

## Stutzke, Martin

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**From:** Stutzke, Martin  
**Sent:** Monday, March 14, 2011 3:21 PM  
**To:** Ake, Jon; Kammerer, Annie; Hayden, Elizabeth  
**Cc:** Burnell, Scott; Manoly, Kamal; Munson, Clifford; Chokshi, Niles  
**Subject:** RE: EXAMPLE OF REQUEST: Earthquake plans/reports/risk analysis for San Onofre nuclear power plant

It's misleading to say that the GI-199 Safety/Risk Assessment determined which plants were OK and which were not. The purpose of the assessment was to determine, on a generic basis, if the risk associated with increased seismic hazard estimates in the Central and Eastern US (CEUS) warrants further investigation for potential imposition of cost-justified backfits. We determined that the seismic core-damage frequencies for 27 plants had increased by 1E-5/y or more, relative to what we thought upon conclusion of the Individual Plant Examination of External Events (Generic Letter 88-20, Supplement 4). This finding is the basis for continuing GI-199 and transitioning it to NRR for development of a generic letter that will request information needed to identify potential plant-specific backfits.

We presented a map that showed the locations of the 27 plants in the GI-199 "continue zone" during a public meeting held October 6, 2010 (see Slide #25 in ML102770665). The GI-199 Safety/Risk Assessment (ML100270582) is also publically available. It does not specifically identify the 27 plants, but contains information in appendices that could be used to figure out which CEUS plants are in the "continue zone."

Marty

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**From:** Ake, Jon  
**Sent:** Monday, March 14, 2011 2:08 PM  
**To:** Kammerer, Annie; Hayden, Elizabeth  
**Cc:** Burnell, Scott; Manoly, Kamal; Munson, Clifford; Stutzke, Martin; Chokshi, Niles  
**Subject:** RE: EXAMPLE OF REQUEST: Earthquake plans/reports/risk analysis for San Onofre nuclear power plant

As Annie has pointed out, all 96 operating reactors in the Central and Eastern U.S. were evaluated as part of the GI-199 assessment. Currently a Generic Letter is being prepared requesting additional seismic and plant-specific information, that letter will be sent to all NPP licensees in the CEUS. It is important to note that the Generic Letter has not yet been finalized, the specific information requests are being developed and reviewed internally. So, at this time we are unable to state exactly what path (analysis, back-fit etc.) a particular plant may follow as a result of the Generic Letter.

Kamal, Marty, Cliff-  
Is this an accurate representation of our current path?

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**From:** Kammerer, Annie  
**Sent:** Monday, March 14, 2011 11:53 AM  
**To:** Hayden, Elizabeth  
**Cc:** Burnell, Scott; Ake, Jon  
**Subject:** RE: EXAMPLE OF REQUEST: Earthquake plans/reports/risk analysis for San Onofre nuclear power plant

The list that was analyzed was basically everything in the CEUS. I don't think we made the list of which plants were OK and which not public due to too much uncertainty. Jon Ake would know.

Jon, can you answer? Did we make the list of plant names and which screened in public?

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**From:** Hayden, Elizabeth  
**Sent:** Monday, March 14, 2011 1:48 PM  
**To:** Kammerer, Annie



**Cc:** Burnell, Scott

**Subject:** RE: EXAMPLE OF REQUEST: Earthquake plans/reports/risk analysis for San Onofre nuclear power plant

Is the list of plants that were analyzed and those found problematic public?

*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*

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**From:** Kammerer, Annie

**Sent:** Monday, March 14, 2011 1:24 PM

**To:** Hayden, Elizabeth

**Cc:** Burnell, Scott

**Subject:** RE: EXAMPLE OF REQUEST: Earthquake plans/reports/risk analysis for San Onofre nuclear power plant

Yes. Wolf Creek was analyzed as part of GI-199. It was not one of the plants that the NRC identified as problematic (i.e. staff believes this plant still has adequate margin given the latest ground shaking estimates). However, due to uncertainties in the data available to our staff, we will be sending a letter to all US plants in the central and eastern US.

I hope this helps.

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**From:** Hayden, Elizabeth

**Sent:** Monday, March 14, 2011 1:18 PM

**To:** Kammerer, Annie

**Cc:** Burnell, Scott

**Subject:** FW: EXAMPLE OF REQUEST: Earthquake plans/reports/risk analysis for San Onofre nuclear power plant

Annie,

Can you help with this question we received from a reporter?

Also, can you verify whether Wolf Creek is one of the plants evaluated in GSI-199?

*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*

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**From:** Uselding, Lara

**Sent:** Monday, March 14, 2011 1:10 PM

**To:** Hayden, Elizabeth; Screnci, Diane

**Subject:** EXAMPLE OF REQUEST: Earthquake plans/reports/risk analysis for San Onofre nuclear power plant

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**From:** keith.darce@uniontrib.com [mailto:keith.darce@uniontrib.com]

**Sent:** Monday, March 14, 2011 12:08 PM



**To:** Uselding, Lara

**Subject:** Earthquake plans/reports/risk analysis for San Onofre nuclear power plant

Lara,

I am trying to track down any documents on file with the NRC concerning the risk of earthquakes occurring near the San Onofre nuclear plant north of San Diego. I am particularly interested in emergency plans, analysis of the risks faced by the plant from earthquakes and predictions of the types of damage and dangers that could be created by earthquake damage to the plant. I'm also interested in documents looking at the risk and dangers posed by tsunamis to the plant. Can you tell me if these types of documents exist and when I might be able to get them? I am trying to turn a story around on this topic for tomorrow's (Tuesday's) edition of the paper.

Thanks,

Keith

**Keith Darcé**

Biotechnology writer

*The San Diego Union-Tribune*

keith.darce@uniontrib.com

619.293.1020

[www.signonsandiego.com/news/business/biotech/](http://www.signonsandiego.com/news/business/biotech/)

Follow me on Twitter at **KeithDarce**



**Bano, Mahmooda**

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**From:** Scott, Michael  
**Sent:** Friday, March 25, 2011 8:34 PM  
**To:** Tinkler, Charles  
**Subject:** RE: hydrogen

Thanks Charlie. But someone in RES is an H-2 guru, and I remember a slide show. Just can't remember who the guru was.

Mike

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**From:** Tinkler, Charles  
**Sent:** Friday, March 25, 2011 11:50 AM  
**To:** Scott, Michael  
**Subject:** hydrogen

Fyi

I passed along the comment to RST

Concerning hydrogen control for containment: If you think you have an explosive mixture in the containment or don't know - then the preferred option would be nitrogen purge and vent

Recombiners can be a source of ignition if a flammable/ explosive mixture exists and should therefor be avoided

Charles Tinkler  
[Charles.Tinkler@nrc.gov](mailto:Charles.Tinkler@nrc.gov)

A/162



## Hogan, Rosemary

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**From:** Ali, Syed  
**Sent:** Monday, March 14, 2011 9:26 AM  
**To:** Pires, Jose  
**Cc:** Hogan, Rosemary  
**Subject:** RE: Follow-up to the Japanese Earthquake/Tsunami

Jose:

Great job of putting this together.

Thanks,  
Syed Ali

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**From:** Pires, Jose  
**Sent:** Monday, March 14, 2011 7:19 AM  
**To:** Hogan, Rosemary; Ali, Syed; Ake, Jon; Anooshehpour, Rasool; Herrity, Thomas; Weaver, Thomas; Roche, Robert; Sircar, Madhumita; Candra, Hernando  
**Cc:** Stovall, Scott; Rivera-Lugo, Richard  
**Subject:** RE: Follow-up to the Japanese Earthquake/Tsunami

Herman,

I placed materials that may help with the seismic design basis for the affected plants (at a plant it can vary by unit depending when it was built and I do not know if retrofits were made) in the G drive in the following folder:

G:\DE\SGSEB\JPires\Seismic Design Japan NPPs

The briefing by Stevenson and the NBS SP 592 (after page 120) have interesting information (the design basis PGA for Unit 1 in Fukushima was 0.18 g and they used the Kern County earthquake (Blume). Not sure if there was retrofit.

Note that the buildings then dot be conservatively designed and they seemed to have performed well. It is usually the mechanical and electrical equipment that raises issues (as noted by Stevenson as well).

Scott,  
Can ShakeCast find the PGAs at the various sites? That would help compare with the design basis which is not only based on magnitude.

Thanks,

Jose.

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**From:** Hogan, Rosemary  
**Sent:** Friday, March 11, 2011 6:15 PM  
**To:** Ali, Syed; Ake, Jon; Pires, Jose; Anooshehpour, Rasool; Herrity, Thomas; Weaver, Thomas; Roche, Robert; Sircar, Madhumita; Candra, Hernando  
**Cc:** Stovall, Scott; Rivera-Lugo, Richard  
**Subject:** FW: Follow-up to the Japanese Earthquake/Tsunami



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**From:** Case, Michael

**Sent:** Monday, March 14, 2011 7:51 AM

**To:** Skeen, David; Hiland, Patrick

**Cc:** Murphy, Andrew; Pires, Jose; Kammerer, Annie; Hogan, Rosemary; Sheron, Brian; Uhle, Jennifer

**Subject:** Japanese Earthquake Questions

Hi guys. I don't know where we stand on the seismic related questions after Sunday's day shift activities (I assume Annie was able to continue). Nevertheless, I have access to some more experts here this morning. If there are residual activities, just let me know and we'll get them working.



## Nuclear Power Plants and Earthquakes

<http://www.world-nuclear.org/info/inf18.html>

- **Japanese, and most other, nuclear plants are designed to withstand earthquakes, and in the event of major earth movement, to shut down safely.**
- **In 1995, the closest nuclear power plants, some 110 km north of Kobe, were unaffected by the severe Kobe-Osaka earthquake, but in 2004, 2005, 2007 and 2009 Japanese reactors shut down automatically due to ground acceleration exceeding their trip settings.**
- **In 1999, three nuclear reactors shut down automatically during the devastating Taiwan earthquake, and were restarted two days later.**

### Design criteria

Nuclear facilities are designed so that earthquakes and other external events will not jeopardise the safety of the plant. In France for instance, nuclear plants are designed to withstand an earthquake twice as strong as the 1000-year event calculated for each site. It is estimated that, worldwide, 20% of nuclear reactors are operating in areas of significant seismic activity.

Because of the frequency and magnitude of earthquakes in Japan, particular attention is paid to seismic issues in the siting, design and construction of nuclear power plants. The seismic design of such plants is based on criteria far more stringent than those applying to non-nuclear facilities. Power reactors are also built on hard rock foundations (not sediments) to minimise seismic shaking.

Japanese nuclear power plants are designed to withstand specified earthquake intensities evident in ground motion. These used to be specified as S1 and S2, but now simply Ss, in Gal units. The plants are fitted with seismic detectors. If these register ground motions of a set level (formerly 90% of S1), systems will be activated to automatically bring the plant to an immediate safe shutdown. The logarithmic Richter magnitude scale (or more precisely the Moment Magnitude Scale more generally used today) measures the overall energy released in an earthquake, and there is not always a good correlation between that and intensity (ground motion) in a particular place. Japan has a seismic intensity scale in shindo units 0 to 7, with weak/strong divisions at levels 5 & 6, hence ten levels. This describes the surface intensity at particular places, rather than the magnitude of the earthquake itself.

The revised seismic regulations released in May 2007 increased the Ss figure to be equivalent to 6.7 on the Richter or Moment Magnitude scale - a factor of 1.5 (up from a magnitude of 6.5). PGA is measured in Galileo units - Gal ( $\text{cm/sec}^2$ ) or g - the force of gravity, one g being 980 Gal.

The design basis earthquake ground motion or peak ground acceleration (PGA) S1 was defined as the largest earthquake which can reasonably be expected to occur at the site of

a nuclear power plant, based on the known seismicity of the area and local active faults. A power reactor could continue to operate safely during an S1 level earthquake, though in practice they are set to trip at lower levels. If it did shut down, a reactor would be expected to restart soon after an S1 event. The revised seismic regulations released in May 2007 increased the S1 figure to be equivalent to 6.7 on the logarithmic Richter scale - a factor of 1.5 (up from 6.5). PGA is measured in Galileo units - Gal (cm/sec<sup>2</sup>) or g - the force of gravity, one g being 980 Gal. The non-SI unit is used here.

Larger earthquake ground motions (PGAs) in the region, considering the tectonic structures and other factors, must also be taken into account, although their probability is very low. The largest conceivable such ground motion was the upper limit design basis extreme earthquake ground motion (PGA) S2, generally assuming a magnitude 6.5 earthquake directly under the reactor. The plant's safety systems would be effective during an S2 level earthquake to ensure safe shutdown without release of radioactivity, though extensive inspection would be required before restart. In particular, reactor pressure vessel, control rods and drive system and reactor containment should suffer no damage at all.

After the magnitude 7.2 Kobe earthquake in 1995 a panel was set up to review the safety of nuclear facilities in Japan and the design guidelines for their construction. The Japanese Nuclear Safety Commission (NSC) then approved the panel's report. Building and road construction standards were also thoroughly reviewed at this time. After recalculating the seismic design criteria required for a nuclear power plant to survive near the epicentre of a large earthquake the NSC concluded that under current guidelines such a plant could survive a quake of magnitude 7.75. The Kobe earthquake was 7.2.

Japan's Rokkasho reprocessing plant and associated facilities are built on stable rock and are designed to withstand an earthquake of magnitude 8.25.

Following a magnitude 7.3 earthquake in 2000 in an area where no geological fault was known, Japan's NSC ordered a full review of the country's 1978 seismic guidelines (which had been adopted by the NSC in 1981 and partially revised in 2001). This reported in 2006 and resulted in NSC and the Nuclear & Industrial Safety Agency (NISA) calling for reactor owners with NISA to undertake plant-specific reviews of seismic safety, to be completed in 2008. The main result of this review was that the S1 - S2 system was formally replaced by NSC in September 2006 with a single Design Basis Earthquake Ground Motion (DBGM Ss). The main reactor facilities "shall maintain their safety functions under the seismic force caused by DBGM Ss." They and ancillary facilities should also withstand the "seismic force loading of those caused by Elastically Dynamic Design Earthquake Ground Motion Sd (EDGM Sd)" calculated from stress analysis and being at least half the Ss figure.

In March 2008 Tepco upgraded its estimates of likely PGA for Fukushima to 600 Gal, and other operators have adopted the same figure. In October 2008 Tepco accepted 1000 Gal (1.02g) PGA as the new Ss design basis for Kashiwazaki Kariwa, following the July 2007 earthquake there.



Japanese nuclear plants such as Hamaoka near Tokai are in regions where earthquakes of up to magnitude 8.5 may be expected. In fact the Tokai region has been racked by very major earthquakes about every 150 years, and it is 155 years since the last big one. Chubu's Hamaoka reactors were designed to withstand such anticipated Tokai earthquake and had design basis S1 of 450 Gal and S2 of 600 Gal. Units 3 & 4 were originally designed for 600 Gal, but the Ss standard established in September 2007 required 800 Gal. Since then units 3-5 have been upgraded to the new Ss standard of 1000 Gal. In August 2009 a magnitude 6.5 earthquake nearby automatically shut down Hamaoka 4 & 5, with ground motion of 426 Gal being recorded at unit 5. Some ancillary equipment was damaged and reactors 3 and 4 were restarted after checking. Restart of unit 5 was repeatedly deferred as the company analysed why such high seismic acceleration was recorded on it, coupled with some planned maintenance being undertaken during the shutdown. It restarted in January 2011.

Hamaoka units 1 & 2 had been shut down since 2001 and 2004 respectively, pending seismic upgrading – they were originally designed to withstand only 450 Gal. In December 2008 the company decided to write them off and build a new reactor to replace them. Modifying the two 1970s units to new seismic standards would have cost about US\$ 3.3 billion and been uneconomic, so Chubu opted for a US\$ 1.7 billion write-down instead.

Early in 2010 Japan's METI confirmed that the seismic safety of the Monju fast reactor was adequate under new standards requiring Ss of 760 Gal PGA. Assessments were carried out in conjunction with Kansai's Mihama plant and JAPC's Tsuruga plant, both nearby.

South Korea's new APR-1400 reactor is designed to withstand 300 Gal seismic acceleration. The older OPR is designed for 200 Gal but is being upgraded to at least 300 Gal so as to be offered to Turkey and Jordan.

#### Japan 1995 - Kobe

Newspaper coverage of the magnitude 7.2 Kobe earthquake which devastated Kobe and the surrounding region on 17 January 1995 raised concerns about the safety of nuclear power plants in the affected area. Horizontal ground acceleration was measured at 817 Gal – more intense than expected – and vertical acceleration was 332 Gal.

In fact none of the power reactors within 200 km of the earthquake epicentre sustained any damage and those running at the time continued to operate at capacity. Takahama and Ohi are located approximately 130 km from the epicentre of the earthquake, on the Pacific Ocean side of the Island of Honshu. Mihama is approximately 180 km away. The research reactors in the region, in Osaka and Kyoto, were also reported to be unaffected by the earthquake.

#### Taiwan 1999 - Chichi

The shallow magnitude 7.6 earthquake in central Taiwan on 21 September 1999 killed thousands of people. It caused three reactors at Chinshan and Kuosheng in the north of the island to shut down automatically. They were cleared to restart two days later. A fourth reactor there was being refuelled. The two reactors at Maanshan in the south continued operating, but reduced power later due to damage to distribution facilities. A major concern following the earthquake was how quickly power could be restored to industry.

#### Japan 2005 - Miyagi

On 16 August 2005 Tohoku's three Onagawa reactors shut down automatically when a magnitude 7.2 earthquake hit northeast Honshu. They were set to trip at 200 Gal, against S1 design basis of 250 Gal (which was reached) and S2 PGA of 350-400 Gal. No damage occurred in any major part of the plant.

Onagawa-2 restarted in January 2006 after comprehensive checks and confirming that an S2 figure of 580 Gal would be safe for that unit (equivalent to magnitude 8.2). Geotechnical analysis and safety evaluation proceeded under NISA, which approved a report from the company. Unit 3 restarted in March 2006, and the smaller unit 1 restarted in May 2007.

#### Japan 2007 - Niigataken Chuetsu-Oki

On 16 July 2007 the magnitude 6.8 Niigata Chuetsu-Oki earthquake occurred with epicentre only 16 km from Tepco's Kashiwazaki Kariwa 7965 MWe nuclear power plant. Local geological factors contributed to a magnification of the seismic intensity at the plant. The plant's seismometers measured PGA of 270 to 680 Gal (a later report said 829 Gal for unit 1), the S1 design bases for different units being 170 to 270 Gal and the S2 figure about 450 Gal. The peak ground acceleration thus exceeded the S1 design values in all units - hence the need to shut down, and the S2 values in units 1, 2 and 4. Four reactors shut down automatically at the pre-set level of 120 Gal, another three were not operating at the time. All the functions of shutdown and cooling worked as designed.

While there were many incidents on site due to the earthquake, none threatened safety and the main reactor and turbine units were structurally unaffected. Analysis of primary cooling water confirmed that there was no damage to the fuel in reactor cores. However, the plant remained closed until full investigation was complete and safety confirmed, about mid 2008. It appears that the four older units may have been more vulnerable than units 5-7 which are located 1.5 km further away.

The Ministry of Economy Trade & Industry (METI) then set up a 20-member Chuetsu Investigation and Countermeasures Committee to investigate the specific impact of this earthquake on the power station, and in the light of this to identify what government and utilities must address to ensure nuclear plant safety. It acknowledged that the government was responsible for approving construction of the first Kashiwazaki Kariwa units in the 1970s very close to what is now perceived to be a geological fault line. NISA



invited the International Atomic Energy Agency to join it, the Nuclear Safety Commission and Tepco in reviewing the situation. A report was presented to the IAEA Senior Regulators' Meeting in September 2007, and a further IAEA visit was made early in 2008.

NISA released its assessment of the safety significance of earthquake damage in November. The worst of the damage rated zero on the International Nuclear Event Scale (INES), having no safety significance. Other damage was deemed not relevant to nuclear safety. The seven main reactor units themselves were still being checked, but appeared undamaged. In May 2008 Tepco adopted a new standard of 2280 Gal (2.33g) maximum design basis seismic motion for Kashiwazaki Kariwa units 1-4, over five times the previous S2 figure, and 1156 Gal (1.18g) for units 5-7, in the light of local geological factors. This standard will be reviewed by NISA and NSC. Meanwhile construction works will be undertaken to bring all units up to be able to withstand a quake producing PGA of 1000 Gal.

Tepco posted a loss of JPY 150 billion (US\$ 1.68 billion) for FY2007 (to 31/3/08) due to the prolonged closure of the plant, followed by JPY 109 billion loss in the first half of FY2008. While no damage to the actual reactors has been found, detailed checks continue, and upgrading of earthquake resistance is required. Major civil engineering works are also required before the reactors resume operation. Overall, the FY2007 impact of the earthquake was projected to be JPY 603.5 billion (\$5.62 billion), three quarters of that being increased fuel costs to replace the 8000 MWe of lost capacity. NISA approved the utility's new seismic estimates in November 2008, and conducted final safety reviews of the units as they were upgraded. Unit 7 restarted in May, unit 6 in August 2009, unit 1 in May 2010, and unit 5 in November 2010. Units 2, 3, & 4 remain shut down.

#### Other experience

Earthquakes have previously occurred in the vicinity of a number of Japanese and other power reactors without adverse effect.

An earthquake registering 6.2 on Richter scale occurred offshore Fukushima in northern Japan on 13 June 2010. At the nearest coastal cities it registered 5 on the Japanese shindo scale. The nearest nuclear power plants (13 reactors): Fukushima I & II and Onagawa were unaffected. The horizontal ground acceleration reached 60 Gal at reactor building base mats at Fukushima-I.

In two decades to 2004, no Japanese reactor had been tripped by the seismic detectors. In those cases where the plant automatically shutdown ("tripped") as a safety precaution, it was because of the impact of the earthquake on the operating characteristics of the plant.

In November 1993, a magnitude 5.8 earthquake in northeast Honshu produced a ground acceleration of 121 Gal at Tohoku's Onagawa-1 power reactor (497 MWe, BWR), located 30 km from the epicentre. The design conditions for the S1 and S2 events at the site were

250 and 375 Gal respectively and the reactor was set to trip at a measured peak ground acceleration (PGA) of 200 Gal. In fact it tripped at a lower level due to variations in the neutron flux outside the set parameters.

In May 2003 a magnitude 7.1 earthquake further from the same Onagawa plant produced ground acceleration of 225 Gal which tripped unit 3 (units 1 & 2 were not operating).

In October 2004 a magnitude 6.8 earthquake in Niigata Prefecture 250 km north of Tokyo had no effect on the nearby Kashiwazaki Kariwa nuclear plant, but a magnitude 5.2 quake there two weeks later caused one of the reactors - unit 7 -to trip.

In March 2005 a magnitude 7.0 earthquake in northern Kyushu did not affect the nearby Genkai and Sendai nuclear plants, nor Shimane and Ikata.

The magnitude 7.8 earthquake off the coast of Hokkaido in July 1993, had no effect on nuclear facilities. Tomari 1 and 2 reactors (550 MWe, PWRs), located 95 km from the epicentre, continued normal operation.

In December 1994, a magnitude 7.5 earthquake struck northern Japan but caused no damage to the 11 boiling water reactors or the nuclear fuel facilities in the vicinity. All operated normally.

Reactors of both western and Soviet design have been subjected to major seismic activity in North America and Europe without damage. California's power reactors, San Onofre 2 and 3 (1,070 and 1,080 MWe, PWRs) and Diablo Canyon 1 and 2 (1,073 MWe and 1,087 MWe, PWRs) continued to operate normally during the 6.6 magnitude earthquake in January 1994. San Onofre, the closer station, was about 112 km from the epicentre.

In December 1988, a magnitude 6.9 earthquake, resulting in the deaths of at least 25,000 people, occurred in northwestern Armenia. It was felt at the two-unit Armenian nuclear power station located approximately 75 km south of the epicentre, but both Soviet-designed PWRs operated normally and no damage was reported. This was the first Russian nuclear power plant specifically adapted for seismic areas, and it started operating in 1976.

In May 2008 a magnitude 7.9 earthquake affected southwestern Sichuan province in central China. The main nuclear facilities affected were military ones, apparently without any radioactive releases. About 250 km from the epicentre the Yibin fuel fabrication plant which produces both power reactor and research reactor fuel assemblies was undamaged. China's power reactors were all at least 900 km from the epicentre.

## Tsunamis

Large undersea earthquakes often cause tsunamis - pressure waves which travel very rapidly across oceans and become massive waves over ten metres high when they reach shallow water, then washing well inland. The December 2004 tsunamis following a

magnitude 9 earthquake in Indonesia reached the west coast of India and affected the Kalpakkam nuclear power plant near Madras/Chennai. When very abnormal water levels were detected in the cooling water intake, the plant shut down automatically. It was restarted six days later.

Even for a nuclear plant situated very close to sea level, the robust sealed containment structure around the reactor itself would prevent any damage to the nuclear part from a tsunami, though other parts of the plant might be damaged. No radiological hazard would be likely.

Sources:

paper originally prepared by Nuclear Services Section, External Affairs, ANSTO;

Nuclear Safety Commission Sept 2006, Regulatory Guide for Reviewing Seismic Design of Nuclear Power Reactor Facilities < <http://www.nsc.go.jp/english/taishin.pdf>>

JAIF

Tepco



## Hogan, Rosemary

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**From:** Pires, Jose  
**Sent:** Monday, March 14, 2011 2:29 PM  
**To:** Kammerer, Annie; Ake, Jon  
**Cc:** Graves, Herman; Hogan, Rosemary  
**Subject:** RE: Japanese Earthquake Questions  
**Attachments:** Seismic design history OP2-2\_Stevenson.pdf

*OK to  
Release w/  
Attachment.*

Annie,

Attached is some information on the design for some of the affected Japanese plants.

Slide 2 says that for Fukushima 1 (unit 1) the PGA was 0.17 g. The National Bureau of Standards damage report for the 1978 Miyagiken-Oki earthquake, NBS SP 592, says that the design basis for that reactor was 0.18 g (and it used the Taft record from the 1952 Kern County earthquake response spectra – design was by Blume's company - an author of the NBS report is Peter Ianev who worked for John Blume at the time of the NBS report).

Slide 10 has values for the seismic design basis loads for other plants (Onagawa, Fukushima 1 and 2 included). It went up since the 1965 design for unit 1. I do not know if unit 1 was upgraded (meaning the mechanical and electrical equipment because the buildings tend to be strong enough).

Slide 30. The first sentence on slide 30 is interesting. It says that the greatest impact of seismic requirements is on mechanical and electrical equipment. I tend to agree with that.

We will try to corroborate the information above with other sources. A comparison of these with PGA's from SHAKECAST may show that the 0.48 g covers the recorded PGA at some sites and not be far from those at other sites.

We are getting a list of US BWR Mark I reactors with their locations and some design parameters (design pressure, OBE and SSE).

Thanks,

Jose.

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**From:** Kammerer, Annie  
**Sent:** Monday, March 14, 2011 12:20 PM  
**To:** Hiland, Patrick  
**Cc:** Murphy, Andrew; Pires, Jose; Hogan, Rosemary; Sheron, Brian; Uhle, Jennifer; Case, Michael; Skeen, David; Munson, Clifford; Ake, Jon  
**Subject:** RE: Japanese Earthquake Questions

Pat,

I currently have about 17 pages of questions that we should have pulled together in a pretty useful form later today.

Attached, please see a list of unanswered engineering type questions that I pulled from the larger Q&A document. If you can get your guys working on these it would be very helpful. I am hoping to publish a version at about 4 or 5 today. So, if I can get something on these by perhaps 3 or 4, that would be great. Otherwise, we will note that we are working on it.

## Hogan, Rosemary

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**From:** Murphy, Andrew  
**Sent:** Monday, March 14, 2011 3:09 PM  
**To:** Kammerer, Annie; Case, Michael; Skeen, David; Hiland, Patrick  
**Cc:** Pires, Jose; Hogan, Rosemary; Sheron, Brian; Uhle, Jennifer  
**Subject:** RE: Japanese Earthquake Questions

Is there anything that I can do to help the effort?

Andy

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**From:** Kammerer, Annie  
**Sent:** Monday, March 14, 2011 10:49 AM  
**To:** Case, Michael; Skeen, David; Hiland, Patrick  
**Cc:** Murphy, Andrew; Pires, Jose; Hogan, Rosemary; Sheron, Brian; Uhle, Jennifer  
**Subject:** RE: Japanese Earthquake Questions

I have compiled a set of questions from all available sources, which I think are pretty complete. I am organizing them now and I have cliff and jon helping me with some of the answers. I've pulled from the questions we got at kashiwazaki, the questions we have that have come in, the GI-199 com plan, the DCNPP com plan, and other places.

I do have a request from RIV to pull a Q&A list for SONGS. If I brainstorm a list can I get help with answers?

What kind of experts do you have?

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**From:** Case, Michael  
**Sent:** Monday, March 14, 2011 7:51 AM  
**To:** Skeen, David; Hiland, Patrick  
**Cc:** Murphy, Andrew; Pires, Jose; Kammerer, Annie; Hogan, Rosemary; Sheron, Brian; Uhle, Jennifer  
**Subject:** Japanese Earthquake Questions

Hi guys. I don't know where we stand on the seismic related questions after Sunday's day shift activities (I assume Annie was able to continue). Nevertheless, I have access to some more experts here this morning. If there are residual activities, just let me know and we'll get them working.

FYI, Jon Ake and Cliff Munson are working on a separate set of the seismic questions.

Also, I don't have any questions on Seismic PRA, which is a hot topic with industry lately (as evidenced by the recent letter from NEI asserting that SPRA is too undeveloped). I have asked Nilesch to develop some Q&As that we may see coming from industry to us as a result of all of this. Those are not likely to make it into the version I want to get out today, but we can add later.

Annie

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**From:** Hiland, Patrick  
**Sent:** Monday, March 14, 2011 11:05 AM  
**To:** Kammerer, Annie  
**Cc:** Murphy, Andrew; Pires, Jose; Hogan, Rosemary; Sheron, Brian; Uhle, Jennifer; Case, Michael; Skeen, David  
**Subject:** RE: Japanese Earthquake Questions

NRR/DE has Kamal (seismic structures) to review specific questions. I also have several very experienced structural design engineers on staff (George Thomas & Farhead Farzam) If electrical, I have qualified staff and George Wilson that can help.

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**From:** Kammerer, Annie  
**Sent:** Monday, March 14, 2011 10:49 AM  
**To:** Case, Michael; Skeen, David; Hiland, Patrick  
**Cc:** Murphy, Andrew; Pires, Jose; Hogan, Rosemary; Sheron, Brian; Uhle, Jennifer  
**Subject:** RE: Japanese Earthquake Questions

I have compiled a set of questions from all available sources, which I think are pretty complete. I am organizing them now and I have cliff and jon helping me with some of the answers. I've pulled from the questions we got at kashiwazaki, the questions we have that have come in, the GI-199 com plan, the DCNPP com plan, and other places.

I do have a request from RIV to pull a Q&A list for SONGS. If I brainstorm a list can I get help with answers?

What kind of experts do you have?

---

**From:** Case, Michael  
**Sent:** Monday, March 14, 2011 7:51 AM  
**To:** Skeen, David; Hiland, Patrick  
**Cc:** Murphy, Andrew; Pires, Jose; Kammerer, Annie; Hogan, Rosemary; Sheron, Brian; Uhle, Jennifer  
**Subject:** Japanese Earthquake Questions

Hi guys. I don't know where we stand on the seismic related questions after Sunday's day shift activities (I assume Annie was able to continue). Nevertheless, I have access to some more experts here this morning. If there are residual activities, just let me know and we'll get them working.



**Bano, Mahmooda**

---

**From:** Scott, Michael  
**Sent:** Saturday, March 26, 2011 1:37 AM  
**To:** Ruland, William  
**Subject:** FW: Decommissioning Type Information

Sorry I didn't call in time. Brian H. did not know what you wanted. What's up?

---

**From:** RST01 Hoc  
**Sent:** Friday, March 25, 2011 10:02 PM  
**To:** Scott, Michael  
**Subject:** FW: Decommissioning Type Information

Mike,

Please call the Reactor Safety Team via the HOOs at 301-816-5100, preferably before 2300 EDT and ask for Bill Ruland.

Thanks,

Brett Rini  
RST Coordinator

---

**From:** LIA02 Hoc  
**Sent:** Friday, March 25, 2011 9:44 PM  
**To:** RST01 Hoc  
**Subject:** FW: Decommissioning Type Information

Please see email and new questions. If this is not yours, please forward as appropriate for follow-up. Thank you

---

**From:** Scott, Michael  
**Sent:** Friday, March 25, 2011 9:26 PM  
**To:** LIA02 Hoc  
**Subject:** RE: Decommissioning Type Information

Looking at this, I had not expected as much of a regulatory discussion – more of a “what do we do over the long run to decommission our badly damaged facility?”

What is the TMI item discussed herein?

Any news on the Hydrogen questions?

---

**From:** LIA02 Hoc  
**Sent:** Friday, March 25, 2011 12:23 PM  
**To:** Scott, Michael  
**Cc:** LIA03 Hoc  
**Subject:** FW: Decommissioning Type Information

Mike,

I believe this answers your request for Long-Term Decommissioning for Damaged Reactors.

A/166

Let me know if you need more information.

Steve

---

**From:** Deegan, George  
**Sent:** Wednesday, March 23, 2011 5:12 PM  
**To:** Bowman, Gregory; RST01 Hoc  
**Cc:** Rini, Brett; McConnell, Keith; Shepherd, James; Moore, Scott; Frazier, Alan; Brock, Kathryn  
**Subject:** FW: Decommissioning Type Information

Greg: Here's FSME's input to the question on the decommission licensing requirements. As Keith's note indicates, the TMI question will be answered a bit later.

---

**From:** McConnell, Keith  
**Sent:** Wednesday, March 23, 2011 5:04 PM  
**To:** Deegan, George  
**Cc:** Camper, Larry; Shepherd, James  
**Subject:** RE: Decommissioning Type Information

George:

Do you want to supply the attached to the EDO? We are still tracking down the TMI question.

Keith

Stu

---

**From:** Camper, Larry  
**Sent:** Wednesday, March 23, 2011 12:49 PM  
**To:** Dorman, Dan  
**Cc:** Deegan, George; RST01 Hoc; Bowman, Gregory; Hickman, John  
**Subject:** Decommissioning Type Information

Dan,  
Greetings! Trust you are holding up well over there! Regarding your message of earlier today, we will be able to provide feedback on Question number 6 today by the 18:00 timeframe. Questions 6,8 and 9 will require a bit of review and interface with RES but we will start that process today. Standby for a better timeline on those. The staff did some work on the entombment issue via a couple of SECY's but the approach died out because it became clear that industry was not going to utilize it in the US. Of course, the situation in Japan is quite different etc. Regardless, our earlier work should be of some benefit but we just have to resurrect it and review etc. In thinking ahead just a bit, I suspect that we will need to put together some sort of Task Force or think tank type group to analyze possible paths forward for the overall decommissioning of the site and for the related waste management etc. Of course, we have some time to think about this issue but not too long etc.

**Bano, Mahmooda**

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**From:** Scott, Michael  
**Sent:** Saturday, March 26, 2011 6:13 AM  
**To:** Notafrancesco, Allen  
**Subject:** FW: QUESTION FROM JAPAN

Allen: Did you pass around a tutorial slide show on hydrogen a while back? If so, Japan team really would appreciate a copy.

Thanks.

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

**From:** Lee, Richard  
**Sent:** Friday, March 25, 2011 7:55 AM  
**To:** Scott, Michael; Gibson, Kathy; Voglewede, John; Santiago, Patricia  
**Subject:** RE: QUESTION FROM JAPAN

Mike:

Charlie Tinkler is our hydrogen expert. So is Allen Notafrensesco. I do not know who did the slide show.

Richard

---

**From:** Scott, Michael  
**Sent:** Friday, March 25, 2011 5:44 AM  
**To:** Gibson, Kathy; Lee, Richard; Voglewede, John; Santiago, Patricia  
**Subject:** QUESTION FROM JAPAN

I seem to remember someone sending out a slide show on hydrogen since I've been in RES. I can't remember who our expert was, but I need to get a copy of the slide show he or she had developed on the subject. Can any of you recall?

Thanks

Mike

## Gibson, Kathy

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**From:** Gibson, Kathy  
**Sent:** Monday, March 14, 2011 8:46 AM  
**To:** Case, Michael; Scott, Michael  
**Cc:** Sheron, Brian; Uhle, Jennifer; Bonaccorso, Amy; Flory, Shirley  
**Subject:** Re: Japanese Earthquake--Ops Center Request

The best person I know of is Trish Milligan in NSIR. Terry Brock should also have some information.

---

**From:** Case, Michael  
**To:** Gibson, Kathy  
**Cc:** Sheron, Brian; Uhle, Jennifer; Bonaccorso, Amy; Flory, Shirley  
**Sent:** Mon Mar 14 08:41:08 2011  
**Subject:** Japanese Earthquake--Ops Center Request

Hi Kathy. They are working on what if scenarios in the Ops Center. They are tasked to compare some of the dose assessment results on the Japanese plants to Chernobyl. They need someone or some information on dose results from Chernobyl. Who do you have to help? The request is specifically from Kathryn Brock on the PMT.



## Gibson, Kathy

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**From:** Gibson, Kathy  
**Sent:** Monday, March 14, 2011 10:56 AM  
**To:** Sheron, Brian; Uhle, Jennifer  
**Cc:** Scott, Michael  
**Subject:** Fw: NRO Meeting - Update on Japan's NPPs

You probably already know this, but just in case...

---

**From:** Zaki, Tarek  
**To:** Gibson, Kathy; Scott, Michael  
**Sent:** Mon Mar 14 10:24:28 2011  
**Subject:** NRO Meeting - Update on Japan's NPPs

No items of interest from today's NRO meeting except the update Mike J provided on the situation in Japan:

- As you know we have 2 NRC technical experts there to help, Tony Ulses and Jim Trapp. Japan is requesting 6 more, primarily in the areas of plant operations, protective measures, severe accident, and dose analysis. There is a call at 9:30am (Office directors, deputies and some division directors) to discuss that request.
- The Chairman will be briefing on the Hill on Wednesday, the plan was for it to be about budget but now it's believed it will be about reactor and reactor safety (in light of the situation in Japan). Q&A's will be circulated in preparation for that.
- NRC staff will naturally have questions. The message to the division directors is to try to focus staff Q's through OPA.
- It's believed that when this is over, the next question will be about US existing, as well as new, reactors wrt earthquakes and tsunamis. So we should start thinking about that.
- We currently work through IAEA as a clearing house.
- GE has folks in Japan, and ran some scenarios through Exelon.

Thanks,  
Tarek

## Gibson, Kathy

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**From:** Gibson, Kathy  
**Sent:** Monday, March 14, 2011 12:56 AM  
**To:** Sheron, Brian; Uhle, Jennifer  
**Subject:** Fw: FYI - Japan Situation  
**Attachments:** ANS Japan Backgrounder.pdf

Tell me if you want me to stop sending this stuff.

---

**From:** Rubin, Stuart  
**To:** Gibson, Kathy; Scott, Michael  
**Sent:** Sun Mar 13 23:23:14 2011  
**Subject:** FW: FYI - Japan Situation

FYI

---

**From:** Inn Seock Kim [<mailto:isk@issatechinc.com>]  
**Sent:** Saturday, March 12, 2011 11:35 PM  
**Subject:** FYI - Japan Situation

FYI -

(1) Most Likely Accident Scenario at Fukushima Dai-ichi Unit 1 (as of noon 3/13, Korea time)

See attached (from Joe Colvin of ANS).

(2) Fukushima Dai-ichi Unit 1 reactor schematic

<http://www.beyondnuclear.org/home/2011/3/12/fukushima-dai-ichi-unit-1-reactor-schematic.html>

(3) BWR Info

<http://holbert.faculty.asu.edu/eee463/NUCLEAR.HTML>

<http://www.iaea.org/NuclearPower/Downloads/Simulators/Conventional.BWR.Manual.2009-10-05.pdf>

(4) Latest Updated Info on All Japanese NPPs

<http://www.nisa.meti.go.jp/english/index.html>

<http://ansnuclearcafe.org>

<http://www.google.com/crisisresponse/japanquake2011.html>

Best regards,  
ISK

--

*Inn Seock Kim, PhD, President  
ISSA Technology, Inc.  
Maryland, USA*

## **American Nuclear Society Backgrounder: Japanese Earthquake/Tsunami; Problems with Nuclear Reactors**

**3/12/2011 5:22 PM EST**

**To begin, a sense of perspective is needed... right now, the Japanese earthquake/tsunami is clearly a catastrophe; the situation at impacted nuclear reactors is, in the words of IAEA, an "Accident with Local Consequences."**

The Japanese earthquake and tsunami are natural catastrophes of historic proportions. The death toll is likely to be in the thousands. While the information is still not complete at this time, the tragic loss of life and destruction caused by the earthquake and tsunami will likely dwarf the damage caused by the problems associated with the impacted Japanese nuclear plants.

### **What happened?**

Recognizing that information is still not complete due to the destruction of the communication infrastructure, producing reports that are conflicting, here is our best understanding of the sequence of events at the Fukushima I-1 power station.

- The plant was immediately shut down (scrammed) when the earthquake first hit. The automatic power system worked.
- All external power to the station was lost when the sea water swept away the power lines.
- Diesel generators started to provide backup electrical power to the plant's backup cooling system. The backup worked.
- The diesel generators ceased functioning after approximately one hour due to tsunami induced damage, reportedly to their fuel supply.
- An Isolation condenser was used to remove the decay heat from the shutdown reactor.
- Apparently the plant then experienced a small loss of coolant from the reactor.
- Reactor Core Isolation Cooling (RCIC) pumps, which operate on steam from the reactor, were used to replace reactor core water inventory, however, the battery-supplied control valves lost DC power after the prolonged use.
- DC power from batteries was consumed after approximately 8 hours.
- At that point, the plant experienced a complete blackout (no electric power at all).
- Hours passed as primary water inventory was lost and core degradation occurred (through some combination of zirconium oxidation and clad failure).



- Portable diesel generators were delivered to the plant site.
- AC power was restored allowing for a different backup pumping system to replace inventory in reactor pressure vessel (RPV).
- Pressure in the containment drywell rose as wetwell became hotter.
- The Drywell containment was vented to outside reactor building which surrounds the containment.
- Hydrogen produced from zirconium oxidation was vented from the containment into the reactor building.
- Hydrogen in reactor building exploded causing it to collapse around the containment.
- The containment around the reactor and RPV were reported to be intact.
- The decision was made to inject seawater into the RPV to continue to the cooling process, another backup system that was designed into the plant from inception.
- Radioactivity releases from operator initiated venting appear to be decreasing.

#### **Can it happen here in the US?**

- While there are risks associated with operating nuclear plants and other industrial facilities, the chances of an adverse event similar to what happened in Japan occurring in the US is small.
- Since September 11, 2001, additional safeguards and training have been put in place at US nuclear reactors which allow plant operators to cool the reactor core during an extended power outage and/or failure of backup generators – “blackout conditions.”

#### **Is a nuclear reactor "meltdown" a catastrophic event?**

- Not necessarily. Nuclear reactors are built with redundant safety systems. Even if the fuel in the reactor melts, the reactor's containment systems are designed to prevent the spread of radioactivity into the environment. Should an event like this occur, containing the radioactive materials could actually be considered a "success" given the scale of this natural disaster that had not been considered in the original design. The nuclear power industry will learn from this event, and redesign our facilities as needed to make them safer in the future.

### **What is the ANS doing?**

ANS has reached out to The Atomic Energy Society of Japan (AESJ) to offer technical assistance.

ANS has established an incident communications response team.

This team has compiling relevant news reports and other publicly available information on the ANS blog, which can be found at [ansnuclearcafe.org](http://ansnuclearcafe.org).

The team is also fielding media inquiries and providing reporters with background information and technical perspective as the events unfold.

Finally, the ANS is collecting information from publicly available sources, our sources in government agencies, and our sources on the ground in Japan, to better understand the extent and impact of the incident.

**Gibson, Kathy**

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**From:** Gibson, Kathy  
**Sent:** Monday, March 14, 2011 2:15 PM  
**To:** Scott, Michael  
**Subject:** Are you calling Sandia?

Do you know who the 6 NRC staff are going to Japan?

## **Gibson, Kathy**

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**From:** Gibson, Kathy  
**Sent:** Monday, March 14, 2011 5:33 PM  
**To:** Sheron, Brian; Scott, Michael; Uhle, Jennifer  
**Cc:** Santiago, Patricia; Tinkler, Charles  
**Subject:** Re: OPCEN SUPPORT - BWR SEVERE ACCIDENT ANALYSTS

If Jason is not being taxed and we need him on SOARCA, can we propose someone else in his place and he be on call?

---

**From:** Sheron, Brian  
**To:** Scott, Michael; Gibson, Kathy; Uhle, Jennifer  
**Cc:** Santiago, Patricia; Tinkler, Charles  
**Sent:** Mon Mar 14 17:24:51 2011  
**Subject:** RE: OPCEN SUPPORT - BWR SEVERE ACCIDENT ANALYSTS

Nope. My thanks to both Jason and Charlie for supporting the Op center.

---

**From:** Scott, Michael  
**Sent:** Monday, March 14, 2011 5:20 PM  
**To:** Gibson, Kathy; Uhle, Jennifer; Sheron, Brian  
**Cc:** Santiago, Patricia; Tinkler, Charles  
**Subject:** OPCEN SUPPORT - BWR SEVERE ACCIDENT ANALYSTS

Jason Schaperow has been there all day and has not been heavily tasked. We have proposed, and the RST lead agreed, that Charlie Tinkler be on call tonight, so we will not have someone sitting there until the wee hours.

Jason is on the Accident Analyst rotation so will be coming in Wednesday on the back shift.

Please let me know if you have any concerns or questions.

Mike

## Gibson, Kathy

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**From:** Gibson, Kathy  
**Sent:** Monday, March 14, 2011 8:31 PM  
**To:** Lee, Richard; Elkins, Scott; Hoxie, Chris; Santiago, Patricia; Bush-Goddard, Stephanie; Zaki, Tarek  
**Cc:** Scott, Michael  
**Subject:** Re: OpsCenter

No not at this point.

As I understand it, Tony Ulses and Jim Trapp from Region 1 have gone to Japan and Chuck Casto, John Monninger, Tony Nakanishi, Tim Kolb, Jack Foster and Richard Devercelly are going.

Besides Hossein and Mike, Tony Huffert, Casper Sun and Jason Schaperow have been on shifts at the Ops Center. Anybody else from DSA?

Thanks!

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

**From:** Lee, Richard  
**To:** Gibson, Kathy  
**Sent:** Mon Mar 14 20:13:07 2011  
**Subject:** RE: OpsCenter

Kathy:

Thanks, I will let them know. Do you whether Charlie or Jason is heading to Japan?

Richard

---

**From:** Gibson, Kathy  
**Sent:** Monday, March 14, 2011 7:31 PM  
**To:** Lee, Richard  
**Cc:** Elkins, Scott; Hoxie, Chris; Scott, Michael; Zaki, Tarek; Uhle, Jennifer  
**Subject:** Re: OpsCenter

Thanks Richard! And Mike and Hossein too!

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

**From:** Lee, Richard  
**To:** Gibson, Kathy  
**Cc:** Elkins, Scott; Hoxie, Chris; Scott, Michael; Zaki, Tarek  
**Sent:** Mon Mar 14 18:17:34 2011  
**Subject:** RE: OpsCenter

Mika Salay and Hossein Esmaili have already been assigned to staff the Ops Center since this weekend.

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

**From:** Gibson, Kathy

Sent: Monday, March 14, 2011 5:56 PM

To: Lee, Richard; Elkins, Scott; Hoxie, Chris; Scott, Michael; Zaki, Tarek

Subject: OpsCenter

Importance: High

Who do we have that can perform the duties of BWR severe accident analyst for the Ops Center?



## Gibson, Kathy

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**From:** Gibson, Kathy  
**Sent:** Monday, March 14, 2011 11:54 PM  
**To:** Skarda, Raymond; Uhle, Jennifer; Scott, Michael  
**Subject:** Re: Kotaro Tonoike and family

Thanks for passing this on to us Ray! We send Kotaro, his family and his colleagues our best wishes.

K

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

**From:** Skarda, Raymond  
**To:** Gibson, Kathy; Uhle, Jennifer; Scott, Michael  
**Sent:** Mon Mar 14 22:38:20 2011  
**Subject:** Kotaro Tonoike and family

I've just received a note at home from Kotaro Tonoike. His new born son and wife are safe in Osaka. He remains on call at JAEA and is responsible of securing/safing STACY/TRACY facilities.

He notes, "I have heard a news that NRC will respond to the official request from Japanese Government to aid the counter actions at Fukushima NPPs. I would like to express personally my greatest gratitude. Please give our best regards to anyone participating the aid actions of NRC if you know."

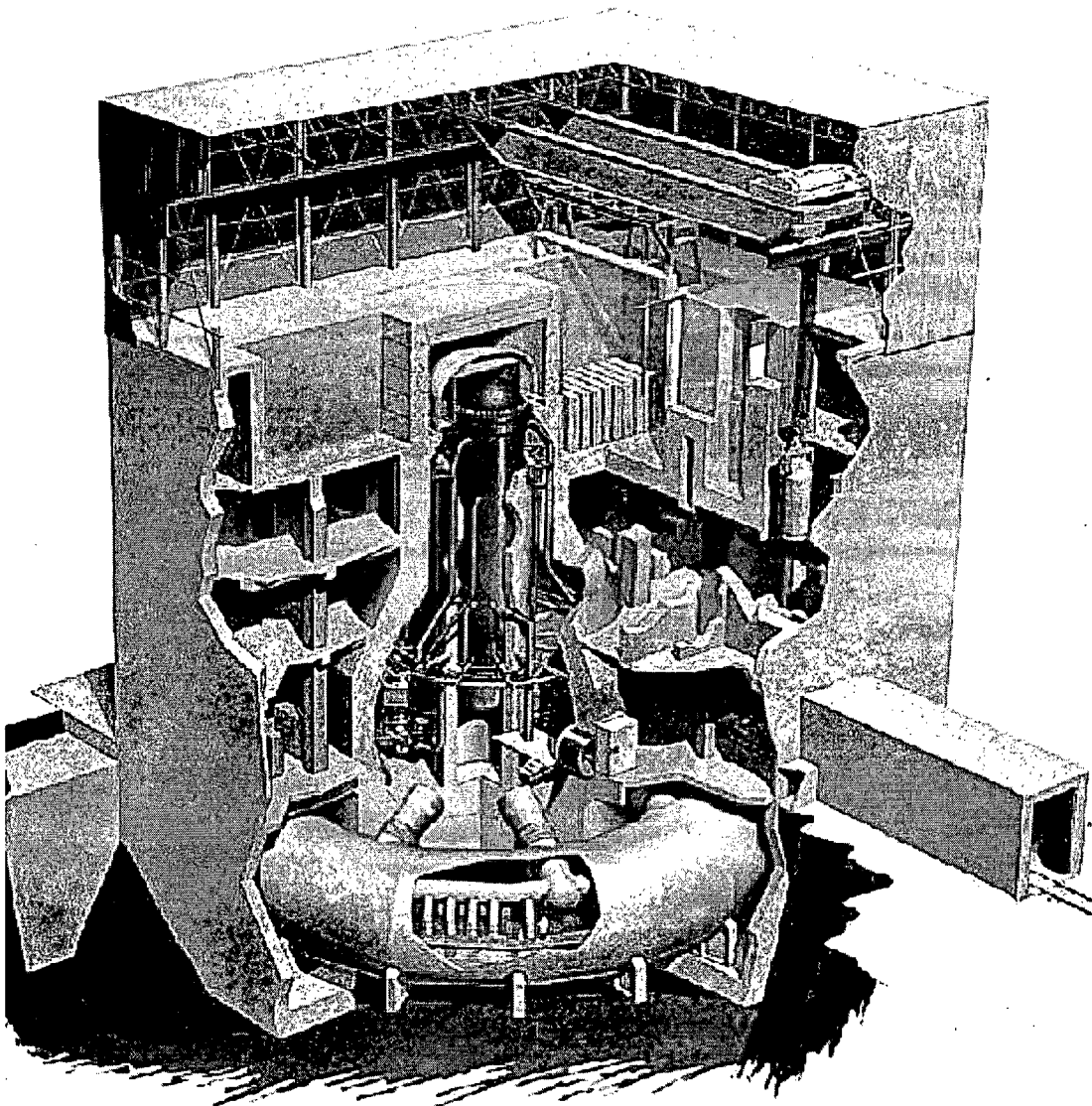
Ray

## Caponiti, Kathleen

**From:** Stevens, Gary *MSR*  
**Sent:** Monday, March 14, 2011 7:56 AM  
**To:** RES\_DE\_CIB; Case, Michael; Richards, Stuart  
**Subject:** Japanese Nuclear Situation  
**Attachments:** ANS Japan Backgrounder.pdf



Several folks have been asking me questions on this topic, so I thought I would share some facts with you from my background experience.

Amidst all of the sensationalizing and speculation coming out of Japan, below and attached is the first report I've seen that seems to contain some good rational facts from NEI and ANS about the Fukushima Unit 1 accident in Japan. Note that Fukushima Daiichi Unit 1 is a GE-designed BWR-3, RPV ID = 188", ~500 MWe, that has operated for about 40 years (entered service in 1971). The explosion you saw on TV was the reactor building (see below, top portion of building) due to hydrogen build-up, as explained in the attachment. The plant has a Mark I containment, which looks like this:



I have several friends in Japan from my days working at GE, some of whom were at the plant performing outage work. I am happy to report, based on an e-mail I received this a.m. containing correspondence from

one of them, that GE's crew of about 40 engineers made it out of the area safely. Under a separate e-mail, I will share that first-hand report anonymously with you.

Gary L. Stevens  
Senior Materials Engineer  
NRC/RES/DE/CIB  
 [Gary.Stevens@nrc.gov](mailto:Gary.Stevens@nrc.gov)  
 301-251-7569

March 13, 2011, 7 p.m. EDT Update

#### Fukushima Daiichi

The hydrogen explosion on March 11 between the primary containment vessel and secondary containment building of the reactor did not damage the primary containment vessel or the reactor core. To control the pressure of the reactor core, TEPCO began to inject seawater and boric acid into the primary containment vessels of Unit 1 on March 12 and Unit 3 on March 13. There is likely some damage to the fuel rods contained in reactors 1 and 3.

At both reactors 1 and 3, seawater and boric acid is being injected into the reactor using fire pumps. On reactor 3, a pressure relief valve in the containment structure failed to open, but was restored by connecting an air pressure to the line driving valve operation.

The water level in the reactor vessel of reactor 2 reactor is steady.

Personnel from TEPCO are closely monitoring the status of all three reactors.

The highest recorded radiation level at the Fukushima Daiichi site was 155.7 millirem at 1:52 p.m. on March 13. Radiation levels were reduced to 4.4 millirem by the evening of March 13. The NRC's radiation dose limit for the public is 100 millirem per year.

Japanese government officials acknowledged the potential for partial fuel meltdowns at Fukushima Daiichi Unit 1 and 3 reactors, but there is no danger for core explosion, as occurred at the nuclear power station at Chernobyl in 1986. Control rods have been successfully inserted at all of the reactors, thereby ending the chain reaction. The reactor cores at Fukushima Daiichi and Daini power stations are surrounded by steel and concrete containment vessels of 40 to 80 inches thick that are designed to contain radioactive materials.

#### Fukushima Daini

The Fukushima Daini plants remains in a state of emergency. There is electricity available at all four of the reactors at Fukushima Daini, although there is limited availability of the cooling water pumps at reactors 1, 2 and 4.

TEPCO is working to maintain constant cooling in the primary containment vessels of those reactors. No radioactivity has been recorded outside of the secondary containment buildings at Fukushima Daini, according to TEPCO.

Two other nuclear power plants in the Tohoku region, Onagawa Nuclear Power Station and Tokai Nuclear Power Station, were automatically shut down in response to the earthquake. The four reactors at these plants have functioning cooling systems and are being monitored by plant operators.

The Rokkasho Reprocessing Plant and accompanying facilities, located far north of the tsunami zone in Rokkasho Town, is operating safely on backup power generation systems.

Japanese nuclear facilities are designed to withstand powerful seismic events, such as earthquakes. In this earthquake—the strongest recorded over the past 100 years in Japan—the containment structures of Fukushima Daiichi maintained their structural integrity. These facilities were designed to withstand tsunamis within a range of assumed strength, however the force of the tsunami on March 10 exceeded the assumed range and flooded diesel generators at Fukushima Daiichi power station. This precipitating the loss of power for the reactor cooling systems.

The automatic shutdown of the 11 operating reactors at the Onagawa Nuclear Power Station, Tokai Nuclear Power Station, Fukushima Daiichi and Daini, represents a loss of 3.5% of electric generation capacity for Japan.

## **American Nuclear Society Backgrounder: Japanese Earthquake/Tsunami; Problems with Nuclear Reactors**

**3/12/2011 5:22 PM EST**

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The team is also fielding media inquiries and providing reporters with background information and technical perspective as the events unfold.

Finally, the ANS is collecting information from publicly available sources, our sources in government agencies, and our sources on the ground in Japan, to better understand the extent and impact of the incident.

5

**From:** Collins, Jay *NRK*  
**To:** Mitchell, Matthew *NRK*  
**Subject:** One for Jim  
**Date:** Monday, March 14, 2011 8:26:00 AM

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“The likelihood there will be a huge fire like at Chernobyl or a major environmental release like at Chernobyl, I think that’s basically impossible,” said James F. Stubbins, a nuclear energy professor at the University of Illinois.

[http://www.washingtonpost.com/world/2nd-explosion-rocks-japan-nuclear-plant-rods-at-another-reactor-fully-exposed/2011/03/14/ABsCDQU\\_story.html](http://www.washingtonpost.com/world/2nd-explosion-rocks-japan-nuclear-plant-rods-at-another-reactor-fully-exposed/2011/03/14/ABsCDQU_story.html)

Jay Collins  
(301)415-4038

A/176

20  
Hiland, Patrick

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From: Hiland, Patrick *NRR*  
Sent: Monday, March 14, 2011 8:27 AM  
To: McDermott, Brian *NRR*  
Subject: Co-ordination

Brian, is there a central location we can continue to update Q's and A's? When I left yesterday, we had started four "topical" groups of Q's and A's: 1) Chairman's 15; 2) RST Technical; 3) PMT Technical; and 4) Seismic/Tsunami. I've a couple of questions from the team that will require effort by NRR to answer in a broad sense, e.g. Status of Station Blackout in U.S., Flooding reviews in U.S., etc. Who do we want to control the Q's and the A's? I'll discuss at NRR's LT meeting this morning.

**Caponiti, Kathleen**

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**From:** Cumblidge, Stephen *NYC*  
**Sent:** Monday, March 14, 2011 9:00 AM  
**To:** Prokofiev, Iouri *RES*  
**Subject:** How about this

Iouri Prokofiev and I would like to extend our sympathies to the Japanese people in this difficult time. We would also like to express our support and thank the workers at the affected Japanese nuclear power plants for their heroic and ongoing efforts.

(I will add your signature)

Stephen Cumblidge  
Materials Engineer  
US Nuclear Regulatory Commission  
Mail Stop OWFN/9 H6  
Washington, DC 20555-0001

Telephone: (301) 415-2823 (Office)

Freeman, Stanley

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**From:** Wrona, David *NR*  
**Sent:** Monday, March 14, 2011 9:04 AM  
**To:** NRR\_DLR\_RPB2 Distribution; NRR\_DLR\_RPB1 Distribution  
**Subject:** Notes for DLR standup meeting

- Mid years are coming up (start thinking about input)
- Semi-annual report to Congress is coming up: Jeremy will start but will need input from plant PMs (stay tuned for request)
- Events in Japan were discussed, some DLR staff have been helping staff the Incident Response Center. We will be taking a look at seismic/other natural phenomena and its interaction with license renewal. Again, stay tuned.

Caponiti, Kathleen

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**From:** Lupold, Timothy, NRR  
**Sent:** Monday, March 14, 2011 9:06 AM  
**To:** Alley, David; Audrain, Margaret; Collins, Jay; Hoffman, Keith; Naujock, Don; Nove, Carol; Patnaik, Prakash; Rezai, Ali; Tsao, John; Wallace, Jay; Cumblidge, Stephen  
**Subject:** FW: American Nuclear Society Mailings on the Fukushima Incident  
**Attachments:** ANS Japan Backgrounder.pdf; ANS Talking Points - 2011-03-13 R1\_2.pdf

FYI. Some information regarding the events taking place at the Japanese Fukushima reactors.

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**From:** Cusumano, Victor, NRR  
**Sent:** Monday, March 14, 2011 8:57 AM  
**To:** Thomas, Brian; Lubinski, John; Hardies, Robert; Karwoski, Kenneth; Lupold, Timothy; McMurtray, Anthony; Mitchell, Matthew; Taylor, Robert  
**Subject:** American Nuclear Society Mailings on the Fukushima Incident

From the ANS...

Two attachments:

A short backgrounder on what is currently believed to be the operational chain of events at Fukushima, and second, the ANS/NEI "talking points" brief on implications on the US nuclear industry. This is what they are using during press briefings.

Caveat emptor... consider the source.

Vic

VICTOR CUSUMANO  
TECHNICAL ASSISTANT

NRR/DCI  
Phone: 301.415.4011  
Location: 0-09C10

## **American Nuclear Society Backgrounder: Japanese Earthquake/Tsunami; Problems with Nuclear Reactors**

**3/12/2011 5:22 PM EST**

**To begin, a sense of perspective is needed... right now, the Japanese earthquake/tsunami is clearly a catastrophe; the situation at impacted nuclear reactors is, in the words of IAEA, an "Accident with Local Consequences."**

The Japanese earthquake and tsunami are natural catastrophes of historic proportions. The death toll is likely to be in the thousands. While the information is still not complete at this time, the tragic loss of life and destruction caused by the earthquake and tsunami will likely dwarf the damage caused by the problems associated with the impacted Japanese nuclear plants.

### **What happened?**

Recognizing that information is still not complete due to the destruction of the communication infrastructure, producing reports that are conflicting, here is our best understanding of the sequence of events at the Fukushima I-1 power station.

- The plant was immediately shut down (scrammed) when the earthquake first hit. The automatic power system worked.
- All external power to the station was lost when the sea water swept away the power lines.
- Diesel generators started to provide backup electrical power to the plant's backup cooling system. The backup worked.
- The diesel generators ceased functioning after approximately one hour due to tsunami induced damage, reportedly to their fuel supply.
- An Isolation condenser was used to remove the decay heat from the shutdown reactor.
- Apparently the plant then experienced a small loss of coolant from the reactor.
- Reactor Core Isolation Cooling (RCIC) pumps, which operate on steam from the reactor, were used to replace reactor core water inventory, however, the battery-supplied control valves lost DC power after the prolonged use.
- DC power from batteries was consumed after approximately 8 hours.
- At that point, the plant experienced a complete blackout (no electric power at all).
- Hours passed as primary water inventory was lost and core degradation occurred (through some combination of zirconium oxidation and clad failure).

- Portable diesel generators were delivered to the plant site.
- AC power was restored allowing for a different backup pumping system to replace inventory in reactor pressure vessel (RPV).
- Pressure in the containment drywell rose as wetwell became hotter.
- The Drywell containment was vented to outside reactor building which surrounds the containment.
- Hydrogen produced from zirconium oxidation was vented from the containment into the reactor building.
- Hydrogen in reactor building exploded causing it to collapse around the containment.
- The containment around the reactor and RPV were reported to be intact.
- The decision was made to inject seawater into the RPV to continue to the cooling process, another backup system that was designed into the plant from inception.
- Radioactivity releases from operator initiated venting appear to be decreasing.

#### **Can it happen here in the US?**

- While there are risks associated with operating nuclear plants and other industrial facilities, the chances of an adverse event similar to what happened in Japan occurring in the US is small.
- Since September 11, 2001, additional safeguards and training have been put in place at US nuclear reactors which allow plant operators to cool the reactor core during an extended power outage and/or failure of backup generators – “blackout conditions.”

#### **Is a nuclear reactor "meltdown" a catastrophic event?**

- Not necessarily. Nuclear reactors are built with redundant safety systems. Even if the fuel in the reactor melts, the reactor's containment systems are designed to prevent the spread of radioactivity into the environment. Should an event like this occur, containing the radioactive materials could actually be considered a "success" given the scale of this natural disaster that had not been considered in the original design. The nuclear power industry will learn from this event, and redesign our facilities as needed to make them safer in the future.



**What is the ANS doing?**

ANS has reached out to The Atomic Energy Society of Japan (AESJ) to offer technical assistance.

ANS has established an incident communications response team.

This team has compiling relevant news reports and other publicly available information on the ANS blog, which can be found at [ansnuclearcafe.org](http://ansnuclearcafe.org).

The team is also fielding media inquiries and providing reporters with background information and technical perspective as the events unfold.

Finally, the ANS is collecting information from publicly available sources, our sources in government agencies, and our sources on the ground in Japan, to better understand the extent and impact of the incident.

The predominance of ANS members reside in the U.S. As we interact with our family, neighbors and citizens in our communities many questions will come based on news coverage of the nuclear power plant situation in Japan. These talking points key on the theme 'could it happen in the U.S.?' \*

### ANS Member Talking Points

#### Implications to U.S. nuclear energy program from the Japanese earthquake

It is premature for the technical community to draw conclusions from the earthquake and tsunami tragedy in Japan with regard to the U.S. nuclear energy program. Many opposed to nuclear power will try to use this event to call for changes in the U.S. Japan is facing beyond a "worst case" disaster since we, the technical community, did not hypothesize an event of this magnitude. Thus far, even the most seriously damaged of Japan's 54 reactors have not released radiation at levels that would harm the public. That is testament to the way professionals in our profession operate: our philosophy of defense in-depth, excellent designs, high standards of construction, conduct of operations, and most important the effectiveness of employees in following emergency preparedness planning.

The Nuclear Science and Technology (NS&T) community takes very seriously our commitment to safe operation of any nuclear facility and will incorporate lessons learned based on this experience into our safety and operating procedures. The ANS will facilitate the sharing of technical information so that these lessons receive wide distribution and be archived for future stewards of this technology. Some points to remember from this week:

- Nuclear power plants have proven their value to society in Japan, the United States and elsewhere. They provide large amounts of base load electricity on an around-the-clock basis, and they do so cost-effectively with the lowest electricity production costs of any large energy source. Both Japan and the United States have benefited greatly from nuclear energy; it has been instrumental in the nations' economic success over the past half century and their high standard of living.
- Our hallmark as a NS&T organization is to incorporate operating experience and lessons learned. When we fully understand the facts surrounding the event in Japan, we will share, document and use those insights to make NS&T even safer.
- Nuclear energy has been and will continue to be a key element in meeting America's energy needs. The nuclear industry sets the highest standards for safety and, through our focus on continuous learning; we will incorporate lessons learned from the events in Japan. The dominant factors determining technology used for new generation will be demand for new generation, the competitiveness of nuclear energy in comparison with other sources of electricity generation, and the continued safe operation of U.S. nuclear power plants.

- There has not been a rush to judgment on the part of U.S. policymakers during the first few days of this situation. We believe that is due in part to the recognition on their part that nuclear energy must continue to play a key role in a diversified energy portfolio that strengthens U.S. energy security and fuels economic growth.

\* The genesis of this document is the NEI "Talking Points - Implications to U.S. nuclear energy program of the Japanese earthquake" dated March 13, 2011

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\* The genesis of this document is the NEI "Talking Points - Implications to U.S. nuclear energy program of the Japanese earthquake" dated March 13, 2011

Heida, Bruce

Heida, Bruce

**From:** Sancaktar, Selim  
**Sent:** Monday, March 14, 2011 9:23 AM  
**To:** Coyne, Kevin; Kuritzky, Alan  
**Cc:** Sancaktar, Selim; Demoss, Gary; Ferrante, Fernando; Mitman, Jeffrey  
**Subject:** In case somebody asks .....

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

IN SPAR all hazards models, we explicitly model the CDF phase of a seismic event sequence like the one happened to Fukushima 1.

In fact, we have the model for a similar GE 3 domestic plant, Monticello.

61  
**Valentine, Nicholee**

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**From:** Dudley, Richard, NRP  
**Sent:** Monday, March 14, 2011 9:59 AM  
**To:** Jolicoeur, John, NRP  
**Subject:** FW: Fukushima Event Status as of this morning  
**Attachments:** Fukushima\_event-status. (12.30) Mar 14.pdf

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**From:** Richter, Brian, NRP  
**Sent:** Monday, March 14, 2011 9:05 AM  
**To:** Bill Long; Reed, Timothy; Dudley, Richard; Inverso, Tara  
**Subject:** FW: Fukushima Event Status as of this morning

FYI

The attached was a Japanese press release.



Status of nuclear power plants in Fukushima as of 12:30 March 14 (Estimated by JAIF)

Power Station	Fukushima #1 Nuclear Power Station					
Unit	1	2	3	4	5	6
Power output (MWe)	460	784	784	784	784	1100
Type of Reactor	BWR-3	BWR-4	BWR-4	BWR-4	BWR-4	BWR-5
Operational Status at the earthquake occur	Service	Service	Service	Outage	Outage	Outage
Fuel Integrity	Damaged	Not Damaged	Damaged	Not Damaged	Not Damaged	Not Damaged
Containment Integrity	Not Damaged	Not Damaged	Not Damaged	Not Damaged	Not Damaged	Not Damaged
Core coolabilit-1 (ECCS/RHR)	Not Functional	Not Functional	Not Functional	Not necessary	Not necessary	Not necessary
Core coolabilit-2 (RCIC/MUWC)	Not Functional	RCIC Working	Not Functional	Not necessary	Not necessary	Not necessary
Building Integrity	Damaged	Not Damaged	Damaged	Not Damaged	Not Damaged	Not Damaged
Environmental effect	Radiation monitor detect radiation increase in the environment (NPS boarder: 20 $\mu$ Sv/h at 11:44AM)					
water level of the pressure vessel	Unknown	Above the top	Unknown	Safe	Safe	Safe
pressure of the pressure vessel	Stable	Stable	Stable	Safe	Safe	Safe
Containment pressure	Stable	Stable	Stable	Safe	Safe	Safe
Sea water injection to core	Suspended	To be decided	Done	Not necessary	Not necessary	Not necessary
Containment venting	Done	Preparing	Done	Not necessary	Not necessary	Not necessary
Evacuation Area	20km from NPS					
INES	Level 4 (estimated by NISA)					

Power Station	Fukushima #2 Nuclear Power Station			
Unit	1	2	3	4
Power output (MWe)	1100	1100	1100	1100
Type of Reactor	BWR-5	BWR-5	BWR-5	BWR-5
Status at the earthquake occurred	Service	Service	Service	Service
Fuel Integrity	Not Damaged	Not Damaged	Not Damaged	Not Damaged
Containment Integrity	Not Damaged	Not Damaged	Not Damaged	Not Damaged
Core coolabilit-1 (ECCS/RHR)	Functioning	Not Functional	Functioning	Not Functional
Core coolabilit-2 (RCIC/MUWC)	Not necessary	Functioning	Not necessary	Functioning
Building Integrity	Not Damaged	Not Damaged	Not Damaged	Not Damaged
Environmental effect	Stable (NPS boarder: 0.038 $\mu$ Sv/h at 8AM)			
water level of the pressure vessel	(No info )	(No info )	(No info )	(No info )
pressure of the pressure vessel	(No info )	(No info )	(No info )	(No info )
Containment pressure	(No info )	Increase	(No info )	Increase
Sea water injection to core	Not necessary	to be decided	Not necessary	to be decided
Containment venting	Not necessary	to be decided	Not necessary	to be decided
Evacuation Area	10km from NPS			
INES	(No Info)			

Source:

Governmental Emergency Headquarters: News Release (10:30), Press conference (11:45)

NISA (Nuclear and Industrial Safety Agency): News Release (7:30)

Tokyo Electric Powe Co.: Prsss Release (6:01, 8:00), Press Conference (12:10)

Abbreviations:

ECCS: Emergency Core Cooling System

RHR: Residual Heat Removal System

RCIC: Reactor Core Isolation Cooling System

MUWC: Make-Up Water Condensate System

INES: International Nuclear Event Scale



**Cartwright, William**

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**From:** Pannier, Stephen, *NRR*  
**Sent:** Monday, March 14, 2011 10:21 AM  
**To:** King, Mark; Garmon-Candelaria, David  
**Cc:** NRR\_DIRS Distribution  
**Subject:** RE: NISA in English - LATEST INFO ON JAPANESE REACTORS / ON-GOING NUCLEAR EMERGENCY

From the most recent TEPCO release, looks like RCIC at Fukushima Daiichi Unit 2 has failed...

<http://www.tepco.co.jp/en/press/corp-com/release/11031403-e.html>

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**From:** King, Mark, *NRR*  
**Sent:** Monday, March 14, 2011 6:52 AM  
**To:** Garmon-Candelaria, David  
**Cc:** NRR\_DIRS Distribution  
**Subject:** FW: NISA in English - LATEST INFO ON JAPANESE REACTORS / ON-GOING NUCLEAR EMERGENCY

FYI

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**From:** King, Mark, *NRR*  
**Sent:** Monday, March 14, 2011 6:50 AM  
**To:** Thomas, Eric  
**Subject:** FW: NISA in English - LATEST INFO ON JAPANESE REACTORS / ON-GOING NUCLEAR EMERGENCY

March 14, 2011

**Japanese Nuclear and Industrial Safety Agency (NISA) -**

**An explosion caused by hydrogen at Unit 3 of Fukushima Dai-ichi NPS (the 2nd release)**

**TEPCO reported NISA that there was an explosion at Unit 3 of Fukushima Dai-ichi Nuclear Power Station, NPS, at 11:01. ← (Japan time)**

**According to TEPCO, the containment vessel of the unit was not broken. Detail information is under investigation.**

**The wind condition is calm and the direction of the wind above the station is the west or the southwest.**

**Residents living within the area at least 20 km radius from Fukushima Dai-ichi NPS are requested to shelter in buildings or houses.**

**TEPCO reported to NISA that one person was injured at Fukushima Dai-ichi NPS at this time. TEPCO is preparing to transfer the person to Fukushima Dai-ichi NPS. (Contact Person)**

**Mr. Toshihiro Bannai**

**Director, International Affairs Office,  
NISA/METI**

**Phone: +81-(0)3-3501-1087**

**SOURCE of above info: <http://www.nisa.meti.go.jp/english/files/en20110314-2.pdf>**

**NOTE: NEWS REPORTS SAY THAT SIX WORKERS WERE INJURED.**

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Source of below: <http://www.nisa.meti.go.jp/english/files/en20110314-1.pdf>



March 14, 2011

• Nuclear and Industrial Safety Agency

Seismic Damage Information(the 22<sup>th</sup> Release)

(As of 07:30 March 14, 2011)

– Japan Time

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)

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)

0.038 microSv/h (19:00 March 13)

→ 0.037 microSv/h (05:00 March 14)

MP4 (Monitoring at the North/West End of Site Boundary)

0.036 microSv/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)

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- 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 March 13)

→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-ichi notified NISA of the situation of the

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

18:33: Units 1,2 and 4 of Fukushima Dai-ichi 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 Ooka 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

(March 12)

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

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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 from Prime Minister and pursuant to Paragraph 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-ichi 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 Dai-ichi NPS.

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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 Mayors of Ooka-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.

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<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.)

9

(Contact Person)

Mr. Toshihiro Bannai

Director, International Affairs Office,  
NISA/METI

Phone: +81-(0)3-3501-1087

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**From:** Wegner, Mary

**Sent:** Saturday, March 12, 2011 4:05 PM

**To:** Beasley, Benjamin; Criscione, Lawrence; King, Mark; Thomas, Eric; Breskovic, Clarence; Bernardo, Robert; Sigmon, Rebecca; Sigmon, Rebecca; Tabatabai, Omid

**Subject:** NISA in English

<http://www.nisa.meti.go.jp/english/index.html>

note MAY you need to **hit refresh** to get the latest info.

