USNRC Earthquake/Tsunami Status Update

It's there now. Sorry we thought we had done it ☺

From: OST01 HOC
Sent: Thursday, March 24, 2011 7:25 PM
To: LIA07 Hoc; OST04 Hoc
Subject: FW: 1800 EDT (March 24, 2011) USNRC Earthquake/Tsunami Status Update

Thanks! Are you going to update the SITREP/SPOTREP Log in WebEOC? Thanks again!

EST Coordinator

From: HOO Hoc [mailto:HOO.Hoc@nrc.gov]
Sent: Thursday, March 24, 2011 6:19 PM
To: LIA07 Hoc; OST01 HOC; OST02 HOC; OST03 HOC
Subject: FW: 1800 EDT (March 24, 2011) USNRC Earthquake/Tsunami Status Update

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From: NITOPS[SMTP:NITOPS@NNSA.DOE.GOV]
Sent: Thursday, March 24, 2011 6:18:47 PM
To: DL-Policy Working Group; Blumenthal, Daniel; Brown, Courtney M (NST); Buntman, Steven; dartdoeliaison1@ofda.gov; dblumenthal@ofda.gov; Debbie Wilber; DOE LNO to USAID; Froh, William; Haley, Billy; McClelland, Vince; Johnson, Steven; Thompson, Roger (NEV); wafroh@gmail.com; Wilber, Deborah; CMHT; HOO Hoc; NARAC; PMT01 Hoc; PMT02 Hoc; Hoc, PMT12
Subject: FW: 1800 EDT (March 24, 2011) USNRC Earthquake/Tsunami Status Update
Auto forwarded by a Rule

From: LIA07 Hoc [mailto:LIA07.Hoc@nrc.gov]
Sent: Thursday, March 24, 2011 6:00 PM
Subject: 1800 EDT (March 24, 2011) USNRC Earthquake/Tsunami Status Update

Attached, please find an 1800 EDT (March 24, 2011) status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami.

YYY/334

Please note that this information is "~~Official Use Only~~" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Sara

Sara K. Mroz
Communications and Outreach
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
Sara.Mroz@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

From: LIA08 Hoc
Sent: Thursday, March 24, 2011 1:53 AM
To: Christensen, Harold; LIA03 Hoc
Subject: NUREG-0728
Attachments: incident-response.pdf

YYY/335

NUREG-0728, Rev. 4

U.S. Nuclear Regulatory Commission
Office of Nuclear Security and Incident Response

April 2005 [Issued for Interim Use Effective April 14, 2005]

ABSTRACT

The United States Nuclear Regulatory Commission (NRC) regulates the Nation's civilian uses of nuclear fuels and materials to protect the health and safety of the public, to promote the common defense and security, and to protect the environment. The NRC Incident Response Plan, NUREG-0728, was developed to reflect Commission policy on the agency's response to radiological and other incidents and emergencies especially incidents involving NRC licensees and certificate holders. The Plan assigns responsibilities for responding to any potentially threatening incident involving NRC-regulated activities and for assuring that the NRC fulfills its statutory mission. This revision, Revision 4, to the Plan reflects the current NRC policy and organization structure and aligns the Plan with the National Response Plan and the National Incident Management System.

Comments regarding this document should be forwarded to the following:

Director, Division of Preparedness and Response
Office of Nuclear Security and Incident Response
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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FIGURES AND TABLES

APPENDICES

EXECUTIVE SUMMARY

This Revision 4 to NUREG-0728, NRC Incident Response Plan (IRP), incorporates (1) agency policy and organizational roles and responsibilities relative to incident and emergency response set forth in Management Directive 8.2, NRC Incident Response Program; (2) national-level incident management policy and mechanisms provided in the National Response Plan (NRP) and the National Incident Management System (NIMS); (3) enhancements and updates to the NRC's Incident Response Program; and (4) agency organizational changes.

This Plan and Management Directive 8.2 are being revised in parallel to ensure consistent documentation of the NRC Incident Response Program. Planning-related information which was previously contained in Management Directive 8.2 has been relocated to this Plan. In addition, certain detailed information previously contained in this Plan has been incorporated into the implementing procedures for this Plan.

Within the framework of the NIMS, the NRP and associated annexes (Emergency Support Function Annexes, Support Annexes, and Incident Annexes) govern the Federal Government's overall response to an incident. As a signatory to the NRP, the NRC commits to support the NRP concepts, processes, and structures and to carry out NRC's assigned functional responsibilities to ensure effective and efficient incident response. Key NRP concepts incorporated into Revision 4 include Incident of National Significance, Homeland Security Operations Center (HSOC), Interagency Incident Management Group (IIMG), Principal Federal Official (PFO), Joint Field Office (JFO), Interagency Modeling and Atmospheric Assessment Center (IMAAC), and provisions of the NIMS related to incident command and management. In addition, Revision 4 incorporates provisions of the Nuclear/Radiological Incident Annex to the NRP. This annex, which supersedes the Federal Radiological Emergency Response Plan (FRERP), provides for timely, coordinated Federal response to nuclear/radiological incidents and is the principal NRP annex applicable to the NRC.

Revision 4 incorporates several programmatic enhancements and updates and reflects the agency's current organization. The revision of the agency's response modes is noteworthy: the Normal mode is the routine state of agency operations and the ongoing level of response readiness; the Monitoring mode reflects a heightened state of agency readiness associated with incident assessment; the Activation mode reflects agency escalation for extensive incident analysis and evaluation, for consideration of dispatching an NRC site team, or for incidents involving terrorist activities; and the Expanded Activation mode reflects agency escalation for incidents which warrant the full response capabilities of the NRC and which may involve dispatch of an NRC site team.

I. INTRODUCTION

A. Purpose and Scope of Plan

The NRC Incident Response Plan (IRP), NUREG-0728, Revision 4, governs the overall NRC response to radiological incidents and emergency events with a focus on those incidents involving NRC licensees and certificate holders (hereafter referred to as "licensees"). The Plan reflects Commission policy regarding the planning and preparations for, response to, and recovery from incidents and assigns headquarters and regional responsibilities, by organization and by position, to assure the NRC will fulfill its statutory mission.

This Plan is a key document of the NRC Incident Response Program and provides the basis for NRC's incident-related interface and coordination with licensees and other stakeholders. The Plan is focused on incidents involving facilities and materials licensed by the NRC or an Agreement State; however, the Plan encompasses all incidents in which the NRC has a response role under its statutory authorities or as part of the overall Federal Government response. For completeness, the Plan includes summaries of the responsibilities and activities of the licensees, State/local/tribal governments, and the Federal Government for incidents involving NRC-regulated facilities and materials.

As a signatory of the NRP (Reference 1), the NRC has committed to the national-level policies, concepts, processes, and structures identified therein. Accordingly, this Plan is in alignment with the NRP and applicable parts of the National Incident Management System (Reference 2).

This Plan:

- Identifies the role and responsibilities of the NRC related to incident response
- Identifies the NRC's capabilities and organizational structure for incident response
- Identifies NRC interrelationships with licensees, State/local/tribal governments, other Federal agencies, and other organizations
- Emphasizes the licensee's primary responsibilities relative to incident response
- Describes NRC response activities and provisions for delegation of incident-related authority vested in the Chairman
- Guides headquarters and regional staff in carrying out their responsibilities for response to an incident
- Guides headquarters and regional staff in interactions prescribed in the NRP and associated annexes
- Identifies the "road map" for implementing procedures and supporting documents related to incident management

B. NRC Statutory Authority

The Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974 provide the statutory authority for the NRC and the foundation for NRC regulations. The statutory authorities for the NRC's incident response functions are summarized as follows:

- **Atomic Energy Act of 1954, as amended (AEA):** Under the AEA, 42 U.S.C. § 2011 *et seq.*, the NRC has broad authority to regulate (by licensing, regulation or order) commercial nuclear power and fuel facilities and the possession, transfer, and use of source, byproduct, and special nuclear materials and other actions to protect the public health and safety and to provide for the common defense and security.

- **Energy Reorganization Act of 1974:** This Act abolished the Atomic Energy Commission (AEC) and moved the AEC's regulatory function to the NRC, establishing the NRC as an independent regulator of certain nuclear materials and facilities. *See* 42 U.S.C. § 5801 *et seq.* This Act (in combination with AEA) gives the NRC authority to regulate a limited number of Federal facilities operated by the Department of Energy.

- **Reorganization Plan No. 1 of 1980:** This plan, which was enacted in Public Law 98-614, establishes the NRC Chairman as the principal executive officer and official spokesman for the Commission. Section 3 of the plan transfers to the Chairman all the functions vested in the Commission pertaining to an emergency involving NRC-licensed or regulated materials and facilities. Under Section 3, the Chairman may delegate this authority in whole or in part to other Commissioners or the NRC staff.

- **Uranium Mill Tailings Radiation Control Act of 1978:** This Act amended the AEA to give the NRC authority to regulate the radioactive tailings or wastes generated by uranium milling and other operations designed to process ores for uranium or thorium. NRC regulations at 10 C.F.R. Part 40 govern disposal of such material.

- **Nuclear Non-Proliferation Act of 1978:** This Act (in combination with the AEA) gives the NRC authority to license the export and import of nuclear materials and equipment to ensure that these items are used for peaceful purposes. NRC regulations governing export licensing are set forth in 10 C.F.R. Part 110.

- **Nuclear Waste Policy Act of 1982/Nuclear Waste Policy Act Amendments of 1987/Energy Policy Act of 1992:** These Acts set forth requirements for development and licensing of Yucca Mountain, a proposed high-level radioactive waste repository being developed by the Department of Energy (DOE). The NRC will consider DOE's eventual license application against technical criteria set forth in NRC regulations in 10 C.F.R. Part 63.

- **Diplomatic Security and Anti-Terrorism Act of 1986:** This Act, 22 U.S.C. § 4802 *et seq.*, requires the Secretaries of Defense, State, and Energy, the Director of the Arms Control and Disarmament Agency, and the NRC to review the adequacy of the physical security standards currently applicable to the shipment and storage outside the United States of special nuclear material which is subject to U.S. prior consent rights, with special attention to protection against terrorist acts. The Act also amends the AEA to require each licensee or applicant for a license to operate a utilization facility (*e.g.*, a nuclear power reactor) to fingerprint each individual who is permitted unescorted access to the facility or is permitted access to certain safeguards information.

- **Solar, Wind, Waste, and Geothermal Power Production Incentives Act of 1990:** This Act amended the AEA to require licensing of uranium enrichment facilities under NRC regulations in 10 C.F.R. Parts 40 and 70.

- **Prohibited transactions involving nuclear materials,** 18 U.S.C. § 831, provides for criminal penalties for specified transactions involving nuclear materials and provides that the Attorney General may request assistance from the Secretary of Defense in the enforcement of this section notwithstanding the Posse Comitatus Act.

The mission of the NRC, under the AEA, is to regulate the civilian commercial, industrial, academic, and medical uses of nuclear materials in order to protect the public health and safety and promote the common defense and security. This congressionally-defined NRC mission enables the Nation to use radioactive materials for beneficial civilian purposes while ensuring that public health and safety, the common defense and security, and the environment are protected.

The NRC's scope of responsibility includes regulation of commercial nuclear power plants; research, test, and training reactors; nuclear fuel cycle facilities; medical, academic, and industrial uses of radioactive materials; and the transport, storage, and disposal of nuclear materials and wastes. NRC's regulations are designed to protect the public and occupational workers from radiation hazards in industries using radioactive materials.

II. OVERVIEW: NRC INCIDENT RESPONSE PROGRAM

This section provides a narrative overview of the NRC Incident Response Program and its relationship to both national policy and the response programs of licensees and State/local/tribal governments.

A. Program Scope

The NRC Incident Response Program integrates the overall NRC capabilities associated with the planning and preparation for, response to, and recovery from radiological incidents and/or emergency events. The program is focused on incidents involving nuclear/radiological facilities and materials licensed by the NRC or an Agreement State. However, the program encompasses all incidents in which the NRC has a response role under its statutory authority or as part of the overall response role of the Federal Government.

The headquarters Office of Nuclear Security and Incident Response (NSIR) manages and administers the program. NSIR's responsibilities include: develop and maintain program documentation; staff, operate and maintain the Headquarters Operations Center (HOC); coordinate the staffing of response teams and functions of personnel in the incident response organization; conduct training, drills, and exercises; conduct outreach activities with stakeholders (e.g., licensees, State, local, and tribal government agencies, other Federal entities); integrate NRC's incident management processes and activities with licensees, State/local/tribal governments, and Federal entities; and carry out a process of agency-wide continuing improvement for incident management.

Each of the four regional offices manages and administers the regional elements of the program. The elements include staffing and operation of the regional incident response centers; developing and maintaining region-specific program documentation; staffing incident response teams; conducting training, drills, and exercises; integrating NRC incident response with licensees' and State/local/tribal governments' incident response; and conducting stakeholder outreach activities.

B. Program Documentation

Management Directive 8.2, NRC Incident Response Program (Reference 3), the top-tier document, sets forth policy on the agency's Incident Response Program. The directive specifies the organizational and positional roles and responsibilities of headquarters and regional offices relative to incident management and response and is applicable to all agency employees.

This Plan, NUREG-0728, Revision 4, reflects the NRC policy and organizational structure provided in Management Directive 8.2. This Plan governs the overall NRC response to incidents and assigns responsibilities for assuring that the NRC fulfills its statutory mission relative to incident response.

Headquarters and regional office implementing procedures, separate from this Plan, document the specific functions and responsibilities and contain the detailed information for the NRC's response teams and personnel to implement and carry out the provisions of the Plan. Procedures address such topics as responder notifications and team staffing, lessons learned, communication protocols, system/equipment operation, licensee interface, interagency coordination, and stakeholder outreach.

C. Program Resources

NRC resources associated with the Incident Response Program include personnel, facilities, and systems/equipment. The agency provides 24/7 staffing of the HOC by duty officers familiar with licensee facilities and operations. In response to an incident, NRC personnel provide staffing of the headquarters response teams, and activate the agency's response capabilities. Regional offices provide personnel to staff their respective incident response centers and, as appropriate, a team to be dispatched to the incident location. Further, NRC personnel staffing is maintained sufficient to continually staff positions on a 24/7 basis as necessary to support incident response functions.

The HOC and the regional incident response centers are equipped with communications, information display, and analysis systems. For example, communications systems provide direct linkages, including secure telephone/fax, with licensees and government entities. The Emergency Response Data System (ERDS) displays real-time safety system data from all nuclear power reactor plants. Radiological analysis and consequence assessment processes provide the capability for predicting radiological consequences to the public and/or the environment.

D. Program Readiness

NRC readiness for response to incidents is maintained by planning and preparedness activities such as: plan and procedure maintenance, training, exercises, interagency liaison/coordination, stakeholder outreach, and program assessments. This Plan and the implementing procedures are reviewed and periodically updated to reflect lessons learned and agency organizational changes. Headquarters Operations Officers(HOOs)/Headquarters Emergency Response Officers (HEROs) receive ongoing training and response team members receive both initial and refresher training. The NRC maintains a broad program of emergency exercises and participates, either full-scale or partial, in both facility and materials licensee exercises and Federal interagency exercises on an ongoing basis. The NRC is an integral part of the Federal incident management community and actively participates in interagency policy and planning and preparedness activities with the Homeland Security Council (HSC), Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA), and other departments/agencies. The agency maintains a comprehensive program of stakeholder outreach activities to include licensees, Federal/State/local/tribal government agencies, and the public. The agency maintains an aggressive program of continuing improvement related to nuclear/radiological security, emergency preparedness, and incident response.

E. Licensee Alignment

The NRC responds to incidents under its own statutory authorities and responsibilities in accordance with this Plan and, if applicable, as an integral part of the overall response by the Federal government consistent with the NRP. Licensees respond to incidents involving their licensed facilities and/or material in accordance with their respective NRC-mandated plans, programs, and procedures. The scope and extent of the NRC response to a licensee incident are dependent upon the incident's severity and typically correlates with the information reported by the licensee and the licensee's scope of response.

Facility licensees are responsible for taking immediate actions to ensure safety and security, to mitigate the consequences of an incident, to promptly notify State/local/tribal officials and the

NRC, and to provide appropriate public protective action recommendations to offsite government authorities.

Incident notifications and response activities are facilitated by the NRC-mandated standardized emergency classification scheme for incidents at licensee facilities.

The NRC (1) performs independent assessment of incidents and potential offsite consequences and, as appropriate, confirms or provides recommendations concerning public protective measures; (2) performs oversight of the licensee to include monitoring, evaluation of protective action recommendations, advice, assistance, and, in rare circumstances, direction; and (3) dispatches, if appropriate, an NRC site team of technical experts to the licensee's facility. Under certain extreme circumstances and subject to significant preconditions, the NRC may take possession of special nuclear materials and/or operate certain facilities regulated by the NRC if necessary to protect the health and safety of the public or the common defense and security.

For incidents involving licensed radioactive materials, the respective responsibilities of the licensee and the NRC are unchanged from those for a facility. Response activities would, however, be incident-specific and vary with incident type and location, source term, and potential consequences.

F. Interagency Alignment

Homeland Security Presidential Directive-5 (HSPD-5), Management of Domestic Incidents, (Reference 4) tasks all Federal departments and agencies to support and assist the Secretary of Homeland Security and to adopt and conform to the NIMS and NRP.

NIMS: The NIMS provides a nationwide framework for Federal, State, local, and tribal governments to prevent, prepare for, respond to, and recover from domestic incidents. The NIMS consists of protocols for incident command and management, plus provisions for resource management, communications, and planning and preparedness.

NRP: The NRP, using the NIMS, integrates Federal domestic prevention, preparedness, response, and recovery plans into a single all-discipline, all-hazards plan. The NRP consists of a "base plan" plus multiple subject-specific annexes that expand upon, and further delineate, the interagency roles, responsibilities and activities pertaining to particular incidents. Participation in the NRP allows Federal agencies to draw on the resources of others in exchange for the commitment to provide similar assistance when requested "consistent with [the agency's] own authorities and responsibilities."

The NRP emphasizes that agencies fully retain their independent authorities and responsibilities; but it also anticipates that participating agencies will coordinate their actions by working through NRP-established multi-agency organizations. The Secretary of Homeland Security does not direct policy or resolve conflicts that may arise within these multi-agency organizations. The Secretary, consistent with HSPD-5, provides the mechanisms necessary to coordinate Federal operations and resources and facilitates conflict resolution.

G. National Response Plan and National Incident Management System

The Federal Government's overall response to an incident is governed by the NRP and associated annexes (Emergency Support Function Annexes, Support Annexes, and Incident Annexes) within the framework of the NIMS.

Revision 4 of this Plan brings the Plan into alignment with the NRP and the NIMS. As a signatory to the interagency letter of agreement that promulgated the NRP, the NRC commits to:

- Supporting NRP concepts, processes, and structures and carrying out NRC's assigned functional responsibilities to ensure effective and efficient incident response
- Agreeing to the terms and conditions of the Memorandum of Agreement (MOA) for mutual aid set forth in the Financial Management Support Annex of the NRP
- Providing cooperation, resources, and support to the Secretary of Homeland Security in the implementation of the NRP, as appropriate and consistent with NRC's authorities and responsibilities
- Cooperating with appropriate Federal incident management leadership to include the Principal Federal Official, Federal Coordinating Officer, and Federal Resource Coordinator, as appropriate and consistent with NRC's authorities and responsibilities
- Modifying existing NRC incident management and emergency response plans to facilitate compliance with the NRP
- Forming and maintaining incident management partnerships with State, local, tribal, and regional entities, the private sector, and nongovernmental organizations
- Utilizing NRC-specific authorities, resources, and programs to facilitate incident management activities in accordance with the NRP
- Developing, exercising, and refining headquarters and regional capabilities to ensure sustained operational readiness in support of the NRP.