**Caponiti, Kathleen**

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**From:** Klein, Paul *NR*  
**Sent:** Monday, March 14, 2011 12:21 PM  
**To:** Karwoski, Kenneth; Hardies, Robert  
**Subject:** FW: Link to Japan Nuke Plant Status Table

---

**From:** Lehning, John *NR*  
**Sent:** Monday, March 14, 2011 12:04 PM  
**To:** Smith, Stephen; Bailey, Stewart  
**Cc:** Klein, Paul  
**Subject:** RE: Link to Japan Nuke Plant Status Table

Oh, here is an updated version – current as of 7:30 this morning:  
[http://www.jaif.or.jp/english/news/2011/110314fukushima\\_event-status-2.pdf](http://www.jaif.or.jp/english/news/2011/110314fukushima_event-status-2.pdf)

This is the mother site that may have updates: <http://www.jaif.or.jp/english/>

---

**From:** Smith, Stephen *NR*  
**Sent:** Monday, March 14, 2011 11:36 AM  
**To:** Lehning, John; Bailey, Stewart  
**Subject:** RE: Link to Japan Nuke Plant Status Table

John and Stew,

Here is the source. The chart is on the main web page along with some news about the Japanese reactors. If you click on the top story there is a link on the next page that sends you to a readable copy of the chart. It hasn't been updated since the one that John sent out.

<http://www.neimagazine.com/>

Steve

---

**From:** Lehning, John *NR*  
**Sent:** Monday, March 14, 2011 11:23 AM  
**To:** Smith, Stephen  
**Subject:** FW: Link to Japan Nuke Plant Status Table

Some info on plant status.

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**From:** Lehning, John  
**Sent:** Monday, March 14, 2011 9:34 AM  
**To:** Klein, Paul  
**Subject:** Link to Japan Nuke Plant Status Table

[http://www.neimagazine.com/journals/Power/NEI/April\\_2011/attachments/110314fukushima\\_event-status-1.pdf](http://www.neimagazine.com/journals/Power/NEI/April_2011/attachments/110314fukushima_event-status-1.pdf)



## Khanna, Meena

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**From:** Thomas, George *NGR*  
**Sent:** Monday, March 14, 2011 1:08 PM  
**To:** *NGR* Khanna, Meena; Manoly, Kamal; Farzam, Farhad; Basavaraju, Chakrapani; Jessup, William; Hoang, Dan; Tsirigotis, Alexander; Uribe, Juan  
**Subject:** FW: Update on Japan Situation  
**Attachments:** ANS Japan Backgrounder.pdf

All,  
FYI - The attached from ANS gives a good summary of what happened at the Japanese nuclear power plants.  
Thanks.  
George

## **American Nuclear Society Backgrounder: Japanese Earthquake/Tsunami; Problems with Nuclear Reactors**

**3/12/2011 5:22 PM EST**

**To begin, a sense of perspective is needed... right now, the Japanese earthquake/tsunami is clearly a catastrophe; the situation at impacted nuclear reactors is, in the words of IAEA, an "Accident with Local Consequences."**

The Japanese earthquake and tsunami are natural catastrophes of historic proportions. The death toll is likely to be in the thousands. While the information is still not complete at this time, the tragic loss of life and destruction caused by the earthquake and tsunami will likely dwarf the damage caused by the problems associated with the impacted Japanese nuclear plants.

### **What happened?**

Recognizing that information is still not complete due to the destruction of the communication infrastructure, producing reports that are conflicting, here is our best understanding of the sequence of events at the Fukushima I-1 power station.

- The plant was immediately shut down (scrammed) when the earthquake first hit. The automatic power system worked.
- All external power to the station was lost when the sea water swept away the power lines.
- Diesel generators started to provide backup electrical power to the plant's backup cooling system. The backup worked.
- The diesel generators ceased functioning after approximately one hour due to tsunami induced damage, reportedly to their fuel supply.
- An Isolation condenser was used to remove the decay heat from the shutdown reactor.
- Apparently the plant then experienced a small loss of coolant from the reactor.
- Reactor Core Isolation Cooling (RCIC) pumps, which operate on steam from the reactor, were used to replace reactor core water inventory, however, the battery-supplied control valves lost DC power after the prolonged use.
- DC power from batteries was consumed after approximately 8 hours.
- At that point, the plant experienced a complete blackout (no electric power at all).
- Hours passed as primary water inventory was lost and core degradation occurred (through some combination of zirconium oxidation and clad failure).

- Portable diesel generators were delivered to the plant site.
- AC power was restored allowing for a different backup pumping system to replace inventory in reactor pressure vessel (RPV).
- Pressure in the containment drywell rose as wetwell became hotter.
- The Drywell containment was vented to outside reactor building which surrounds the containment.
- Hydrogen produced from zirconium oxidation was vented from the containment into the reactor building.
- Hydrogen in reactor building exploded causing it to collapse around the containment.
- The containment around the reactor and RPV were reported to be intact.
- The decision was made to inject seawater into the RPV to continue to the cooling process, another backup system that was designed into the plant from inception.
- Radioactivity releases from operator initiated venting appear to be decreasing.

#### **Can it happen here in the US?**

- While there are risks associated with operating nuclear plants and other industrial facilities, the chances of an adverse event similar to what happened in Japan occurring in the US is small.
- Since September 11, 2001, additional safeguards and training have been put in place at US nuclear reactors which allow plant operators to cool the reactor core during an extended power outage and/or failure of backup generators – “blackout conditions.”

#### **Is a nuclear reactor "meltdown" a catastrophic event?**

- Not necessarily. Nuclear reactors are built with redundant safety systems. Even if the fuel in the reactor melts, the reactor's containment systems are designed to prevent the spread of radioactivity into the environment. Should an event like this occur, containing the radioactive materials could actually be considered a "success" given the scale of this natural disaster that had not been considered in the original design. The nuclear power industry will learn from this event, and redesign our facilities as needed to make them safer in the future.

### **What is the ANS doing?**

ANS has reached out to The Atomic Energy Society of Japan (AESJ) to offer technical assistance.

ANS has established an incident communications response team.

This team has compiling relevant news reports and other publicly available information on the ANS blog, which can be found at [ansnuclearcafe.org](http://ansnuclearcafe.org).

The team is also fielding media inquiries and providing reporters with background information and technical perspective as the events unfold.

Finally, the ANS is collecting information from publicly available sources, our sources in government agencies, and our sources on the ground in Japan, to better understand the extent and impact of the incident.

**Cohen, Shari**

---

**From:** Leeds, Eric *ELR*  
**Sent:** Monday, March 14, 2011 1:11 PM  
**To:** *RIV* ← Collins, Elmo; Satorius, Mark; McCree, Victor; Dean, Bill; Sheron, Brian; Tracy, Glenn; Hudson, Jody; Johnson, Michael; Miller, Charles; Haney, Catherine; Zimmerman, Roy; Stewart, Sharon; Virgilio, Martin; Weber, Michael; Borchardt, Bill; Mamish, Nader; Doane, Margaret; Muessele, Mary  
**Cc:** Boger, Bruce; Grobe, Jack; Ruland, William; Meighan, Sean  
**Subject:** Confirmation of names for Japan

Folks –

Thanks so much for your help – we have a strong database of names/expertise to support the Japanese. For this first wave, we are sending Chuck Casto, John Monninger, Tony Nakanishi, Tim Kolb, Jack Foster and Richard Devercelly. I believe that Bruce Boger has contacted all those going to join Tony Ulsis and Jim Trapp in Japan.

I imagine that at some point we may need to send a second wave of responders to relieve our first wave. We will let you know as soon as we know if this needs to be done. We are also sensitive not to over-burden any one office.

Thanks again for your support!

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

## Hiland, Patrick

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**From:** Hiland, Patrick *NRR*  
**Sent:** Monday, March 14, 2011 1:18 PM  
**To:** Brown, Frederick; Ruland, William; McGinty, Tim; Skeen, David; Thomas, Eric; Thorp, John; Glitter, Joseph  
**Cc:** Boger, Bruce  
**Subject:** RE:

Looks good; be sure to include other offices that are working on this effort (e.g. RES has drafted a section on seismic and continue to brainstorm questions). I'm assuming that Eric will act as filter, as best he can, to avoid duplication.

---

**From:** Brown, Frederick *NRR*  
**Sent:** Monday, March 14, 2011 1:11 PM  
**To:** Hiland, Patrick; Ruland, William; McGinty, Tim; Skeen, David; Thomas, Eric; Thorp, John; Glitter, Joseph  
**Cc:** Boger, Bruce  
**Subject:**  
**Importance:** High

Drafted the message below for Eric to send to all NRR staff. Does this look like a reasonable scope?

-----  
As you are all aware from the Agency wide e-mails, the NRC Operations Center is being manned 24 hours a day to support monitoring of the situation in Japan. Many of your NRR colleagues are involved with this effort.

Here in NRR, we can look forward in the coming days and months to many questions about the situation in Japan and the relevance to domestic nuclear facilities. The staff in the Operations Center has already been working on these types of questions and answers. It will be important to maintain effective communication and coordination between the work done in the Office, and the work done in the Operations Center.

In an effort to minimize disruption of Operations Center activities, NRR has designated Eric Thomas ([eric.thomas@nrc.gov](mailto:eric.thomas@nrc.gov)) in NRR's Operating Experience Branch to be the focused single point of contact for information requests that NRR staff may have for the Reactor Safety and Preventative Measures Teams in the Operations Center.

If you are assigned a task involving event questions and answers, please let Eric know so that he can coordinate with the Operations Center to ensure that we are providing consistent responses. If you are contacted directly by staff in the Operations Center, please respond to the request promptly, and provide an electronic copy of your response to Eric so that he can maintain the response for future use by others.

Plan and to for: email for FOIA - 2011-0119  
Feintuch, Karl

From: Riemer, Kenneth  
Sent: Monday, March 14, 2011 2:02 PM  
To: Scarbeary, April; Ramirez, Frances; Ruiz, Robert; Haeg, Lucas; Murray, Robert; Thomas, Christopher; Voss, Patricia; Shah, Nirodh; Feintuch, Karl  
Cc: Riemer, Kenneth  
Subject: Japanese event

Just a quick update based on what we've heard so far. Just a couple of caveats and general info:

- As Nick indicated in his e-mail, if you get any requests for info or status, forward them to the HOO. That way the agency will have one voice.
- It's frustrating, but we have very little factual info as an agency. What we've been getting has been through the State Dept.
- The Japanese regulatory body is very mature, sophisticated and technically competent, as is the Japanese industry so the NRC is being very careful to not interfere or imply that they are not equipped to handle the reactor events.
- The NRC has sent 2 people over with the potential to send some more.
- The plants appear to have survived the earthquake pretty well, but lost the EDG fuel oil supplies (therefore complete station blackout situation) when the tsunami hit. EDG fuel oil tanks were above ground design.
- Repeat of first bullet – if you get any inquiries, send them to the HOO

The site has 6 reactors; three were operating and the other three were shut down for maintenance at the time of the earthquake. For the operating units:

**Unit 1:** similar design to Dresden with iso-condenser. core damage is likely. Core coverage is uncertain. Injecting borated sea water to the core, but have now lost that capability. Hydrogen explosion and have lost secondary containment, but believe primary containment is intact. Venting fission product daughters off-site, but prevailing winds are out to sea.

**Unit 2:** similar design to Quad Cities/Duane Arnold. in the best (very relative term) shape of the three previously operating reactors. Were operating on RCIC but that is now lost. Primary and secondary containment believed intact, however anticipate that a hydrogen explosion is imminent.

**Unit 3:** similar design to Quad Cities/Duane Arnold. hydrogen explosion yesterday with breach of secondary containment. Injecting seawater into the core

Boiling in the spent fuel pools – feeding as able with seawater.

I'll provide more tomorrow if we get it.

Ken

**Manoly, Kamal**

---

**From:** Tsirigotis, Alexander *in KR*  
**Sent:** Monday, March 14, 2011 2:09 PM  
**To:** Thomas, George; Khanna, Meena; Manoly, Kamal; Farzam, Farhad; Basavaraju, Chakrapani; Jessup, William; Hoang, Dan; Uribe, Juan  
**Subject:** FYI, Fukushima Dai-ichi; reactor types

There are 6 BWR units in Fukushima Daiichi and 4 BWRs in Fukushima Daini.

U1 → 439 MWe, GE Rx, commercial 1971, AE Ebasco  
U2 → 760 MWe, GE Rx, commercial 1974, AE Ebasco  
U3 → 760 MWe, Toshiba Rx, commercial 1976, AE Toshiba  
U4 → 760 MWe, Hitachi Rx, commercial 1978, AE Hitachi  
Etc ...

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**From:** Thomas, George *in KR*  
**Sent:** Monday, March 14, 2011 1:08 PM  
**To:** Khanna, Meena; Manoly, Kamal; Farzam, Farhad; Basavaraju, Chakrapani; Jessup, William; Hoang, Dan; Tsirigotis, Alexander; Uribe, Juan  
**Subject:** FW: Update on Japan Situation

All,  
FYI - The attached from ANS gives a good summary of what happened at the Japanese nuclear power plants.  
Thanks.  
George



**Ross, Robin**

---

**From:** Nguyen, Quynh, *NRP*  
**Sent:** Monday, March 14, 2011 4:02 PM  
**To:** Stone, Rebecca, *NSIR*  
**Subject:** FW: (Action) Tsunami Fact Sheet - NUREG issued in March 2009 Link  
**Attachments:** Natural Phenomena Limitations.wpd

Rebecca,

OK, here's the official tasking... Sorry for putting you on the spot – Eric Leeds (NRR Office Director) was in my office. Jack Grobe is my direct supervisor.

Sean Meighan is my equivalent so keep him in the loop as you gather the requested documents.

I will set up the SharePoint and give you Contributor Rights.

I'll be out on Thursday as I'll be celebrating St. Patty's Day and March Madness (I'm gonna be at the opening rounds at Verizon – I hope there is a team I dislike so I can distract them at the foul line!).

Given recent events, I'll have to be good so I can come back to the office on Friday!

Thanks for your support – looks like you are making a name for yourself – well done!  
Quynh

---

**From:** Leeds, Eric, *NRP*  
**Sent:** Monday, March 14, 2011 3:39 PM  
**To:** Grobe, Jack; Virgilio, Martin; Weber, Michael  
**Cc:** Nguyen, Quynh; Ruland, William; Skeen, David; Brown, Frederick; Brenner, Eliot; Collins, Elmo; Dean, Bill; Satorius, Mark; McCree, Victor; Schmidt, Rebecca; Boger, Bruce  
**Subject:** FW: (Action) Tsunami Fact Sheet - NUREG issued in March 2009 Link

FYI – I've asked Quynh Nguyen to work with the Ops Center to create a share-point site to house our Q&As from the Japanese quake and tsunami. Attached is a list of Q&As we created during the last tsunami, which we should consider. The regions requested Q&As to support their EOC meetings next week with members of the public. I'd like to have something completed by the end of the week for the regions.

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

---

**From:** Boger, Bruce, *NRP*  
**Sent:** Monday, March 14, 2011 9:21 AM  
**To:** Leeds, Eric  
**Subject:** FW: (Action) Tsunami Fact Sheet - NUREG issued in March 2009 Link

FYI—this is a knowledge management challenge. We've collected information in the past, but we have to drag it out and it's not available in the Ops center.

---

**From:** King, Mark, NRP  
**Sent:** Monday, March 14, 2011 7:23 AM  
**To:** Boger, Bruce; Brown, Frederick; Thorp, John  
**Cc:** Thomas, Eric  
**Subject:** RE: (Action) Tsunami Fact Sheet - NUREG issued in March 2009 Link

I think the attached is what Bruce is referring to – a natural phenomena limitations document. See attached.

---

**From:** Boger, Bruce, NRP  
**Sent:** Monday, March 14, 2011 7:20 AM  
**To:** Brown, Frederick; King, Mark; Thorp, John  
**Cc:** Thomas, Eric  
**Subject:** RE: (Action) Tsunami Fact Sheet - NUREG issued in March 2009 Link

Great. Thanks. This is a start. I still remember something that was created to provide some plant-specific protection information. (e.g., Diablo Canyon has some tsunami protection). I believe we explored west coast plants for tsunamis and east coast plants for hurricane flooding protection. If you can't find it easily (or if Bruce's gray matter failed again), please reach out to the west coast plant PMs to see what tsunami protection they have. I suspect we'll receive some cards and letters. Thanks again.

---

**From:** Brown, Frederick, NRP  
**Sent:** Monday, March 14, 2011 7:10 AM  
**To:** King, Mark; Thorp, John  
**Cc:** Thomas, Eric; Boger, Bruce  
**Subject:** RE: (Action) Tsunami Fact Sheet - NUREG issued in March 2009 Link

Thanks Mark

---

**From:** King, Mark, NRP  
**Sent:** Monday, March 14, 2011 7:08 AM  
**To:** Thorp, John; Boger, Bruce  
**Cc:** Brown, Frederick; Thomas, Eric  
**Subject:** RE: (Action) Tsunami Fact Sheet - NUREG issued in March 2009 Link

We had a NUREG issued on this subject back in March 2009.

**TSUNAMI HAZARD ASSESSMENT AT NUCLEAR POWER PLANT SITES IN THE UNITED STATES OF AMERICA**

Click link to view: **[NUREG/CR-6966]**

<http://pbadupws.nrc.gov/docs/ML0915/ML091590193.pdf>

---

**From:** Thorp, John, NRP  
**Sent:** Monday, March 14, 2011 6:57 AM  
**To:** Boger, Bruce  
**Cc:** Brown, Frederick; King, Mark; Thomas, Eric  
**Subject:** RE: (Action) Tsunami Fact Sheet

We'll look for it; If we don't find it quickly, we'll start producing one. (Mark King, please start looking)

I take it we would define & describe the tsunami phenomena, then address which nuclear stations in the U.S. are located in areas subject to tsunami waves, and describe what we can regarding the design of plants to withstand tsunami impacts?

Thanks,

John

---

**From:** Boger, Bruce, *NBP*  
**Sent:** Monday, March 14, 2011 6:48 AM  
**To:** Thorp, John  
**Cc:** Brown, Frederick  
**Subject:** Tsunami Fact Sheet

I seem to recall that OpE developed a tsunami fact sheet? Should we dust it off?

### Nuclear Power Plant Design for Natural Phenomena

The NRC regulations require that nuclear power plants be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, and tsunamis. Nuclear power plant design reflects consideration of the most severe natural phenomena that have been historically reported for the plant site and surrounding area. The design also provides sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated. Additionally, the design considers the appropriate combinations of the effects of the natural phenomena with the effects of normal and accident conditions at the plant.

Each nuclear power plant is, therefore, designed to a specific magnitude or strength of a natural phenomenon that is appropriate for the plant site and surrounding area. For example, a nuclear power plant in Texas or Florida (where earthquakes are of small magnitude and rarely occur) would not be designed for the same earthquake loading as a nuclear power plant in California (where earthquakes are more severe and common).

The attached table shows some examples of design values of natural phenomena for the Waterford Steam Electric Station, Unit 3 (Waterford-3), the River Bend Station (River Bend), South Texas Project, Units 1 and 2 (STP), Wolf Creek Generating Station, Unit 1 (Wolf Creek), Diablo Canyon Nuclear Power Plant, Units 1 and 2 (Diablo Canyon), Duane Arnold Energy Center (Duane Arnold), and Grand Gulf Nuclear Station, Unit 1 (Grand Gulf).

TABLE 1 - Comparison of Plant-Specific Design Values for Selected Natural Phenomena

PLANT	EARTHQUAKE (ground acceleration, g)		TORNADO WIND SPEED (mph)		SUSTAINED WIND (mph)	FLOOD height above grade (ft)	TSUNAMI/Storm Surge height above grade (ft)
	SSE <sup>1</sup> (horz.)	SSE (vert.)	Translational Speed (mph)	Tangential Speed (mph)			
Waterford-3	0.10	0.07	60	300	200 at 30 ft.	15.5	14.5
River Bend	0.15	0.10	70	290	100 at 30 ft.	N/A <sup>2</sup>	N/A <sup>3</sup>
STP	0.10	0.07g	70	290	125 at 30 ft.	23	N/A <sup>3</sup>
Wolf Creek	0.20/ 0.12 <sup>4</sup>	0.20/ 0.12 <sup>4</sup>	70	290	100 at 30 ft.	N/A <sup>2</sup>	N/A <sup>5,6</sup>
Diablo Canyon	0.20	0.13	43	157	80 <sup>7</sup>	N/A <sup>2</sup>	N/A <sup>2</sup>
Duane Arnold	0.12	0.10	60	300	105-145 <sup>8</sup>	12	N/A <sup>5</sup>
Grand Gulf	0.15	0.10	70	290	90 at 30 ft.	N/A <sup>2</sup>	N/A <sup>3</sup>

<sup>1</sup> Safe Shutdown Earthquake

<sup>2</sup> Maximum flood level or tsunami/storm surge is below grade

<sup>3</sup> Tsunami is not a credible event in the Gulf Coast

<sup>4</sup> Power-block/non-power-block

<sup>5</sup> Not a coastal plant

<sup>6</sup> Remote from large bodies of water

<sup>7</sup> Gust factor of 1.1 will apply

<sup>8</sup> Depending on height

**Caponiti, Kathleen**

---

**From:** Smith, Stephen , *NR*  
**Sent:** Monday, March 14, 2011 3:43 PM  
**To:** Klein, Paul; Bailey, Stewart; Lehning, John  
**Subject:** Earthquakes in the Last 7 Days

See attached from the USGS. The 8.9 is way down the list. I think this is all earthquakes in the last 7 days greater than Magnitude 5. Almost all near Japan. Pretty interesting.

[http://earthquake.usgs.gov/earthquakes/recenteqsww/Quakes/quakes\\_big.php](http://earthquake.usgs.gov/earthquakes/recenteqsww/Quakes/quakes_big.php)

Steve  
415-3190

*A/1911*

7

**Cartwright, William**

---

**From:** Brown, Frederick *NRR*  
**Sent:** Monday, March 14, 2011 4:46 PM  
**To:** Boger, Bruce; Leeds, Eric *NRR*  
**Cc:** Grobe, Jack  
**Subject:** FW: POC for Japanese Earthquake questions

**Importance:** High

Only comment that I got about the text below was including other Offices, which I defer to you on (not sure how much authority you want to assert about other people's staff). If you agree, you could cut the text below the dotted line into an e-mail to all NRR staff.

---

**From:** Brown, Frederick *NRR*  
**Sent:** Monday, March 14, 2011 1:11 PM  
**To:** Hiland, Patrick; Ruland, William; McGinty, Tim; Skeen, David; Thomas, Eric; Thorp, John; Glitter, Joseph  
**Cc:** Boger, Bruce  
**Subject:**  
**Importance:** High

Drafted the message below for Eric to send to all NRR staff. Does this look like a reasonable scope?

-----  
As you are all aware from the Agency wide e-mails, the NRC Operations Center is being manned 24 hours a day to support monitoring of the situation in Japan. Many of your NRR colleagues are involved with this effort.

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In an effort to minimize disruption of Operations Center activities, NRR has designated Eric Thomas ([eric.thomas@nrc.gov](mailto:eric.thomas@nrc.gov)) in NRR's Operating Experience Branch to be the focused single point of contact for information requests that NRR staff may have for the Reactor Safety and Preventative Measures Teams in the Operations Center.

If you are assigned a task involving event questions and answers, please let Eric know so that he can coordinate with the Operations Center to ensure that we are providing consistent responses. If you are contacted directly by staff in the Operations Center, please respond to the request promptly, and provide an electronic copy of your response to Eric so that he can maintain the response for future use by others.

Cohen, Shari

---

**From:** Leeds, Eric, *NRP*  
**Sent:** Monday, March 14, 2011 5:30 PM  
**To:** Weber, Michael, *EDO*  
**Subject:** RE: Response - Tsunami Fact Sheet - NUREG issued in March 2009 Link

Got it – thanks Mike!

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

---

**From:** Weber, Michael, *EDO*  
**Sent:** Monday, March 14, 2011 3:46 PM  
**To:** Leeds, Eric  
**Cc:** Hudson, Jody; Tracy, Glenn; Cohen, Miriam  
**Subject:** Response - Tsunami Fact Sheet - NUREG issued in March 2009 Link

Thanks, Eric. It would be useful to ensure that we capture these in the Knowledge Center.

---

**From:** Leeds, Eric, *NRP*  
**To:** Grobe, Jack; Virgilio, Martin; Weber, Michael  
**Cc:** Nguyen, Quynh; Ruland, William; Skeen, David; Brown, Frederick; Brenner, Eliot; Collins, Elmo; Dean, Bill; Satorius, Mark; McCree, Victor; Schmidt, Rebecca; Boger, Bruce  
**Sent:** Mon Mar 14 15:38:43 2011  
**Subject:** FW: (Action) Tsunami Fact Sheet - NUREG issued in March 2009 Link

FYI – I've asked Quynh Nguyen to work with the Ops Center to create a share-point site to house our Q&As from the Japanese quake and tsunami. Attached is a list of Q&As we created during the last tsunami, which we should consider. The regions requested Q&As to support their EOC meetings next week with members of the public. I'd like to have something completed by the end of the week for the regions.

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Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
301-415-1270

---

**From:** Boger, Bruce, *NRP*  
**Sent:** Monday, March 14, 2011 9:21 AM  
**To:** Leeds, Eric  
**Subject:** FW: (Action) Tsunami Fact Sheet - NUREG issued in March 2009 Link

FYI—this is a knowledge management challenge. We've collected information in the past, but we have to drag it out and it's not available in the Ops center.

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**From:** King, Mark, *NRP*  
**Sent:** Monday, March 14, 2011 7:23 AM  
**To:** Boger, Bruce; Brown, Frederick; Thorp, John  
**Cc:** Thomas, Eric  
**Subject:** RE: (Action) Tsunami Fact Sheet - NUREG issued in March 2009 Link



I think the attached is what Bruce is referring to – a natural phenomena limitations document. See attached.

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**From:** Boger, Bruce, *NRR*  
**Sent:** Monday, March 14, 2011 7:20 AM  
**To:** Brown, Frederick; King, Mark; Thorp, John  
**Cc:** Thomas, Eric  
**Subject:** RE: (Action) Tsunami Fact Sheet - NUREG issued in March 2009 Link

Great. Thanks. This is a start. I still remember something that was created to provide some plant-specific protection information. (e.g., Diablo Canyon, has some tsunami protection). I believe we explored west coast plants for tsunamis and east coast plants for hurricane flooding protection. If you can't find it easily (or if Bruce's gray matter failed again), please reach out to the west coast plant PMs to see what tsunami protection they have. I suspect we'll receive some cards and letters. Thanks again.

---

**From:** Brown, Frederick, *NRR*  
**Sent:** Monday, March 14, 2011 7:10 AM  
**To:** King, Mark; Thorp, John  
**Cc:** Thomas, Eric; Boger, Bruce  
**Subject:** RE: (Action) Tsunami Fact Sheet - NUREG issued in March 2009 Link

Thanks Mark

---

**From:** King, Mark, *NRR*  
**Sent:** Monday, March 14, 2011 7:08 AM  
**To:** Thorp, John; Boger, Bruce  
**Cc:** Brown, Frederick; Thomas, Eric  
**Subject:** RE: (Action) Tsunami Fact Sheet - NUREG issued in March 2009 Link

We had a NUREG issued on this subject back in March 2009.

**TSUNAMI HAZARD ASSESSMENT AT NUCLEAR POWER PLANT SITES IN THE UNITED STATES OF AMERICA**

Click link to view: **[NUREG/CR-6966]**

<http://pbadupws.nrc.gov/docs/ML0915/ML091590193.pdf>

---

**From:** Thorp, John, *NRR*  
**Sent:** Monday, March 14, 2011 6:57 AM  
**To:** Boger, Bruce  
**Cc:** Brown, Frederick; King, Mark; Thomas, Eric  
**Subject:** RE: (Action) Tsunami Fact Sheet

We'll look for it; If we don't find it quickly, we'll start producing one. (Mark King, please start looking)

I take it we would define & describe the tsunami phenomena, then address which nuclear stations in the U.S. are located in areas subject to tsunami waves, and describe what we can regarding the design of plants to withstand tsunami impacts?

Thanks,

John

**From:** Boger, Bruce , NRP  
**Sent:** Monday, March 14, 2011 6:48 AM  
**To:** Thorp, John  
**Cc:** Brown, Frederick  
**Subject:** Tsunami Fact Sheet

---

I seem to recall that OpE developed a tsunami fact sheet? Should we dust it off?

**Cohen, Shari**

---

**From:** Leeds, Eric, *NRR*  
**Sent:** Monday, March 14, 2011 6:06 PM  
**To:** Steger (Tucci), Christine, *NRR*  
**Cc:** Givvines, Mary  
**Subject:** RE: ACTION: Please distribute to all NRR staff in a HIGNFY message.

You are fantastic – thanks Christine!

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

---

**From:** Steger (Tucci), Christine, *NRR*  
**Sent:** Monday, March 14, 2011 6:04 PM  
**To:** Leeds, Eric  
**Subject:** RE: ACTION: Please distribute to all NRR staff in a HIGNFY message.

Done.

Thanks,  
Christine

---

**From:** Leeds, Eric  
**Sent:** Monday, March 14, 2011 5:17 PM  
**To:** Steger (Tucci), Christine  
**Cc:** Givvines, Mary; Grobe, Jack; Boger, Bruce; Ruland, William; Brown, Frederick; Schwarz, Sherry; McDermott, Brian; Evans, Michele  
**Subject:** ACTION: Please distribute to all NRR staff in a HIGNFY message.

As you are all aware from the Agency wide e-mails, the NRC Operations Center is being manned 24 hours a day to support monitoring of the situation in Japan. Many of your NRR colleagues are involved with this effort.

Here in NRR, we can look forward in the coming days and months to many questions about the situation in Japan and the relevance to domestic nuclear facilities. The staff in the Operations Center has already been working on these types of questions and answers. It will be important to maintain effective communication and coordination between the work done in the Office, and the work done in the Operations Center.

In an effort to minimize disruption of Operations Center activities, NRR has designated Eric Thomas ([eric.thomas@nrc.gov](mailto:eric.thomas@nrc.gov)) in NRR's Operating Experience Branch to be the focused single point of contact for information requests that NRR staff may have for the Reactor Safety and Preventative Measures Teams in the Operations Center.

If you are assigned a task involving event questions and answers, please let Eric know so that he can coordinate with the Operations Center to ensure that we are providing consistent responses. If you are contacted directly by staff in the Operations Center, please respond to the request promptly, and provide an electronic copy of your response to Eric so that he can maintain the response for future use by others.

Thanks for your cooperation and assistance!

Eric J. Leeds, Director  
Office of Nuclear Reactor Regulation

U.S. Nuclear Regulatory Commission  
301-415-1270

Heida, Bruce

**From:** Circle, Jeff *NRK*  
**Sent:** Monday, March 14, 2011 6:26 PM  
**To:** Ward, Leonard *NRK*  
**Subject:** Containment Failure Values

Len,

Here are some values from the James A. Fitzpatrick IPE PRA (licensee updated):

Drywell failure probability with DW at > 30 psig, high H2 concentration and deflagration burn ~ 0.61.  
Drywell failure probability with DW at > 30 psig, medium H2 concentration and deflagration burn ~0.057  
Drywell failure probability with high DW pressure, low RPV pressure ~ 0.016.  
Pedestal melt-through given wet drywell and superheated debris 0.84

Some of these are related to the conditions at Fukushima – long term SBO, complete loss of decay heat removal, loss of injection and no containment venting. If they vent containment and not ignite hydrogen, the failure probability drops off significantly. For clarification, I will check this against the analysis in NUREG/CR-4550 on Wednesday morning.

Jeff.

**Caponiti, Kathleen**

---

**From:** Taylor, Robert *MR*  
**Sent:** Monday, March 14, 2011 6:51 PM  
**To:** Hiland, Patrick; Skeen, David *MR*  
**Cc:** Mathew, Roy  
**Subject:** Question on Japanese/US Batteries

Pat and Dave,

I am preparing the Chairman's Q&As related the events in Japan. One has come up related to the effectiveness of batteries. I am requesting your staff's support in preparing a response. I would appreciate getting a concise answer that the Chairman can use to briefly respond to questions from external stakeholders. A response by COB Tuesday would be greatly appreciated.

The question is:

**Is our [U.S.] battery backup power less effective than the Japanese?**

Let me know if you have any questions.

Regards,  
Rob

**Caponiti, Kathleen**

---

**From:** Cumblidge, Stephen, *mc*  
**Sent:** Monday, March 14, 2011 8:13 AM  
**To:** Prokofiev, Iouri *mes*  
**Subject:** Joint letter to Japanese PARENT members?

I was thinking that it could be a good idea to send a very brief email to the Japanese PARENT members expressing our sympathy and concern and moral support for the workers at the Japanese nuclear power plants. Shall I draft something that we send jointly?

We can expect this earthquake, nuclear issues, and diverted attention to have significant effects on the PARENT schedule

Stephen Cumblidge  
Materials Engineer  
US Nuclear Regulatory Commission  
Mail Stop OWFN/9 H6  
Washington, DC 20555-0001

Telephone: (301) 415-2823 (Office)

**Giitter, Joseph**

**From:** Giitter, Joseph  
**Sent:** Monday, March 14, 2011 8:34 PM  
**To:** Hiland, Patrick  
**Cc:** Stutzke, Martin I  
**Subject:** RE: URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY

Thanks. I'll forward to him. Things are really getting bad at the second unit. NISA reported an explosion and TEPCO said that it happened in the suppression pool.

---

**From:** Hiland, Patrick  
**Sent:** Monday, March 14, 2011 8:33 PM  
**To:** Giitter, Joseph  
**Subject:** Re: URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY

Marty stutzky in res may have data table in gi199

---

**From:** Giitter, Joseph  
**To:** NRR\_DORL Distribution  
**Cc:** Rihm, Roger; Kammerer, Annie; Hiland, Patrick; Thomas, Eric  
**Sent:** Mon Mar 14 20:28:07 2011  
**Subject:** URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY

The EDO has asked us to prepare a table that contains the following information for each of the operating reactors: Safe Shutdown Earthquake, Reference Level Earthquake and probable maximum tsunami or maximum tsunami water level (for coastal sites). I'm requesting you to obtain the pertinent information from the 1<sup>st</sup> and 3<sup>rd</sup> columns (as applicable) from the FSARs and provide it to Michael Mahoney the format below. Michael will put this information into an Excel spreadsheet so that it can be sorted various ways. I'm trying to get clarification on a couple of questions, including what is meant by Reference Level Earthquake. Hopefully, I will be able to provide you with clearer instructions tomorrow morning—once I get this additional clarification. It may be that they were looking for Review Level Earthquake information, which is in Table 3.1 of the attached 50.54(f) letter (GL 88-20, Supplement 4) pertaining to Individual Plant Evaluations of External Events (IPEEE). The 50.54(f) letter can be found at [http://r12k3web.nrc.gov/drs/toolbox/fp\\_refs/Gen-Ltrs/gl8820s4.pdf](http://r12k3web.nrc.gov/drs/toolbox/fp_refs/Gen-Ltrs/gl8820s4.pdf). I also have a call into Annie Kammerer to see if she has any of this information available. { I checked with the Ops Center and they referred me to Annie. } If at all possible, please provide this information to Mike no later than 11:00 on Tuesday.



Plant Name (location)	Safe shutdown or Design basis earthquake <sup>3</sup>	Reference Review Level earthquake	probable max tsunami OR max tsunami water level (for coastal sites)
San Onofre 2 and 3 (California)	0.67 g	N/A	+30 feet mllw <sup>1</sup>

1. The controlling tsunami occurs during simultaneous high tide and storm surge produces a maximum runup to elevation +15.6 feet mean lower low water line (mllw) at the Unit 2 and 3 seawall. When storm waves are superimposed, the predicted maximum runup is to elevation +27 mllw. Tsunami protection for the SONGS site is provided by a reinforced concrete seawall constructed to elevation +30.0 mllw.
2. The NRC requires safety-significant structures, systems, and components be designed to take into account: (1) The most severe natural phenomena historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated, (2) appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena and (3) the importance of the safety functions to be performed.
3. The design basis earthquake (DBE) is defined as that earthquake producing the maximum vibratory ground motion that the nuclear power generating station is designed to withstand without functional impairment of those features necessary to shut down the reactor, maintain the station in a safe condition, and prevent undue risk to the health and safety of the public. The DBE for SONGS was assessed during the construction permit phase of the project. The DBE is postulated to occur near the site (5 miles), and the ground accelerations are postulated to be quite high (0.67g), when compared to other nuclear plant sites in the U.S (0.25g or less is typical for plants in the eastern U.S.). Based on the unique seismic characteristics of the SONGS site, the site tends to amplify long-period motions, and to attenuate short-period motions. These site-specific characteristics were accounted for in the SONGS site-specific seismic analyses.

Joseph G. Glitter  
Director  
Division of Operating Reactor Licensing



Heida, Bruce

**From:** Ferrante, Fernando, *NRP*  
**Sent:** Monday, March 14, 2011 10:13 PM  
**To:** Sancaktar, Selim  
**Cc:** Mitman, Jeffrey  
**Subject:** RE: In case somebody asks ..... *DES*

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Selim, I am looking at the model and it appears to be either LOOPWR: 40-10/LOOPWR: 40-07/LOOPWR: 40-05 for Fukushima-Daichi Unit 1, is that correct?

---

**From:** Sancaktar, Selim  
**Sent:** Monday, March 14, 2011 9:22 AM  
**To:** Coyne, Kevin; Kuritzky, Alan  
**Cc:** Sancaktar, Selim; Demoss, Gary; Ferrante, Fernando; Mitman, Jeffrey  
**Subject:** In case somebody asks .....

IN SPAR all hazards models, we explicitly model the CDF phase of a seismic event sequence like the one happened to Fukushima 1.

In fact, we have the model for a similar GE 3 domestic plant, Monticello.

## Balarabe, Sarah

---


**From:** Balarabe, Sarah *nrcc*  
**Sent:** Tuesday, March 15, 2011 3:30 PM  
**To:** Ruland, William  
**Subject:** You are on shift at 3:00 PM-11: 00 PM on the 16th. (EOM)


*Sarah Balarabe*

Division Administrative Assistant

Division of Safety Systems

Office of Nuclear Reactor Regulation

 Work: 301-415-3283

 E-mail: [sarah.balarabe@nrc.gov](mailto:sarah.balarabe@nrc.gov)

## Balarabe, Sarah

---

**Subject:** Brainstorming Actions Going Forward Based Upon Japan Events  
**Location:** O13 D20

**Start:** Tue 3/15/2011 2:00 PM  
**End:** Tue 3/15/2011 2:30 PM  
**Show Time As:** Tentative

**Recurrence:** (none)

**Meeting Status:** Not yet responded

**Organizer:** Leeds, Eric  
**Required Attendees:** Boger, Bruce; Ruland, William; NRR-OWFN-13D20-15p

Requested by Eric

**Titus, Brett**

---

**From:** Leeds, Eric *mlk*  
**Sent:** Tuesday, March 15, 2011 10:55 AM  
**To:** Ruland, William  
**Cc:** Grobe, Jack; Boger, Bruce; Bahadur, Sher  
**Subject:** ACTION:: Clothes for Ulsis  
**Attachments:** RE: Clothes for Ulsis

Bill -

Please be sure to save this email so Tony knows that NRR, the CFO and the Agency wants to be sure that he stays appropriately attired in Japan.

We care about our folks!!!!

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

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

From: Dyer, Jim *JD*  
Sent: Tuesday, March 15, 2011 9:48 AM  
To: Dyer, Jim; Grobe, Jack; Virgilio, Martin; Leeds, Eric; Givvines, Mary  
Cc: Mitchell, Reggie; Kaplan, Michele; Matheson, Mary  
Subject: RE: Clothes for Ulsis

Sorry I left off the 2nd e-mail. See attached. Jim

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

From: Dyer, Jim *JD*  
Sent: Tuesday, March 15, 2011 9:47 AM  
To: Grobe, Jack; Virgilio, Martin; Leeds, Eric; Givvines, Mary  
Cc: Mitchell, Reggie; Kaplan, Michele; Matheson, Mary  
Subject: RE: Clothes for Ulsis

NRR Folk,

See attached. Mary Matheson has some good ideas for covering Tony's cost of getting additional clothes. Jim

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

From: Grobe, Jack *mlk*  
Sent: Monday, March 14, 2011 6:28 PM  
To: Virgilio, Martin; Dyer, Jim  
Subject: Clothes for Ulsis

Tony Ulsis took clothing for three days and needs additional stuff. His wife advised that she found the least expensive approach would cost 800 dollars. She was ready to drive to deliver the stuff for shipment and wanted to be sure it would be reimbursed. The critical problem here is that Tony is 6 foot 7. I conferred with ADM and they indicated that they would do exactly what she was doing regarding shipment of the clothes so this would be authorized. I directed to go forward with this effort.

Jack Grobe, Deputy Director, NRR

*A/200*

**Balarabe, Sarah**

**From:** NRC Announcement  
**Sent:** Wednesday, March 16, 2011 9:55 AM  
**To:** NRC Announcement  
**Subject:** General Interest: U.S. House of Representatives Energy and Commerce Committee hearing today, March 16 @ 9:30 AM

## NRC Daily Announcements



**Wednesday March 16, 2011 -- Headquarters Edition**

General Interest: U.S. House of Representatives Energy and Commerce Committee hearing today, March 16 @ 9:30 AM

**General Interest: U.S. House of Representatives Energy and Commerce Committee hearing today, March 16 @ 9:30 AM**

Chairman Jaczko and Energy Secretary Chu will be testifying this morning at a joint hearing of two subcommittees of the House Energy and Commerce Committee, scheduled to begin @ 9:30 a.m. This event can be viewed on C-Span 3, which is channel 39 (NRC Broadband) and is expected to be available on the C-Span website. The hearing was originally scheduled to examine the FY2012 budget, but has been expanded to provide an opportunity for Congress to formally receive a status update on the Japanese nuclear facilities damaged by the earthquake and tsunami. There also will be a Senate Environment and Public Works Committee briefing this afternoon at 3:30 p.m. that is expected to be carried on C-Span.

[TOP](#)

(2011-03-16 00:00:00.0)

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A/203

Titus, Brett

---

**From:** Lobel, Richard *NR*  
**Sent:** Tuesday, March 15, 2011 9:21 AM  
**To:** Thomas, Eric  
**Cc:** Ruland, William; Dennig, Robert; Burnell, Scott  
**Subject:** Response to Question 2  
**Attachments:** japanese reactor question.docx

Attached is NRR/DSS response to Question 2 in an 8:26 pm e-mail from Holly Harrington to Scott Burnell, et al.

A/204



Filename: Japanese reactor question

Q: Some in the media and in Hill briefings are suggesting that mark I containment is flawed. What are the concerns about this type of containment? Are the US plants safe?

A. BWR Mark I containments have relatively small volumes in comparison with PWR containments. This makes the BWR Mark I containment relatively more susceptible to containment failure given a core meltdown severe enough to (1) fail the reactor vessel and also (2) severe enough so that the core melt reaches the containment boundary. On the positive side, BWRs have more ways of adding water to the core than PWRs. This includes water injection sources which do not rely on AC electric power.

The NRC considers BWRs with Mark I containment design to be safe.

**Bano, Mahmooda**

---

**From:** 佐藤 隆 [satoh.takashi@tepcoco.jp]  
**Sent:** Saturday, March 26, 2011 9:25 PM  
**To:** Nakanishi, Tony; bannai-toshihiro@meti.go.jp  
**Cc:** nei-hisanori; Dorman, Dan; Monninger, John; Foggie, Kirk; Scott, Michael  
**Subject:** Re: NRC Meetings for March 27, 2011

Dear Tony,

Thank you for the information.

See you at the TEPCO building lobby.

Takashi Sato  
TEPCO

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

**From:** "Nakanishi, Tony" <Tony.Nakanishi@nrc.gov>  
**To:** <bannai-toshihiro@meti.go.jp>; "'?? ?'" <satoh.takashi@tepcoco.jp>  
**Cc:** "nei-hisanori" <nei-hisanori@meti.go.jp>; "Dorman, Dan" <Dan.Dorman@nrc.gov>; "Monninger, John" <John.Monninger@nrc.gov>; "Foggie, Kirk" <Kirk.Foggie@nrc.gov>; "Scott, Michael" <Michael.Scott@nrc.gov>  
**Sent:** Sunday, March 27, 2011 9:33 AM  
**Subject:** NRC Meetings for March 27, 2011

> Bannai-sama, Sato-sama,  
>  
> Please find the attached document with the schedule for NRC meetings  
> today.  
>  
> Best Regards,  
>  
> Tony Nakanishi  
> USNRC  
>  
>

A/205

**Rivera-Lugo, Richard**

---

**From:** Kardaras, Tom  
**Sent:** Monday, March 28, 2011 8:57 AM  
**To:** Rivera-Lugo, Richard  
**Subject:** Action: Please call me...I am trying to understand the information you sent Andrea on Friday, 3/25 regarding staff who are working on the Japan event

**Categories:** Green Category

I need to send the information out and I would like to get clarification on one thing.

Regards,  
Tom Kardaras, Deputy Director (Acting)  
Program Management, Policy Development and Analysis Staff  
Office of Nuclear Regulatory Research  
(o) 301-251-7667

A/2006

**Titus, Brett**

---

**From:** Titus, Brett  
**Sent:** Wednesday, March 16, 2011 11:56 AM  
**To:** Wood, Kent  
**Subject:** FW: New Agency Wide TAC Number for Japan

For the question you are working on...

Brett Titus  
301-415-3075

---

**From:** HRMSBulletin Resource  
**Sent:** Wednesday, March 16, 2011 9:52 AM  
**To:** HRMSBulletin Resource  
**Cc:** HRMSBulletin Resource  
**Subject:** New Agency Wide TAC Number

**All Employees,**

**Due to the most current event in Japan, the Agency has decided to establish a new Agency wide Activity Code. It is: ZG0061 - Japan Earthquake and Tsunami. The PA will be: 111180 – Response Program-Event/Response - Operating RX. Please be reminded that if you charged hours to D92374 in PP6, you will need to submit a corrected time card and use the new TAC number ZG0061 under PA 111180. Also please contact your T & L Coordinator to have that TAC established in your profile.**

**Thank you for your cooperation.**

**Time, Labor and Payroll Services**

A/207

**Balarabe, Sarah**

---

**From:** Architzel, Ralph *nrk*  
**Sent:** Tuesday, March 15, 2011 12:47 PM  
**To:** Lehning, John  
**Subject:** RE:

Thanks John

---

**From:** Lehning, John *nrk*  
**Sent:** Tuesday, March 15, 2011 11:53 AM  
**To:** Klein, Paul; Smith, Stephen; Architzel, Ralph  
**Subject:**

Below illustrates the point from earlier this morning, figures from NUREG-1150 first that show the SBO as the dominant (internal event) driver for BWR/4 core damage next to a comparison with Surry, and second a graphic from P-300 training class (ultimately also from NUREG-1150), that shows the conditional (upon core damage) failure probability for large dry, ice condenser, Mark I, and Mark III containments.

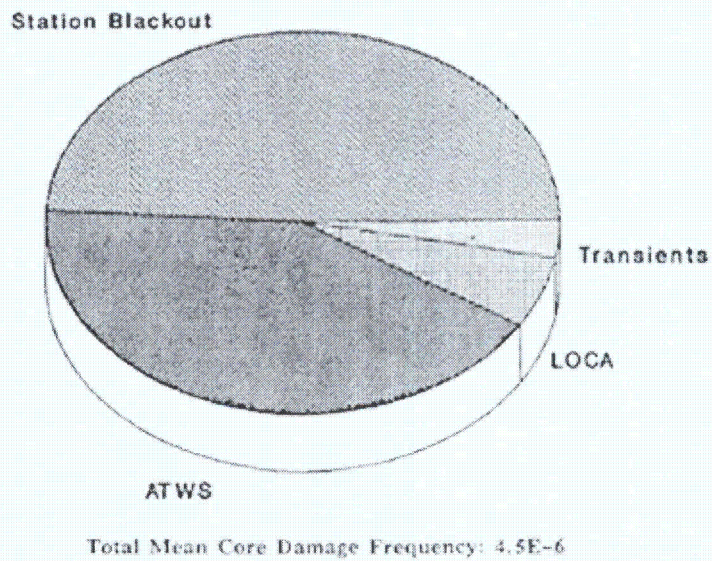


Figure 4.3 Contributors to mean core damage frequency from internal events at Peach Bottom.

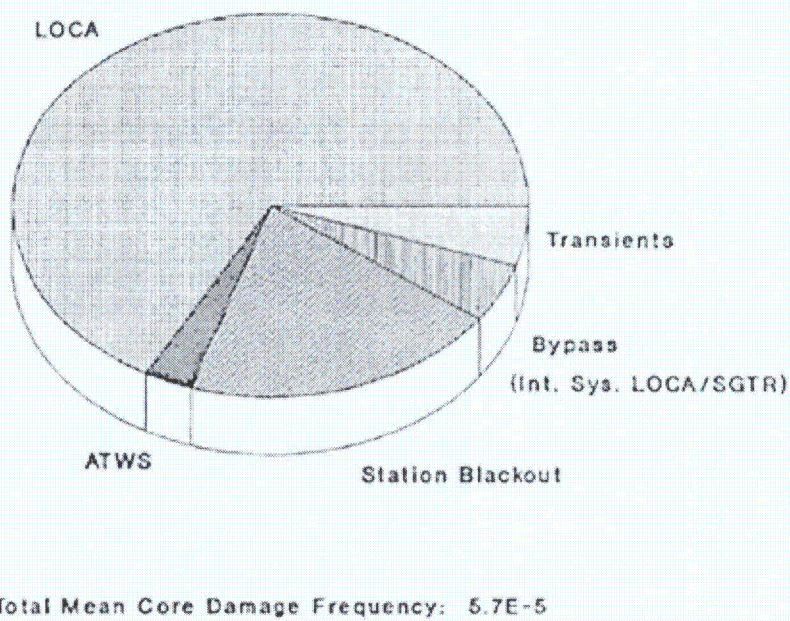


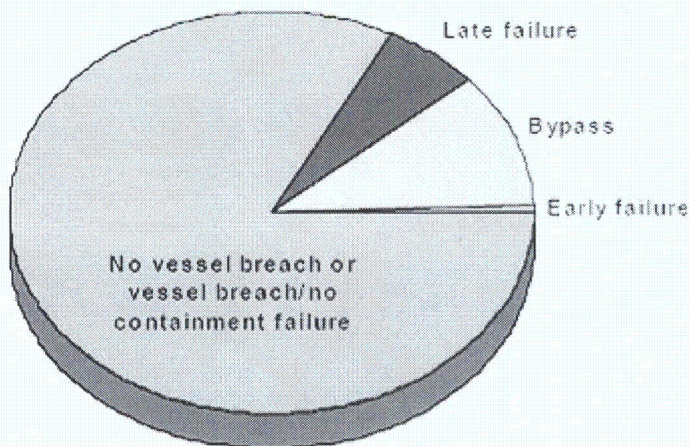
Figure 5.3 Contributors to mean core damage frequency from internal events at Sequoyah.



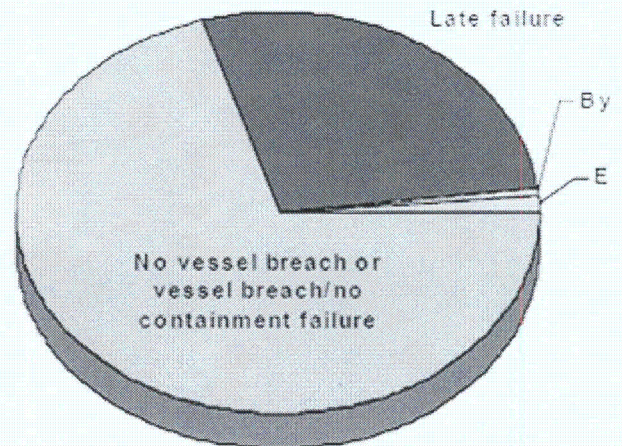
## Failure Analyses

# NUREG-1150 Results Indicating Containment Failures

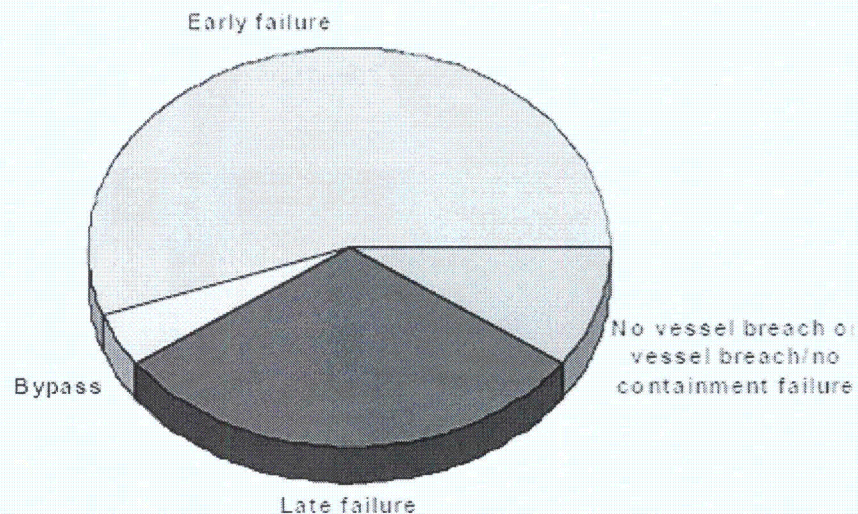
Surry



Zion



Peach Bottom



*NUREG-1150 relative probability of containment failure*

4/2010

Accident Progression Analysis (F

**Balarabe, Sarah**

---

**From:** NRC Announcement  
**Sent:** Tuesday, March 15, 2011 9:36 AM  
**To:** NRC Announcement  
**Subject:** From the Chairman: Events in Japan

## NRC Daily Announcements



**Tuesday March 15, 2011 -- Headquarters Edition**

► **From the Chairman: Events in Japan**

### **From the Chairman: Events in Japan**

By now I am sure that most of you are aware of the tragic earthquake and tsunami that struck Japan last week, killing thousands of people, destroying cities and infrastructure, and knocking out large portions of the electricity grid.

I am so proud of our staff and the dedication and tenacity they have shown during the tragic events of the past several days. NRC employees have been willingly working around the clock, and their energy, experience and expertise have been invaluable to our response. Those of you who have not directly been involved in this effort are playing just as valuable a role in making sure that the facilities we license are safe and secure.

The natural disasters in Japan—and the resulting situations at the Fukushima nuclear power plant—are sobering in their size and scope. It's easy to become distracted by the stories and images of devastation and destruction. The best thing we can do in this situation is to make sure we remain mindful of our responsibilities for the safety and security of our existing nuclear plants and materials, and to keep our focus where it must always be—on our mission. I continue to appreciate your dedication to ensure the safety and security of the American people.

(2011-03-15 00:00:00.0)

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A/209



**Balarabe, Sarah**

---

**From:** Smith, Stephen *mk*  
**Sent:** Tuesday, March 15, 2011 7:34 AM  
**To:** Lehning, John; Klein, Paul  
**Subject:** RE: Satellite Site Photos - Before and After

I am surprised that the turbine buildings held up. I couldn't see where the diesels are installed. I was looking for exhaust stacks. Maybe on the water side of the turbine buildings, but it would make more sense from a layout perspective if they were on the Rx Bldg side. The smoking reactor bldg doesn't look too good.

Steve

---

**From:** Lehning, John *mk*  
**Sent:** Monday, March 14, 2011 5:40 PM  
**To:** Klein, Paul; Smith, Stephen  
**Subject:** Satellite Site Photos - Before and After

Actually, a fair amount of stuff survived at the site considering the total destruction in some other areas. I was trying to look for the diesels – perhaps they are housed on the sheltered side of the reactor/turbine building? Couldn't tell due to lack of expertise / difficulty in seeing given the resolution and damage.

- John L.

## Beasley, Benjamin

---

**From:** Beasley, Benjamin  
**Sent:** Tuesday, March 15, 2011 7:30 AM  
**To:** Bensi, Michelle  
**Subject:** RE: Japan EQ

It is much too early to tell, but if I must guess, I think the issue will center around an extended station blackout. Apparently the reactors shutdown and the diesels were providing power for ECCS until the tsunami hit. Our regulations require 8 hours of battery capability. The plants get into trouble pretty quickly after the batteries run out. That is what seems to have happened at Fukushima.

Ben

---

**From:** Bensi, Michelle  
**Sent:** Monday, March 14, 2011 7:46 AM  
**To:** Beasley, Benjamin  
**Subject:** RE: Japan EQ

Hi Ben,

I am sure you have seen the news and the implications for the nuclear power plants in Japan. How do you think this will affect GI-199? I assume the NRC will want to learn from the experiences in Japan as they related to seismic robustness of the existing fleet of plants. Have you heard anything in this area?

I am glad to hear the ACRS meeting went well.

Shelby

---

**From:** Beasley, Benjamin  
**Sent:** Friday, March 11, 2011 3:01 PM  
**To:** Bensi, Michelle  
**Subject:** RE: Japan EQ

I am not keeping up with it. There may be a problem at one of the plants but I have not had time today to inquire. (The ACRS briefing went well.)

BB

---

**From:** Bensi, Michelle  
**Sent:** Friday, March 11, 2011 1:57 PM  
**To:** Beasley, Benjamin  
**Subject:** Japan EQ

Hi Ben,

Are you all getting any news on the situation at the plant in Japan?

I imagine this will bring a lot more importance to GI-199, especially in light of a claim made by an NRC speaker at the RIC claiming that Japanese plants are more seismically robust than US plants.

-Shelby

**Lewis, Doris**

---

**From:** Lewis, Doris  
**Sent:** Tuesday, March 15, 2011 7:42 AM  
**To:** Sherbini, Sami; Shaffer, Vered  
**Subject:** RE: chernobyl doses

Thanks Sami!

Thanks Vered!

---

**From:** Sherbini, Sami  
**Sent:** Monday, March 14, 2011 7:02 PM  
**To:** Shaffer, Vered  
**Cc:** Lewis, Doris  
**Subject:** RE: chernobyl doses

Vered, Doris,

Very nice. The information should give the ops center people a good qualitative idea of the types of doses such releases can be expected to deliver.

Sami

---

**From:** Shaffer, Vered  
**Sent:** Monday, March 14, 2011 5:34 PM  
**To:** Sherbini, Sami  
**Cc:** Lewis, Doris  
**Subject:** chernobyl doses

Hi Sami,

Doris and I came up with this response based on information we found in the documents below. Let us know what you think!

Vered

\*\* Info from the Chernobyl Forum booklet Pages 11 and 12  
(<http://www.iaea.org/Publications/Booklets/Chernobyl/chernobyl.pdf>)

\*\* Info from NUREG 1250 Report on the Accident at the Chernobyl Nuclear Power Station (chapter 7)

Population categories exposed from the Chernobyl accident:

- Emergency and recovery operation workers who worked at the Chernobyl power plant and in the exclusion zone after the accident;
  - Individual doses estimated to range from 2 - 20 Gy (200 rads – 2000 rads); Average lethal dose of 4 Gy (400 rads)
- Inhabitants who were 3-7 km around the plant
  - Effective doses estimated to be 54 rem (540 mSv)

A/212

- Inhabitants evacuated from contaminated areas
  - Effective doses estimated on the order of 3.3 rem (33 mSv)
- Inhabitants who remained in the contaminated areas for 7 days or more
  - Effective doses estimated from 60 - 80 rem ( 600 – 800 mSv)
- For 135,000 evacuees exposed from the plume and by radionuclides deposited on the ground
  - Individual effective doses estimated at 12 rem per person

**Wagner, Katie**

**From:** Wagner, Katie  
**Sent:** Tuesday, March 15, 2011 9:41 AM  
**To:** Dickson, Elijah  
**Subject:** FW: From the Chairman: Events in Japan

I really like this message.

---

**From:** NRC Announcement [<mailto:nrc.announcement@nrc.gov>]  
**Sent:** Tuesday, March 15, 2011 9:36 AM  
**To:** NRC Announcement  
**Subject:** From the Chairman: Events in Japan

## NRC Daily Announcements



**Tuesday March 15, 2011 -- Headquarters Edition**

◆ [From the Chairman: Events in Japan](#)

### From the Chairman: Events in Japan

By now I am sure that most of you are aware of the tragic earthquake and tsunami that struck Japan last week, killing thousands of people, destroying cities and infrastructure, and knocking out large portions of the electricity grid.

I am so proud of our staff and the dedication and tenacity they have shown during the tragic events of the past several days. NRC employees have been willingly working around the clock, and their energy, experience and expertise have been invaluable to our response. Those of you who have not directly been involved in this effort are playing just as valuable a role in making sure that the facilities we license are safe and secure.

The natural disasters in Japan—and the resulting situations at the Fukushima nuclear power plant—are sobering in their size and scope. It's easy to become distracted by the stories and images of devastation and destruction. The best thing we can do in this situation is to make sure we remain mindful of our responsibilities for the safety and security of our existing nuclear plants and materials, and to keep our focus where it must always be—on our mission. I continue to appreciate your dedication to ensure the safety and security of the American people.

[TOP](#)

(2011-03-15 00:00:00.0)

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## Beasley, Benjamin

---

**From:** Beasley, Benjamin  
**Sent:** Tuesday, March 15, 2011 11:48 AM  
**To:** Burnell, Scott  
**Subject:** RE: Media questions

I was put in touch with Ivonne and sent an early draft of brief answers to her.

Ben

---

**From:** Burnell, Scott  
**Sent:** Tuesday, March 15, 2011 11:47 AM  
**To:** Beasley, Benjamin  
**Subject:** Media questions

Ben;

Got your voicemail, I'll be looking for your answers. Thanks.

Scott

A/2014

**From:** Chang, Richard  
**To:** Tinkler, Charles  
**Cc:** Schaperow, Jason; Ghosh, Tina  
**Subject:** Path forward  
**Date:** Tuesday, March 15, 2011 12:51:00 PM

---

Charlie,

I hope you slept well- I don't want to bother you too much because you have bigger fish to fry (e.g., Reactors in Japan).

I wanted to let you know my thoughts for moving ahead on the Peer Review response letter (and see if you agree/had any suggestions for improvement)-

Assumptions:

Randy is not in Japan

KC is working on part-time this week on spent fuel pool items

Charlie and Jason may be working on the Japanese reactors for a few weeks

Proposed Steps forward:

1. Since Randy is in Japan, have me/ Randy/ Yvonne/ Mark/ KC (if he is available) agree to draft resolutions.
2. I will include you on concurrence for a letter that goes out so that you can review/modify the resolutions.
3. We can have a follow-on meeting with Randy to discuss your comments.

Please let me know your thoughts.

The reason why I am proposing this is to allow work to continue while you are tied up in this other work.

Thanks,  
Richard Chang  
Program Manager  
RES/DSA/SPB  
301-251-7980

A/215

**From:** Chang, Richard  
**To:** Spencer, Ruth  
**Cc:** Santiago, Patricia  
**Subject:** Question on Funds  
**Date:** Tuesday, March 15, 2011 1:17:00 PM

---

Ruth,

I stopped by your office, but didn't catch you...I had a question:

Background:

I am the project manager for a contract with Sandia National Labs. Since the reactor event in Japan, some members of my team have been asking Sandia to do work (with the contract scope) for this emergency event.

Question:

Is there a way to reimburse my contract dollars from an agency fund related to emergencies?

Thanks,  
Richard Chang  
Program Manager  
RES/DSA/SPB  
301-251-7980

A/2.16



## Rathbun, Howard

---

**From:** Rudland, David  
**Sent:** Tuesday, March 15, 2011 3:27 PM  
**To:** Stevens, Gary; Csontos, Aladar; Kirk, Mark; Focht, Eric; Rathbun, Howard  
**Subject:** FW: BEST WISHES AND HOPE YOUR ARE OK

Guys

Take a look at this animation.... It gives you a feel for the magnitude of the aftershocks that occurred after the Japan earthquake. Just amazing...

[http://www.msnbc.msn.com/id/42037498/ns/world\\_news-asia-pacific/](http://www.msnbc.msn.com/id/42037498/ns/world_news-asia-pacific/)

Dave

## **Murphy, Andrew**

---

**From:** Murphy, Andrew  
**Sent:** Tuesday, March 15, 2011 3:39 PM  
**To:** Kirk, Mark  
**Subject:** RE: as you were just saying!

Thanks for the informative download.

Andy

---

**From:** Kirk, Mark  
**Sent:** Tuesday, March 15, 2011 3:34 PM  
**To:** Murphy, Andrew  
**Subject:** as you were just saying!

---

**From:** Rudland, David  
**Sent:** Tuesday, March 15, 2011 3:27 PM  
**To:** Stevens, Gary; Csontos, Aladar; Kirk, Mark; Focht, Eric; Rathbun, Howard  
**Subject:** FW: BEST WISHES AND HOPE YOUR ARE OK

Guys

Take a look at this animation.... It gives you a feel for the magnitude of the aftershocks that occurred after the Japan earthquake. Just amazing...

[http://www.msnbc.msn.com/id/42037498/ns/world\\_news-asia-pacific/](http://www.msnbc.msn.com/id/42037498/ns/world_news-asia-pacific/)

Dave

**Balarabe, Sarah**

---

**From:** Sheron, Brian *RES*  
**Sent:** Wednesday, March 16, 2011 1:51 PM  
**To:** Ruland, William; Williams, Donna; Uhle, Jennifer; Moore, Scott; Miller, Charles; Brenner, Eliot; Haney, Catherine; Dorman, Dan; Wiggins, Jim; Evans, Michele; Doane, Margaret; Mamish, Nader  
**Cc:** Johnson, Michael; Holahan, Gary; Leeds, Eric; Grobe, Jack; Howe, Allen; Dion, Jeanne  
**Subject:** RE: Planning for upcoming, short notice Commission meeting

Jeanne Dion is the RES POC.

---

**From:** Ruland, William *MR*  
**Sent:** Wednesday, March 16, 2011 1:19 PM  
**To:** Williams, Donna; Uhle, Jennifer; Sheron, Brian; Moore, Scott; Miller, Charles; Brenner, Eliot; Haney, Catherine; Dorman, Dan; Wiggins, Jim; Evans, Michele; Doane, Margaret; Mamish, Nader  
**Cc:** Johnson, Michael; Holahan, Gary; Leeds, Eric; Grobe, Jack; Howe, Allen  
**Subject:** Planning for upcoming, short notice Commission meeting

Folks,

Attached find a early draft of a scheduling note for a Commission meeting that may be held as early as this coming Monday, March 21<sup>st</sup>. NRR has been assigned as the lead to pull the meeting together. As you could imagine, this will take some effort. To help with coordination, please provide me a contact so that we can draw on your expertise and help to make this happen. Alan Howe, currently deputy director of DORL, has the lead to pull this together.

I know you have many questions. I'd ask for your patience as we try to get this done. I'll keep you updated through the contact that you provide to us.

Thank you very much.

Bill Ruland

## Rodriguez-Luccioni, Hector

---

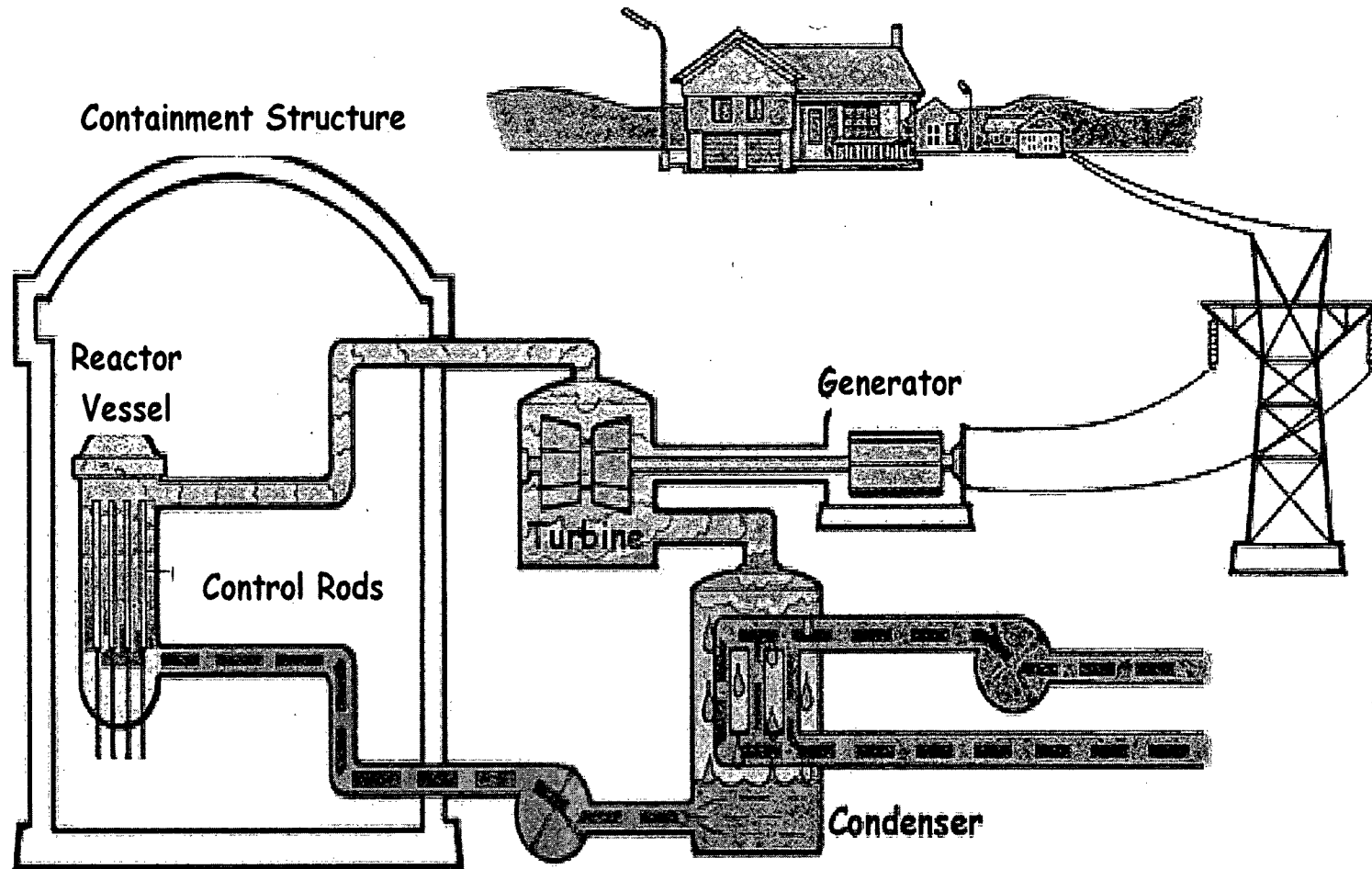
**From:** Rodriguez-Luccioni, Hector  
**Sent:** Tuesday, March 15, 2011 7:23 AM  
**To:** Bayssie, Mekonen; Borges, Jennifer; Boyce, Tom (RES); Carpenter, Robert; Hicks, Angelisa; Jervy, Richard; Karagiannis, Harriet; O'Donnell, Edward; Orr, Mark; Rodriguez-Luccioni, Hector  
**Subject:** Today's meeting  
**Attachments:** BWR's.pptx

Hello everyone, good morning. Attach are some slides that Tom Boyce will like to discuss during today's meeting. Thank you.