Key NRP concepts adopted by the NRC and incorporated into the provisions of this Plan include:

- Incident of National Significance. As determined by DHS, an actual or potential high-impact event that requires a coordinated and effective response by an appropriate combination of Federal, State, local, tribal, nongovernmental, and/or private-sector entities in order to save lives and minimize damage and to provide the basis for long-term community recovery and mitigation activities is termed an Incident of National Significance. For such incidents, DHS coordinates the overall Federal response according to provisions of the NRP and annexes.

- Nuclear/Radiological Incident Annex. Incidents involving nuclear/radioactive materials, including incidents considered Incidents of National Significance, are addressed in this annex to the NRP (see discussion below).

- Homeland Security Operations Center (HSOC). The NRC and other Federal departments/agencies report incident-related information to the DHS headquarters 24/7 operations center. In addition, the NRC provides staff liaisons on a "situation basis" as requested by DHS to facilitate interagency coordination.

- Interagency Incident Management Group (IIMG). The NRC provides management-level representation to the IIMG, on a "situation basis" and in parallel with other

Federal departments/agencies, for interagency policy-level support to the Secretary of Homeland Security and the White House.

- Principal Federal Official (PFO) and Joint Field Office (JFO). During Incidents of National Significance, when a PFO is designated to locally oversee, coordinate, and execute the Secretary of Homeland Security's responsibilities and a JFO is established to coordinate Federal assistance to the affected jurisdictions, the NRC staffs positions in the JFO organization in support of the PFO and other Federal agencies. The JFO may include a joint information center (JIC).

- Interagency Modeling and Atmospheric Assessment Center (IMAAC). The IMAAC, coordinated by DHS, provides hazardous materials (radiological, chemical, biological) atmospheric dispersion modeling and health effect predictions during an Incident of National Significance and generates the single Federal prediction of atmospheric dispersion and consequences utilizing the best available resources from the Federal Government. The NRC interfaces and coordinates with the IMAAC.

- NIMS. This Plan and the associated implementing procedures incorporate the provisions of the NIMS related to incident command and management. The NRC will evaluate and adopt, as appropriate, the other provisions of the NIMS which are currently undergoing DHS-coordinated interagency collaborative development.

H. Nuclear/Radiological Incident Annex

The NRP's Nuclear/Radiological Incident Annex (Reference 5), which supersedes the FRERP, provides for timely, coordinated response by Federal agencies to nuclear/radiological incidents and is the principal annex applicable to the NRC. The annex applies to any nuclear/radiological incident that has actual, potential, or perceived radiological consequences within the United States, its territories, possessions, or territorial waters, and requires a response by the Federal Government. The annex does not create any new authorities nor change any existing authorities and nothing in the annex alters or impedes the ability of the NRC or other Federal agencies to carry out their specific authorities and perform their responsibilities under law. Under this annex, the NRC roles/responsibilities are analogous to those under the superseded FRERP and the annex comports closely with the FRERP.

The annex may be implemented (1) concurrently with, and as integral part of, the NRP for Incidents of National Significance or (2) independently as a stand-alone Federal interagency protocol for incidents below the threshold of an Incident of National Significance. Under the annex, NRC is either the Coordinating Agency or a Cooperating Agency. The Coordinating Agency is that Federal agency which owns, has custody of, authorizes, regulates, or is otherwise deemed responsible for the radiological facility or activity involved in the incident. (Note: "Coordinating Agency" equates to "Lead Federal Agency" under the FRERP.) The NRC is the Coordinating Agency for incidents that occur at fixed facilities or activities licensed by the NRC or Agreement States or involving AEA licensed material. For terrorism incidents involving materials or facilities licensed by NRC or Agreement States, NRC is the Coordinating Agency responsible for coordinating technical support and assistance to the Federal Bureau of Investigation (FBI) in the performance of its law enforcement mission.

As the Coordinating Agency, NRC performs the following Federal-level functions: (1) coordinates actions of Federal agencies related to the overall response; (2) coordinates Federal activities related to response and recovery of the radiological aspects of the incident; (3) coordinates security activities related to Federal response operations; (4) ensures coordination of technical data (collection, analysis, storage, and dissemination); (5) ensures that Federal protective action recommendations are developed and provides advice and assistance to State, local, and tribal governments for implementation; (6) coordinates release of Federal information to the public; (7) coordinates release of Federal information to Congress; (8) informs the White House on aspects of the incident; and (9) ensures coordination of demobilization of Federal assets. For Incidents of National Significance, DHS is responsible for the overall coordination of Federal response activities and NRC performs the Coordinating Agency response functions in concert with DHS.

As a Cooperating Agency, the NRC provides technical and resource support to the Coordinating Agency. The NRC is a Cooperating Agency for all nuclear/radiological incidents other than those for which it is the Coordinating Agency. For example, for incidents involving Department of Energy (DOE)-owned/operated facilities and for terrorism incidents involving material not licensed by NRC or Agreement States, NRC would provide technical assistance to other Federal, State, local, and tribal agencies as a Cooperating Agency.

III. KEY PLANNING CONCEPTS

A. Nuclear/Radiological Incidents

The Nuclear/Radiological Incident Annex of the NRP is implemented (1) concurrently with, and as an integral part of, the NRP for nuclear/radiological incidents considered to be Incidents of National Significance or (2) independently for other nuclear/radiological incidents considered to be below the threshold of an Incident of National Significance and, therefore, not requiring overall Federal coordination by DHS.

The Coordinating Agency leads the nuclear/radiological aspects of the response in support of DHS for Incidents of National Significance or, for incidents below the threshold of an Incident of National Significance, leads the overall Federal response. The Cooperating Agencies provide technical and resource support to DHS and to the Coordinating Agency.

B. Incidents Involving Licensees

The licensee, pursuant to provisions of Title10 of the Code of Federal Regulations, is responsible for controlling the nuclear/radioactive material or facility, protecting against radiological releases, and mitigating the consequences of the incident. The licensee must be prepared to perform essential activities to ensure protection of the public in the event of an incident.

The NRC supports and assists the licensee, conducts an independent assessment of licensees and others to ensure safety and mitigate potential offsite consequences, and provides assistance and recommendations concerning any protective measures. For incidents involving facilities or materials licensed by the NRC or an Agreement State, the NRC is the designated Coordinating Agency under the Nuclear/Radiological Incident Annex.

For a transportation incident, the respective responsibilities of the licensee and NRC are the same as for a regulated facility. Response activities vary with the mode of transportation (e.g., highway, rail, ship, or plane), incident location, incident type, source term, and potential consequences. Response to an incident in the public transportation domain inherently relies on licensee and NRC cooperation with appropriate State, local, tribal, and Federal agencies.

C. Nonlicensee Incidents

For an incident involving a nuclear or radiological facility or material not licensed by the NRC or an Agreement State, another Federal department/agency is the designated Coordinating Agency under the Nuclear/Radiological Incident Annex and the NRC serves as a Cooperating Agency. In this capacity, the NRC provides technical assistance and support to DHS, other Federal entities, and State/local/tribal authorities commensurate with its capabilities and consistent with its statutory authorities.

D. Terrorism Incidents

Terrorism incidents involving nuclear or radioactive materials, including facilities and materials licensed by the NRC or an Agreement State, are considered Incidents of National Significance. For such incidents, DHS coordinates the overall Federal response under the provisions of the NRP and the associated annexes. Under the provisions of the Terrorism Incident Law Enforcement and Investigation Annex, the FBI manages and directs law enforcement and intelligence aspects of the response, while coordinating its activities with appropriate Federal/State/local/tribal governments.

For facilities or material licensed by the NRC or an Agreement State, the NRC is the Coordinating Agency under the Nuclear/Radiological Incident Annex. The NRC performs the functions delineated in the annex and, supported by the designated cooperating agencies, provides technical support and assistance to the FBI in the performance of its law enforcement and criminal investigative mission.

IV. ROLES AND RESPONSIBILITIES

A. Licensees

Licensees have the following responsibilities for incident response, pursuant to provisions of Title 10 of the Code of Federal Regulations:

(1) Limiting the Consequences
The licensee has the immediate and primary continuing responsibility for preventing the occurrence and limiting the consequences of an incident. Limiting the consequences to public health and safety takes clear precedence over adverse publicity or limiting financial loss. During an incident the licensee is required to take whatever action is deemed necessary to limit the consequences to public health and safety.

(2) Notifications and Protective Action Recommendations
The licensee is responsible for initial incident notifications to State, local, tribal, and Federal authorities (as specified in the licensee's emergency plan) and for keeping these entities informed of the status of the incident with respect to protection of the public health and safety. The licensee is required to promptly recommend to State, local, tribal, and Federal authorities specific protective actions to limit the danger to the public, including evacuation and sheltering and the prophylactic use of potassium iodide (KI) as appropriate.

(3) Notifying NRC
The licensee is responsible for notifying the NRC in compliance with regulatory requirements (e.g., 10 CFR Part 20, Subpart M, "Reports"; 10 CFR 30.50, "Reporting Requirements"; 10 CFR 40.60, "Reporting requirements"; 10 CFR 50.72, "Immediate notification requirements for operating nuclear power reactors"; 10 CFR 70.50, "Reporting requirements"; 10 CFR 70.74, "Additional reporting requirements"; 10 CFR 73.71, "Reporting of safeguards events"; and 10 CFR 76.120, "Reporting requirements").

B. State, Local, and Tribal Governments

State governments and, as applicable, local/tribal governments are responsible for determining and implementing measures to protect life, property, and the environment in areas outside the facility boundary or incident location. Although the licensee has the primary role in preventing and mitigating onsite incident consequences, the State authorities are responsible for implementing a response to assure the protection of the public from offsite consequences. These State authorities are assisted by the NRC, DHS, and other Federal Government departments/agencies. In addition, for incidents involving Agreement State licensees, State governments are responsible for notifying the NRC of the incident in a timely and effective manner.

C. NRC

NRC roles and responsibilities for incident response are as follows:

(1) Licensee Incidents
For incidents involving facilities or materials licensed by the NRC or an Agreement State, NRC responsibilities include (1) performing an independent assessment of the safety of

the facility or material; (2) evaluating licensee protective action recommendations; (3) performing oversight of the licensee (monitoring, advising, assisting, and/or directing); (4) supporting and coordinating with State/local/tribal authorities, DHS, and other Federal agencies; (5) reporting information to appropriate entities including the media and the public.

In carrying out its responsibilities related to a licensee incident, the NRC may have more than one licensee interface role, sometimes concurrently, as events progress. These interface roles are not discrete or mutually exclusive, but are generally incremental. The following interface roles are presented in ascending order of NRC responsibility:

- **Monitor and assess.** In this role, NRC response is limited and involves information acquisition and assessment. The licensee has primary responsibility for ensuring safety and responding to the incident. NRC keeps itself appraised of both the situation and the status of response actions, based on information and electronic data supplied directly by the licensee, as well as any data obtained from independent sources, reported by NRC personnel on site, or provided by offsite authorities. NRC maintains cognizance of offsite conditions and activities related to the incident. Data are collated, verified, analyzed, and evaluated by NRC to arrive at an independent assessment of the situation and of the adequacy of safety and protective measures being recommended or implemented. NRC serves as the focal point at the Federal level for providing authoritative technical information on the incident related to the onsite situation and licensee activities.

- **Coordinate and inform.** The NRC will appropriately inform cognizant officials, other agencies, and the public about the status of the incident. This role is exercised when it is clear that responsible parties are not aware of pertinent information or when information is specifically requested by interested parties (e.g., news media, DHS, White House). NRC activities are coordinated with DHS and other Federal entities.

- **Advisory.** The NRC response is expanded to exert influence on the response process. The primary responsibility for dealing with the incident remains with the licensee. NRC gives advisory support and assists in diagnosing the situation, isolating critical problems, and determining what courses of action and additional precautionary measures are necessary and appropriate. NRC advises the licensee and, as applicable, State/local/tribal authorities and other Federal agencies. In coordination with DHS, NRC advises State and local/tribal authorities on actions to mitigate the consequences of the incident and to protect the public. This advice may confirm the licensee's recommendation or provide additional recommendations.

- **Assistance.** The NRC may, upon request, assist the licensee by obtaining onsite and external support relating directly to onsite response activities. In this capacity, NRC may serve as an intermediary between the licensee and other response participants. NRC may also coordinate the deployment of Federal resources to the State and/or other response organizations.

- **Limited direction.** In rare situations, the NRC may find it necessary to intervene in a limited manner to direct the licensee's onsite response. NRC rarely assumes this role, but plans are made for such a contingency. The Chairman of the NRC has the authority to issue orders and directives to the licensee and, in such situation, the Chairman or designee issues formal orders to the licensee to take certain measures and then monitor implementation of the actions ordered. The licensee continues to make other incident-related decisions and to operate and manage the facility with licensee personnel.

(2) Nonlicensee Incidents

For nuclear/radiological incidents not involving facilities or materials licensed by the NRC or an Agreement State, the NRC is responsible for providing technical assistance and support, consistent with its statutory authorities. For incidents in which the Nuclear/Radiological Incident Annex is implemented, the NRC serves as a Cooperating Agency and is responsible for (1) providing technical assistance to include source term estimation, plume dispersion, and dose assessment calculations (2) providing assistance concerning protective action measures and (3) providing assistance in Federal radiological monitoring and assessment activities.

D. Federal Government

1. The White House

The President leads the Nation in response to an Incident of National Significance. The President may instruct a Federal department/agency, subject to statutory limitations, to utilize its authorities and resources. Under provisions of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), the President may declare a major disaster or emergency to provide Federal assistance to State/local/tribal entities. The Assistant to the President for Homeland Security, as directed by the President, may convene Federal interagency meetings to coordinate policy issues. The White House uses the mechanisms and provisions of the NRP to coordinate the response activities of Federal departments/agencies.

2. Department of Homeland Security

The Secretary of Homeland Security is responsible for coordinating the overall Federal Government response to Incidents of National Significance in accordance with HSPD-5 and the NRP. The Secretary, in accordance with HSPD-3, "Homeland Security Advisory System," coordinates dissemination of information regarding the risk of terrorist acts and the implementation of measures to reduce vulnerability or increase response capability during a period of heightened alert.

For a nuclear/radiological Incident of National Significance, DHS carries out overall coordination responsibilities according to the provisions of the NRP Base Plan, the Nuclear/Radiological Incident Annex, and other NRP annexes. For nuclear/radiological incidents of lesser severity, below the threshold of an Incident of National Significance and, therefore, not requiring overall coordination by DHS, organizational elements of DHS (e.g., DHS/FEMA); DHS/Infrastructure Analysis and Infrastructure Protection, Customs and Border Protection; Science and Technology Directorate; DHS/U.S. Coast Guard (USCG); DHS/U.S. Secret Service; others) carry out their respective responsibilities according to the provisions of the Nuclear/Radiological Incident Annex and other annexes.

In accordance with provisions of the Stafford Act, DHS/FEMA is responsible for coordinating the provision of Federal resources and assistance to affected State, local, and tribal governments for incidents resulting in presidentially declared disasters or emergencies. All incidents resulting in disaster and emergency declarations under the Stafford Act are considered Incidents of National Significance. However, not all Incidents of National Significance necessarily result in a declaration under the Stafford Act.

3. Federal Bureau of Investigation (FBI)

Under the AEA, the FBI is responsible for investigating all alleged or suspected criminal violations of the act. The Attorney General, typically acting through the FBI, has lead responsibility for criminal investigations of terrorist acts or threats, including those involving nuclear/radioactive materials, and for coordinating activities of other members of the law enforcement community. The FBI also plays a key part in working with the NRC and DHS in determining the credibility of threats involving nuclear facilities and materials.

For a nuclear/radiological terrorism incident, the FBI is responsible for managing and directing the law enforcement and intelligence aspects of incident response under the Terrorism Incident Law Enforcement and Investigation Annex of the NRP. The Coordinating Agency and Cooperating Agencies under the Nuclear/Radiological Incident Annex perform their respective functions delineated in the annex and provide technical support and assistance to the FBI.

4. Federal Departments/Agencies

The responsibilities of other Federal departments/agencies (e.g., DOE, Environmental Protection Agency [EPA], U.S. Department of Agriculture [USDA]) pertaining to nuclear/radiological incidents are delineated in the Nuclear/Radiological Incident Annex. For a nuclear/radiological incident in which the NRC is designated the Coordinating Agency, these departments/agencies serve as Cooperating Agencies and provide technical assistance and support to the NRC.

V. CONCEPT OF OPERATIONS

A. NRC Response Functions

The NRC carries out incident response functions, in accordance with this Plan, under its own statutory authorities and responsibilities (see Section I.B) and, if applicable, as an integral part of the overall Federal response consistent with the NRP. For incidents involving facilities and/or materials licensed by the NRC or an Agreement State, the NRC (1) performs an independent assessment of the incident and potential offsite consequences and, as appropriate, provides/confirms recommendations concerning any protective measures (2) performs oversight of the licensee (monitoring, evaluation of protective action recommendations, advice, assistance, and, in rare circumstances, direction) and (3) dispatches, if appropriate, an NRC team of technical experts to the licensee's site.

As a signatory to the NRP, the NRC supports the NRP concepts, processes, and structures and carries out assigned functional responsibilities to ensure effective and efficient incident management. In addition, NRC cooperates with and supports the Secretary of Homeland Security in implementation of the NRP, as appropriate and consistent with NRC's authorities and responsibilities.

For incidents involving facilities and/or materials licensed by the NRC or an Agreement State, NRC is the Coordinating Agency under the Nuclear/Radiological Incident Annex. Accordingly, the NRC performs the specified Federal-level response functions, as appropriate and consistent with the agency's authorities and responsibilities, including (1) coordinating actions of Federal agencies related to the overall response; (2) coordinating Federal activities related to response and recovery of the radiological aspects of the incident; (3) coordinating security activities related to Federal response operations; (4) ensuring coordination of technical data (collection, analysis, storage, and dissemination); (5) ensuring Federal protective action recommendations are developed in a timely and effective manner and providing advice and assistance to State, local, and tribal governments for implementation; (6) coordinating release of Federal information to the public; (7) coordinating release of Federal information to Congress; (8) informing the White House on all aspects of the incident; and (9) ensuring coordination of demobilization of Federal assets. The designated cooperating agencies (e.g., DOE, EPA, USDA) provide assistance and support to the NRC.

For incidents below the threshold of an Incident of National Significance, the NRC, as Coordinating Agency, performs the Federal-level functions and coordinates the overall Federal response as provided in the annex. For Incidents of National Significance, DHS is responsible for the overall coordination of Federal response activities and the NRC, as Coordinating Agency, performs the Federal-level functions in concert with DHS.

For other nuclear/radiological incidents (e.g., incidents involving DOE-owned material), the NRC is a Cooperating Agency. Accordingly, NRC provides technical assistance and support to DHS and the Coordinating Agency as appropriate and consistent with the agency's authorities and responsibilities.

For non-nuclear/radiological incidents, NRC may be designated a "support agency" or "cooperating agency" under one or more of the Emergency Support Function Annexes, Support Annexes, and/or Incident Annexes. Accordingly, NRC provides technical assistance and support according to the provisions of the annexes as appropriate and consistent with NRC's authorities and responsibilities.

B. NRC Response Organization

The overall response to any incident is under the direction of the NRC Chairman, or his/her designee. Response personnel at both headquarters and regional offices are organized by teams and the Chairman is the Director of the Executive Team. The agency's response at the regional level is under the direction of the respective Regional Administrator or designee. If an NRC site team is established and dispatched to the vicinity of an incident (e.g., licensee's site), the Site Team Director (i.e., director of the NRC site team) assumes lead responsibilities under specific authorities delegated by the Chairman.

NRC headquarters and regional response teams are staffed by experienced and qualified personnel whose routine responsibilities/activities correlate with the respective team's incident response functions and activities. Experienced and qualified supervisors/managers serve as team directors. Team directors tailor team staffing for a particular incident and, for an extended incident, determine long-term team staffing. Team-specific incident response implementing procedures identify the specific staffing and functions/activities for each team.

1. Headquarters Operations Center (HOC)

The HOC is continuously staffed (24 hours a day, 7 days a week) with a HOO/HERO. The HOO and HERO function as a team to receive emergency and non-emergency notifications from NRC licensees, government agencies, and/or private entities. Notifications made to the HOC include safety and security incidents. Depending on the nature of the reported incident, the HOO and HERO notify designated headquarters and regional management-level decision makers. If a decision is made to escalate the NRC response mode, the HOO and HERO promptly notify the appropriate NRC incident response team members. In addition to internal notifications, the HOO and HERO notify other Federal departments/agencies and, if appropriate, licensees and State agencies. The HOO and HERO, while continuing to perform their functions, are an integral part of the headquarters incident response organization. HOO/HERO functions are conducted in accordance with an implementing procedure.

2. Regional Offices

Regional incident response is under the leadership of the respective Regional Administrator with oversight by the Executive Team (ET). Response personnel include selected management and technical staff at the respective regional offices and the resident inspectors at nuclear power plant and nuclear fuel facility sites. For an incident at a licensee site with resident inspectors, the inspectors typically receive prompt notification from the licensee, monitor the licensee's response, and communicate with the respective regional office. Regional response personnel communicate with the HOO/HERO and, if appropriate, additional headquarters response personnel.

Depending on the incident's complexity and severity, the regional office may partially or fully staff its incident response center. For a severe incident at a licensee's site, the regional office staffs its incident response center and dispatches the site team. For an Incident of National Significance in which a JFO is established, the regional office may provide NRC representation consisting of the Senior NRC Official and appropriate support staff. NRC representation at the Joint Field Office is typically supplemented by headquarters and/or other regional offices. Regional office incident response staffing and activities are addressed in an implementing procedure.

3. Headquarters Executive Team (ET)

The ET, typically under the leadership of the Chairman, is the NRC's senior decision-making body for incident response. The ET's essential functions are (1) support licensees and State/local/tribal decision makers to assure that radiological consequences are minimized and (2) communicate and coordinate effectively with Federal stakeholders. The ET:

- Leads Federal response under NRC statutory authorities
- Responds as the Coordinating Agency or a Cooperating Agency under the NRP
- Supports and assists decision-making to assure that risk to the public is minimized
- Communicates appropriateness of actions to protect the public to Federal departments/agencies, Congress, media, and other stakeholders
- Coordinates Federal resources to licensee or support organizations when licensee capabilities are exceeded

The ET is led by the Director (NRC Chairman or designee) and the Deputy Director (appointed by the Director, typically the Executive Director for Operations [EDO]). Additional team members may include: the Deputy Executive Directors, the Director of the Office of Nuclear Reactor Regulation (NRR), the Director of the Office of Nuclear Regulatory Research (RES), the Director of the Office of Nuclear Material Safety and Safeguards (NMSS), and/or the Director of the Office of Nuclear Security and Incident Response (NSIR).

At the discretion of the Director, additional management support to the ET may include: the Director of Communications, the Office of General Counsel, the Office of the Inspector General, the Office of the Chief Financial Officer, the Office of Enforcement, the Office of Public Affairs, the Office of Investigations, the Office of Information Services, the Office of Administration, and/or other senior managers. For an extended incident requiring long-term staffing of the ET, members of the Team may be relieved by other senior managers as authorized by the Director.

Other Commissioners are kept informed of the incident but are typically not designated as part of the ET. For an extended incident requiring long-term staffing of the ET, other Commissioners may relieve the Chairman as the Director. The staffing and activities of the ET are addressed in an implementing procedure.

4. Headquarters Support Teams

The headquarters support teams provide technical expertise and support to the ET. One team assesses the licensee actions to ensure safety and project future conditions. Another team monitors and independently determines potential radiological exposure to the public and provides assistance to licensees and governmental agencies in determination of public protective measures. Additional teams assess licensee actions to ensure safeguards/security and coordinate security response with law enforcement and intelligence agencies; provide liaison with DHS and other Federal departments/agencies; communicate and coordinate with Federal agencies, State governmental agencies, and other stakeholder organizations; communicate with media representatives and the public; and provide administrative support for the effective functioning of the NRC response organization. The staffing and activities of the support teams are addressed in an implementing procedure.

C. NRC Response Modes

The NRC response is flexible and tailored to the specific incident(s). Predesignated response modes enable the agency to activate response capabilities in a structured manner and focus the agency's response, as appropriate, at the region, headquarters, or incident site. This flexibility permits the NRC response to be commensurate with incident characteristics and severity and with licensee activities. The appropriate response mode is based on the NRC's assessment of incident severity and/or uncertainty. NRC's performance measure in this area is to make a decision regarding the appropriate agency response mode within 30 minutes of receiving initial notification of an incident. The NRC response modes are addressed in an implementing procedure.

The NRC Chairman is the senior authority for all aspects of emergency response. The Chairman becomes the Director of the ET with the authority and the responsibility for leading the agency in responding to emergencies. The Director may call on other Commissioners to provide advice and/or perform key functions.

Certain authorities may be delegated by the Chairman to the Deputy Director of the ET. The Deputy Director, typically the EDO, exercises the delegated authorities unless the Chairman specifically directs otherwise. Together, the Director and Deputy Director assure that planned actions are under way during the response modes and, in addition, identify other necessary actions unique to the particular incident. The headquarters and regional teams carry out those actions.

For an incident at a specific licensed facility, the NRC response mode is determined by consideration of the licensee emergency classification and the NRC's independent assessment of incident conditions. (Table 1, Part A, identifies and describes licensee emergency classes for nuclear power plants, as excerpted from NUREG-0654, Rev. 1 (Reference 6). Table 1, Part B, describes emergency classes for gaseous diffusion plants, regulated under 10 CFR Part 76, and facilities regulated under 10 CFR Part 30 (byproduct material), 10 CFR Part 40 (source material), and 10 CFR Part 70 (special nuclear material), as excerpted from the respective parts of 10 CFR.) The NRC response mode for other types of incidents (e.g., a transportation incident involving regulated material, regional electric grid incident affecting multiple licensed facilities, large-scale natural disaster, national-level domestic threat, and/or terrorist threat/attack *not* focused at a specific facility) is determined by the NRC's independent assessment of the aggregate of available incident-related information, including information from licensees and other sources.

The NRC's deactivation of activated response capabilities and, if applicable, participation in recovery activities are performed in a structured manner but are flexible and tailored to the specific incident(s). Deactivation includes activities such as collecting incident-related information and records, identifying and assigning post-incident activities and investigations, resupply of expended response consumables, addressing personal needs of response personnel, and developing lessons learned. Recovery may include radiological cleanup activities in accordance with mechanisms of the National Response Plan and the development, coordination, and execution of restoration plans for impacted communities. Deactivation and recovery are addressed in an implementing procedure.

1. NORMAL Mode

The routine (i.e., normal) state of NRC operations includes all activities designed to maintain incident response readiness (e.g., 24/7 staffing by HOOs/HEROs). In addition, the NRC is poised to respond at its alternate Continuity of Operations (COOP) site. The regional offices are prepared to back up each other and headquarters. When warranted (e.g., during National Special Security Events), the NRC may dispatch staff to the HSOC and other sites to enhance coordination and communications.

2. MONITORING Mode

The NRC escalates to the MONITORING mode, a heightened state of readiness for incident assessment, upon decision by designated headquarters and regional managers. For a facility-specific or region-specific incident, the responsible regional office has the lead for agency response and appropriately staffs its incident response center. Headquarters supports the region and may have specific individuals participating in monitoring and/or analysis activities, but the HOC is not staffed and activated.

The NRC may escalate to the MONITORING mode for situations that are not facility or region-specific (e.g., natural phenomena involving multiple licensees, multi-region electric grid incident, international incident, terrorism-related incidents). For such situations, headquarters has the lead for agency response and the regions provide appropriate support. Figure 1 illustrates the role of headquarters and regional offices for the MONITORING mode.

3. ACTIVATION Mode

The NRC escalates to the ACTIVATION mode if an incident is sufficiently complex or uncertain that it warrants extensive analysis and evaluation by the agency, if it warrants consideration for sending an NRC site team to the vicinity of the incident, or if the incident involves terrorist activities. In the ACTIVATION mode, the lead for agency response shifts from the region to headquarters. The HOC is activated with partial staffing by the support teams under the leadership of a partially-staffed ET. For a facility-specific or location-specific incident (e.g., a transportation incident), the responsible regional office continues staffing of its incident response center and may prepare a site team to travel to the licensee's site or the location of the incident. Headquarters and the regional office maintain continuous communication, evaluate available information, make appropriate notifications, and prepare for escalation of response should it be necessary. Other regional offices provide appropriate support. Figure 2 illustrates the role of headquarters and regional offices for the ACTIVATION mode.

4. EXPANDED ACTIVATION Mode

The NRC escalates to the EXPANDED ACTIVATION mode if the incident severity and/or situation uncertainty warrants the full response capabilities of the NRC. EXPANDED ACTIVATION may be initiated in response to a facility-specific incident at a licensee's site, incident(s) involving multiple licensees' facilities, terrorist attack or other incidents in which the full capabilities of the NRC are needed to support the overall Federal response. Headquarters typically continues to lead the agency's response in the EXPANDED ACTIVATION mode. The ET Director leads the agency response and the HOC is activated with full staffing by the ET and support teams. Team membership is tailored to the specific incident. The regional office incident response center is fully staffed and, if appropriate, staffing is adjusted to accommodate a site team. Other regional offices may partially staff their incident response centers or provide resources and/or personnel to the NRC site team. Figure 3 illustrates the role of headquarters and regional offices for the EXPANDED ACTIVATION mode.

The EXPANDED ACTIVATION mode may involve dispatch of an NRC site team to the licensee's site or the vicinity of an incident under the leadership of the Regional Administrator or designee. The Site Team Director is delegated specific authorities from the ET Director to lead NRC response activities. The focus of NRC response is at the incident site and the site team may have the lead for most of the agency response. At the site, the Site Team Director assumes supervision of NRC personnel, represents NRC in interactions with other agencies (e.g., represents the NRC locally as Coordinating Agency or Cooperating Agency), and decides what response actions must be taken, consistent with the delegated authority. The ET Director retains any authority not specifically delegated to the Site Team Director. Figure 4 illustrates the role of the site team, headquarters, and regional offices during EXPANDED ACTIVATION.

D. NRC External Coordination

1. Licensees

For incidents involving facilities and/or materials licensed by the NRC or an Agreement State, the NRC continually interfaces and coordinates with the licensee. The NRC relies upon the licensee for providing the initial notification of an incident or potential incident in accordance with NRC regulations and guidance (see Section IV.A.3). Following the initial notification, the NRC may establish and maintain a continuous communications link with the licensee via the Federal Telecommunications System (FTS) telephone lines and/or other means. In addition, if appropriate, the NRC may dispatch a site team to the incident site.

2. State, Local, and Tribal Governments

a. Protective Action Recommendations

For incidents involving facilities and/or materials licensed by the NRC or an Agreement State, the NRC coordinates with State and, as appropriate, local/tribal authorities. These offsite authorities have responsibilities for deciding what public protective actions are to be implemented. A major emphasis in the NRC incident response is providing offsite authorities with an evaluation of license protective action recommendations that represent the position of the Federal Government. In order to effectively perform this task, NRC establishes communication channels with government officials (e.g., the Governor's office, emergency management agencies, and radiological health organizations) at both the headquarters and regional levels. The NRC typically coordinates such communications with DHS.

b. Incident Command System

State/local/tribal government agencies, consistent with implementation of the NIMS, use the incident command system as the organization structure for their response to an incident. As such, these agencies may establish and/or support multi-agency coordination centers (e.g., emergency operations centers (EOCs) and incident command posts).

For incidents involving facilities and/or materials licensed by the NRC or an Agreement State and consistent with the need for interagency coordination, the NRC may provide NRC representatives to the multi-agency coordination center(s). Staffing for the representative(s) is provided by the respective regional office with headquarters and other regional offices providing backup personnel to support shift-work and/or long-term activities. The NRC representative(s) interfaces with the representatives of other agencies/organizations and coordinates NRC activities via communication with the region, headquarters, and, if established, the NRC Site Team.

3. Department of Homeland Security

NRC coordination and interactions with DHS regarding incident response may occur at multiple levels over an extended period of time and involve both headquarters and regional personnel. Figure 5 illustrates overall NRC interface with DHS and Figure 6 illustrates NRC interface within the multiagency coordination system.

a. Homeland Security Operations Center

Homeland Security Operations Center (HSOC)
The HSOC, located at DHS headquarters, serves as the primary national-level hub for operational communications and information pertaining to domestic incident management. The HSOC is a standing 24/7 interagency organization fusing law enforcement, national intelligence, emergency response, and private sector reporting. It facilitates homeland security information-sharing and operational coordination with other Federal, State, local, tribal, and non-governmental emergency response organizations.

National Response Coordination Center (NRCC)
The NRCC, a component of the HSOC located at FEMA headquarters, is a multiagency center that provides overall Federal response coordination for Incidents of National Significance. The NRCC supports the efforts of regional and field components and, during an incident, may operate on a 24/7 basis with staffing by representatives from Federal departments/agencies associated with the Emergency Support Function Annexes.

NRC Information Reporting
The NRC reports incident-related information to the HSOC through execution of an implementing procedure. The HOO/HERO notifies the HSOC upon notification that a licensee has declared an event (to include facility events, significant transportation events, or events that occur in the field or at industrial sites). The threshold for such notifications is below the minimum reporting threshold mandated by DHS (i.e., actual or potential Incident of National Significance). If the NRC transitions to a response mode, additional notifications are made to the HSOC. Incident updates are reported to entities that were part of the initial notification process and, therefore, the HSOC is informed of interactions between the NRC and other Federal agencies, State, local, and tribal governments, and private/non-government entities.

NRC Staffing
The NRC and other Federal departments/agencies provide staff-level representation to the HSOC in order to integrate a spectrum of interagency subject matter expertise and reach-back capability to meet the demands of a wide range of potential incidents. Many agencies support the HSOC on a routine basis by shift staffing; however, the NRC and other selected agencies provide HSOC support as warranted on a situational basis. Headquarters provides staff-level technical liaisons to the HSOC as provided in an implementing procedure. The liaison, as necessary, also serves as the agency's representative to the NRCC.

b. Incident of National Significance

The Secretary of Homeland Security, in consultation with other departments and agencies as appropriate, determines whether an incident is an Incident of National Significance. The criteria for an Incident of National Significance derive from HSPD-5 and are generally qualitative (e.g., resources of State and local /tribal authorities are overwhelmed; threats or incidents related to high-profile, large-scale events present high-probability targets such as National Special Security Events (NSSEs); and the President directs the Secretary of Homeland Security to assume responsibility for managing an incident).

The NRC staff and DHS have developed the following definitive criteria for an Incident of National Significance involving radiological facilities or materials licensed by the NRC or an Agreement State (Reference 7):

<u>Nuclear Power Plants</u>
For radiological incidents at nuclear power plants, the criteria for an Incident of National Significance typically correlate with the licensee emergency classification scheme.

- The following would likely be considered Incidents of National Significance:
    - General Emergency declaration at a nuclear power plant resulting from an "accident" (i.e., non-terrorist incident) due to natural disaster, equipment failure, operator errors, etc.
    - General Emergency, Site Area Emergency, or Alert declaration at a nuclear power plant resulting from a terrorist incident.
- The following would likely be considered <u>below</u> the threshold for an Incident of National Significance:
    - Site Area Emergency, Alert, or Unusual Event declaration at a nuclear power plant resulting from an "accident" (i.e., non-terrorist incident) due to natural disaster, equipment failure, operator errors, etc.

<u>Facilities/Materials</u>
For radiological incidents involving facilities (other than nuclear power plants) or materials licensed by the NRC or an Agreement State, the criteria for an Incident of National Significance generally correlate with the above nuclear power plant criteria with respect to radiological source term magnitude and potential impact on public health and safety.

- The following would likely be considered Incidents of National Significance:
    - Facilities (other than nuclear power plants): Alert or higher emergency class declaration resulting from a terrorist incident.
    - Materials (i.e., incidents outside nuclear/radiological facility boundaries): Terrorist incidents involving an improvised nuclear device (IND), radiological dispersal device (RDD), and/or radiological exposure device.

- The following would likely be considered <u>below</u> the threshold for an Incident of National Significance:

  - Facilities (other than nuclear power plants): Any "accident" (i.e., non-terrorist incident) due to natural disaster, equipment failure, operator errors, etc.

  - Materials (i.e., incidents outside nuclear/radiological facility boundaries): Any "accident" (i.e., non-terrorist incident) due to natural disaster, equipment failure, operator errors, etc.

c. Interagency Incident Management Group

<u>Interagency Incident Management Group (IIMG)</u>
The IIMG is convened during Incidents of National Significance and periods of heightened national alert as requested by the Secretary of Homeland Security. The IIMG, located at DHS headquarters, provides policy-level support to the Secretary and other national authorities. It consists of management-level, senior representatives from DHS components, other selected Federal departments/agencies, and selected State/local/tribal agencies. IIMG members officially represent, and provide time-sensitive reach-back to, their respective agencies.

<u>NRC Staffing</u>
In coordination with DHS, NRC headquarters provides qualified managers at the Senior Executive Service (SES) level as representatives to the IIMG as specified in an implementing procedure. The NRC's representative coordinates with the representatives of other departments/agencies and provides reach-back to headquarters.

d. Principal Federal Official and Joint Field Office

<u>Principal Federal Official (PFO) and Joint Field Office (JFO)</u>
The PFO and JFO are established as part of the DHS-coordinated Federal response to an Incident of National Significance. The PFO is the Federal official designated by the Secretary of Homeland Security to act as his/her representative *locally* to oversee, coordinate, and execute the Secretary's incident management responsibilities under HSPD-5. The PFO is typically located at the JFO and *coordinates* the activities of the Federal officials involved in incident management activities acting under their own authorities. In addition, the PFO provides a channel for communicating with the media and the public about the incident. The PFO does *not* direct or replace the incident command structure and does not have directive authority over Federal/State officials, including the NRC Site Team, who retain their authorities as defined in existing statutes and directives.

The JFO, a temporary Federal facility established to coordinate Federal assistance to the affected jurisdiction(s), provides a central location for Federal, State, local, tribal, non-governmental, and private-sector organizations with primary responsibility for incident support and coordination. The JFO focus is providing support to on-scene efforts and conducting broad support operations beyond the incident site. The JFO is intended to combine, within a single Federal facility, the traditional functions of the FBI Joint Operations Center (JOC), the FEMA Disaster Field Office, and, in some situations, joint information centers (JICs).