Hector Luis Rodriguez-Luccioni, PhD-Chem Eng  
Regulatory Guide Development Branch  
Division of Engineering  
Office of Nuclear Regulatory Research  
(301)251-7685  
[Hector.Rodriguez-Luccioni@nrc.gov](mailto:Hector.Rodriguez-Luccioni@nrc.gov)



# Boiling Water Reactors



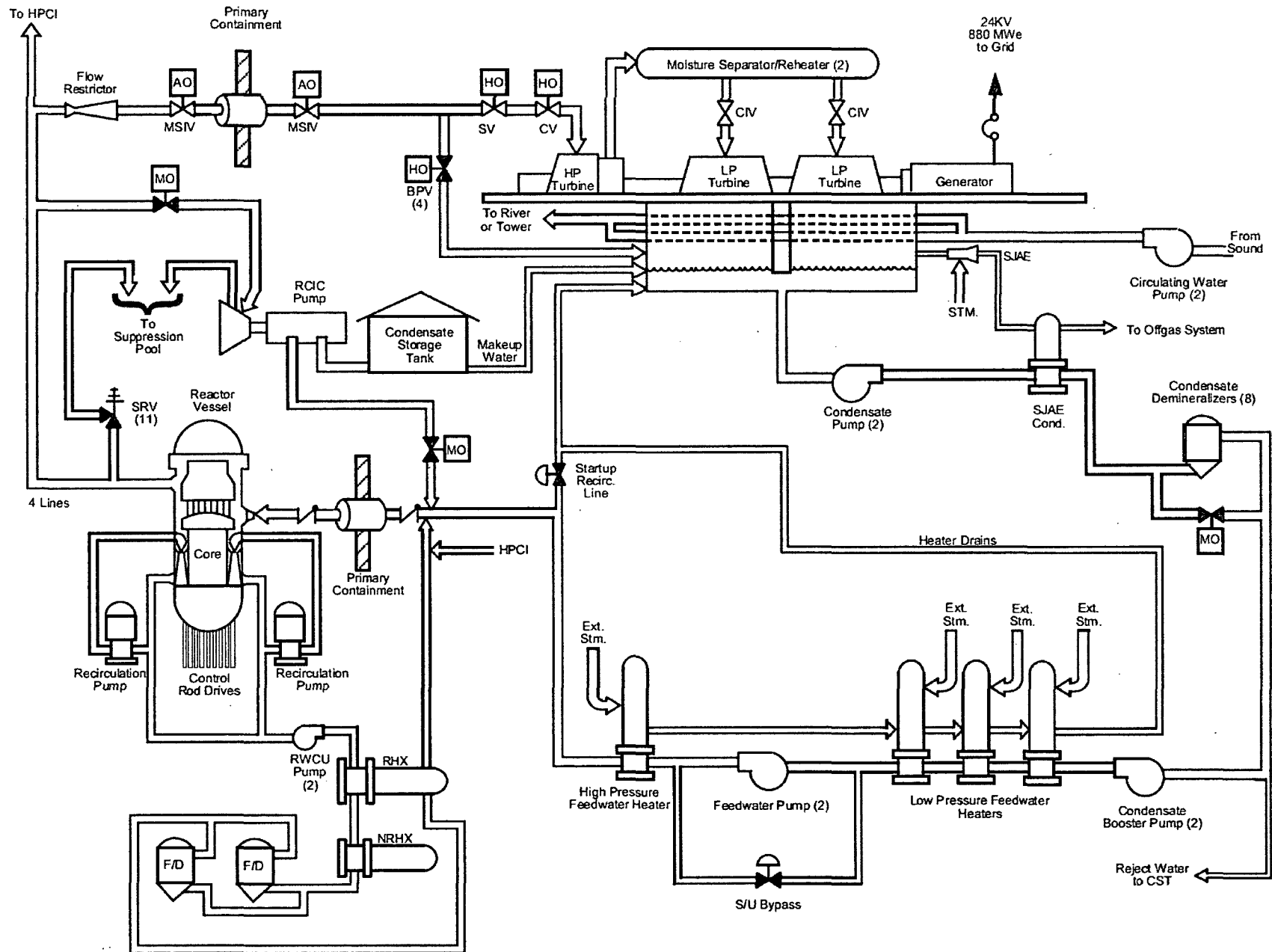


Figure 2.0-1 Simplified BWR Primary and Auxiliary Systems

High Pressure Coolant Injection

Low Pressure Coolant Injection

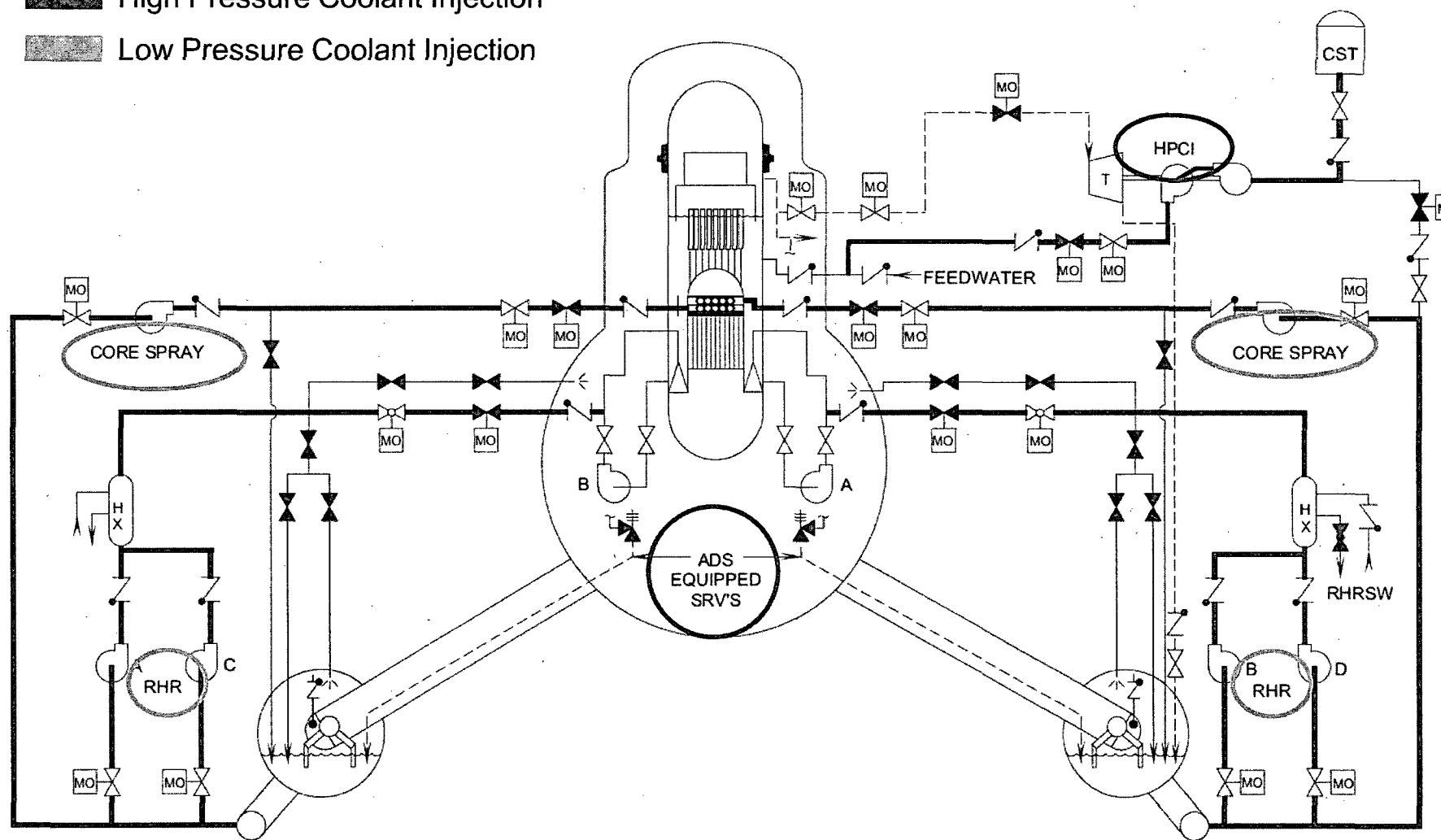


Figure 1.11-1 Emergency Core Cooling System



Status of nuclear power plants in Fukushima as of 12:30 March 14 (Estimated by JAIF)

Power Station	Fukushima #1 Nuclear Power Station					
Unit	1	2	3	4	5	6
Power output (MWe)	460	784	784	784	784	1100
Type of Reactor	BWR-3	BWR-4	BWR-4	BWR-4	BWR-4	BWR-5
Operational Status at the earthquake occur	Service	Service	Service	Outage	Outage	Outage
Fuel Integrity	Damaged	Not Damaged	Damaged	Not Damaged	Not Damaged	Not Damaged
Containment Integrity	Not Damaged	Not Damaged	Not Damaged	Not Damaged	Not Damaged	Not Damaged
Core coolabilit-1 (ECCS/RHR)	Not Functional	Not Functional	Not Functional	Not necessary	Not necessary	Not necessary
Core coolabilit-2 (RCIC/MUWC)	Not Functional	RCIC Working	Not Functional	Not necessary	Not necessary	Not necessary
Building Integrity	Damaged	Not Damaged	Damaged	Not Damaged	Not Damaged	Not Damaged
Environmental effect	Radiation monitor detect radiation increase in the environment (NPS boarder: 20 $\mu$ Sv/h at 11:44AM)					
water level of the pressure vessel	Unknown	Above the top	Unknown	Safe	Safe	Safe
pressure of the pressure vessel	Stable	Stable	Stable	Safe	Safe	Safe
Containment pressure	Stable	Stable	Stable	Safe	Safe	Safe
Sea water injection to core	Suspended	To be decided	Done	Not necessary	Not necessary	Not necessary
Containment venting	Done	Preparing	Done	Not necessary	Not necessary	Not necessary
Evacuation Area	20km from NPS					
INES	Level 4 (estimated by NISA)					

Power Station	Fukushima #2 Nuclear Power Station			
Unit	1	2	3	4
Power output (MWe)	1100	1100	1100	1100
Type of Reactor	BWR-5	BWR-5	BWR-5	BWR-5
Status at the earthquake occurred	Service	Service	Service	Service
Fuel Integrity	Not Damaged	Not Damaged	Not Damaged	Not Damaged
Containment Integrity	Not Damaged	Not Damaged	Not Damaged	Not Damaged
Core coolabilit-1 (ECCS/RHR)	Functioning	Not Functional	Functioning	Not Functional
Core coolabilit-2 (RCIC/MUWC)	Not necessary	Functioning	Not necessary	Functioning
Building Integrity	Not Damaged	Not Damaged	Not Damaged	Not Damaged
Environmental effect	Stable (NPS boarder: 0.038 $\mu$ Sv/h at 8AM)			
water level of the pressure vessel	(No info )	(No info )	(No info )	(No info )
pressure of the pressure vessel	(No info )	(No info )	(No info )	(No info )
Containment pressure	(No info )	Increase	(No info )	Increase
Sea water injection to core	Not necessary	to be decided	Not necessary	to be decided
Containment venting	Not necessary	to be decided	Not necessary	to be decided
Evacuation Area	10km from NPS			
INES	(No Info)			

Source:

Governmental Emergency Headquarters: News Release (10:30), Press conference (11:45)

NISA (Nuclear and Industrial Safety Agency): News Release (7:30)

Tokyo Electric Powe Co.: Prsss Release (6:01, 8:00), Press Conference (12:10)

Abbreviations:

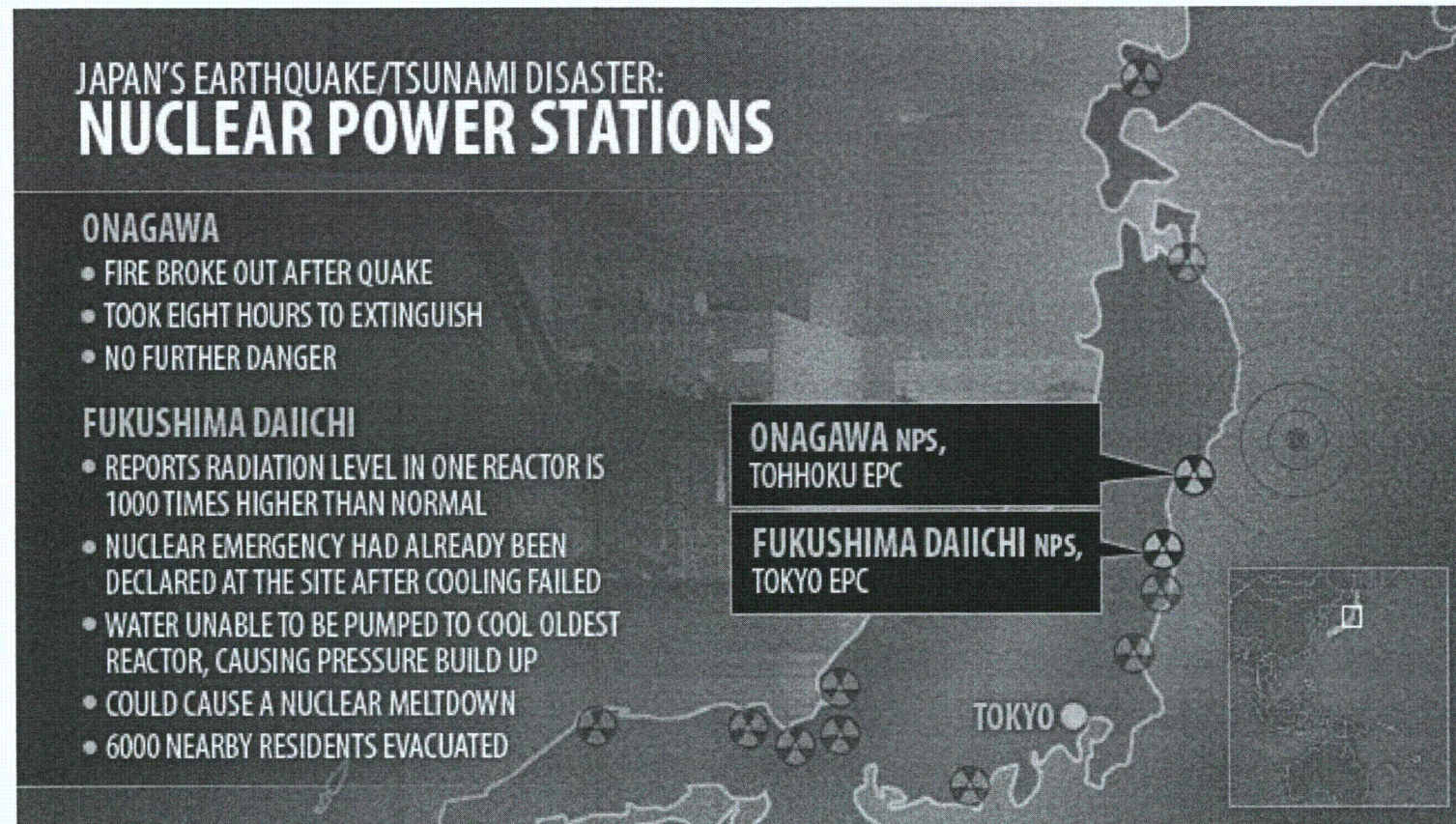
ECCS: Emergency Core Cooling System  
RHR: Residual Heat Removal System  
RCIC: Reactor Core Isolation Cooling System  
MUWC: Make-Up Water Condensate System  
INES: International Nuclear Event Scale



- High Pressure Injection
  - Maintains Adequate reactor vessel water inventory for core cooling on small break LOCA's
  - Depressurizes the reactor vessel to allow the low pressure emergency core cooling systems to inject on intermediate break LOCA's
- Automatic Depressurization System
  - Depressurizes the reactor vessel so that the low pressure emergency core cooling systems can inject water
- Low Pressure Injection
  - Uses the Residual Heat Removal System to restores and maintains water level in the reactor vessel following a large break LOCA's

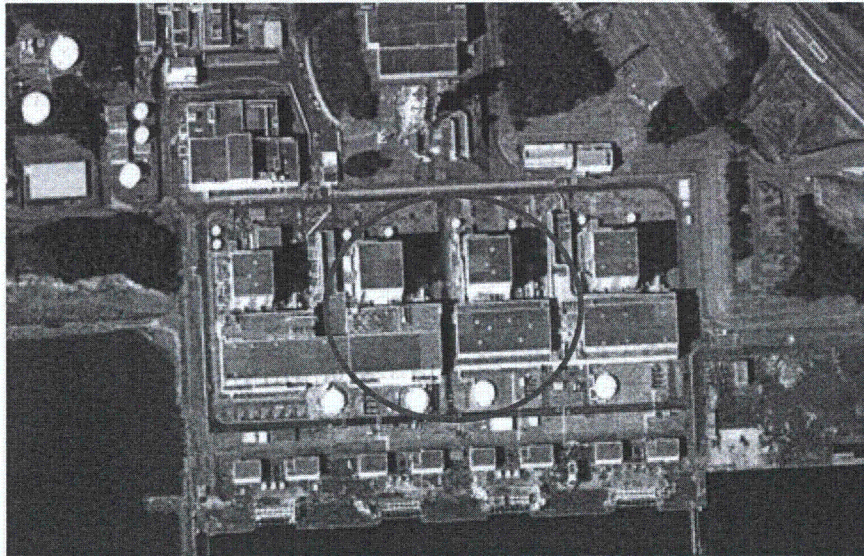


# Japan Earthquake Effect on Nuclear Plants





# Fukushima Nuclear Power Plant



Before Earthquake



After Earthquake

## **Rivera-Lugo, Richard**

---

**From:** Kardaras, Tom  
**Sent:** Monday, March 28, 2011 9:57 AM  
**To:** Rivera-Lugo, Richard  
**Subject:** RE: Action: Please call me...I am trying to understand the information you sent Andrea on Friday, 3/25 regarding staff who are working on the Japan event

**Categories:** Green Category

Let me check but I believe we will need it. I will let you know.

Regards,  
Tom Kardaras, Deputy Director (Acting)  
Program Management, Policy Development and Analysis Staff  
Office of Nuclear Regulatory Research  
(o) 301-251-7667

---

**From:** Rivera-Lugo, Richard  
**Sent:** Monday, March 28, 2011 9:54 AM  
**To:** Kardaras, Tom  
**Subject:** RE: Action: Please call me...I am trying to understand the information you sent Andrea on Friday, 3/25 regarding staff who are working on the Japan event

Sorry if it was a little confusing; I asked Andrea if that was what she needed and she said yes.  
Does PMDA still need the TAs to gather this information for pay period 8?

---

**From:** Kardaras, Tom  
**Sent:** Monday, March 28, 2011 9:53 AM  
**To:** Rivera-Lugo, Richard  
**Subject:** RE: Action: Please call me...I am trying to understand the information you sent Andrea on Friday, 3/25 regarding staff who are working on the Japan event

No problem.....I think I understand your sheet. No further action is required.

Regards,  
Tom Kardaras, Deputy Director (Acting)  
Program Management, Policy Development and Analysis Staff  
Office of Nuclear Regulatory Research  
(o) 301-251-7667

---

**From:** Rivera-Lugo, Richard  
**Sent:** Monday, March 28, 2011 9:50 AM  
**To:** Kardaras, Tom  
**Subject:** RE: Action: Please call me...I am trying to understand the information you sent Andrea on Friday, 3/25 regarding staff who are working on the Japan event

Hello Tom,

I tried to call, but you were not available. Call me or let me know if you need me to go upstairs.

Richie

*Richard Rivera-Lugo*, EIT, MEM  
Technical Assistant (Acting)  
U.S. Nuclear Regulatory Commission – HQ  
RES/DE  
Ph. 301-251-7652  
Fax 301-251-7420  
Mail M.S. C5C07M  
E-mail [Richard.Rivera-Lugo@nrc.gov](mailto:Richard.Rivera-Lugo@nrc.gov)



Please consider the Environment before printing this e-mail.

---

**From:** Kardaras, Tom  
**Sent:** Monday, March 28, 2011 8:57 AM  
**To:** Rivera-Lugo, Richard  
**Subject:** Action: Please call me...I am trying to understand the information you sent Andrea on Friday, 3/25 regarding staff who are working on the Japan event

I need to send the information out and I would like to get clarification on one thing.

Regards,  
Tom Kardaras, Deputy Director (Acting)  
Program Management, Policy Development and Analysis Staff  
Office of Nuclear Regulatory Research  
(o) 301-251-7667



**From:** Chang, Richard  
**To:** "mtl@dycoda.com"  
**Cc:** Tinkler, Charles; McClellan, Yvonne; Schaperow, Jason  
**Subject:** RE: Plant Fact Comment Resolutions/Fukushima  
**Date:** Tuesday, March 15, 2011 9:09:00 AM

---

Mark,

Because Charlie and Jason were/are tied up in Fukushima issues, I want to postpone it until tomorrow.

Thanks,  
Richard

---

**From:** M.T. Leonard [mailto:mtl@dycoda.com]  
**Sent:** Tuesday, March 15, 2011 9:08 AM  
**To:** Chang, Richard  
**Cc:** Tinkler, Charles; McClellan, Yvonne; Schaperow, Jason  
**Subject:** Re: Plant Fact Comment Resolutions/Fukushima

Richard --  
What is the plan now?  
Mark

On Mon, 14 Mar 2011 16:29:24 -0400, Chang, Richard wrote:

> Mark,  
>  
> If you are not traveling to Japan, can you let me know if we can  
> reschedule tomorrow's Plant Fact check call to Wednesday afternoon?  
>  
> Thanks,  
>  
> Richard Chang  
>  
> Program Manager  
>  
> RES/DSA/SPB  
>  
> 301-251-7980

A/220

**From:** Chang, Richard  
**To:** "McClellan, Yvonne"  
**Subject:** RE: Japan  
**Date:** Tuesday, March 15, 2011 9:14:00 AM

---

Before you set a time and day, give me a ring, so we can work out a time that makes sense. Part of the difficulty is that Charlie and Jason are spent fuel pool experts and may be unavailable due to Japan.

How many people on the SOARCA team from Sandia are tied up in what is going on in Japan?

Thanks,  
Richard

---

**From:** McClellan, Yvonne [mailto:ymcclel@sandia.gov]  
**Sent:** Tuesday, March 15, 2011 9:03 AM  
**To:** Chang, Richard  
**Subject:** RE: Japan

Richard,  
I am meeting with Randy this morning to get the notes from last Thursday's meeting. I plan on incorporated these comments today into the peer review file. When I meet with Randy I will go over his calendar and set a time and day.  
Hope Charlie will be back soon.

Yvonne

---

**From:** Chang, Richard [mailto:Richard.Chang@nrc.gov]  
**Sent:** Tuesday, March 15, 2011 6:03 AM  
**To:** McClellan, Yvonne  
**Subject:** RE: Japan

Yvonne, I talked to me management...I am pretty sure that he will no longer be going to Japan. This is based on a conversation that Mike Scott had with Susan Pickering last night.

So if that is the case, let's schedule a Peer Review conference call this week. Charlie was up at the NRC's Emergency Ops center last night, so I doubt he is coming in today....how does tomorrow/ Thursday look for Randy's calendar?

Thanks,  
Richard

---

**From:** McClellan, Yvonne [mailto:ymcclel@sandia.gov]  
**Sent:** Tuesday, March 15, 2011 7:52 AM  
**To:** Chang, Richard  
**Subject:** Re: Japan

No one knows yet. Good idea.

A/223.

---

**From:** Chang, Richard [mailto:Richard.Chang@nrc.gov]  
**Sent:** Tuesday, March 15, 2011 05:26 AM  
**To:** McClellan, Yvonne  
**Subject:** Japan

Yvonne,

Do you know if Randy is going to Japan? If not, give me a call this morning and let's plan the week.

Thanks,

Richard Chang  
Program Manager  
RES/DSA/SPB  
301-251-7980



## Stutzke, Martin

---

**From:** Stutzke, Martin  
**Sent:** Tuesday, March 15, 2011 10:25 AM  
**To:** Ake, Jon; Kammerer, Annie  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

We need information to answer Question #3 concerning the development of new consensus seismic hazard curves:

1. What is the official project name?
2. Who is the overall project manager and his/her contact information?
3. Is there a public website that provides overview information on the project?
4. List of all participating organizations (domestic and international)?
5. Projected schedule? (I think this is by December 2011)

FYI – The reporter's understanding on Question #1 is correct. I'm working on Question #2 by going to the Region IV SRAs to find out what licensees have available. We will defer Question #4 to NRR.

Marty

---

**From:** Beasley, Benjamin  
**Sent:** Tuesday, March 15, 2011 9:36 AM  
**To:** Stutzke, Martin; Ake, Jon  
**Cc:** Kauffman, John  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

I am still reading this but need to give you the heads up. I am walking to the 6<sup>th</sup> floor to get permission to work on this.

Ben

---

**From:** Wilson, George  
**Sent:** Tuesday, March 15, 2011 9:31 AM  
**To:** Beasley, Benjamin  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

fyi

---

**From:** Hiland, Patrick  
**Sent:** Tuesday, March 15, 2011 9:20 AM  
**To:** Wilson, George; Manoly, Kamal  
**Cc:** Stutzke, Martin; Ake, Jon; Coe, Doug; Skeen, David; Scales, Kerby  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

Need to work with OPA, and RES. Kamal should coordinate with RES, and I suggest Marty/Jon respond directly through RES. Doug Coe is good source also for the GI. Get OPA involved.

---

**From:** Bill Dedman [mailto:Bill.Dedman@msnbc.com]  
**Sent:** Tuesday, March 15, 2011 9:06 AM  
**To:** Manoly, Kamal; Sheron, Brian; Hiland, Patrick; OPA Resource  
**Subject:** NBC deadline question for NRC on seismic hazard estimates

Good morning,

My name is Bill Dedman. I'm a reporter for NBC News and msnbc.com, writing an article today about:

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

I reached out to NRC Public Affairs yesterday but have not heard back, and my deadline is end-of-day today. I'm hoping to get on the phone today with someone from NRC to make sure I'm conveying this information accurately to the public. If nothing else, I'm hoping one of the technical people can help clarify the points below. My telephone number is 203-451-9995.

I've read Director Brian Sheron's memo of Sept. 2, 2010, to Mr. Patrick Hiland; the safety/risk assessment of August 2010; its appendices A through D; NRC Information Notice 2010-18; and the fact sheet from public affairs from November 2010.

I have these questions:

1. I'd like to make sure that I accurately place in layman's terms the seismic hazard estimates. I need to make sure that I'm understanding the nomenclature for expressing the seismic core-damage frequencies. Let's say there's an estimate expressed as "2.5E-06." (I'm looking at Table D-2 of the safety/risk assessment of August 2010.) I believe that this expression means the same as  $2.5 \times 10^{-6}$ , or 0.0000025, or 2.5 divided by one million. In layman's terms, that means an expectation, on average, of 2.5 events every million years, or once every 400,000 years. Similarly, "2.5E-05" would be 2.5 divided by 100,000, or 2.5 events every 100,000 years, on average, or once every 40,000 years. Is this correct?
2. These documents give updated probabilistic seismic hazard estimates for existing nuclear power plants in the Central and Eastern U.S. What document has the latest seismic hazard estimates (probabilistic or not) for existing nuclear power plants in the Western U.S.?
3. The documents refer to newer data on the way. Have NRC, USGS et al. released those? I'm referring to this: "New consensus seismic-hazard estimates will become available in late 2010 or early 2011 (these are a product of a joint NRC, U.S. Department of Energy, U.S. Geological Survey (USGS) and Electric Power Research Institute (EPRI) project). These consensus seismic hazard estimates will supersede the existing EPRI, Lawrence Livermore National Laboratory, and USGS hazard estimates used in the GI-199 Safety/Risk Assessment."
4. What is the timetable now for consideration of any regulatory changes from this research?

Thank you for your help.

Regards,

Bill Dedman

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**Stutzke, Martin**

---

**From:** Stutzke, Martin  
**Sent:** Tuesday, March 15, 2011 10:39 AM  
**To:** Runyan, Michael  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates

**Importance:** High

Mike –

I was given your name by Don Marksberry. By way of introduction, I'm one of the PRA SLS working in RES/DRA, and coauthored the Safety/Risk Assessment of GI-199 concerning the impact of updated seismic hazard estimates in the Central and Eastern US.

We are trying to answer Question #2 (see below). Since GI-199 focused in CEUS plants, we did not collect recent information on seismic hazards and seismic core-damage frequencies for the Western US plants (Columbia, Diablo Canyon, San Onofre, and Palo Verde). I am hoping that you might have or can readily obtain this information. Specifically, here's what we would like to know:

1. What is the current estimate of seismic core-damage frequency at each Western US plant?
2. What is the current estimate of exceeding the safe shutdown earthquake (SSE) at each Western US plant? To get a complete picture, we'd like to know the annual exceedence frequencies for various spectral frequencies (e.g., 1 Hz, 5 Hz, and 10 Hz) as well as peak ground acceleration.

Thanks in advance,

Marty

Martin A. Stutzke  
Senior Technical Advisor of PRA Technologies  
Division of Risk Analysis  
Office of Nuclear Regulatory Research  
301-251-7614

---

**From:** Beasley, Benjamin  
**Sent:** Tuesday, March 15, 2011 9:36 AM  
**To:** Stutzke, Martin; Ake, Jon  
**Cc:** Kauffman, John  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

I am still reading this but need to give you the heads up. I am walking to the 6<sup>th</sup> floor to get permission to work on this.

Ben

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**From:** Wilson, George  
**Sent:** Tuesday, March 15, 2011 9:31 AM  
**To:** Beasley, Benjamin  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

fyi

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**From:** Hiland, Patrick  
**Sent:** Tuesday, March 15, 2011 9:20 AM  
**To:** Wilson, George; Manoly, Kamal  
**Cc:** Stutzke, Martin; Ake, Jon; Coe, Doug; Skeen, David; Scales, Kerby  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

Need to work with OPA, and RES. Kamal should coordinate with RES, and I suggest Marty/Jon respond directly through RES. Doug Coe is good source also for the GI. Get OPA involved.

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**From:** Bill Dedman [mailto:Bill.Dedman@msnbc.com]  
**Sent:** Tuesday, March 15, 2011 9:06 AM  
**To:** Manoly, Kamal; Sheron, Brian; Hiland, Patrick; OPA Resource  
**Subject:** NBC deadline question for NRC on seismic hazard estimates

Good morning,

My name is Bill Dedman. I'm a reporter for NBC News and msnbc.com, writing an article today about:

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

I reached out to NRC Public Affairs yesterday but have not heard back, and my deadline is end-of-day today. I'm hoping to get on the phone today with someone from NRC to make sure I'm conveying this information accurately to the public. If nothing else, I'm hoping one of the technical people can help clarify the points below. My telephone number is 203-451-9995.

I've read Director Brian Sheron's memo of Sept. 2, 2010, to Mr. Patrick Hiland; the safety/risk assessment of August 2010; its appendices A through D; NRC Information Notice 2010-18; and the fact sheet from public affairs from November 2010.

I have these questions:

1. I'd like to make sure that I accurately place in layman's terms the seismic hazard estimates. I need to make sure that I'm understanding the nomenclature for expressing the seismic core-damage frequencies. Let's say there's an estimate expressed as "2.5E-06." (I'm looking at Table D-2 of the safety/risk assessment of August 2010.) I believe that this expression means the same as  $2.5 \times 10^{-6}$ , or 0.0000025, or 2.5 divided by one million. In layman's terms, that means an expectation, on average, of 2.5 events every million years, or once every 400,000 years. Similarly, "2.5E-05" would be 2.5 divided by 100,000, or 2.5 events every 100,000 years, on average, or once every 40,000 years. Is this correct?
2. These documents give updated probabilistic seismic hazard estimates for existing nuclear power plants in the Central and Eastern U.S. What document has the latest seismic hazard estimates (probabilistic or not) for existing nuclear power plants in the Western U.S.?
3. The documents refer to newer data on the way. Have NRC, USGS et al. released those? I'm referring to this: "New consensus seismic-hazard estimates will become available in late 2010 or early 2011 (these are a product of a joint NRC, U.S. Department of Energy, U.S. Geological Survey (USGS) and Electric Power Research Institute (EPRI) project). These consensus seismic hazard estimates will supersede the existing EPRI, Lawrence Livermore National Laboratory, and USGS hazard estimates used in the GI-199 Safety/Risk Assessment."
4. What is the timetable now for consideration of any regulatory changes from this research?

Thank you for your help.

Regards,

Bill Dedman

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**Pires, Jose**

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**From:** Pires, Jose  
**Sent:** Tuesday, March 15, 2011 11:08 AM  
**To:** Graves, Herman  
**Subject:** RE: SEISMIC DATABASE

Thanks.

Jose.

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**From:** Graves, Herman  
**Sent:** Tuesday, March 15, 2011 11:07 AM  
**To:** Pires, Jose  
**Subject:** SEISMIC DATABASE

Jose,

Here's the information.

<<Herman>>

<<301.251.7625>>

mail to: Herman.Graves@nrc.gov

## Stutzke, Martin

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**From:** Stutzke, Martin  
**Sent:** Tuesday, March 15, 2011 1:44 PM  
**To:** Mahoney, Michael; Gitter, Joseph; Hiland, Patrick  
**Cc:** Kammerer, Annie; Ake, Jon  
**Subject:** Plant Seismic information to Support NRC Hearing on Wednesday  
**Attachments:** SSE Exceed and SCDF.xlsx

I've prepared a spreadsheet that provides the following information for each operating plant:

1. Safe shutdown earthquake (SSE)
2. Annual frequency of exceeding the SSE

For Western US plants (Columbia, Diablo Canyon, San Onofre, and Palo Verde), this information is based on the seismic hazard curve for peak ground acceleration as reported in the IPEEE. For the Central and Eastern US (CEUS) plants, this information is based on the 2008 US Geological Survey seismic hazard curves (adjusted for site-specific soil amplification) for peak ground acceleration, 10 Hz, 5 Hz, and 1 Hz spectral frequencies as developed for the Safety/Risk Assessment of Generic Issue 199 (GI-199).

3. The review-level earthquake (RLE) used in the IPEEE

This information was obtained from the IPEEE submittals, and is reported in NUREG-1742. The RLE is only applicable to those plants that used seismic margins analysis (SMA) to respond to the IPEEE (Generic Letter 88-20, Supplement 4). The RLE is specified in terms of the high confidence of low probability of failure (HCLPF) for peak ground acceleration. The HCLPF is the acceleration value at which there is a 1% probability of core damage. The RLE is not applicable to plants that performed seismic PRAs.

4. The seismic core-damage frequency

For most Western US plants (Columbia, Diablo Canyon, and San Onofre), this information is based on IPEEE submittals as summarized in NUREG-1742. For Palo Verde, I made an estimate using the methods developed for GI-199. For the CEUS plants, this information was developed in the Safety/Risk Assessment of GI-199.

5. The method used in the IPEEE to assess seismic risk, as reported in NUREG-1742

The attached spreadsheet also provides fleetwide summary statistics for the frequencies of exceeding the SSE and the seismic core-damage frequencies (average, median, minimum, maximum, etc.).

Please note that the GI-199 Safety/Risk Assessment is publically available (ML100270582). NUREG-1742 is available in the Electronic Reading Room on the public website. IPEEEs are no longer publically available (following the 9/11/2001 event).

Martin A. Stutzke  
Senior Technical Advisor for PRA Technologies  
Division of Risk Assessment  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
(301) 251-7614



## SEISMIC INFORMATION: SSE, SSE EXCEEDANCE FREQUENCIES, REVIEW-LEVEL EARTHQUAKES, AND SEISMIC CORE-DAMAGE FREQUENCIES

Plant	Docket	SSE (g's)	Frequency of Exceeding the SSE (per year)	RLE (HCLPF) (g's)	Seismic Core Damage Frequency (per year)	IPEEE Method	Source
Arkansas 1	05000313	0.2	2.8E-04	0.3	4.1E-06	0.3g full-scope EPRI SMA	GI-199
Arkansas 2	05000368	0.2	9.7E-05	0.3	4.1E-06	0.3g focused-scope EPRI SMA	GI-199
Beaver Valley 1	05000334	0.12	3.3E-04	n/a	4.8E-05	seismic PRA	GI-199
Beaver Valley 2	05000412	0.12	2.7E-04	n/a	2.2E-05	seismic PRA	GI-199
Braidwood 1	05000456	0.2	6.7E-05	0.3	7.3E-06	0.3g focused-scope EPRI SMA	GI-199
Braidwood 2	05000457	0.2	6.7E-05	0.3	7.3E-06	0.3g focused-scope EPRI SMA	GI-199
Browns Ferry 1	05000259	0.2	2.5E-04	0.3	3.7E-06	0.3g focused-scope EPRI SMA	GI-199
Browns Ferry 2	05000260	0.2	2.5E-04	0.26	5.4E-06	0.3g focused-scope EPRI SMA	GI-199
Browns Ferry 3	05000296	0.2	2.5E-04	0.26	5.4E-06	0.3g focused-scope EPRI SMA	GI-199
Brunswick 1	05000325	0.16	7.3E-04	0.3	1.5E-05	0.3g focused-scope EPRI SMA	GI-199
Brunswick 2	05000324	0.16	7.3E-04	0.3	1.5E-05	0.3g focused-scope EPRI SMA	GI-199
Byron 1	05000454	0.2	5.2E-05	0.3	5.8E-06	0.3g focused-scope EPRI SMA	GI-199
Byron 2	05000455	0.2	5.2E-05	0.3	5.8E-06	0.3g focused-scope EPRI SMA	GI-199
Callaway	05000483	0.2	3.8E-05	0.3	2.0E-06	0.3g focused-scope EPRI SMA	GI-199
Calvert Cliffs 1	05000317	0.15	1.9E-04	n/a	1.0E-05	seismic PRA	GI-199
Calvert Cliffs 2	05000318	0.15	1.9E-04	n/a	1.2E-05	seismic PRA	GI-199
Catawba 1	05000413	0.15	1.4E-04	n/a	3.7E-05	seismic PRA	GI-199
Catawba 2	05000414	0.15	1.4E-04	n/a	3.7E-05	seismic PRA	GI-199
Clinton	05000461	0.25	5.8E-05	0.3	2.5E-06	0.3g focused-scope EPRI SMA	GI-199
Columbia	05000397	0.25	1.7E-04	n/a	2.1E-05	seismic PRA	IPEEE
Comanche Peak 1	05000445	0.12	1.6E-05	0.12	4.0E-06	reduced-scope EPRI SMA; SSE = 0.12g	GI-199
Comanche Peak 2	05000446	0.12	1.6E-05	0.12	4.0E-06	reduced-scope EPRI SMA; SSE = 0.12g	GI-199
Cooper	05000298	0.2	1.5E-04	0.3	7.0E-06	0.3g focused-scope EPRI SMA	GI-199
Crystal River 3	05000302	0.1	8.9E-05	0.1	2.2E-05	reduced-scope EPRI SMA; SSE = 0.1g	GI-199
D.C. Cook 1	05000315	0.2	2.1E-04	n/a	2.2E-05	seismic PRA	GI-199
D.C. Cook 2	05000316	0.2	2.1E-04	n/a	2.2E-05	seismic PRA	GI-199
Davis Besse	05000346	0.15	6.3E-05	0.26	6.7E-06	reduced-scope EPRI SMA	GI-199
Diablo Canyon 1	05000275	0.75	3.9E-03	n/a	4.2E-05	seismic PRA	IPEEE
Diablo Canyon 2	05000323	0.75	3.9E-03	n/a	4.2E-05	seismic PRA	IPEEE
Dresden 2	05000237	0.2	9.7E-05	0.26	1.9E-05	0.3g focused-scope EPRI SMA	GI-199
Dresden 3	05000249	0.2	9.7E-05	0.26	1.9E-05	0.3g focused-scope EPRI SMA	GI-199
Duane Arnold	05000331	0.12	2.3E-04	0.12	3.2E-05	reduced-scope EPRI SMA; SSE = 0.12g	GI-199
Farley 1	05000348	0.1	1.0E-04	0.1	2.8E-05	reduced-scope EPRI SMA; SSE = 0.1g	GI-199
Farley 2	05000364	0.1	1.0E-04	0.1	2.8E-05	reduced-scope EPRI SMA; SSE = 0.1g	GI-199
Fermi 2	05000341	0.15	1.0E-04	0.3	4.2E-06	0.3g focused-scope EPRI SMA	GI-199
Fitzpatrick	05000333	0.15	3.2E-04	0.22	6.1E-06	0.3g focused-scope NRC SMA	GI-199
Fort Calhoun 1	05000285	0.17	3.7E-04	0.25	5.4E-06	0.3g focused-scope NRC SMA	GI-199
Ginna	05000244	0.2	1.0E-04	0.2	1.3E-05	0.3g focused-scope EPRI SMA	GI-199
Grand Gulf	05000416	0.15	1.0E-04	0.15	1.2E-05	reduced-scope EPRI SMA; SSE = 0.15g	GI-199
Hatch 1	05000400	0.148	3.9E-04	0.29	2.3E-06	0.3g focused-scope EPRI SMA	GI-199
Hatch 2	05000321	0.15	2.7E-04	0.3	2.5E-06	0.3g focused-scope EPRI SMA	GI-199
Hope Creek	05000366	0.2	9.7E-05	0.3	2.5E-06	0.3g focused-scope EPRI SMA	GI-199
Indian Point 2	05000354	0.15	4.9E-04	n/a	2.8E-06	seismic PRA	GI-199
Indian Point 3	05000247	0.15	4.9E-04	n/a	3.3E-05	seismic PRA	GI-199
Kewaunee	05000286	0.12	2.8E-04	n/a	1.0E-04	seismic PRA	GI-199
LaSalle 1	05000305	0.2	1.7E-04	n/a	5.1E-06	seismic PRA	GI-199
LaSalle 2	05000373	0.2	1.7E-04	n/a	2.8E-06	seismic PRA	GI-199
Limerick 1	05000374	0.15	1.8E-04	n/a	2.8E-06	seismic PRA	GI-199
Limerick 2	05000352	0.15	1.8E-04	0.15	5.3E-05	reduced-scope EPRI SMA	GI-199
McGuire 1	05000353	0.15	9.5E-05	0.15	5.3E-05	reduced-scope EPRI SMA	GI-199
McGuire 2	05000369	0.15	9.5E-05	n/a	3.1E-05	seismic PRA	GI-199
Millstone 1	05000370	0.254	9.3E-05	n/a	3.1E-05	seismic PRA	GI-199
Millstone 2	05000336	0.17	8.3E-05	0.25	1.1E-05	0.3g focused-scope EPRI SMA	GI-199
Millstone 3	05000423	0.17	8.3E-05	n/a	1.5E-05	seismic PRA	GI-199
Monticello	05000263	0.12	9.3E-05	0.12	1.9E-05	modified focused/expended reduced-scope EPRI S	GI-199
Nine Mile Point 1	05000220	0.11	1.5E-04	0.27	4.2E-06	0.3g focused-scope EPRI SMA	GI-199
Nine Mile Point 2	05000410	0.15	4.8E-05	0.23	5.6E-06	SPRA and focused-scope EPRI SMA	GI-199
North Anna 1	05000338	0.12	2.1E-04	0.16	4.4E-05	0.3g focused-scope EPRI SMA	GI-199
North Anna 2	05000339	0.12	2.1E-04	0.16	4.4E-05	0.3g focused-scope EPRI SMA	GI-199
Oconee 1	05000269	0.1	9.7E-04	n/a	4.3E-05	seismic PRA	GI-199
Oconee 2	05000270	0.1	9.7E-04	n/a	4.3E-05	seismic PRA	GI-199
Oconee 3	05000287	0.1	9.7E-04	n/a	4.3E-05	seismic PRA	GI-199
Oyster Creek	05000219	0.17	1.5E-04	n/a	1.4E-05	seismic PRA	GI-199
Palisades	05000255	0.2	1.4E-04	n/a	6.4E-06	seismic PRA	GI-199
Palo Verde 1	05000528	0.258	3.5E-05	0.3	3.8E-05	0.3g full-scope EPRI SMA	IPEEE
Palo Verde 2	05000529	0.258	3.5E-05	0.3	3.8E-05	0.3g full-scope EPRI SMA	IPEEE
Palo Verde 3	05000530	0.258	3.5E-05	0.3	3.8E-05	0.3g full-scope EPRI SMA	IPEEE
Peach Bottom 2	05000277	0.12	2.0E-04	0.2	2.4E-05	modified focused-scope EPRI SMA	GI-199
Peach Bottom 3	05000278	0.12	2.0E-04	0.2	2.4E-05	modified focused-scope EPRI SMA	GI-199
Perry	05000440	0.15	2.2E-04	0.3	2.1E-05	0.3g focused-scope EPRI SMA	GI-199
Pilgrim 1	05000293	0.15	8.1E-04	n/a	6.9E-05	seismic PRA	GI-199
Point Beach 1	05000266	0.12	2.0E-04	n/a	1.1E-05	seismic PRA	GI-199
Point Beach 2	05000301	0.12	2.0E-04	n/a	1.1E-05	seismic PRA	GI-199
Prairie Island 1	05000282	0.12	2.0E-04	0.28	3.0E-06	0.3g focused-scope EPRI SMA	GI-199
Prairie Island 2	05000306	0.12	2.0E-04	0.28	3.0E-06	0.3g focused-scope EPRI SMA	GI-199
Quad Cities 1	05000254	0.24	8.2E-04	0.09	2.7E-05	0.3g focused-scope EPRI SMA	GI-199
Quad Cities 2	05000265	0.24	8.2E-04	0.09	2.7E-05	0.3g focused-scope EPRI SMA	GI-199

River Bend	05000458	0.1	2.4E-04	0.1	2.5E-05	reduced-scope EPRI SMA; SSE = 0.1g	GI-199
Robinson (HR)	05000261	0.2	1.1E-03	0.28	1.5E-05	0.3g full-scope EPRI SMA	GI-199
Saint Lucie	05000335	0.1	1.4E-04	0.1	4.6E-05	reduced-scope EPRI SMA; SSE = 0.1g	GI-199
Salem 1	05000389	0.2	2.6E-04	0.1	4.6E-05	reduced-scope EPRI SMA; SSE = 0.1g	GI-199
Salem 2	05000272	0.2	2.6E-04	n/a	9.3E-06	seismic PRA	GI-199
San Onofre 2	05000361	0.67	1.2E-04	n/a	1.7E-05	seismic PRA	IPEEE
San Onofre 3	05000362	0.67	1.2E-04	n/a	1.7E-05	seismic PRA	IPEEE
Seabrook	05000311	0.25	1.3E-04	n/a	9.3E-06	seismic PRA	GI-199
Sequoyah 1	05000443	0.18	7.1E-04	n/a	2.2E-05	seismic PRA	GI-199
Sequoyah 2	05000327	0.18	7.1E-04	0.27	5.1E-05	0.3g full-scope EPRI SMA	GI-199
Shearon Harris 1	05000328	0.15	4.6E-05	0.27	5.1E-05	0.3g full-scope EPRI SMA	GI-199
South Texas 1	05000498	0.1	3.0E-05	n/a	6.2E-06	seismic PRA	GI-199
South Texas 2	05000499	0.1	3.0E-05	n/a	6.2E-06	seismic PRA	GI-199
Summer	05000395	0.15	3.9E-04	0.22	3.8E-05	0.3g focused-scope EPRI SMA	GI-199
Surry 1	05000280	0.15	2.2E-04	n/a	5.7E-06	seismic PRA	GI-199
Surry 2	05000281	0.15	2.2E-04	n/a	5.7E-06	seismic PRA	GI-199
Susquehanna 1	05000387	0.1	1.9E-04	0.21	1.3E-05	0.3g focused-scope EPRI SMA	GI-199
Susquehanna 2	05000388	0.1	1.9E-04	0.21	1.3E-05	0.3g focused-scope EPRI SMA	GI-199
Three Mile Island 1	05000289	0.12	1.0E-04	n/a	4.0E-05	seismic PRA	GI-199
Turkey Point 3	05000250	0.15	3.8E-05	0.15	1.0E-05	site-specific approach; SSE=0.15g	GI-199
Turkey Point 4	05000251	0.15	3.8E-05	0.15	1.0E-05	site-specific approach; SSE=0.15g	GI-199
Vermont Yankee	05000271	0.14	1.2E-04	0.25	8.1E-06	0.3g focused-scope EPRI SMA	GI-199
Vogtle 1	05000424	0.2	1.5E-04	0.3	1.8E-05	0.3g focused-scope EPRI SMA	GI-199
Vogtle 2	05000425	0.2	1.5E-04	0.3	1.8E-05	0.3g focused-scope EPRI SMA	GI-199
Waterford 3	05000382	0.1	1.1E-04	0.1	2.0E-05	reduced-scope EPRI SMA; SSE = 0.1g	GI-199
Watts Bar	05000390	0.18	2.9E-04	0.3	3.6E-05	0.3g focused-scope EPRI SMA	GI-199
Wolf Creek	05000482	0.12	3.7E-05	0.2	1.8E-05	reduced-scope EPRI SMA	GI-199
25th percentile			9.6E-05		6.0E-06		
min			1.6E-05		2.0E-06		
median			1.7E-04		1.5E-05		
mean			3.1E-04		2.1E-05		
max			3.9E-03		1.0E-04		
75th percentile			2.6E-04		3.2E-05		

## **Wegner, Mary**

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**From:** Wegner, Mary  
**Sent:** Tuesday, March 15, 2011 2:45 PM  
**To:** Garmon-Candelaria, David  
**Subject:** FYI

From <http://rt.com> (Russian Television)

The technical challenges facing Japan's nuclear industry in Fukushima reminds of those the US had to deal with after the Three Mile Island accident in Pennsylvania back in 1979, said the 41st Governor of Pennsylvania, Richard Thornburgh.

Being asked about the situation at Fukushima Dai-Ichi nuclear power plant, where the buildings of three units exploded because of excessive hydrogen concentration and a massive fire at the spent fuel storage pond, Richard Thornburgh said *"what is most scary is that we cannot get all of the facts."*

He said that after the Three Mile Island incident, specialists around the world were studying the lessons of the accident in which about a third of the active core melted. Thornburgh hopes the disaster at Fukushima nuclear power plant is going to be a good lesson for the whole nuclear industry.

The fruitless attempts of Japanese authorities to cool down the reactors show that even for technologically advanced states such as Japan it is absolutely necessary to have *"defense in depth against these kinds of occurrences."*

Japanese authorities are trying to do their best to prevent and investigate the incident at Fukushima nuclear power plant, but they also have to convey accurate information to the public, Thornburgh pointed out.

*"It has to be tested. Every fact has to be examined in terms of source and the setting which it arises. It is not an easy thing to do. The single biggest challenge of emergency management is getting accurate facts so that you can make the right decisions. You can be the best decision maker in the world, but if you do not have the right facts – you're in trouble."*

Thornburgh reminded that though there are ongoing protests against the development of nuclear energy, the arising costs of alternative sources of energy and the global fight against carbon emission make nuclear energy a favorite in some aspects – even for the environmental community.

No country currently using nuclear energy on a large scale, like the US, Russia, France, China or India, is going to scrap their present commitment to nuclear power, Thornburgh believes. He adds, though, that *"they all are going to stop, take a deep breath and look at consequences of this [disaster] once they are fully available" and the catastrophe in Japan is going to be a "step back in terms of their desire to build more nuclear plants".*

**Wegner, Mary**

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**From:** Wegner, Mary  
**Sent:** Tuesday, March 15, 2011 2:49 PM  
**To:** Garmon-Candelaria, David  
**Cc:** Beasley, Benjamin  
**Subject:** Editorial Blasting Gov't TEPCO

## **Govt, TEPCO fail on info-sharing / No N-crisis HQ for 4 days after tsunami disabled reactor cooling system**

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The Yomiuri Shimbun

Both the government of Prime Minister Naoto Kan and Tokyo Electric Power Co. failed to exercise a firm grip over the release of information on the rapidly unfolding nuclear crisis at the utility's nuclear power plant in Fukushima Prefecture, and did not set up an integrated government-TEPCO headquarters until Tuesday, four days after the outbreak of earthquake-triggered abnormalities.

A domino effect of crises at the Fukushima No. 1 nuclear power plant took place with hydrogen blasts occurring at the No. 1 reactor on Saturday and at the No. 3 reactor on Monday.

The events were followed by the most serious development yet in the escalating crisis--the No. 2 reactor's inner pressure suppression system was found to be damaged early Tuesday, resulting in the detection of high radiation readings in the vicinity of the plant later in the morning.

It was at 8:45 p.m. Friday, six hours after the catastrophic earthquake hammered the Pacific coastal regions of the Tohoku and Kanto areas, that the Fukushima prefectural government issued a warning against residents living within a two-kilometer radius of the plant to be evacuated over fear of radiation exposure.

About an hour later, Chief Cabinet Secretary Yukio Edano announced an instruction urging residents within a three-kilometer radius of the No. 1 plant to evacuate. In making the announcement, however, Edano denied any possibility of radioactive leakage out of the nuclear facility.

Things changed drastically a day later, Saturday afternoon: A hydrogen explosion blew off all but the framework of the No. 1 reactor's external containment structure.

Nonetheless, in a press conference five hours after the blast, Edano continued stressing that the reactor's inner components were "kept under control," repeating that the public should "act calmly."

It was not until Sunday morning that TEPCO informed the Fukushima prefectural government's disaster countermeasures headquarters that the No. 3 reactor cooling system had stopped functioning. The firm at that time did not provide any detailed information about radiation levels in areas surrounding the plant.

Each time problems with the nuclear plant took a new turn, Edano held a press conference, but always came up came short of providing specific details about what was going on. TEPCO, for its part, made a point of parroting Edano's words, a far-from-responsible position for the company, which should have been expected to offer intelligible explanations about the quake-hit nuclear facility.

Kan, apparently in a fret over the utility's responses to the crisis, said to reporters on Sunday that the information provided to the government from the company was of a piecemeal and "belated" nature, a statement interpreted by some observers as intending to dodge responsibility for the crisis by shifting blame to TEPCO.

At that point, the prime minister was hardly ready to launch integrated, collaborative arrangements with the company and the Fukushima prefectural government to share information on measures to address the emerging crisis.

At the same time, the Economy, Trade and Industry Ministry's Nuclear and Industry Safety Agency maintained there was "no serious problem" with the reactor's containment structure covering its core.

Asked by reporters on Monday the reason for the statement, nuclear safety agency officials could not provide any explanation other than the agency had received "no other information from TEPCO" on the matter, making it conspicuous that there was no effective information-sharing arrangement between the power utility and the government.

It was not until Tuesday morning that the government made a belated decision to establish an integrated information-sharing headquarters with TEPCO after the blast at the No. 2 reactor--four days after the earthquake-triggered tsunami onslaught.

(Mar. 16, 2011)

## Beasley, Benjamin

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**From:** Beasley, Benjamin  
**Sent:** Tuesday, March 15, 2011 9:36 AM  
**To:** Stutzke, Martin; Ake, Jon  
**Cc:** Kauffman, John  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
  
**Importance:** High

I am still reading this but need to give you the heads up. I am walking to the 6<sup>th</sup> floor to get permission to work on this.

Ben

---

**From:** Wilson, George  
**Sent:** Tuesday, March 15, 2011 9:31 AM  
**To:** Beasley, Benjamin  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

fyi

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**From:** Hiland, Patrick  
**Sent:** Tuesday, March 15, 2011 9:20 AM  
**To:** Wilson, George; Manoly, Kamal  
**Cc:** Stutzke, Martin; Ake, Jon; Coe, Doug; Skeen, David; Scales, Kerby  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

Need to work with OPA, and RES. Kamal should coordinate with RES, and I suggest Marty/Jon respond directly through RES. Doug Coe is good source also for the GI. Get OPA involved.

---

**From:** Bill Dedman [<mailto:Bill.Dedman@msnbc.com>]  
**Sent:** Tuesday, March 15, 2011 9:06 AM  
**To:** Manoly, Kamal; Sheron, Brian; Hiland, Patrick; OPA Resource  
**Subject:** NBC deadline question for NRC on seismic hazard estimates

Good morning,

My name is Bill Dedman. I'm a reporter for NBC News and msnbc.com, writing an article today about:

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

I reached out to NRC Public Affairs yesterday but have not heard back, and my deadline is end-of-day today. I'm hoping to get on the phone today with someone from NRC to make sure I'm conveying this information accurately to the public. If nothing else, I'm hoping one of the technical people can help clarify the points below. My telephone number is 203-451-9995.

I've read Director Brian Sheron's memo of Sept. 2, 2010, to Mr. Patrick Hiland; the safety/risk assessment of August 2010; its appendices A through D; NRC Information Notice 2010-18; and the fact sheet from public affairs from November 2010.

I have these questions:

1. I'd like to make sure that I accurately place in layman's terms the seismic hazard estimates. I need to make sure that I'm understanding the nomenclature for expressing the seismic core-damage frequencies. Let's say there's an estimate expressed as "2.5E-06." (I'm looking at Table D-2 of the safety/risk assessment of August 2010.) I believe that this expression means the same as  $2.5 \times 10^{-6}$ , or 0.0000025, or 2.5 divided by one million. In layman's terms, that means an expectation, on average, of 2.5 events every million years, or once every 400,000 years. Similarly, "2.5E-05" would be 2.5 divided by 100,000, or 2.5 events every 100,000 years, on average, or once every 40,000 years. Is this correct?
2. These documents give updated probabilistic seismic hazard estimates for existing nuclear power plants in the Central and Eastern U.S. What document has the latest seismic hazard estimates (probabilistic or not) for existing nuclear power plants in the Western U.S.?
3. The documents refer to newer data on the way. Have NRC, USGS et al. released those? I'm referring to this: "New consensus seismic-hazard estimates will become available in late 2010 or early 2011 (these are a product of a joint NRC, U.S. Department of Energy, U.S. Geological Survey (USGS) and Electric Power Research Institute (EPRI) project). These consensus seismic hazard estimates will supersede the existing EPRI, Lawrence Livermore National Laboratory, and USGS hazard estimates used in the GI-199 Safety/Risk Assessment."
4. What is the timetable now for consideration of any regulatory changes from this research?

Thank you for your help.

Regards,

Bill Dedman

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## **Bush-Goddard, Stephanie**

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**Subject:** FW: EDO Alignment: Japanese Earthquake Status – Focus on Health Effects of Radiation  
**Location:** O17-B04  
**Start:** Mon 03/28/2011 3:00 PM  
**End:** Mon 03/28/2011 4:00 PM  
**Show Time As:** Tentative  
**Recurrence:** (none)  
**Meeting Status:** Not yet responded  
**Organizer:** RES\_DSA\_Calendar Resource

RES, FSME and NSIR,

You are cordially invited to an EDO Alignment meeting

**When and Where:** Monday, March 28<sup>th</sup>, in O17-B04 from 3 to 4pm.

**Why:** Get aligned on a Commission meeting (April 14<sup>th</sup>) to provide an update of the Japanese nuclear event, discuss NRCs radiation protection strategies in emergency situations and hear a representative sample of external stakeholder viewpoints.

Thanks

-Stephanie Bush-Goddard

Chief, Health Effects Branch

Office of Nuclear Regulatory Research

301-251-7528

A/231



## SCHEDULING NOTE

**Title:** BRIEFING ON THE STATUS OF EVENTS IN JAPAN AND DISCUSSION ON U.S. RADIATION PROTECTION STRATEGY IN EMERGENCY SITUATIONS (Public)

**Purpose:** Provide the Commission an update of the Japanese nuclear event, discuss NRCs radiation protection strategies in emergency situations and hear a representative sample of external stakeholder viewpoints.

**Scheduled:** April 14, 2011  
9:00am

**Duration:** Approx. 3 hours

**Location:** Commissioner's Hearing Room, 1<sup>st</sup> fl. OWFN

**Participants:**

**Presentation**

**NRC Staff**

**30 mins.\***

**Robert Lewis**, Acting Director, Division of Materials Safety and State Agreements, FSME

**30 mins.\***

Topic: Opening Remarks and Status of the Japanese Event

Overall Strategy of Radiation Protection in the United States

- Normal and accident conditions
- NRC's Response to a Radiological Event
- Use of Models and source term determinations
- Protective Action Strategies

**Commission Q & A**

**50 mins.**

**BREAK**

**5 mins.**

**Stakeholder Panel**

**40 mins.\***

**Edward Maher**, President, Health Physics Society  
Topic: U.S. Response from an HPS Perspective

**10 mins.\***

**John Boice**, Scientific Director of the International Epidemiology Institute  
Topic: Epidemiological Consequences of Emergency Situations

**10 mins.\***

<b>Richard Toohey, Oak Ridge Associate Universities</b> <u>Topic:</u> TBD	<b>10 mins.</b>
<b>National Council on Radiation Protection and Measurements</b> <u>Topic:</u> U.S. Response in Emergency Situations	<b>10 mins.</b>
<b>Commission Q &amp; A</b>	<b>50 mins.</b>
<b>Discussion – Wrap-up</b>	<b>5 mins.</b>

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

Documents:

- TBD

Staff background material due to SECY: March 31, 2011.

Slides due to SECY: April 7, 2011.

## Beasley, Benjamin

---

**From:** Beasley, Benjamin  
**Sent:** Tuesday, March 15, 2011 11:39 AM  
**To:** Manoly, Kamal  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

Got it. I will be sending Ivonne an update before long. I will try to remember to copy you on the original.

BB

---

**From:** Manoly, Kamal  
**Sent:** Tuesday, March 15, 2011 11:32 AM  
**To:** Beasley, Benjamin; Couret, Ivonne  
**Cc:** Wilson, George; Hiland, Patrick; Skeen, David; Kauffman, John; Stutzke, Martin; Ake, Jon; Bowman, Eric  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates

Ben,  
Please revise as shown below in red.

---

**From:** Manoly, Kamal  
**Sent:** Tuesday, March 15, 2011 11:22 AM  
**To:** Beasley, Benjamin  
**Cc:** Wilson, George; Hiland, Patrick; Skeen, David; Kauffman, John; Stutzke, Martin; Ake, Jon; Bowman, Eric  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

Ben;  
Below is my input on item 4. Please make sure that Marty and Jon are comfortable with my dates.  
The NRC is working on developing a Generic Letter (GL) to request information from affected licensees. The GL will likely be issued in a draft form within the next 2 months to stimulate discussions with industry in a public meeting. After that it has to be approved by CRGR, presented to ACRS and issued as a draft for formal public comments (45 days). After evaluation of the public comments it can then be finalized for issuance. We anticipate to issue the GL by the end of this calendar year as the new consensus seismic hazard estimates are expected to be available. The information from licensees will likely require 3-6 months to complete. Staff's review will commence after receiving licensees' responses. Based on staff's review, a determination can be made regarding cost beneficial backfits where it can be justified.

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**From:** Hiland, Patrick  
**Sent:** Tuesday, March 15, 2011 9:33 AM  
**To:** Manoly, Kamal  
**Cc:** Wilson, George  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

Kamal help George Wilson co-ordinate this response. Don't leave out RES.

---

**From:** Bill Dedman [mailto:Bill.Dedman@msnbc.com]  
**Sent:** Tuesday, March 15, 2011 9:06 AM  
**To:** Manoly, Kamal; Sheron, Brian; Hiland, Patrick; OPA Resource  
**Subject:** NBC deadline question for NRC on seismic hazard estimates

Good morning,

My name is Bill Dedman. I'm a reporter for NBC News and msnbc.com, writing an article today about:

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

I reached out to NRC Public Affairs yesterday but have not heard back, and my deadline is end-of-day today. I'm hoping to get on the phone today with someone from NRC to make sure I'm conveying this information accurately to the public. If nothing else, I'm hoping one of the technical people can help clarify the points below. My telephone number is 203-451-9995.

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4. What is the timetable now for consideration of any regulatory changes from this research?

Thank you for your help.

Regards,

Bill Dedman

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## Beasley, Benjamin

---

**From:** Beasley, Benjamin  
**Sent:** Tuesday, March 15, 2011 5:02 PM  
**To:** Kauffman, John  
**Subject:** FW: SBO impact on Mark I's  
**Attachments:** ORNL Study Secondary Containment.pdf

I have been wondering if, after things settle down, you or I should propose a generic issue on extended station blackout.

BB

---

**From:** Lane, John  
**Sent:** Tuesday, March 15, 2011 2:28 PM  
**To:** Beasley, Benjamin  
**Subject:** SBO impact on Mark I's

Ben, FYI--Here is a report from ORNL from the late '80s, a time when NRC was actively studying containment/secondary containment failure issues. It provides a little bit of background information about station blackout studies undertaken then and the impact of SBO on the secondary containment.

The NRC required Mark I's to add a hardened vent around 1990, when it was discovered (probably from NUREG 1150) that the containment was likely to fail (up to 90% likely) as a result of some core melt accidents. The fix was intended to allow for a gradual release of overpressure to maintain the containment integrity as much as possible. I don't know if the Japanese plants added the hardened wetwell vent but with GE/Hitachi right there, I'm sure they are well aware of it.

CONF-8710111-6

CONF-8710111--6

DE88 002534

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### THE IMPACT OF BWR MK I PRIMARY CONTAINMENT FAILURE DYNAMICS ON SECONDARY CONTAINMENT INTEGRITY

Sherrell R. Greene  
Boiling Water Reactor Severe Accident  
Technology (BWRSAT) Program\*  
Oak Ridge National Laboratory

For presentation at  
15th Water Reactor Safety Information Meeting  
October 29, 1987

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\*Research sponsored by the Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission under Interagency Agreement DOE 0551-0551-A1 with the U.S. Department of Energy under contract DE-AC05-84OR21400 with the Martin Marietta Energy Systems, Inc.

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# THE IMPACT OF BWR MK I PRIMARY CONTAINMENT FAILURE DYNAMICS ON SECONDARY CONTAINMENT INTEGRITY

Sherrell R. Greene  
Oak Ridge National Laboratory

## ABSTRACT

During the past four years, the ORNL BWRSAT Program has developed a series of increasingly sophisticated BWR secondary containment models. These models have been applied in a variety of studies to evaluate the severe accident mitigation capability of BWR secondary containments. This paper describes the results of a recent ORNL study of the impact of BWR MK I primary containment failure dynamics on secondary containment integrity. A 26-cell MELCOR Browns Ferry secondary containment model is described and the predicted thermodynamic response of the secondary containment to a variety of postulated primary containment failure modes is presented. The effects of primary containment failure location, timing, and ultimate hole size on secondary containment response is investigated, and the potential impact of hydrogen deflagrations on secondary containment integrity is explored.

## 1. INTRODUCTION

The most common boiling water reactor (BWR) plant design in the United States is the BWR-4/MK I primary containment system. These plants employ secondary containments (Exhibit 1) consisting of a reactor building and refueling bay that completely surround the primary containment. Detailed severe accident analyses of MK I containment designs generally indicate that the conditional probability of primary containment failure is quite high in the unlikely event that core debris escapes the reactor vessel.

Should the primary containment pressure boundary fail, the secondary containment becomes the final barrier between the plant's fission product inventory and the environment. Traditional BWR risk studies have, however, de-emphasized the ability of the secondary containment to act as an effective fission product trap. During the past four years, the ORNL BWRSAT Program has developed a series of increasingly sophisticated BWR secondary containment models. These models have been applied in a variety of studies to evaluate the severe accident mitigation capability of BWR secondary containments.

This paper describes the results of a recent ORNL study of the impact of BWR MK I primary containment failure dynamics on secondary

containment integrity. The fundamental design characteristics of the Browns Ferry secondary containment are first discussed, followed by a brief description of potential MK I severe accident containment failure modes. A 26-cell MELCOR Browns Ferry secondary containment model is described and the predicted thermodynamic response of the secondary containment to a variety of postulated primary containment failure modes is presented. The effects of primary containment failure location, timing, and ultimate hole size on secondary containment response is investigated, and the potential impact of hydrogen deflagrations on secondary containment integrity is explored.

## 2. BWR SECONDARY CONTAINMENT DESIGN

Domestic BWRs of the MK I primary containment design employ a secondary containment which is comprised of a multi-floored reactor building and a refueling bay which completely surround and enclose the primary containment. Multi-unit plants employ separate reactor buildings for each unit but may utilize a common refueling bay to service all units. Exhibit 1 is a cross sectional view of the Browns Ferry Unit 1 reactor building and refueling bay (shared with Units 2 and 3). The Browns Ferry reactor building is a massive (1.4 million ft<sup>3</sup> or 40000 m<sup>3</sup>), five floored structure with reinforced external concrete walls. The thickness of the walls varies from 6 ft (1.8 m) in the reactor building basement to 2.5 ft (0.76 m) at the junction of the refueling bay siding and the reactor building wall.

Secondary containment above the reactor building is provided by a 2.75 million ft<sup>3</sup> (77700 m<sup>3</sup>) refueling bay which is constructed of corrugated sheet metal walls that contain large blowout panels to provide protection from the effects of tornados and steam line breaks. Not shown in Exhibit 1 are details such as stairways, elevator shafts, and internal blowout panels which provide communication pathways between the various floors of the reactor building and between the reactor building and the turbine building.

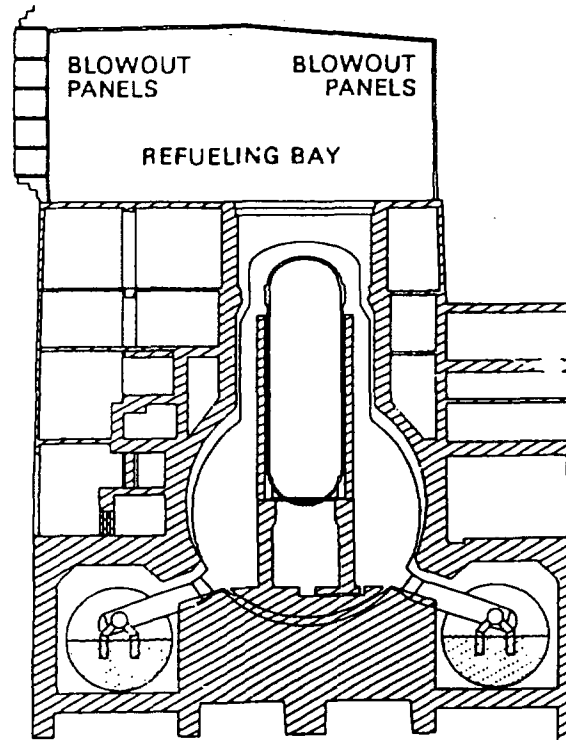
The Browns Ferry Final Safety Analysis Report<sup>1</sup> indicates that the above grade exterior walls of the reactor building are designed for pressures up to 250 lb/ft<sup>2</sup> (11970 Pa) without structural failure. The tornado design basis is a pressure decrease of 3 psi (20684 Pa) at a rate of 0.6 psi (4137 Pa) per second. The refueling bay siding is designed to withstand internal pressure in excess of 57.6 lb/ft<sup>2</sup> (2758 Pa) without structural failure. Pressures in excess of 50 lb/ft<sup>2</sup> (2394 Pa) will, however, be relieved by blowout panels in the siding.

## 3. MK I SEVERE ACCIDENT FAILURE MECHANISMS

The design basis accident for existing MK I primary containments is the large break loss of coolant accident in which one of the main re-



# REACTOR BUILDING AND REFUELING BAY PROVIDE BWR SECONDARY CONTAINMENT



ornl

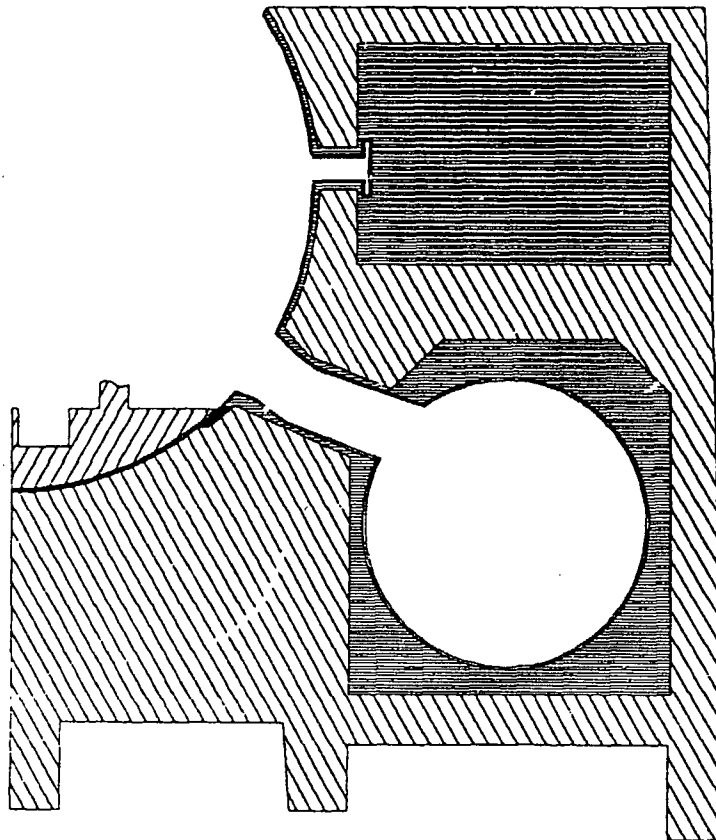
circulation pipes is assumed to circumferentially rupture. The purpose of the primary containment is to limit the release of fission products from this accident to levels which will not exceed the limits of 10 CFR 100. This goal is accomplished by designing the containment to withstand the predicted transient pressure and temperature loads induced by the blowdown of steam and hydrogen (produced by cladding oxidation) from the reactor vessel. The design pressure and temperature of the Browns Ferry primary containment are 56 psig (487 kPa) and 281°F (411 K). The primary containment is inerted with nitrogen during reactor operation.

Recent ORNL calculations for an unmitigated short-term station blackout severe accident sequence at Browns Ferry<sup>2</sup> indicate that temperatures as high as 2700°F (1750 K) may be generated in the primary containment if the majority of the core was to be relocated onto the drywell floor. Maximum primary containment pressures for this case appear to be limited primarily by the containment's maximum pressure capability. A recent Chicago Bridge and Iron Company study<sup>3</sup> of the ultimate pressure capability of Peach Bottom's primary containment produced a maximum pressure capability estimate (assuming median gasket resiliency) of 140 psia (965 kPa), with failure predicted to occur via leakage past the drywell head flange assembly. Since the design of the drywell head flange assembly is plant specific, the Peach Bottom results cannot be applied a priori to other plants. It must be noted, of course, that the continued pressure increase associated with the evolution of noncondensable gases from an unmitigated core/concrete reaction would eventually result in over-pressure failure of the primary containment unless precluded by some other failure mechanism.

A second potential mechanism for MK I primary containment failure in an unmitigated severe accident is drywell liner (shell) ablation due to direct attack by molten corium. The ability of molten metals to erode steel structures is well documented.<sup>4</sup> While significant uncertainties surround the behavior of core/concrete reactions and corium spreading in a MK I containment configuration,<sup>2</sup> preliminary analyses indicate failure of the MK I drywell liner is quite likely if core debris does contact the inner liner surface<sup>5</sup>.

Should the liner fail near the drywell floor elevation, the most probable sites for blowdown entry into the secondary containment are the reactor building basement torus room and the second floor of the reactor building (Exhibit 2). The transport path for the blowdown is the gap between the drywell shell and the surrounding reactor building concrete, and the annular gaps surrounding the drywell vent pipes and penetrations. These gaps provide a 145 ft<sup>2</sup> (13.5 m<sup>2</sup>) flow path into the torus room and a 135 ft<sup>2</sup> (12.6 m<sup>2</sup>) flow path into the second floor of the reactor building. Since elevated drywell pressures and temperatures result in swelling of the drywell liner and a reduction in the gap between the liner and the reactor building concrete (Exhibit 3), it appears that the effective flow path area for drywell blowdown would be limited by the actual size of the drywell shell rupture or the available space between the liner and the surrounding concrete. Significant

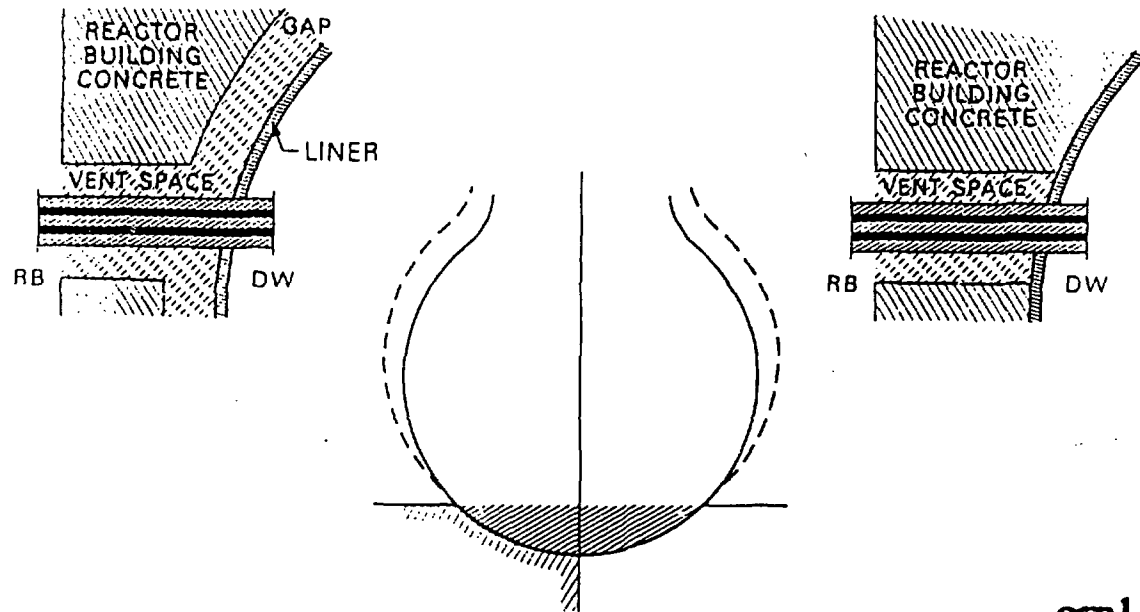
**DRYWELL SHELL MELT-THROUGH WOULD  
RESULT IN BLOWDOWN TO TORUS ROOM  
OR SECOND FLOOR OF REACTOR BUILDING**



**ornl**

Exhibit 2

# DRYWELL LINER EXPANSION WILL RESULT IN LOCALIZED BLOWDOWN TO SECONDARY CONTAINMENT



oml

uncertainty therefore surrounds both the ultimate hole size and the ablation time associated with opening of the hole for this drywell failure mechanism.

Given the uncertainties surrounding the dynamics of MK I primary containment failure, it appears prudent to investigate the impact of a range of failure mode assumptions on secondary containment hydrogen deflagration phenomena and building survivability. Such an investigation is possible only via detailed computer simulations of secondary containment behavior. During the past two years ORNL has developed an extremely detailed computer model of the Browns Ferry Unit 1 secondary containment. That model is described in the following section.

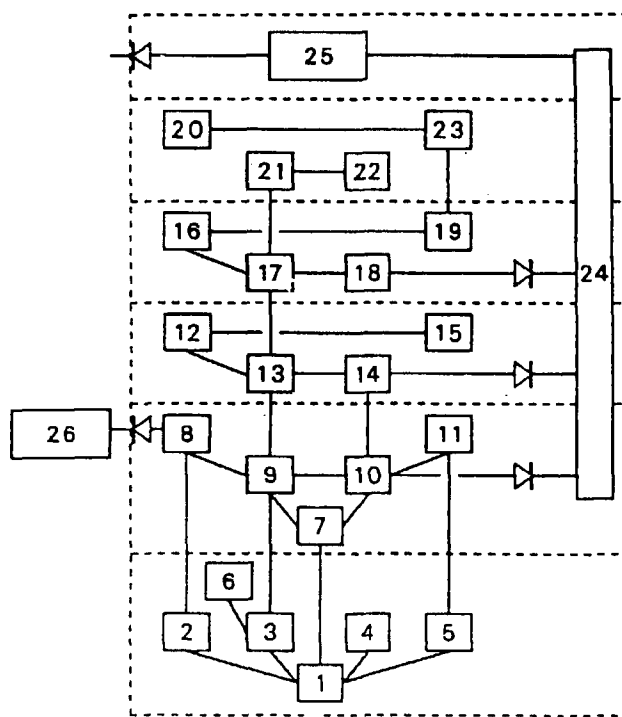
#### 4. DESCRIPTION OF ORNL 26 CELL BROWNS FERRY SECONDARY CONTAINMENT MODEL

Exhibit 4 is a schematic representation of the ORNL MELCOR<sup>6</sup> Browns Ferry secondary containment model utilized in this study. The model employs 26 computation cells (control volumes) and 51 flow paths to represent the Browns Ferry reactor building, refueling bay, the turbine building, and the interconnections between these compartments and the outside environment. The outside environment is represented by a single control volume yielding a total of 27 computational cells. The overall model topology is dictated by the actual reactor building architecture (Exhibit 5). Each distinct room in the reactor building is represented by a separate cell, while stairwells and open doorways are characterized as flow paths. The floors, ceilings, walls, and steel structures within the reactor building, refueling bay, and turbine building are represented by 126 distinct structures. Table 1 presents a summary of the physical characteristics of each of the 26 cells. The model structure and the parameters employed in the model are based on a detailed review of drawings and on measurements made at the plant by ORNL personnel.

The basement of the reactor building (Exhibit 5) is modeled with six cells representing the torus room, the four corner rooms, and the HPCI pump room (Cell 6). The 565 ft elevation of the reactor building (immediately above the basement) is simulated with five cells representing the north, west, south, and east quadrants of the building and the drywell personnel access room. Each floor of the reactor building above the 565 ft elevation (i.e., elevations 593, 621, and 639 ft) is modeled by four cells representing the north, west, south, and east quadrants of that floor. Additionally, the large refueling cask hatchway which provides the vent path from the blowout panels (at the 565, 593, and 621 ft elevations) to the refueling bay is represented by a single cell. The refueling bay and turbine building are each modeled with single cell representations.