The JFO utilizes the scalable organizational structure of the NIMS and the organization adapts to the magnitude and complexity of the incident. The Coordination Group manages JFO activities and consists of the PFO, Senior Federal Law Enforcement Officer, Federal Coordinating Officer, Senior Federal Officials with jurisdictional responsibility or functional authority, selected State/local/tribal officials, and appropriate private-sector representatives. The Senior Federal Officials, including the Senior NRC Official if provided, use the existing authorities, expertise, and capabilities of their respective departments/agencies to assist in incident management in coordination with other members of the Coordination Group.

NRC Staffing

The NRC, as Coordinating Agency under the Nuclear/Radiological Incident Annex and Supporting (Cooperating) Agency under other NRP annexes, supports the JFO structure with staffing appropriate to the specific incident. The NRC may staff the Senior NRC Official position to participate in the Coordination Group and provide additional technical staff to support the Senior NRC Official. JFO staffing is typically provided by the respective Regional Office with Headquarters and other Regional Offices providing backup personnel to support shift work and/or long-term activities. NRC staffing to the JFO is addressed in an implementing procedure. Figure 7 illustrates NRC interface within the JFO.

e. Federal Emergency Management Agency

DHS/FEMA, in consultation with the Coordinating Agency, coordinates the provision of Federal resources and assistance to affected State/local/tribal governments under the Stafford Act. In addition, DHS/FEMA maintains integrated, coordinated information regarding the status of all resource support activities.

The NRC, as Coordinating Agency, interfaces with FEMA regarding issues/activities related to the Stafford Act. The NRC, as a Cooperating Agency, may interface with FEMA regarding provision of NRC technical assistance and support for the incident.

4. Federal Interagency Assets

Federal interagency assets for a nuclear/radiological incident are available upon request by the Coordinating Agency or DHS. The NRC may access and/or contribute to these assets.

a. Interagency Modeling and Atmospheric Assessment Center (IMAAC)

The IMAAC, is the Federal center responsible for providing hazardous materials, atmospheric dispersion modeling, and health effect predictions during an Incident of National Significance. Under DHS coordination, IMAAC generates the *single* Federal prediction of atmospheric dispersion and consequences utilizing the best available resources from the Federal Government. IMAAC products are to be recognized for single utilization by Federal agencies and for distribution to all levels of government and to local responders.

The NRC, for a radiological incident involving a NRC-licensed facility, uses the agency-developed radiological assessment tools and methodologies to independently generate a source term and dose assessment based on facility or event conditions and other data supplied by the licensee in accordance with an implementing procedure.

As Coordinating Agency, the NRC shares source term information with IMAAC and uses IMAAC capabilities to confirm and/or modify the NRC assessments. IMAAC supports the NRC and develops dose assessments, using the source information, to provide confirmation and overall refinement using the NRC source term and dose assessment calculations. When available, IMAAC results are compared to those obtained by the NRC and licensee. As Coordinating Agency, the NRC may request/coordinate data from the IMAAC, and coordinate the release of these data to other government agencies.

b. Advisory Team for Environment, Food, and Health

The Federal Advisory Team develops coordinated advice and recommendations concerning environmental, food health, and animal health matters for use by DHS, the JFO Coordination Group, the Coordinating Agency, and State/local/tribal governments. The Advisory Team includes representatives from DHS, EPA, USDA, Food and Drug Administration (FDA), Centers for Disease Control and Prevention, and other Federal agencies.

As Coordinating Agency, the NRC is a member of the Advisory Team and coordinates the composition and activities of the Advisory Team in accordance with an implementing procedure. As a Cooperating Agency, the NRC may participate as a member of the Team as requested by the Coordinating Agency.

c. Federal Radiological Monitoring & Assessment Center

The FRMAC is established at or near the incident location in coordination with DHS, the Coordinating Agency, other Federal agencies, and State/local/tribal authorities. DOE is responsible for developing and maintaining FRMAC policies and procedures, determining FRMAC composition, and maintaining FRMAC operational readiness. A FRMAC normally includes representation from DOE, EPA, Department of Commerce, National Communications System, U.S. Army Corps of Engineers, and other Federal agencies as needed. DOE coordinates radiological monitoring and assessment activities during the initial phases of incident response and typically transfers this responsibility to EPA during the recovery process.

As Coordinating Agency, the NRC provides representation to the FRMAC and coordinates FRMAC activities as provided in an implementing procedure. As a Cooperating Agency, the NRC may provide representatives to the FRMAC at the request of the Coordinating Agency.

d. Radiological Assistance Program (Department of Energy - DOE)

The DOE maintains Radiological Assistance Program (RAP) teams at DOE field locations as a first-responder resource to assess, evaluate, and mitigate the hazards of a radiological incident. The NRC, or other Federal agency or State, may acquire RAP team assistance on a 24/7 basis via request to DOE.

e. Other Interagency Assets

The NRC, as Coordinating Agency, may access additional nuclear/radiological Federal assets as provided in the Nuclear/Radiological Incident Annex to the NRP. Examples include the Aerial Measurement System (AMS) to provide wide-area radiation monitoring; the Radiation Emergency Assistance Center/Training Site (REAC/TS) to provide medical assistance, advisory teams, and training related to nuclear/radiological incidents; and the Accident Response Group (ARG) for response to an incident involving U.S. nuclear weapons.

5. The White House

As the Coordinating Agency, the NRC in concert with DHS will provide incident-related information to the White House for Incidents of National Significance and other significant events. In addition, the NRC may interface and coordinate with the White House through the HSC and/or the National Security Council (NSC) regarding interagency policy-level issues and courses of action. Interface with White House and/or the HSC/NSC typically involves the Chairman or his/her designee.

6. Congress

As the Coordinating Agency, the NRC in concert with DHS may provide incident-related information to Congress. For example, members of Congress will be informed about significant events involving facilities or materials in their States and districts. Such interface is typically coordinated by the Office of Congressional Affairs (OCA).

7. International Organizations

As the Coordinating Agency, the NRC in concert with DHS, informs and coordinates with the Department of State (DOS) for an incident with actual or potential foreign impact. Although DOS is responsible for official interactions with foreign governments, NRC has bilateral agreements with governments and organizations (e.g., Canada Nuclear Safety Commission, International Atomic Energy Agency) that permit direct interface and exchange of information. Such interface is typically coordinated by the Office of International Programs (OIP).

8. Public/Media

As the Coordinating Agency, the NRC in concert with DHS, provides incident-related information to the public. At the Federal level, communication with the public is accomplished in accordance with procedures outlined in annexes to the NRP (ESF #15, External Affairs, and the Public Affairs Support Annex). NRC's interface with the media and release of information to the public is coordinated by the OPA and may include the News Center, JIC in the vicinity of the licensee's site, and/or a DHS-coordinated Joint Information Center integral with the JFO.

E. Continuity of Operations (COOP) Planning

This Plan sets forth the agency's incident response and emergency decisionmaking functions when normal facilities and equipment are available. These important functions are a subset of the agency's minimum essential functions. The NRC Plan for COOP (Reference 8) describes the agency's minimum essential functions and the comprehensive and effective program to ensure that capabilities exist to continue these minimal essential functions, uninterrupted, across a wide range of potential emergencies and disruptions, including loss of normal facilities and equipment.

This Plan may be activated under the umbrella of the agency's COOP. Available members of Headquarters senior management and others will form a COOP Management Team to address interagency coordination at the headquarters level, restoration of operations, and other functions (additional to the minimum essential functions) that may arise in a COOP emergency.

Each Federal department/agency must contribute to the national capability by maintaining a COOP plan that provides for continuity of its minimum essential functions. Continuity of Government (COG) provides for continuity at the next level, the executive branch, by coordinating department and agency COOP plans to meet the Federal Government's policy goals. Although NRC is a participant in COG activities, the COG plan is maintained at the executive branch level.

VI. INCIDENT RESPONSE MANAGEMENT and ADMINISTRATION

The NRC Incident Response Program integrates the overall NRC capabilities associated with the planning and preparation for, response to, and recovery from radiological incidents and/or emergency events. The program, focused on incidents involving nuclear/radiological facilities and materials licensed by the NRC or an Agreement State, encompasses all incidents in which the NRC has a response role under its statutory authority or as part of the overall response of the Federal Government.

The program is maintained in coordination with the NRC's licensees and other stakeholders.

A. Authorities and Responsibilities

1. Management Directive 8.2

Management Directive 8.2, NRC Incident Response Program, and the associated Handbook 8.2 specify agency policy, the organizational roles/responsibilities of headquarters and regional offices, and the positional authorities and responsibilities relative to the program.

2. Office of Nuclear Security and Incident Response (NSIR)

NSIR is responsible for the management and administration of the NRC Incident Response Program. NSIR responsibilities include the following:

(1) Develop and maintain agency plans, program requirements, and procedures for planning, preparedness, response and recovery related to incidents. Ensure the NRC response to incidents is consistent with the agency's role and responsibilities and is coordinated with the DHS, other Federal/State activities, and licensees.

(2) Develop, maintain, and integrate agency plans, program requirements, and procedures for response to incidents that threaten the continuity of government (COG) or COOP.

(3) Develop, maintain, and administer the agency personnel qualification program related to incident response.

(4) Manage the HOC. Receive, screen, and promptly communicate operational event information reported to the center.

(5) Conduct and coordinate exercises with licensees and Federal/State/local/tribal entities to achieve and test readiness objectives.

(6) Oversee the regional incident response program. Provide guidance to regional offices and assess regional office response capabilities.

(7) Conduct outreach and communication activities with licensees, Agreement States, and other stakeholders.

(8) Conduct investigations of significant operational events involving facilities or materials licensed by the NRC.

(9) Perform programmatic oversight of the agency's Incident Response Program. Chair a joint headquarters/regional oversight committee and ensure performance of periodic assessments and continual improvements to the agency's program.

B. Plan, Procedures, and Agreements

This Plan reflects the policy and organizational responsibilities set forth in Management Directive 8.2. It governs the overall NRC response to incidents and assigns responsibilities to assure that the agency fulfills its statutory mission relative to incident response. The implementing procedures, separate from this Plan, document the specific functions and responsibilities and contain the detailed information for response teams and personnel to implement and carry out the provisions of the Plan. Appendix C lists the implementing procedures.

1. Headquarters Implementing Procedures

NSIR is responsible for developing, managing, and administering the headquarters implementing procedures. The implementing procedures are generally organized to correlate with the structure, functions, and responsibilities of the Headquarters response teams. Several implementing procedures address functions of the HOC and these procedures are integrated with other procedures utilized by the NRC's incident response organization.

2. Regional Implementing Procedures

Standardized regional implementing procedures are applicable to all regional offices. NSIR is responsible for developing, managing, and administering these procedures. Some procedures (e.g., State/local/tribal interfaces, COOP activities) vary among the regions and some procedures (e.g., hurricane response) are not applicable to all regions. The respective regional offices, under the guidance and oversight of NSIR, are responsible for developing, managing, and administering these region-specific procedures

3. Memoranda of Agreement/Understanding (MOA/MOU)

In addition to Management Directive 8.2, this Plan, and the associated implementing procedures, the NRC may establish MOA/Memoranda of Understanding (MOU) with other Federal departments/agencies to provide support or services relating to the NRC's Incident Response Program. Where appropriate, commitments to be fulfilled by NRC will be addressed in implementing procedures. These Memoranda will be maintained and periodically reviewed to assure that they meet current program needs.

4. Document Management

a. Current/Superseded Documents

Revision 4 (April 2005) of this Plan supercedes all prior revisions and/or versions. In addition, Revision 4 takes priority over and supercedes all other documents on incident response which contradict Revision 4.

The following documents are superseded upon issuance of Revision 4:

- NUREG/BR-0230, Response Coordination Manual 1996, September 1996
- NUREG-1471, Concept of Operations, February 1994
- NUREG-0845, Agency Procedures for NRC IRP, February 1983

b. Document Maintenance – review/update/distribution

This Plan and the associated implementing procedures are formally reviewed, updated as appropriate, and distributed to Headquarters /Regional offices on a periodic basis in accordance with the document maintenance implementing procedure.

C. Supporting Programs

Associated with the NRC Incident Response Program are a number of "supporting programs" which either directly correlate with, or are an integral part of, the agency's response capabilities. These supporting programs address personnel resources (e.g., notification and training of responders), communications equipment, facility operations/maintenance; response tools (e.g., consequence assessment model), stakeholder outreach, and readiness (e.g., exercises, lessons learned). Documentation associated with supporting programs is included within implementing procedures.

VII. REFERENCES

1. National Response Plan, December 2004
2. National Incident Management System, March 1, 2004
3. NRC Incident Response Program, Management Directive 8.2
4. Homeland Security Presidential Directive 5 (HSPD-5), Management of Domestic Incidents, February 28, 2003
5. Nuclear/Radiological Incident Annex to NRP, December 2004
6. Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, NUREG-0654/FEMA-REP-1, Rev. 1, November 1980
7. Memorandum to the Commission, April 12, 2004, Subject: Results from Nuclear Regulatory Commission and Department of Homeland Security Tabletop Exercise
8. Plan for Continuity of Operations (COOP), USNRC, June 2003

Licensee Emergency Classes

A. Nuclear Power Plants*

Notification of Unusual Event	Alert	Site Area Emergency	General Emergency
Events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.	Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.	Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Any releases are not expected to exceed EPA Protective Action Guideline exposure levels except near the site boundary.	Events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

* "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," NUREG-0654/FEMA-REP-1, Rev. 1, November 1980

B. Regulated Material Facilities and Gaseous Diffusion Plants**

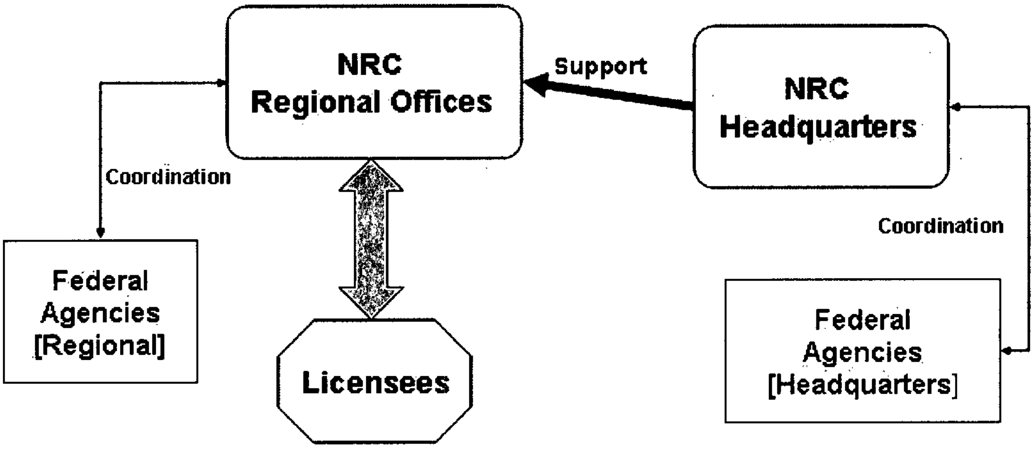
Alert	Site Area Emergency
Events may occur, are in progress, or have occurred that could lead to a release of radioactive material, but the release is not expected to require a response by an offsite response organization to protect persons off site.	Events may occur, are in progress, or have occurred that could lead to a significant release of radioactive material and that could require a response by offsite response organizations to protect persons offsite.

** 10 CFR Part 76, "Certification of Gaseous Diffusion Plants;" 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material;" 10 CFR Part 40, "Domestic Licensing of Source Material;" and 10 CFR Part 30, "Domestic Licensing of Byproduct Material"

Table 1

Monitoring
NRC Response Mode

NRC regional office typically has agency lead for licensee-specific incidents*

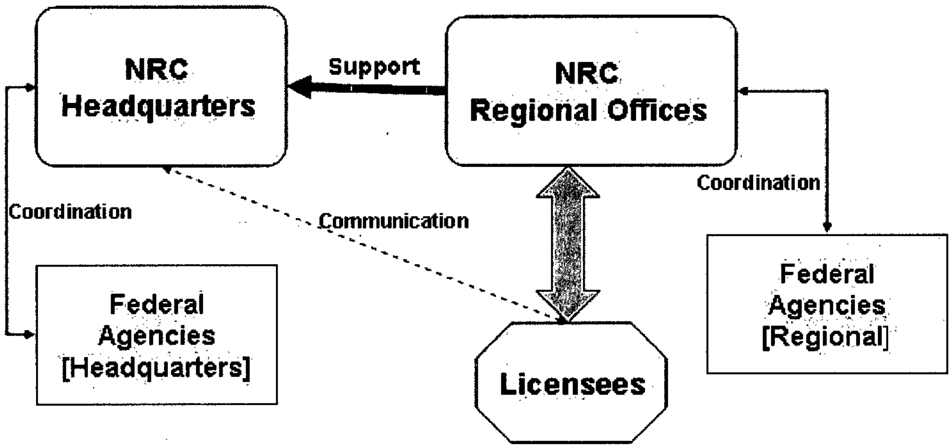


* Headquarters may have agency lead for incidents related to terrorism and/or involving multiple licensees.

Figure 1

Activation
NRC Response Mode

NRC headquarters has agency lead for all types of incidents*



*** For licensee-specific incidents, the Regional Office may prepare and dispatch a NRC site team.**

Figure 2

Expanded Activation (w/o site team)
NRC Response Mode

NRC headquarters has agency lead for all types of incidents*

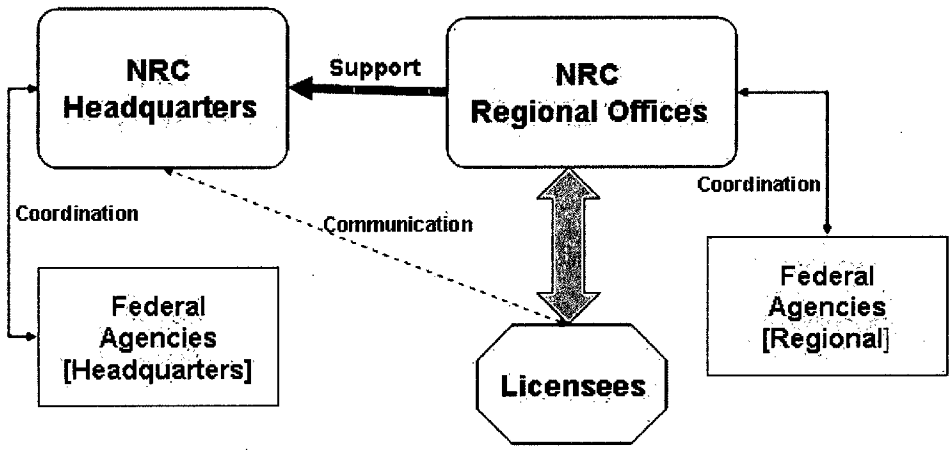
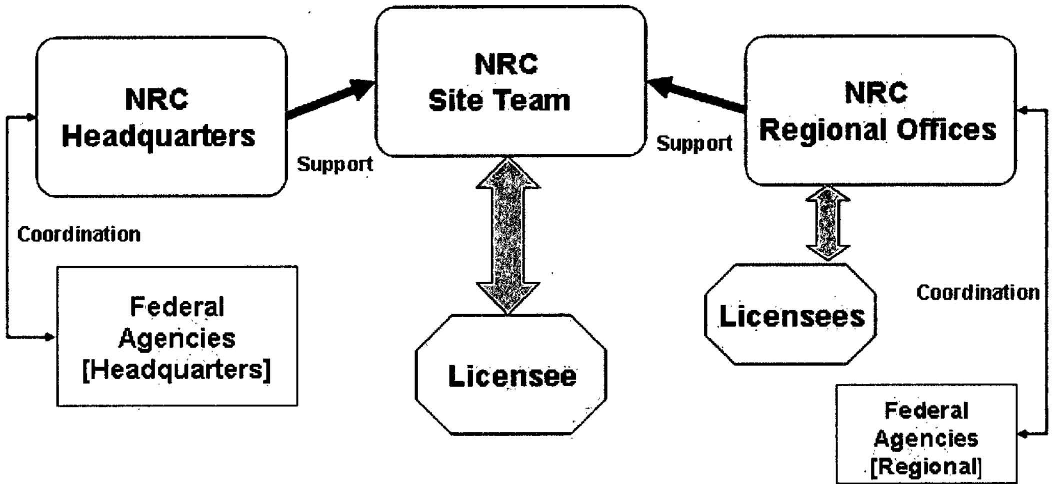


Figure 3

Expanded Activation (with site team)
NRC Response Mode

NRC Site Team is staffed/activated at incident site*



*Headquarters retains authority and agency lead for all decisions/actions not specifically delegated to the Site Team Director.

Figure 4

NRC Interface With Department of Homeland Security

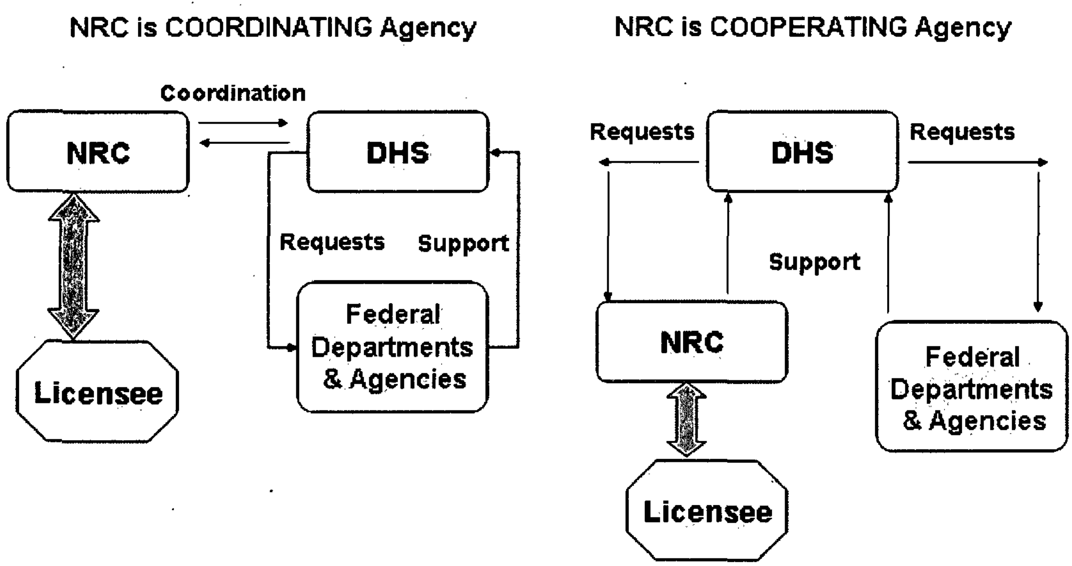


Figure 5

Multiagency Coordination

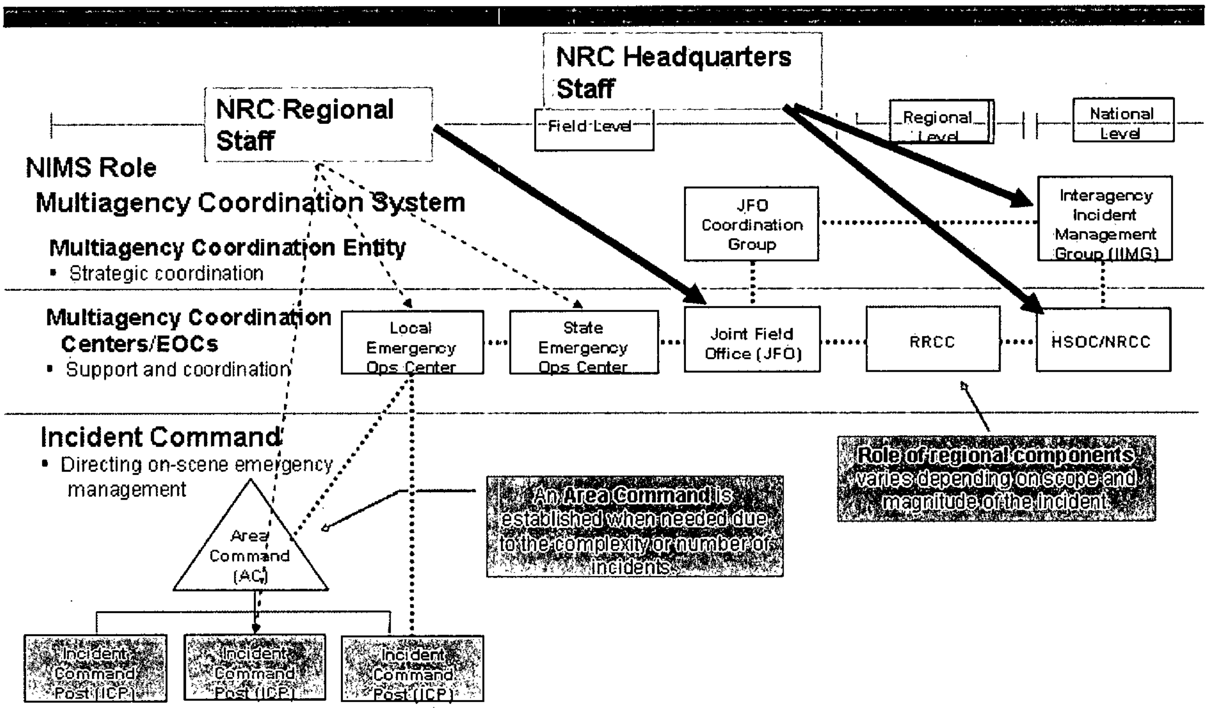


Figure 6

Principal Federal Official/Joint Field Office (PFO/JFO)

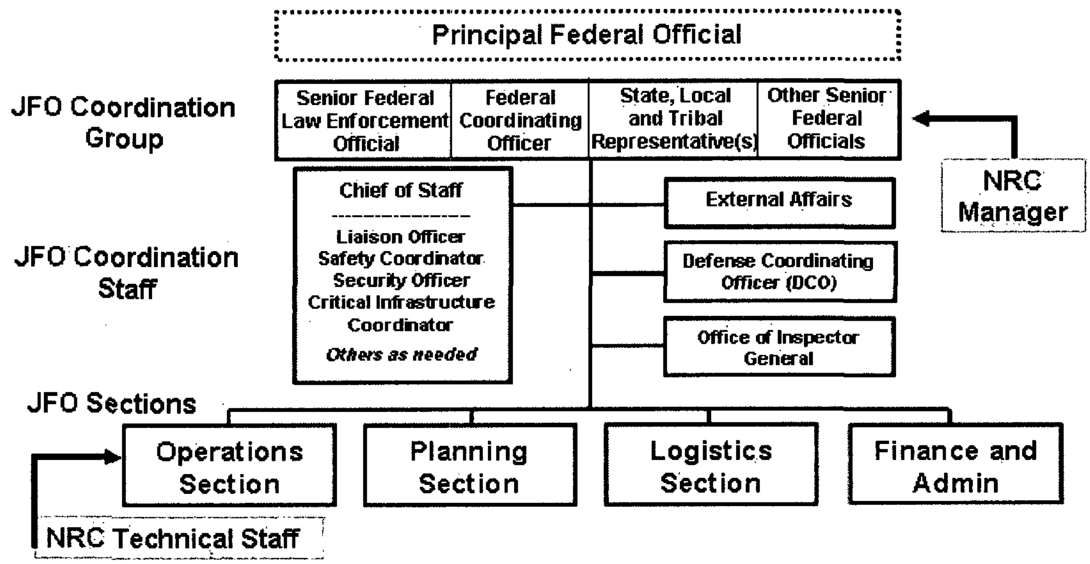


Figure 7

Appendix A[1]

Key Terms and Authorities

The **Atomic Energy Act of 1954,** 42 U.S.C. §§ 2011- 2297 (2003), and the **Energy Reorganization Act of 1974,** 5 U.S.C. §§ 5313-5316, 42 U.S.C. §§ 5801- 5891 (2002), provide the statutory authority for both the DOE and the NRC, and the foundation for NRC regulation of the Nation's civilian use of byproduct, source, and special nuclear materials to ensure adequate protection of public health and safety, to promote the common defense and security, and to protect the environment.

Catastrophic Incident. Any natural or manmade incident, including terrorism, that results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, national morale, and/or government functions. It could result in sustained national impacts over a prolonged period of time; almost immediately exceeds resources normally available to State, local, tribal, and private-sector authorities in the impacted area; and significantly interrupts governmental operations and emergency services to such an extent that national security could be threatened. All catastrophic incidents are Incidents of National Significance.

Chain of Command. A series of command, control, executive, or management positions in hierarchical order of authority.

Consequence Management. Predominantly an emergency management function and included measures to protect public health and safety, restore essential government services, and provide emergency relief to governments, businesses, and individuals affected by the consequences of terrorism. The requirements of consequence management and crisis management are combined in the NRP.

Credible Threat. A potential terrorist threat that, based on a threat assessment, is credible and likely to involve Weapons of Mass Destruction (WMD).

Crisis Management. Predominantly a law enforcement function and included measures to identify, acquire, and plan the use of resources needed to anticipate, prevent, and/or resolve a threat or act of terrorism. The requirements of consequence management and crisis management are combined in the NRP.

Critical Infrastructures. Systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters.

Defense Support of Civil Authorities (DSCA). Refers to DOD support, including Federal military forces, DOD civilians and DOD contractor personnel, and DOD agencies and components, for domestic emergencies and for designated law enforcement and other activities.

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[1]This Appendix consists of excerpted information from the National Response Plan, December 2004.

Emergency. As defined by the Stafford Act, an emergency is "any occasion or instance for which, in the determination of the President, Federal assistance is needed to supplement State and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States."

Emergency Operations Center (EOC). The physical location at which the coordination of information and resources to support domestic incident management activities normally takes place. An EOC may be a temporary facility or may be located in a more central or permanently established facility, perhaps at a higher level of organization within a jurisdiction. EOCs may be organized by major functional disciplines (e.g., fire, law enforcement, and medical services), by jurisdiction (e.g., Federal, State, regional, county, city, tribal), or by some combination thereof.

Emergency Public Information. Information that is disseminated primarily in anticipation of an emergency or during an emergency. In addition to providing situational information to the public, it also frequently provides directive actions required to be taken by the general public.

Emergency Support Function (ESF). A grouping of government and certain private-sector capabilities into an organizational structure to provide the support, resources, program implementation, and services that are most likely to be needed to save lives, protect property and the environment, restore essential services and critical infrastructure, and help victims and communities return to normal, when feasible, following domestic incidents. The ESFs serve as the primary operational-level mechanism to provide assistance to State, local, and tribal governments or to Federal departments and agencies conducting missions of primary Federal responsibility.

Evacuation. Organized, phased, and supervised withdrawal, dispersal, or removal of civilians from dangerous or potentially dangerous areas, and their reception and care in safe areas.

Federal. Of or pertaining to the Federal Government of the United States of America.

Federal Coordinating Officer (FCO). The Federal officer who is appointed to manage Federal resource support activities related to Stafford Act disasters and emergencies. The FCO is responsible for coordinating the timely delivery of Federal disaster assistance resources and programs to the affected State and local governments, individual victims, and the private sector.

Federal On-Scene Coordinator (FOSC or OSC). The Federal official predesignated by the EPA or the USCG to coordinate responses under subpart D of the NCP, or the government official designated to coordinate and direct removal actions under subpart E of the NCP.

Federal Resource Coordinator (FRC). The Federal official appointed to manage Federal resource support activities related to non-Stafford Act incidents. The FRC is responsible for coordinating support from other Federal departments and agencies using interagency agreements and MOUs.

First Responder. Local and nongovernmental police, fire, and emergency personnel who in the early stages of an incident are responsible for the protection and preservation of life, property, evidence, and the environment, including emergency response providers as defined in section 2 of the Homeland Security Act of 2002 (6 U.S.C. 101), as well as emergency management, public health, clinical care, public works, and other skilled support personnel (such as equipment operators) who provide immediate support services during prevention, response, and recovery operations. First responders may include personnel from Federal, State, local, tribal, or nongovernmental organizations.

The **Homeland Security Act of 2002,** Pub. Law 107- 296, 116 Stat. 2135 (2002) (codified predominantly at 6 U.S.C. §§ 101-557 and in other scattered sections of the U.S.C.), established the Department of Homeland Security with the mandate and legal authority to protect the American people from the continuing threat of terrorism. Congress assigned DHS the primary missions to: Prevent terrorist attacks within the United States; Reduce the vulnerability of the United States to terrorism at home; Minimize the damage and assist in the recovery from terrorist attacks that occur; and act as the focal point regarding natural and manmade crises and emergency planning.

Homeland Security Presidential Directive-1: Organization and Operation of the Homeland Security Council, Oct. 29, 2001. This directive establishes policies for the creation of the HSC, which shall ensure the coordination of all homeland security-related activities among executive departments and agencies and promote the effective development and implementation of all homeland security policies.

Homeland Security Presidential Directive-3: Homeland Security Advisory System, March 11, 2002. This directive establishes policy for the creation of a Homeland Security Advisory System, which shall provide a comprehensive and effective means to disseminate information regarding the risk of terrorist acts to Federal, State, and local authorities and to the American people. Such a system would provide warnings in the form of a set of graduated "Threat Conditions" that would increase as the risk of the threat increases. At each Threat Condition, Federal departments/agencies would implement a corresponding set of "Protective Measures" to further reduce vulnerability or increase response capability during a period of heightened alert.

Homeland Security Presidential Directive-5: Management of Domestic Incidents, February 28, 2003, is intended to enhance the ability of the United States to manage domestic incidents by establishing a single, comprehensive national incident management system. In HSPD-5 the President designates the Secretary of Homeland Security as the PFO for domestic incident management and empowers the Secretary to coordinate Federal resources used in response to or recovery from terrorist attacks, major disasters, or other emergencies in specific cases. The directive assigns specific responsibilities to the Attorney General, Secretary of Defense, Secretary of State, and the Assistants to the President for Homeland Security and National Security Affairs, and directs the heads of all Federal departments and agencies to provide their "full and prompt cooperation, resources, and support," as appropriate and consistent with their own responsibilities for protecting national security. HSPD-5 notes that it does not alter, or impede the ability to carry out, the authorities of Federal departments and agencies to perform their responsibilities under law.

Homeland Security Presidential Directive-7: Critical Infrastructure Identification, Prioritization, and Protection, Dec. 17, 2003. This directive establishes a national policy for Federal departments and agencies to identify and prioritize U.S. critical infrastructure and key resources and to protect them from terrorist attacks.

Homeland Security Presidential Directive-8: National Preparedness, Dec. 17, 2003. This directive establishes policies to strengthen the preparedness of the United States to prevent and respond to threatened or actual domestic terrorist attacks, major disasters, and other emergencies by requiring a national domestic all-hazards preparedness goal, establishing mechanisms for improved delivery of Federal preparedness assistance to State and local governments, and outlining actions to strengthen preparedness capabilities of Federal, State, and local entities.

Incident. An occurrence or event, natural or human-caused, that requires an emergency response to protect life or property. Incidents can, for example, include major disasters, emergencies, terrorist attacks, terrorist threats, wildland and urban fires, floods, hazardous materials spills, nuclear accidents, aircraft accidents, earthquakes, hurricanes, tornadoes, tropical storms, war-related disasters, public health and medical emergencies, and other occurrences requiring an emergency response.

Incident Action Plan. An oral or written plan containing general objectives reflecting the overall strategy for managing an incident. It may include the identification of operational resources and assignments. It may also include attachments that provide direction and important information for management of the incident during one or more operational periods.

Incident Command Post (ICP). The field location at which the primary tactical-level, on-scene incident command functions are performed. The ICP may be collocated with the incident base or other incident facilities and is normally identified by a green rotating or flashing light.

Incident Command System (ICS). A standardized onscene emergency management construct specifically designed to provide for the adoption of an integrated organizational structure that reflects the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries. ICS is the combination of facilities, equipment, personnel, procedures, and communications operating with a common organizational structure, designed to aid in the management of resources during incidents.

Incident Commander (IC). The individual responsible for all incident activities, including the development of strategies and tactics and the ordering and release of resources. The IC has overall authority and responsibility for conducting incident operations and is responsible for the management of all incident operations at the incident site.

Incident of National Significance. Based on criteria established in HSPD-5, an actual or potential high-impact event that requires a coordinated and effective response by and appropriate combination of Federal, State, local, tribal, nongovernmental, and/or private-sector entities in order to save lives and minimize damage, and provide the basis for long-term community recovery and mitigation activities.

Infrastructure. The manmade physical systems, assets, projects, and structures, publicly and/or privately owned, that are used by or provide benefit to the public. Examples of infrastructure include utilities, bridges, levees, drinking water systems, electrical systems, communications systems, dams, sewage systems, and roads.

Interagency Modeling and Atmospheric Assessment Center (IMAAC). An interagency center responsible for production, coordination, and dissemination of consequence predictions for an airborne hazardous material release. The IMAAC generates the single Federal prediction of atmospheric dispersions and their consequences utilizing the best available resources from the Federal Government.

Interim Operating Facility (IOF). The IOF is a temporary field facility used by a DHS/EPR/FEMA-led ERT in the early stages of an incident when the team cannot operate at the State EOC due to space limitations or other reasons, and the JFO is not yet established. An IOF is generally located at or near the State EOC, or near the incident site. The IOF remains in operation until the JFO is established.

Joint Field Office (JFO). A temporary Federal facility established locally to provide a central point for Federal, State, local, and tribal executives with responsibility for incident oversight, direction, and/or assistance to effectively coordinate protection, prevention, preparedness, response, and recovery actions. The JFO will combine the traditional functions of the JOC, the FEMA DFO, and the JIC within a single Federal facility.

Joint Information Center (JIC). A facility established to coordinate all incident-related public information activities. It is the central point of contact for all news media at the scene of the incident. Public information officials from all participating agencies should collocate at the JIC.

Joint Information System (JIS). Integrates incident information and public affairs into a cohesive organization designed to provide consistent, coordinated, timely information during a crisis or incident operations. The mission of the JIS is to provide a structure and system for developing and delivering coordinated interagency messages; developing, recommending, and executing public information plans and strategies on behalf of the IC; advising the IC concerning public affairs issues that could affect a response effort; and controlling rumors and inaccurate information that could undermine public confidence in the emergency response effort.

Joint Operations Center (JOC). The JOC is the focal point for all Federal investigative law enforcement activities during a terrorist or potential terrorist incident or any other significant criminal incident, and is managed by the SFLEO. The JOC becomes a component of the JFO when the NRP is activated.

Major Disaster. As defined by the Stafford Act, any natural catastrophe (including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought) or, regardless of cause, any fire, flood, or explosion, in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance under this act to supplement the efforts and available resources of States, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby.