Prior to primary containment pressure boundary failure, the major interaction between the primary and secondary containments is heating of the torus room atmosphere due to heat transfer from the outer surface of

# BROWNS FERRY UNIT 1 SECONDARY CONTAINMENT MODEL



oml

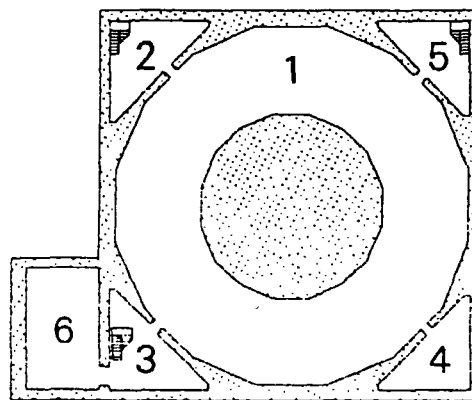
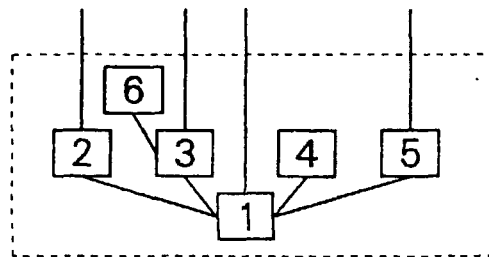
Exhibit 4

Table 1. ORNL 26 Cell Browns Ferry Secondary  
Containment Model Characteristics

Cell No.	Name	Volume (m <sup>3</sup> )	Total area (m <sup>2</sup> )		
			Floor	Ceiling	Walls
1	Torus room	5848	1172	1185	2535
2	North corner	775	71	69	346
3	West corner	2784	71	55	340
4	South corner	555	46	46	346
5	East corner	775	71	64	346
6	HPCI Pump rm	1147	144	144	238
7	565 P/A rm	198	58	58	118
8	565 north	2438	342	342	514
9	565 west	2240	276	284	584
10	565 south	1571	197	197	595
11	565 east	1698	235	242	565
12	593 north	1187	121	172	400
13	593 west	2934	321	318	566
14	593 south	1292	133	133	580
15	593 east	1022	117	117	608
16	621 north	526	123	123	226
17	621 west	1556	350	350	363
18	621 south	982	229	229	277
19	621 east	522	110	110	225
20	639 north	3660	158	158	452
21	639 west	3030	423	423	559
22	639 south	1711	239	239	505
23	639 east	525	73	73	402
24	Hatchway	1001	—	—	327
Reactor building total		39977	5080	5131	12017
25	Refueling bay	77730	4202	4756	5709
26	Turbine building	161567	8279	8279	7596

# MODEL TOPOLOGY IS DICTATED BY REACTOR BUILDING ARCHITECTURE

REACTOR BUILDING BASEMENT



oml



the torus. This effect is captured by representing the torus wall as a steel slab with an appropriate surface area. A time-dependent surface temperature boundary condition is specified on the "inner" surface of the slab, while the outer surface is allowed to convect and radiate energy to the surrounding torus room atmosphere. The inner surface temperature history is taken from the appropriate DB-AR<sup>7</sup> (prior to reactor vessel failure) and CONTAIN<sup>8</sup> (after reactor vessel failure) calculation results.

All blowout panels are modeled as pressure dependent flow areas. The panels are assumed to begin leaking with an area equivalent to 10% of the total panel area, at a pressure differential equivalent to 90% of the design basis pressure differential for the blowout panel. Eighty percent of the total panel area is assumed to be open at the design pressure differential, and all of the blowout panel is assumed to be open at 110% of the design actuation pressure. This modeling approach reflects the results of laboratory tests which indicate that the blowout panel retaining bolts may fail at pressure differentials equivalent to plus or minus 10% of the design value.<sup>9</sup>

Some BWR secondary containments incorporate comprehensive fire protection systems which utilize fused-link water sprinklers for fire suppression. The Browns Ferry plant utilizes fused-link sprinklers which are designed to actuate at 165°F (347 K). The system consists of two 10000 gallon (37.9 m<sup>3</sup>) raw service water (RSW) storage tanks (located atop the reactor building), four RSW pumps (which maintain the tank inventory during normal operation), four fire system pumps (one of which is driven by a dedicated diesel), and the sprinkler system. The RSW storage tanks provide a 20000 gallon (75.7 m<sup>3</sup>), gravity-fed sprinkler supply reservoir, and no power is required for actuation of the fused-link sprinklers. Additionally, and very importantly, the one diesel-driven pump provides a highly reliable supply of water to sprinklers located in the first two levels of the reactor building.

The Browns Ferry secondary containment fire protection system sprays would be expected to actuate following primary containment blow-down as a result of rising reactor building temperatures. The MELCOR secondary containment model incorporates a detailed representation of the reactor building fire protection system sprays. The model utilizes ten separate spray systems to simulate the spray heads installed in the west and south basement corner rooms, and the four quadrants of the 565 and 593 ft elevations. The spray flow rate characteristics of each of the ten systems were developed from an analysis of the expected performance characteristics for the situation in which (a) only the diesel-driven pump is available, and (b) all spray heads are open on all systems. The results of that analysis indicate that (for the assumed conditions) the 593 ft elevation sprays would function only until the RSW tank inventory is exhausted.

## 5. THE PARAMETRIC STUDY

The model described in Section 4 was employed to investigate the impact of MK I primary containment failure dynamics on the Browns Ferry secondary containment's response to the initial (first 5 min) drywell blowdown phase of the short-term station blackout severe accident sequence. A test matrix of 15 cases was defined as described in Table 2. The size of the drywell rupture was varied from 0.5 m<sup>2</sup> (775 in<sup>2</sup>) down to 0.0005 m<sup>2</sup> (0.78 in<sup>2</sup>), while the time for ablation of the hole was varied from 1 s to 60 s. Additionally, various assumptions were made regarding the hydrogen concentration necessary for deflagration (1, 8, and 12 mole %) and the location at which the blowdown enters the secondary containment (torus room, one corner of reactor building second floor, or all zones of reactor building second floor).

The Browns Ferry secondary containment model described in Section 4 was augmented for this study by the addition of a single cell to represent the entire primary containment (drywell and wetwell). The initial primary containment conditions for the analyses were based on Browns Ferry short-term station blackout CONTAIN calculations performed by C. R. Hyman at ORNL.<sup>2</sup> The drywell pressure boundary is assumed to fail at 9.6 h into the accident due to erosion of the drywell shell by molten corium. This failure is modeled by opening a flow path between the primary containment cell and the appropriate cell or cells of the secondary containment model. The drywell conditions at the time of failure are as noted in Table 2, and the secondary containment is assumed to be at 14.7 psia (101 kPa), 80°F (300 K), and 80 % relative humidity at the start of the accident. The MELCOR calculations for each case were conducted for the period from accident initiation until 5 minutes after drywell failure.

## 6. RESULTS OF THE ANALYSIS

The results of the various case studies are summarized in Table 3. Cases 1, 2, and 3 (0.5 m<sup>2</sup> cases) all result in hydrogen burn-induced secondary containment pressures well in excess of the design value of 17.7 psia. Case 7 produced the lowest pressure response of any of the cases, because no hydrogen deflagrations were predicted to occur during the first 5 minutes after primary containment failure.

Exhibit 6 depicts the results of Cases 3, 4, 5, 8, and 6, in which a 60 s ablation time was assumed, and hole sizes of 0.5, 0.05, 0.005, 0.0008, and 0.0005 m<sup>2</sup> were employed. The abscissa of Exhibit 6 is reactor building elevation, where RB1 is the reactor building basement, PA-RM is the drywell personnel access room (an interior room) on the second floor (565 ft elevation) of the reactor building, RB2 is the remainder of the second floor of the reactor building, RB3, RB4 and RB5 are the third, fourth, and fifth floors of the reactor building, and RF is the refueling bay. The ordinate of Exhibit 6 is the maximum observed

Table 2. Secondary Containment Study Cases<sup>1</sup>

Case	Description
1	0.5 m <sup>2</sup> hole, 1 s ablation time
2	0.5 m <sup>2</sup> hole, 30 s ablation time
3	0.5 m <sup>2</sup> hole, 60 s ablation time
4	0.05 m <sup>2</sup> hole, 60 s ablation time
5	0.005 m <sup>2</sup> hole, 60 s ablation time
6	0.0005 m <sup>2</sup> hole, 60 s ablation time
7	0.0005 m <sup>2</sup> hole, 1 s ablation time
8	0.0028 m <sup>2</sup> hole, 60 s ablation time
9	Case 5 except 1/2 primary containment H <sub>2</sub>
10	Case 5 except no burn propagation allowed
11	Case 5 except flame speed fixed at 3.0 m/s
12	Case 5 except blowdown to one corner of second floor of reactor building
13	Case 5 except blowdown into all of second floor of reactor building
14	Case 5 except burn triggers at 1 mole % H <sub>2</sub>
15	Case 5 except burn triggers at 12 mole % H <sub>2</sub>

<sup>1</sup>Except as noted, all cases assume:

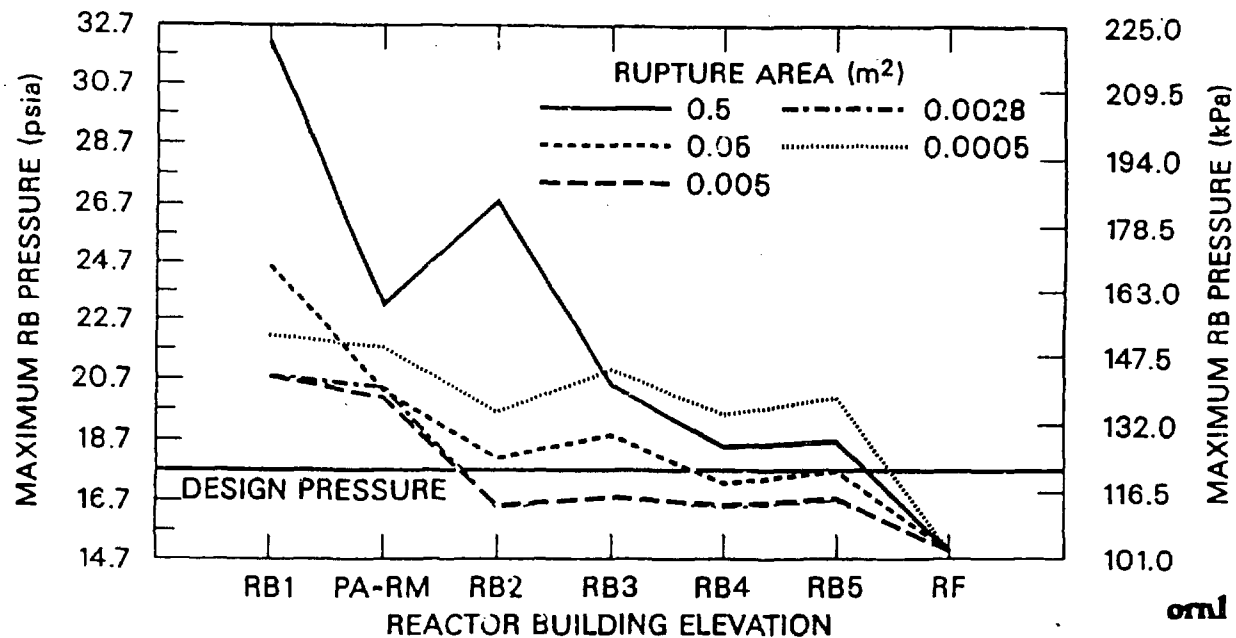
- (a) blowdown to torus room,
- (b) deflagration trigger at 8 mole % H<sub>2</sub>,
- (c) 4.1 mole % H<sub>2</sub> for upward flame propagation,
- (d) 6 mole % H<sub>2</sub> for horizontal flame propagation,
- (e) 9 mole % H<sub>2</sub> for downward flame propagation,
- (f) drywell failure at 9.6 h,
- (g) primary containment conditions at failure — 81 psia (559 kPa), 381°F (467 K), 53 mole % hydrogen, 1 mole % oxygen, 25 mole % nitrogen, 1 mole % carbon dioxide, and 20 mole % steam

Table 3. Results of Case Studies — Reactor Building Response

Case No.	Peak Basement		Peak Reactor Building <sup>1</sup>	
	Pressure (psia)	Temperature (°F)	Pressure (psia)	Temperature (°F)
1	37.7	3683	27.2	2397
2	32.3	3288	28.9	2286
3	32.1	3445	26.8	2225
4	24.6	3362	18.1	1978
5	20.8	1452	16.5	337
6	22.1	1340	19.6	946
7	14.8	101	14.7	88
8	20.8	137	16.5	783
9	20.7	1352	16.5	330
10	20.9	4404	16.4	662
11	18.0	1275	17.2	895
12	15.6	125	15.7	1292
13	16.3	189	16.8	1295
14	15.3	4756	15.0	836
15	25.9	1929	18.4	659

<sup>1</sup>Excluding basement compartments.

REACTOR BUILDING STRUCTURAL INTEGRITY MAY  
BE THREATENED BY EVEN SMALL RUPTURES  
OF PRIMARY CONTAINMENT BOUNDARY



pressure on each respective floor of the reactor building during the duration of the 5 minute analysis period. (It should be noted that the pressures plotted in Exhibit 6 and the exhibits to follow may not have occurred at the same instant in time.)

A review of Exhibit 6 reveals that peak reactor building pressures in excess of the design pressure may be produced by a wide range of primary containment hole sizes (0.5, 0.05, and 0.0005 m<sup>2</sup>). Interestingly, Exhibit 6 suggests that there may be an optimal hole size which minimizes the deflagration-induced secondary containment pressures. This inference is of little utility, however, since there is currently no available method for predicting the hole size resulting from corium ablation of the drywell liner.

The results of this evaluation indicate that reactor building survivability may be a function of the hydrogen concentration at which deflagrations initiate. This behavior is demonstrated by Exhibit 7, which depicts the results of Cases 5, 14, and 15. Case 5 is a default case in which a 0.005 m<sup>2</sup> hole is assumed to open over 60 s. Deflagration is allowed to occur at hydrogen concentrations of 8 mole %. Case 14 is identical to Case 5, except that deflagrations are allowed to occur at hydrogen concentrations of only 1 mole %. This case is a crude approximation of a situation in which the hydrogen is assumed to burn in a continuous fashion as it enters the torus room. Case 15 is a case in which hydrogen deflagration is delayed until 12 mole % concentrations are reached (as might occur in the absence of auto-ignition or ignition sources). Exhibit 7 demonstrates that, for a given primary containment hole size and ablation time, the survivability of the reactor building may depend on avoidance of delayed hydrogen deflagrations.

Not shown in Exhibit 7, but illustrated by Table 3, is the effect of continuous hydrogen burning (Case 14) on reactor building basement atmosphere temperatures. While continuous burning does reduce the magnitude of deflagration-induced reactor building pressure spikes, this reduction in pressure is coupled with a tremendous increase in thermal loading in the zone in which the burn is occurring. The maximum observed reactor building temperature (4756°F or 2898 K) occurs in conjunction with the continuous burning case. If maintained, temperatures of this magnitude would challenge the integrity of the pressure suppression pool torus and produce degassing of the structural concrete. Neither of these effects were considered in the present analysis.

Exhibit 8 displays the impact that the primary containment blowdown entrance site into the secondary containment has on peak deflagration-induced reactor building pressures. Each of the three cases depicted in Exhibit 8 assumes a 0.005 m<sup>2</sup> primary containment failure hole size and a 60 s ablation time. The lowest peak pressures are seen to result from the case in which the blowdown is assumed to enter the south quadrant of the second floor of the reactor building. Intermediate pressures are generated by the case in which the blowdown is assumed to enter all quadrants of the second floor of the reactor building. The highest pressures are produced by the case in which the primary containment

## DEFLAGRATION TRIGGER MECHANISM DOMINATES SECONDARY CONTAINMENT RESPONSE UNCERTAINTIES

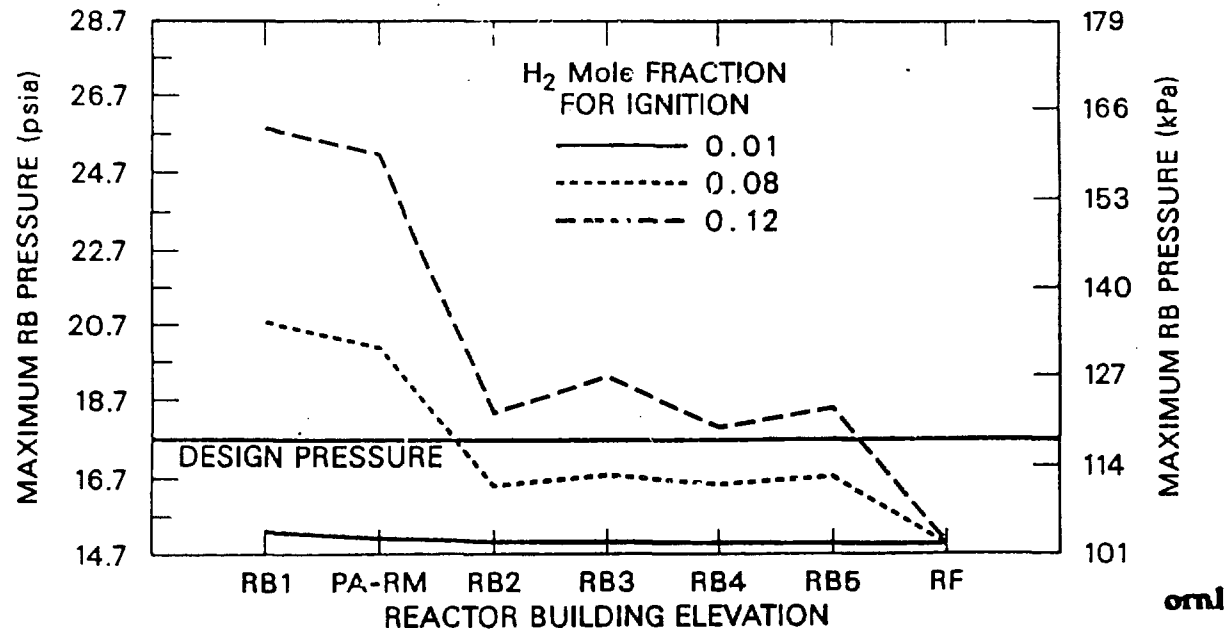


Exhibit 7

# LOCATION OF BLOWDOWN ENTRANCE INTO SECONDARY CONTAINMENT INFLUENCES PEAK PRESSURES

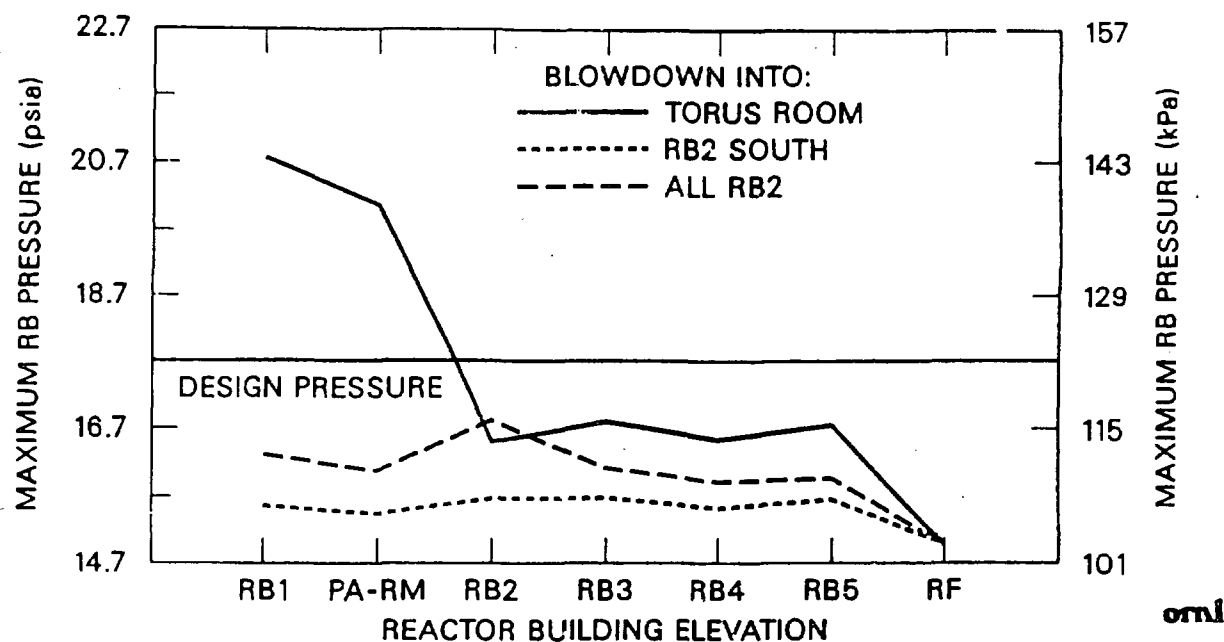


Exhibit 8



blowdown enters the torus room. Maximum pressures in the regions of the reactor building above ground level are below the design dynamic pressure of the concrete walls for all three cases.

## 7. SECONDARY CONTAINMENT SURVIVABILITY — UNCERTAINTIES

The results of the analysis presented here do not constitute a definitive assessment of reactor building survivability due to a host of unresolved phenomenological and modeling uncertainties. From the phenomenological standpoint, the major uncertainty is probably the characterization of the primary containment failure opening (hole size and ablation time). It must be noted, however, that a wide range of hole sizes result in peak deflagration-induced reactor building pressures significantly in excess of design values.

Secondly, the peak induced reactor building pressures are very sensitive to the assumed minimum hydrogen concentrations necessary for ignition. In the case of primary containment boundary failure due to corium attack of the drywell shell, the gases leaving the drywell would flow over hot core debris and might be heated to auto-ignition conditions (approximately 1000°F or 800 K). A spark source would be required for ignition of the resulting hydrogen mixtures for cases in which auto-ignition does not occur. While power would not be available during the station blackout scenario, the abundance of batteries and capacitive and inductive devices in the secondary containment should provide the necessary spark source. The length of the delay prior to ignition is an important unknown, since long delays would result in hydrogen-rich secondary containment gas concentrations and higher peak pressures when deflagrations do occur.

Modeling uncertainties which have the potential to significantly impact the results of this analysis include model topology issues and uncertainties in MELCOR's deflagration physics models. Previous ORNL secondary containment studies<sup>10</sup> have demonstrated the importance of detailed, architectural-based secondary containment models. The model employed in this study, while more detailed than any previous model employed by ORNL, does treat the reactor building torus room as a single, well mixed cell. The torus cell is the largest cell (volume) in the reactor building model, and approximately 83 lb (37.7 kg) of hydrogen are required to bring the torus room atmosphere up to default (8 mole % hydrogen) deflagration conditions. The intricacies of the communication between the torus room and the basement corner rooms are also not completely captured by this model. Sub-nodalization of this cell would result in more accurate representation of torus room and corner room interaction, and (perhaps) impact peak building pressures due to ignition of smaller quantities of hydrogen.

The second major area of modeling uncertainty which has the capacity to impact the results of this study is associated with MELCOR's hydrogen deflagration physics models. MELCOR employs the basic

deflagration models developed for HECTR<sup>11</sup> and CONTAIN, with the exception that MELCOR's flame speed correlation does not include a term which reduces flame speeds for steam-rich atmospheres. Most of the experimental data upon which the deflagration models are based was generated by small and intermediate scale experiments (less than 10 m<sup>3</sup> compartments). The scaling of flame speed and burn completeness correlations, burn-induced heat flux partitioning fractions (convective versus radiative), and hydrogen concentration ignition thresholds from these small experiments to compartments with volumes of 1000 to 6000 m<sup>3</sup> is subject to many uncertainties.

Finally, the results of this study suggest that primary containment venting might be employed as a solution to the secondary containment survivability issue. One can envision scenarios in which hydrogen would be vented via a "hard" (special purpose) wetwell vent, thereby reducing the amount of hydrogen available for combustion in the secondary containment should the primary containment boundary fail. The vent could (in theory) be closed prior to drywell liner failure to insure that subsequent hydrogen deflagrations in the reactor building basement would not result in torus or vent ducting failure and the opening of a direct vent path from the primary containment to the outside atmosphere. Although we intend to investigate this concept further, it should be noted that (a) corium attack of the drywell shell would not be precluded by containment venting, and (b) recent ORNL studies<sup>2,7</sup> indicate that significant hydrogen might be generated by the core/concrete reaction after the drywell liner is failed.

## 8. CONCLUSIONS

The impact of BWR MK I primary containment boundary failure dynamics on Browns Ferry's secondary containment integrity has been explored via a parametric study approach. The results of the study indicate that peak hydrogen deflagration-induced reactor building pressures exceed design pressures for a wide range of primary containment hole sizes and ablation times, but that reactor building survivability appears probable for some scenarios. The major uncertainty in the analysis is the assumption regarding the minimum hydrogen concentration necessary for deflagration. Low minimum hydrogen concentrations (an approximation to continuous burning) result in low reactor building peak pressures but extremely high temperatures. The location at which the primary containment blowdown enters the secondary containment influences the peak deflagration-induced reactor building pressures. Primary containment venting for the purpose of reducing the hydrogen inventory available for deflagration in the secondary containment may improve the probability of secondary containment survivability for some scenarios. Additional analysis is underway to explore the potential benefits of this procedure. Finally, existing hydrogen deflagration physics models incorporated in present codes are based on small and intermediate scale experiments. Significant uncertainties are implicit in the application of these models to the simulation of deflagrations in large compartments.

## REFERENCES

1. *Browns Ferry Final Safety Analysis Report*, Sect. 5.3, Tennessee Valley Authority.
2. C. R. Hyman, "Multicell CONTAIN Analysis Of BWR MK I Drywell Response To Time-Dependent Vessel Release Of Core Debris," Presented at *Severe Fuel Damage, Containment Loads, and Source Term Research Program Review Meeting*, Silver Spring, Maryland, October 19-23, 1987.
3. *Mark I Containment Severe Accident Analysis*, Chicago Bridge and Iron Company, for the Mark I Owners Group, April 1987.
4. D. A. Powers, "Erosion of Steel Structures by High-Temperature Melts", *Nuclear Science and Engineering*, 88, 357-366 (1984).
5. G. A. Greene, K. R. Perkins, and S. A. Hodge, "Impact of Core-Concrete Interactions in the Mark I Containment Drywell On Containment Integrity and Failure Of The Drywell Liner", IAEA-SM-281/36, *International Symposium on Source Term Evaluation For Accident Conditions*, Columbus, Ohio, 28 October - 1 November, 1985.
6. F. E. Haskin, et al., "Development and Status of MELCOR", SAND86-2115C, Sandia National Laboratories, presented at the *Fourteenth Water Reactor Safety Information Meeting*, National Bureau of Standards, Gaithersburg, Maryland, October, 1986.
7. L. J. Ott, "Advanced Severe Accident Response Models for BWR Application," Oak Ridge National Laboratory, presented at the *Fifteenth Water Reactor Safety Information Meeting*, National Bureau of Standards, Gaithersburg, Maryland, October 1987.
8. K. D. Bergeron, et al., *User's Manual for CONTAIN 1.0, A Computer Code for Severe Nuclear Reactor Accident Containment Analysis*, NUREG/CR-4085, Sandia National Laboratories, May, 1985.
9. *Browns Ferry Final Safety Analysis Report*, p. 5.3-23
10. S. R. Greene, "The Role of BWR MK I Secondary Containments In Severe Accident Mitigation," Oak Ridge National Laboratory, presented at the *Fourteenth Water Reactor Safety Information Meeting*, National Bureau of Standards, Gaithersburg, Maryland, October, 1986.
11. S. E. Dingman, et al., *HECTR Version 1.5 User's Manual*, NUREG/CR-4507, SAND86-0101, Sandia National Laboratories, April, 1986.

## **Beasley, Benjamin**

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**From:** Beasley, Benjamin  
**Sent:** Tuesday, March 15, 2011 12:00 PM  
**To:** Ake, Jon  
**Subject:** my edits  
**Attachments:** Ben edits to NBC\_questions.docx

See attached

I have these questions:

1. I'd like to make sure that I accurately place in layman's terms the seismic hazard estimates. I need to make sure that I'm understanding the nomenclature for expressing the seismic core-damage frequencies. Let's say there's an estimate expressed as "2.5E-06." (I'm looking at Table D-2 of the safety/risk assessment of August 2010.) I believe that this expression means the same as  $2.5 \times 10^{-6}$ , or 0.000025, or 2.5 divided by one million. In layman's terms, that means an expectation, on average, of 2.5 events every million years, or once every 400,000 years. Similarly, "2.5E-05" would be 2.5 divided by 100,000, or 2.5 events every 100,000 years, on average, or once every 40,000 years. Is this correct?

A1: Yes, at least partly. In the subject documents, the frequencies for core damage or ground motion exceedance have been expressed in the form "2.5E-06". As you noted this is equivalent to  $2.5 \times 10^{-6}$ , or 0.000025 *per year*. If, for example, the core damage frequency was estimated as 2.5E-06, this would be equivalent to an expectation of 2.5 divided by a million *per year*. It is not really correct to think of these values as "once every 400,000 years" but you could characterize it as 1 in 400,000 per year.

2. These documents give updated probabilistic seismic hazard estimates for existing nuclear power plants in the Central and Eastern U.S. What document has the latest seismic hazard estimates (probabilistic or not) for existing nuclear power plants in the Western U.S.?

A2: At this time the staff has not formally developed updated probabilistic seismic hazard estimates for the existing nuclear power plants in the Western U.S. NRC staff has continued to stay abreast of the latest research on seismic hazards in the Western U.S. and interface with colleagues at the U.S. Geological Survey. The focus of Generic Issue 199 has been on the CEUS. However, the Information Notice that summarized the results of the Safety/Risk Assessment was sent to all existing reactor licensees. The documents that summarize existing hazard estimates are contained in the FSARs and in the Independent Plant Examination of External Events (IPEEEs). Following 9-11, the IPEEEs are no longer publicly available.

3. The documents refer to newer data on the way. Have NRC, USGS et al. released those? I'm referring to this: "New consensus seismic-hazard estimates will become available in late 2010 or early 2011 (these are a product of a joint NRC, U.S. Department of Energy, U.S. Geological Survey (USGS) and Electric Power Research Institute (EPRI) project). These consensus seismic hazard estimates will supersede the existing EPRI, Lawrence Livermore National Laboratory, and USGS hazard estimates used in the GI-199 Safety/Risk Assessment."

A3: The new consensus hazard curves are being developed in a cooperative project that has NRC, U.S. Department of Energy, U.S. Geological Survey (USGS) and Electric Power Research Institute (EPRI) participation. The title is: the Central and Eastern U.S. Seismic Source Characterization (CEUS-SSC) project. The project is being conducted following comprehensive standards to ensure quality and regulatory defensibility. It is in

its final phase and is expected to be released in the fall of 2011. The project manager is Larry Salamone ([Lawrence.salamone@srs.gov](mailto:Lawrence.salamone@srs.gov), 803-645-9195) and the technical lead on the project is Dr. Kevin Coppersmith (925-974-3335, [kcoppersmith@earthlink.net](mailto:kcoppersmith@earthlink.net)).

4. What is the timetable now for consideration of any regulatory changes from this research?

A4: 4. The NRC is working on developing a Generic Letter (GL) to request information from affected licensees. The GL will likely be issued in a draft form within the next 2 months to stimulate discussions with industry in a public meeting. After that it has to be approved by CRGR, presented to ACRS and issued as a draft for formal public comments (45 days). After evaluation of the public comments it can then be finalized for issuance. We expect to issue the GL by the end of this calendar year, as the new consensus seismic hazard estimates become available. The information from licensees will likely require 3-6 months to complete. Staff's review will commence after receiving licensees' responses. Based on staff's review, a determination can be made regarding cost beneficial backfits where it can be justified.

**Bano, Mahmooda**

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**From:** Scott, Michael  
**Sent:** Tuesday, March 29, 2011 5:08 AM  
**To:** 'hochevarar@inpo.org'  
**Subject:** FW: Potential support for access to damaged cores

Al:

Another item for industry. Can you help by providing an "expert" on TMI melted fuel removal techniques to consult with the Japanese task team addressing the subject?

---

**From:** RST06 Hoc  
**Sent:** Tuesday, March 29, 2011 4:48 AM  
**To:** Scott, Michael; RST01 Hoc  
**Cc:** Wiggins, Jim  
**Subject:** Potential support for access to damaged cores

Mike,

I discussed with Jim Wiggins (on-shift ET Director) the question you raised on our phone call, concerning whether NRC has any expertise to assist the Japanese in determining the potential for accessing the damaged cores in Fukushima 1-3. The NRC was not involved in the work to clean up and remove the damaged core at TMI 2. We believe that DOE may have been involved, but the licensee used a commercial contractor to plan and perform the work.

We both agree that the best source of support for the Japanese on this issue would be to work through the industry consortium. It would seem the best thing for TEPCO to do would be to develop a commercial contract, and the industry consortium is in the best position to advise them on this issue.

Hope this helps.

Please let me know if we can be of further support.

Dave Skeen  
On-shift RST Director

A/235

## Beasley, Benjamin

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**From:** Beasley, Benjamin  
**Sent:** Tuesday, March 15, 2011 1:04 PM  
**To:** Coe, Doug  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

Thanks Doug. We are working with Ivonne Couret on this. I think OPA is overwhelmed and Scott was not available. We sent her written responses to the questions that we had coordinated with RES/DE, NRR and NRO.

Ben

---

**From:** Coe, Doug  
**Sent:** Tuesday, March 15, 2011 1:02 PM  
**To:** Hiland, Patrick; Wilson, George; Manoly, Kamal; Coyne, Kevin; Beasley, Benjamin; Burnell, Scott; Brenner, Eliot  
**Cc:** Stutzke, Martin; Ake, Jon; Skeen, David; Scales, Kerby  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

OPA (Scott) handled the previous GI199 PA work and both he and Ben Beasley's branch have the comm plan which I believe should help address the first two questions. DE (Ake or Kammerer) should be able to address question 3.

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**From:** Hiland, Patrick  
**Sent:** Tuesday, March 15, 2011 9:19 AM  
**To:** Wilson, George; Manoly, Kamal  
**Cc:** Stutzke, Martin; Ake, Jon; Coe, Doug; Skeen, David; Scales, Kerby  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates

Need to work with OPA, and RES. Kamal should coordinate with RES, and I suggest Marty/Jon respond directly through RES. Doug Coe is good source also for the GI. Get OPA involved.

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**From:** Bill Dedman [<mailto:Bill.Dedman@msnbc.com>]  
**Sent:** Tuesday, March 15, 2011 9:06 AM  
**To:** Manoly, Kamal; Sheron, Brian; Hiland, Patrick; OPA Resource  
**Subject:** NBC deadline question for NRC on seismic hazard estimates

Good morning,

My name is Bill Dedman. I'm a reporter for NBC News and msnbc.com, writing an article today about:

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

I reached out to NRC Public Affairs yesterday but have not heard back, and my deadline is end-of-day today. I'm hoping to get on the phone today with someone from NRC to make sure I'm conveying this information accurately to the public. If nothing else, I'm hoping one of the technical people can help clarify the points below. My telephone number is 203-451-9995.

I've read Director Brian Sheron's memo of Sept. 2, 2010, to Mr. Patrick Hiland; the safety/risk assessment of August 2010; its appendices A through D; NRC Information Notice 2010-18; and the fact sheet from public affairs from November 2010.



I have these questions:

1. I'd like to make sure that I accurately place in layman's terms the seismic hazard estimates. I need to make sure that I'm understanding the nomenclature for expressing the seismic core-damage frequencies. Let's say there's an estimate expressed as "2.5E-06." (I'm looking at Table D-2 of the safety/risk assessment of August 2010.) I believe that this expression means the same as  $2.5 \times 10^{-6}$ , or 0.0000025, or 2.5 divided by one million. In layman's terms, that means an expectation, on average, of 2.5 events every million years, or once every 400,000 years. Similarly, "2.5E-05" would be 2.5 divided by 100,000, or 2.5 events every 100,000 years, on average, or once every 40,000 years. Is this correct?
2. These documents give updated probabilistic seismic hazard estimates for existing nuclear power plants in the Central and Eastern U.S. What document has the latest seismic hazard estimates (probabilistic or not) for existing nuclear power plants in the Western U.S.?
3. The documents refer to newer data on the way. Have NRC, USGS et al. released those? I'm referring to this: "New consensus seismic-hazard estimates will become available in late 2010 or early 2011 (these are a product of a joint NRC, U.S. Department of Energy, U.S. Geological Survey (USGS) and Electric Power Research Institute (EPRI) project). These consensus seismic hazard estimates will supersede the existing EPRI, Lawrence Livermore National Laboratory, and USGS hazard estimates used in the GI-199 Safety/Risk Assessment."
4. What is the timetable now for consideration of any regulatory changes from this research?

Thank you for your help.

Regards,

Bill Dedman

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## Manoly, Kamal

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**From:** Hiland, Patrick *MR*  
**Sent:** Tuesday, March 15, 2011 7:19 AM  
**To:** Manoly, Kamal *MR*  
**Cc:** Giitter, Joseph; Wilson, George; Skeen, David  
**Subject:** FW: Clarifying Questions on the Table

Kamal, please ask Joe if he needs any help from you

---

**From:** Giitter, Joseph *MR*  
**Sent:** Monday, March 14, 2011 9:47 PM  
**To:** Rihm, Roger  
**Cc:** Howe, Allen; Nelson, Robert; Hiland, Patrick; Kammerer, Annie; Stutzke, Martin  
**Subject:** Clarifying Questions on the Table

I cc'd you on an earlier e-mail. I wasn't sure what you meant by reference level earthquake. Did you mean review level earthquake? Also, I wondered how the Chairman was planning to use this information. The design basis is usually expressed in terms of ground acceleration (horizontal) with a more complete description in terms of a curve showing acceleration versus frequency. However, you wouldn't be able to infer what level earthquake (for example, on the Richter Scale) the plant would handle without the soil characteristics, etc. Sorry if I'm being pedantic--I just want to make sure we give you what you're looking for.

Also, I could anticipate that the Chairman might get a question about whether the NRC licensed coastal plants are designed for a design basis earthquake in combination with a maximum probable tsunami. Let me know if you need that information.

A/237

**Cartwright, William**

---

**From:** Lobel, Richard *NRK*  
**Sent:** Tuesday, March 15, 2011 9:21 AM  
**To:** Thomas, Eric *NRK*  
**Cc:** Ruland, William; Dennig, Robert; Burnell, Scott  
**Subject:** Response to Question 2  
**Attachments:** japanese reactor question.docx

Attached is NRR/DSS response to Question 2 in an 8:26 pm e-mail from Holly Harrington to Scott Burnell, et al.

*A/238*

Filename: Japanese reactor question

Q: Some in the media and in Hill briefings are suggesting that mark I containment is flawed. What are the concerns about this type of containment? Are the US plants safe?

A. BWR Mark I containments have relatively small volumes in comparison with PWR containments. This makes the BWR Mark I containment relatively more susceptible to containment failure given a core meltdown severe enough to (1) fail the reactor vessel and also (2) severe enough so that the core melt reaches the containment boundary. On the positive side, BWRs have more ways of adding water to the core than PWRs. This includes water injection sources which do not rely on AC electric power.

The NRC considers BWRs with Mark I containment design to be safe.

**Orf, Tracy**

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**From:** Orf, Tracy *mlr*  
**Sent:** Tuesday, March 15, 2011 9:23 AM  
**To:** Broaddus, Doug, *NRK*  
**Subject:** Fukushima earthquake in acceleration

<http://news.nationalgeographic.com/news/energy/2011/03/110314-japan-nuclear-power-plant-disaster/>

This talks about 0.35 g at the epicenter, but not the site.

A/239

**Manoly, Kamal**

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**From:** Ferrante, Fernando *MR*  
**Sent:** Tuesday, March 15, 2011 9:31 AM  
**To:** *RC* Stutzke, Martin; Ake, Jon; Munson, Clifford; Manoly, Kamal  
**Subject:** NRC on the news piece

See underline:

***NRC Chairman Seen As Giving "Imprecise" Answers.*** On the CBS News (3/15) "Political Hotsheet" blog, Chip Reid writes, "White House Press Secretary Jay Carney brought a special guest to the briefing room today - Chairman of the Nuclear Regulatory Commission Gregory Jaczko," who was "asked repeatedly about the safety of US nuclear power plants, but his answers did little to satisfy reporters looking for information that might assure readers and viewers that American nuclear plants are built to withstand a crisis of this magnitude." The blog adds that Jaczko gave an "imprecise answer" to the question of whether there was a new attempt to study the ability of US plants to withstand an earthquake. "All US plants are 'designed to withstand significant natural phenomena, like earthquakes, tornadoes, and tsunamis.'" Reid says he tried "one last attempt at getting a precise answer," but says he got "another generality" in response. Reid says Chairman Jaczko's answers were "pretty thin gruel."

Thank you,

Fernando Ferrante, Ph.D.  
Office of Nuclear Reactor Regulation (NRR)  
Division of Risk Assessment (DRA)  
PRA Operational Support Branch (APOB)  
Mail Stop: 0-10C15  
Phone: 301-415-8385  
Fax: 301-415-3577

*A/ 240*

**Broaddus, Doug**

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**From:** Broaddus, Doug, *NR*  
**Sent:** Tuesday, March 15, 2011 9:33 AM  
**To:** Sean Meighan (Meighan, Sean); Mahoney, Michael  
**Cc:** Orf, Tracy  
**Subject:** FW: Fukushima earthquake in acceleration

Sean/Mike,

We discussed this morning that we mainly have data in ground acceleration, and not in the magnitude. Some of the FSARs do have magnitude information, but it is not complete. However, Trace found the following information at the site listed below that we may be able to use for comparison purposes (data was apparently provided by NEI):

- The earthquake at its epicenter reached a peak ground acceleration of .35 g.
- The Fukushima plants were built to endure peak ground acceleration of .18 g.

Doug

---

**From:** Orf, Tracy, *NR*  
**Sent:** Tuesday, March 15, 2011 9:23 AM  
**To:** Broaddus, Doug  
**Subject:** Fukushima earthquake in acceleration

<http://news.nationalgeographic.com/news/energy/2011/03/110314-japan-nuclear-power-plant-disaster/>

This talks about 0.35 g at the epicenter, but not the site.

From: NRC Announcement  
Sent: Tuesday, March 15, 2011 9:36 AM  
To: NRC Announcement  
Subject: From the Chairman: Events in Japan

## NRC Daily Announcements



Tuesday March 15, 2011 -- Headquarters Edition

♦ From the Chairman: Events in Japan

### From the Chairman: Events in Japan

By now I am sure that most of you are aware of the tragic earthquake and tsunami that struck Japan last week, killing thousands of people, destroying cities and infrastructure, and knocking out large portions of the electricity grid.

I am so proud of our staff and the dedication and tenacity they have shown during the tragic events of the past several days. NRC employees have been willingly working around the clock, and their energy, experience and expertise have been invaluable to our response. Those of you who have not directly been involved in this effort are playing just as valuable a role in making sure that the facilities we license are safe and secure.

The natural disasters in Japan—and the resulting situations at the Fukushima nuclear power plant—are sobering in their size and scope. It's easy to become distracted by the stories and images of devastation and destruction. The best thing we can do in this situation is to make sure we remain mindful of our responsibilities for the safety and security of our existing nuclear plants and materials, and to keep our focus where it must always be—on our mission. I continue to appreciate your dedication to ensure the safety and security of the American people.

TOP

(2011-03-15 00:00:00.0)

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A/242



9/1

**From:** Astwood, Heather *ner*  
**To:** Cullingford, Michael  
**Subject:** Are you the office today?  
**Date:** Tuesday, March 15, 2011 9:45:00 AM

---

Hey – have you heard anything about the status in Japan? Are we still worried about a exposing the cores? I heard there was an issue with the spent fuel pool.

A1243

**Manoly, Kamal**

**From:** Martin, Robert *NR*  
**Sent:** Tuesday, March 15, 2011 9:59 AM  
**To:** Meighan, Sean; Kulésa, Gloria; Howe, Allen  
**Cc:** Manoly, Kamal; Tsirigotis, Alexander  
**Subject:** RE: URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY

The seismic design of the plant is founded on the SSE value. However, as I recall, adequate seismic design also depends on the chosen response spectra, critical damping factors, and the time history accelerogram. I suggest that the data, and whether the numerical SSE value by itself should be used to characterize a plant's seismic capability, should be run by someone like Kamal Manoly or Alexander Tsirigotis for a check before determining how to use it.

**From:** Meighan, Sean *NR*  
**Sent:** Tuesday, March 15, 2011 9:42 AM  
**To:** NRR\_DORL Distribution  
**Subject:** FW: URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY

Clarification:

Provide OBE and SSE levels, NOT the RLE level in earlier draft table.

5

**From:** Vaidya, Bhalchandra *NR*  
**Sent:** Tuesday, March 15, 2011 9:08 AM  
**To:** Mahoney, Michael  
**Cc:** Glitter, Joseph; Pickett, Douglas; Salgado, Nancy  
**Subject:** RE: URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY

Response in Table form.

Plant Name (location)	Safe shutdown or Design basis earthquake <sup>3</sup>	Reference Review Level earthquake	probable max tsunami OR max tsunami water level (for coastal sites)
James A. FitzPatrick Nuclear Power Plant (New York)	0.15 g	0.3 g Focused Scope	N/A
Susquehanna Steam Electric Station, Units 1 and 2 (Pennsylvania)	0.15 g	0.3 g Focused Scope	N/A

**From:** Glitter, Joseph *NR*  
**Sent:** Monday, March 14, 2011 8:28 PM  
**To:** NRR\_DORL Distribution  
**Cc:** Rihm, Roger; Kammerer, Annie; Hiland, Patrick; Thomas, Eric  
**Subject:** URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY

A1244

The EDO has asked us to prepare a table that contains the following information for each of the operating reactors: Safe Shutdown Earthquake, Reference Level Earthquake and probable maximum tsunami or maximum tsunami water level (for coastal sites). I'm requesting you to obtain the pertinent information from the 1<sup>st</sup> and 3<sup>rd</sup> columns (as applicable) from the FSARs and provide it to Michael Mahoney the format below. Michael will put this information into an Excel spreadsheet so that it can be sorted various ways. I'm trying to get clarification on a couple of questions, including what is meant by Reference Level Earthquake. Hopefully, I will be able to provide you with clearer instructions tomorrow morning—once I get this additional clarification. It may be that they were looking for Review Level Earthquake information, which is in Table 3.1 of the attached 50.54(f) letter (GL 88-20, Supplement 4) pertaining to Individual Plant Evaluations of External Events (IPEEE). The 50.54(f) letter can be found at [http://r12k3web.nrc.gov/drs/toolbox/fp\\_refs/Gen-Ltrs/gl8820s4.pdf](http://r12k3web.nrc.gov/drs/toolbox/fp_refs/Gen-Ltrs/gl8820s4.pdf). I also have a call into Annie Kammerer to see if she has any of this information available. { I checked with the Ops Center and they referred me to Annie. } **If at all possible, please provide this information to Mike no later than 11:00 on Tuesday.**

Plant Name (location)	Safe shutdown or Design basis earthquake <sup>3</sup>	Reference Review Level earthquake	probable max tsunami OR max tsunami water level (for coastal sites)
San Onofre 2 and 3 (California)	0.67 g	N/A	+30 feet mllw <sup>1</sup>

1. The controlling tsunami occurs during simultaneous high tide and storm surge produces a maximum runup to elevation +15.6 feet mean lower low water line (mllw) at the Unit 2 and 3 seawall. When storm waves are superimposed, the predicted maximum runup is to elevation +27 mllw. Tsunami protection for the SONGS site is provided by a reinforced concrete seawall constructed to elevation +30.0 mllw.
2. The NRC requires safety-significant structures, systems, and components be designed to take into account: (1) The most severe natural phenomena historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated, (2) appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena and (3) the importance of the safety functions to be performed.
3. The design basis earthquake (DBE) is defined as that earthquake producing the maximum vibratory ground motion that the nuclear power generating station is designed to withstand without functional impairment of those features necessary to shut down the reactor, maintain the station in a safe condition, and prevent undue risk to the health and safety of the public. The DBE for SONGS was assessed during the construction permit phase of the project. The DBE is postulated to occur near the site (5 miles), and the ground accelerations are postulated to be quite high (0.67g), when compared to other nuclear plant sites in the U.S (0.25g or less is typical for plants in the eastern U.S.). Based on the unique seismic characteristics of the SONGS site, the site tends to amplify long-period motions, and to attenuate short-period motions. These site-specific characteristics were accounted for in the SONGS site-specific seismic analyses.

Joseph G. Glitter  
Director  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

**Wilhelm, Martha**

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**From:** McConnell, Matthew *MR*  
**Sent:** Tuesday, March 15, 2011 10:08 AM  
**To:** Mathew, Roy  
**Subject:** RE: Question on Japanese/US Batteries

My comments are incorporated below.

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**From:** Mathew, Roy *MR*  
**Sent:** Tuesday, March 15, 2011 10:05 AM  
**To:** McConnell, Matthew  
**Subject:** RE: Question on Japanese/US Batteries

U.S. nuclear power plants utilize nuclear-grade (i.e., Class 1E, safety-related) batteries as emergency power supplies for various design basis events, station blackout (10 CFR 50.63), and fire protection (Appendix R). Nuclear-grade batteries are qualified in accordance with Regulatory Guide 1.158 which provides an acceptable method for satisfying the Commission's regulations with respect to qualification of safety-related lead storage batteries for nuclear power plants. Nuclear power plant structures, systems, and components important to safety are designed to withstand natural phenomena such as earthquakes, tornadoes, tsunamis, and floods in accordance with 10 CFR 50, Appendix A, General Design Criterion (GDC) 2. GDC 2 is applicable to both nuclear-grade batteries and the structures that house them. Additionally, nuclear-grade batteries are sized and routinely tested in accordance with plant technical specifications to ensure adequate capacity and capability exists to perform their intended safety functions. For U.S. nuclear power plants, the typical design duty cycles for nuclear-grade batteries range from 1 -8 hrs.

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**From:** Taylor, Robert *MR*  
**Sent:** Monday, March 14, 2011 6:51 PM  
**To:** Hiland, Patrick; Skeen, David  
**Cc:** Mathew, Roy  
**Subject:** Question on Japanese/US Batteries

Pat and Dave,

I am preparing the Chairman's Q&As related the events in Japan. One has come up related to the effectiveness of batteries. I am requesting your staff's support in preparing a response. I would appreciate getting a concise answer that the Chairman can use to briefly respond to questions from external stakeholders. A response by COB Tuesday would be greatly appreciated.

The question is:

**Is our [U.S.] battery backup power less effective than the Japanese?**

Let me know if you have any questions.

Regards,  
Rob

Tracking:

A1245

**Recipient**  
Mathew, Roy

**Read**  
Read: 3/15/2011 10:09 AM

## Howe, Allen

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**From:** Howe, Allen, *NRR*  
**Sent:** Tuesday, March 15, 2011 10:10 AM  
**To:** West, Steven, *elli*  
**Cc:** Shear, Gary  
**Subject:** RE: Info requested by 0930 3/15 FW: URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY

Steve – the PMs were expected to do this. I will work it here.

---

**From:** West, Steven, *elli*  
**Sent:** Tuesday, March 15, 2011 10:08 AM  
**To:** Howe, Allen  
**Cc:** Shear, Gary  
**Subject:** FW: Info requested by 0930 3/15 FW: URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY  
**Importance:** High

Allen,

This is the first I've seen of this. Just for clarity, are we being asked by NRR to pull info out of the FSARs and provide it back to you?

Steve

---

**From:** Giessner, John, *elli*  
**Sent:** Tuesday, March 15, 2011 8:55 AM  
**To:** Cameron, Jamnes; Duncan, Eric; Kunowski, Michael; Lara, Julio; Riemer, Kenneth; Ring, Mark  
**Cc:** West, Steven; Shear, Gary; Chawla, Mahesh  
**Subject:** FW: Info requested by 0930 3/15 FW: URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY  
**Importance:** High

Your folks maybe getting calls soon!  
We would need to add seiche for the Great Lakes.

---

**From:** Chawla, Mahesh, *NRR*  
**Sent:** Tuesday, March 15, 2011 7:57 AM  
**To:** Giessner, John; Ellegood, John; Taylor, Thomas; Morris, R. Michael; Jones, Robert; Zurawski, Paul; Lerch, Robert  
**Subject:** FW: Info requested by 0930 3/15 FW: URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY  
**Importance:** High

Please forward this information ASAP! Thanks

---

**From:** Howe, Allen, *NRR*  
**Sent:** Tuesday, March 15, 2011 8:49 AM  
**To:** Wengert, Thomas; Pascarelli, Robert; Beltz, Terry; Tam, Peter; Feintuch, Karl; Chawla, Mahesh  
**Subject:** Info requested by 0930 3/15 FW: URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY  
**Importance:** High

The timeline has been shortened to 0930!. Please supply the SSE, OBE and max tsunami (wave or flood levels if they are applicable and more severe) to Sean Meighan and Mike Mahoney.

Thanks - Allen

**From:** Glitter, Joseph *NRR*  
**Sent:** Monday, March 14, 2011 8:28 PM  
**To:** NRR\_DORL Distribution  
**Cc:** Rihm, Roger; Kammerer, Annie; Hiland, Patrick; Thomas, Eric  
**Subject:** URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY

The EDO has asked us to prepare a table that contains the following information for each of the operating reactors: Safe Shutdown Earthquake, Reference Level Earthquake and probable maximum tsunami or maximum tsunami water level (for coastal sites). I'm requesting you to obtain the pertinent information from the 1<sup>st</sup> and 3<sup>rd</sup> columns (as applicable) from the FSARs and provide it to Michael Mahoney the format below. Michael will put this information into an Excel spreadsheet so that it can be sorted various ways. I'm trying to get clarification on a couple of questions, including what is meant by Reference Level Earthquake. Hopefully, I will be able to provide you with clearer instructions tomorrow morning—once I get this additional clarification. It may be that they were looking for Review Level Earthquake information, which is in Table 3.1 of the attached 50.54(f) letter (GL 88-20, Supplement 4) pertaining to Individual Plant Evaluations of External Events (IPEEE). The 50.54(f) letter can be found at [http://r12k3web.nrc.gov/drs/toolbox/fp\\_refs/Gen-Ltrs/gl8820s4.pdf](http://r12k3web.nrc.gov/drs/toolbox/fp_refs/Gen-Ltrs/gl8820s4.pdf). I also have a call into Annie Kammerer to see if she has any of this information available. { I checked with the Ops Center and they referred me to Annie. } **If at all possible, please provide this information to Mike no later than 11:00 on Tuesday.**

Plant Name (location)	Safe shutdown or Design basis earthquake <sup>3</sup>	Reference Review Level earthquake	probable max tsunami OR max tsunami water level (for coastal sites)
San Onofre 2 and 3 (California)	0.67 g	N/A	+30 feet mllw <sup>1</sup>

1. The controlling tsunami occurs during simultaneous high tide and storm surge produces a maximum runup to elevation +15.6 feet mean lower low water line (mllw) at the Unit 2 and 3 seawall. When storm waves are superimposed, the predicted maximum runup is to elevation +27 mllw. Tsunami protection for the SONGS site is provided by a reinforced concrete seawall constructed to elevation +30.0 mllw.
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of the SONGS site, the site tends to amplify long-period motions, and to attenuate short-period motions. These site-specific characteristics were accounted for in the SONGS site-specific seismic analyses.

Joseph G. Giitter  
Director  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

## Howe, Allen

---

**From:** Howe, Allen, *NRR*  
**Sent:** Tuesday, March 15, 2011 10:11 AM  
**To:** Chawla, Mahesh, *NRR*  
**Cc:** Pascarelli, Robert  
**Subject:** FW: Info requested by 0930 3/15 FW: URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY  
**Attachments:** Tide\_legal\_use.gif  
**Importance:** High

Mac – this is a PM assignment not something for the region.

Thanks - Allen

---

**From:** West, Steven, *R3*  
**Sent:** Tuesday, March 15, 2011 10:08 AM  
**To:** Howe, Allen  
**Cc:** Shear, Gary  
**Subject:** FW: Info requested by 0930 3/15 FW: URGENT REQUEST TO SUPPORT NRC HEARING ON WEDNESDAY  
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**Sent:** Monday, March 14, 2011 8:28 PM  
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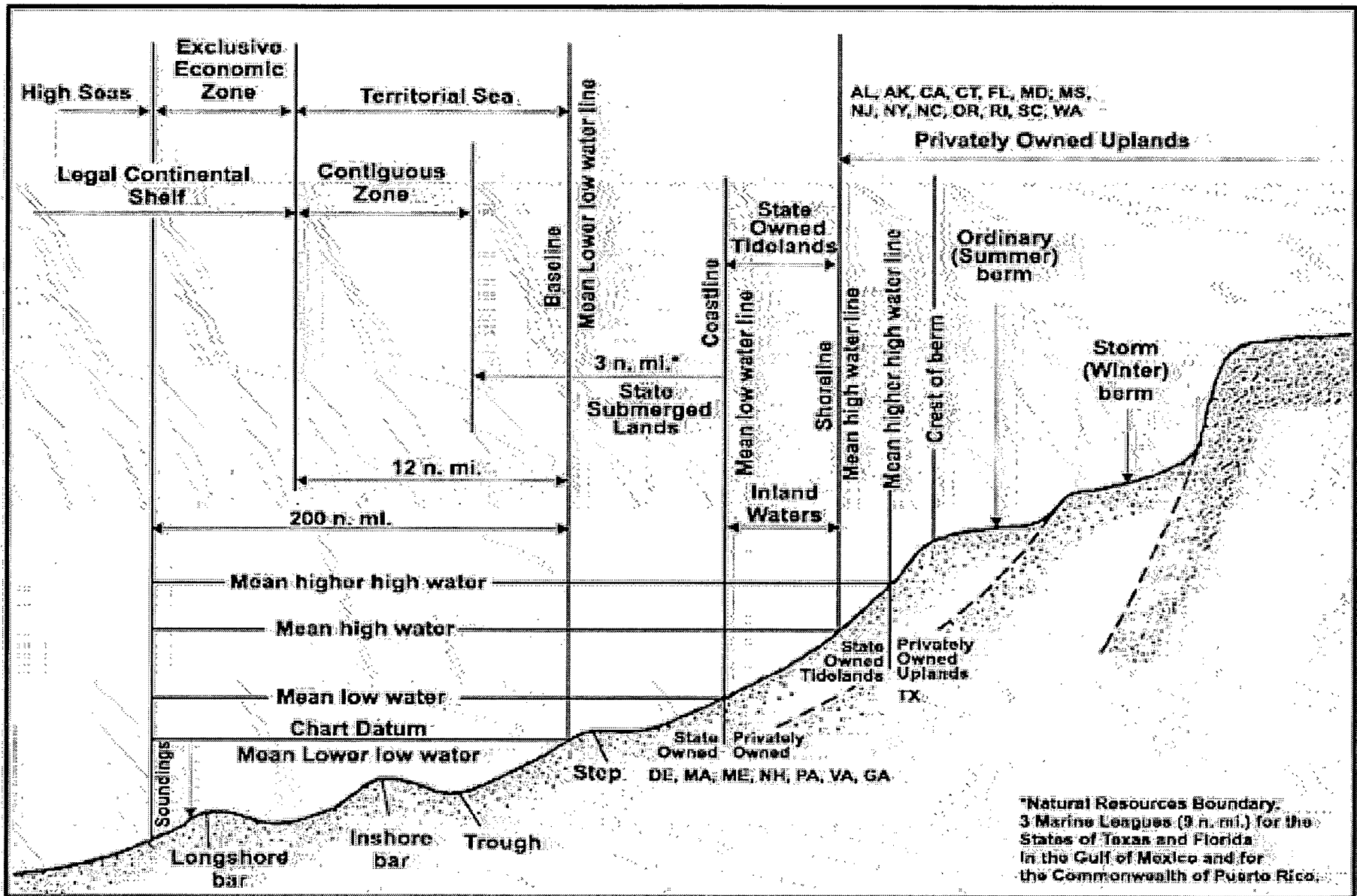
Plant Name (location)	Safe shutdown or Design basis earthquake <sup>3</sup>	Reference <u>Review</u> Level earthquake	probable max tsunami OR max tsunami water level (for coastal sites)
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Joseph G. Glitter  
Director  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

# DATUMS



**Cartwright, William**

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**From:** NRC Announcement  
**Sent:** Tuesday, March 15, 2011 10:15 AM  
**To:** Taylor, Renee  
**Subject:** EDO Update



## EDO Update

---

Tuesday, March 15, 2011



We are all saddened about the tragic events in Japan. Our thoughts and prayers go out to all of those affected by the earthquake and tsunami. The serious nuclear power plant issues have obviously been a special focus of the NRC. Rest assured, we are closely monitoring the situation and providing requested assistance. Senior managers and staff have been manning the Operations Center in rotations 24 hours a day since the earthquake. Over the weekend, we sent two staff members to Japan who are boiling-water reactor experts (the technology used at the Fukushima site). At the Japanese government's request, we have also sent nine additional NRC staff to help the American embassy in Tokyo and to support the Japanese regulators. Not surprisingly, the Congressional hearing scheduled for this Wednesday, which was originally to focus on our Fiscal Year 2012 budget, will now be primarily focused on the events in Japan.

It is not for the NRC to speak for the Japanese or United States governments, so I won't comment on the situation in any greater detail. Additional information can be obtained from the International Atomic Energy Agency and the U.S. Agency for International Development, a part of the State Department that is coordinating the U.S. response and assistance efforts.

It is possible that some of you will be requested by colleagues in another country to provide technical advice and assistance during this emergency. It is essential that all such communications be handled through the NRC Operations Center. If you receive such a request, contact the NRC Operations Officer (301-816-5100 or via the NRC Operator) immediately. All media calls should be forwarded to the Office of Public Affairs (301-415-8200).

If you receive information regarding this or any emergency (foreign or domestic) and you are not certain that the NRC's Incident Response Operations Officer is already aware of that information, you should contact the NRC Operations Officer (301-816-5100 or via the NRC Operator) and provide that information.

A/248

Notwithstanding the significance of what is occurring in Japan, we still have our domestic mission to carry out, and with the exception of the small number of people who have been directly called upon to respond to this situation we should all proceed with previously planned activities. We will continue to process licensing actions, conduct inspections, and fulfill our regulatory responsibilities.

In accordance with NRC regulations, every American nuclear power plant is designed with multiple, redundant safety systems to be robust enough to withstand the seismic and natural event risks associated with its specific location. In other words, the NRC analyzes every reactor site for own specific features and potential hazards, and requires the plant to be designed and operated accordingly. But in calculating risks, a certain level of uncertainty is always present. To compensate for these uncertainties, the NRC utilizes the concept of "defense in depth"—an approach to safety where multiple, diverse, and redundant layers of protection are used to prevent accidents and mitigate consequences. While it is inappropriate to speculate on what would happen to an American nuclear power plant under similar circumstances to the Japan event, we do know that U.S. nuclear facilities are among the most robust and well-protected civilian structures in the country.

Let me express my thanks to the NRC staff that have served in or supported the Operations Center since the earthquake hit. I'd also like to thank those who have had to compensate for their colleagues who have been called away from their regular duties.

I will keep you informed of ongoing developments.

---



Bill Borchardt, EDO

Heida, Bruce

From: Sancaktar, Selim  
Sent: Tuesday, March 15, 2011 10:19 AM  
To: Ferrante, Fernando  
Cc: Sancaktar, Selim  
Subject: RE: In case somebody asks .....

Follow Up Flag: Follow up  
Flag Status: Flagged

Hi Fernando,

I looked at the Monticello model very quickly; I think Fukushima event sequences may be 2-40-13 or 2-40-18 in seismic bin-3 SBO event tree.

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

From: Ferrante, Fernando  
Sent: Monday, March 14, 2011 10:13 PM  
To: Sancaktar, Selim  
Cc: Mitman, Jeffrey  
Subject: RE: In case somebody asks .....

Selim, I am looking at the model and it appears to be either LOOPWR: 40-10/LOOPWR: 40-07/LOOPWR: 40-05 for Fukushima-Daichi Unit 1, is that correct?

From: Sancaktar, Selim  
Sent: Monday, March 14, 2011 9:22 AM  
To: Coyne, Kevin; Kuritzky, Alan  
Cc: Sancaktar, Selim; Demoss, Gary; Ferrante, Fernando; Mitman, Jeffrey  
Subject: In case somebody asks .....

IN SPAR all hazards models, we explicitly model the CDF phase of a seismic event sequence like the one happened to Fukushima 1.

In fact, we have the model for a similar GE 3 domestic plant, Monticello.



## Hiland, Patrick

---

**From:** Hiland, Patrick *MPR*  
**Sent:** Tuesday, March 15, 2011, 11:28 AM  
**To:** Mathew, Roy; Wilson, George  
**Cc:** McConnell, Matthew; Sahay, Prem; Scales, Kerby; Skeen, David  
**Subject:** RE: Question on Japanese/US Batteries

OK, here is my thoughts: In the U.S., "safety grade" batteries are very robust and our testing requirements assure they are capable to perform their safety mission. U.S. plants maintain their batteries in a continuously charged condition, and there is a redundant set for the safety function. We do not have a specific comparison of U.S. to Japanese batteries.

---

**From:** Mathew, Roy *MPR*  
**Sent:** Tuesday, March 15, 2011 11:17 AM  
**To:** Wilson, George; Hiland, Patrick  
**Cc:** McConnell, Matthew; Sahay, Prem; Scales, Kerby; Skeen, David  
**Subject:** RE: Question on Japanese/US Batteries

Battery designs are plant specific. We don't have any information on the Japanese battery design, regulatory requirements, manufacturer data, sizing criteria, and loading requirements to compare it to US batteries. The only thing we can say is about US battery system design and regulatory requirements.

---

**From:** Hiland, Patrick *MPR*  
**Sent:** Tuesday, March 15, 2011 10:51 AM  
**To:** Mathew, Roy  
**Cc:** McConnell, Matthew; Sahay, Prem; Scales, Kerby; Wilson, George; Skeen, David  
**Subject:** RE: Question on Japanese/US Batteries

This does not answer the question, i.e. are U.S. batteries less effective. You provide all the requirements and rules but don't answer the question. Please run through George prior to responding.

---

**From:** Mathew, Roy *MPR*  
**Sent:** Tuesday, March 15, 2011 10:14 AM  
**To:** Taylor, Robert  
**Cc:** McConnell, Matthew; Sahay, Prem; Scales, Kerby; Wilson, George; Hiland, Patrick; Skeen, David  
**Subject:** RE: Question on Japanese/US Batteries

Rob: Here is the write-up

U.S. nuclear power plants utilize nuclear-grade (i.e., Class 1E, safety-related) batteries as emergency power supplies for various design basis events, station blackout (10 CFR 50.63), and fire protection (Appendix R). Nuclear-grade batteries are qualified in accordance with Regulatory Guide 1.158 which provides an acceptable method for satisfying the Commission's regulations with respect to qualification of safety-related lead storage batteries for nuclear power plants. Nuclear power plant structures, systems, and components important to safety are designed to withstand natural phenomena such as earthquakes, tornadoes, tsunami, and floods in accordance with 10 CFR 50, Appendix A, General Design Criterion (GDC) 2. GDC 2 is applicable to both nuclear-grade batteries and the structures that house them. Additionally, nuclear-grade batteries are sized and routinely tested in accordance with plant technical specifications to ensure adequate capacity and capability exists to perform their intended safety functions. For U.S. nuclear power plants, the typical design duty cycles for nuclear-grade batteries range from 1 -8 hrs.

Any questions, please give me a call.

Thanks,

Roy

---

**From:** Taylor, Robert *MTK*  
**Sent:** Monday, March 14, 2011 6:51 PM  
**To:** Hiland, Patrick; Skeen, David  
**Cc:** Mathew, Roy  
**Subject:** Question on Japanese/US Batteries

Pat and Dave,

I am preparing the Chairman's Q&As related the events in Japan. One has come up related to the effectiveness of batteries. I am requesting your staff's support in preparing a response. I would appreciate getting a concise answer that the Chairman can use to briefly respond to questions from external stakeholders. A response by COB Tuesday would be greatly appreciated.

The question is:

**Is our [U.S.] battery backup power less effective than the Japanese?**

Let me know if you have any questions.

Regards,  
Rob

## Manoly, Kamal

---

**From:** Manoly, Kamal *NRC*  
**Sent:** Tuesday, March 15, 2011 11:46 AM  
**To:** Hiland, Patrick; Skeen, David *NRC*  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

Attached is the preliminary response to the NBC reporter questions.

---

**From:** Beasley, Benjamin *BES*  
**Sent:** Tuesday, March 15, 2011 11:29 AM  
**To:** Couret, Ivonne  
**Cc:** Wilson, George  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

Ivonne,

I am coordinating the assembly of answers for the NBC reporter on GI-199. We are still working, but draft answers are:

1. His plain language understanding of the risk is correct.
2. The latest seismic hazard estimates for western U.S. nuclear plants are in the IPEEEs. Following 9-11, these documents are no longer publicly available. There are updated USGS seismic estimates for the entire U.S., but these have not been applied to the western plants.
3. The consensus hazard estimates are not out yet. We expect them by the end of the year.
4. The NRC is working on developing a Generic Letter (GL) to request information from affected licensees. The GL will likely be issued in a draft form within the next 2 months to stimulate discussions with industry in a public meeting. After that it has to be approved by CRGR, presented to ACRS and issued as a draft for formal public comments (45 days). After evaluation of the public comments it can then be finalized for issuance. We anticipate to issue the GL by the end of this calendar year as the new consensus seismic hazard estimates are expected to be available. The information from licensees will likely require 3-6 months to complete. Staff's review will commence after receiving licensees' responses. Based on staff's review, a determination can be made regarding cost beneficial backfits where it can be justified.

I will send an update after I get final information. Please let me know if there is something else we can do.

Ben Beasley



Benjamin Beasley, Chief  
Operating Experience and Generic Issues Branch  
Division of Risk Analysis  
Office of Nuclear Regulatory Research

*A/251*

301-251-7676  
Benjamin.Beasley@nrc.gov  
Generic Issues Program  
Operating Experience Databases

---

**From:** Wilson, George *NR*  
**Sent:** Tuesday, March 15, 2011 9:31 AM  
**To:** Beasley, Benjamin  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

fyi

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**From:** Hiland, Patrick *NR*  
**Sent:** Tuesday, March 15, 2011 9:20 AM  
**To:** Wilson, George; Manoly, Kamal  
**Cc:** Stutzke, Martin; Ake, Jon; Coe, Doug; Skeen, David; Scales, Kerby  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

Need to work with OPA, and RES. Kamal should coordinate with RES, and I suggest Marty/Jon respond directly through RES. Doug Coe is good source also for the GI. Get OPA involved.

---

**From:** Bill Dedman [mailto:Bill.Dedman@msnbc.com]  
**Sent:** Tuesday, March 15, 2011 9:06 AM  
**To:** Manoly, Kamal; Sheron, Brian; Hiland, Patrick; OPA Resource  
**Subject:** NBC deadline question for NRC on seismic hazard estimates

Good morning,

My name is Bill Dedman. I'm a reporter for NBC News and msnbc.com, writing an article today about:

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

I reached out to NRC Public Affairs yesterday but have not heard back, and my deadline is end-of-day today. I'm hoping to get on the phone today with someone from NRC to make sure I'm conveying this information accurately to the public. If nothing else, I'm hoping one of the technical people can help clarify the points below. My telephone number is 203-451-9995.

I've read Director Brian Sheron's memo of Sept. 2, 2010, to Mr. Patrick Hiland; the safety/risk assessment of August 2010; its appendices A through D; NRC Information Notice 2010-18; and the fact sheet from public affairs from November 2010.

I have these questions:

1. I'd like to make sure that I accurately place in layman's terms the seismic hazard estimates. I need to make sure that I'm understanding the nomenclature for expressing the seismic core-damage frequencies. Let's say there's an estimate expressed as "2.5E-06." (I'm looking at Table D-2 of the safety/risk assessment of August 2010.) I believe that this expression means the same as  $2.5 \times 10^{-6}$ , or 0.0000025, or 2.5 divided by one million. In layman's terms, that means an expectation, on average, of 2.5 events every million years, or once every 400,000 years. Similarly, "2.5E-05" would be 2.5 divided by 100,000, or 2.5 events every 100,000 years, on average, or once every 40,000 years. Is this correct?

2. These documents give updated probabilistic seismic hazard estimates for existing nuclear power plants in the Central and Eastern U.S. What document has the latest seismic hazard estimates (probabilistic or not) for existing nuclear power plants in the Western U.S.?

3. The documents refer to newer data on the way. Have NRC, USGS et al. released those? I'm referring to this: "New consensus seismic-hazard estimates will become available in late 2010 or early 2011 (these are a product of a joint NRC, U.S. Department of Energy, U.S. Geological Survey (USGS) and Electric Power Research Institute (EPRI) project). These consensus seismic hazard estimates will supersede the existing EPRI, Lawrence Livermore National Laboratory, and USGS hazard estimates used in the GI-199 Safety/Risk Assessment."

4. What is the timetable now for consideration of any regulatory changes from this research?

Thank you for your help.

Regards,

Bill Dedman

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This e-mail message and attached documents are confidential; intended only for the named recipient(s) above and may contain information that is privileged, confidential, proprietary, and/or exempt from disclosure under applicable law. If the reader of this message is not the intended recipient, you are hereby notified that any unauthorized use, dissemination, distribution or copy of this communication is strictly prohibited. No waiver of privilege, confidence or otherwise is intended by virtue of this communication. If you have received this message in error, or are not the named recipient(s), please immediately notify the sender, destroy all copies and delete this e-mail message from your computer. Thank you.

**Wilhelm, Martha**

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**From:** Mathew, Roy *NR*  
**Sent:** Tuesday, March 15, 2011 1:05 PM  
**To:** Wilson, George *NR*  
**Subject:** FW: Question on Japanese/US Batteries

George: Please review it and send it to Rob

In the U.S., "safety grade" batteries are very robust and our testing requirements assure they are capable to perform their safety mission. U.S. plants maintain their batteries in a continuously charged condition, and there is a redundant set for the safety function. These batteries are located in structures that can withstand natural phenomena such as earthquakes, tornadoes, tsunami, and floods in accordance with NRC regulations. For U.S. nuclear power plants, the typical design duty cycles for safety grade batteries range from 1 -8 hrs. We do not have a specific comparison of U.S. to Japanese batteries.

Thanks,

Roy

---

**From:** Hiland, Patrick *NR*  
**Sent:** Tuesday, March 15, 2011 11:28 AM  
**To:** Mathew, Roy; Wilson, George  
**Cc:** McConnell, Matthew; Sahay, Prem; Scales, Kerby; Skeen, David  
**Subject:** RE: Question on Japanese/US Batteries

OK, here is my thoughts: In the U.S., "safety grade" batteries are very robust and our testing requirements assure they are capable to perform their safety mission. U.S. plants maintain their batteries in a continuously charged condition, and there is a redundant set for the safety function. We do not have a specific comparison of U.S. to Japanese batteries.

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**Sent:** Tuesday, March 15, 2011 11:17 AM  
**To:** Wilson, George; Hiland, Patrick  
**Cc:** McConnell, Matthew; Sahay, Prem; Scales, Kerby; Skeen, David  
**Subject:** RE: Question on Japanese/US Batteries

Battery designs are plant specific. We don't have any information on the Japanese battery design, regulatory requirements, manufacturer data, sizing criteria, and loading requirements to compare it to US batteries. The only thing we can say is about US battery system design and regulatory requirements.

---

**From:** Hiland, Patrick *NR*  
**Sent:** Tuesday, March 15, 2011 10:51 AM  
**To:** Mathew, Roy  
**Cc:** McConnell, Matthew; Sahay, Prem; Scales, Kerby; Wilson, George; Skeen, David  
**Subject:** RE: Question on Japanese/US Batteries

This does not answer the question, i.e. are U.S. batteries less effective. You provide all the requirements and rules but don't answer the question. Please run through George prior to responding.

---

**From:** Mathew, Roy *NR*  
**Sent:** Tuesday, March 15, 2011 10:14 AM  
**To:** Taylor, Robert

**Cc:** McConnell, Matthew; Sahay, Prem; Scales, Kerby; Wilson, George; Hiland, Patrick; Skeen, David  
**Subject:** RE: Question on Japanese/US Batteries

Rob: Here is the write-up

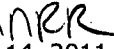
U.S. nuclear power plants utilize nuclear-grade (i.e., Class 1E, safety-related) batteries as emergency power supplies for various design basis events, station blackout (10 CFR 50.63), and fire protection (Appendix R). Nuclear-grade batteries are qualified in accordance with Regulatory Guide 1.158 which provides an acceptable method for satisfying the Commission's regulations with respect to qualification of safety-related lead storage batteries for nuclear power plants. Nuclear power plant structures, systems, and components important to safety are designed to withstand natural phenomena such as earthquakes, tornadoes, tsunamis, and floods in accordance with 10 CFR 50, Appendix A, General Design Criterion (GDC) 2. GDC 2 is applicable to both nuclear-grade batteries and the structures that house them. Additionally, nuclear-grade batteries are sized and routinely tested in accordance with plant technical specifications to ensure adequate capacity and capability exists to perform their intended safety functions. For U.S. nuclear power plants, the typical design duty cycles for nuclear-grade batteries range from 1 -8 hrs.