Mission Assignment. The vehicle used by DHS/EPR/FEMA to support Federal operations in a Stafford Act major disaster or emergency declaration. It orders immediate, short-term emergency response assistance when an applicable State or local government is overwhelmed by the event and lacks the capability to perform, or contract for, the necessary work.

Mitigation. Activities designed to reduce or eliminate risks to persons or property or to lessen the actual or potential effects or consequences of an incident. Mitigation measures may be implemented prior to, during, or after an incident. Mitigation measures are often developed in accordance with lessons learned from prior incidents. Mitigation involves ongoing actions to reduce exposure to, probability of, or potential loss from hazards. Measures may include zoning and building codes, flood plain buyouts, and analysis of hazard-related data to determine where it is safe to build or locate temporary facilities. Mitigation can include efforts to educate governments, businesses, and the public on measures they can take to reduce loss and injury.

Multiagency Command Center (MACC). An interagency coordination center established by DHS/USSS during NSSEs as a component of the JFO. The MACC serves as the focal point for interagency security planning and coordination, including the coordination of all NSSE-related information from other intra-agency centers (e.g., police command posts, Secret Service security rooms) and other interagency centers (e.g., intelligence operations centers, joint information centers).

Multiagency Coordination System. Provides the architecture to support coordination for incident prioritization, critical resource allocation, communications systems integration, and information coordination. The components of multiagency coordination systems include facilities, equipment, EOCs, specific multiagency coordination entities, personnel, procedures, and communications. The systems assist agencies and organizations to fully integrate the subsystems of NIMS.

National Counterterrorism Center (NCTC). The NCTC serves as the primary Federal organization for analyzing and integrating all intelligence possessed or acquired by the U.S. Government pertaining to terrorism and counterterrorism, excepting purely domestic counterterrorism information. The NCTC may, consistent with applicable law, receive, retain, and disseminate information from any Federal, State, or local government or other source necessary to fulfill its responsibilities.

National Incident Management System (NIMS). A system mandated by HSPD-5 that provides a consistent, nationwide approach for Federal, State, local, and tribal governments; the private sector; and NGOs to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity. To provide for interoperability and compatibility among Federal, State, local, and tribal capabilities, the NIMS includes a core set of concepts, principles, and terminology.

National Infrastructure Coordinating Center (NICC). Managed by the DHS Information Analysis and Infrastructure Protection Directorate, the NICC monitors the Nation's critical infrastructure and key resources on an ongoing basis. In the event of an incident, the NICC provides a coordinating vehicle to share information with critical infrastructure and key resources information-sharing entities.

National Response Center. A national communications center for activities related to oil and hazardous substance response actions. The National Response Center, located at DHS/USCG Headquarters in Washington, DC, receives and relays notices of oil and hazardous substances releases to the appropriate Federal OSC.

National Response Team (NRT). The NRT, comprised of the 16 Federal agencies with major environmental and public health responsibilities, is the primary vehicle for coordinating Federal agency activities under the NCP. The NRT carries out national planning and response coordination and is the head of a highly organized Federal oil and hazardous substance emergency response network. EPA serves as the NRT Chair, and DHS/USCG serves as Vice Chair.

National Special Security Event (NSSE). A designated event that, by virtue of its political, economic, social, or religious significance, may be the target of terrorism or other criminal activity.

Nongovernmental Organization (NGO). A nonprofit entity that is based on interests of its members, individuals, or institutions and that is not created by a government, but may work cooperatively with government. Such organizations serve a public purpose, not a private benefit. Examples of NGOs include faith-based charity organizations and the American Red Cross.

Nuclear Incident Response Team (NIRT). Created by the Homeland Security Act to provide DHS with a nuclear/radiological response capability. When activated, the NIRT consists of specialized Federal response teams drawn from DOE and/or EPA. These teams may become DHS operational assets providing technical expertise and equipment when activated during a crisis or in response to a nuclear/radiological incident as part of the DHS Federal response.

On-Scene Coordinator (OSC). See **Federal On-Scene Coordinator.**

Preparedness. The range of deliberate, critical tasks and activities necessary to build, sustain, and improve the operational capability to prevent, protect against, respond to, and recover from domestic incidents. Preparedness is a continuous process involving efforts at all levels of government and between government and private-sector and nongovernmental entities to identify threats, determine vulnerabilities, and identify required resources.

Prevention. Actions taken to avoid an incident or to intervene to stop an incident from occurring. Prevention involves actions taken to protect lives and property. It involves applying intelligence and other information to a range of activities that may include such countermeasures as deterrence operations; heightened inspections; improved surveillance and security operations; investigations to determine the full nature and source of the threat; public health and agricultural surveillance and testing processes; immunizations, isolation, or quarantine; and, as appropriate, specific law enforcement operations aimed at deterring, preempting, interdicting, or disrupting illegal activity and apprehending potential perpetrators and bringing them to justice.

The **Price-Anderson Amendments Act of 1988,** Pub.L. No. 100-408, 102 Stat. 1066 (1988) (amending the Atomic Energy Act of 1954 and codified at 42 U.S.C. §§ 2014, 2210, 2273, 2282a (2003)), provides for indemnification of governments and individuals affected by nuclear incidents.

Principal Federal Official (PFO). The Federal official designated by the Secretary of Homeland Security to act as his/her representative locally to oversee, coordinate, and execute the Secretary's incident management responsibilities under HSPD-5 for Incidents of National Significance.

Private Sector. Organizations and entities that are not part of any governmental structure. Includes for-profit and not-for-profit organizations, formal and informal structures, commerce and industry, private emergency response organizations, and private voluntary organizations.

Radiological Emergency Response Teams (RERTs). Teams provided by EPA's Office of Radiation and Indoor Air to support and respond to incidents or sites containing radiological hazards. These teams provide expertise in radiation monitoring, radionuclide analyses, radiation health physics, and risk assessment. RERTs can provide both mobile and fixed laboratory support during a response.

Recovery. The development, coordination, and execution of service and site restoration plans for impacted communities and the reconstitution of government operations and services through individual, private-sector, nongovernmental, and public assistance programs that: identify needs and define resources; provide housing and promote restoration; address long-term care and treatment of affected persons; implement additional measures for community restoration; incorporate mitigation measures and techniques, as feasible; evaluate the incident to identify lessons learned; and develop initiatives to mitigate the effects of future incidents.

Regional Response Teams (RRTs). Regional counterparts to the National Response Team, the RRTs comprise regional representatives of the Federal agencies on the NRT and representatives of each State within the region. The RRTs serve as planning and preparedness bodies before a response, and provide coordination and advice to the Federal OSC during response actions.

Response. Activities that address the short-term, direct effects of an incident. Response includes immediate actions to save lives, protect property, and meet basic human needs. Response also includes the execution of emergency operations plans and of incident mitigation activities designed to limit the loss of life, personal injury, property damage, and other unfavorable outcomes. As indicated by the situation, response activities include: applying intelligence and other information to lessen the effects or consequences of an incident; increased security operations; continuing investigations into the nature and source of the threat; ongoing public health and agricultural surveillance and testing processes; immunizations, isolation, or quarantine; and specific law enforcement operations aimed at preempting, interdicting, or disrupting illegal activity, and apprehending actual perpetrators and bringing them to justice.

The **Robert T. Stafford Disaster Relief and Emergency Assistance Act,** 93 Pub. L. No. 288, 88 Stat. 143 (1974) (codified as amended at 42 U.S.C. §§ 5121- 5206, and scattered sections of 12 U.S.C., 16 U.S.C., 20 U.S.C., 26 U.S.C., 38 U.S.C. (2002)), establishes the programs and processes for the Federal Government to provide disaster and emergency assistance to States, local governments, tribal nations, individuals, and qualified private nonprofit organizations. The Act covers all hazards including natural disasters and terrorist events. The Act includes a process for Governors to request Federal disaster and emergency assistance from the President and for the President to declare a major disaster or emergency.

Senior Federal Official (SFO). An individual representing a Federal department or agency with primary statutory responsibility for incident management. SFOs utilize existing authorities, expertise, and capabilities to aid in management of the incident working in coordination with other members of the JFO Coordination Group.

Subject-Matter Expert (SME). An individual who is a technical expert in a specific area or in performing a specialized job, task, or skill.

Terrorism. Any activity that (1) involves an act that (a) is dangerous to human life or potentially destructive of critical infrastructure or key resources; and (b) is a violation of the criminal laws of the United States or of any State or other subdivision of the United States; and (2) appears to be intended (a) to intimidate or coerce a civilian population; (b) to influence the policy of a government by intimidation or coercion; or (c) to affect the conduct of a government by mass destruction, assassination, or kidnaping.

Threat. An indication of possible violence, harm, or danger.

Unified Command. An application of ICS used when there is more than one agency with incident jurisdiction or when incidents cross political jurisdictions. Agencies work together through the designated members of the Unified Command to establish their designated Incident Commanders at a single ICP and to establish a common set of objectives and strategies and a single Incident Action Plan.

Weapons of Mass Destruction (WMD). As defined in Title 18, U.S.C. § 2332a: (1) any explosive, incendiary, or poison gas, bomb, grenade, rocket having a propellant charge of more than 4 ounces, or missile having an explosive or incendiary charge of more than one-quarter ounce, or mine or similar device; (2) any weapon that is designed or intended to cause death or serious bodily injury through the release, dissemination, or impact of toxic or poisonous chemicals or their precursors; (3) any weapon involving a disease organism; or (4) any weapon that is designed to release radiation or radioactivity at a level dangerous to human life.

Appendix B [2]

Acronyms and Initialisms

CDRG Catastrophic Disaster Response Group
CERCLA Comprehensive Environmental Response, Compensation, and Liability Act
CFO Chief Financial Officer
CONPLAN U.S. Government Interagency Domestic Terrorism Concept of Operations Plan
DCO Defense Coordinating Officer
DEST Domestic Emergency Support Team
DFO Disaster Field Office
DHS Department of Homeland Security
DMAT Disaster Medical Assistance Team
DMORT Disaster Mortuary Operational Response Team
DOC Department of Commerce
DOD Department of Defense
DOE Department of Energy
DOI Department of the Interior
DOJ Department of Justice
DOL Department of Labor
DOS Department of State
DOT Department of Transportation
DRC Disaster Recovery Center
DRM Disaster Recovery Manager
DSCA Defense Support of Civil Authorities
DTRIM Domestic Threat Reduction andIncident Management
EOC Emergency Operations Center
EPA Environmental Protection Agency
EPCRA Emergency Planning and Community Right-to-Know Act
EPR Emergency Preparedness and Response
ERT Environmental Response Team (EPA)
ERT-A Emergency Response Team—Advance Element
ERT-N National Emergency Response Team
ESF Emergency Support Function
ESFLG Emergency Support Function Leaders Group
EST Emergency Support Team
FBI Federal Bureau of Investigation
FCO Federal Coordinating Officer
FEMA Federal Emergency Management Agency
FIRST Federal Incident Response Support Team
FMC Federal Mobilization Center
FOC FEMA Operations Center
FRC Federal Resource Coordinator
FRERP Federal Radiological Emergency Response Plan
FRP Federal Response Plan
GAR Governor's Authorized Representative
GIS Geographical Information System

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[2] This Appendix consists of excerpted information from the National Response Plan, December 2004.

GSA General Services Administration
HHS Department of Health and Human Services
HQ Headquarters
HSAS Homeland Security Advisory System
HSC Homeland Security Council
HSOC Homeland Security Operations Center
HSPD Homeland Security Presidential Directive
IAIP Information Analysis and Infrastructure Protection
IC Incident Command
ICP Incident Command Post
ICS Incident Command System
IIMG Interagency Incident Management Group
IMT Incident Management Team
INRP Initial National Response Plan
IOF Interim Operating Facility
JFO Joint Field Office
JIC Joint Information Center
JIS Joint Information System
JOC Joint Operations Center
JTF Joint Task Force
JTTF Joint Terrorism Task Force
MAC Entity Multiagency Coordinating Entity
MACC Multiagency Command Center
MERS Mobile Emergency Response Support
MOA Memorandum of Agreement
MOU Memorandum of Understanding
NASA National Aeronautics and Space Administration
NAWAS National Warning System
NCP National Oil and Hazardous Substances Pollution Contingency Plan
NCR National Capital Region
NCS National Communications System
NCTC National Counterterrorism Center
NDMS National Disaster Medical System
NEP National Exercise Program
NGO Nongovernmental Organization
NICC National Infrastructure Coordinating Center
NICC National Interagency Coordination Center
NIMS National Incident Management System
NIPP National Infrastructure Protection Plan
NIRT Nuclear Incident Response Team
NJTTF National Joint Terrorism Task Force
NMRT National Medical Response Team
NOAA National Oceanic and Atmospheric Administration
NRC Nuclear Regulatory Commission
NRCC National Response Coordination Center
NRP National Response Plan
NRT National Response Team
NSC National Security Council
NSSE National Special Security Event
NVOAD National Voluntary Organizations Active in Disaster
OSC On-Scene Coordinator

OSHA Occupational Safety and Health Administration
OSLGCP DHS Office of State and Local Government Coordination and Preparedness
PCC Policy Coordination Committee
PDA Preliminary Damage Assessment
PDD Presidential Decision Directive
PFO Principal Federal Official
POC Point of Contact
RCRA Resource Conservation and Recovery Act
RISC Regional Interagency Steering Committee
RRCC Regional Response Coordination Center
RRT Regional Response Team
ROC Regional Operations Center
SAC Special Agent-in-Charge
SAR Search and Rescue
SCO State Coordinating Officer
SFLEO Senior Federal Law Enforcement Official
SFO Senior Federal Official
SIOC Strategic Information and Operations Center
SOG Standard Operating Guideline
SOP Standard Operating Procedure
START Scientific and Technical Advisory and Response Team
TSA Transportation Security Administration
TSC Terrorist Screening Center
US&R Urban Search and Rescue
USACE U.S. Army Corps of Engineers
USCG U.S. Coast Guard
USDA U.S. Department of Agriculture
USSS U.S. Secret Service
VMAT Veterinarian Medical Assistance Team
WAWAS Washington Area Warning System
WMD Weapons of Mass Destruction

Appendix C

NRC Incident Response Plan Implementing Procedures
(Topical Listing)

Headquarters Implementing Procedures

- HOO/HERO Incident Notifications
- Responder Notifications and Team Staffing
- Executive Team
- Headquarters Support Teams
- External Coordination
- Responder Protection and Health/Safety
- Maintenance of Incident Response Documentation
- Qualification of Responders
- Incident Response Facilities/Systems/Equipment
- Communications
- Emergency Response Data System
- Consequence Assessment Models
- Lessons Learned
- Natural Phenomena

Regional Implementing Procedures

- Standardized Regional Implementing Procedures
- Region-specific Implementing Procedures

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OST04 Hoc

From: LIA07 Hoc
Sent: Wednesday, March 16, 2011 8:29 PM
To: OST04 Hoc
Subject: FW: Statement by U.S. Ambassador John V. Roos

WITH Hoc

From: RMTPACTSU_ELNRC [mailto:RMTPACTSU_ELNRC@ofda.gov]
Sent: Wednesday, March 16, 2011 3:52 PM
To: LIA11 Hoc; LIA01 Hoc; LIA07 Hoc; LIA02 Hoc; LIA08 Hoc; Harrington, Holly; McIntyre, David; Burnell, Scott; Marshall, Jane; Grant, Jeffery
Subject: Statement by U.S. Ambassador John V. Roos

Subject: Statement Issued by U.S. Embassy Tokyo

State Department Press Corps:

Following is a statement being issued by U.S. Embassy Tokyo now.

Press Office
U.S. Department of State

U.S. Embassy
Tokyo, Japan

March 16, 2011

Statement by U.S. Ambassador John V. Roos

The United States Nuclear Regulatory Commission (NRC), the Department of Energy and other technical experts in the U.S. Government have reviewed the scientific and technical information they have collected from assets in country, as well as what the Government of Japan has disseminated, in response to the deteriorating situation at the Fukushima Nuclear Power Plant. Consistent with the NRC guidelines that apply to such a situation in the United States, we are recommending, as a precaution, that American citizens who live within 50 miles (80 kilometers) of the Fukushima Nuclear Power Plant evacuate the area or to take shelter indoors if safe evacuation is not practical.

We want to underscore that there are numerous factors in the aftermath of the earthquake and Tsunami, including weather, wind direction and speed, and the nature of the reactor problem that affect the risk of radioactive contamination within this 50 mile (80 km) radius or the possibility of lower-level radioactive materials reaching greater distances.

The U.S. Embassy will continue to update American citizens as the situation develops. U.S. citizens in need of emergency assistance should send an e-mail to JapanEmergencyUSC@state.gov with detailed information about their location and contact information, and monitor the U.S. Department of State website at travel.state.gov.

The United States is continuing to do everything in its power to help Japan and American citizens who were there at the time of these tragic events. To support our citizens there, the Embassy is working around the clock, we have our consular services available 24 hours a day to determine the whereabouts and well-being of all U.S. citizens in Japan and we have offered our Japanese friends includes disaster response experts, search and rescue teams, technical advisers with nuclear expertise and logistical support from the United States military.

YYY/336

Search

Press Releases

Press Release (Mar 17,2011)
March 17th (Thu): Group 1 (Original Schedule: 9:20 - 13:00)

-Blackout Period: Approximately 3 hours (9:20AM - 13:00PM)
-Expected Number of Households: Approximately 2,890,000 customers
-Applicable Region: Chiba pref., Tochigi pref., Saitama pref., Gunma pref., Kanagawa pref.

[Areas] No. is based on each substation's coverage area.

No.A
Kyonan Town, Kamogawa City, Tateyama City, Kimitsu City, Ichihara City, Sodegaura City, Chonan Town, Nagara Town, Minamiboso City, Futtsu City, Mobara City, Kisarazu City

No.B
Sakura City, Otawara City, Nasukarasuyama City, Nasushiobara City, Nakagawa Town, Nasu Town, Yaita City

No.C
Saitama City (Nishi ward), Fujimino City, Sayama City, Sakado City, Shiki City, Tokorozawa City, Niiza City, Kawagoe City, Asaka City, Miyoshi Town, Iruma City, Fujimi City, Wako City

No.D
Yotsukaido City*, Isumi City, Sakura City, Oamishirasato Town, Ichihara City, Chiba City (Inage Ward, Hanamigawa Ward, Wakaba Ward, Chuo Ward, Mihama Ward, Midori Ward), Funabashi City, Ichinomiya Town, Chosei Village, Chonan Town, Nagara Town, Shirako Town, Mutsuzawa Town, Togane City, Yachimata City, Yachiyo City, Mobara City

No.E
Kanna Town, Minano Town, Ogano Town, Chichibu City, Yorii Town, Nagatoro Town, Higashichichibu Village, Yokoze Town, Hanno City, Ogawa Town, Tokigawa Town, Ranzan Town

No.F
Yokosuka City, Yokohama City (Isogo Ward, Sakae Ward, Kanazawa Ward, Konan Ward), Kamakura City, Chigasaki City, Hayama Town, Zushi City, Fujisawa City

No.G
Kamagaya City, Funabashi City, Shiroi City

No.H
Kawasaki City (Saiwai Ward*, Kawasaki Ward*)

No.I
Midori City, Isesaki City, Kiryu City, Tamamura Town, Maebashi City

No.J
Aikawa Town, Kiyokawa Village, Ayase City, Isehara City, Ebina City, Chigasaki City, Atsugi City, Samukawa Town, Zama City, Sagamihara City (Chuo Ward, Minami Ward), Yamato City, Fujisawa City, Hiratsuka City

No.K
Shibukawa City, Maebashi City, Showa Village

No.L
Ayase City, Yokohama City (Sakae Ward, Totsuka Ward, Konan Ward, Izumi Ward), Kamakura City, Chigasaki City, Yamato City, Fujisawa City, Hiratsuka City

•egarding railroad systems, TEPCO is endeavoring to secure continuous supply of electricity. For this reason, rolling blackout may not be implemented in some areas.

*Newly applicable areas due to operations from substations. However, those areas could be out of the target if the network systems change in future.

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From:	LIA07 Hoc
To:	Borchardt, Bill; Virgilio, Martin; Weber, Michael; Jaczko, Gregory; Pace, Patti; Speiser, Herald; Gibbs, Catina; Leeds, Eric
Subject:	Updates to the "Go Books" with the latest information from the Ops Center
Date:	Wednesday, March 16, 2011 2:36:54 PM
Attachments:	USNRC Earthquake-Tsunami Update.031611.1400EDT.docx Talking Points Two Pager.031611.1400EDT.docx ET Chronology 3-16-11 1.22am.pdf Press Release 9.pdf Talking Points 6.pdf

WITH HOC

Please find attached updated information for the "Go Books" provided earlier today.

The updates include:

- The 1400, 3/16/11 Status Update
- The 1400, 3/16/11 Talking Points Two-Pager
- The latest ET Chronology
- The latest NRC Press Release (11-050)
- The latest NRC OPA Talking Points

Please let me know if you have any questions or concerns.

Jim Anderson
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
james.anderson@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

YYY/337

NRC "Talking Points" – Current as of March 16, 2011, 1400 EDT

Reactor Status

- Fukushima Daiichi Units 1 - 6

Unit 1

- Core damage from insufficient cooling water caused by loss of offsite power and onsite diesel generators following tsunami
- Sea water being injected with reported stable cooling
- Primary containment described as "functional"
- Hydrogen explosion from overheated fuel-water reaction damaged reactor building (secondary containment)
- Spent fuel pool level is unknown
- High radiation levels reduced to 600 microsieverts/hr (60 millirem/ hr) at 2:00 am EDT (March 15) at site gate. Site gate is same for each unit.

Unit 2

- Core damage from insufficient cooling water caused by loss of offsite power and onsite diesel generators following tsunami
- Sea water being injected
- Core cooling reported as not stable
- Loud sound near containment building caused concern that containment integrity is not assured
  - Reported at 7:30 AM EDT, March 15, that containment is intact (better than previously thought)
  - NHK cites NISA that there is partial damage to the containment
- Secondary containment: Cut hole to reduce likelihood of hydrogen gas buildup
- Spent fuel pool level is unknown. Possibility of steam/smoke from water boil-off or zirc-water interaction
- High radiation levels reduced to 600 microsieverts/hr (60 millirem/ hr) at 2:00 am EDT (March 15) at site gate. Site gate is same for each unit.

Unit 3

- Core damage from insufficient cooling water caused by loss of offsite power and onsite diesel generators following tsunami
- Sea water being injected with reported stable cooling
- Primary containment described as "functional"
- Hydrogen explosion from overheated fuel-water reaction damaged reactor building (secondary containment)
- Spent fuel pool level is unknown. Possibility of steam/smoke from water boil-off or zirc-water interaction
- High radiation levels reduced to 600 microsieverts/hr (60 millirem/hr) at 2:00 am EDT (March 15) at site gate. Site gate is same for each unit.

Unit 4

- First fire: Generator lube oil fire in reactor building; IAEA reports that fire out at 2200 EDT, March 14.
- High radiation levels reduced to 600 microsieverts/hr (60 millirem/hr)at 2:30 am EDT (March 15) at site gate
- Second fire began 5:45am local time in reactor building. Reports indicate not yet contained. TEPCO determining whether to use helicopter or fire truck to fight fire. Fuel reported uncovered.
- TEPCO reported 30R/hr inside Unit 4 following second fire.
- Reports of hydrogen explosion in Unit 4 due to uncovered fuel in the fuel pool. Secondary containment is destroyed. There is no water in the spent fuel pool and the

pool's ability to retain water is in doubt.

Unit 5

- IAEA reports that water level in the SFP was down 40 cm in 5 hours since 0800 EDT, March 15, 2011. TEPCO plans to use operational diesel generator at Unit 6 to provide water to Unit 5.

Unit 6 stable

- Reactor spent fuel pool level unknown. Heatup reported.

Other Japanese Nuclear Sites:

- Fukushima Daini Units 1 - 4: As of 7:15 am on March 15 (Japan), Tepco press release reports reactors in cold shutdown and offsite power available.
- Onagawa Units 1 - 3: shutdown, stable, turbine building basement fire extinguished.
- Kashiwazaki Kariwa Nuclear Power Station (Advanced Reactors): Units 1, 5, 6, 7: normal operation / Units 2 to 4: regular outage

Protective Action Recommendations

- For Fukushima Daiichi site, Japanese national government issued a protective action recommendation that instructed evacuation for local residents within a 20km radius of the site boundary and sheltering in place out to 30km for residents who stayed behind
- Japan has imposed no-fly zone (30km radius, altitude unlimited) over Daiichi plants.
- A RASCAL run at 06:54AM (EDT) on March 16, 2011 for hypothetical combined core based on the following assumptions: Units 2 & 3 each, 33% core melt & no containment; Unit 4, full core offload 100% melt in the Spent Fuel Pool (SFP) with no roof; wind direction from West Northwest blowing out to the ocean. Results: PAG exceded at 50 miles (80.5 km) with TEDE of 24.0 rem, and CDE thyroid of 130 rem.

Meteorological Conditions:

As of 1100 EDT, March 16, wind direction is from the West and wind speed is between 10-20 mph. This wind direction not expected to change significantly until the next front comes through over the weekend.

General Talking Points

- Based upon the degrading situation at the Daiichi plant, the US NRC recommends that Americans within 50 miles of the Daiichi plant to evacuate the area.
- 6.1 Aftershock near Hamaoka: no damage to reactors
    - 5 reactors: 2 are decommissioned; 1 shutdown; 2 operating
- TEPCO and US Forces in Japan (USFJ) are working together to allocate firefighting and heavy equipment capable of pumping seawater from the ocean into containment.
    - A list of additional equipment to provide for accident mitigation has been developed by NRC and provided to USAID.
- Disaster Assistance Response Team arrived Sunday:
    - 11 NRC staff are in Tokyo with the Ambassador and getting information from Japanese officials.
- NRC continues to develop projections of the accident's progression, dose estimates and Q&As, including those addressing the safety of reactors in operation in the US.
- Government of Japan has accepted US offer to conduct aerial/ground monitoring and also requested potassium iodide tablets. DOE Aerial Measurement Teams are expected to fly over the Daiichi site on March 17 at around 0900 local time (2000 EDT).
- The NRC has been asked to provide recommendations for solutions to the spent fuel pool issues during conference call with NISA and TEPCO.

NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION

Office of Public Affairs Telephone: 301/415-8200
Washington, D.C. 20555-0001
E-mail: opa.resource@nrc.gov Site: www.nrc.gov
Blog: http://public-blog.nrc-gateway.gov

No. 11-050 March 16, 2011

NRC PROVIDES PROTECTIVE ACTION RECOMMENDATIONS BASED ON U.S. GUIDELINES

Under the guidelines for public safety that would be used in the United States under similar circumstances, the NRC believes it is appropriate for U.S. residents within 50 miles of the Fukushima reactors to evacuate.

Among other things, in the United States protective actions recommendations are implemented when projected doses could exceed 1 rem to the body or 5 rem to the thyroid. A rem is a measure of radiation dose. The average American is exposed to approximately 620 millirems, or 0.62 rem, of radiation each year from natural and manmade sources.

In making protective action recommendations, the NRC takes into account a variety of factors that include weather, wind direction and speed, and the status of the problem at the reactors.

Attached are the results of two sets of computer calculations used to support the NRC recommendations.

In response to nuclear emergencies, the NRC works with other U.S. agencies to monitor radioactive releases and predict their path. All the available information continues to indicate Hawaii, Alaska, the U.S. Territories and the U.S. West Coast are not expected to experience any harmful levels of radioactivity.

###

15 March 2010 02:51am (EDT), NRC Operations Center, Protective Measures Team

This data is based on system condition estimates for a hypothetical, single reactor site, 2350 MWt, Boiling Water Reactor. Model results are projections only and may **not** be representative of an actual release. This projection uses modeled forecast meteorological conditions and is subject to change.

Maximum Dose Values (rem) - Close-In

Dist from release								
miles	0.5	1.	1.5	2.	3.	5.	7.	10.
(kilometers)	(0.8)	(1.61)	(2.41)	(3.22)	(4.83)	(8.05)	(11.27)	(16.09)
Total EDE	5.4E+03	2.0E+03	1.2E+03	8.2E+02	4.8E+02	2.4E+02	1.6E+02	9.5E+01
Thyroid CDE	2.8E+04	1.1E+04	6.2E+03	4.3E+03	2.5E+03	1.3E+03	8.4E+02	5.1E+02
Inhalation CEDE	3.7E+03	1.4E+03	8.0E+02	5.6E+02	3.3E+02	1.7E+02	1.1E+02	6.7E+01
Cloudshine	1.9E+01	9.3E+00	5.8E+00	4.1E+00	2.5E+00	1.4E+00	9.7E-01	6.2E-01
4-day Groundshine	1.7E+03	6.5E+02	3.8E+02	2.6E+02	1.5E+02	7.3E+01	4.6E+01	2.8E+01
Inter Phase 1st Yr	2.4E+04	9.4E+03	5.4E+03	3.8E+03	2.2E+03	1.1E+03	6.6E+02	3.9E+02
Inter Phase 2nd Yr	1.1E+04	4.4E+03	2.6E+03	1.8E+03	1.0E+03	4.9E+02	3.1E+02	1.8E+02

Notes:
- Doses exceeding PAGs are underlined.
- Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
- Intermediate-Phase EPA PAGs: 1st year - 2 rem, 2nd year - 0.5 rem
- *** indicates values less than 1 mrem
- To view all values - use Detailed Results | Numeric Table
- Total EDE = Inhalation CEDE + Cloudshine + 4-Day Groundshine

Maximum Dose Values (rem) - To 50 mi

Dist from release					
miles	15	20	30	40	50
(kilometers)	(24.1)	(32.2)	(48.3)	(64.4)	(80.5)
Total EDE	8.6E+01	6.3E+01	3.7E+01	1.8E+01	8.1E+00
Thyroid CDE	3.3E+02	2.7E+02	1.3E+02	5.9E+01	2.3E+01
Inhalation CEDE	3.9E+01	3.1E+01	1.3E+01	4.4E+00	1.3E+00
Cloudshine	4.5E-01	3.8E-01	1.7E-01	7.4E-02	2.7E-02
4-day Groundshine	4.7E+01	3.2E+01	2.4E+01	1.3E+01	6.7E+00
Inter Phase 1st Yr	7.2E+02	4.8E+02	3.8E+02	2.2E+02	1.3E+02
Inter Phase 2nd Yr	3.4E+02	2.3E+02	1.8E+02	1.1E+02	6.9E+01

Notes:
- Doses exceeding PAGs are underlined.
- Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
- Intermediate-Phase PAGs: 1st year - 2 rem, 2nd year - 0.5 rem
- *** indicates values less than 1 mrem
- To view all values - use Detailed Results | Numeric Table
- Total EDE = CEDE Inhalation + Cloudshine + 4-Day Groundshine
- Total Acute Bone = Bone Inhalation + Cloudshine + Period Groundshine

16 March 2010 12:24pm (EDT), NRC Operations Center, Protective Measures Team

This data is based on system condition estimates for a hypothetical, four reactor site. Model results are projections only and may **not** be representative of an actual release. This projection uses modeled forecast meteorological conditions and is subject to change.

Maximum Dose Values (rem) - Close-In

Dist from release miles (kilometers)	0.5 (0.8)	1. (1.61)	1.5 (2.41)	2. (3.22)	3. (4.83)	5. (8.05)	7. (11.27)	10. (16.09)
Total EDE	5.4E+03	1.5E+03	6.7E+02	3.9E+02	1.8E+02	7.5E+01	4.0E+01	1.4E+01
Thyroid CDE	2.9E+04	7.9E+03	3.6E+03	2.1E+03	9.6E+02	4.0E+02	2.1E+02	7.5E+01
Inhalation CEDE	3.8E+03	1.0E+03	4.8E+02	2.8E+02	1.3E+02	5.4E+01	2.9E+01	1.0E+01
Cloudshine	2.2E+01	8.0E+00	3.9E+00	2.3E+00	8.0E-01	2.6E-01	2.1E-01	1.1E-01
4-day Groundshine	1.5E+03	4.1E+02	1.9E+02	1.1E+02	5.0E+01	2.1E+01	1.1E+01	4.3E+00
Inter Phase 1st Yr	2.6E+04	7.0E+03	3.2E+03	1.9E+03	8.5E+02	3.6E+02	1.9E+02	7.5E+01
Inter Phase 2nd Yr	1.3E+04	3.5E+03	1.6E+03	9.2E+02	4.2E+02	1.8E+02	9.5E+01	3.8E+01

Notes:
- Doses exceeding PAGs are underlined.
- Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
- Intermediate-Phase EPA PAGs: 1st year - 2 rem, 2nd year - 0.5 rem
- *** indicates values less than 1 mrem
- To view all values - use Detailed Results | Numeric Table
- Total EDE = Inhalation CEDE + Cloudshine + 4-Day Groundshine

Maximum Dose Values (rem) - To 50 mi

Dist from release miles (kilometers)	15 (24.1)	20 (32.2)	30 (48.3)	40 (64.4)	50 (80.5)
Total EDE	1.5E+01	1.3E+01	1.1E+01	1.0E+01	9.9E+00
Thyroid CDE	8.6E+01	7.0E+01	5.2E+01	4.9E+01	4.8E+01
Inhalation CEDE	1.1E+01	9.2E+00	7.7E+00	7.6E+00	7.3E+00
Cloudshine	1.2E-01	9.7E-02	7.3E-02	7.0E-02	6.6E-02
4-day Groundshine	4.1E+00	3.4E+00	2.8E+00	2.6E+00	2.5E+00
Inter Phase 1st Yr	7.1E+01	6.0E+01	4.7E+01	4.5E+01	4.3E+01
Inter Phase 2nd Yr	3.6E+01	3.0E+01	2.3E+01	2.2E+01	2.1E+01

Notes:
- Doses exceeding PAGs are underlined.
- Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
- Intermediate-Phase PAGs: 1st year - 2 rem, 2nd year - 0.5 rem
- *** indicates values less than 1 mrem
- To view all values - use Detailed Results | Numeric Table
- Total EDE = CEDE Inhalation + Cloudshine + 4-Day Groundshine
- Total Acute Bone = Bone Inhalation + Cloudshine + Period Groundshine

T EDE - Total Effective Dose Equivalent
CDE - Committed Dose Equivalent
CEDE - Committed Effective Dose Equivalent
PAGs – Protective Action Guidelines
EPA – Environmental Protection Agency

OPA

TALKING POINTS

JAPAN NUCLEAR SITUATION

As of 3/16/2011 1:45 p.m. EDT

- Based on calculations performed by NRC experts, we now believe that it is appropriate for U.S. residents within 50 miles of the Fukushima reactors to evacuate. Our recommendation is based on NRC guidelines for public safety that would be used in the United States under similar circumstances.

- The NRC continues to believe, based on all available information, that the type and design of the Japanese reactors, combined with how events have unfolded, will prevent radiation at harmful levels from reaching U.S. territory.

- The Japanese government has formally asked for U.S. assistance in responding to nuclear power plant cooling issues triggered by an earthquake and tsunami on March 11. The NRC has eleven staff on the ground in Japan as part of the USAID team.

- The NRC is coordinating its actions with other federal agencies as part of the U.S. government response. The NRC's headquarters Operations Center was activated at the beginning of the event and has been monitoring the situation on a 24-hour basis ever since.

- The NRC is always looking to learn information that can be applied to U.S. reactors and we will analyze the information that comes from this incident.

- The NRC is working with other U.S. agencies to monitor radioactive releases from Japan and to predict their path.

- Given the results of the monitoring and distance between Japan and Hawaii, Alaska, U.S. Pacific Territories and the U.S. West Coast, the NRC expects the U.S. to AVOID any harmful levels of radioactivity.

- U.S. nuclear power plants are built to withstand environmental hazards, including earthquakes. Even those plants that are located outside of areas with extensive seismic activity are designed for safety in the event of such a natural disaster.

- The NRC requires that safety-significant structures, systems, and components be designed to take into account the most severe natural phenomena historically reported for the site and surrounding area. The NRC then adds a margin for error to account for the historical data's limited accuracy. In other words, U.S. nuclear power plants are designed to be safe based on historical data to predict the area's maximum credible earthquake.

From: Haney, Catherine
To: Walker, Dwight; Dorman, Dan
Subject: Call
Date: Wednesday, March 16, 2011 6:39:25 AM

Dan - give me a call on my cell if you go back to the office.

Dwight-make sure Dan sees this if he returns to the office.

YY/338

From: Haney, Catherine
To: OST04 Hoc
Cc: Walker, Dwight
Subject: RE: Go-books
Date: Wednesday, March 16, 2011 2:55:00 PM

Can you send electronic updates to me and to my Admin asst., Dwight Walker.

From: OST04 Hoc
Sent: Wednesday, March 16, 2011 2:54 PM
To: Haney, Catherine; Sheron, Brian; Johnson, Michael
Subject: Go-books

Shortly, you should be receiving hard copy go-books to support your public outreach efforts. Further updates to the books will be sent electronically. Please identify where you would like your electronic updates to be sent (yourselves, administrative staff, etc.).l

Regards,
Melissa Ralph, NSIR
Melissa.Ralph@NRC.gov
LIA07.hoc@nrc.gov (Operations Center)

YYY/339

From: LIA07 Hoc
To: Borchardt, Bill; Bradford, Anna; Cohen, Shari; Cooper, LaToya; Dyer, Jim; Flory, Shirley; Gibbs, Catina; Haney, Catherine; Hudson, Sharon; Johnson, Michael; Leeds, Eric; Loyd, Susan; Pace, Patti; Schwarz, Sherry; Sheron, Brian; Speiser, Herald; Taylor, Renee; Virgilio, Martin; Walls, Lorena; Weber, Michael
Subject: Update for "Go Books," 0600 3/23/11: Corrected Time Stamp on One Page
Date: Wednesday, March 23, 2011 7:24:07 AM
Attachments: March 23 0600EDT one pager (2) (4).docx

WITH HOC

Please find attached updated information for the "Go Books".

The updates include:

- The 0600 EDT, 03/23/11 One Page: **This Update corrects time stamp.**

Please let me know if you have any questions or concerns.