Any questions, please give me a call.

Thanks,

Roy

---

**From:** Taylor, Robert,   
**Sent:** Monday, March 14, 2011 6:51 PM  
**To:** Hiland, Patrick; Skeen, David  
**Cc:** Mathew, Roy  
**Subject:** Question on Japanese/US Batteries

Pat and Dave,

I am preparing the Chairman's Q&As related the events in Japan. One has come up related to the effectiveness of batteries. I am requesting your staff's support in preparing a response. I would appreciate getting a concise answer that the Chairman can use to briefly respond to questions from external stakeholders. A response by COB Tuesday would be greatly appreciated.

The question is:

**Is our [U.S.] battery backup power less effective than the Japanese?**

Let me know if you have any questions.

Regards,  
Rob

Wilhelm, Martha

---

**From:** McConnell, Matthew *NRK*  
**Sent:** Tuesday, March 15, 2011 1:09 PM  
**To:** Mathew, Roy *NRK*  
**Subject:** RE: Question on Japanese/US Batteries

I recommend the following based on Pat's remarks:

We currently do not have sufficient information to compare the differences in design requirements and performance characteristics of nuclear-grade batteries in the U.S. and Japanese nuclear power plants. However, in the U.S., nuclear power plants utilize redundant nuclear-grade (i.e., Class 1E, safety-related) batteries that are designed and constructed using rigorous standards and are routinely tested in accordance with plant technical specifications to ensure adequate capacity and capability exists to perform their intended safety functions.

---

**From:** Hiland, Patrick *NRK*  
**Sent:** Tuesday, March 15, 2011 11:28 AM  
**To:** Mathew, Roy; Wilson, George  
**Cc:** McConnell, Matthew; Sahay, Prem; Scales, Kerby; Skeen, David  
**Subject:** RE: Question on Japanese/US Batteries

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**To:** Wilson, George; Hiland, Patrick  
**Cc:** McConnell, Matthew; Sahay, Prem; Scales, Kerby; Skeen, David  
**Subject:** RE: Question on Japanese/US Batteries

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---

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**Sent:** Tuesday, March 15, 2011 10:51 AM  
**To:** Mathew, Roy  
**Cc:** McConnell, Matthew; Sahay, Prem; Scales, Kerby; Wilson, George; Skeen, David  
**Subject:** RE: Question on Japanese/US Batteries

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**Sent:** Tuesday, March 15, 2011 10:14 AM  
**To:** Taylor, Robert  
**Cc:** McConnell, Matthew; Sahay, Prem; Scales, Kerby; Wilson, George; Hiland, Patrick; Skeen, David  
**Subject:** RE: Question on Japanese/US Batteries

Rob: Here is the write-up




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Thanks,

Roy

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**From:** Taylor, Robert   
**Sent:** Monday, March 14, 2011 6:51 PM  
**To:** Hiland, Patrick; Skeen, David  
**Cc:** Mathew, Roy  
**Subject:** Question on Japanese/US Batteries

Pat and Dave,

I am preparing the Chairman's Q&As related the events in Japan. One has come up related to the effectiveness of batteries. I am requesting your staff's support in preparing a response. I would appreciate getting a concise answer that the Chairman can use to briefly respond to questions from external stakeholders. A response by COB Tuesday would be greatly appreciated.

The question is:

**Is our [U.S.] battery backup power less effective than the Japanese?**

Let me know if you have any questions.

Regards,  
Rob

Tracking:

**Recipient**  
Mathew, Roy

**Read**  
Read: 3/15/2011 1:11 PM

## Caponiti, Kathleen

---

**From:** Taylor, Robert *inrr*  
**Sent:** Tuesday, March 15, 2011 1:14 PM  
**To:** Harrington, Holly *OPA*  
**Cc:** Shoop, Undine  
**Subject:** RE: Potential OPA Questions.docx

Will do. Have I seen Undine's questions? Are they the 4 added to the end of the bigger Chairman questions?

---

**From:** Harrington, Holly, *OPA*  
**Sent:** Tuesday, March 15, 2011 1:12 PM  
**To:** Taylor, Robert  
**Subject:** RE: Potential OPA Questions.docx

Correct answer to foreign travel, not our place. My changes to this one:

1. **My family has planned a vacation to Hawaii/Alaska/Seattle next week – is it safe to go, or should we cancel our plans?**

Repeat our overall message about not affecting U.s. and then say: changes to travel is a personal decision. We are unaware of any travel restriction. that the events in Japan warrant any travel restrictions within the United States or its territories.

We'll marry these with Undine questions for the public. Yes?

---

**From:** Taylor, Robert *inrr*  
**Sent:** Tuesday, March 15, 2011 1:02 PM  
**To:** Harrington, Holly  
**Subject:** Potential OPA Questions.docx

Here are the responses I drafted to the questions Dave thought up. I added the last one regarding travel to Asia based on the email you sent me. I really don't think it is our place to speak regarding foreign travel. Your thoughts?

I plan to maintain this bank of questions and add as anyone from OPA deems necessary.

**Gibson, Kathy**

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 3:10 PM  
**To:** Sheron, Brian  
**Subject:** MACCS run

Sandia is doing a MACCS run out to 50 miles at Jennifer's request. Charlie is on the phone with Sandia to ensure they are using the "right" source term considering multiple reactors and spent fuel pools.

A1255

## Gibson, Kathy

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 5:55 PM  
**To:** Zigh, Ghani; Scott, Michael  
**Cc:** Tinkler, Charles; Lee, Richard; Santiago, Patricia  
**Subject:** Re: BWR Zirc Fire Experiment

Charlie also talked to Sandia and they told him that NEI and GE asked for a list of reports that are relevant to SFP zirc fire. Charlie told them to go ahead and provide the list. I suspect GE and/or NEI will then ask us for some or all of the docs on the list.

Richard sent an email to OGC to ask about releasing OUO docs and waiting to hear back.

We will keep working it until we have the relevant information to make a decision about what to release and to whom.

---

**From:** Zigh, Ghani  
**To:** Gibson, Kathy; Scott, Michael  
**Sent:** Wed Mar 16 16:30:23 2011  
**Subject:** BWR Zirc Fire Experiment

Kathy,  
I did talk to Sandia. They are going to inquire more about the information that both NEI and GE are looking for. They may refer them to us.  
The bottom line is that no information about zirc fire will be exchanged without our knowledge.  
I also told SNL that we may prepare a fact sheet that we can give to GE and NEI. The information sheet will have enough information to indicate that zirc fire is possible.  
Thanks

*Ghani Zigh*

## Gibson, Kathy

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 10:46 PM  
**To:** Sheron, Brian  
**Cc:** Uhle, Jennifer  
**Subject:** Re: MACCS run

It is being run beyond 50, sorry I should have said beyond. There are apparently difficulties because Nate Bixler is away teaching a MACCS class and there are questions about whether we have an appropriate spent fuel model (our models were high density and these are low density pools). However Charlie and Randy Gauntt are working it. Randy is clear we need something tomorrow and I passed on to Charlie and him Jennifer's specifications for the runs (3 reactors + 3 pools, and 3 reactors + 6 pools over 4 days).

I saw on the news that they tried dropping water from helicopters but because they were so high up they only hit the target once. But they are bringing 11 water cannon truck to the site. Also 180 staff are working rotating shifts.

Also, Jennifer, it doesn't appear that Jason talked to Sandia or Richard today. We called Jason but were unable to contact him tonight, so I will check in the morning.

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

**From:** Sheron, Brian  
**To:** Gibson, Kathy  
**Cc:** Uhle, Jennifer  
**Sent:** Wed Mar 16 21:21:06 2011  
**Subject:** RE: MACCS run

Why are we only running it out to 50 miles. I was told Rascal calculates out to 50 miles and they already ran the RASCAL analysis in the IRC. I would think we would want to run MACCS out to further distances to see what the projected doses are and whether our (U.S.) recommendation that U.S. citizens in Japan evacuate out to 50 miles remains valid, or if we should increase the recommended evacuation zone.

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 3:09 PM  
**To:** Sheron, Brian  
**Subject:** MACCS run

Sandia is doing a MACCS run out to 50 miles at Jennifer's request. Charlie is on the phone with Sandia to ensure they are using the "right" source term considering multiple reactors and spent fuel pools.

84

**Orf, Tracy**

---

**From:** Orf, Tracy *TR*  
**Sent:** Wednesday, March 16, 2011 7:47 AM  
**To:** NRR\_DORL\_LPL2-2 Distribution  
**Cc:** Howe, Allen  
**Subject:** MSNBC article on earthquake risk to US plants

[http://www.msnbc.msn.com/id/42103936/ns/world\\_news-asiapacific/](http://www.msnbc.msn.com/id/42103936/ns/world_news-asiapacific/)

A1258

**Dion, Jeanne**

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**From:** Bayssie, Mekonen  
**Sent:** Thursday, March 17, 2011 8:43 AM  
**To:** Rivera-Lugo, Richard; RES\_DE  
**Subject:** RE: NRC's Congressional Hearing - March 16th

The Full Hearing could be found on C-span on  
<http://www.c-span.org/Events/Congress-looks-at-Nuclear-Safety-and-Crisis-in-Japan/10737420229-1/>


---

**From:** Rivera-Lugo, Richard  
**Sent:** Thursday, March 17, 2011 8:39 AM  
**To:** RES\_DE  
**Subject:** NRC's Congressional Hearing - March 16th

FYI - Article from the NY Times about Chairman Jaczko's Congressional hearing on March 16th.

[http://www.nytimes.com/2011/03/17/science/earth/17nrc.html?\\_r=2](http://www.nytimes.com/2011/03/17/science/earth/17nrc.html?_r=2)

*Richard Rivera-Lugo*, EIT, MEM  
Technical Assistant (Acting)  
U.S. Nuclear Regulatory Commission – HQ  
RES/DE  
Ph. 301-251-7652  
Fax 301-251-7420  
Mail M.S. C5C07M  
E-mail [Richard.Rivera-Lugo@nrc.gov](mailto:Richard.Rivera-Lugo@nrc.gov)

 Please consider the Environment before printing this e-mail.

A/259



## Dion, Jeanne

---

**From:** Armstrong, Kenneth  
**Sent:** Thursday, March 17, 2011 9:57 AM  
**To:** Dion, Jeanne  
**Subject:** RE: Assistance with Commission Brief

Jeanne,

Mike Scott is leading this effort, we will assist.

---

**From:** Dion, Jeanne  
**Sent:** Wednesday, March 16, 2011 5:38 PM  
**To:** Armstrong, Kenneth  
**Subject:** FW: Assistance with Commission Brief  
**Importance:** High

Meant to cc you on this..

---

**From:** Dion, Jeanne  
**Sent:** Wednesday, March 16, 2011 5:36 PM  
**To:** Sheron, Brian; Uhle, Jennifer  
**Cc:** Rini, Brett  
**Subject:** FW: Assistance with Commission Brief  
**Importance:** High

Brian and Jennifer,

There is a request for RES to support a Commission Meeting on Monday on 3/21 (see the scheduling note- 1<sup>st</sup> attachment).

Right now, RES is the lead for

1. "advance our understanding of safety and risk" and

2. "Consequence Projections in Japan/and in the US" as noted in the meeting outline (2<sup>nd</sup> attachment). We will need to prepare Mike Weber's presentation/talking points/Q&A on "Consequence Projections for Japan and what we might expect to see in the US".

RES might also need to support NRR for "Situation assessment for US reactors and Applicants" - see the outline.

Tomorrow morning I'm in a meeting in 6B01 with AREVA until noon- Ken will attend the morning meeting. There is a conf call tomorrow- I'll get more info.

Jeanne

---

**From:** Howe, Allen  
**Sent:** Wednesday, March 16, 2011 5:09 PM  
**To:** Dion, Jeanne; Williams, Donna; Bajwa, Chris; Wittick, Susan; Shropshire, Alan; VandenBerghe, John; Deegan, George; Milligan, Patricia  
**Cc:** Meighan, Sean; Hall, Randy; Boska, John  
**Subject:** Assistance with Commission Brief  
**Importance:** High

I am looking for assistance to pull together background information, slides, key messages, talking points and possible Q&A for the Commission briefing on the Japan event. The briefing is likely to happen Monday. Looks like a busy weekend. A rough draft outline is attached with leads for the areas. Please keep in mind that the meeting will be public and the information will be at a fairly high level. If you know of a point of contact that is best suited to address the information, please let me know.

I am working to schedule a meeting tomorrow afternoon @1:30 to flesh this out. I will send out a scheduler with a bridge line.

Thanks - Allen

## Schaperow, Jason

---

**From:** Schaperow, Jason  
**Sent:** Friday, March 18, 2011 5:40 AM  
**To:** Schaperow, Jason  
**Subject:** fukushima nuclear update by Japan govt

<http://www.nisa.meti.go.jp/english/>

A/261

**Schaperow, Jason**

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**From:** Schaperow, Jason  
**Sent:** Friday, March 18, 2011 9:57 AM  
**To:** Navarro, Carlos

<http://www.nrc.gov/reading-rm/doc-collections/news/2011/11-050.pdf>

A/262

## Schaperow, Jason

---

**From:** Schaperow, Jason  
**Sent:** Friday, March 18, 2011 10:38 AM  
**To:** Navarro, Carlos  
**Subject:** Request

I need to go home now, because I have to be in the Ops Center from 3:00 p.m. to 11:00 p.m. Please email me whatever you come up with by 11:00. (Please don't spend more than an hour on this total.) Here is a format you could use:

Release start time:  
Release end time:  
Core inventory:  
Total release fraction for iodine:  
Total release fraction for cesium:  
Retention is containment:

Thanks,  
Jason

A1263

## Lee, Richard

---

**From:** Gauntt, Randall O [rogaunt@sandia.gov]  
**Sent:** Friday, March 18, 2011 3:54 PM  
**To:** Tinkler, Charles; Lee, Richard  
**Subject:** FW: How important is a reshaped rpv to its response in an accident?

---

**From:** Belcourt, Kenneth  
**Sent:** Friday, March 18, 2011 1:52 PM  
**To:** Humphries, Larry Laron; Gauntt, Randall O  
**Subject:** How important is a reshaped rpv to its response in an accident?

Botched Container?

Mitsuhiko Tanaka, 67, working as an engineer at **Babcock Hitachi K.K.**, helped design and supervise the manufacture of a \$250 million steel pressure vessel for Tokyo Electric in 1975. Today, that vessel holds the fuel rods in the core of the No. 4 reactor at Fukushima's Dai-Ichi plant, hit by explosion and fire after the tsunami.

Tanaka says the vessel was damaged in the production process. He says he knows because he orchestrated the cover-up. When he brought his accusations to the government more than a decade later, he was ignored, he says.

The accident occurred when Tanaka and his team were strengthening the steel in the pressure vessel, heating it in a furnace to more than 600 degrees Celsius (1,112 degrees Fahrenheit), a temperature that melts metal. Braces that should have been inside the vessel during the blasting were either forgotten or fell over. After it cooled, Tanaka found that its walls had warped.

'Felt Like a Hero'

The law required the flawed vessel be scrapped, a loss that Tanaka said might have bankrupted the company. Rather than sacrifice years of work and risk the company's survival, Tanaka used computer modeling to devise a way to reshape the vessel so that no one would know it had been damaged. He did that with Hitachi's blessings, he said.

"I saved the company billions of yen," Tanaka said in an interview March 12, the day after the earthquake. Tanaka says he got a 3 million yen bonus (\$38,000) from Hitachi and a plaque acknowledging his "extraordinary" effort in 1974. "At the time, I felt like a hero."

<http://noir.bloomberg.com/apps/news?pid=20601109&sid=aFWC3RYALjeI&pos=12>

A1264

**Sturzebecher, Karl**

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**From:** Haskell, Russell  
**Sent:** Friday, March 18, 2011 5:08 PM  
**Subject:** New OpE Forum COMM Posting - DAVIS-BESSE - Radio Frequency Interference from Walkie Talkie Causes Licensee to Declare a Loss of Emergency Feedwater

This e-mail is being sent to notify recipients of a new posting on the **@Operating Experience Community Forum**. Recipients are expected to review the posting for applicability to their areas of regulatory responsibility and consider appropriate actions. However, information contained in the posting is not tasking; therefore, no specific action or written response is required.

**Information Security Reminder: this link is on NRC's Internal Web site and may contain sensitive information. Please check with the information owner before distributing outside the agency.**

The posting may be reviewed at:

**<http://nrr10.nrc.gov/forum/forumtopic.cfm?selectedForum=03&forumId=SW&topicId=3265&CFID=86342&CFTOKEN=82223744>**

It is being provided to the following groups and individuals: ***All Communications, Auxiliary Feedwater, Control Room Habitability, Cyber Security, ECCS, Electrical Power Systems, Emergency Diesel Generators, Fire Protection, Human Performance, HVAC, Instrumentation and Controls, Main Steam & Condensate/Feed Systems, Pump and Valve Performance, Safety Culture, Shutdown Risk, Station Service Water Systems & Ultimate Heat Sink***

To unsubscribe from this distribution list or to subscribe to a different list on the OpE Community, please visit **<http://nrr10.nrc.gov/rps/dyn/subscription1.cfm>**.

For more information on the Reactor OpE Program, please visit our OpE Gateway at: **<http://nrr10.nrc.gov/ope-info-gateway/index.html>**

**Russell S. Haskell II**

United States Nuclear Regulatory Commission (NRC)  
Reactor Systems Engineer (NRR/DIRS/IOEB)

**[Russell.Haskell@nrc.gov](mailto:Russell.Haskell@nrc.gov)** | 301.415.1129 | O-7H23

A1265

## Schaperow, Jason

---

**From:** Schaperow, Jason  
**Sent:** Monday, March 21, 2011 2:53 PM  
**To:** Santiago, Patricia  
**Subject:** RE: Op Center request

Thanks.

---

**From:** Santiago, Patricia  
**Sent:** Monday, March 21, 2011 2:48 PM  
**To:** Schaperow, Jason; Navarro, Carlos; Tinkler, Charles  
**Cc:** Scott, Michael; Lee, Richard; Zigh, Ghani; Chang, Richard; Wagner, Katie  
**Subject:** RE: Op Center request

Brian McDermott, NSIR, may have been in the OPCEN. Ghani may have responded to this request earlier and provided him information about what the chemistry of the emissions is during a zirc fire.

Thanks

---

**From:** Schaperow, Jason  
**Sent:** Monday, March 21, 2011 2:36 PM  
**To:** Santiago, Patricia; Gauntt, Randall O; Navarro, Carlos; Tinkler, Charles  
**Cc:** Scott, Michael; Lee, Richard; Zigh, Ghani; Bixler, Nathan E; Chang, Richard; Wagner, Katie; Pickering, Susan Y  
**Subject:** RE: Op Center request

I reported to the Ops Center at 9:00 a.m. as you requested. The RST Director (Fred Brown) said he needed me to meet with the NR rep. So I did. Who is Brian McDermott and what is he doing?

---

**From:** Santiago, Patricia  
**Sent:** Monday, March 21, 2011 11:07 AM  
**To:** Gauntt, Randall O; Navarro, Carlos; Schaperow, Jason; Tinkler, Charles  
**Cc:** Scott, Michael; Lee, Richard; Zigh, Ghani; Bixler, Nathan E; Chang, Richard; Wagner, Katie; Pickering, Susan Y  
**Subject:** RE: Op Center request

Jason did you discuss with Brian McDermott and if not, please contact him. Brian's phone number is (301) 415-2334 but you may need to call the opcen.

Thanks again all!

---

**From:** Gauntt, Randall O [<mailto:rogaunt@sandia.gov>]  
**Sent:** Monday, March 21, 2011 11:02 AM  
**To:** Navarro, Carlos; Schaperow, Jason; Tinkler, Charles  
**Cc:** Scott, Michael; Santiago, Patricia; Lee, Richard; Zigh, Ghani; Bixler, Nathan E; Chang, Richard; Wagner, Katie; Pickering, Susan Y  
**Subject:** Re: Op Center request

While the nosepieces of the assemblies are under water, the oxidation is in steam - so chemistry is like in-vessel. Most significantly, Ru release is not favored. Under pure air, Ru oxide could be evolved. Late in boildown the Zr outer canisters could air oxidize.

---

**From:** Navarro, Carlos [<mailto:Carlos.Navarro@nrc.gov>]  
**Sent:** Monday, March 21, 2011 08:55 AM  
**To:** Schaperow, Jason <[Jason.Schaperow@nrc.gov](mailto:Jason.Schaperow@nrc.gov)>; Tinkler, Charles <[Charles.Tinkler@nrc.gov](mailto:Charles.Tinkler@nrc.gov)>; Gauntt, Randall O



**Cc:** Scott, Michael <[Michael.Scott@nrc.gov](mailto:Michael.Scott@nrc.gov)>; Santiago, Patricia <[Patricia.Santiago@nrc.gov](mailto:Patricia.Santiago@nrc.gov)>; Lee, Richard <[Richard.Lee@nrc.gov](mailto:Richard.Lee@nrc.gov)>; Zigh, Ghani <[Ghani.Zigh@nrc.gov](mailto:Ghani.Zigh@nrc.gov)>; Bixler, Nathan E; Chang, Richard <[Richard.Chang@nrc.gov](mailto:Richard.Chang@nrc.gov)>; Wagner, Katie <[Katie.Wagner@nrc.gov](mailto:Katie.Wagner@nrc.gov)>

**Subject:** Op Center request

The Op Center requested a response to the following question to Jennifer Uhle.

"Can someone call Brian McDermott and provide him information about what the chemistry of the emissions is during a zirc fire. Please do so sometime today, preferably before lunch."

Brian's phone number is (301) 415-2334.

Please let us all know if any of you have addressed the question and what was the answer for us to follow up.

Thanks,

C.

## Schaperow, Jason

---

**From:** Schaperow, Jason  
**Sent:** Monday, March 21, 2011 2:54 PM  
**To:** Zigh, Ghani  
**Subject:** RE: Op Center request

Thanks.

---

**From:** Zigh, Ghani  
**Sent:** Monday, March 21, 2011 2:50 PM  
**To:** Santiago, Patricia; Schaperow, Jason; Navarro, Carlos; Tinkler, Charles  
**Cc:** Scott, Michael; Lee, Richard; Chang, Richard; Wagner, Katie  
**Subject:** RE: Op Center request

Yes,  
I responded to his questions.  
It was about the difference between zirc fire and Hydrocarbons fire.

---

**From:** Santiago, Patricia  
**Sent:** Monday, March 21, 2011 2:48 PM  
**To:** Schaperow, Jason; Navarro, Carlos; Tinkler, Charles  
**Cc:** Scott, Michael; Lee, Richard; Zigh, Ghani; Chang, Richard; Wagner, Katie  
**Subject:** RE: Op Center request

Brian McDermott, NSIR, may have been in the OPCEN. Ghani may have responded to this request earlier and provided him information about what the chemistry of the emissions is during a zirc fire.  
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---

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**Sent:** Monday, March 21, 2011 2:36 PM  
**To:** Santiago, Patricia; Gauntt, Randall O; Navarro, Carlos; Tinkler, Charles  
**Cc:** Scott, Michael; Lee, Richard; Zigh, Ghani; Bixler, Nathan E; Chang, Richard; Wagner, Katie; Pickering, Susan Y  
**Subject:** RE: Op Center request

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---

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**Sent:** Monday, March 21, 2011 11:07 AM  
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**Cc:** Scott, Michael; Lee, Richard; Zigh, Ghani; Bixler, Nathan E; Chang, Richard; Wagner, Katie; Pickering, Susan Y  
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---

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Pickering, Susan Y

**Subject:** Re: Op Center request

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---

**From:** Navarro, Carlos [<mailto:Carlos.Navarro@nrc.gov>]

**Sent:** Monday, March 21, 2011 08:55 AM

**To:** Schaperow, Jason <[Jason.Schaperow@nrc.gov](mailto:Jason.Schaperow@nrc.gov)>; Tinkler, Charles <[Charles.Tinkler@nrc.gov](mailto:Charles.Tinkler@nrc.gov)>; Gauntt, Randall O

**Cc:** Scott, Michael <[Michael.Scott@nrc.gov](mailto:Michael.Scott@nrc.gov)>; Santiago, Patricia <[Patricia.Santiago@nrc.gov](mailto:Patricia.Santiago@nrc.gov)>; Lee, Richard

<[Richard.Lee@nrc.gov](mailto:Richard.Lee@nrc.gov)>; Zigh, Ghani <[Ghani.Zigh@nrc.gov](mailto:Ghani.Zigh@nrc.gov)>; Bixler, Nathan E; Chang, Richard

<[Richard.Chang@nrc.gov](mailto:Richard.Chang@nrc.gov)>; Wagner, Katie <[Katie.Wagner@nrc.gov](mailto:Katie.Wagner@nrc.gov)>

**Subject:** Op Center request

The Op Center requested a response to the following question to Jennifer Uhle.

"Can someone call Brian McDermott and provide him information about what the chemistry of the emissions is during a zirc fire. Please do so sometime today, preferably before lunch."

Brian's phone number is (301) 415-2334.

Please let us all know if any of you have addressed the question and what was the answer for us to follow up.

Thanks,

C.

## Schaperow, Jason

---

**From:** Schaperow, Jason  
**Sent:** Monday, March 21, 2011 4:37 PM  
**To:** Santiago, Patricia  
**Subject:** emails

FYI. I received about 65 emails today. I think that is a new record for me.

A1268

59  
Cartwright, William

---

From: Thompson, John *NR*  
Sent: Monday, March 21, 2011 11:38 AM  
To: Cartwright, William *NR*  
Subject: FW: ACTION: FOIA 2011-0119  
  
Importance: High

OpE COMM 3429

**Information Security Reminder**

Information Security Reminder: OpE COMMs contain preliminary information in the interest of timely internal communication of operating experience. OpE COMMs may be pre-decisional and may contain sensitive information. They are not intended for distribution outside the agency.

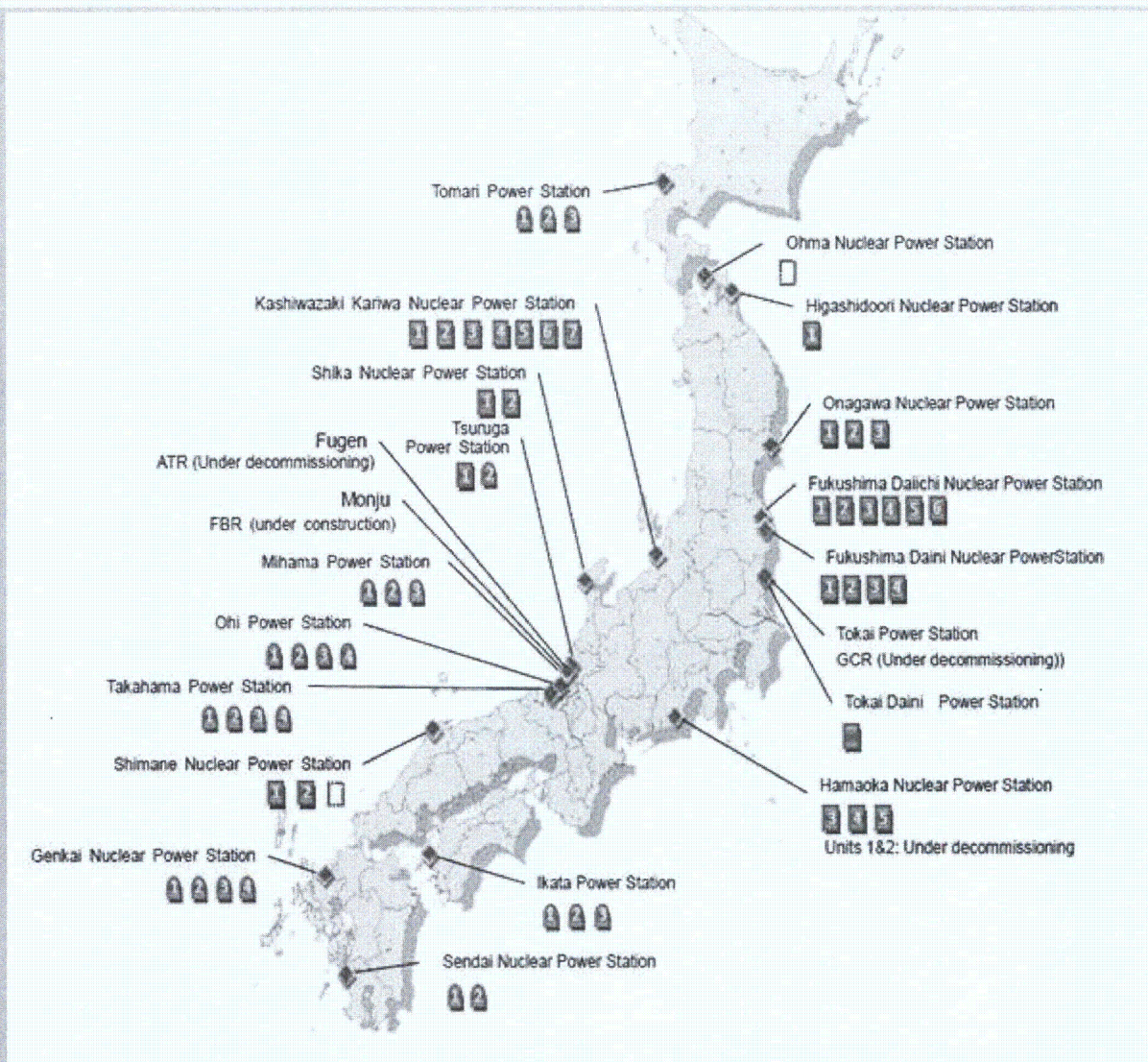
Page: 1

*Revised on 3/14/2011 2:03:00 pm*

**INES Level 4 Event - Miyagiken-Oki Earthquake (Japan)**

<A





### Summary:

A magnitude 8.9 earthquake struck off the east coast of Honshu, Japan on March 11, 2011. There are four sites that contain multiple reactors (14 total) that have been affected by the earthquake: Onagawa; Fukushima Dai'ichi; Fukushima Daini and Tokai. All plants successfully tripped; however, there is a varying degree of damage at each site (Act on Special Measures Concerning Nuclear Emergency Preparedness).

Onagawa, a three unit site, experienced a fire in a turbine building but this fire was extinguished; Units 1 and 3 are in cold shutdown and unit 2 is in automatic shutdown-the plant operator intends to place this unit in cold shutdown as well. There have been no reports from Tokai except that the plant was shutdown at the onset of the earthquake. Fukushima Daini, a four unit site, reports that all of its units are in automatic shutdown with Unit 3 entering cold shutdown on March 12. The Fukushima Daini site retains offsite power.

The Fukushima Dai'ichi site is responding to a reactor accident that is preliminarily classified as an INES Level 4 Event (Accident with Local Consequences[INES User's Manual], for context, Three Mile Island was rated as an INES Level 5 event). The site experienced a station blackout and has sustained two explosions (one at Unit 1 and one at Unit 3) while venting hydrogen gas to relieve containment pressure. The explosions both occurred outside of the primary containment. The plant operator is injecting borated seawater through the fire extinguishing system to cool Units 1 and 3. Unit 2 was being cooled through the RCIC system; however, this function was lost on March 14 and the plant operator has begun injecting seawater into Unit 2 as well. The Dai'ichi site still does not have offsite power; however, portable



generators are being used to supply equipment.

NRC Response:

The NRC is coordinating its actions with other Federal agencies as part of the U.S. government response to the events in Japan. The NRC is examining all available information as part of the effort to analyze the event and understand its implications both for Japan and the United States. The NRC's Headquarters Operations Center in Rockville, MD has been stood up since the beginning of the emergency in Japan and is operating on a 24-hour basis.

NRC Incident Responders at Headquarters have spoken with the agency's counterpart in Japan and offered the assistance of U.S. technical experts. Two officials from the NRC with expertise on boiling water nuclear reactors have deployed to Japan as part of a U.S. International Agency for International Development (USAID) team. USAID is the Federal government agency primarily responsible for providing assistance to countries recovering from disasters.

It is possible that some of us will be requested by colleagues in another country to provide technical advice and assistance during this emergency. It is essential that all such communications be handled through the NRC Operations Center. Any assistance to a foreign government or entity must be coordinated through the NRC Operations Center and the U.S. Department of State (DOS). If you receive such a request, contact the NRC Operations Officer (301-816-5100 or via the NRC Operator) immediately.

If you receive information regarding this or any emergency (foreign or domestic) and you are not certain that the NRC's Incident Response Operations Officer is already aware of that information, you should contact the NRC Operations Officer (301-816-5100 or via the NRC Operator) and provide that information.

([NRC blog](#), [NRC Press Releases](#))

The following sites provide periodic updates:

[NISA](#)

[IAEA](#)

[TEPCO](#)

This COMM will be updated as further information becomes available. Please forward relevant information to Dave Garmon (301) 415-3512.

***This COMM has been posted to the following communities: All Communications***



**Caponiti, Kathleen**

---

**From:** Taylor, Robert *NR*  
**Sent:** Tuesday, March 15, 2011 2:27 PM  
**To:** Taylor, Robert  
**Subject:** IAEA INES Link

<http://www-news.iaea.org/news/topics/default.asp>

*A1270*



**Cartwright, William**

---

**From:** Sigmon, Rebecca *NR*  
**Sent:** Tuesday, March 15, 2011 2:08 PM  
**To:** Hasselberg, Rick *MSR*  
**Cc:** King, Mark; Thomas, Eric  
**Subject:** Timelines for Daiichi Units 1 and 4  
**Attachments:** 2011 fukushima daiichi unit 1 timeline.doc; 2011 Fukushim-Daiichi Unit 4 Timeline.docx

Rick,

Attached are timelines for Units 1 and 4. Most of the information for Unit 1 came from the press releases put out by TEPCO and NISA (noted after each comment). One observation – neither TEPCO nor NISA refers to the explosion at Unit 1 as a hydrogen explosion at any point; they initially refer to it as a loud noise and white smoke following an earthquake centered near the plant. Following the explosion at Unit 3 though, the comments about the Unit 3 explosion reference the similar explosion at Unit 1, they just never update any of the previous information about Unit 1.

There wasn't much out there about Unit 4 yet. TEPCO and NISA don't have any press releases out yet about any of this morning's events there, so what I do have is from news sites and nei.org. Hope this meets your needs, let me know if you want me to focus on any area in particular and see what else is out there.

(all times are local (Tokyo) time)

Rebecca Sigmon  
Reactor Systems Engineer  
NRR/DIRS/IOEB  
Operating Experience Branch  
(301) 415-4018  
[Rebecca.Sigmon@nrc.gov](mailto:Rebecca.Sigmon@nrc.gov)

**Fukushima-Daiichi Unit 1 (all times Tokyo) (source of information)**

**3/11/2011**

**1446** Automatic shutdown due to earthquake, loss of offsite power (TEPCO)

**1541** Loss of emergency AC power, declaration of "1<sup>st</sup> Level Emergency" – Article 10 (TEPCO)

**1636** Declaration of Article 15 due to inability to verify coolant injection. Water level verification temporarily restored, Article 15 re-declared at 1707 (TEPCO)

**2200** Evacuation ordered within 3 km (TEPCO)

**2400** Status Update (TEPCO):

Unit 1 shutdown and cooled by isolation condenser

Possible radiation release due to decreasing water level

**3/12/2011**

**0300** Decision made to reduce containment pressure for units that cannot confirm water injection by RCIC (TEPCO)

**0520** Radiation levels near the main gate have risen from .07 uSv/hr (7 mRem) to (NISA):

MP6 .59 uSv/hr (59 mRem)

MP8 .38 uSv/hr (38 mRem)

**0600** Increasing levels of radiation measured by monitoring car, and one radiation monitoring post shows radiation levels greater than normal (TEPCO)

**0700** Evacuation ordered out to 10 km (TEPCO)

**0700** Status Update (NISA):

Unit 1 is in Article 15 "Nuclear Emergency Situation"

Work in progress to connect electric generating cars to power pumps for water injection

Containment vessel pressure could be as high as 840 kPa (design pressure 400 kPa)

**0755** Radiation levels (NISA):

MP6 5.1 uSv/hr

MP8 2.5 uSv/hr

**0940** Radiation levels (NISA)

MP6 5.1 uSv/hr

MP8 2.9 uSv/hr

**1000** Containment pressure reduction ordered by government (TEPCO)

**1100** Steam release in progress to relieve containment pressure (NISA)

**1100** Status Update (TEPCO):

Reactor was cooled by isolation condenser, but that has since stopped.

Containment pressure increasing  
Containment pressure reduction in progress  
Reactor water level decreasing

**1430** Successful reduction of containment pressure completed (TEPCO)

**1500** One employee reported to have received 100 mSv exposure (10 Rem) (TEPCO)

**1529** Large earth motion due to earthquake with close epicenter caused loud noise and white smoke from unit 1, reading of 500 uSv/hr at site boundary (NISA)\*\*\*

**1536** Explosion noted at Unit 1, mentioned as due to an earthquake very close to the site, 4 personnel injured (TEPCO)\*\*\*

*\*\*\*Neither TEPCO nor NISA refers to this as a hydrogen explosion from Unit 1 in any of their communications at any point. Following the explosion from Unit 3 around 1100 on 3/14 though, both TEPCO and NISA comment that what happened at Unit 3 is similar to what happened at Unit 1*

**1536** Hydrogen explosion in the space between the concrete containment and the reactor's primary system, but the explosion did not damage the containment function or the reactor system (News Conference with Japanese Cabinet Secretary Edano)

**1617** Article 15 "Radiation Disaster Measure" declared due to radiation levels at site boundary exceeding limits (TEPCO)

**1911** Evacuation order extended out to 20 km (TEPCO)

**2005** Radiation levels (NISA):

MP4 (monitoring car at site boundary NW of units)	1015 uSv/hr
MP6 (main gate)	3.25 uSv/hr
MP8 (observation platform)	2.06 uSv/hr

**2020** Injection of seawater into core followed by boric acid (TEPCO)

**2215** Suspension of seawater injection following aftershock and tsunami alert (TEPCO)

**2300** Continuation of containment pressure reduction efforts (TEPCO)

**3/13/2011**

**0200** Seawater/boric acid injection recommenced at some point before 0300 update (TEPCO)

**0400** Radiation levels (NISA):

MP4	40 uSv/hr
MP6	3.1 uSv/hr
MP8	4.5 uSv/hr

**0550** Radiation level (NISA):

MP6	3.2 uSv/hr
-----	------------

**0856** Radiation levels at the site boundary, which had been decreasing, increased again above the limit, causing a renewed declaration of Article 15 "Radiation Disaster Measure" (TEPCO)

**0930** Radiation level (NISA):  
MP6 26 uSv/hr

**1155** Seawater is being injected into containment via fire extinguishing system line (NISA)

**1220** Radiation level (NISA):  
MP4 47.1 uSv/hr

**1500** Coordinating with authorities to determine how to cool spent fuel pool (TEPCO)

**1930** Radiation levels (NISA)  
MP4 44 uSv/hr  
MP6 5.2 uSv/hr

**03/14/2011**

**0110** Interruption of seawater injection to Unit 1 due to lack of seawater in pit (NISA)

**0250** Radiation level (NISA):  
MP6 66.3 uSv/hr

**0408** Radiation level (NISA):  
MP4 56.4 uSv/hr

**1234** Radiation level (NISA)  
MP6 4.2 uSv/hr

<b>1930</b> Plant Parameters (NISA)	
Reactor Pressure	.047/.270 MPa
Primary Containment Pressure	Not Available
Reactor Water Level	Low off scale
Suppression Pool Water Temp	Not Available
Suppression Pool Water Pressure	Not Available

## **Fukushima-Daiichi Unit 4**

Unit was shutdown at the time of the earthquake and tsunami for regular inspection.

All TEPCO updates through 1500 on 3/13/2011 indicate that reactor level is stable, and there is no known reactor coolant leakage into the containment vessel.

All NISA updates through 1930 on 3/14/2011 state that Unit 4 is in periodic inspection outage with no other information on Unit 4. This is the most recent NISA press release available as of 1300 on 3/15/2011.

### **3/13/2011**

**2100** General comment for Daiichi site about coordination to ensure cooling of the spent fuel pools

### **3/15/2011**

**0600** Loud explosion heard on the site. The 4<sup>th</sup> floor rooftop of the Unit 4 reactor building was found to be damaged (TEPCO)

**0600** Fire burning in the Unit 4 spent fuel pool (press conference with Cabinet Secretary Edano)

**0938** Fire reported in Unit 4 reactor building believed to be from a lube oil leak from the recirc pump drive system. Fire fighting efforts were successful, though the roof of the building was damaged (nei.org)

**1100** Radiation level near Unit 4 ~10 Rem/hr, 821 mrem/hr at the site boundary (nei.org)

**Caponiti, Kathleen**

---

**From:** Taylor, Robert *NR*  
**Sent:** Tuesday, March 15, 2011 2:32 PM  
**To:** Wilson, George; Mathew, Roy; McConnell, Matthew  
**Cc:** Hiland, Patrick; Skeen, David; Thomas, Eric; Sigmon, Rebecca; King, Mark  
**Subject:** RE: Battery Answer

Thanks.

---

**From:** Wilson, George *NR*  
**Sent:** Tuesday, March 15, 2011 2:32 PM  
**To:** Taylor, Robert; Mathew, Roy; McConnell, Matthew  
**Cc:** Hiland, Patrick; Skeen, David; Thomas, Eric; Sigmon, Rebecca; King, Mark  
**Subject:** Battery Answer

Rob, use this answer in lieu of what was previously sent

We currently do not have sufficient information to compare the differences in design requirements and performance characteristics of nuclear-grade batteries in the U.S. and Japanese nuclear power plants. However, in the U.S., nuclear power plants utilize redundant nuclear-grade (i.e., Class 1E, safety-related) batteries that are designed and constructed using rigorous standards and are routinely tested in accordance with plant technical specifications to ensure adequate capacity and capability exists to perform their intended safety functions. These batteries are located in structures that can withstand natural phenomena such as earthquakes, tornadoes, tsunamis, and floods in accordance with NRC regulations. For U.S. nuclear power plants, the typical design duty cycles for safety grade batteries range from 1-8 hrs.

George Wilson  
USNRC  
EICB Branch Chief, Division of Engineering  
Mail Stop O12H2  
301-415-1711

A/272

## Hiland, Patrick

---

**From:** Hiland, Patrick *mer*  
**Sent:** Tuesday, March 15, 2011 2:38 PM  
**To:** Mathew, Roy *mer*  
**Cc:** Skeen, David; Wilson, George  
**Subject:** RE: Station Blackout for US plants

For the battery plants, what is the acceptable coping time? Still 4-16, or specific?

---

**From:** Mathew, Roy *mer*  
**Sent:** Tuesday, March 15, 2011 1:17 PM  
**To:** Hiland, Patrick; Skeen, David; Wilson, George  
**Subject:** Station Blackout for US plants

Here is a write-up for station blackout, in case somebody is looking for it.

The NRC designated station blackout (SBO), which is a loss of all offsite and onsite ac power concurrent with a turbine trip, as Unresolved Safety Issue A-44 in 1980. In 1988, the Commission concluded that additional SBO regulatory requirements were justified and issued the SBO rule (Title 10 *Code of Federal Regulations* [CFR] Section 50.63 [10 CFR 50.63]) to provide further assurance that a loss of both offsite and onsite emergency ac power systems would not adversely affect public health and safety.

10CFR50.63 Requirement: Loss of all alternating current power.

Each light-water-cooled nuclear power plant licensed to operate must be able to withstand for a specified duration and recover from a station blackout as defined in Sec. 50.2.

As a result of the SBO rule all plants have (1) established SBO coping and recovery procedures; (2) completed training for these procedures; (3) implemented modifications as necessary to cope with an SBO; and (4) ensured a 4- 16 hour coping capability.

There are 44 Units that rely on Battery power to cope with a SBO  
There are 60 Units that have opted to use an alternate AC source

The NRC staff reviewed the responses from each licensee and issued a SER accepting the proposed coping methods.

*A/273*

**Titus, Brett**

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**From:** Purciarello, Gerard *ink*  
**Sent:** Wednesday, March 16, 2011 5:57 PM  
**To:** Jones, Steve; Smith, Edward; Gardocki, Stanley; Hopkins, Ogbonna; Levine, Michael; Armstrong, Garry  
**Cc:** Casto, Greg  
**Subject:** FW: Request for staff that can support OIP .... Additional Staff requirements outside Ops Center Long Term Staffing

**Importance:** High

Gentlemen,

See below. If interested and if work load allows, let me know by 9 AM tomorrow. Thanks.

Jerry

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**From:** Titus, Brett *ink*  
**Sent:** Wednesday, March 16, 2011 1:43 PM  
**To:** Miranda, Samuel; Purciarello, Gerard; Bailey, Stewart; Casto, Greg; Clifford, Paul; Collins, Timothy; Dennig, Robert; Mendiola, Anthony; Ulses, Anthony  
**Cc:** Bahadur, Sher; Ruland, William  
**Subject:** FW: Request for staff that can support OIP .... Additional Staff requirements outside Ops Center Long Term Staffing  
**Importance:** High

For your consideration...please see the request below and let me know if there are people on your staff who fit the criteria. Also, please send a negative response if there are none.

Thanks,

Brett Titus  
301-415-3075

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**From:** Astwood, Heather *ink*  
**Sent:** Wednesday, March 16, 2011 1:39 PM  
**To:** Azeem, Almas; Cartwright, William; Cusumano, Victor; Fields, Leslie; Heida, Bruce; Meighan, Sean; Nguyen, Quynh; Roquecruz, Carla; Susco, Jeremy; Titus, Brett; Valentine, Nicholee  
**Cc:** Boger, Bruce  
**Subject:** FW: Request for staff that can support OIP .... Additional Staff requirements outside Ops Center Long Term Staffing  
**Importance:** High

Dear NRR TAs

Please see the request below. EDO is asking that we support OIP. OIP is asking for names of people who would be interested in helping them with the Japan crisis. They are not sure exactly what the work would entail at this point. It could be doing shifts for OIP in the Ops Center, it could be fielding calls and questions from regulators from other countries or it could be helping with OIP's normal case load.

Eric Leeds would like to support this request. He specifically does not want us to hurt any of NRR's increasing workload but we should help if we can. The time spent assisting OIP could be broken down in a variety of ways. It is unlikely that anyone would be detailed to OIP for a long period of time (i.e. 2 months straight).



More likely it would one day a week, or two weeks of one person, then two weeks of a different person. Whatever fits their needs and NRR's need to do our normal case work. The timing is negotiable.

OIP is specifically looking for people who have some international experience. Several members of the international team have already volunteered. Please let me know if there is anyone in your division that would also like to add their names to the list. Note they are asking for the names by COB today. However, I think tomorrow morning would also work.

**Heather Astwood**

International Team Leader  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
301-415-1075

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**From:** Muessele, Mary *MD*

**Sent:** Wednesday, March 16, 2011 9:32 AM

**To:** Evans, Michele; Hackett, Edwin; Brenner, Eliot; Schmidt, Rebecca; Powell, Amy; Droggitis, Spiros; Doane, Margaret; Mamish, Nader; Dyer, Jim; Brown, Milton; Greene, Kathryn; Stewart, Sharon; Howard, Patrick; Miller, Charles; Moore, Scott; Cohen, Miriam; Tracy, Glenn; Haney, Catherine; Dorman, Dan; Johnson, Michael; Holahan, Gary; Leeds, Eric; Boger, Bruce; Grobe, Jack; Zimmerman, Roy; Campbell, Andy; Sheron, Brian; Uhle, Jennifer; Dean, Bill; Lew, David; McCree, Victor; Wert, Leonard; Casto, Chuck; Satorius, Mark; Pederson, Cynthia; Collins, Elmo; Howell, Art; Andersen, James; Akstulewicz, Brenda; Belmore, Nancy; Quesenberry, Jeannette; Kreuter, Jane; Armstrong, Janine; Hudson, Sharon; Ellis, Mary; Hasan, Nasreen; Ronewicz, Lynn; Schumann, Stacy; Daniels, Stanley; Casby, Marcia; Thomas, Loretta; Walker, Dwight; Sprogeris, Patricia; Schwarz, Sherry; Ross, Robin; Cohen, Shari; Riddick, Nicole; Flory, Shirley; Veltri, Debra; Matakas, Gina; ODaniell, Cynthia; Miles, Patricia; Lee, Pamela; Dubose, Sheila; Buckley, Patricia; Tomczak, Tammy; Owen, Lucy; Tannenbaum, Anita; Gusack, Barbara; Harrington, Holly; Ricketts, Paul; Howell, Linda; Higginbotham, Tina; Ross, Brenda; Boyce, Thomas (OIS); Schaeffer, James; Jackson, Donald

**Cc:** Williams, Shawn; Andersen, James; Ramsey, Jack

**Subject:** Additional Staff requirements outside Ops Center Long Term Staffing

**Importance:** High

OPA and OIP expect large call volumes today and in the next few weeks given expected news from Japan. OIP is looking for names of people who have desk officer or other OIP or international experience to assist them in the event that current staff cannot meet the work demands for call inquiries as well as ongoing international work. Please provide Shawn Williams and I a list of names that could serve to help OIP in this capacity and their general availability over the next week and month. It is difficult to determine the need level at this time, but as in the Op Center, it is anticipated OIP will have for an additional month. We would like the list of names by COB today.

Thanks

Mary

Mary Muessele

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

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**From:** Evans, Michele *ngir*

**Sent:** Tuesday, March 15, 2011 5:53 PM

**To:** Hackett, Edwin; Brenner, Eliot; Schmidt, Rebecca; Powell, Amy; Droggitis, Spiros; Doane, Margaret; Mamish, Nader; Dyer, Jim; Brown, Milton; Greene, Kathryn; Stewart, Sharon; Howard, Patrick; Miller, Charles; Moore, Scott; Cohen, Miriam; Tracy, Glenn; Haney, Catherine; Dorman, Dan; Johnson, Michael; Holahan, Gary; Leeds, Eric; Boger, Bruce; Grobe, Jack; Zimmerman, Roy; Campbell, Andy; Sheron, Brian; Uhle, Jennifer; Dean, Bill; Lew, David; McCree, Victor;

Wert, Leonard; Casto, Chuck; Satorius, Mark; Pederson, Cynthia; Collins, Elmo; Howell, Art; Muessle, Mary; Andersen, James; Akstulewicz, Brenda; Belmore, Nancy; Quesenberry, Jeannette; Kreuter, Jane; Armstrong, Janine; Hudson, Sharon; Ellis, Marv; Hasan, Nasreen; Ronewicz, Lynn; Schumann, Stacy; Daniels, Stanley; Casby, Marcia; Thomas, Loretta; Walker, Dwight; Sprogeris, Patricia; Schwarz, Sherry; Ross, Robin; Cohen, Shari; Riddick, Nicole; Flory, Shirley; Veltri, Debra; Matakas, Gina; ODaniell, Cynthia; Miles, Patricia; Lee, Pamela; Dubose, Sheila; Buckley, Patricia; Tomczak, Tammy; Owen, Lucy; Tannenbaum, Anita; Gusack, Barbara; Harrington, Holly; Ricketts, Paul; Howell, Linda; Higginbotham, Tina; Ross, Brenda; Boyce, Thomas (OIS); Schaeffer, James; Jackson, Donald

**Subject:** Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Everyone,

Please find attached 1) a list of current positions being staffed in the Ops Center and 2) the staff identified as available to support in Japan.

Regarding additional staff available to support in the ops center, the primary needs are for the specialized positions on the PMT and anyone with previous international experience in OIP.

Regarding support in Japan, please provide any updates/changes to the list by COB March 17. The target time frame for sending these staff members is March 27-April 9, so please consider that when considering staff to put on the list.

Thanks for your support.

*Michele*

**Titus, Brett**

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**From:** Dean, Bill *WB*  
**Sent:** Wednesday, March 16, 2011 10:43 PM  
**To:** Ruland, William  
**Subject:** RE: A link for information about the Japanese reactors.

super. thanks

---

**From:** Ruland, William *WR*  
**Sent:** Wednesday, March 16, 2011 1:21 PM  
**To:** Collins, Elmo; McCree, Victor; Satorius, Mark; Dean, Bill  
**Subject:** A link for information about the Japanese reactors.

<http://www.jaif.or.jp/english/>

A/275

**Titus, Brett**

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**From:** Titus, Brett  
**Sent:** Wednesday, March 16, 2011 4:54 PM  
**To:** Scales, Kerby  
**Subject:** RE: responding to questions

No. I'm handling on a case-by-case basis.

Brett Titus  
301-415-3075

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**From:** Scales, Kerby  
**Sent:** Wednesday, March 16, 2011 4:27 PM  
**To:** Titus, Brett  
**Subject:** responding to questions

Did you send out an email to your staff about responding to questions regarding the events in Japan?

A/276

**Titus, Brett**

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**From:** Cartwright, William *incc*  
**Sent:** Wednesday, March 16, 2011 2:42 PM  
**To:** Azeem, Almas; Cusumano, Victor; Fields, Leslie; Heida, Bruce; Meighan, Sean; Nguyen, Quynh; Roquecruz, Carla; Susco, Jeremy; Titus, Brett; Valentine, Nicholee  
**Subject:** FW: \*\*Update 1:15pm March 16\*\* Information on the Japanese Earthquake and Reactors in that Region

FYI – some actions that US licensees are taking proactively in light of the Japanese experience.

This is a publically available list of the actions spelled out in detail in the INPO notice.

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**From:** [NEIGA@nei.org](mailto:NEIGA@nei.org) [<mailto:NEIGA@nei.org>]  
**Sent:** Wednesday, March 16, 2011 2:01 PM  
**To:** Cartwright, William  
**Subject:** \*\*Update 1:15pm March 16\*\* Information on the Japanese Earthquake and Reactors in that Region



**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.

Click [here](#) to unsubscribe

*A1277*

**Balarabe, Sarah**

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**From:** Mendiola, Anthony *nm*  
**Sent:** Wednesday, March 16, 2011 1:59 PM  
**To:** Attard, Anthony; Heller, Kevin; Kaizer, Joshua; Lehning, John; Orechwa, Yuri; Panicker, Mathew; Proffitt, Andrew; Tony Attard (HOME); Ward, Leonard; Wu, Shih-Liang  
**Cc:** Collins, Timothy  
**Subject:** Commission Meeting on Japan  
**Importance:** High

There will be a commission meeting to discuss the events in Japan next Tuesday.

One of the elements of the staff's presentation is a discussion of the long term regulatory response to these events.

I know that you all have considered the events in Japan and have given considerations and thoughts on what we can expect in our future work for years to come. At this point, to support Tim Collins, who is the point man for this topic for DSS, consider what the short term and long term regulatory response may be needed to assure that US Nuclear power plants and fuel facilities are as safe as they need to be. This is a pretty broad request I know, but we need to consider all items then narrow them to something manageable.

See me if you have any questions or comments. Please forward anything you want to get considered to me first.

Thanks,

Anthony Mendiola  
Chief, Nuclear Performance and Code Review Branch  
SNPB/DSS/NRR/NRC  
(301) 415-1054

*A1278*

**Balarabe, Sarah**

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**From:** Howe, Allen *nr*  
**Sent:** Wednesday, March 16, 2011 3:47 PM  
**To:** Harrington, Holly; Wittick, Susan  
**Cc:** Ruland, William; Leeds, Eric  
**Subject:** RE: Draft Scheduling Note for Japan event 3-16-2011

Apologies for the rapidly developing story. Right now the story is that this will be a public meeting. I will also call Susan.

*10PA*  
**From:** Harrington, Holly  
**Sent:** Wednesday, March 16, 2011 3:36 PM  
**To:** Howe, Allen; Wittick, Susan  
**Cc:** Ruland, William; Leeds, Eric  
**Subject:** RE: Draft Scheduling Note for Japan event 3-16-2011

Allen – can we get more information. Eliot seems unaware of this. Is it public/nonpublic?

*nr*  
**From:** Howe, Allen  
**Sent:** Wednesday, March 16, 2011 2:10 PM  
**To:** Harrington, Holly  
**Cc:** Ruland, William; Leeds, Eric  
**Subject:** FW: Draft Scheduling Note for Japan event 3-16-2011  
**Importance:** High

Holly – I appreciate the challenges you are facing right now with the blizzard of requests coming to your office. I am coordinating a Commission briefing on the Japan event to be conducted as early as Monday. The draft scheduling note is attached. We are reaching out to impacted offices to prepare for the brief. I have Eliot Brenner as a speaker to discuss communication challenges. What is needed is a POC who can engage in preparations to develop slides and talking points for Eliot. The POC is needed ASAP.

Thanks for your help - Allen

**From:** Howe, Allen  
**Sent:** Wednesday, March 16, 2011 1:18 PM  
**To:** Merzke, Daniel; Andersen, James  
**Cc:** Leeds, Eric; Ruland, William; Giitter, Joseph; Boger, Bruce; Grobe, Jack; Virgilio, Martin; Weber, Michael; Borchardt, Bill; Brenner, Eliot; Schmidt, Rebecca; Doane, Margaret; Holian, Brian; Brown, Frederick  
**Subject:** Draft Scheduling Note for Japan event 3-16-2011

Dan/Jim – attached is a rough draft scheduling note for the Commission meeting. Eric Leeds has reviewed it and approved. We are coordinating support for the meeting, which could occur as early as Monday. Please keep me updated on any developments.

Thanks - Allen

**Balarabe, Sarah**

---

**From:** Harrington, Holly *IOPA*  
**Sent:** Wednesday, March 16, 2011 3:26 PM  
**To:** Howe, Allen; Wittick, Susan  
**Cc:** Ruland, William; Leeds, Eric  
**Subject:** RE: Draft Scheduling Note for Japan event 3-16-2011

Susan, from OCA, is helping us out in OPA and I've asked her to take this on for us. Susan – pls give him a call ... thank you all

**From:** Howe, Allen *inr*  
**Sent:** Wednesday, March 16, 2011 2:10 PM  
**To:** Harrington, Holly  
**Cc:** Ruland, William; Leeds, Eric  
**Subject:** FW: Draft Scheduling Note for Japan event 3-16-2011  
**Importance:** High

Holly – I appreciate the challenges you are facing right now with the blizzard of requests coming to your office. I am coordinating a Commission briefing on the Japan event to be conducted as early as Monday. The draft scheduling note is attached. We are reaching out to impacted offices to prepare for the brief. I have Eliot Brenner as a speaker to discuss communication challenges. What is needed is a POC who can engage in preparations to develop slides and talking points for Eliot. The POC is needed ASAP.

Thanks for your help - Allen

**From:** Howe, Allen *inr*  
**Sent:** Wednesday, March 16, 2011 1:18 PM  
**To:** Merzke, Daniel; Andersen, James  
**Cc:** Leeds, Eric; Ruland, William; Giitter, Joseph; Boger, Bruce; Grobe, Jack; Virgilio, Martin; Weber, Michael; Borchardt, Bill; Brenner, Eliot; Schmidt, Rebecca; Doane, Margaret; Holian, Brian; Brown, Frederick  
**Subject:** Draft Scheduling Note for Japan event 3-16-2011

Dan/Jim – attached is a rough draft scheduling note for the Commission meeting. Eric Leeds has reviewed it and approved. We are coordinating support for the meeting, which could occur as early as Monday. Please keep me updated on any developments.

Thanks - Allen



Titus, Brett

---

**From:** Ward, Leonard *mw*  
**Sent:** Wednesday, March 16, 2011 2:45 PM  
**To:** Ruland, William; Mendiola, Anthony  
**Cc:** Bahadur, Sher  
**Subject:** Possible Staff Activities as aResult of the Quake in Japan  
**Attachments:** RESPONSE TO THE QUAKE DAMAGE IN JAPAN.docx

Bill and Tony:

After leaving the response center Monday morning, I had some thoughts that I wanted to share with you about what the staff could possibly do to improve plant capabilities against such catastrophes as the recent one in Japan. It is a brainstorm as such, but gives examples of what we might want to think about and possible take a proactive approach in response to the damage to the plants in Japan. It may be prudent to think about putting together a team to document what could be done to further elevate improve safety of our units located along oceans cites. See the attachment; FYI. What do you think? Len



Dr. Leonard W. Ward, PhD  
US Nuclear Regulatory Commission  
NRR/DSS/SNPB  
MS O10-B3  
Washington DC 20555-001  
Work (301) 415-2866  
Fax (301) 415-3577

*A/281*

## RESPONSE TO THE QUAKE DAMAGE IN JAPAN

As a result of the earthquake and tsunamis that recently damaged several nuclear plants in Japan, this document identifies examples of NRC Staff activities that could be undertaken to improve the protect US plants against such catastrophes. This action could consist of evaluating and reviewing the short term and long term actions that may be recommended or implemented to further improve protection and safety of US nuclear power plants. They include the following example thoughts, brainstorming and recommendations.

- 1.0 It may be prudent for the staff at this time to assemble an assessment team to investigate and identify what can be done at ocean shore based plants to better protect these units from tsunamis. This could include constructing larger walls/barriers to better protect the site. Placing emergency diesels/generators along with fuel supplies in underground protected locations. Better protect emergency busses and all vital electrical equipment/components
- 2.0 Cites in the US could be set-up as an emergency storage cite that contains for example, diesel generators, fuel, batteries, chargers, condensate supplies, cabling and other vital equipment, etc. that could be easily flown into any site needing emergency assistance. Tanks of condensate that can also be flown into sites.
- 3.0 Development of portable high and low pressure pumps, auxiliary/emergency feedwater pumps etc., that could be easily flown into cites and connected to the RCS and secondary systems to provide cooling capabilities.
- 4.0 Development of a portable decay heat removal system that can be taken to any site to remove decay heat. Possible decay heat removal systems that can operate at high pressures such as secondary side relief valve set pressures (1000 – 1400 psia).
- 5.0 Modifying ocean plant cites to easily allow connection of portable HPSI, LPSI, and emergency feed pumps in the event of a major catastrophe.

It may be prudent for the staff to take a pro-active stance at this time to brainstorm and think about what we can do to further improve site protection against catastrophes such as the one in Japan recently. Public confidence in nuclear power needs to be elevated in view of the recent quake in Japan.

At a minimum, a multidisciplinary committee or team could be put together to summarize the causes and consequences of the quake in Japan, and suggest/recommend what can be done at US cites to further improve plant capabilities to withstand such catastrophes or event more extreme circumstances. These actions could not only result in better protecting US plants against such catastrophes, but also further capabilities against terrorist threats/attacks.

**Titus, Brett**

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**From:** Ruland, William  
**Sent:** Wednesday, March 16, 2011 2:41 PM  
**To:** Howe, Allen  
**Subject:** Fw: Planning for upcoming, short notice Commission meeting  
**Attachments:** Scheduling NoteMar2011\_JapaneseEvent agh 3-16-2011.docx

Bill Ruland, from  
USNRC Blackberry

---

**From:** Correia, Richard *INSIR*  
**To:** Ruland, William; Evans, Michele  
**Cc:** Erlanger, Craig; Westreich, Barry; Layton, Michael; Shropshire, Alan; VandenBerghe, John; Holahan, Patricia  
**Sent:** Wed Mar 16 14:38:00 2011  
**Subject:** Fw: Planning for upcoming, short notice Commission meeting

Bill. The NSIR POCs are:  
John Vanden Berghe and Alan Shropshire.  
Rich Correia, Director  
Division of Security Policy  
NSIR

---

**From:** Evans, Michele *INSIR*  
**To:** Correia, Richard  
**Sent:** Wed Mar 16 14:05:39 2011  
**Subject:** FW: Planning for upcoming, short notice Commission meeting

Please provide the POC as we discussed. Thanks

---

**From:** Ruland, William *INSIR*  
**Sent:** Wednesday, March 16, 2011 1:19 PM  
**To:** Williams, Donna; Uhle, Jennifer; Sheron, Brian; Moore, Scott; Miller, Charles; Brenner, Eliot; Haney, Catherine; Dorman, Dan; Wiggins, Jim; Evans, Michele; Doane, Margaret; Mamish, Nader  
**Cc:** Johnson, Michael; Holahan, Gary; Leeds, Eric; Grobe, Jack; Howe, Allen  
**Subject:** Planning for upcoming, short notice Commission meeting

Folks,

Attached find a early draft of a scheduling note for a Commission meeting that may be held as early as this coming Monday, March 21<sup>st</sup>. NRR has been assigned as the lead to pull the meeting together. As you could imagine, this will take some effort. To help with coordination, please provide me a contact so that we can draw on your expertise and help to make this happen. Alan Howe, currently deputy director of DORL, has the lead to pull this together.

I know you have many questions. I'd ask for your patience as we try to get this done. I'll keep you updated through the contact that you provide to us.

Thank you very much.

Bill Ruland

## SCHEDULING NOTE

**Title:** BRIEFING ON JAPANESE EVENT and US RESPONSE (Public?)

**Purpose:** To provide the Commission a status on the recent event in Japan, and to provide an overview of staff actions to date, early planned actions

**Scheduled:** March XX, 2011  
9:00 am

**Duration:** Approx. 2 hours

**Location:** Commissioners' Conference Room OWFN

**Participants:** Presentation

**NRC Staff Panel** 50 mins.\*

**Bill Borchardt**, Executive Director for Operations 15 mins.\*  
Topic: Overview of Japanese Event and U.S. response

**Mike Weber**, Deputy Executive Director Materials, Waste,  
Research, State, Tribal and Compliance Programs 10 mins.\*  
Topic: Potential consequences; what will be seen in U.S.

**Marty Virgilio**, Deputy Executive Director for Reactor  
and Preparedness Programs 10 mins.\*  
Topic: Situation assessment for U.S. reactors and applicants

**Elliot Brenner**, OPA 5 mins.\*  
Topic: Communication Challenges

**Eric Leeds**, Director, NRR 10 mins.\*  
Topic: Path forward; Near term and longer term

**Commission Q & A** 30 mins.

**Discussion – Wrap-up** 5 mins.

**Break** 10 mins.

**Closed session**

**Strategy and agenda planning**

Documents:

Staff background material due to SECY: March \_\_, 2011.

Slides due to SECY: March \_\_, 2011.

**Rini, Brett**

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**From:** Sheron, Brian  
**Sent:** Wednesday, March 16, 2011 1:57 PM  
**To:** Dion, Jeanne  
**Cc:** Uhle, Jennifer  
**Subject:** FW: Planning for upcoming, short notice Commission meeting

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**From:** Moore, Scott  
**Sent:** Wednesday, March 16, 2011 1:56 PM  
**To:** Ruland, William; Howe, Allen  
**Cc:** Johnson, Michael; Holahan, Gary; Leeds, Eric; Grobe, Jack; Deegan, George; Evans, Michele; Doane, Margaret; Mamish, Nader; Wiggins, Jim; Dorman, Dan; Haney, Catherine; Brenner, Eliot; Miller, Charles; Sheron, Brian; Uhle, Jennifer; Williams, Donna  
**Subject:** RE: Planning for upcoming, short notice Commission meeting

George Deegan (415-7834) is FSME's POC.

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**From:** Ruland, William  
**Sent:** Wednesday, March 16, 2011 1:19 PM  
**To:** Williams, Donna; Uhle, Jennifer; Sheron, Brian; Moore, Scott; Miller, Charles; Brenner, Eliot; Haney, Catherine; Dorman, Dan; Wiggins, Jim; Evans, Michele; Doane, Margaret; Mamish, Nader  
**Cc:** Johnson, Michael; Holahan, Gary; Leeds, Eric; Grobe, Jack; Howe, Allen  
**Subject:** Planning for upcoming, short notice Commission meeting

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I know you have many questions. I'd ask for your patience as we try to get this done. I'll keep you updated through the contact that you provide to us.

Thank you very much.

Bill Ruland

**Rini, Brett**

---

**From:** Sheron, Brian  
**Sent:** Wednesday, March 16, 2011 1:55 PM  
**To:** Dion, Jeanne  
**Cc:** Uhle, Jennifer  
**Subject:** FW: Planning for upcoming, short notice Commission meeting

---

**From:** Johnson, Michael  
**Sent:** Wednesday, March 16, 2011 1:54 PM  
**To:** Ruland, William; Williams, Donna; Uhle, Jennifer; Sheron, Brian; Moore, Scott; Miller, Charles; Brenner, Eliot; Haney, Catherine; Dorman, Dan; Wiggins, Jim; Evans, Michele; Doane, Margaret; Mamish, Nader  
**Cc:** Holahan, Gary; Leeds, Eric; Grobe, Jack; Howe, Allen  
**Subject:** RE: Planning for upcoming, short notice Commission meeting

Donna Williams is NRO's poc.

---

**From:** Ruland, William  
**Sent:** Wednesday, March 16, 2011 1:19 PM  
**To:** Williams, Donna; Uhle, Jennifer; Sheron, Brian; Moore, Scott; Miller, Charles; Brenner, Eliot; Haney, Catherine; Dorman, Dan; Wiggins, Jim; Evans, Michele; Doane, Margaret; Mamish, Nader  
**Cc:** Johnson, Michael; Holahan, Gary; Leeds, Eric; Grobe, Jack; Howe, Allen  
**Subject:** Planning for upcoming, short notice Commission meeting

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Thank you very much.

Bill Ruland

**Balarabe, Sarah**

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**From:** Haney, Catherine *NMSS*  
**Sent:** Wednesday, March 16, 2011 2:06 PM  
**To:** Ruland, William; Williams, Donna; Uhle, Jennifer; Sheron, Brian; Moore, Scott; Miller, Charles; Brenner, Eliot; Dorman, Dan; Wiggins, Jim; Evans, Michele; Doane, Margaret; Mamish, Nader  
**Cc:** Johnson, Michael; Holahan, Gary; Leeds, Eric; Grobe, Jack; Howe, Allen; Bajwa, Chris  
**Subject:** RE: Planning for upcoming, short notice Commission meeting

NMSS POC is Chris Bajwa, SFST

**From:** Ruland, William *NRB*  
**Sent:** Wednesday, March 16, 2011 1:19 PM  
**To:** Williams, Donna; Uhle, Jennifer; Sheron, Brian; Moore, Scott; Miller, Charles; Brenner, Eliot; Haney, Catherine; Dorman, Dan; Wiggins, Jim; Evans, Michele; Doane, Margaret; Mamish, Nader  
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**Subject:** Planning for upcoming, short notice Commission meeting

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I know you have many questions. I'd ask for your patience as we try to get this done. I'll keep you updated through the contact that you provide to us.

Thank you very much.

Bill Ruland

**Balarabe, Sarah**

---

**From:** Howe, Allen *ink*  
**Sent:** Wednesday, March 16, 2011 1:42 PM  
**To:** Ruland, William  
**Subject:** RE: Planning for upcoming, short notice Commission meeting

Thanks Bill

I left a voice mail with Alex Marion.

---

**From:** Ruland, William *ink*  
**Sent:** Wednesday, March 16, 2011 1:19 PM  
**To:** Williams, Donna; Uhle, Jennifer; Sheron, Brian; Moore, Scott; Miller, Charles; Brenner, Eliot; Haney, Catherine; Dorman, Dan; Wiggins, Jim; Evans, Michele; Doane, Margaret; Mamish, Nader  
**Cc:** Johnson, Michael; Holahan, Gary; Leeds, Eric; Grobe, Jack; Howe, Allen  
**Subject:** Planning for upcoming, short notice Commission meeting

Folks,

Attached find a early draft of a scheduling note for a Commission meeting that may be held as early as this coming Monday, March 21<sup>st</sup>. NRR has been assigned as the lead to pull the meeting together. As you could imagine, this will take some effort. To help with coordination, please provide me a contact so that we can draw on your expertise and help to make this happen. Alan Howe, currently deputy director of DORL, has the lead to pull this together.

I know you have many questions. I'd ask for your patience as we try to get this done. I'll keep you updated through the contact that you provide to us.

Thank you very much.

Bill Ruland

*A/286*



**Balarabe, Sarah**

---

**From:** Collins, Elmo *REV*  
**Sent:** Wednesday, March 16, 2011 1:41 PM  
**To:** Ruland, William  
**Subject:** RE: A link for information about the Japanese reactors.

Thanks Bill  
Elmo

---

**From:** Ruland, William *WR*  
**Sent:** Wednesday, March 16, 2011 12:21 PM  
**To:** Collins, Elmo; McCree, Victor; Satorius, Mark; Dean, Bill  
**Subject:** A link for information about the Japanese reactors.

<http://www.jaif.or.jp/english/>

*A/287*

**Balarabe, Sarah**

---

**From:** Leeds, Eric *MLK*  
**Sent:** Wednesday, March 16, 2011 1:34 PM  
**To:** Howe, Allen; Ruland, William; Boger, Bruce; Grobe, Jack  
**Cc:** Brown, Frederick; McGinty, Tim; Giitter, Joseph; Hiland, Patrick  
**Subject:** Brain-storming upcoming Commish meeting

Allen/all –

I will undoubtedly need your help in crafting the staff's messages for the upcoming Commission meeting on the Japanese event. If there is a public part of this meeting, and there probably will be, it will be a good opportunity for us to get out the message that we have requirements in place for severe accident management, 50.63 SBO, flooding, 50.54hh(2), Mark I containment improvements, etc. Please brainstorm how we can make that part of our message to the Commission. A lot of what I think we need to do with our licensees, at least in the near term, is to verify what they are already required to do. It might make a good message for the public.

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

*A/288*

**Balarabe, Sarah**

---

**From:** Miranda, Samuel *17K8C*  
**Sent:** Wednesday, March 16, 2011 1:16 PM  
**To:** Mendiola, Anthony; Ruland, William  
**Cc:** Martin, Robert  
**Subject:** Fukushima Daiichi reactor status reports

You can obtain the status of the six Fukushima Daiichi reactors, updated several times per day, by going to <http://www.jaif.or.jp/english/> and clicking on the reactor status link at the top of the list. Prior status reports appear below it on the list.

(Thanks to Bob Martin for this source.)

**Samuel Miranda, Sr Reactor Sys Engr**  
U.S. Nuclear Regulatory Commission  
NRR/DSS/SRXB - (301) 415-2303

*A/289*

**Titus, Brett**

---

**From:** Gray, Kathy *ink*  
**Sent:** Wednesday, March 16, 2011 11:25 AM  
**To:** Brown, Frederick  
**Cc:** Ruland, William; Holian, Brian; Thorp, John; Thomas, Eric  
**Subject:** RE: RST  
**Attachments:** RST Director Schedule

Will do.

Brian . please see the attached email I sent out to the RST Directors. Thanks!

---

**From:** Brown, Frederick *ink*  
**Sent:** Wednesday, March 16, 2011 11:21 AM  
**To:** Gray, Kathy  
**Cc:** Ruland, William; Holian, Brian; Thorp, John; Thomas, Eric  
**Subject:** FW: RST

Please add in Joe's place, thanks!

---

**From:** Holian, Brian *ink*  
**Sent:** Wednesday, March 16, 2011 10:57 AM  
**To:** Brown, Frederick  
**Subject:** RST

Fred

Don't know why I'm not a Rep for RST. No one ever picked me up when I was back from the Region. Qualified in Region I up through Base Team manager.

Am currently out of town Thurs 2pm to Sun afternoon in Western PA/ Ohio border.

As needed after that for sure (starting swings Sun)...and before if needed ...

- Brian

*A1290*

Titus, Brett

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*11/16/11*

**From:** Gray, Kathy  
**Sent:** Wednesday, March 16, 2011 10:31 AM  
**To:** Brown, Frederick; Uhle, Jennifer; Skeen, David; Dudes, Laura; Hiland, Patrick; Case, Michael; Ruland, William; Giitter, Joseph  
**Cc:** Thorp, John; Thomas, Eric; Holahan, Gary  
**Subject:** RST Director Schedule  
**Importance:** High

As you know, I've been asked to coordinate the RST Director schedule, starting with mid-shift 3/18 (2300-7:00am). They would like for us to staff in 4-day blocks. Before I prepare the schedule, I'd like to see if anyone would like to volunteer for the mid-shifts. Also, if you have any days/shifts that you absolutely cannot cover, please let me know. A prompt response would be most appreciated.

Thanks!

*Kathy A. Gray*

Information Management Asst.  
Operating Experience Branch, DIRS/NRR  
301-415-1166, Rm. O-7F04  
[Kathy.Gray@nrc.gov](mailto:Kathy.Gray@nrc.gov)

Tracking:

<b>Recipient</b>	<b>Read</b>
Brown, Frederick	
Uhle, Jennifer	
Skeen, David	
Dudes, Laura	
Hiland, Patrick	Read: 3/16/2011 10:33 AM
Case, Michael	Read: 3/16/2011 10:37 AM
Ruland, William	
Giitter, Joseph	Read: 3/16/2011 10:31 AM
Thorp, John	
Thomas, Eric	
Holahan, Gary	

Titus, Brett

---

**From:** Howe, Allen *NR*  
**Sent:** Wednesday, March 16, 2011 11:22 AM  
**To:** Cheok, Michael; Holian, Brian; Ruland, William; Wilson, George; Lubinski, John; Thomas, Brian; Quay, Theodore; Nelson, Robert; Giitter, Joseph; Brown, Frederick  
**Subject:** Outline from today's emergency LT attached  
**Attachments:** Commission Meeting Outline.pdf

A1291

*open & closed*

## Commission Meeting Outline

### NRC Response to Core Damage Accident in Japan

#### Current Status of Fukushima Daiichi

- Reactors
- Spent Fuel Pools

#### Consequence Projections

#### NRC Response Objectives

- Support of US Citizens in Japan
- Support of the Japanese Government
- Advance Our Understanding of Safety and Risk

#### NRC Response Actions

- In Japan
- At HQ

#### US Government Response

- NRC Partners and Stakeholders

#### Challenges to Success in the Response

- Information
- Coordination

#### Situation Assessment For US Reactors and Applicants (JCO)

- External Events
- Severe Accidents

#### Path Forward and Priorities

- Near Term Actions  
In Support of Response
- Longer Term Actions  
Lessons Learned From this Event  
Resolution of GSI 19<sup>9</sup>

*What's not getting done*



**Balarabe, Sarah**

---

**From:** McDermott, Brian *MSR*  
**Sent:** Wednesday, March 16, 2011 10:51 AM  
**To:** OST02 HOC  
**Cc:** Leeds, Eric; Boger, Bruce; Rosenberg, Stacey; Quay, Theodore; Blount, Tom; Bowman, Eric; Ruland, William; Bowers, Anthony; McGinty, Tim; Evans, Michele  
**Subject:** RE: Request: Remove Stacey Rosenberg from PMT Deputy Director Watchbill to oversee development of Time Sensitive Generic Communications

Please address request from NRR.

Thanks,  
Brian

**From:** McGinty, Tim *INRR*  
**Sent:** Wednesday, March 16, 2011 10:48 AM  
**To:** Evans, Michele; McDermott, Brian  
**Cc:** Leeds, Eric; Boger, Bruce; Rosenberg, Stacey; Quay, Theodore; Blount, Tom; Bowman, Eric; Ruland, William; Bower, Anthony  
**Subject:** Request: Remove Stacey Rosenberg from PMT Deputy Director Watchbill to oversee development of Time Sensitive Generic Communications

Michele/Brian – NRR/DPR has a high priority near term assignment to prepare parallel generic communications (IN, RIS, Bulletin) based on the INPO Level 1 Event Report that was issued to licensees.

Stacey Rosenberg is the Branch Chief for Generic Communications. She is currently scheduled to be on shift (3 – 11) in the Ops Center on Friday as PMT Deputy Director. I am requesting that she be allowed to focus on overseeing the development of the Generic Communications (also an event related responsibility) while we rely on other elements of the NRC Organization and our Response Team depth to perform the Deputy Director function, as necessary.

Please advise at your earliest convenience. I estimate that I would need her off the watchbill for about a week or so to directly support this activity. Thanks, Tim

## **Wegner, Mary**

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**From:** Wegner, Mary  
**Sent:** Wednesday, March 16, 2011 10:29 AM  
**To:** Gonzalez, Felix; Hill, Kendra; Hyslop, JS; Melly, Nicholas; Salley, MarkHenry; Stroup, David; Taylor, Gabriel  
**Subject:** Japan Info

This is the latest from Japan. I can get all the earlier info if you would like it – From NISA, the regulator and TEPCO, the licensee. I also have information from the Japanese press which I call tentative. I do not poll the US press as what I have seen is inaccurate, to be kind. Would you like to continue receiving this? Would you like the older info.

### **JAPAN – TEPCO Plant Status, 03/16/11**

#### **From NISA**

##### **1. Nuclear Power Stations (NPS)**

###### **○ Fukushima Dai-ichi NPS**

- TEPCO evaluated that core damage of Unit 2 is “less than 5%” (22:14 March 14th)
- Water level in RPV in Unit 2 was decreasing. (22:50 March 14th)
- There was 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)
- The fire at Unit 4 occurred. Fire extinguishing work was underway. (09:38 March 15th)

###### **○ Fukushima Dai-ni NPS**

- Continue to remove the residual heat by Residual Heat Removal System (RHR) in Unit 1,2,3 and 4 (02:00 March 15th)
- Cold shut down of Unit 4 was confirmed (07:15 March 15th)

###### **○ Onagawa NPS**

- Readings of monitoring post indicates 6.1 micro Sv/h. (07:00 March 15th)

###### **○ Tokai**

- Cold shut down was confirmed. (00:40 March 15th)

#### **From TEPCO**

**(Mar 16,2011)**

#### **Impact to TEPCO's Facilities due to Tohoku-Taiheiyu-Oki Earthquake**

**(as of 2:00PM)**

Below is the status of TEPCO's major facilities that suffered from the Tohoku-Taiheiyu-Oki Earthquake that occurred at 2:46PM, March 11th 2011.

\*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 at the occurrence of earthquake

\*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 within 30km radius of the site periphery.

\*Since the value of radioactive materials (iodine, etc) at the site (outside) measured by monitoring car exceeded the ordinary level, it was determined that a specific incident stipulated in article 15,

A1293

clause 1 occurred (Extraordinary increase of radiation dose at site boundary).

- 4:17 pm, March 15th at the main gate of the site

- 11:05 pm, March 15th at the main gate of the site

\* Unit 1

The explosive sound and white smoke was confirmed near Unit 1 after the big quake occurred at 3:36pm, March 12th. We have started sea water injection at 8:20 pm and then boric acid into the reactor.

\*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.

Approximately 6:14 am, March 15th, the extraordinary 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 extraordinary 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 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, 450 kPa).

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 dispatched to the hospital by ambulances.

\*Unit 4

Approximately 6:00 am, March 15th, an explosive sound occurred 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 employee confirmed that the fire was off.

Approximately 5:45 am, 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 prepared to extinguish the fire. However, during an inspection approximately 6:15 am, TEPCO staff found no signs of fire.

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.

\*As the radiation dose at the site boundary exceeded the limitation, it was determined that a specific incident stipulated in article 15, clause 1 occurred (Extraordinary increase of radiation dose at site

boundary) at 9:58 pm, March 14th and at 0:00 am, March 15th.)

\*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 15th.

\* (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

Considering the critical balance of our power supply capacity and expected power demand forward, in order to avoid unexpected blackout, TEPCO has implemented rolling blackout (planned blackout alternates from one area to another) since yesterday. We will make our utmost to secure the stable power supply as early as possible.

**From:** Chang, Richard  
**To:** "mtl@dycoda.com"; ymccllel@sandia.gov  
**Subject:** RE: Plant Fact Check Discussion with Appendix A  
**Date:** Wednesday, March 16, 2011 1:23:00 PM

---

Mark,

I'll reschedule it later this week when I can get a firm grasp on the work we have ahead of us.

Thanks,  
Richard

---

**From:** M.T. Leonard [mailto:mtl@dycoda.com]  
**Sent:** Wednesday, March 16, 2011 1:05 PM  
**To:** Chang, Richard; ymccllel@sandia.gov  
**Subject:** Re: Plant Fact Check Discussion with Appendix A

Richard --

I will be on a plane from here to DC at this time on Monday!

I have (hadan ANS mtg scheduled for Tues/Wed at NEI, which might be redirected. But I'll be in town anyway.

Mark

Mark

Sent on the Now Network from my Sprint® BlackBerry

---

**From:** "Chang, Richard" <Richard.Chang@nrc.gov>  
**Date:** Wed, 16 Mar 2011 12:53:21 -0400  
**To:** 'mtl@dycoda.com'<mtl@dycoda.com>; Tinkler, Charles<Charles.Tinkler@nrc.gov>; Schaperow, Jason<Jason.Schaperow@nrc.gov>; McClellan, Yvonne<ymccllel@sandia.gov>  
**Subject:** Plant Fact Check Discussion with Appendix A

When: Monday, March 21, 2011 1:00 PM-2:30 PM (GMT-05:00) Eastern Time (US & Canada).

Where: HQ-CSB-04C19-18p-VTC

Note: The GMT offset above does not reflect daylight saving time adjustments.


\*~\*~\*~\*~\*~\*~\*~\*~\*~\*

All,

Mark has sent out a final list of Plant Fact Check topics... The purpose of this meeting is to discuss the proposed resolutions on the Appendix A fact check comments.

I have shifted the date until Monday due to what is going on in Japan. This date may change based on events.

A/294



Thanks,  
Richard

## **Murphy, Andrew**

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**From:** Murphy, Andrew  
**Sent:** Wednesday, March 16, 2011 3:26 PM  
**To:** Case, Michael  
**Subject:** RE: COMMISSION E-READER....WEDNESDAY, MARCH 16, 2011

Mike,

The Japanese Qs & As can do a very good job of addressing the Congressional inquiries for the general seismic background but there are some question on specific seismic issues or plant systems that are not covered by the Qs & As..

Andy

---

**From:** Case, Michael  
**Sent:** Wednesday, March 16, 2011 2:19 PM  
**To:** Munson, Clifford; Murphy, Andrew; Kammerer, Annie; Hogan, Rosemary; Ake, Jon  
**Subject:** FW: COMMISSION E-READER....WEDNESDAY, MARCH 16, 2011

Here's some test cases to see how well the Q&As hold together!

---

**From:** Sheron, Brian  
**Sent:** Wednesday, March 16, 2011 1:13 PM  
**To:** Case, Michael; Coe, Doug; Correia, Richard; Gibson, Kathy; Lui, Christiana; Richards, Stuart; Sangimino, Donna-Marie; Scott, Michael; Uhle, Jennifer; Valentin, Andrea  
**Subject:** FW: COMMISSION E-READER....WEDNESDAY, MARCH 16, 2011

And so it starts.

---

**From:** Champ, Billie  
**Sent:** Wednesday, March 16, 2011 12:14 PM  
**To:** Commission E-Reader Distribution; E-Reader Distribution  
**Subject:** COMMISSION E-READER....WEDNESDAY, MARCH 16, 2011

**INTERNAL USE ONLY**  
Some of the information contained in the  
Reader is not publicly available.  
If there are any questions, please contact SECY.

**READING FILE**

**INDEX**

**March 16, 2011**

## **INCOMING CORRESPONDENCE**

Tab "A" 03/15/11 -- Letter from Reps. Edward Markey and Lois Capps, requests additional information related to the seismic safety features in nuclear reactors in the U.S.

**Murphy, Andrew**

---

**From:** Murphy, Andrew  
**Sent:** Wednesday, March 16, 2011 3:44 PM  
**To:** Murphy, Andrew  
**Subject:** Emailing: Worldmap\_2D.jpg  
**Attachments:** Worldmap\_2D.jpg

*Releasable*

*A/296*







## Murphy, Andrew

---

**From:** Murphy, Andrew  
**Sent:** Wednesday, March 16, 2011 3:42 PM  
**To:** Murphy, Andrew  
**Subject:** Emailing: sanandreas\_2.jpg  
**Attachments:** sanandreas\_2.jpg





**EURASIAN PLATE**

**PACIFIC PLATE**

**JAPAN**

**PHILLIPINE PLATE**



**Dion, Jeanne**

---

**From:** Wittick, Susan  
**Sent:** Wednesday, March 16, 2011 5:58 PM  
**To:** Deegan, George; Dion, Jeanne; Turtill, Richard; Rivera, Alison  
**Cc:** Piccone, Josephine; Jackson, Deborah; Moore, Scott  
**Subject:** RE: Assistance with Commission Brief

George,

Thank you for the input from FSME to include with Eliot's presentation.

Susan

---

**From:** Deegan, George  
**Sent:** Wednesday, March 16, 2011 5:39 PM  
**To:** Dion, Jeanne; Turtill, Richard; Rivera, Alison  
**Cc:** Piccone, Josephine; Jackson, Deborah; Moore, Scott; Wittick, Susan  
**Subject:** RE: Assistance with Commission Brief

Jeanne- Thanks.

Rich/Alison: Can FSME/DILR provide some talking points on the Communication Challenges we're having with States and other stakeholders (for Eliot Brenner's section). Once we have our message (bullets, talking points, background, possible Q&A's) I will provide this to Susan Wittick in OPA. We are probably looking at 2 minutes total out of Eliot's 5 minute presentation.

---

**From:** Dion, Jeanne  
**Sent:** Wednesday, March 16, 2011 5:28 PM  
**To:** Howe, Allen; Deegan, George  
**Cc:** Moore, Scott; Piccone, Josephine; Jackson, Deborah; Turtill, Richard; Brock, Kathryn; Frazier, Alan; Wittick, Susan  
**Subject:** RE: Assistance with Commission Brief

Yes- we can. We have staff with expertise in severe accidents (SOARCA) and health effects branch.

Can you provide more information on the agenda item ("advance our understanding of safety and risk")- RES is noted as the lead for the item.

Thanks- Jeanne

---

**From:** Howe, Allen  
**Sent:** Wednesday, March 16, 2011 5:22 PM  
**To:** Deegan, George; Dion, Jeanne  
**Cc:** Moore, Scott; Piccone, Josephine; Jackson, Deborah; Turtill, Richard; Brock, Kathryn; Frazier, Alan; Wittick, Susan  
**Subject:** RE: Assistance with Commission Brief

Thanks George – Susan Wittick is coordinating for OPA.

Jeanne – can RES address the consequence projections?

Thanks - Allen

A/298

---

**From:** Deegan, George  
**Sent:** Wednesday, March 16, 2011 5:18 PM  
**To:** Howe, Allen  
**Cc:** Moore, Scott; Piccone, Josephine; Jackson, Deborah; Turtill, Richard; Brock, Kathryn; Frazier, Alan  
**Subject:** FW: Assistance with Commission Brief  
**Importance:** High

Allen- I think our two emails may have crossed with one another (see my earlier response). I think RES would be best on Consequence Projections, not FSME. We may have some input to provide regarding Communication Challenges (since we serve in a liaison capability with States). If you'd like, I can check with our folks and see if they can develop some talking points to support Eliot's part of the presentation.

---

**From:** Howe, Allen  
**Sent:** Wednesday, March 16, 2011 5:09 PM  
**To:** Dion, Jeanne; Williams, Donna; Bajwa, Chris; Wittick, Susan; Shropshire, Alan; VandenBerghe, John; Deegan, George; Milligan, Patricia  
**Cc:** Meighan, Sean; Hall, Randy; Boska, John  
**Subject:** Assistance with Commission Brief  
**Importance:** High

I am looking for assistance to pull together background information, slides, key messages, talking points and possible Q&A for the Commission briefing on the Japan event. The briefing is likely to happen Monday. Looks like a busy weekend. A rough draft outline is attached with leads for the areas. Please keep in mind that the meeting will be public and the information will be at a fairly high level. If you know of a point of contact that is best suited to address the information, please let me know.

I am working to schedule a meeting tomorrow afternoon @1:30 to flesh this out. I will send out a scheduler with a bridge line.

Thanks - Allen

## Moyer, Carol

---

**From:** Doctor, Steven R [steven.doctor@pnl.gov]  
**Sent:** Wednesday, March 16, 2011 7:36 PM  
**To:** Braatz, Brett G; Cumblidge, Stephen; Prokofiev, Iouri; Moyer, Carol; Harris, Robert V  
**Subject:** Info from Tetsuo Shoji

Got this information from Stephen Bruemmer and thought you might find it informative.

Steve

---

Steven R. Doctor, Ph.D.  
Laboratory Fellow  
Applied Physics/National Security Directorate

Pacific Northwest National Laboratory  
902 Battelle Boulevard  
P.O. Box 999, MSIN K5-26  
Richland, WA 99352 USA  
Tel: 509-375-2495  
Fax: 509-375-6497  
[steven.doctor@pnl.gov](mailto:steven.doctor@pnl.gov)  
[www.pnl.gov](http://www.pnl.gov)

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

**From:** Bruemmer, Stephen M  
**Sent:** Wednesday, March 16, 2011 3:58 PM  
**To:** Doctor, Steven R  
**Cc:** Bond, Leonard J  
**Subject:** Re: Sympathy for earthquake in Sendai

Steve - thanks. I was trying to reach several people at Tokoku University including Tetsuo since Friday. Finally made contact on Tuesday with Tetsuo through his home email and found out my friends were OK (as you can be).

Here is part of the most recent message from Tetsuo sent to our ICG-EAC organizing committee early this morning:

Thank you very much for the kind and supportive message. It's a huge tragedy we have never never thought or imagined.

M9 is far above the estimated level and everything can't resist against such a level. I was in the building which is newly constructed last year and shake was so big as I have never experienced in my life and shake last a few minutes, very very long we felt. Tsunami height was more than 20 m in some areas which over flow the tsunami barrier of 10 m height. Everything washed away. Our campus and my home are rather West of Sendai which is far from sea coast and didn't affected by the Tsunami.

My family and my lab. member are all fine and my residence area is now recovered mostly except gas. So my family has no difficulty in living but still a lot of people are living in many evacuated places and at home without electricity, water and gas.

All transportation don't work except some buses. No Shinkansen, no flight.

We have a serious shortage of gas for cars and a lot of cars are waiting the gas supply. A lot of cars are left on the road which raise an another problem that rescues can not effectively move by this traffic jam.

We may need some more weeks to get better condition in life line.

Fukushima NPP is a serious situation of activities confinement because of possible failure of suppression camber with a explosion sound, which no one know the details. RPV and container seem to be maintained

so far and TEPCO is trying to pump sea water in the reactor but still a half of the fuel is above the water line. Let's see what's going on. I hope it cool down soon.

My lab. may start to work next week after the building inspection on Thursday 16, March and electricity supply check. I think it will take a few days to put them back in operation condition for all lab. equipments and working space.

Cheers - Steve

## Case, Michael

---

**From:** Case, Michael  
**Sent:** Wednesday, March 16, 2011 6:39 AM  
**To:** Csontos, Aladar; Richards, Stuart  
**Cc:** Stevens, Gary  
**Subject:** RE: BWR Mark 1 Containment Issue - Torus

Yes, that would be nice.

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

**From:** Csontos, Aladar  
**Sent:** Tuesday, March 15, 2011 7:46 PM  
**To:** Case, Michael; Richards, Stuart  
**Cc:** Stevens, Gary  
**Subject:** BWR Mark 1 Containment Issue - Torus

Mike,

Just need to inform you about potential issues that are starting to make it in the press on the Mark 1 containment. 1) Mark 1 had design issues back in the 80's that led to lawsuits by licensees and 2) torus corrosion questions regarding reduced stress margins led a contentious debate with ACRS over the Oyster Creek license renewal and others.

Both have tons of publically available reports that may come up while the Japan issues get sorted out especially regarding our 23 Mark 1 BWRs. Gary briefed me about this before the press rediscovered the issues. If you want a brief tomorrow am, just let me know.

AI

A/300



## **Murphy, Andrew**

---

**From:** Case, Michael  
**Sent:** Wednesday, March 16, 2011 7:16 AM  
**To:** Graves, Herman; Hogan, Rosemary; Csontos, Aladar; Koshy, Thomas; Lin, Bruce; Boyce, Tom (RES); Ali, Syed; Murphy, Andrew; Tregoning, Robert; Gavrilas, Mirela; Sydnor, Russell; Lorette, Phillip  
**Cc:** Richards, Stuart  
**Subject:** FW: IRC Staffing

Can you all start to think about this and let me know of any potential names by around noon?

---

**From:** Sheron, Brian  
**Sent:** Tuesday, March 15, 2011 5:27 PM  
**To:** Coyne, Kevin; Case, Michael; Coe, Doug; Correia, Richard; Gibson, Kathy; Lui, Christiana; Richards, Stuart; Sangimino, Donna-Marie; Scott, Michael; Uhle, Jennifer; Valentin, Andrea  
**Cc:** Dion, Jeanne  
**Subject:** IRC Staffing

I participated on a conference call with other ODs and led by Michele Evans, acting deputy OD in NSIR at 4 pm today.

The purpose of the conference call was to discuss staffing for the IRC for the near future. The IRC is currently staffed with members of the Reactor safety team, the Protective Measures team, Liaison Team, etc. There is also an ET member there. None of the teams are at their full compliment. What Michele is looking for is people that can staff the IRC and relieve the staff that are currently there. She said they are currently running 3 shifts (11pm-7am, 7am – 3pm, and 3pm to 11 pm). They would like to find staff that can work shifts for 4 days in a row (I think she wants 4 days on, 3 days off). She said the staff do not have to have had IRC training.

Several of us said we would certainly canvas our staff to see who was qualified to work in the IRC and could work there, but we needed to know what technical disciplines they were looking for. Michele did not have a list of needed disciplines, but said she would generate one and send it out. As of 5:15 pm I have not received a list yet.

However, I am assuming they will be looking for staff with expertise in such areas as systems analysis, severe accidents, radiological dose assessment, etc. In anticipation that these are the technical disciplines of interest, can you please start identifying your staff that you believe have some of the requisite skills needed for the IRC, and start asking if they would be available to work shifts in the IRC if asked to. HR said they would be eligible for normal overtime compensation.

Also, they will be looking for staff to go to Japan and relieve the technical staff that recently went there. There were 2 BWR experts that left over the weekend, and a team of 9 more (6 engineers and 3 OIP staff) left yesterday. The thinking is that the staff that recently went over would come back in 2 weeks, which is when they want to send a replacement team over there. So please check to see if you have any staff with the proper technical credentials, are reasonably good communicators, and would be willing to spend about 2 weeks in Japan as part of the team there.

I will forward the list of desired disciplines as soon as I receive them from Michele. Michele said she will be looking for the list of potential IRC replacements by COB tomorrow (3/16/11), thus, I will need your candidates by mid-afternoon.

For the team that will replace the one that was just sent to Japan, she said she would like us to update the list we previously sent by COB 3/17.

**Wegner, Mary**

---

**From:** Wegner, Mary  
**Sent:** Wednesday, March 16, 2011 7:19 AM  
**To:** Beasley, Benjamin  
**Subject:** From NISA

1. Nuclear Power Stations (NPS)

○ **Fukushima Dai-ichi NPS**

- TEPCO evaluated that core damage of Unit 2 is "less than 5%" (22:14 March 14th)
- Water level in RPV in Unit 2 was decreasing. (22:50 March 14th)
- There was 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)
- The fire at Unit 4 occurred. Fire extinguishing work was underway. (09:38 March 15th)

○ **Fukushima Dai-ni NPS**

- Continue to remove the residual heat by Residual Heat Removal System (RHR) in Unit 1,2,3 and 4 (02:00 March 15th)
- Cold shut down of Unit 4 was confirmed (07:15 March 15th)

○ **Onagawa NPS**

- Readings of monitoring post indicats 6.1 micro Sv/h. (07:00 March 15th)

○ **Tokai**

- Cold shut down was confirmed. (00:40 March 15th)

A/302

**From:** Chang, Richard  
**To:** "[mtl@dycoda.com](mailto:mtl@dycoda.com)"  
**Cc:** [McClellan, Yvonne](#); [Santiago, Patricia](#)  
**Subject:** Today's conference call  
**Date:** Wednesday, March 16, 2011 7:22:00 AM

---

Mark,

I might be postponing today's conference call as well- Jason (and possibly Charlie) got asked to support a hearing down on Capitol Hill today in regards to the reactors in Japan. I will try to give you a definite answer by noon EST.

Thanks,

Richard Chang  
Program Manager  
RES/DSA/SPB  
301-251-7980

A/303

## Sydnor, Russell

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**From:** Sydnor, Russell  
**Sent:** Wednesday, March 16, 2011 7:44 AM  
**To:** Betancourt, Luis; Birla, Sushil; Burton, Thomas; Concepcion, Milton; Dion, Jeanne; Halverson, Derek; Hardin, Leroy; Rebstock, Paul; Sturzebecher, Karl; Waterman, Michael; Yang, Yaguang  
**Subject:** FW: IRC Staffing  
**Importance:** High

The agency is looking for some more staff to help relieve the burden on the folks supporting the NRC's response to the incidents in Japan. I am not sure they are looking for our discipline, but if any of you think you could support this **let me know today by noon.**

Russell Sydnor  
Branch Chief  
NRC/RES/DE/DICB  
301-251-7405  
[Russell.Sydnor@nrc.gov](mailto:Russell.Sydnor@nrc.gov)

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**From:** Case, Michael  
**Sent:** Wednesday, March 16, 2011 7:16 AM  
**To:** Graves, Herman; Hogan, Rosemary; Csontos, Aladar; Koshy, Thomas; Lin, Bruce; Boyce, Tom (RES); Ali, Syed; Murphy, Andrew; Tregoning, Robert; Gavrilas, Mirela; Sydnor, Russell; Lorette, Phillip  
**Cc:** Richards, Stuart  
**Subject:** FW: IRC Staffing

Can you all start to think about this and let me know of any potential names by around noon?

---

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**Sent:** Tuesday, March 15, 2011 5:27 PM  
**To:** Coyne, Kevin; Case, Michael; Coe, Doug; Correia, Richard; Gibson, Kathy; Lui, Christiana; Richards, Stuart; Sangimino, Donna-Marie; Scott, Michael; Uhle, Jennifer; Valentin, Andrea  
**Cc:** Dion, Jeanne  
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can you please start identifying your staff that you believe have some of the requisite skills needed for the IRC, and start asking if they would be available to work shifts in the IRC if asked to. HR said they would be eligible for normal overtime compensation.

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For the team that will replace the one that was just sent to Japan, she said she would like us to update the list we previously sent by COB 3/17.

**From:** Chang, Richard  
**To:** Guzman, Richard  
**Cc:** Burnell, Scott; Santiago, Patricia  
**Subject:** Question  
**Date:** Wednesday, March 16, 2011 7:45:00 AM

---

Rich,

Do you know if anyone from NRR has done a writeup/ comparison of the Japanese reactors to the US BWRs?

Thanks,  
Richard Chang  
Program Manager  
RES/DSA/SPB  
301-251-7980

A1305

**From:** Chang, Richard  
**To:** "[kcw@dycoda.com](mailto:kcw@dycoda.com)"  
**Cc:** [Schaperow, Jason](#); [Santiago, Patricia](#); [McClellan, Yvonne](#)  
**Subject:** Jason's availability  
**Date:** Wednesday, March 16, 2011 7:57:00 AM

---

KC,

I talked to Jason the other day about ways that the ISLOCA work can continue at its current pace, and he came up with an idea.

Since Jason is going to be busy on the Japanese reactors (likely) this week and next, if you are available, could I ask that you perform QA/QC on the work that Kyle/Jessie is doing and continue in your role as a mentor?

I have not discussed this yet with Yvonne, but I will follow-up with her this morning on her thoughts on this.

Thanks,  
Richard Chang  
Program Manager  
RES/DSA/SPB  
301-251-7980

A1306

## Murphy, Andrew

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**From:** Case, Michael  
**Sent:** Wednesday, March 16, 2011 8:11 AM  
**To:** Murphy, Andrew  
**Cc:** Kammerer, Annie; Ake, Jon; Hogan, Rosemary; Richards, Stuart; Uhle, Jennifer  
**Subject:** FW: Seismic and Tsunami Hazard in PRA

Hi Andy. Can you take the lead for this one in coordination with Annie and Jon? I sort of see an overview of where the agency is seismically and tsunamically (new word!) and how we approach various issues (including PRA). I'd shoot for about a half hour presentation and a half hour for discussion with all the folks Jennifer indicated.

Shoot for early to mid next week?

---

**From:** Uhle, Jennifer  
**Sent:** Monday, March 14, 2011 5:09 PM  
**To:** Coe, Doug; Sheron, Brian; Coyne, Kevin; Case, Michael  
**Cc:** Stutzke, Martin; Sancaktar, Selim  
**Subject:** RE: Seismic and Tsunami Hazard in PRA

Thanks. I am going to ask DE to put together an update on where we are with understanding tsunami hazard due to either seismic or landslide and all on this email should attend. Annie has the lead for tsunami and John Ake has it for GI-199. So, Mike Case, yours, right...

---

**From:** Coe, Doug  
**Sent:** Monday, March 14, 2011 4:59 PM  
**To:** Sheron, Brian; Uhle, Jennifer; Coyne, Kevin; Case, Michael  
**Cc:** Stutzke, Martin; Sancaktar, Selim  
**Subject:** RE: Seismic and Tsunami Hazard in PRA

Hi all,  
My BB doesn't work here, but webmail does, so I'm following the discussions sporadically. GI-199 is based on recent 'best' understanding of seismology throughout the US. The information needed to understand plant-specific risk, last time I discussed with NRR, is expected to be collected from all US licensees, including those on the West Coast. However, GI-199 doesn't specifically address related tsunami impacts, but it probably should for all coastal or near-coastal plants. The generic communication is still being written by NRR with our support, so there is an opportunity to discuss this with NRR, and with DE. Clearly there will be a lot more attention on GI-199.  
Jennifer's restart basis question is a good one. In practice a licensee needs to determine from engineering analysis that the stresses on the plant did not exceed their licensed limits. That would be a very tall order for a plant that experienced a beyond design basis quake, and probably is why it had taken Japan so long to restore the KK plants following the earlier quake.  
Doug

---

**From:** Sheron, Brian  
**Sent:** Monday, March 14, 2011 3:27 PM  
**To:** Uhle, Jennifer; Coyne, Kevin; Case, Michael  
**Cc:** Coe, Doug; Stutzke, Martin; Sancaktar, Selim  
**Subject:** RE: Seismic and Tsunami Hazard in PRA

The question is, did the Japanese also consider an 8.9 magnitude earthquake and resulting tsunami "way too low a probability for consideration"?



Look at GI-199. It shows we didn't know everything about the seismicity of CEUS. And isn't there a prediction that the West coast is likely to get hit with some huge earthquake in the next 30 years or so? Yet we relicense their plants.....

---

**From:** Uhle, Jennifer  
**Sent:** Monday, March 14, 2011 3:20 PM  
**To:** Sheron, Brian; Coyne, Kevin; Case, Michael  
**Cc:** Coe, Doug; Stutzke, Martin; Sancaktar, Selim  
**Subject:** RE: Seismic and Tsunami Hazard in PRA

I think this highlights our need to get a better handle on external events hazards—ensure that the tsunami hazard is way too low a probability for consideration. I know we are updating our tsunami hazard for the east coast and gulf coast but did not think we were doing recent work on the west coast. Has industry done anything on tsunami hazards? Also, has anyone done work to look at the effect of numerous cycles of low amplitude acceleration following a larger event. I would expect we would have some information because how do we know a plant would be fit to start back up after an event? We cannot possibly do NDE on everything to determine if flaws have propagated to the point where they need to be replaced.

---

**From:** Sheron, Brian  
**Sent:** Monday, March 14, 2011 3:05 PM  
**To:** Coyne, Kevin  
**Cc:** Uhle, Jennifer; Coe, Doug; Stutzke, Martin; Sancaktar, Selim  
**Subject:** RE: Seismic and Tsunami Hazard in PRA

And so the first question is, "Should we make licensees consider a Tsunami coincident with a seismic event that triggers the Tsunami?"

The second question is, How should we consider after-shocks in seismic hazard analyses?

---

**From:** Coyne, Kevin  
**Sent:** Monday, March 14, 2011 2:39 PM  
**To:** Sheron, Brian  
**Cc:** Uhle, Jennifer; Coe, Doug; Stutzke, Martin; Sancaktar, Selim  
**Subject:** Seismic and Tsunami Hazard in PRA

Brian –

You raised a question at the standup meeting this morning regarding (1) the treatment of coupled seismic and tsunami events and (2) treatment of seismic aftershocks. I spoke with Marty Stutzke and Selim Sancaktar - the PRA Standard (ASME/ANS-Ra-Sa2009) does address the technical requirements for both seismic events and tsunamis (tsunami hazard under the technical requirements for external flooding analysis). The standard does note that uncertainties associated with probabilistic analysis of tsunami hazard frequency are large and that an engineering analysis can usually be used to screen out tsunamis. Seismic PRAs do not consider the affect of aftershocks since there are not methods to predict equipment fragility after the first main shock. Although the standard does address both these events, there are not specific requirements that require a PRA to assess a tsunami generated by a local seismic event.

Marty also checked on the Diablo Canyon and San Onofre IPEEEs - based on the Technical Evaluation Reports, Diablo did consider a locally induced tsunami in a limited way (the aux service water pumps were assumed to become flooded following a seismic event) while SONGS did not consider a coupled seismic/tsunami event.

-Kevin

## **Rodriguez-Luccioni, Hector**

---

**From:** Rodriguez-Luccioni, Hector  
**Sent:** Wednesday, March 16, 2011 8:36 AM  
**To:** Wegner, Mary  
**Subject:** RE: Information

Thank you very much.

---

**From:** Wegner, Mary  
**Sent:** Wednesday, March 16, 2011 8:26 AM  
**To:** Rodriguez-Luccioni, Hector  
**Subject:** RE: Information

This is the latest. It is updated infrequently, but I keep track of it.

From NISA

1. Nuclear Power Stations (NPS)

○ Fukushima Dai-ichi NPS

- TEPCO evaluated that core damage of Unit 2 is "less than 5%" (22:14 March 14th)

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- Cold shut down of Unit 4 was confirmed (07:15 March 15th)

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- Readings of monitoring post indicats 6.1 micro Sv/h. (07:00 March 15th)

○ Tokai

- Cold shut down was confirmed. (00:40 March 15th)

---

**From:** Rodriguez-Luccioni, Hector  
**Sent:** Wednesday, March 16, 2011 8:07 AM  
**To:** Wegner, Mary  
**Subject:** Information

Hello Mary, good morning. I am trying to put together some slides for a Branch meeting about Japan Nuclear Plants. I was wondering if you could tell me where I could found the latest status and condition of the plants. Also I would like to include what is the NRC doing about it, what is doing to help them. Thank you very much.

Hector Luis Rodriguez-Luccioni, PhD-Chem Eng  
Regulatory Guide Development Branch  
Division of Engineering  
Office of Nuclear Regulatory Research  
(301)251-7685

A/308

[Hector.Rodriguez-Luccioni@nrc.gov](mailto:Hector.Rodriguez-Luccioni@nrc.gov)



**Bano, Mahmooda**

---

**From:** Scott, Michael  
**Sent:** Tuesday, March 29, 2011 5:34 AM  
**To:** 'nei-hisanori@meti.go.jp'  
**Subject:** Summary of TMI-2 fuel removal/cleanup activities

Dear Nei-san:

Please find forwarded below a link to an article related to TMI that may be of use to your team.

Regards,

Mike Scott  
USNRC

<http://www.iaea.org/Publications/Magazines/Bulletin/Bull274/27404691622.pdf>

A/309

**From:** nei-hisanori@meti.go.jp  
**Sent:** Tuesday, March 29, 2011 11:28 AM  
**To:** Scott, Michael  
**Subject:** Re: Summary of TMI-2 fuel removal/cleanup activities Hisanori Nei

Hisanori Nei, NISA

-----  
A/B/O

Summary of TMI-2 fuel removal/cleanup activities

>-----

-----|

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USNRC

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## Wagner, Katie

---

**From:** Wagner, Katie  
**Sent:** Wednesday, March 16, 2011 11:58 AM  
**To:** Armstrong, Kenneth  
**Cc:** Lee, Richard  
**Subject:** FW: Request for info

**Importance:** High

Ken,

I just got into the office and saw this email. I have not read through the entire email yet, but will send a basic response now since info. is needed before noon and I have a meeting at noon.

1) Yes willing to work in the Ops Center. Day or night shifts are fine. I operate well at night.

2) No, at this point in time.

3) Area of expertise:

- written and oral communications (i.e. general support)
- have completed the PWR series in Chattanooga

Thanks,  
Katie

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

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 8:59 AM  
**To:** RES\_DSA  
**Subject:** Request for info  
**Importance:** High

It seems I need to clarify my information request.

Please let Ken know 3 things:

Are you willing to work in the Ops Center (if asked)? If so what shifts?

Are you willing to go to Japan (if asked)?

We need this by noon.

What is your area of expertise?

A/311

## Sydnor, Russell

---

**From:** Sydnor, Russell  
**Sent:** Wednesday, March 16, 2011 11:59 AM  
**To:** Case, Michael; Graves, Herman; Hogan, Rosemary; Csontos, Aladar; Koshy, Thomas; Lin, Bruce; Boyce, Tom (RES); Ali, Syed; Murphy, Andrew; Tregoning, Robert; Gavrilas, Mirela; Lorette, Phillip  
**Cc:** Richards, Stuart  
**Subject:** RE: IRC Staffing

Mike, I do not think DICB has the primary areas of expertise needed, but the following people expressed a desire to help out;

Milton Concepcion  
Leroy Hardin  
Karl Sturzebecher  
Luis Betancourt  
Paul Rebstock  
Yaguang Yang

Russell Sydnor  
Branch Chief  
NRC/RES/DE/DICB  
301-251-7405  
[Russell.Sydnor@nrc.gov](mailto:Russell.Sydnor@nrc.gov)

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**From:** Case, Michael  
**Sent:** Wednesday, March 16, 2011 7:16 AM  
**To:** Graves, Herman; Hogan, Rosemary; Csontos, Aladar; Koshy, Thomas; Lin, Bruce; Boyce, Tom (RES); Ali, Syed; Murphy, Andrew; Tregoning, Robert; Gavrilas, Mirela; Sydnor, Russell; Lorette, Phillip  
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of needed disciplines, but said she would generate one and send it out. As of 5:15 pm I have not received a list yet.

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## Beasley, Benjamin

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**From:** Beasley, Benjamin  
**Sent:** Wednesday, March 16, 2011 12:03 PM  
**To:** Kauffman, John  
**Subject:** Am I right?

### Article:

"One problem is a lack of data about the nuclear reactors themselves. The NRC task force said the agency has detailed data on what it calls plant fragility — the probability that the expected earthquake would damage the reactor's core — for only one-third of the nation's nuclear plants. That's because only the plants that had been thought to be in areas of higher seismic risk had done detailed studies. For the rest, the scientists had to estimate from other information submitted by plant operators."

### Correction:

The NRC task force had more information for some plants than for others. The difference is based on the type of analysis the plant operator chose to use. Two thirds of the plant operators used a bounding analysis while the other third performed a more detailed analysis. The choice of analysis method was not connected to an area of higher seismic risk.

**Bano, Mahmooda**

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**From:** Scott, Michael  
**Sent:** Tuesday, March 29, 2011 7:37 PM  
**To:** RST01 Hoc; Taylor, Robert; Blamey, Alan; Giessner, John; Nakanishi, Tony  
**Cc:** Ali, Syed; Sheikh, Abdul  
**Subject:** FW: Floding of Drywell - Structural Considerations  
**Attachments:** Reactor Building Ability to Support Flooding.doc

Comments? Please reply to all if you have any.

Thanks

Mike

---

**From:** Sheikh, Abdul  
**Sent:** Tuesday, March 29, 2011 7:21 PM  
**To:** Scott, Michael  
**Cc:** Ali, Syed  
**Subject:** Floding of Drywell - Structural Considerations

Please see the attached file.

A/ 3/4

Question:

Can the reactor building structure support additional loads of water due to flooding of primary containment and reactor vessel..

Response:

Item #1: Drywell Flooding

The drywell containment is 1-1/2 inch thick steel plate. The bottom of the drywell steel containment is resting directly on concrete. The upper part of the drywell is enclosed by thick (5-7 feet thick) concrete shield walls. There is approximately 2 inch gap between the drywell and shield walls. The foundation more that 30 feet thick.

There is no information about the condition of concrete walls or floor after the earthquake/tsunami event. However, it is unlikely that these walls or foundation are severely damaged or cracked. A quick review of the videos or photographs is inconclusive.

Addition of water to flood the drywell containment will impose gravity loads. These loads will be directly transferred to the concrete foundation. The concrete foundation is thick and can support these loads.

In the unlikely event of a new earthquake while the drywell is flooded, additional horizontal loads will be imposed on the drywell steel. The existing structure has not been analyzed for these loads. However, in the worst case scenario, drywell vessel may deflect 2 inches and come into with the thick concrete shield walls. The shield walls have significant capacity to resist horizontal loads to be imposed by the drywell during this unlikely event. Furthermore, the horizontal ground motion detected during the recent earthquake were about the same or less than design basis. Any subsequent earthquake in future during the short time the drywell is flooded is not likely to be of the same magnitude as the March 11, 2011 earthquake.

The reactor vessel is supported on a pedestal inside the drywell. This pedestal is designed for design basis earthquake loads. Once the drywell and reactor vessel are flooded, the horizontal forces transferred to the pedestal are not likely to increase because of the damping effect of the water inside the drywell.

In summary, flooding of drywell and reactor vessel is not likely to compromise their structural integrity.

Item # 2 - Suppression Pool (Torus)

The suppression pool ( torus) has a diameter of 29.5 foot diameter and major diameter of 109.9 foot diameter. Bottom half of the torus is full of water during normal plant operations. If the torus is flooded to the top, it will increase gravity loads on the 5/8" to 3/4" thick torus steel and associated supports. This will not affect the structural integrity of the torus or associated steel supports.

During an earthquake, the torus will be subjected to additional horizontal loads due to an increase in total volume of water. However, due to overall rigidity and geometrical configuration, it is not likely to affect the structural integrity of the torus and associated supports.

**Dion, Jeanne**

---

**From:** Dion, Jeanne  
**Sent:** Wednesday, March 16, 2011 1:31 PM  
**To:** Weerakkody, Sunil  
**Subject:** RE: Tsunami documents from RES

My mistake- the second is ML072920474

---

**From:** Weerakkody, Sunil  
**Sent:** Wednesday, March 16, 2011 1:29 PM  
**To:** Dion, Jeanne  
**Subject:** RE: Tsunami documents from RES

Jeanne,

Do both reports have the same ML#?

Sunil

---

**From:** Dion, Jeanne  
**Sent:** Wednesday, March 16, 2011 12:36 PM  
**To:** Weerakkody, Sunil  
**Cc:** Uhle, Jennifer; Sheron, Brian; Richards, Stuart; Case, Michael; Hogan, Rosemary; Rini, Brett; Rivera-Lugo, Richard; Armstrong, Kenneth; Kammerer, Annie  
**Subject:** Tsunami documents from RES

Sunil,  
Per your request, here are two letter reports regarding tsunamis. If you have additional specific questions please call the Op center and ask to speak with a Reactor Safety team seismologist.

"Evaluation of Tsunami Sources with the Potential to Impact the US Atlantic and Gulf Coasts" ML082960196

"The Current State of Knowledge Regarding Potential Tsunami Sources Affecting U.S. Atlantic and Gulf Coasts." ML082960196

Let me know if I can be of further assistance.  
Thanks,

Jeanne Dion  
Technical Assistant (Acting)  
U.S. Nuclear Regulatory Commission  
Office of Nuclear Regulatory Research  
[jeanne.dion@nrc.gov](mailto:jeanne.dion@nrc.gov)  
301-251-7482

A/315

**Rini, Brett**

---

**From:** Sheron, Brian  
**Sent:** Wednesday, March 16, 2011 1:51 PM  
**To:** Ruland, William; Williams, Donna; Uhle, Jennifer; Moore, Scott; Miller, Charles; Brenner, Eliot; Haney, Catherine; Dorman, Dan; Wiggins, Jim; Evans, Michele; Doane, Margaret; Mamish, Nader  
**Cc:** Johnson, Michael; Holahan, Gary; Leeds, Eric; Grobe, Jack; Howe, Allen; Dion, Jeanne  
**Subject:** RE: Planning for upcoming, short notice Commission meeting

Jeanne Dion is the RES POC.

---

**From:** Ruland, William  
**Sent:** Wednesday, March 16, 2011 1:19 PM  
**To:** Williams, Donna; Uhle, Jennifer; Sheron, Brian; Moore, Scott; Miller, Charles; Brenner, Eliot; Haney, Catherine; Dorman, Dan; Wiggins, Jim; Evans, Michele; Doane, Margaret; Mamish, Nader  
**Cc:** Johnson, Michael; Holahan, Gary; Leeds, Eric; Grobe, Jack; Howe, Allen  
**Subject:** Planning for upcoming, short notice Commission meeting

Folks,

Attached find a early draft of a scheduling note for a Commission meeting that may be held as early as this coming Monday, March 21<sup>st</sup>. NRR has been assigned as the lead to pull the meeting together. As you could imagine, this will take some effort. To help with coordination, please provide me a contact so that we can draw on your expertise and help to make this happen. Alan Howe, currently deputy director of DORL, has the lead to pull this together.

I know you have many questions. I'd ask for your patience as we try to get this done. I'll keep you updated through the contact that you provide to us.

Thank you very much.

Bill Ruland

A/316

**Wegner, Mary**

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**From:** Wegner, Mary  
**Sent:** Wednesday, March 16, 2011 1:53 PM  
**To:** Garmon-Candelaria, David  
**Subject:** From Japan

<http://www.nisa.meti.go.jp/english/files/en20110316-3.pdf>



**Dion, Jeanne**

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**From:** Sheron, Brian  
**Sent:** Wednesday, March 16, 2011 9:12 PM  
**To:** Dion, Jeanne  
**Cc:** Uhle, Jennifer  
**Subject:** FW: IRC Staffing

---

**From:** Boyce, Tom (RES)  
**Sent:** Wednesday, March 16, 2011 5:15 PM  
**To:** Case, Michael  
**Cc:** Richards, Stuart; Sheron, Brian  
**Subject:** RE: IRC Staffing

The following people have expressed interest from RGDB:

IRC staffing:

- Hector Luis Rodriguez-Luccioni, NSPDP
- Mark Orr, 25 years of nuclear and large plant construction experience in PWRs
- Rick Jervy, former plant STA who played various roles in emergency response, particularly radiological response teams in the ops center, EOF and TSC
- Tom Boyce, RGDB Branch Chief, 20 years in NRR doing new reactor licensing for ABWR and System 80+, operating plant licensing in DORL, Technical Specifications in DIRS, and inspection program branch in DIRS.

Japan Team

- Hector Luis Rodriguez-Luccioni, NSPDP

**From:** Case, Michael  
**Sent:** Wednesday, March 16, 2011 7:16 AM  
**To:** Graves, Herman; Hogan, Rosemary; Csontos, Aladar; Koshy, Thomas; Lin, Bruce; Boyce, Tom (RES); Ali, Syed; Murphy, Andrew; Tregoning, Robert; Gavrilas, Mirela; Sydnor, Russell; Lorette, Phillip  
**Cc:** Richards, Stuart  
**Subject:** FW: IRC Staffing

Can you all start to think about this and let me know of any potential names by around noon?

**From:** Sheron, Brian  
**Sent:** Tuesday, March 15, 2011 5:27 PM  
**To:** Coyne, Kevin; Case, Michael; Coe, Doug; Correia, Richard; Gibson, Kathy; Lui, Christiana; Richards, Stuart; Sangimino, Donna-Marie; Scott, Michael; Uhle, Jennifer; Valentin, Andrea  
**Cc:** Dion, Jeanne

A1318

Subject: IRC Staffing

I participated on a conference call with other ODs and led by Michele Evans, acting deputy OD in NSIR at 4 pm today.

The purpose of the conference call was to discuss staffing for the IRC for the near future. The IRC is currently staffed with members of the Reactor safety team, the Protective Measures team, Liaison Team, etc. There is also an ET member there. None of the teams are at their full compliment. What Michele is looking for is people that can staff the IRC and relieve the staff that are currently there. She said they are currently running 3 shifts (11pm-7am, 7am – 3pm, and 3pm to 11 pm). They would like to find staff that can work shifts for 4 days in a row (I think she wants 4 days on, 3 days off). She said the staff do not have to have had IRC training.

Several of us said we would certainly canvas our staff to see who was qualified to work in the IRC and could work there, but we needed to know what technical disciplines they were looking for. Michele did not have a list of needed disciplines, but said she would generate one and send it out. As of 5:15 pm I have not received a list yet.

However, I am assuming they will be looking for staff with expertise in such areas as systems analysis, severe accidents, radiological dose assessment, etc. In anticipation that these are the technical disciplines of interest, can you please start identifying your staff that you believe have some of the requisite skills needed for the IRC, and start asking if they would be available to work shifts in the IRC if asked to. HR said they would be eligible for normal overtime compensation.

Also, they will be looking for staff to go to Japan and relieve the technical staff that recently went there. There were 2 BWR experts that left over the weekend, and a team of 9 more (6 engineers and 3 OIP staff) left yesterday. The thinking is that the staff that recently went over would come back in 2 weeks, which is when they want to send a replacement team over there. So please check to see if you have any staff with the proper technical credentials, are reasonably good communicators, and would be willing to spend about 2 weeks in Japan as part of the team there.

I will forward the list of desired disciplines as soon as I receive them from Michele. Michele said she will be looking for the list of potential IRC replacements by COB tomorrow (3/16/11), thus, I will need your candidates by mid-afternoon.

For the team that will replace the one that was just sent to Japan, she said she would like us to update the list we previously sent by COB 3/17.

**From:** Chang, Richard  
**To:** Burnell, Scott  
**Subject:** FW: Google Alert - nrc peach bottom - Japan & SOARCA  
**Date:** Wednesday, March 16, 2011 9:22:00 AM

---

Scott,

FYI on an article about Japan and SOARCA.

NRC tapping tech for better analysis of nuclear accidents

A/320

**From:** Chang, Richard  
**To:** Armstrong, Kenneth  
**Subject:** RE: IRC Staffing  
**Date:** Wednesday, March 16, 2011 9:57:00 AM

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Any.

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**From:** Armstrong, Kenneth  
**Sent:** Wednesday, March 16, 2011 9:56 AM  
**To:** Chang, Richard  
**Subject:** RE: IRC Staffing

What shifts at the OpCenter?

---

**From:** Chang, Richard  
**Sent:** Wednesday, March 16, 2011 8:31 AM  
**To:** Armstrong, Kenneth  
**Subject:** RE: IRC Staffing

Ken,

- 1) I am interested and available to work at the Ops center.
- 2) I am willing to go to Japan for 2 weeks.
- 3) I do not think I have a specific skill set that would help with the reactors in Japan.

Thanks,  
Richard

---

**From:** Gibson, Kathy  
**Sent:** Tuesday, March 15, 2011 7:16 PM  
**To:** RES\_DSA  
**Subject:** FW: IRC Staffing  
**Importance:** High

Please let Ken Armstrong know by noon tomorrow the following:

- 1) If you are interested and available to work a shift in the Ops Center. Please indicate your preference of shift and your area(s) of expertise.
- 2) If you are willing and able to go to Japan for 2 weeks. Indicate your availability to go at the end of the month or at some future time (dates to be negotiated). Also indicate your area(s) of expertise.

See below for details about this request.

Ken, please compile a list of the information you receive in response to this request for my review.

Thanks to all!

A/321

## Spencer, Ruth

---

**From:** Spencer, Ruth  
**Sent:** Wednesday, March 16, 2011 10:17 AM  
**To:** Grancorvitz, Teresa  
**Subject:** FW: Question on Funds

FYI re the Richard Chang question about asking NSIR for \$.

\*\*\*\*\*

Ruth Spencer, NRC/RES, 301 251 7921

---

**From:** Bowlin, Elizabeth  
**Sent:** Wednesday, March 16, 2011 10:01 AM  
**To:** Spencer, Ruth  
**Subject:** RE: Question on Funds

Ruth, thanks for reply. Will follow it.

---

**From:** Spencer, Ruth  
**Sent:** Tuesday, March 15, 2011 4:46 PM  
**To:** Chang, Richard  
**Cc:** Santiago, Patricia; Schofer, Maria; Bowlin, Elizabeth  
**Subject:** RE: Question on Funds

Hi Richard,

PMDA just started to work on RES funding needs for the rest of the year and update the 3<sup>rd</sup> quarter APP. So we may find out that there are RES funds that are going to go unused. You can add your emergent need for your contract to that list and if dollars are available then management could decide to allocate them to you.

You (or Elizabeth) should let Maria Schofer in PMDA know if this need is immediate, so we can request additional continuing resolution (CR) funding. And put this mod for your agreement into the 3<sup>rd</sup> quarter APP submission, to show your emergent need.

(FYI, funds cannot be transferred among offices during a CR, so even if NSIR agreed we couldn't get them for the foreseeable future. So lets try to find what you need within RES first.)

Ruth

\*\*\*\*\*

Ruth Spencer, NRC/RES, 301 251 7921

---

**From:** Chang, Richard  
**Sent:** Tuesday, March 15, 2011 1:17 PM  
**To:** Spencer, Ruth  
**Cc:** Santiago, Patricia  
**Subject:** Question on Funds

Ruth,

A/322

I stopped by your office, but didn't catch you...I had a question:

Background:

I am the project manager for a contract with Sandia National Labs. Since the reactor event in Japan, some members of my team have been asking Sandia to do work (with the contract scope) for this emergency event.

Question:

Is there a way to reimburse my contract dollars from an agency fund related to emergencies?

Thanks,  
Richard Chang  
Program Manager  
RES/DSA/SPB  
301-251-7980

## Case, Michael

---

**From:** Case, Michael  
**Sent:** Wednesday, March 16, 2011 10:38 AM  
**To:** Gray, Kathy; Brown, Frederick; Uhle, Jennifer; Skeen, David; Dudes, Laura; Hiland, Patrick; Ruland, William; Giitter, Joseph  
**Cc:** Thorp, John; Thomas, Eric; Holahan, Gary  
**Subject:** RE: RST Director Schedule

I've been doing a lot of them recently so I'm OK with continuing (as long as I don't do them all)

---

**From:** Gray, Kathy  
**Sent:** Wednesday, March 16, 2011 10:31 AM  
**To:** Brown, Frederick; Uhle, Jennifer; Skeen, David; Dudes, Laura; Hiland, Patrick; Case, Michael; Ruland, William; Giitter, Joseph  
**Cc:** Thorp, John; Thomas, Eric; Holahan, Gary  
**Subject:** RST Director Schedule  
**Importance:** High

As you know, I've been asked to coordinate the RST Director schedule, starting with mid-shift 3/18 (2300-7:00am). They would like for us to staff in 4-day blocks. Before I prepare the schedule, I'd like to see if anyone would like to volunteer for the mid-shifts. Also, if you have any days/shifts that you absolutely cannot cover, please let me know. A prompt response would be most appreciated.

Thanks!

*Kathy A. Gray*

Information Management Asst.  
Operating Experience Branch, DIRS/NRR  
301-415-1166, Rm. O-7F04  
[Kathy.Gray@nrc.gov](mailto:Kathy.Gray@nrc.gov)

A/323

## **Herrity, Thomas**

---

**From:** Herrity, Thomas  
**Sent:** Wednesday, March 16, 2011 11:07 AM  
**To:** Pires, Jose  
**Subject:** info for Annie's list

Jose,

I noticed that Annie was asking someone to help with Question 26. Here's my 2-cents worth:

26) Are US plants susceptible to the same sort of loss of all power?

NRC recognized that there is the possibility of a total loss of AC power at a site, called a 'Station Blackout', or SBO. Existing Regulations require the sites to be prepared for the possibility of an SBO. In addition to battery powered back-up system to immediately provide power for emergency systems, NRC regulations require the sites to have a detailed plan of action to address the loss of AC power while maintaining control of the reactor.

Additional info:  
SBO definition in 10CFR50.2

SBO plan requirements in 10CFR50.63

Thomas J. Herrity  
Structural, Geotechnical and Seismic Engineering Branch  
Office of Research - Division of Engineering  
US Nuclear Regulatory Commission  
(301) 251-7447  
ofc: CSB05A18  
ms: CSB05A24

A/324



## Dion, Jeanne

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**From:** Dion, Jeanne  
**Sent:** Wednesday, March 16, 2011 11:26 AM  
**To:** Armstrong, Kenneth  
**Cc:** Rini, Brett  
**Subject:** RE: Quick Question regarding any Published RES Documents Related to Tsunamis

Yes- Rosemary's group has Annie Kammerer and Rasool Anoshehpour as seismologists. Annie is in the Op center and Rasool will be on Annual Leave. I'll try to see if there are any reports available.

---

**From:** Armstrong, Kenneth  
**Sent:** Wednesday, March 16, 2011 11:12 AM  
**To:** Dion, Jeanne  
**Cc:** Rini, Brett  
**Subject:** FW: Quick Question regarding any Published RES Documents Related to Tsunamis

This would be DE no?

---

**From:** Scott, Michael  
**Sent:** Wednesday, March 16, 2011 11:08 AM  
**To:** Zaki, Tarek; Bush-Goddard, Stephanie; Elkins, Scott; Hoxie, Chris; Lee, Richard; Santiago, Patricia; Armstrong, Kenneth; Bajorek, Stephen; Boyd, Christopher; Rubin, Stuart; Sherbini, Sami; Tinkler, Charles; Voglewede, John; Zigh, Ghani  
**Subject:** FW: Quick Question regarding any Published RES Documents Related to Tsunamis

Is anyone aware of any recent RES-generated tsunami documents? If so, please respond to me ASAP. Thanks.

---

**From:** Weerakkody, Sunil  
**Sent:** Wednesday, March 16, 2011 10:30 AM  
**To:** Scott, Michael; Richards, Stuart; Coe, Doug  
**Cc:** Gibson, Kathy; Uhle, Jennifer; Wilson, Peter  
**Subject:** Quick Question regarding any Published RES Documents Related to Tsunamis

Mike, Doug, and Stu,

Region 1 is getting ready to perform End-of-Cycle meetings with regional licensees. Ironically, our first EOC is scheduled at TMI!

As you know, these are public meetings. RGN I is expecting sophisticated informed members of public to show up at these meetings. As such, regional management is performing necessary thinking and preparation at this time.

While we plan to rely heavily on communications developed by HQ, in getting ready for the EOC meetings, we want to become aware of any Tsunami related publications (e.g., NUREGs or NUREG\CRs). Are there any recent documents that you are aware of published by RES?

Just so that you or your staff doesn't spend too much time, we are simply trying to be aware (i.e., an answer can be simply a NUREG title or ML#...). In other word, if nothing comes to your or (your BC)'s mind, that is OK.

Sunil D. Weerakkody

Deputy Director - DRS (Acting)

NRC - RGN I

Tel: 610-337-5128

**Dion, Jeanne**

---

**From:** Rivera-Lugo, Richard  
**Sent:** Wednesday, March 16, 2011 11:31 AM  
**To:** Dion, Jeanne  
**Subject:** POCs for Tsunami info

**RES/DE/SGSEB:**

Annie Kammerer  
Rasool Anooshehpour

**Our contractor working with tsunami related projects are:**

Vasily Titov, NOAA – Washington  
Uri Ten Brink, USGS – Woods Hole, MA

*Richard Rivera-Lugo*, EIT, MEM  
Technical Assistant (Acting)  
U.S. Nuclear Regulatory Commission – HQ  
RES/DE  
Ph. 301-251-7652  
Fax 301-251-7420  
Mail M.S. C5C07M  
E-mail [Richard.Rivera-Lugo@nrc.gov](mailto:Richard.Rivera-Lugo@nrc.gov)



Please consider the Environment before printing this e-mail.

A/326

**Rini, Brett**

---

**From:** Sheron, Brian  
**Sent:** Wednesday, March 16, 2011 2:06 PM  
**To:** Dion, Jeanne  
**Subject:** FW: Planning for upcoming, short notice Commission meeting

Already did.

---

**From:** Sheron, Brian  
**Sent:** Wednesday, March 16, 2011 1:51 PM  
**To:** Ruland, William; Williams, Donna; Uhle, Jennifer; Moore, Scott; Miller, Charles; Brenner, Eliot; Haney, Catherine; Dorman, Dan; Wiggins, Jim; Evans, Michele; Doane, Margaret; Mamish, Nader  
**Cc:** Johnson, Michael; Holahan, Gary; Leeds, Eric; Grobe, Jack; Howe, Allen; Dion, Jeanne  
**Subject:** RE: Planning for upcoming, short notice Commission meeting

Jeanne Dion is the RES POC.

---

**From:** Ruland, William  
**Sent:** Wednesday, March 16, 2011 1:19 PM  
**To:** Williams, Donna; Uhle, Jennifer; Sheron, Brian; Moore, Scott; Miller, Charles; Brenner, Eliot; Haney, Catherine; Dorman, Dan; Wiggins, Jim; Evans, Michele; Doane, Margaret; Mamish, Nader  
**Cc:** Johnson, Michael; Holahan, Gary; Leeds, Eric; Grobe, Jack; Howe, Allen  
**Subject:** Planning for upcoming, short notice Commission meeting

Folks,

Attached find a early draft of a scheduling note for a Commission meeting that may be held as early as this coming Monday, March 21<sup>st</sup>. NRR has been assigned as the lead to pull the meeting together. As you could imagine, this will take some effort. To help with coordination, please provide me a contact so that we can draw on your expertise and help to make this happen. Alan Howe, currently deputy director of DORL, has the lead to pull this together.

I know you have many questions. I'd ask for your patience as we try to get this done. I'll keep you updated through the contact that you provide to us.

Thank you very much.

Bill Ruland

A1327

## Case, Michael

---

**From:** Case, Michael  
**Sent:** Wednesday, March 16, 2011 2:06 PM  
**To:** Hurd, Sapna  
**Cc:** Lorette, Phillip; West, Stephanie  
**Subject:** RE: Ops Center

Thanks. Got it!

---

**From:** Hurd, Sapna  
**Sent:** Wednesday, March 16, 2011 2:00 PM  
**To:** Case, Michael  
**Subject:** Ops Center

Mike,

I know I briefly mentioned it, but wanted to make sure I emailed the information as well. I will be in the Ops Center tomorrow from 7am – 3pm tomorrow and back in the office on Friday, however I am doing the night shift on Friday night, so will leave a little bit early on Friday.

Sapna Hurd  
Management Analyst  
Division of Engineering  
Office of Nuclear Regulatory Research  
U.S. NRC  
Ph: 301-251-7687  
5C04

## Case, Michael

---

**From:** Case, Michael  
**Sent:** Wednesday, March 16, 2011 2:08 PM  
**To:** Sangimino, Donna-Marie  
**Subject:** RE: NRC travel to Japan

Thanks. You're terrific.

---

**From:** Sangimino, Donna-Marie  
**Sent:** Wednesday, March 16, 2011 1:50 PM  
**To:** Case, Michael  
**Cc:** Sheron, Brian; Uhle, Jennifer; Gibson, Kathy; Coe, Doug; Valentin, Andrea; Dion, Jeanne; Grancorvitz, Teresa; Kardaras, Tom; Eisenberg, Wendy  
**Subject:** NRC travel to Japan

Mike,

Per your inquiry at the 845 meeting today, we spoke with Charlotte Abrams, Chief, International Cooperation and Assistance Branch/OIP, and inquired as to Agency guidelines on upcoming travel to Japan by NRC staff. Charlotte indicated that an Agency Announcement would be issued this week providing guidance on this question, but early indications are that "routine" travel to Japan (**not** including travel associated with the ongoing emergency) will be curtailed for the next several weeks.

We have only a few RES travelers slated to attend routine meetings in Japan over the next several weeks. I suggest we hold their travel until that announcement comes out, and then the IPT will work with the traveler to formulate an appropriate response to our international counterpart conducting the meeting.

*Donna-Marie Sangimino*

International Programs Team Leader  
US Nuclear Regulatory Commission  
Office of Nuclear Regulatory Research (RES)

[Donna-Marie.Sangimino@nrc.gov](mailto:Donna-Marie.Sangimino@nrc.gov)  
(+1) 301-251-7673

## Case, Michael

---

**From:** Case, Michael  
**Sent:** Wednesday, March 16, 2011 2:08 PM  
**To:** Harris, Charles; Gavrilas, Mirela  
**Subject:** FW: NRC travel to Japan

FYI

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**From:** Sangimino, Donna-Marie  
**Sent:** Wednesday, March 16, 2011 1:50 PM  
**To:** Case, Michael  
**Cc:** Sheron, Brian; Uhle, Jennifer; Gibson, Kathy; Coe, Doug; Valentin, Andrea; Dion, Jeanne; Grancorvitz, Teresa; Kardaras, Tom; Eisenberg, Wendy  
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*Donna-Marie Sangimino*

International Programs Team Leader  
US Nuclear Regulatory Commission  
Office of Nuclear Regulatory Research (RES)

[Donna-Marie.Sangimino@nrc.gov](mailto:Donna-Marie.Sangimino@nrc.gov)  
(+1) 301-251-7673

A/330

## Lewis, Doris

---

**From:** Lewis, Doris  
**Sent:** Wednesday, March 16, 2011 2:18 PM  
**To:** Gibson, Kathy  
**Cc:** Tomon, John  
**Subject:** RE: RASCAL Dose Assessment person for this evening and tomorrow

Hi Kathy,

HEB only has 2 staffers that can run RASCAL – Tony and Casper. Both of them are currently supporting the PMT.

I spoke to Sami and he is familiar with this code (about 10 years ago) but has not used it in its recent version.

Thanks,  
Doris

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 1:49 PM  
**To:** Lewis, Doris  
**Subject:** Fw: RASCAL Dose Assessment person for this evening and tomorrow

Please survey HEB staff(including Sami) and let me know who all can run RASCAL.

---

**From:** Sheron, Brian  
**To:** Gibson, Kathy; Scott, Michael  
**Sent:** Wed Mar 16 13:45:52 2011  
**Subject:** FW: RASCAL Dose Assessment person for this evening and tomorrow

What about Sami?

---

**From:** Moore, Scott  
**Sent:** Wednesday, March 16, 2011 1:35 PM  
**To:** Evans, Michele; OST02 HOC  
**Cc:** Tracy, Glenn; Cohen, Miriam; Uhle, Jennifer; Sheron, Brian; Deegan, George  
**Subject:** RASCAL Dose Assessment person for this evening and tomorrow

Michelle:

You asked for additional people to support RASCAL in the Ops Center for the 11-7 shift this evening, and the 7-3 shift tomorrow. We are checking our staff that may have experience with RASCAL, but are finding that many are already working the Operations Center on the Protective Measures team, in assigned roles. FSME will continue looking.

In addition, you may want to look into the following:

OHR offers a course in RASCAL. I believe that the most recent one was offered in Region I, and all of the attendees may have been from the Region, so that may not help you for shifts this evening, but if OHR could provide you with a list of staff who have completed the RASCAL course who are here, at HQ, then that could give you a group from which to draw upon.



Finally, Dr. Sami Sherbini, who is assigned to RES and was formerly of FSME, is well versed in dose assessment and codes, and may have RASCAL experience. He came to mind. You would need to talk to RES about Sami's availability.

We will still get back to you with an answer from FSME, in follow up to the conference call yesterday, but I wanted you to be aware of the RASCAL course and Sherbini.

Scott  
x7875

## Dion, Jeanne

---

**From:** Case, Michael  
**Sent:** Wednesday, March 16, 2011 2:21 PM  
**To:** Dion, Jeanne  
**Subject:** RE: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Severe Accident Management Guidelines (typically some of the PRA folks, reactor systems folks and maybe the human factors folks would have knowledge in that area.

---

**From:** Dion, Jeanne  
**Sent:** Wednesday, March 16, 2011 2:19 PM  
**To:** Case, Michael  
**Subject:** RE: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Thanks Mike,  
In the table, what is SAMG?

Jeanne

---

**From:** Case, Michael  
**Sent:** Wednesday, March 16, 2011 2:17 PM  
**To:** Dion, Jeanne  
**Cc:** Sheron, Brian; Uhle, Jennifer  
**Subject:** FW: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Hi Jeanne. With respect to the Op Center request, although about a dozen folks volunteered, I did not think any were a particularly good fit for the op center critical skills. Sapna Hurd, Tom Koshy and myself are already participating from DE.

---

**From:** Sheron, Brian  
**Sent:** Wednesday, March 16, 2011 7:41 AM  
**To:** Case, Michael; Coe, Doug; Correia, Richard; Gibson, Kathy; Lui, Christiana; Richards, Stuart; Sangimino, Donna-Marie; Scott, Michael; Uhle, Jennifer; Valentin, Andrea  
**Subject:** FW: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Here is the list of expertise the Op center is looking for.

---

**From:** Evans, Michele  
**Sent:** Tuesday, March 15, 2011 5:53 PM  
**To:** Hackett, Edwin; Brenner, Eliot; Schmidt, Rebecca; Powell, Amy; Droggitis, Spiros; Doane, Margaret; Mamish, Nader; Dyer, Jim; Brown, Milton; Greene, Kathryn; Stewart, Sharon; Howard, Patrick; Miller, Charles; Moore, Scott; Cohen, Miriam; Tracy, Glenn; Haney, Catherine; Dorman, Dan; Johnson, Michael; Holahan, Gary; Leeds, Eric; Boger, Bruce; Grobe, Jack; Zimmerman, Roy; Campbell, Andy; Sheron, Brian; Uhle, Jennifer; Dean, Bill; Lew, David; McCree, Victor; Wert, Leonard; Casto, Chuck; Satorius, Mark; Pederson, Cynthia; Collins, Elmo; Howell, Art; Muessle, Mary; Andersen, James; Akstulewicz, Brenda; Belmore, Nancy; Quesenberry, Jeannette; Kreuter, Jane; Armstrong, Janine; Hudson, Sharon; Ellis, Marv; Hasan, Nasreen; Ronewicz, Lynn; Schumann, Stacy; Daniels, Stanley; Casby, Marcia; Thomas, Loretta; Walker, Dwight; Sprogeris, Patricia; Schwarz, Sherry; Ross, Robin; Cohen, Shari; Riddick, Nicole; Flory, Shirley; Veltri, Debra; Matakas, Gina; ODaniell, Cynthia; Miles, Patricia; Lee, Pamela; Dubose, Sheila; Buckley, Patricia; Tomczak, Tammy; Owen, Lucy; Tannenbaum, Anita; Gusack, Barbara; Harrington, Holly; Ricketts, Paul; Howell, Linda; Higginbotham, Tina; Ross, Brenda; Boyce, Thomas (OIS); Schaeffer, James; Jackson, Donald  
**Subject:** Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Everyone,

A/332

Please find attached 1) a list of current positions being staffed in the Ops Center and 2) the staff identified as available to support in Japan.

Regarding additional staff available to support in the ops center, the primary needs are for the specialized positions on the PMT and anyone with previous international experience in OIP.

Regarding support in Japan, please provide any updates/changes to the list by COB March 17. The target time frame for sending these staff members is March 27-April 9, so please consider that when considering staff to put on the list.

Thanks for your support.

*Michele*

## Murphy, Andrew

---

**From:** Murphy, Andrew  
**Sent:** Wednesday, March 16, 2011 2:54 PM  
**To:** Case, Michael  
**Subject:** GI-199 & Japanese Qs & As  
**Attachments:** Outline.docx

Mike,

Attached is a draft of an outline for the discussion/briefing with Brian & Jennifer.

Your comments; please.

Andy

A/333

## NBC Report vis-à-vis Japanese Event Qs & As

### Seismic Background

#### Tectonics of Japanese Island Area

##### Earthquakes

##### Tsunami

#### Tectonics of North America

##### West Coast of North America (California)

##### Earthquakes

##### Tsunami

##### Central & Eastern North America (U.S.)

##### Earthquakes

##### Tsunami

### GI-199 Background

#### Origin

#### Panel & its Memo

#### Transfer to NRR for Generic Communication

#### Qs & As

Implications for Japanese Earthquake & Aftermath – (earth science implications not BWR systems material)

### Indian Point Fragility

There should be sufficient information in the 30+ pages of Japanese event Qs & As to prepare a briefing – some of the tectonic discussion will very probably require additional material slides.

**Dion, Jeanne**

---

**From:** Dion, Jeanne  
**Sent:** Wednesday, March 16, 2011 2:57 PM  
**To:** Rini, Brett  
**Subject:** RE: Update

Everything is ok here- we are polling RES staff to get relief for the IRC staff and replacements for those in Japan. I hope you were able to take some time off- I heard you've been supporting the Op Center.

NRR is the lead for a quick turnaround Commission meeting on Monday 3/21 so we might get tapped to support that. I'm the RES POC for that and I'll let you know what happens.

Hope you're doing well- I'll be happy to continue acting for the rest of the week.

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

**From:** Rini, Brett  
**Sent:** Wednesday, March 16, 2011 2:51 PM  
**To:** Dion, Jeanne  
**Subject:** Update

Hey Jeanne,

How are you? Anything going on that I need to be aware of?

Do you mind acting for me for the rest of the week? I need to email the bosses too, but I may do some work at home tomorrow morning.

I appreciate you covering for me.

Thanks,  
Brett

Brett A. Rini  
Technical Assistant  
Office of Nuclear Regulatory Research

A1334

**Rini, Brett**

---

**From:** Sheron, Brian  
**Sent:** Wednesday, March 16, 2011 9:21 PM  
**To:** Gibson, Kathy  
**Cc:** Uhle, Jennifer  
**Subject:** RE: MACCS run

Why are we only running it out to 50 miles. I was told Rascal calculates out to 50 miles and they already ran the RASCAL analysis in the IRC. I would think we would want to run MACCS out to further distances to see what the projected doses are and whether our (U.S.) recommendation that U.S. citizens in Japan evacuate out to 50 miles remains valid, or if we should increase the recommended evacuation zone.

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 3:09 PM  
**To:** Sheron, Brian  
**Subject:** MACCS run

Sandia is doing a MACCS run out to 50 miles at Jennifer's request. Charlie is on the phone with Sandia to ensure they are using the "right" source term considering multiple reactors and spent fuel pools.

A1335

**Pires, Jose**

---

**From:** Pires, Jose  
**Sent:** Wednesday, March 16, 2011 10:43 AM  
**To:** Graves, Herman  
**Subject:** RE: INCIDENT RESPONSE CENTER (IRC) STAFFING

Herman,

I will be interested if my skill set is deemed useful. Thanks,

Jose

---

**From:** Graves, Herman  
**Sent:** Wednesday, March 16, 2011 10:10 AM  
**To:** RES\_DE\_SGSEB  
**Subject:** INCIDENT RESPONSE CENTER (IRC) STAFFING

TO ALL:

Let me know by 11:30am today if you have an interest in working shift work at the IRC. The front office will make a final decision based on needed skill sets.

They maybe a future opportunity to travel to Japan to assist also as needed.

<<Herman>>

<<301.251.7625>>

mail to: Herman.Graves@nrc.gov

A1336



**Pires, Jose**

---

**From:** Pires, Jose  
**Sent:** Wednesday, March 16, 2011 11:15 AM  
**To:** Herrity, Thomas  
**Cc:** Graves, Herman  
**Subject:** RE: info for Annie's list

Thom,  
Thanks. It is helpful.

---

**From:** Herrity, Thomas  
**Sent:** Wednesday, March 16, 2011 11:07 AM  
**To:** Pires, Jose  
**Subject:** info for Annie's list

Jose,

I noticed that Annie was asking someone to help with Question 26. Here's my 2-cents worth:

26) Are US plants susceptible to the same sort of loss of all power?

NRC recognized that there is the possibility of a total loss of AC power at a site, called a 'Station Blackout', or SBO. Existing Regulations require the sites to be prepared for the possibility of an SBO. In addition to battery powered back-up system to immediately provide power for emergency systems, NRC regulations require the sites to have a detailed plan of action to address the loss of AC power while maintaining control of the reactor.

Additional info:  
SBO definition in 10CFR50.2

SBO plan requirements in 10CFR50.63

Thomas J. Herrity  
Structural, Geotechnical and Seismic Engineering Branch  
Office of Research - Division of Engineering  
US Nuclear Regulatory Commission  
(301) 251-7447  
ofc: CSB05A18  
ms: CSB05A24

A1337

**Pires, Jose**

---

**From:** Pires, Jose  
**Sent:** Wednesday, March 16, 2011 1:30 PM  
**To:** Graves, Herman  
**Subject:** FW: Earthquake

Please see the email below from Gene Corley. They are experts (were closely related to the Portland Cement Association) on most aspects of concrete materials, damage detection, repairs, etc. We still have a contract with them (Dr. Gene Corley was one of the contractors for the AP1000).

If the NRC has interest on contacting a worldwide expert on concrete and construction this is a possibility to consider.

Thanks,

Jose.

---

**From:** Corley, Gene [<mailto:GCorley@ctlgroup.com>]  
**Sent:** Wednesday, March 16, 2011 12:20 PM  
**To:** Pires, Jose  
**Cc:** Kolf, Peter  
**Subject:** RE: Earthquake

Our firm and I would be pleased to participate in the efforts to assist in Japan. As you know, we have expertise in damage detection and repair.

If you hear of any need for assistance, we have people who can be sent immediately.

Gene

NOTICE OF CONFIDENTIALITY: This e-mail and any attachments is covered by the Electronic Communications Privacy Act, 18 U.S.C. 2510-2521 and may contain privileged, confidential, copyrighted, or other legally protected information. If you are not the intended recipient, you may not use, copy, or retransmit this e-mail. If you have received this by mistake please notify us by return e-mail, then delete.