Yen

Yen Chen
US Nuclear Regulatory Commission
LIA07.HOC@nrc.gov (Operations Center)

YY/340

From:	RST12 Hoc
Sent:	Thursday, March 17, 2011 2:13 AM
To:	tony.ulses@nrc.gov
Subject:	plant status
Attachments:	boarddata.pdf

YYY/341

Japan Earthquake and Tsunami Daiichi

Daiichi Unit 1 (Shutdown)

Core Damage - Yes, reported Cs.
RPV Level Control - Borated Sea Water
Containment - Intact/Prev. Vented
Release - Yes, reported CS

Daiichi Unit 2 (Shutdown)

Core Damage - No Evidence
RPV Level Control - RCIC: TAF + 355
Containment - Heat Up
Release - No evidence

Daiichi Unit 3 (Shutdown)

Core Damage - Uncertain, conflicting level reports
RPV Level Control - HPCI and borated water; TAF + 135
Containment - Intact
Release - No

Status

Unit 1 - Stable
Unit 2 - Monitoring venting
Unit 3 - Level above TAF, HPCI

Critical Safety Functions

Current 03/13/2011 04:20:08 (ET) +1-2 Hours

Reactor Shutdown / Criticality
Core Cooling & Heat Removal
RCS & Reactor Vessel Integrity
Containment Pressure Control
Rad. Confinement & Mitigation

Licensee Event Classification

General and Site Emergency
Evacuation ordered to 20 km
2200 EST March 12

Looking Forward:

Unit 2/3 - Hydrogen issue?
Unit 1 - Injection clogging issues?

Kuritzky, Alan

From: Coyne, Kevin
Sent: Thursday, March 17, 2011 8:55 AM
To: Marksberry, Don; Kuritzky, Alan; Salley, MarkHenry; Beasley, Benjamin; Ott, William; Peters, Sean; Demoss, Gary
Subject: FW: 0700 EDT (March 17, 2011) USNRC Earthquake/Tsunami SitRep
Attachments: NRC Status Update 3-17.11--07.00am.pdf

Fyi...

From: Barclay, Kevin
Sent: Thursday, March 17, 2011 8:52 AM
To: Coyne, Kevin; Ghasemian, Shahram
Subject: FW: 0700 EDT (March 17, 2011) USNRC Earthquake/Tsunami SitRep

At Rob Krseks request.......

From: Pederson, Cynthia
Sent: Thursday, March 17, 2011 6:55 AM
To: All R3 Users
Subject: FW: 0700 EDT (March 17, 2011) USNRC Earthquake/Tsunami SitRep

Please note that this information is "Official Use Only" and is only being shared within the federal family.

Spent fuel pools are currently biggest concern.

From: LIA07 Hoc
Sent: Thursday, March 17, 2011 6:16 AM
To: LIA07 Hoc
Subject: 0700 EDT (March 17, 2011) USNRC Earthquake/Tsunami SitRep

Attached, please find a 0700 EDT situation report from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami on March 17, 2011. **This Update corrects information about the US State Department's actions for employees in Japan.**
Please note that this information is "~~Official Use Only~~" and is only being shared within the federal family.
Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Jim

Jim Anderson
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
james.anderson@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

YYY/342

From: Joosten, Sandy
To: Vietti-Cook, Annette; Brenner, Eliot; Hayden, Elizabeth
Subject: COMGBJ-11-0002
Date: Wednesday, March 23, 2011 8:04:18 AM

The Chairman's COM on NRC Actions Following the Events in Japan has been posted to the NRC's public web site.

Sandy

YYY/343

From:	Couret, Ivonne
To:	Janbergs, Holly; Harrington, Holly; McIntyre, David; Burnell, Scott; Brenner, Eliot; Hayden, Elizabeth; Screnci, Diane; Sheehan, Neil; Uselding, Lara; Dricks, Victor; Chandrathil, Prema; Mitlyng, Viktoria; Hannah, Roger; Ledford, Joey
Subject:	FYI - FW: Air News Release (HQ): CORRECTION: UPDATED - please note the addition of "hundreds of thousands" in the second and sixth paragraphs
Date:	Wednesday, March 23, 2011 7:43:25 AM

FYI – Yesterday's EPA press release correction. Ivonne

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

Visit our online photo gallery. Incorporate graphics and photographs to tell your story!
http://www.nrc.gov/reading-rm/photo-gallery/

2010-2011 Information Digest - Where you can find NRC Facts at a Glance
http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/

From: U.S. EPA [mailto:usaepa@govdelivery.com]
Sent: Tuesday, March 22, 2011 8:45 PM
To: Couret, Ivonne
Subject: Air News Release (HQ): CORRECTION: UPDATED - please note the addition of "hundreds of thousands" in the second and sixth paragraphs

CONTACT:
EPA Press Office
press@epa.gov

FOR IMMEDIATE RELEASE:
March 22, 2011

CORRECTION: UPDATED – please note the addition of "hundreds of thousands" in the second and sixth paragraphs

Radiation Monitors Continue to Confirm That No Radiation Levels of Concern Have Reached the United States

WASHINGTON – During a detailed analysis of four west coast RadNet air monitor filters, the U.S. Environmental Protection Agency (EPA) identified trace amounts of radioactive iodine, cesium, and tellurium consistent with the Japanese nuclear incident. These levels are consistent with the levels found by a Department of Energy monitor last week and are to be expected in the coming days.

EPA's samples were captured by three monitors in California and one in Washington State on Friday, March 18 and sent to EPA scientists for detailed laboratory analysis. The data was reviewed over the

YYY/344

weekend and the analysis was completed Monday night. The radiation levels detected on the filters from California and Washington monitors are **hundreds of thousands** to millions of times below levels of concern.

In addition, last night preliminary monitor results in Hawaii detected minuscule levels of an isotope that is also consistent with the Japanese nuclear incident. This detection varies from background and historical data in Hawaii. This isotope was detected at our fixed monitor in Hawaii, and it is far below any level of concern for human health. The sampling filter from this monitor is being sent to our national radiation lab for further analysis.

In a typical day, Americans receive doses of radiation from natural sources like rocks, bricks and the sun that are about 100,000 times higher than what we have detected coming from Japan. For example, the levels we're seeing coming from Japan are 100,000 times lower than what you get from taking a roundtrip international flight.

EPA is in the process of conducting detailed filter analyses for fixed monitors located in Oregon.

EPA's RadNet filter results for San Francisco, Seattle, Riverside and Anaheim, California detected minuscule quantities of iodine isotopes and other radioactive particles that pose no health concern at the detected levels. Below are the results of the detailed filter analysis. All of the radiation levels detected during the detailed filter analysis are **hundreds of thousands to** millions of times below levels of concern.

All units are in Picocuries per meter cubed.

- Filter results for Anaheim, Calif. found:
  Cesium-137: 0.0017
  Tellurium-132: 0.012
  Iodine-132: 0.0095
  Iodine-131: 0.046

- Filter results for Riverside, Calif. found:
  Cesium-137: 0.00024
  Tellurium-132: 0.0014
  Iodine-132: 0.0015
  Iodine-131: 0.011
- Filter results for Seattle, Wash. found:
  Cesium-137: 0.00045
  Tellurium-132: 0.0034
  Iodine-132: 0.0029
  Iodine-131: 0.013

- Filter results for San Francisco, Calif. found:
  Cesium-137: 0.0013
  Tellurium-132: 0.0075
  Iodine-132: 0.0066
  Iodine-131: 0.068

EPA's RadNet system is designed to protect the public by notifying scientists, in near real time, of elevated levels of radiation so they can determine whether protective action is required. In addition, an analysis of the filters in the monitors can identify even the smallest trace amounts of specific radioactive isotopes.

As part of the federal government's continuing effort to make our activities and science transparent and available to the public, EPA will continue to keep RadNet data available at: http://www.epa.gov/japan2011/

R102

Note: If a link above doesn't work, please copy and paste the URL into a browser.

Note: If a link above doesn't work, please copy and paste the URL into a browser.

View all news releases related to air issues

From: Brenner, Eliot
To: Batkin, Joshua; Hayden, Elizabeth; Loyd, Susan
Subject: RE:
Date: Wednesday, March 23, 2011 7:09:41 AM

At youro convenience.

-----Original Message-----
From: Batkin, Joshua
Sent: Wednesday, March 23, 2011 7:08 AM
To: Hayden, Elizabeth; Brenner, Eliot; Loyd, Susan
Subject: Fw:

Let's chat

Joshua C. Batkin
Chief of Staff
Chairman Gregory B. Jaczko
(301) 415-1820

----- Original Message -----
From: Howard Glaser <Howard.Glaser@exec.ny.gov>
To: Leeds, Eric; R D <RD@exec.ny.gov>; Richard Bamberger <Richard.Bamberger@exec.ny.gov>; Thomas Congdon <Thomas.Congdon@exec.ny.gov>
Cc: Batkin, Joshua
Sent: Wed Mar 23 01:05:05 2011
Subject: RE:

Eric -- just to confirm, yesterday at meetings end we had agreement on 3 things: IP would be the top priority in NRC's seismic review; NRC would share data; and NY could have its people accompany NRC on related inspections. We then reported precisely these things back to Governor and in our statement about the meeting. The Lt. Gov also read verbatim our statement to the Chairman in 2nd phone conversation in the afternoon. So we were a little surprised to see your spokeman's comments that "this is not a serious concern". Your chairman certainly expressed that he thought this was a serious concern, enough so that he would agree to make a personal visit to IP.

"This is really not a serious concern," said NRC spokeswoman Elizabeth Hayden, referring to a new safety review of the Indian Point plant by her agency in the wake of Japan's nuclear crisis.
That is, it's not so serious that it would be started anytime this year, she said. "I know what [Cuomo] said," Hayden explained yesterday, but the NRC's review "won't start until 2012."

Copying the Lt Gov and our director of communications.

Thanks. hg

From: Leeds, Eric [Eric.Leeds@nrc.gov]
Sent: Tuesday, March 22, 2011 5:15 PM
To: Howard Glaser
Cc: Batkin, Joshua
Subject: RE:

Understand the issue - it's not where any of us what to be. I spoke with the Chairman right after LTGOV Duffy. Here's the answer to your question:

1 in 1,000 (10-3) - requires consideration of immediate action.
So Indian Point is in the range of 10-4 (1 in 10,000)- which in accordance with our processes means to continue performing prudent regulatory evaluation.

YYY/345

From:	Batkin, Joshua
To:	Hayden, Elizabeth; Brenner, Eliot; Loyd, Susan
Subject:	Fw:
Date:	Wednesday, March 23, 2011 7:08:26 AM

Let's chat

Joshua C. Batkin
Chief of Staff
Chairman Gregory B. Jaczko
(301) 415-1820

----- Original Message -----
From: Howard Glaser <Howard.Glaser@exec.ny.gov>
To: Leeds, Eric; R D <RD@exec.ny.gov>; Richard Bamberger <Richard.Bamberger@exec.ny.gov>; Thomas Congdon <Thomas.Congdon@exec.ny.gov>
Cc: Batkin, Joshua
Sent: Wed Mar 23 01:05:05 2011
Subject: RE:

Eric -- just to confirm, yesterday at meetings end we had agreement on 3 things: IP would be the top priority in NRC's seismic review; NRC would share data; and NY could have its people accompany NRC on related inspections. We then reported precisely these things back to Governor and in our statement about the meeting. The Lt. Gov also read verbatim our statement to the Chairman in 2nd phone conversation in the afternoon. So we were a little surprised to see your spokeman's comments that "this is not a serious concern". Your chairman certainly expressed that he thought this was a serious concern, enough so that he would agree to make a personal visit to IP.

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So Indian Point is in the range of 10-4 (1 in 10,000)- which in accordance with our processes means to continue performing prudent regulatory evaluation.

Hope this helps.

Eric J. Leeds, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
301-415-1270

-----Original Message-----
From: Howard Glaser [mailto:Howard.Glaser@exec.ny.gov]
Sent: Tuesday, March 22, 2011 12:26 PM
To: Leeds, Eric
Cc: Batkin, Joshua
Subject:

Thanks for today. Expedited review is what we all really need. Duffy spoke to Chair.

One point; your guy said one in 13K. But ur report says 1 in 10K at IP. Which is your standard for immediate review.

Horn, Brian

From: Horn, Brian
Sent: Thursday, March 17, 2011 6:47 AM
To: Owens, Janice
Cc: Habighorst, Peter
Subject: RE: General guidance to export licensees

Morning Janice:

Good work.

I have marked a couple of possible word changes to your draft e-mail. (changes are marked in Red).

Brian Horn
492-3122

From: Owens, Janice
Sent: Wednesday, March 16, 2011 8:57 PM
To: Caldwell, Robert; Habighorst, Peter
Cc: Mamish, Nader; Collins, Chiquita; Bukharin, Oleg; Horn, Brian; Aguilar, Santiago; Kim, Grace; Fragoyannis, Nancy
Subject: General guidance to export licensees

As promised, here is a draft email message to the companies currently licensed or who have applications pending for exports of LEU (UF6 or UO2) to Japan. We believe that given the present circumstances, a short email message is the best means of communicating with them. I do not think there is a reason to delay shipments to operating Japanese reactors; but we do not know how long fuel fabrication facilities in Tokai Mura, Japan will be shut down and the operating fuel fabrication facility in Osaka, Japan is not a back-up on all the export licenses.

I would like to thank Chiquita Collins for being this matter to OIP's attention and we look forward to receiving your feedback. Please give first priority to the draft message to AREVA that I sent to you earlier. Thank you,

Janice Owens

AREVA NP;
Mitsui & Co. (USA), Inc;
Transnuclear Inc.;
Transport Logistics International
Edlow International ?
GNFA ?

> In light of developments in Japan, the NRC staff is advising export licensees and export license applicants that shipments of low enriched uranium (LEU) or natural uranium to Japanese fuel fabrication facilities and/or Japanese reactors may need to be delayed, rescheduled, rerouted or cancelled. In addition to the power reactors that have been shut down due to the earthquake, we understand that nuclear fuel fabrication facilities located in Tokai Mura, Japan have also been temporarily shut down. Those who currently hold active licenses or who have submitted applications for licenses authorizing exports to Japan need to assess their plans to determine whether alterative arrangements potentially requiring amendments are required.

Y/1346

Staff in the NRC Office of International Programs is prepared to work with you and to coordinate with staff in the Office of Nuclear Security and Incident Response (NSIR). During this time, please be advised that the required 10-day advance notification for shipments of special nuclear material of low strategic significance to NSIR's Director, Division of Security Policy, (AdvanceNotificationsResource@nrc.gov), may not be sufficient.

Please contact me if you have questions or need additional information.

Janice E. Owens
Branch Chief, Export Controls and International Organizations
Office of International Programs
U.S. Nuclear Regulatory Commission
301-415-3684
301-415-2395 (fax)
Janice.Owens@nrc.gov

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

From: Cindy Brower <mail@change.org>
Sent: Thursday, March 17, 2011 12:57 PM
To: FOIA Resource
Subject: Please follow Europe and China's leads and inspect old nuclear plants and delay new starts

Dear U.S. Nuclear Regulatory Commission,

Given the worsening Japanese nuclear disaster, I am writing to demand immediate closure of U.S. nuclear energy facilities that remain operational after having exceeded their engineered operable life. Please immediately close these facilities for inspection in an orderly manner as is occurring in Europe. It is the prudent thing to do given many older reactors in the U.S. are of similar design as those melting down in Japan.

Japan is facing the worst nuclear crisis since the atomic bombing of Hiroshima and Nagasaki. Multiple explosions have hit the Fukushima Daiichi nuclear plant, several reactors have lost their cooling systems, raising fears of meltdown(s). Radiation levels have been detected as far as 100 miles away. Many people have tested positive for radiation exposure, and hundreds of thousands of have been evacuated, with the numbers expected to rise.

In the United States, some reactors which have recently had their licenses extended are nearly 40 years old, and their owners are asking the Nuclear Regulatory Commission for approval to extend their lives further. No additional extensions should be granted, and these older reactors that have been extended must be taken off line immediately and inspected given recent happenings in Japan. Clearly these 1970s vintage era systems were not adequately engineering for infrequent but large natural disasters and increasingly human exacerbated events.

Further, it is presumptuous for the federal government to be planning to provide for $36 billion in loan guarantees to build still more nuclear plants, when we do not yet have a permanent waste repository, or even a plan. We are dooming civilizations for hundreds of thousands of years to having to protect and maintain enclosure upon our nuclear waste. Nuclear waste stored on site has caught fire in Japan, and the current on site storage across America is completely unacceptable. It is not a matter of if, it is only one of when will there be a nuclear disaster in America.

All existing nuclear energy plants, waste and weapons are accidents waiting to happen. Nuclear complexity, ecological costs, natural disasters and a conflict ridden world show nukes can never be safe. The price of nuclear fission is potentially enormous when even one accident happens, must less several as now with our Japanese brothers and sisters. In a continually more disorderly world, it is clear that no nuclear materials are secured, and that developing countries embracing nuclear energy will lead to weapon proliferation and yet more great loss of life from accidents and war. But we could choose to ban nuclear materials in their entirety.

It is time for humanity to choose which technologies they allow based upon full preponderance of the evidence - and as an ecologist I would predict all but certain similar impacts no matter the effort from the introduction of geo-engineering, genetically modified organisms (particularly food), nanotech, etc. Nuclear fission has been shown to be deadly in the field of battle, along Japan's coastal plains, it's unsecured wastes are growing, and through terrorist and militaristic rhetoric regarding their use in an increasingly unstable world.

Please immediately cease extending the licenses of old nuclear power plants, and shut down for inspection those which have been extended. We will be calling upon President Obama to convene an urgent summit to begin

YYY/347

fully dismantling global nuclear weaponry. Some technologies such as splitting the atom at their root are anti-human and Earth. Let's get it done, ban the bomb, ban nuclear energy, and commit to climate and energy solutions that are serious and include life-saving energy conservation, efficiency, carbon taxes & using only true renewables. This will soon be the only energy at our disposal if we desire a habitable Earth, and we must transform our society accordingly.

Signed,

Cindy Brower
Chicago, IL

Note: this email was sent as part of a petition started on Change.org, viewable at www.change.org/petitions/ban-nuclear-energy-time-for-true-renewables-only. To respond, email responses@change.org and include a link to this petition.

From: Yasiu Kruszynski <mail@change.org>
Sent: Thursday, March 17, 2011 12:36 PM
To: FOIA Resource
Subject: Please follow Europe and China's leads and inspect old nuclear plants and delay new starts

Dear U.S. Nuclear Regulatory Commission,

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YYY/348

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Signed,

Yasiu Kruszynski
Chicago, IL

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From: Ioannis Zambartas <mail@change.org>
Sent: Thursday, March 17, 2011 6:29 PM
To: FOIA Resource
Subject: Please follow Europe and China's leads and inspect old nuclear plants and delay new starts

Dear U.S. Nuclear Regulatory Commission,

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From: Hayden, Elizabeth
To: Main, Jeffrey
Cc: Couret, Ivonne
Subject: RE: USA.gov Japan page
Date: Wednesday, March 23, 2011 9:07:00 AM

Thanks. Ivonne had pointed this out yesterday and I've asked that the first link be added to our Japan page.

Beth Hayden
Senior Advisor
Office of Public Affairs
U.S. Nuclear Regulatory Commission
--- Protecting People and the Environment
301-415-8202
elizabeth.hayden@nrc.gov

From: Main, Jeffrey
Sent: Wednesday, March 23, 2011 7:31 AM
To: Hayden, Elizabeth
Cc: Hoffman, Joan; Hardy, Sally; Main, Jeffrey; Harrington, Holly
Subject: USA.gov Japan page

Beth,

Just saw the following. I don't know whether this would add value to our Japan page or not. Just thought I'd pass it along.

http://www.usa.gov/Japan2011.shtml

I noticed they do not link to us, although the USAID page linked from the above site does mention our efforts at http://www.usaid.gov/japanquake/index.html#help

--Jeffrey

YYY/350