**Pires, Jose**

---

**From:** Pires, Jose  
**Sent:** Wednesday, March 16, 2011 1:31 PM  
**To:** 'Corley, Gene'  
**Cc:** Kolf, Peter  
**Subject:** RE: Earthquake

Gene,

Thanks for sending this email. I will forward your email and information to those addressing expertise that may be needed. Will let you know.

Jose

---

**From:** Corley, Gene [<mailto:GCorley@ctlgroup.com>]  
**Sent:** Wednesday, March 16, 2011 12:20 PM  
**To:** Pires, Jose  
**Cc:** Kolf, Peter  
**Subject:** RE: Earthquake

Our firm and I would be pleased to participate in the efforts to assist in Japan. As you know, we have expertise in damage detection and repair.

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Gene

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## Rodriguez-Luccioni, Hector

---

**From:** Rodriguez-Luccioni, Hector  
**Sent:** Wednesday, March 16, 2011 2:06 PM  
**To:** Boyce, Tom (RES)  
**Subject:** Presentation for tomorrow  
**Attachments:** BWR's.pptx

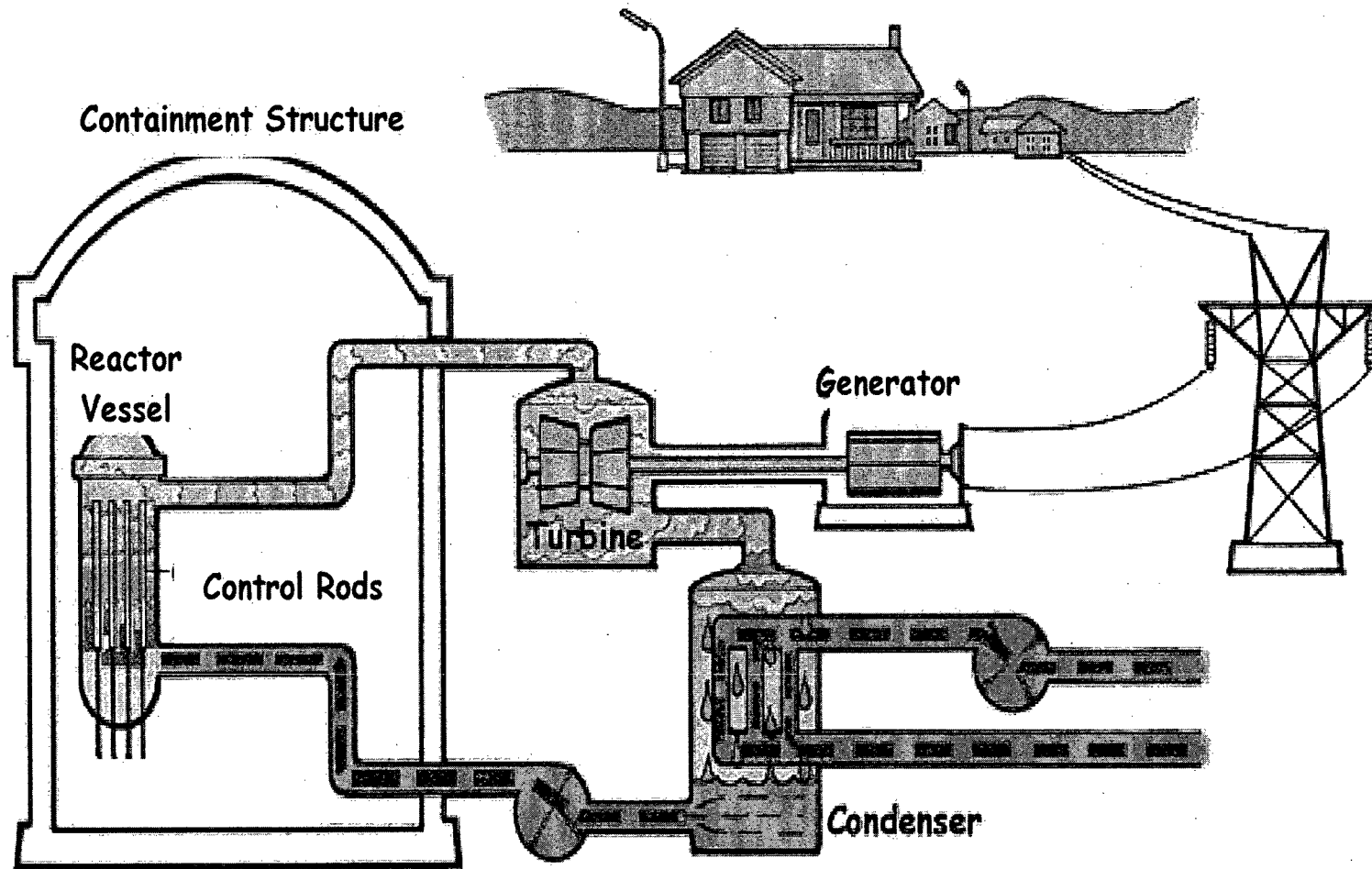
Hello Tom, this is what I have for now about the Presentation. I will keep looking for latest news in NISA tomorrow. Please revise the slides if you think I should add something else let me know.

Hector Luis Rodriguez-Luccioni, PhD-Chem Eng  
Regulatory Guide Development Branch  
Division of Engineering  
Office of Nuclear Regulatory Research  
(301)251-7685  
[Hector.Rodriguez-Luccioni@nrc.gov](mailto:Hector.Rodriguez-Luccioni@nrc.gov)

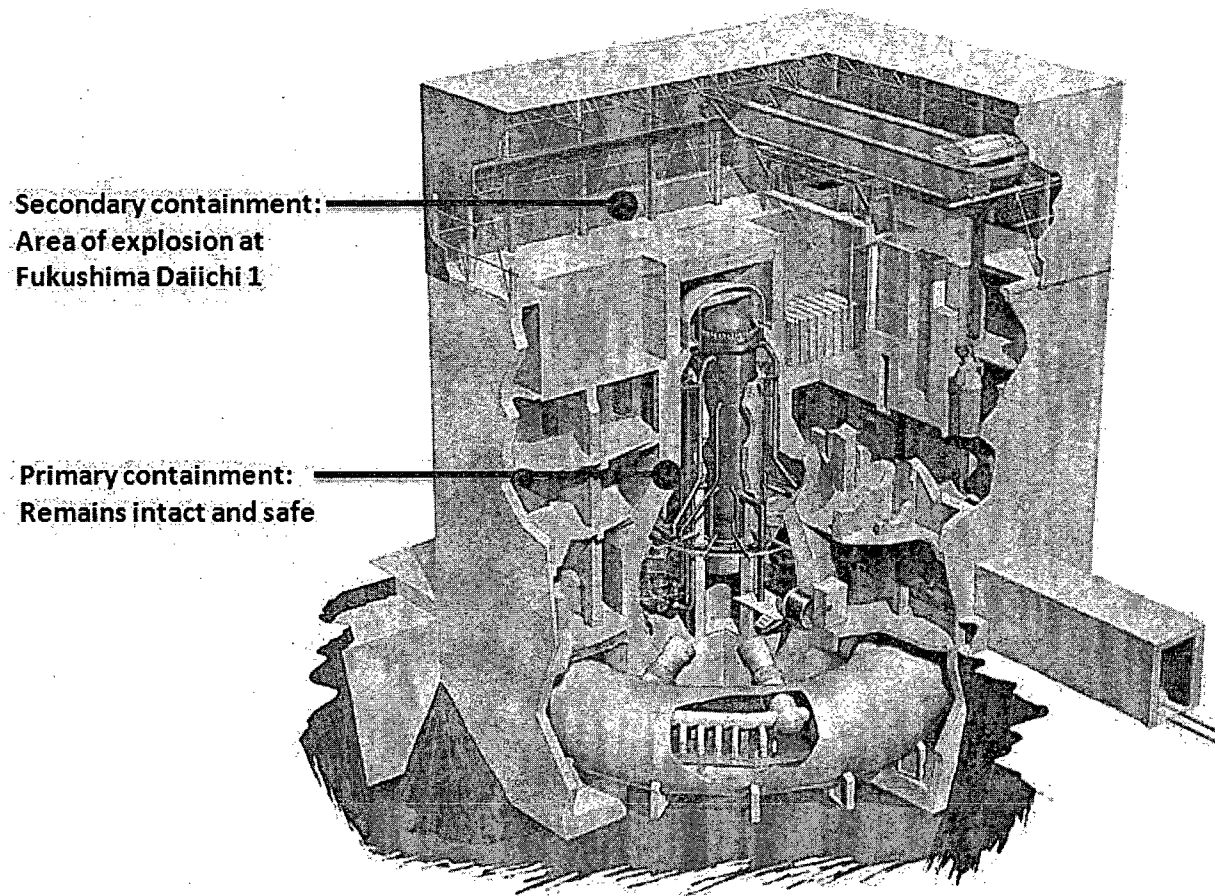


A1340

# Boiling Water Reactors

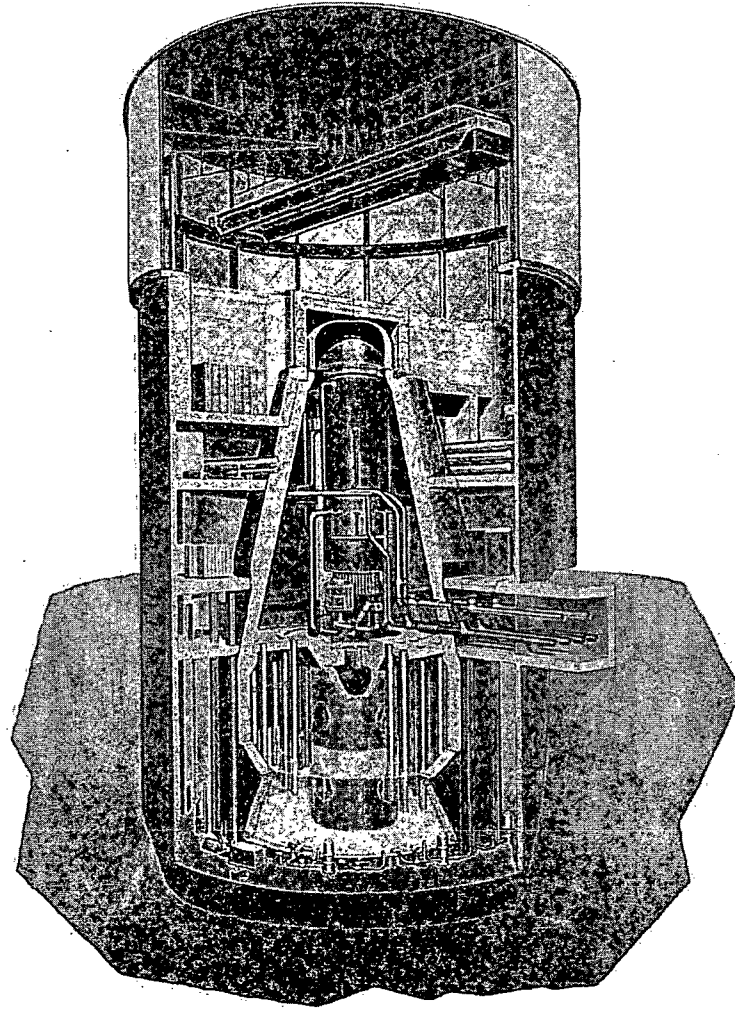


# BWR Mark 1 Containment Building

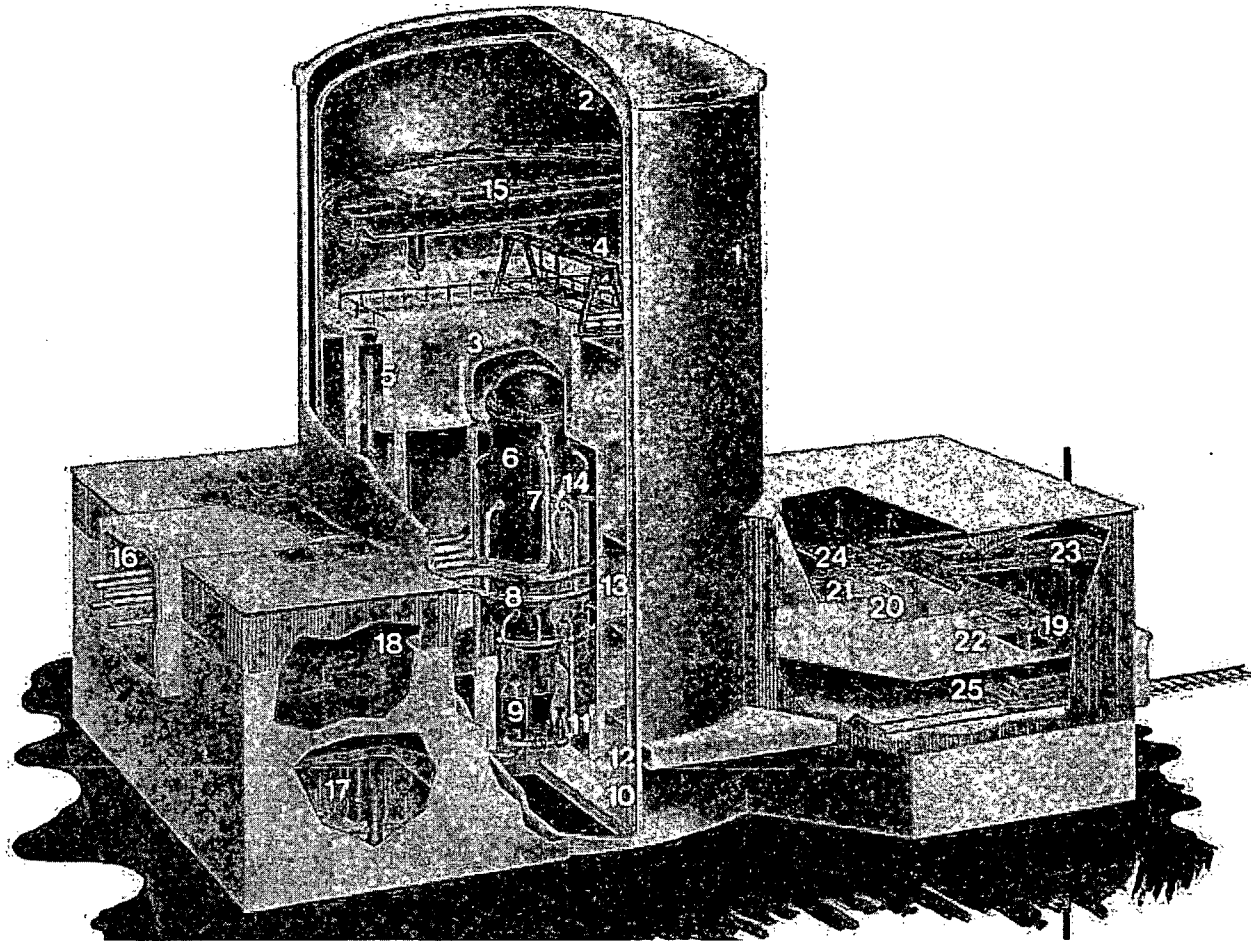


Boiling Water Reactor Design

# BWR Mark II Containment Building



# BWR Mark III Containment Building



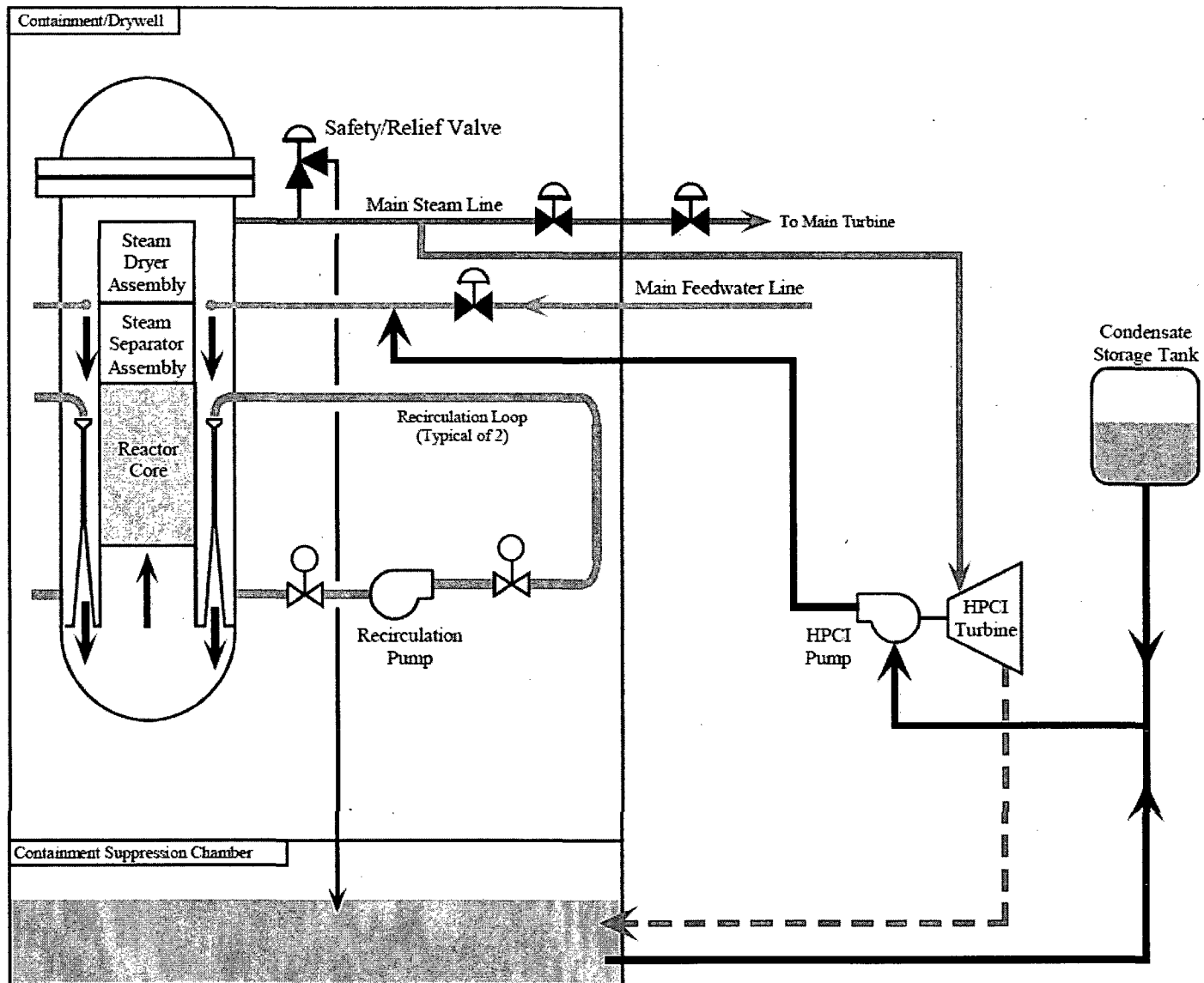




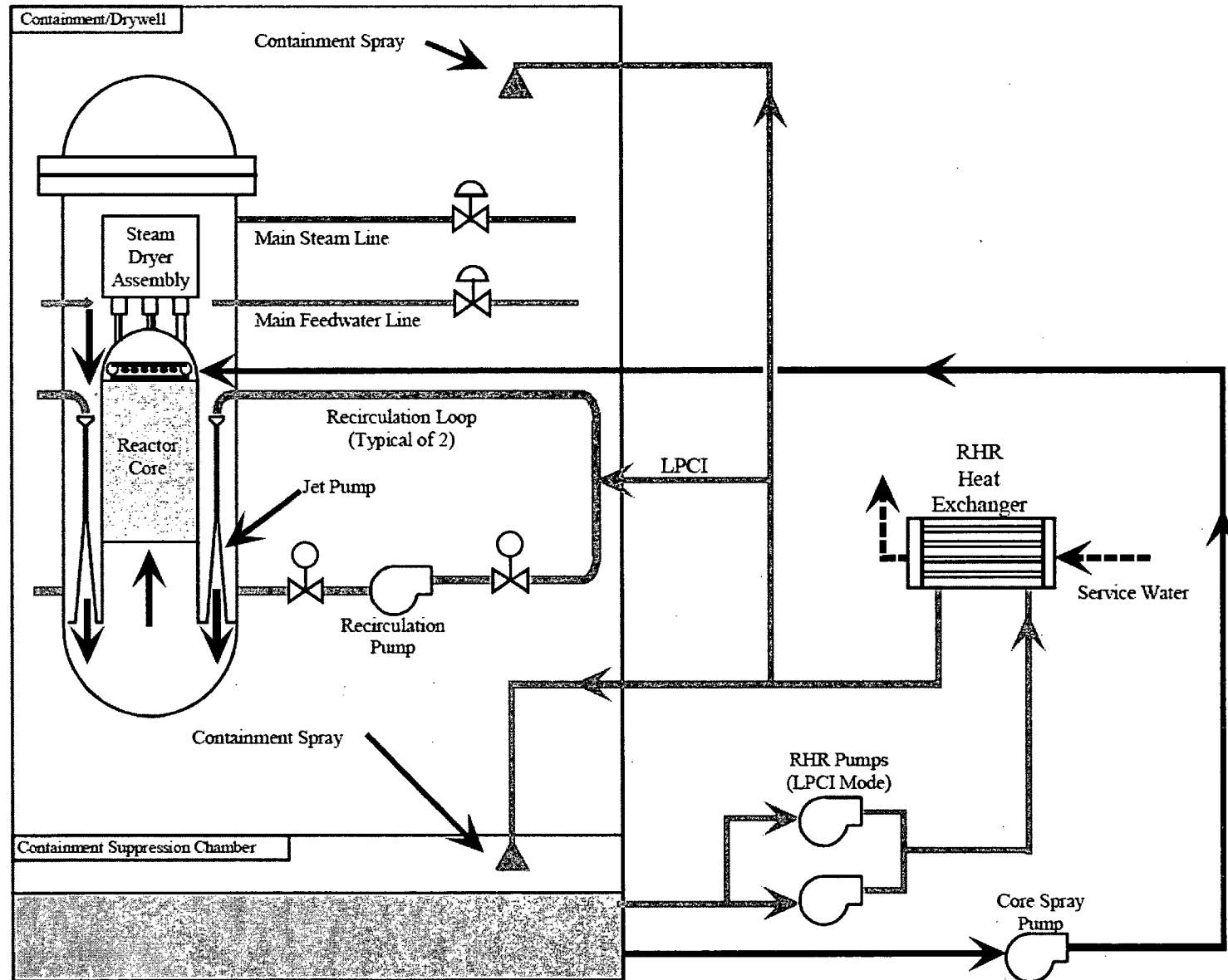
# Emergency Core Cooling Systems

- Provide core cooling under loss of coolant accident conditions to limit fuel cladding damage
  - 2 High Pressure
    - High Pressure Coolant Injection (HPCI)
    - Automatic Depressurization System (ADS)
  - 2 Low Pressure
    - Low Pressure Coolant Injection (LPCI) or Residual Heat Removal System (RHR)
    - Core Spray System (CS)

# HPCI



# LPCI



■ High Pressure Coolant Injection

▨ Low Pressure Coolant Injection

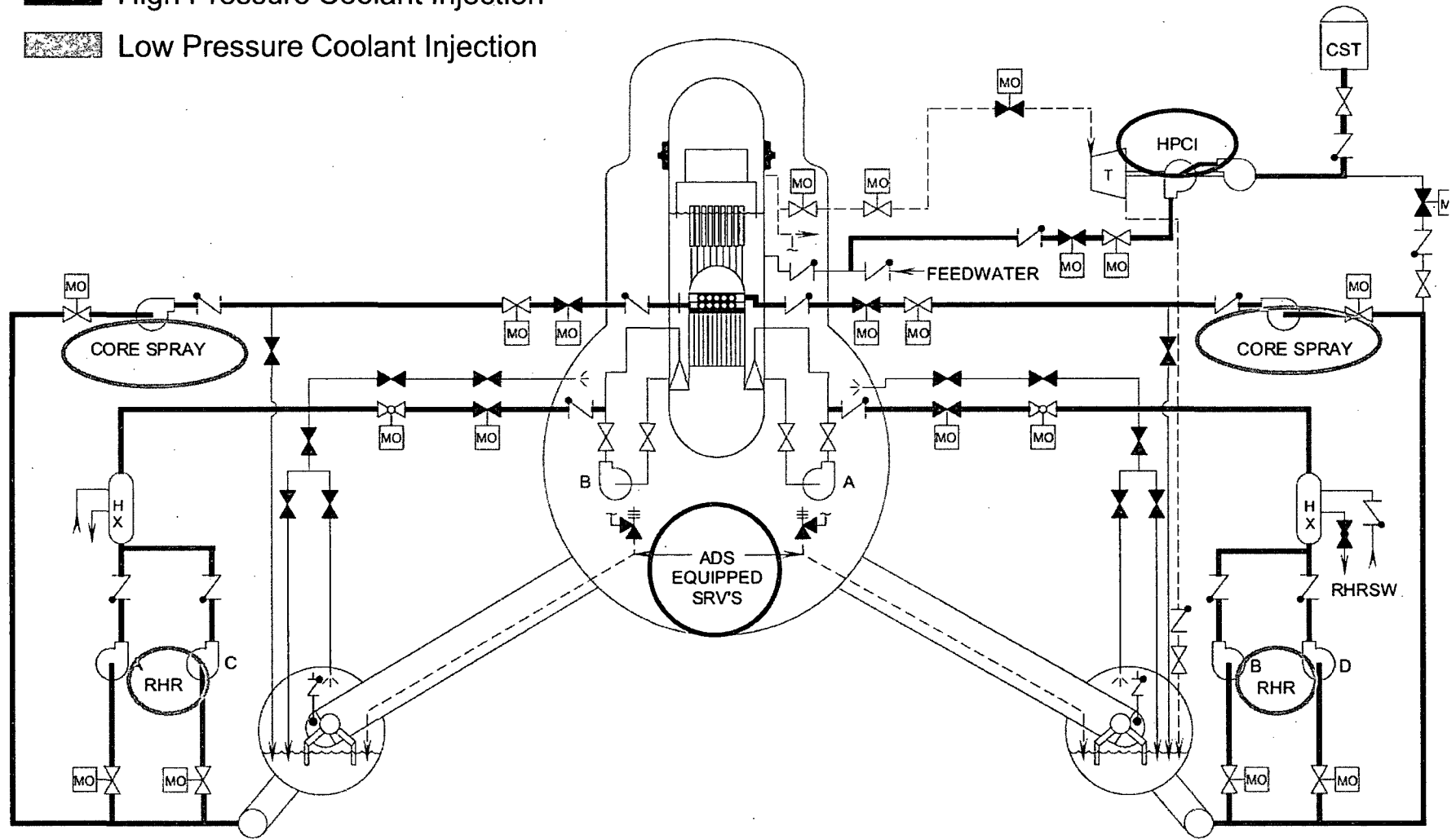


Figure 1.11-1 Emergency Core Cooling System

# Status of nuclear power plants in Fukushima as of 12:30 March 14 (Estimated by JAIF)

Power Station	Fukushima #1 Nuclear Power Station					
Unit	1	2	3	4	5	6
Power output (MWe)	460	784	784	784	784	1100
Type of Reactor	BWR-3	BWR-4	BWR-4	BWR-4	BWR-4	BWR-5
Operational Status at the earthquake occurred	Service	Service	Service	Outage	Outage	Outage
Fuel Integrity	Damaged	Not Damaged	Damaged	Not Damaged	Not Damaged	Not Damaged
Containment Integrity	Not Damaged	Not Damaged	Not Damaged	Not Damaged	Not Damaged	Not Damaged
Core coolability-1 (ECCS/RHR)	Not functional	Not functional	Not functional	Not necessary	Not necessary	Not necessary
Core coolability-2 (RCIC/MUWC)	Not functional	RCIC Working	Not functional	Not necessary	Not necessary	Not necessary
Building Integrity	Damaged	Not Damaged	Damaged	Not Damaged	Not Damaged	Not Damaged
Environmental effect	Radiation monitor detect radiation increase in the environment (NPS boarder: 20 $\mu$ Sv/h at 11:44AM)					
water level of the pressure vessel	Unknown	Above the top	Unknown	Safe	Safe	Safe
pressure of the pressure vessel	Stable	Stable	Stable	Safe	Safe	Safe
Containment pressure	Stable	Stable	Stable	Safe	Safe	Safe
Sea water injection to core	Suspended	To be decided	Done	Not necessary	Not necessary	Not necessary
Containment venting	Done	Preparing	Done	Not necessary	Not necessary	Not necessary
Evacuation Area	20km from NPS					
INES	Level 4 (estimated by NISA)					

Power Station	Fukushima #2 Nuclear Power Station			
Unit	1	2	3	4
Power output (MWe)	1100	1100	1100	1100
Type of Reactor	BWR-5	BWR-5	BWR-5	BWR-5
Status at the earthquake occurred	Service	Service	Service	Service
Fuel Integrity	Not Damaged	Not Damaged	Not Damaged	Not Damaged
Containment Integrity	Not Damaged	Not Damaged	Not Damaged	Not Damaged
Core coolability-1 (ECCS/RHR)	Functioning	Not functional	Functioning	Not functional
Core coolability-2 (RCIC/MUWC)	Not necessary	Functioning	Not necessary	Functioning
Building Integrity	Not Damaged	Not Damaged	Not Damaged	Not Damaged
Environmental effect	Stable (NPS boarder: 0.038 $\mu$ Sv/h at 8AM)			
water level of the pressure vessel	(No info )	(No info )	(No info )	(No info )
pressure of the pressure vessel	(No info )	(No info )	(No info )	(No info )
Containment pressure	(No info )	Increase	(No info )	Increase
Sea water injection to core	Not necessary	to be decided	Not necessary	to be decided
Containment venting	Not necessary	to be decided	Not necessary	to be decided
Evacuation Area	10km from NPS			
INES	(No Info)			

## Source:

Governmental Emergency Headquarters: News Release (10:30), Press conference (11:45)

NISA (Nuclear and Industrial Safety Agency): News Release (7:30)

Tokyo Electric Power Co.: Press Release (6:01, 8:00), Press Conference (12:10)

## Abbreviations:

ECCS: Emergency Core Cooling System

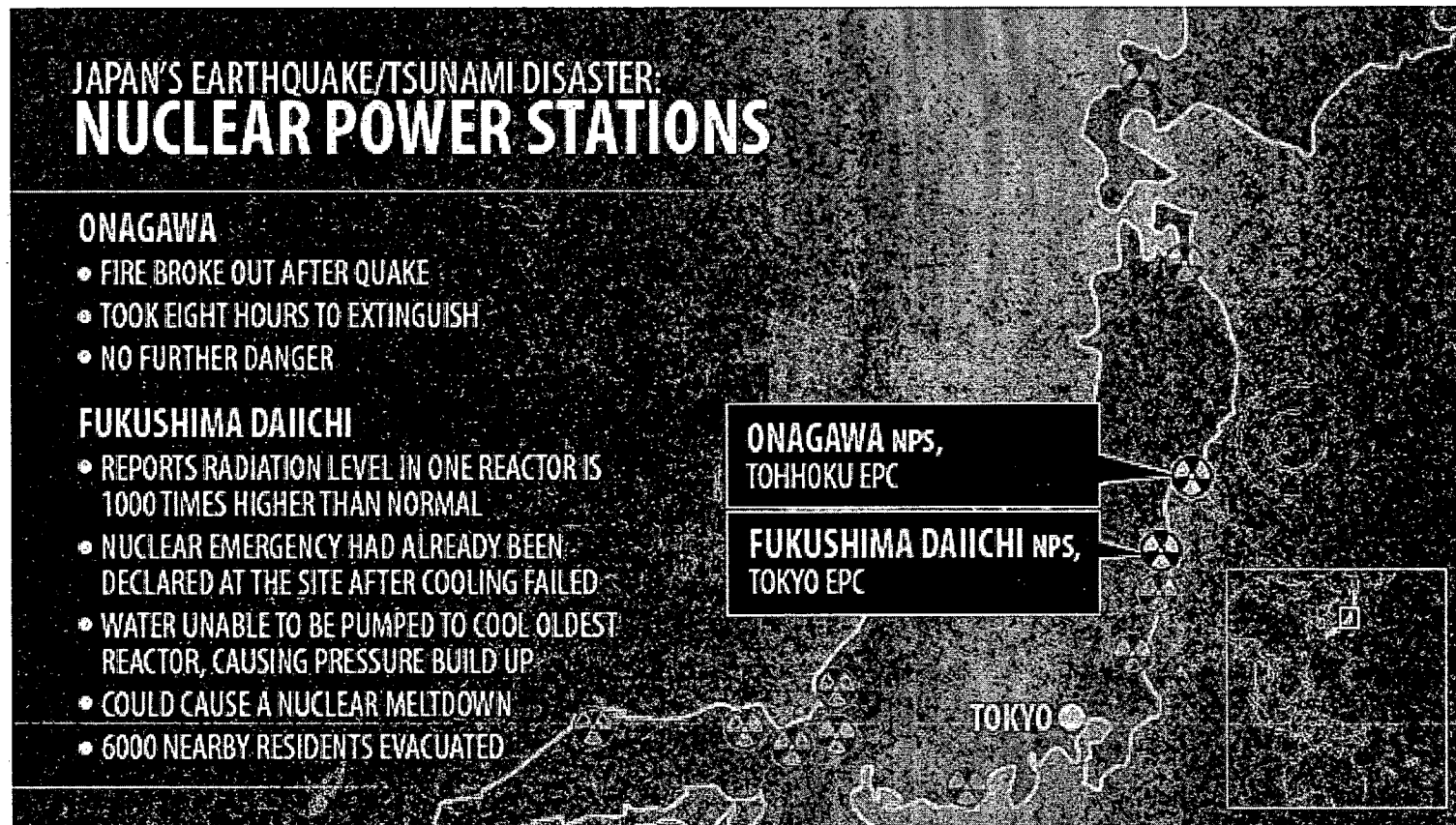
RHR: Residual Heat Removal System

RCIC: Reactor Core Isolation Cooling System

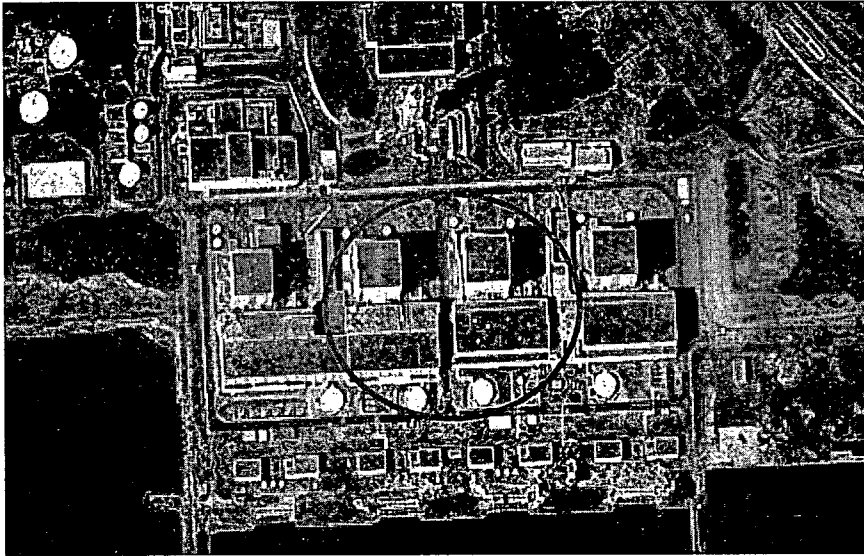
MUWC: Make-Up Water Condensate System

INES: International Nuclear Event Scale

# Japan Earthquake Effect on Nuclear Plants



# Fukushima Nuclear Power Plant



Before Earthquake



After Earthquake



# Nuclear Power Plants Status

- Fukushima Dai-ichi NPS
  - Unit 2 core damage < 5% (03/14)
- Fukushima Dai-ni NPS
  - Unit 1,2 and 3: RHRs working (03/15)
  - Unit 4 cold shutdown confirm (03/15)
- Onagawa NPS
  - 6.1 micro Sv/h (03/15)
- Tokai
  - Cold shut down confirm (03/15)

# NRC Status

- DG 1258 “Tsunami Hazard Assessment for Design of Nuclear Power Plants”
- OPS Center – operating in a 24 hours basis
- NRC employees in Japan:
  - 2 BWR experts
  - 6 Engineers
  - 3 OIP staff
  - Looking for volunteers for a two weeks rotation

**Pires, Jose**

---

**From:** Pires, Jose  
**Sent:** Wednesday, March 16, 2011 3:12 PM  
**To:** 'Corley, Gene'  
**Cc:** Kolf, Peter  
**Subject:** RE: Earthquake

Gene,

I talked to my Division Director, Mike Case, and forwarded your email to him with Peter's contact information (I had it at hand) in case he identifies any need for assistance that matches your expertise.

Thanks again for reminding us of your experience and expertise. I will contact you as well if I get other information in this regard.

Jose.

---

**From:** Corley, Gene [<mailto:GCorley@ctlgroupp.com>]  
**Sent:** Wednesday, March 16, 2011 12:20 PM  
**To:** Pires, Jose  
**Cc:** Kolf, Peter  
**Subject:** RE: Earthquake

Our firm and I would be pleased to participate in the efforts to assist in Japan. As you know, we have expertise in damage detection and repair.

If you hear of any need for assistance, we have people who can be sent immediately.

Gene

.....  
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A/341

**Pires, Jose**

---

**From:** Pires, Jose  
**Sent:** Wednesday, March 16, 2011 3:35 PM  
**To:** Kammerer, Annie  
**Cc:** Herrity, Thomas; Graves, Herman  
**Subject:** FW: info for Annie's list

Annie,  
Thom proposed the following for Question 26)

---

**From:** Herrity, Thomas  
**Sent:** Wednesday, March 16, 2011 11:07 AM  
**To:** Pires, Jose  
**Subject:** info for Annie's list

Jose,

I noticed that Annie was asking someone to help with Question 26. Here's my 2-cents worth:

26) Are US plants susceptible to the same sort of loss of all power?

NRC recognized that there is the possibility of a total loss of AC power at a site, called a 'Station Blackout', or SBO. Existing Regulations require the sites to be prepared for the possibility of an SBO. In addition to battery powered back-up system to immediately provide power for emergency systems, NRC regulations require the sites to have a detailed plan of action to address the loss of AC power while maintaining control of the reactor.

Additional info:  
SBO definition in 10CFR50.2

SBO plan requirements in 10CFR50.63

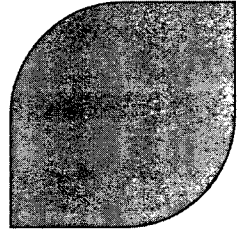
Thomas J. Herrity  
Structural, Geotechnical and Seismic Engineering Branch  
Office of Research - Division of Engineering  
US Nuclear Regulatory Commission  
(301) 251-7447  
ofc: CSB05A18  
ms: CSB05A24

A/342

19/3/13



# The Fukushima Daiichi Incident



1. Plant Design
2. Accident Progression
3. Radiological releases
4. Spent fuel pools
5. Sources of Information

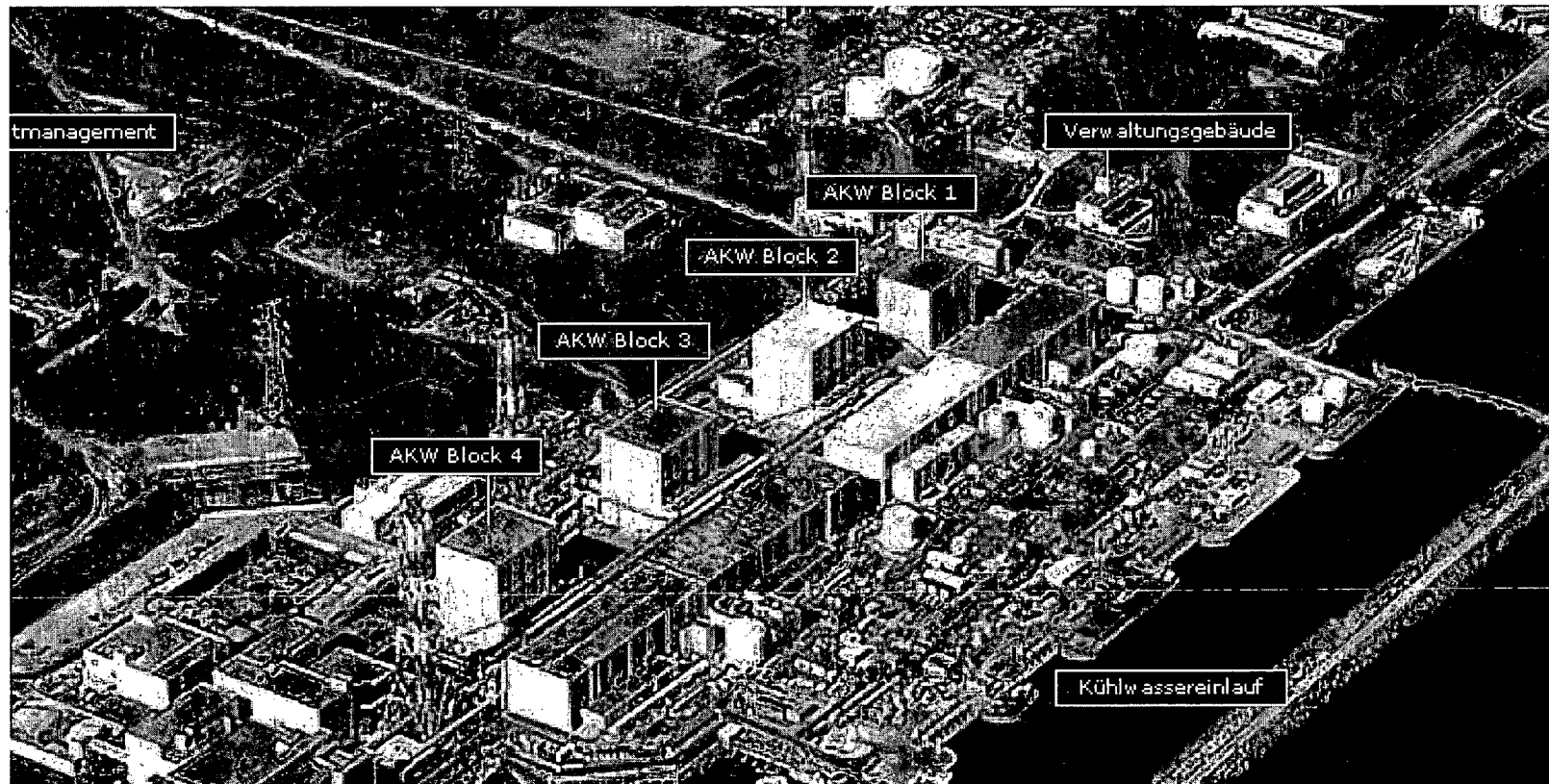
Matthias Braun  
PEPA4-G, AREVA-NP GmbH  
[Matthias.Braun@AREVA.com](mailto:Matthias.Braun@AREVA.com)

# The Fukushima Daiichi Incident

## 1. Plant Design

### ► Fukushima Daiichi (Plant I)

- ◆ Unit I - GE Mark I BWR (439 MW), Operating since 1971
- ◆ Unit II-IV - GE Mark I BWR (760 MW), Operating since 1974

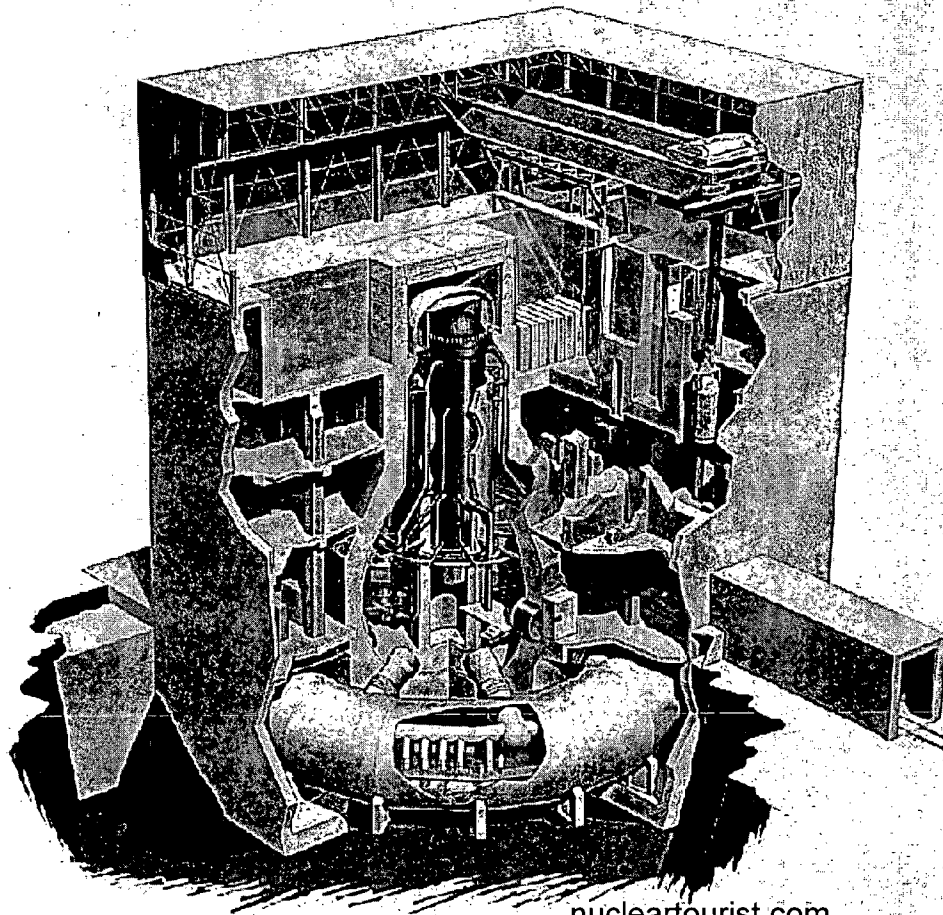


# The Fukushima Daiichi Incident

## 1. Plant Design

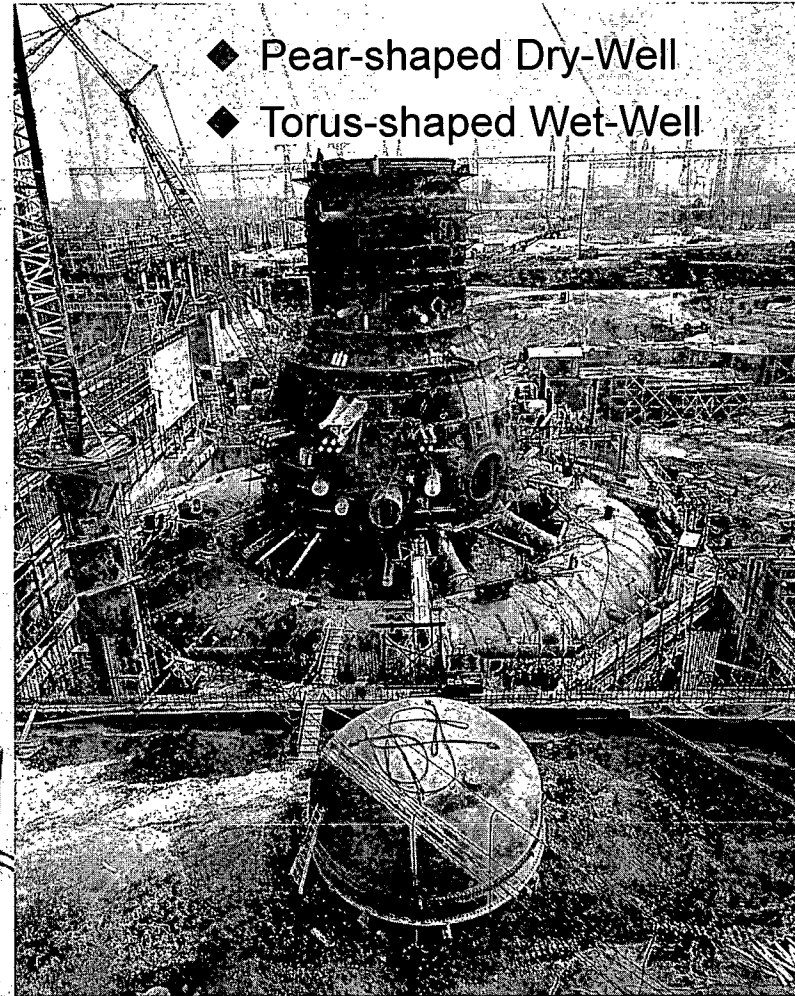
### ► Building structure

- ◆ Concrete Building
- ◆ Steel-framed Service Floor



### ► Containment

- ◆ Pear-shaped Dry-Well
- ◆ Torus-shaped Wet-Well



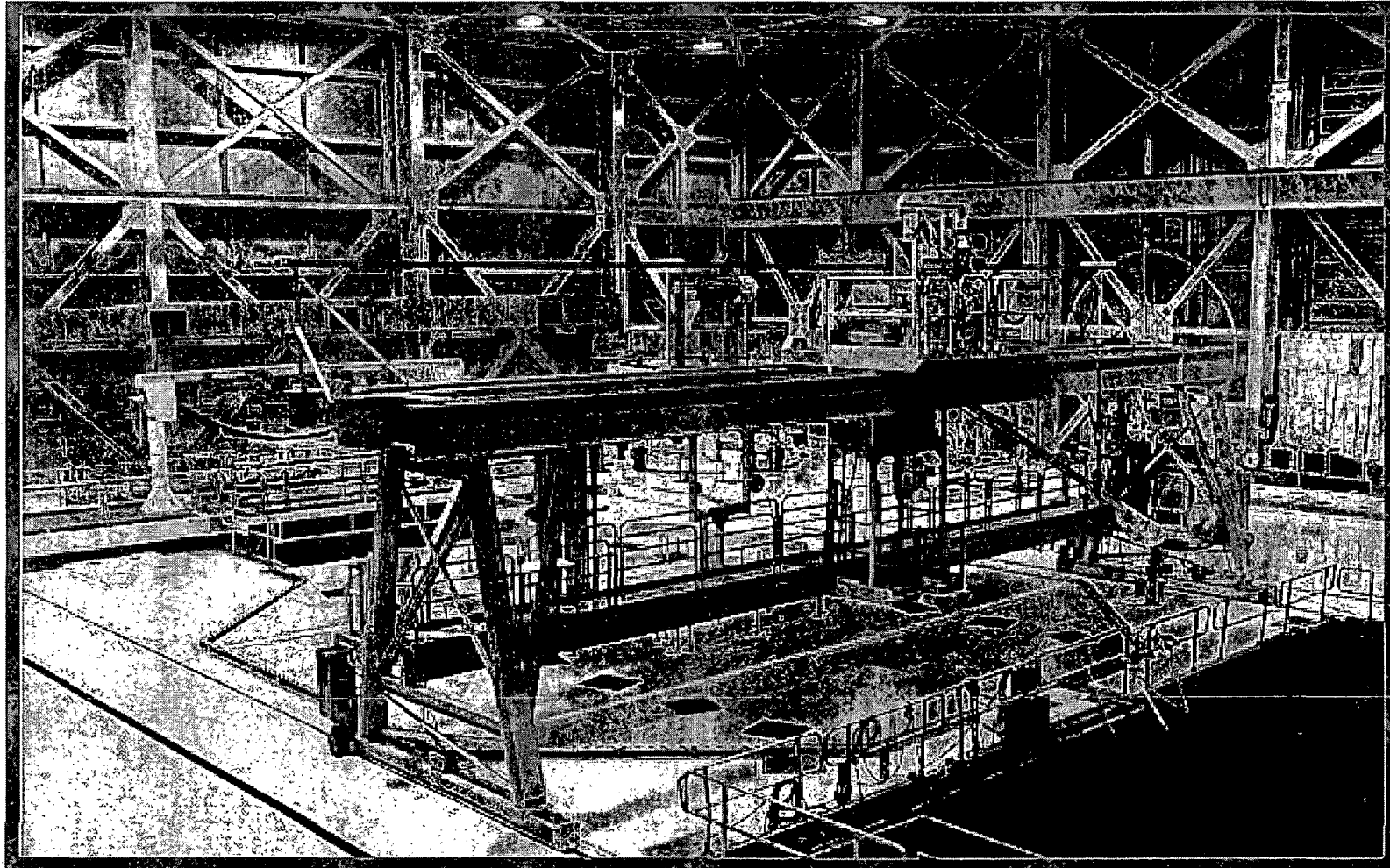
en.wikipedia.org/wiki/Browns\_Ferry\_Nuclear\_Power\_Plant



# The Fukushima Daiichi Incident

## 1. Plant Design

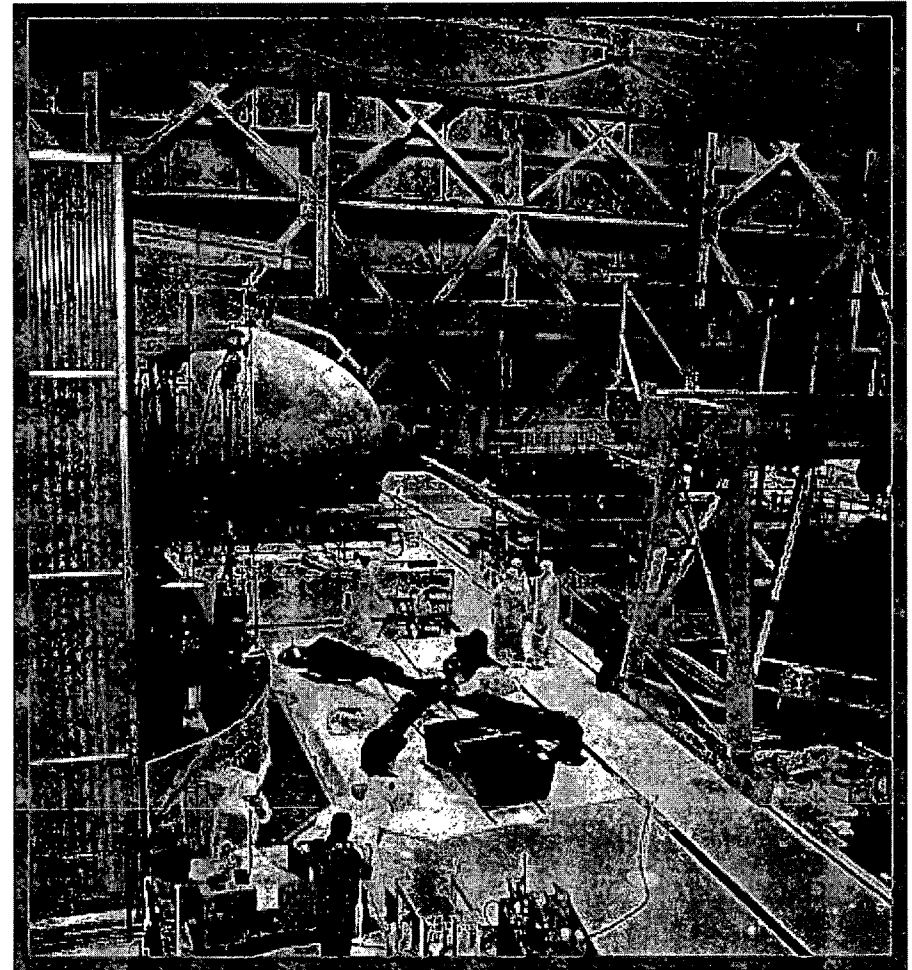
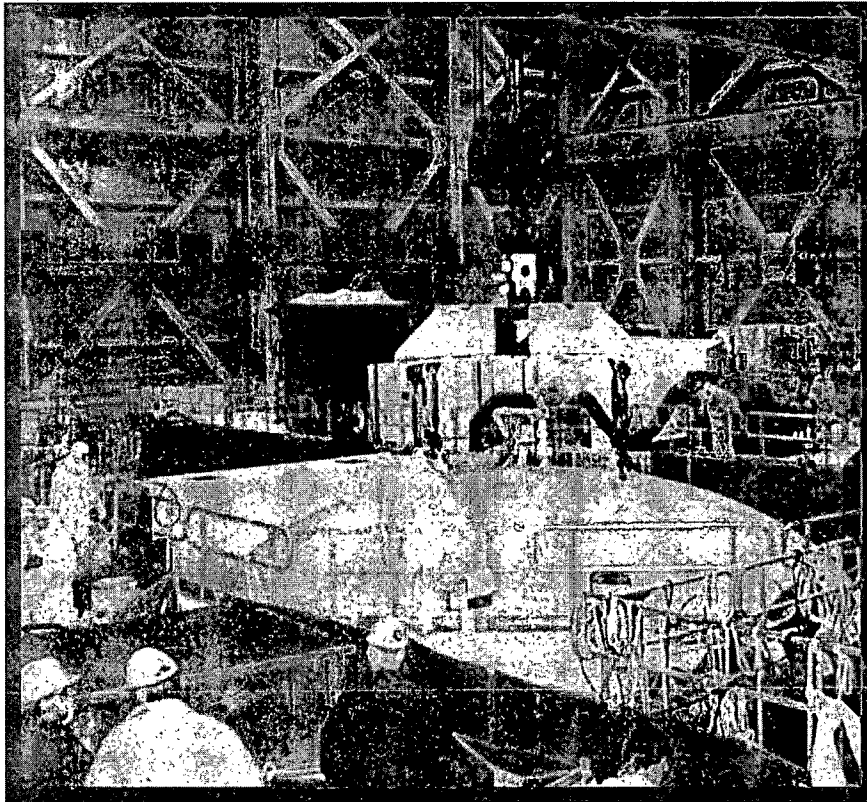
### ► Service Floor



# The Fukushima Daiichi Incident

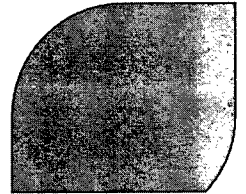
## 1. Plant Design

- Lifting the Containment closure head



# The Fukushima Daiichi Incident

## 1. Plant Design



► Reactor Service Floor  
(Steel Construction)

► Concrete Reactor Building  
(secondary Containment)

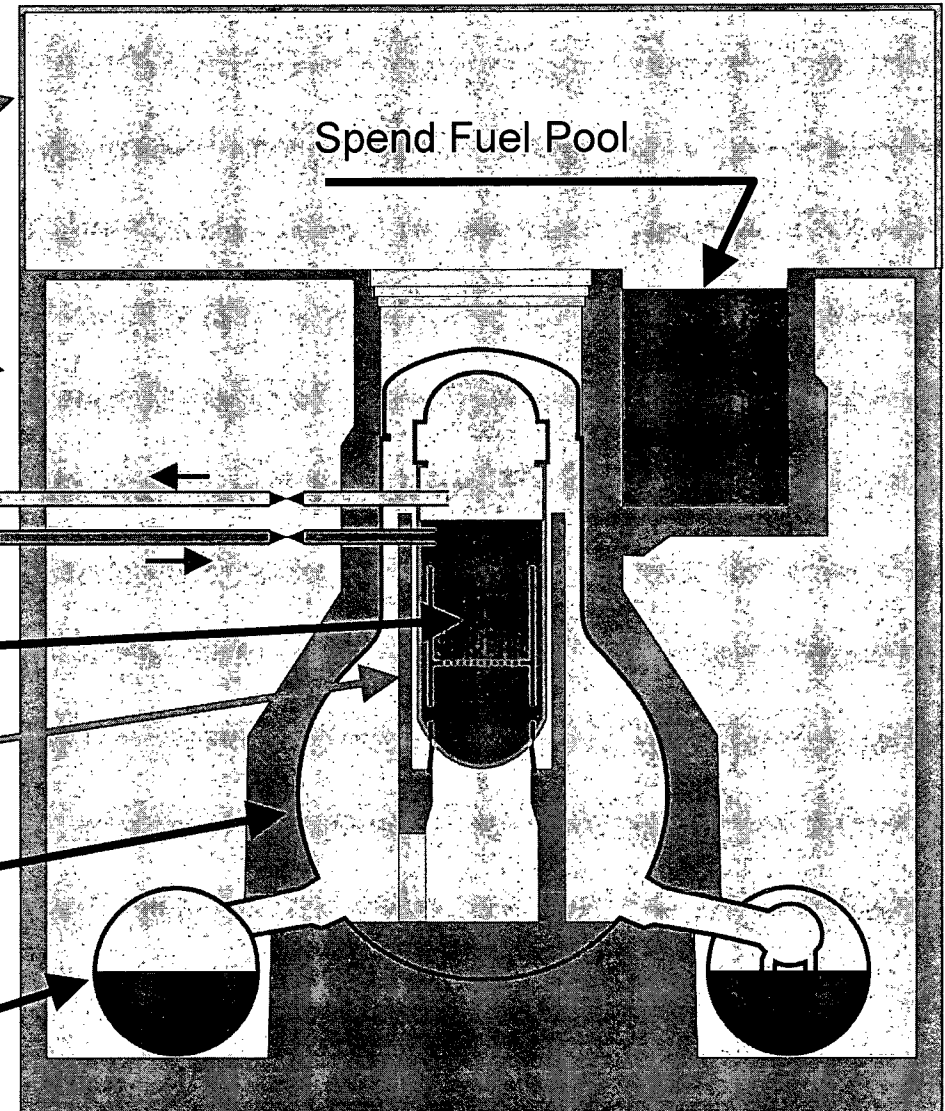
Fresh Steam line  
Main Feedwater

► Reactor Core

► Reactor Pressure Vessel

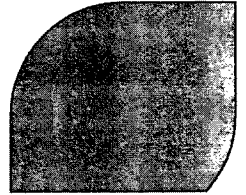
► Containment (Dry well)

► Containment (Wet Well) /  
Condensation Chamber



# The Fukushima Daiichi Incident

## 2. Accident progression

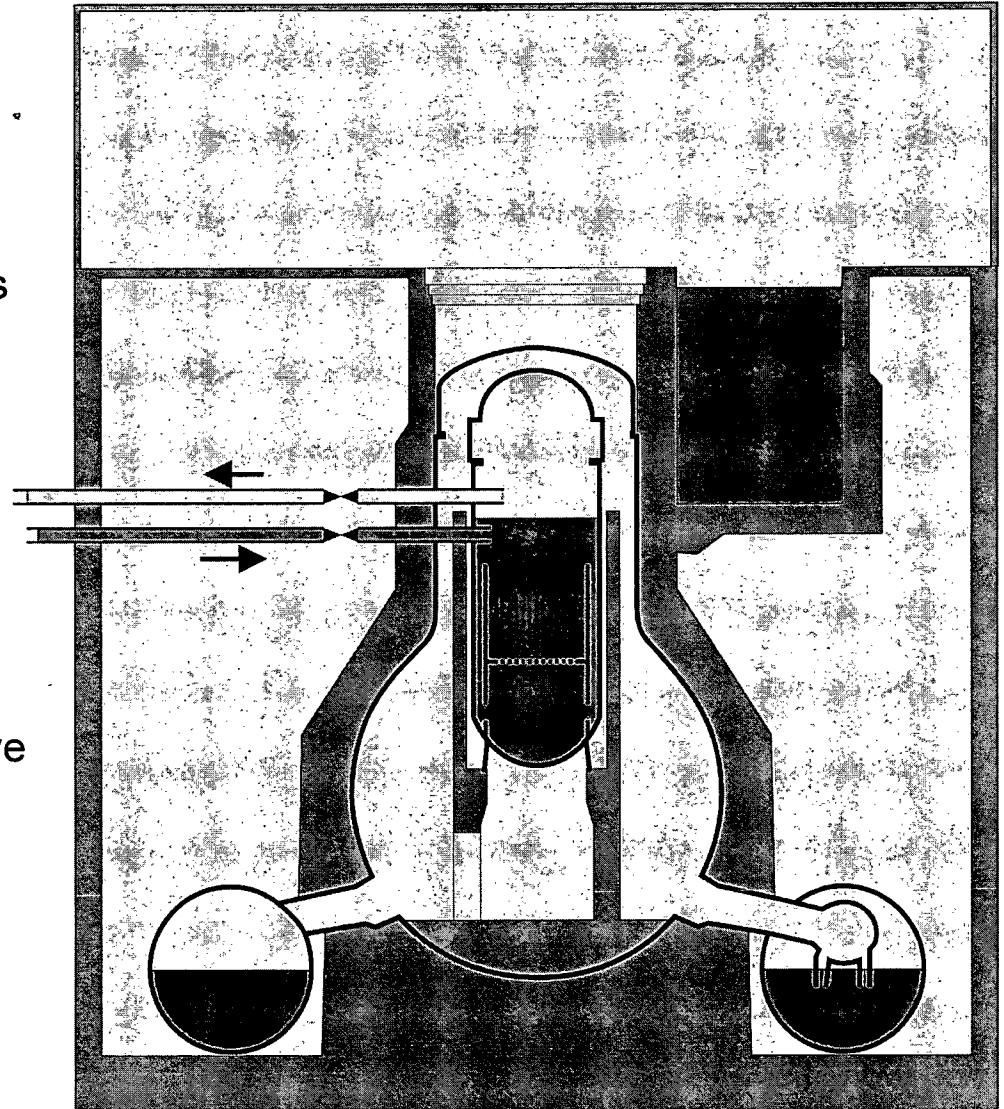


### ► 11.3.2011 14:46 - Earthquake

- ◆ Magnitude 9
- ◆ Power grid in northern Japan fails
- ◆ Reactors itself are mainly undamaged

### ► SCRAM

- ◆ Power generation due to Fission of Uranium stops
- ◆ Heat generation due to radioactive Decay of Fission Products
  - After Scram ~6%
  - After 1 Day ~1%
  - After 5 Days ~0.5%



# The Fukushima Daiichi Incident

## 2. Accident progression

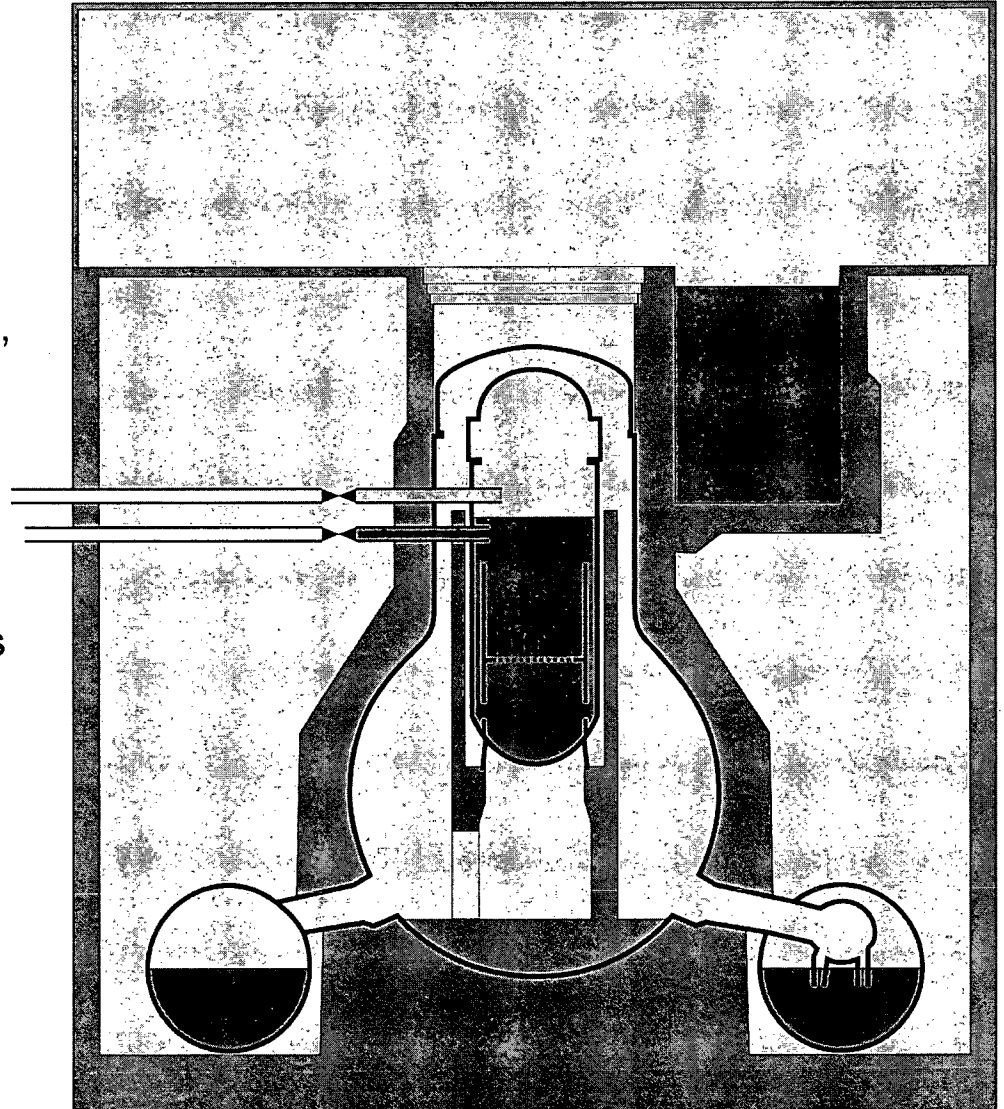
### ► Containment Isolation

- ◇ Closing of all non-safety related Penetrations of the containment
- ◇ Cuts off Machine hall
- ◇ If containment isolation succeeds, a large early release of fission products is highly unlikely

### ► Diesel generators start

- ◇ Emergency Core cooling systems are supplied

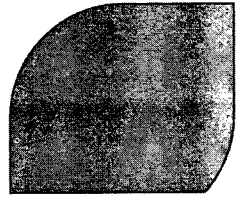
### ► Plant is in a stable save state



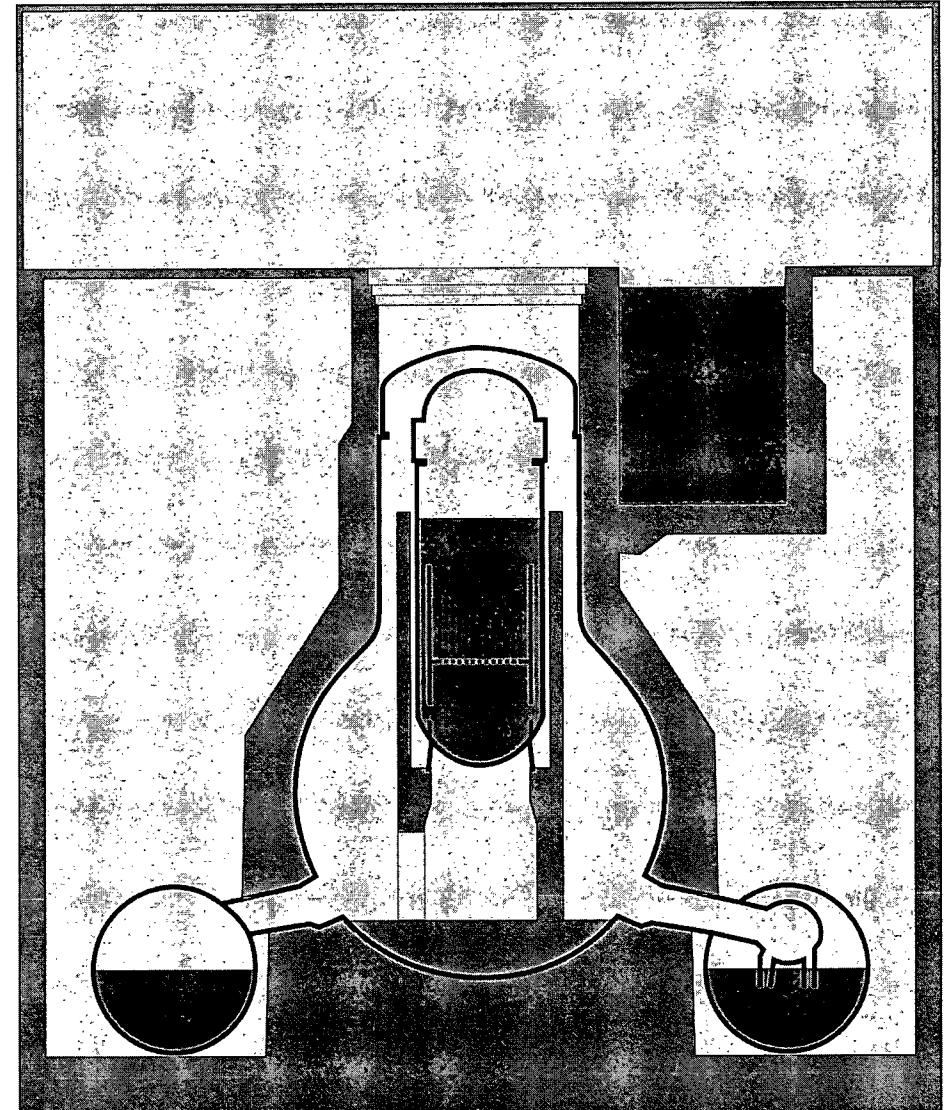


# The Fukushima Daiichi Incident

## 2. Accident progression



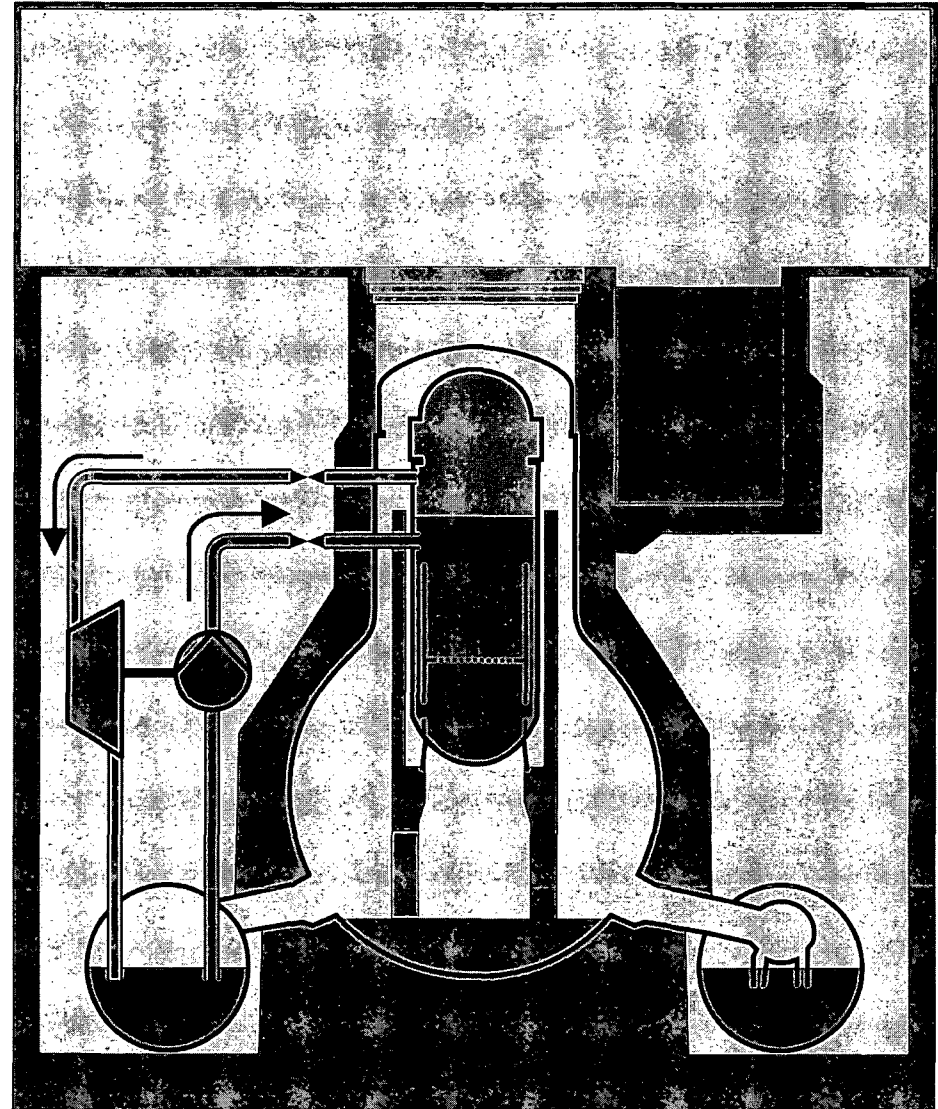
- ▶ 11.3. 15:41 Tsunami hits the plant
  - ◆ Plant Design for Tsunami height of up to 6.5m
  - ◆ Actual Tsunami height >7m
  - ◆ Flooding of
    - Diesel Generators and/or
    - Essential service water building cooling the generators
  
- ▶ Station Blackout
  - ◆ Common cause failure of the power supply
  - ◆ Only Batteries are still available
  - ◆ Failure of all but one Emergency core cooling systems



# The Fukushima Daiichi Incident

## 2. Accident progression

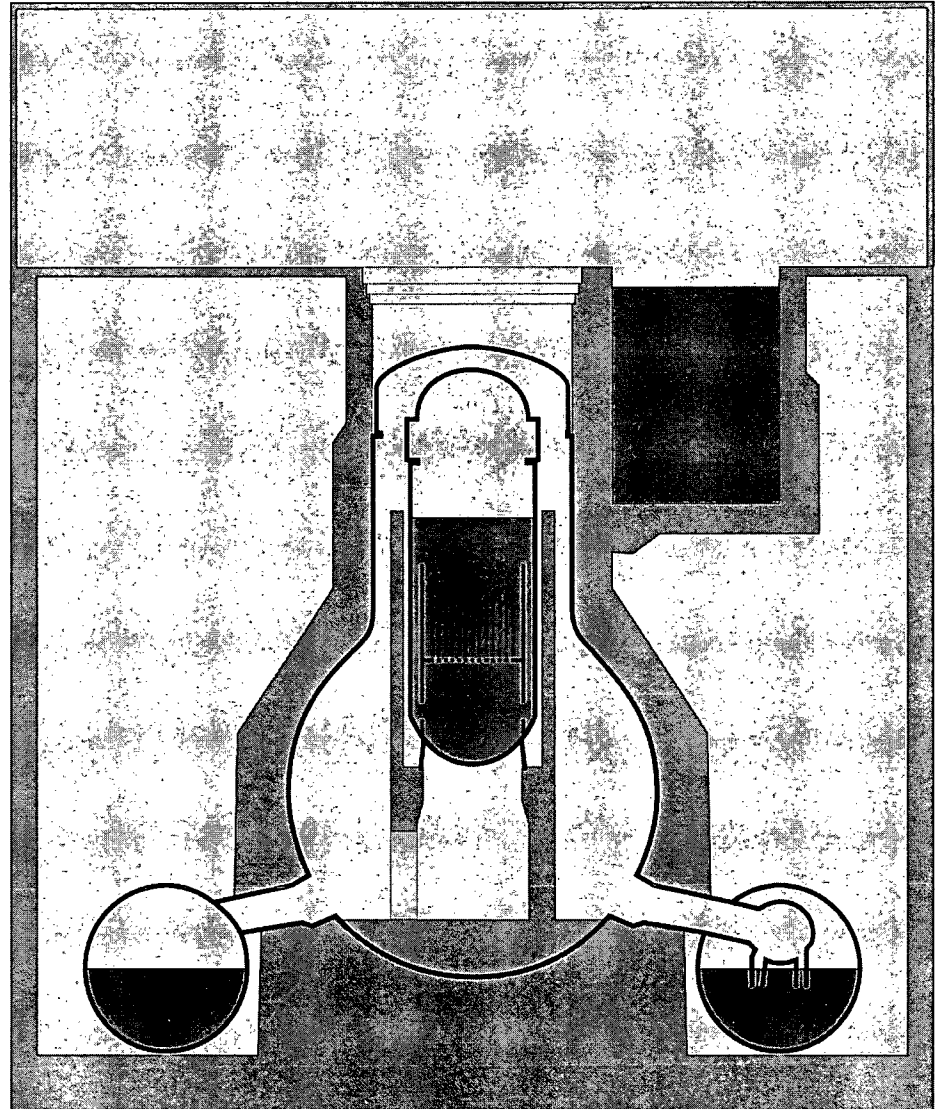
- ▶ Reactor Core Isolation Pump still available
  - ◆ Steam from the Reactor drives a Turbine
  - ◆ Steam gets condensed in the Wet-Well
  - ◆ Turbine drives a Pump
  - ◆ Water from the Wet-Well gets pumped in Reactor
  - ◆ Necessary:
    - Battery power
    - Temperature in the wet-well must be below 100°C
- ▶ As there is no heat removal from the building, the Core isolation pump cant work infinitely



# The Fukushima Daiichi Incident

## 2. Accident progression

- ▶ Reactor Isolation pump stops
  - ◆ 11.3. 16:36 in Unit 1  
(Batteries empty)
  - ◆ 14.3. 13:25 in Unit 2  
(Pump failure)
  - ◆ 13.3. 2:44 in Unit 3  
(Batteries empty)
- ▶ Decay Heat produces still steam in Reactor pressure Vessel
  - ◆ Pressure rising
- ▶ Opening the steam relieve valves
  - ◆ Discharge Steam into the Wet-Well
- ▶ Descending of the Liquid Level in the Reactor pressure vessel

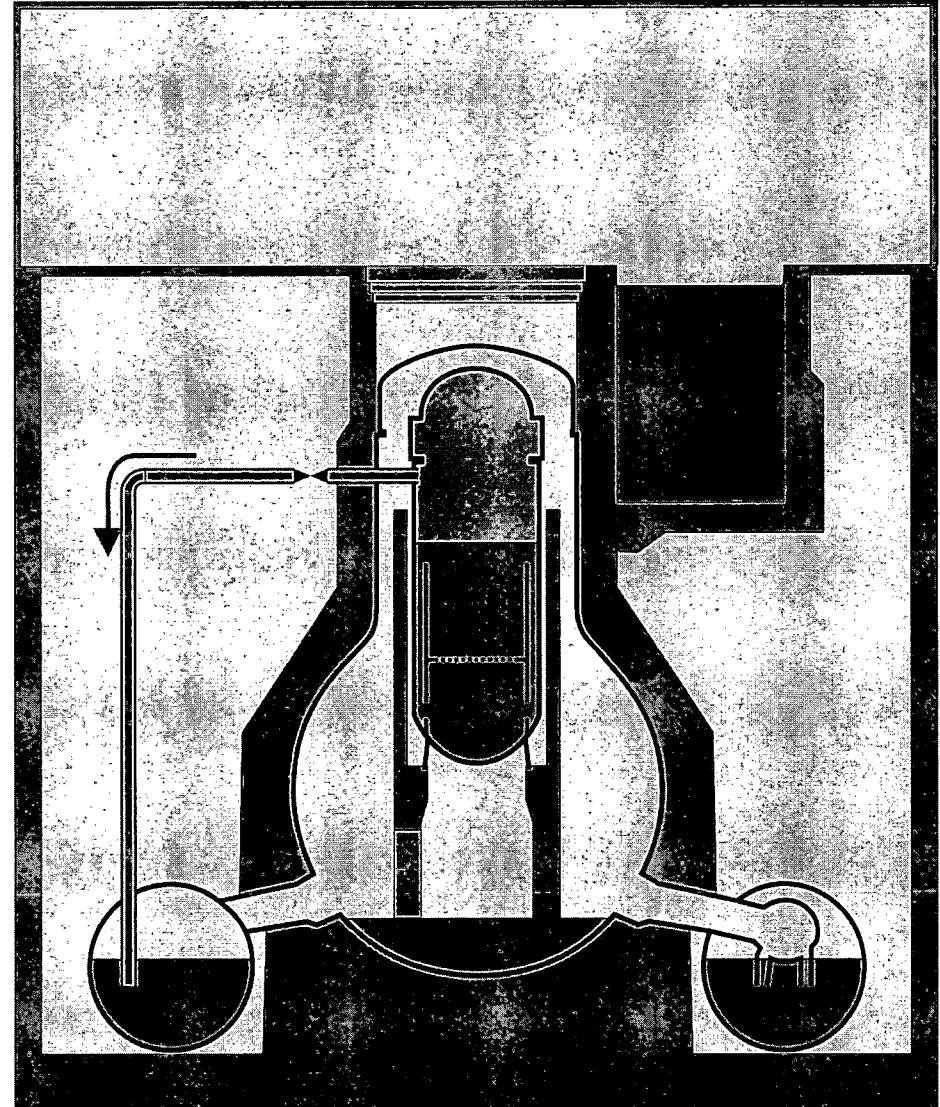




# The Fukushima Daiichi Incident

## 2. Accident progression

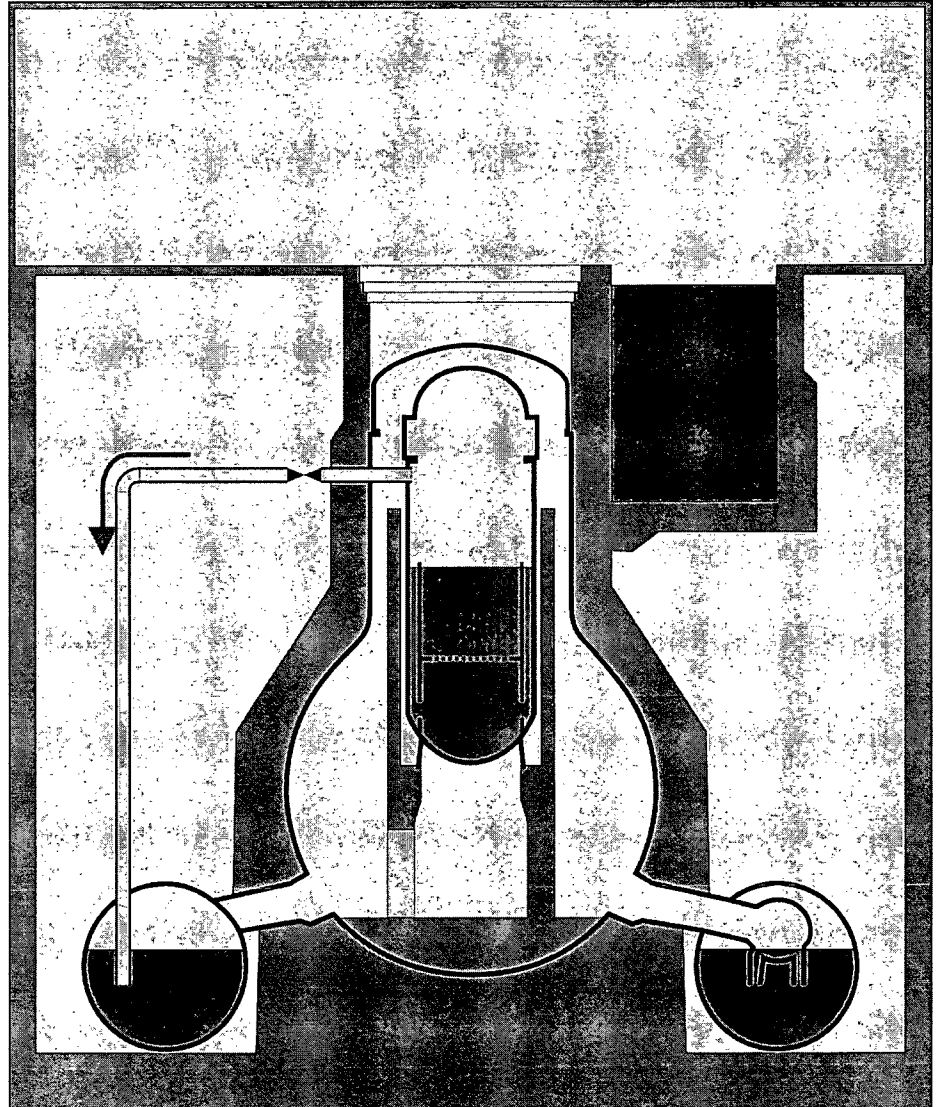
- ▶ Reactor Isolation pump stops
  - ◆ 11.3. 16:36 in Unit 1  
(Batteries empty)
  - ◆ 14.3. 13:25 in Unit 2  
(Pump failure)
  - ◆ 13.3. 2:44 in Unit 3  
(Batteries empty)
- ▶ Decay Heat produces still steam in Reactor pressure Vessel
  - ◆ Pressure rising
- ▶ Opening the steam relieve valves
  - ◆ Discharge Steam into the Wet-Well
- ▶ Descending of the Liquid Level in the Reactor pressure vessel



# The Fukushima Daiichi Incident

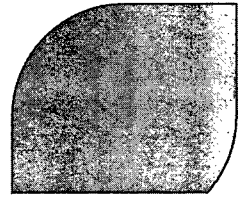
## 2. Accident progression

- ▶ Reactor Isolation pump stops
  - ◆ 11.3. 16:36 in Unit 1 (Batteries empty)
  - ◆ 14.3. 13:25 in Unit 2 (Pump failure)
  - ◆ 13.3. 2:44 in Unit 3 (Batteries empty)
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- ▶ Descending of the Liquid Level in the Reactor pressure vessel

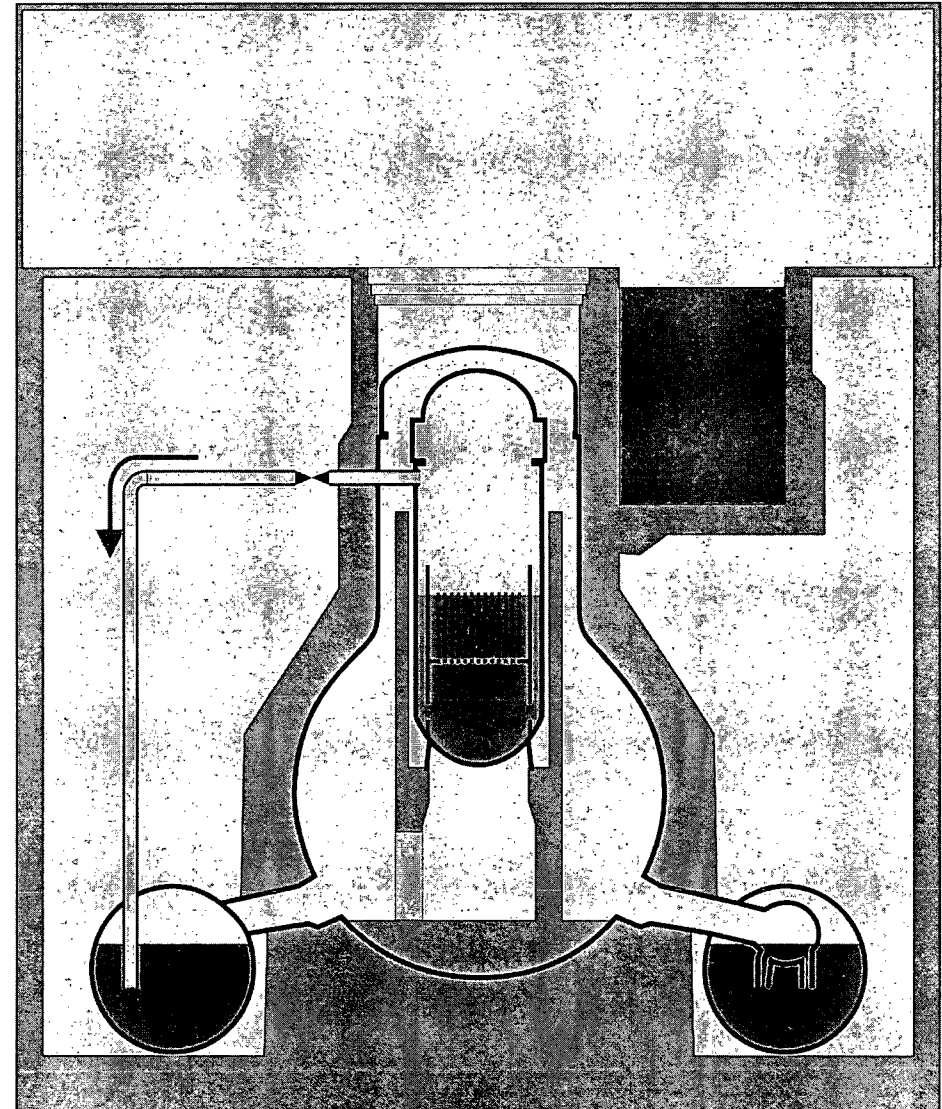


# The Fukushima Daiichi Incident

## 2. Accident progression



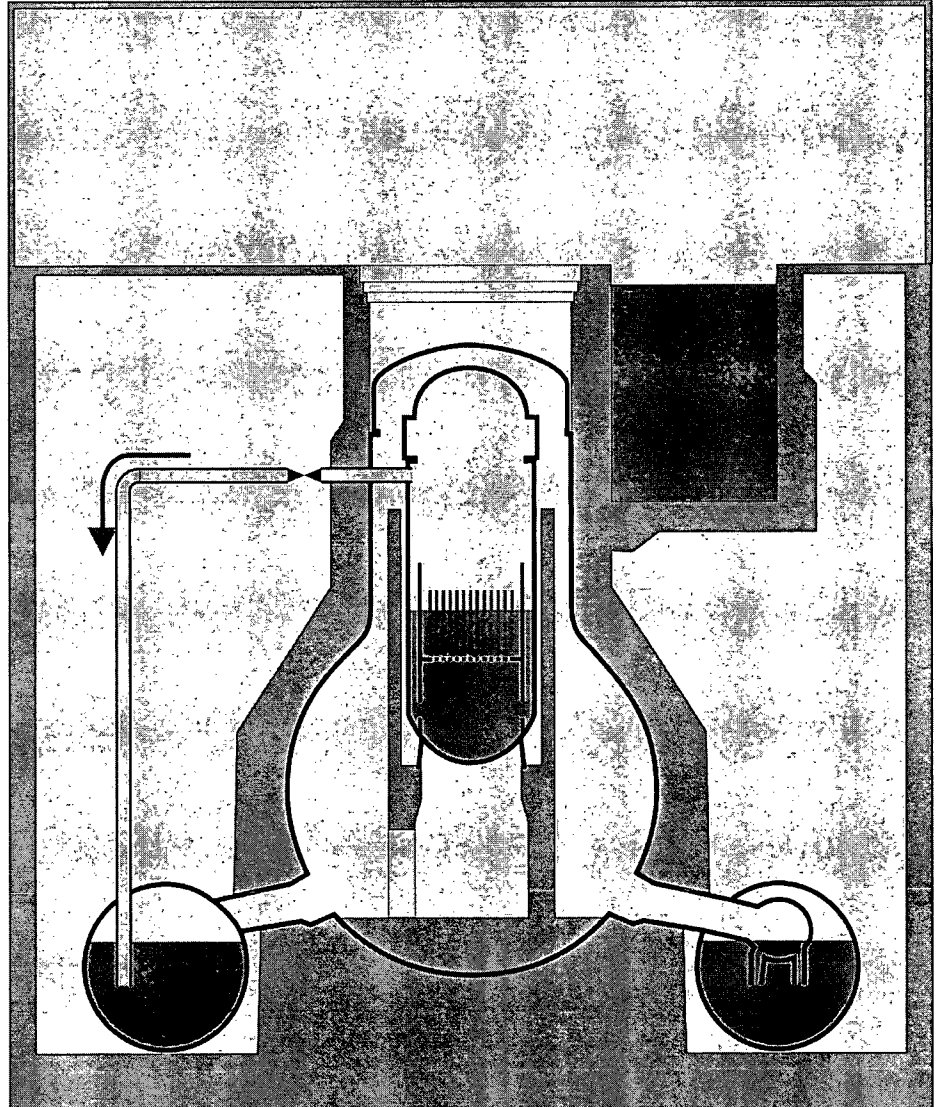
- ▶ Reactor Isolation pump stops
  - ◆ 11.3. 16:36 in Unit 1  
(Batteries empty)
  - ◆ 14.3. 13:25 in Unit 2  
(Pump failure)
  - ◆ 13.3. 2:44 in Unit 3  
(Batteries empty)
- ▶ Decay Heat produces still steam in Reactor pressure Vessel
  - ◆ Pressure rising
- ▶ Opening the steam relieve valves
  - ◆ Discharge Steam into the Wet-Well
- ▶ Descending of the Liquid Level in the Reactor pressure vessel



# The Fukushima Daiichi Incident

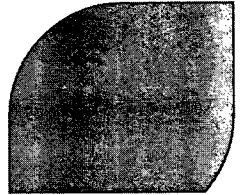
## 2. Accident progression

- ▶ Reactor Isolation pump stops
  - ◆ 11.3. 16:36 in Unit 1 (Batteries empty)
  - ◆ 14.3. 13:25 in Unit 2 (Pump failure)
  - ◆ 13.3. 2:44 in Unit 3 (Batteries empty)
- ▶ Decay Heat produces still steam in Reactor pressure Vessel
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- ▶ Opening the steam relieve valves
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- ▶ Descending of the Liquid Level in the Reactor pressure vessel

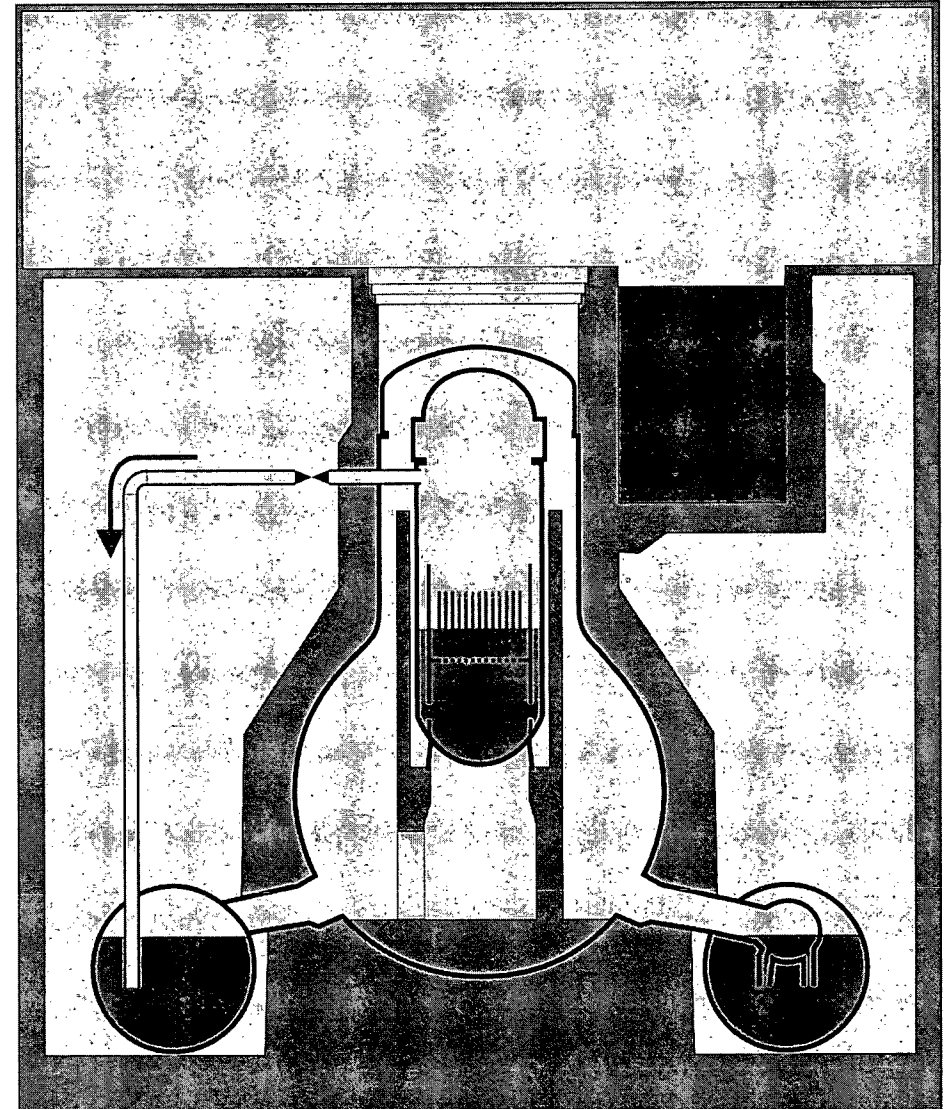


# The Fukushima Daiichi Incident

## 2. Accident progression



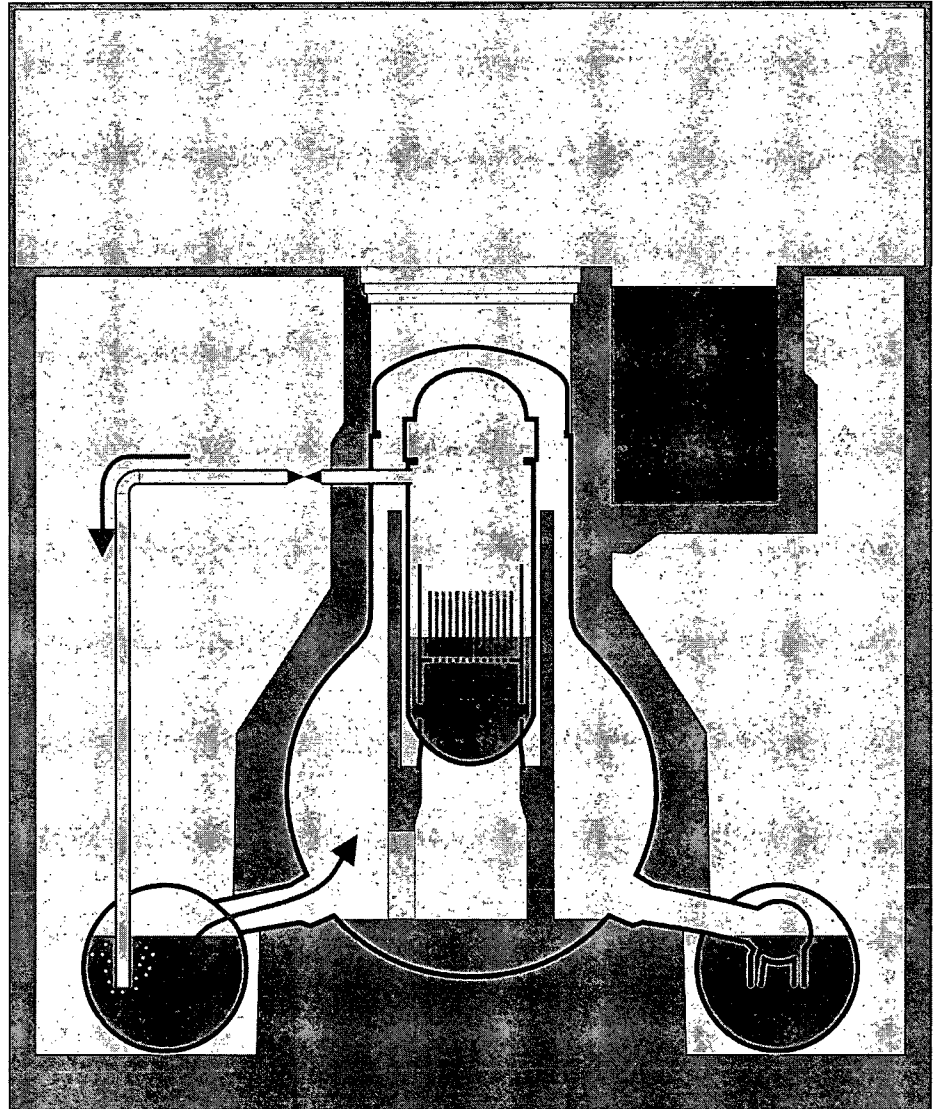
- ▶ Measured, and here referenced Liquid level is the collapsed level. The actual liquid level lies higher due to the steam bubbles in the liquid
- ▶ ~50% of the core exposed
  - ◆ Cladding temperatures rise, but still no significant core damage
- ▶ ~2/3 of the core exposed
  - ◆ Cladding temperature exceeds  $\sim 900^{\circ}\text{C}$
  - ◆ Ballooning / Breaking of the cladding
  - ◆ Release of fission products from the fuel rod gaps



# The Fukushima Daiichi Incident

## 2. Accident progression

- ▶ ~3/4 of the core exposed
  - ◇ Cladding exceeds ~1200°C
  - ◇ Zirconium in the cladding starts to burn under Steam atmosphere
  - ◇  $\text{Zr} + 2\text{H}_2\text{O} \rightarrow \text{ZrO}_2 + 2\text{H}_2$
  - ◇ Exothermal reaction further heats the core
  - ◇ Generation of hydrogen
    - Unit 1: 300-600kg
    - Unit 2/3: 300-1000kg
  - ◇ Hydrogen gets pushed via the wet-well, the wet-well vacuum breakers into the dry-well

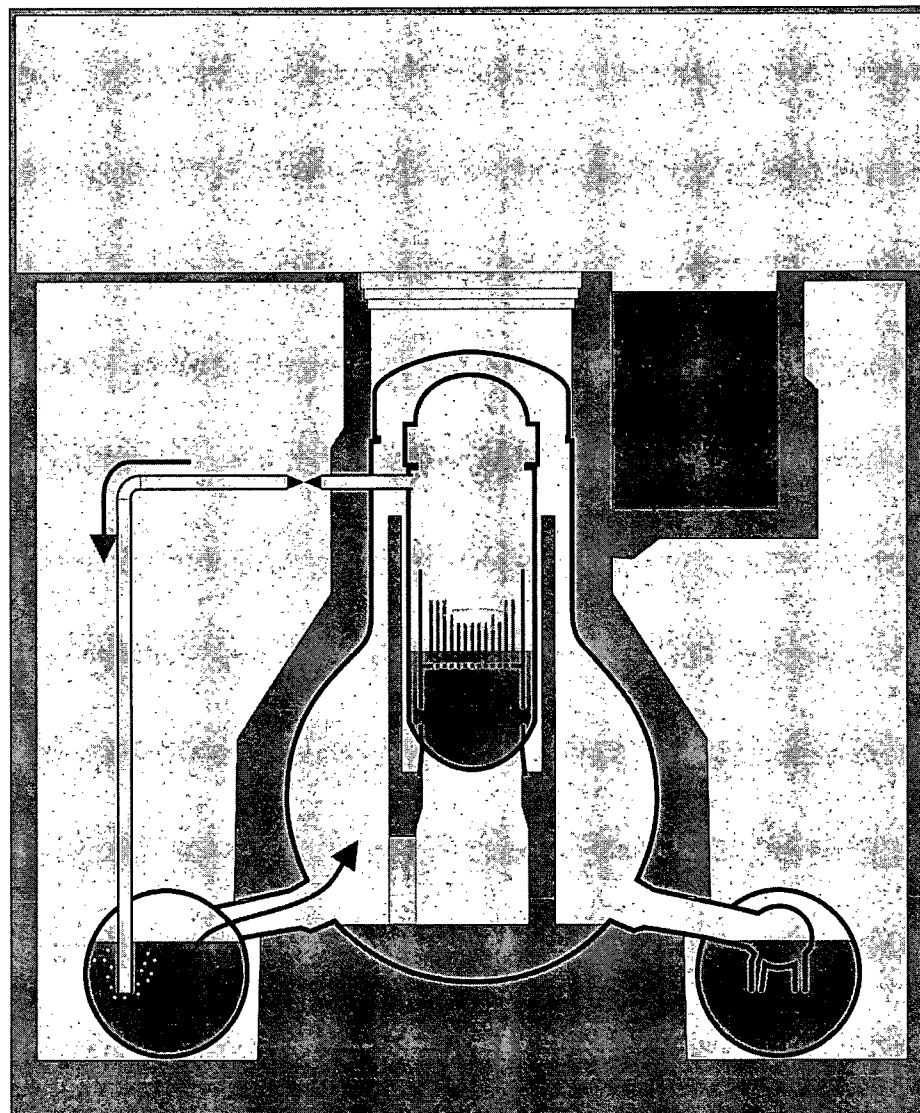




# The Fukushima Daiichi Incident

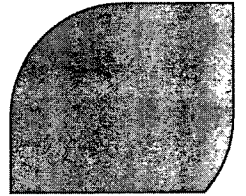
## 2. Accident progression

- ▶ at ~1800°C [Unit 1,2,3]
  - ◆ Melting of the Cladding
  - ◆ Melting of the steel structures
- ▶ at ~2500°C [Block 1,2]
  - ◆ Breaking of the fuel rods
  - ◆ debris bed inside the core
- ▶ at ~2700°C [Block 1]
  - ◆ Melting of Uranium-Zirconium eutectics
- ▶ Restoration of the water supply stops accident in all 3 Units
  - ◆ Unit 1: 12.3. 20:20 (27h w.o. water)
  - ◆ Unit 2: 14.3. 20:33 (7h w.o. water)
  - ◆ Unit 3: 13.3. 9:38 (7h w.o. water)

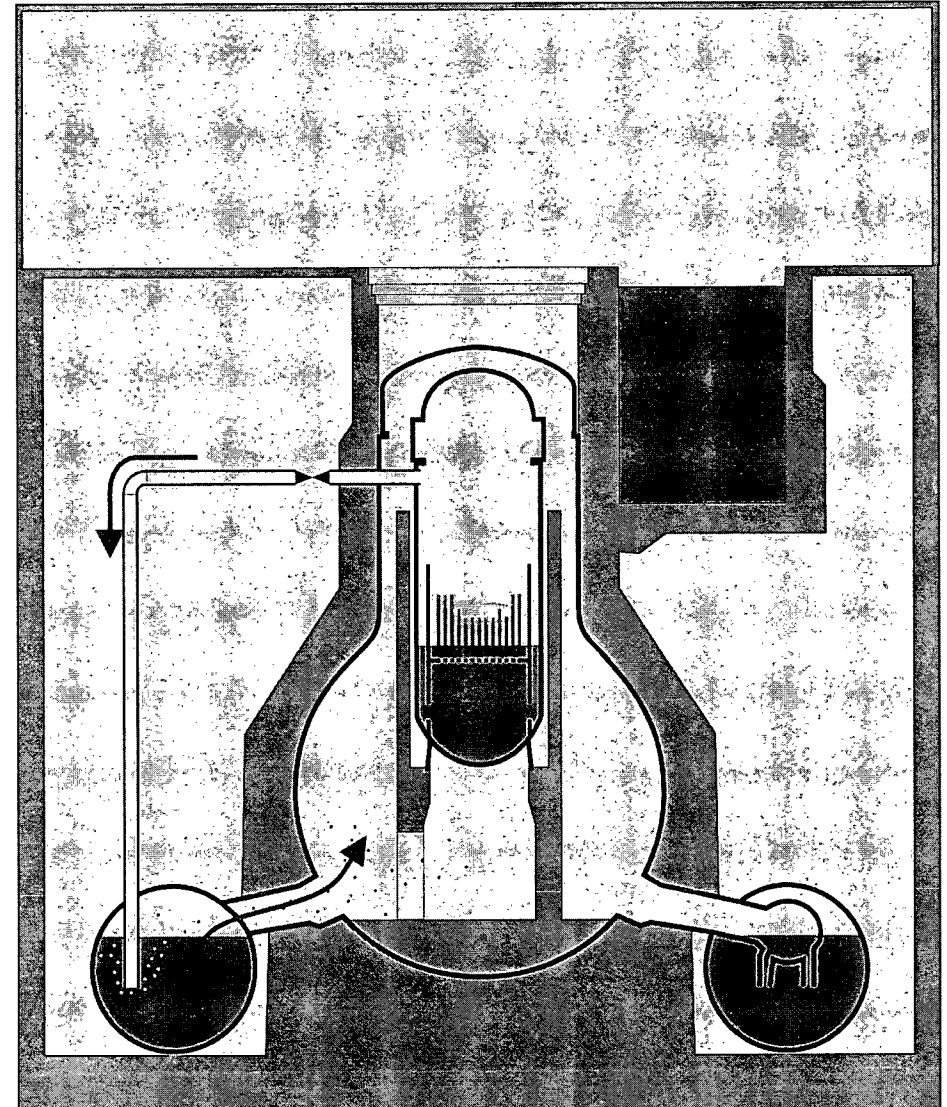


# The Fukushima Daiichi Incident

## 2. Accident progression



- ▶ Release of fission products during melt down
  - ◆ Xenon, Cesium, Iodine,...
  - ◆ Uranium/Plutonium remain in core
  - ◆ Fission products condensate to airborne Aerosols
- ▶ Discharge through valves into water of the condensation chamber
  - ◆ Pool scrubbing binds a fraction of Aerosols in the water
- ▶ Xenon and remaining aerosols enter the Dry-Well
  - ◆ Deposition of aerosols on surfaces further decontaminates air





# The Fukushima Daiichi Incident

## 2. Accident progression

### ► Containment

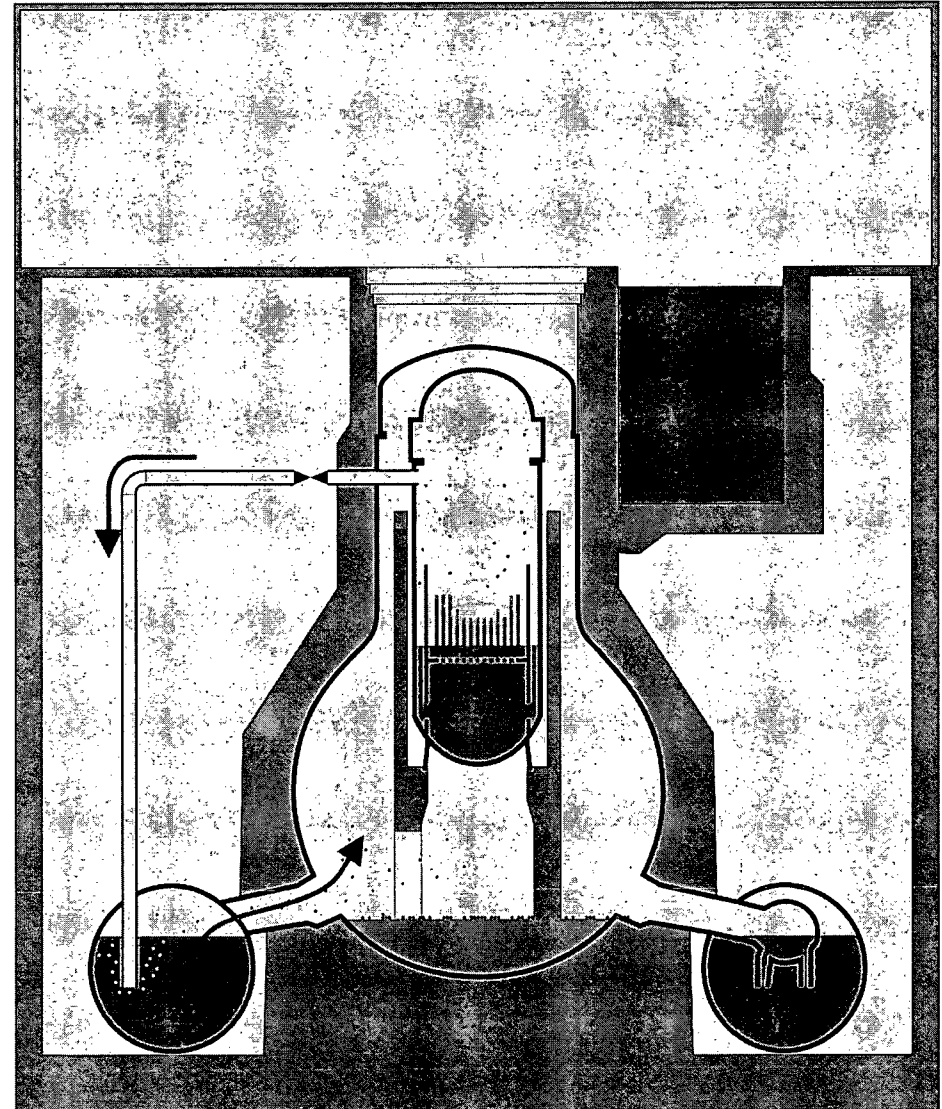
- ◆ Last barrier between Fission Products and Environment
- ◆ Wall thickness ~3cm
- ◆ Design Pressure 4-5bar

### ► Actual pressure up to 8 bars

- ◆ Normal inert gas filling (Nitrogen)
- ◆ Hydrogen from core oxidation
- ◆ Boiling condensation chamber (like a pressure cooker)

### ► Depressurization of the containment

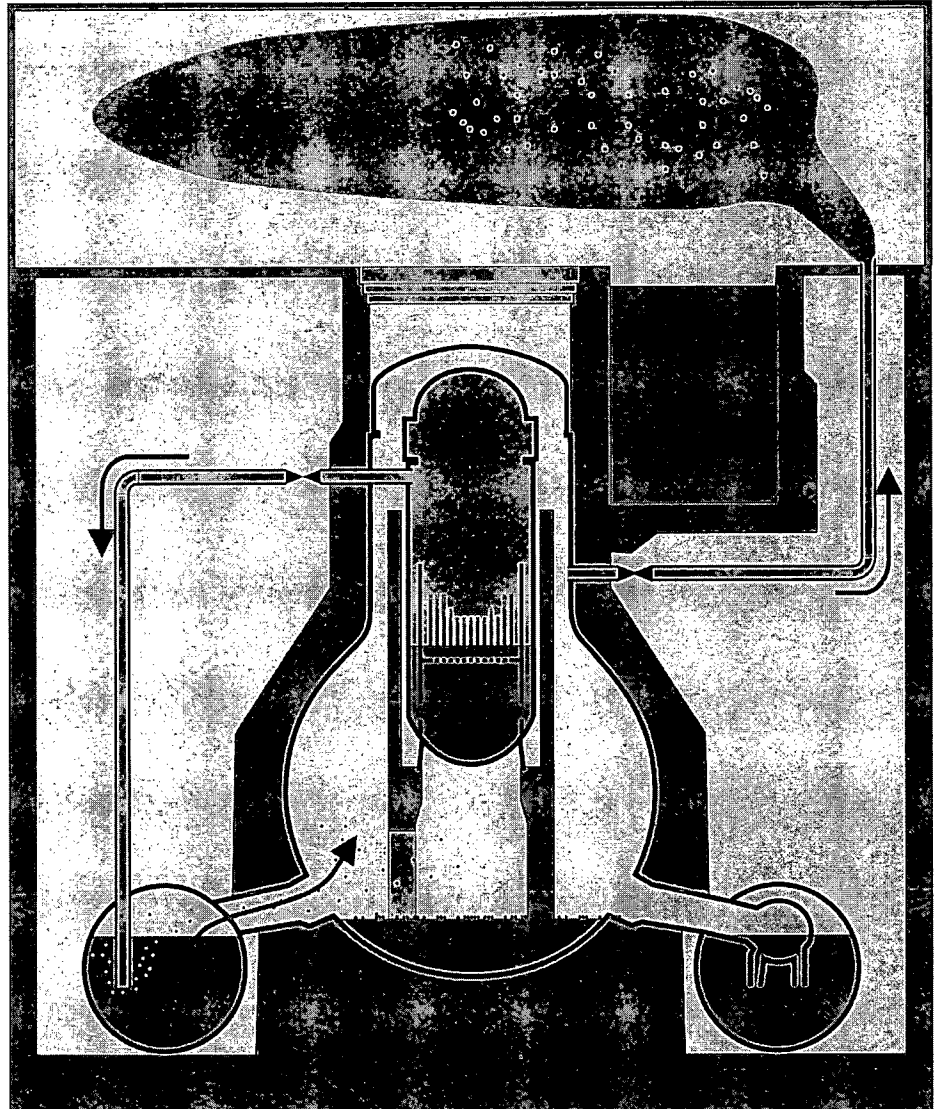
- ◆ Unit 1: 12.3. 4:00
- ◆ Unit 2: 13.3 00:00
- ◆ Unit 3: 13.3. 8.41



# The Fukushima Daiichi Incident

## 2. Accident progression

- ▶ Positive and negative Aspects of depressurizing the containment
  - ◆ Removes Energy from the Reactor building (only way left)
  - ◆ Reducing the pressure to ~4 bar
  - ◆ Release of small amounts of Aerosols (Iodine, Cesium ~0.1%)
  - ◆ Release of all noble gases
  - ◆ Release of Hydrogen
- ▶ Gas is released into the reactor service floor
  - ◆ Hydrogen is flammable

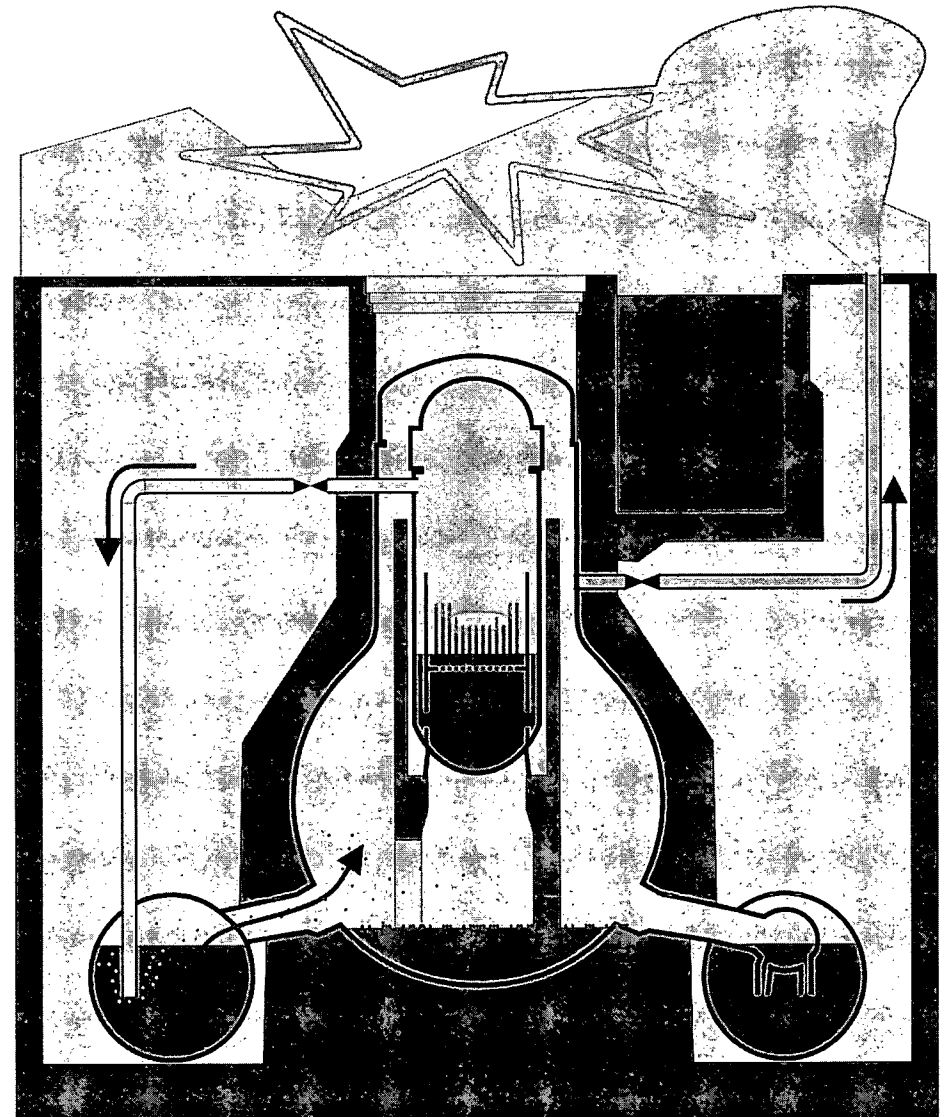
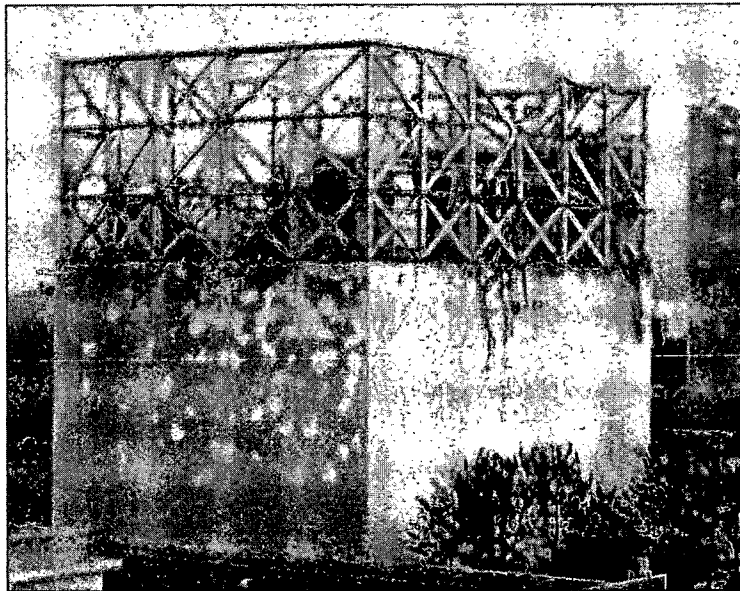


# The Fukushima Daiichi Incident

## 2. Accident progression

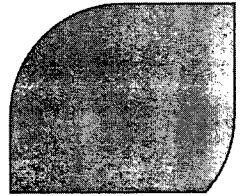
### ► Unit 1 und 3

- ◆ Hydrogen burn inside the reactor service floor
- ◆ Destruction of the steel-frame roof
- ◆ Reinforced concrete reactor building seems undamaged
- ◆ Spectacular but minor safety relevant



# The Fukushima Daiichi Incident

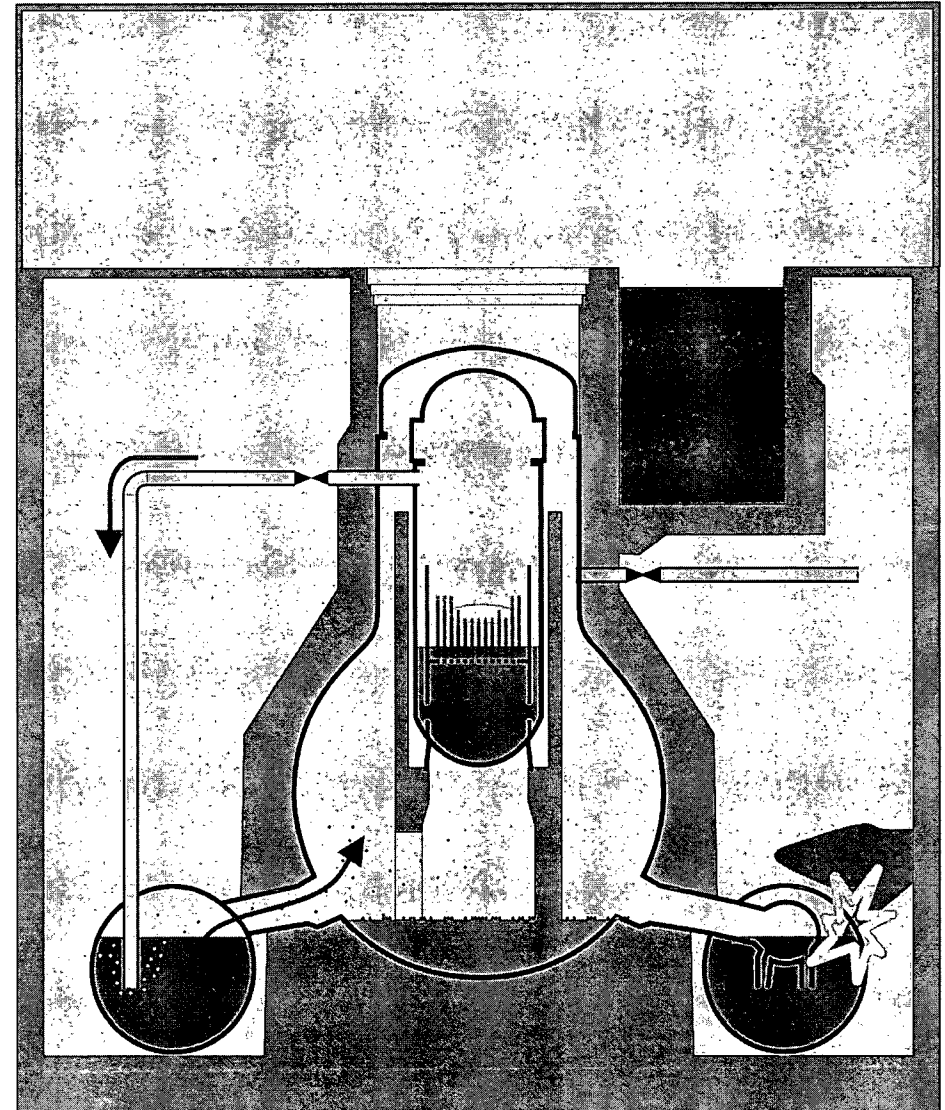
## 2. Accident progression



### ► Unit 2

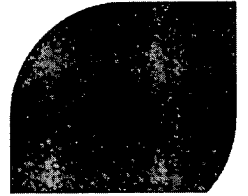
- ◆ Hydrogen burn inside the reactor building
- ◆ Probably damage to the condensation chamber (highly contaminated water)
- ◆ Uncontrolled release of gas from the containment
- ◆ **Release of fission products**
- ◆ Temporal evacuation of the plant
- ◆ High local dose rates on the plant site due to wreckage hinder further recovery work

- No clear information's why Unit 2 behaved differently

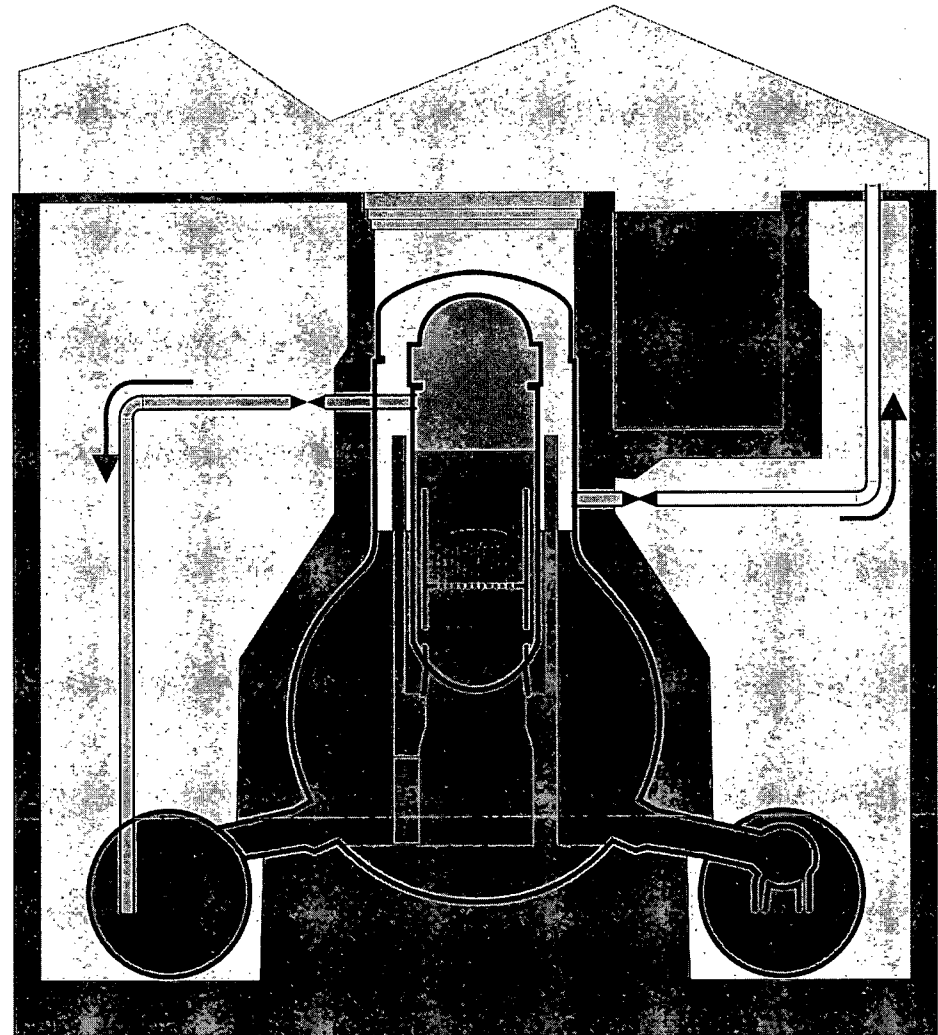


# The Fukushima Daiichi Incident

## 2. Accident progression

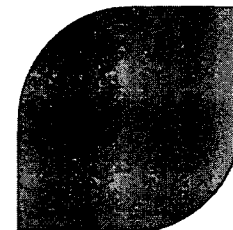


- ▶ Current status of the Reactors
  - ◆ Core Damage in Unit 1,2, 3
  - ◆ Building damage due to various burns Unit 1-4
  - ◆ Reactor pressure vessels flooded in all Units with mobile pumps
  - ◆ At least containment in Unit 1 flooded
- ▶ Further cooling of the Reactors by releasing steam to the atmosphere
- ▶ Only small further releases of fission products can be expected



# The Fukushima Daiichi Incident

## 3. Radiological releases



### ► Directly on the plant site

#### ◆ Before Explosion in Unit Block 2

- Below 2mSv / h
- Mainly due to released radioactive noble gases
- Measuring posts on west side. Maybe too small values measured due to wind

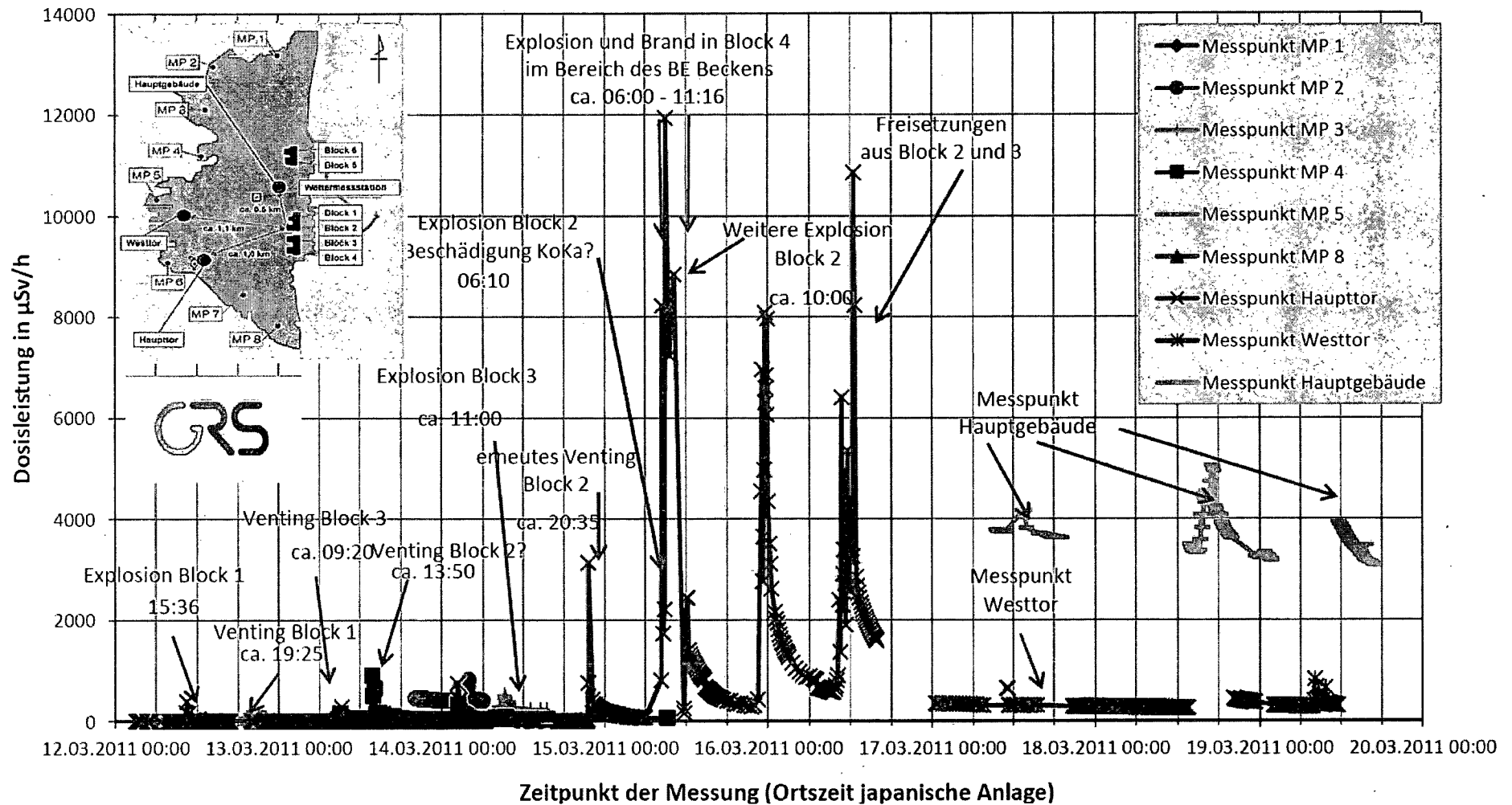
#### ◆ After Explosion in Unit 2 (Damage of the Containment)

- Temporal peak values 12mSv / h
- (Origin not entirely clear)
- Local peak values on site up to 400mSv /h (wreckage / fragments?)
- Currently stable dose on site at 5mSv /h
- Inside the buildings a lot more

#### ◆ Limiting time of exposure of the workers necessary

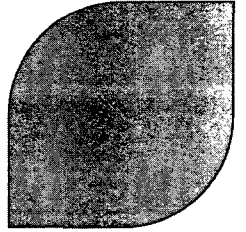
# The Fukushima Daiichi Incident

## 3. Radiological releases



# The Fukushima Daiichi Incident

## 3. Radiological releases



### ► Outside the Plant site

- ◆ As reactor building mostly intact  
=> reduced release of Aerosols (not Chernobyl-like)
- ◆ Fission product release in steam  
=> fast Aerosol grows, large fraction falls down in the proximity of the plant
- ◆ Main contribution to the radioactive dose outside plant are the radioactive noble gases
- ◆ Carried / distributed by the wind, decreasing dose with time
- ◆ No „Fall-out“ of the noble gases, so no local high contamination of soil

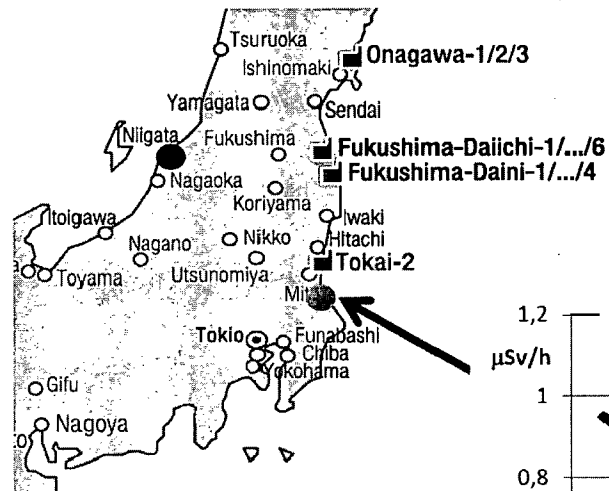
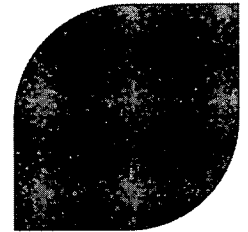
### ► ~20km around the plant

- ◆ Evacuations were adequate
- ◆ Measured dose up to 0.3mSv/h for short times
- ◆ Maybe destruction of crops / dairy products this year
- ◆ Probably no permanent evacuation of land necessary

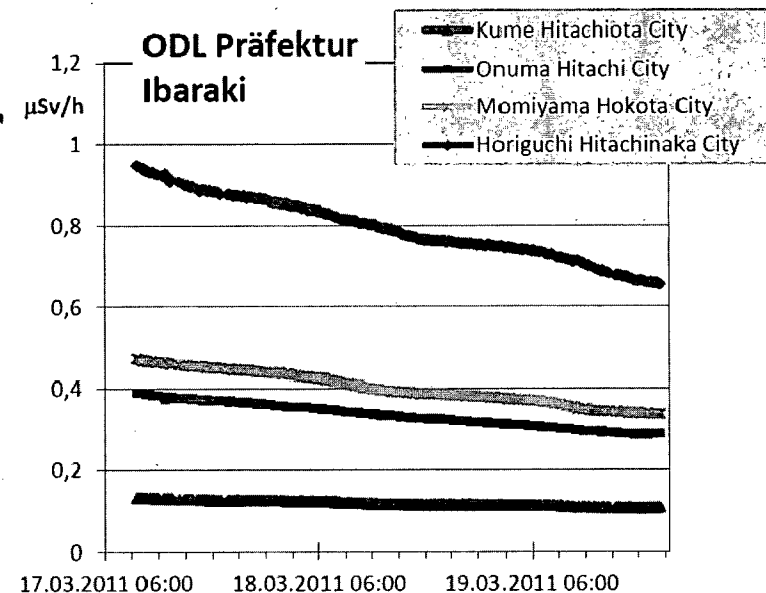


# The Fukushima Daiichi Incident

## 3. Radiological releases



GRS.de

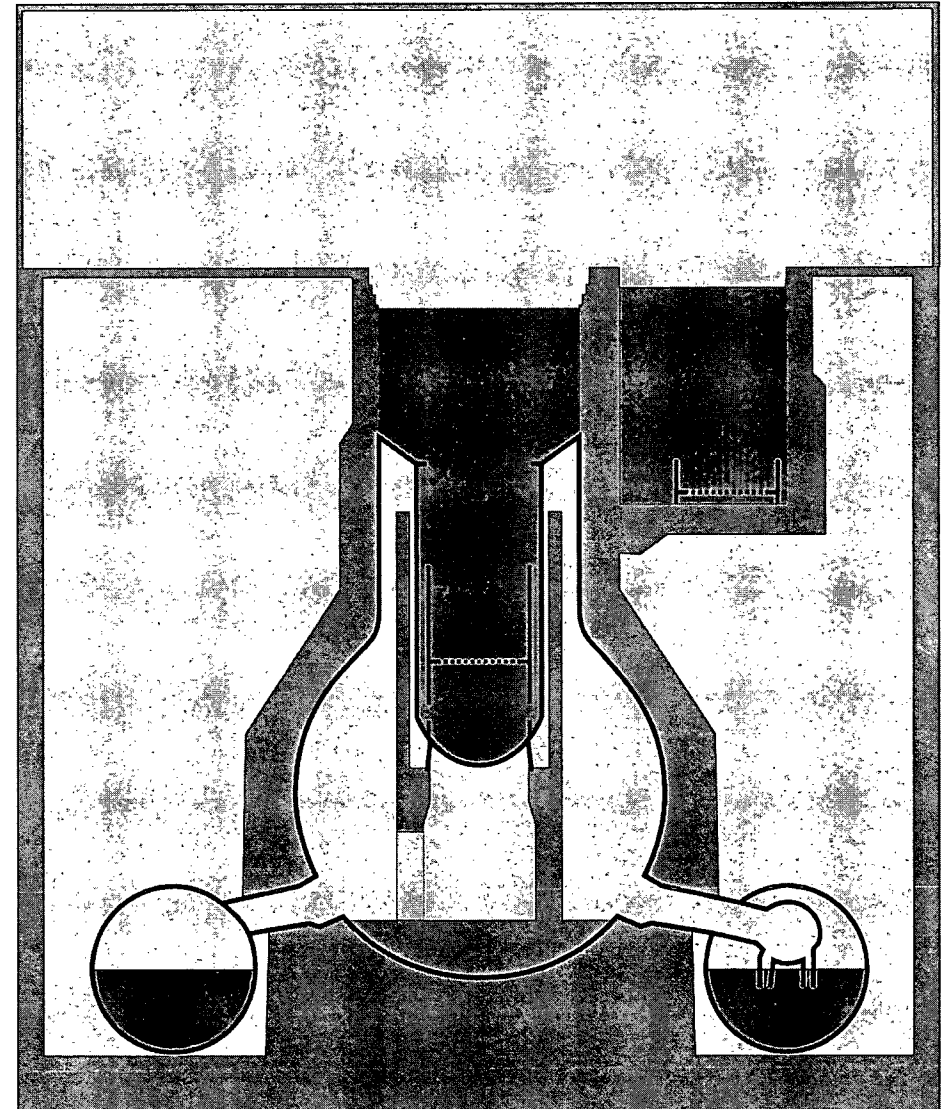


- ~50km around the plant
  - ◆ Control of Crop / Dairy products
  - ◆ Usage of Iodine pills  
(Caution, pills can interfere with heart medicine)

# The Fukushima Daiichi Incident

## 4. Spent fuel pools

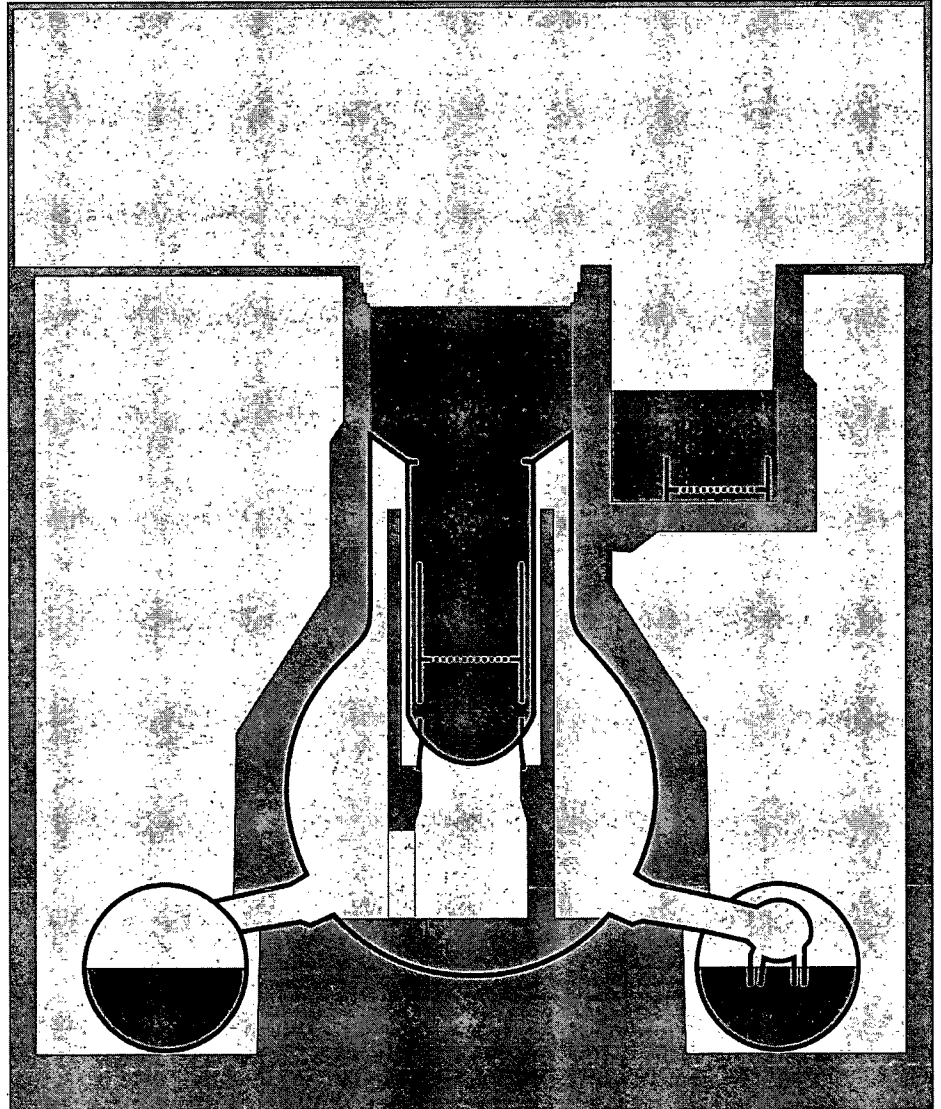
- ▶ Spent fuel stored in Pool on Reactor service floor
  - ◆ Due to maintenance in Unit 4 entire core stored in Fuel pool
  - ◆ Dry-out of the pools
    - Unit 4: in 10 days
    - Unit 1-3,5,6 in few weeks
  - ◆ **Leakage of the pools due to Earthquake?**
- ▶ Consequences
  - ◆ Core melt „on fresh air “
  - ◆ Nearly no retention of fission products
  - ◆ Large release



# The Fukushima Daiichi Incident

## 4. Spent fuel pools

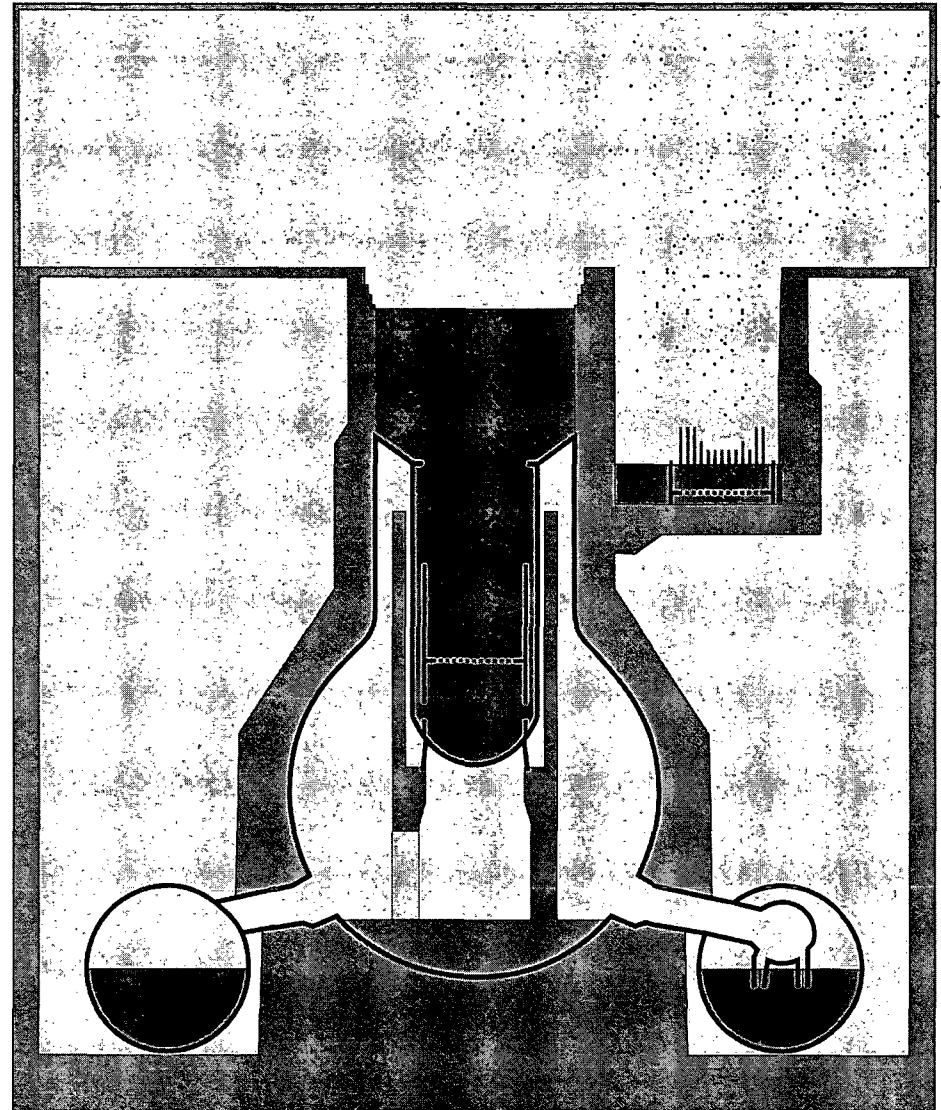
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# The Fukushima Daiichi Incident

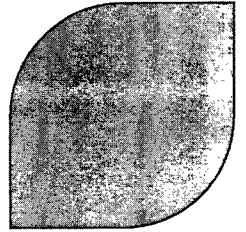
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  - ◇ **Leakage of the pools due to Earthquake?**
- ▶ Consequences
  - ◇ Core melt „on fresh air “
  - ◇ Nearly no retention of fission products
  - ◇ Large release
- ▶ **It is currently unclear if release from fuel pool already happened**



# The Fukushima Daiichi Incident

## 5. Sources of Information



### ► Good sources of Information

#### ◆ Gesellschaft für Reaktorsicherheit [GRS.de]

- Up to date
- Radiological measurements published
- German translation of japanese/englisch web pages

#### ◆ Japan Atomic Industrial Forum [jaif.or.jp/english/]

- Current Status of the plants
- Measurement values of the reactors (pressure liquid level)

#### ◆ Tokyo Electric Power Company [Tepco.co.jp]

- Status of the recovery work
- Casualties

### ► May too few information are released by TEPCO, the operator of the plant

## Gibson, Kathy

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 8:33 AM  
**To:** Sherbini, Sami  
**Subject:** Re: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

You should be. I'd like to add you to the Ops Center list for health physics expertise, ok?

---

**From:** Sherbini, Sami  
**To:** Gibson, Kathy  
**Sent:** Wed Mar 16 08:23:45 2011  
**Subject:** RE: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

I don't think so.

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 8:20 AM  
**To:** Sherbini, Sami  
**Subject:** Re: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Are you not on a PMT?

---

**From:** Sherbini, Sami  
**To:** Gibson, Kathy  
**Sent:** Wed Mar 16 08:11:37 2011  
**Subject:** RE: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Kathy,

Per your request, I don't have the expertise that would be of help in this situation. Thanks.

Sami

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 8:06 AM  
**To:** RES\_DSA  
**Subject:** Fw: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing  
**Importance:** High

More info on staffing the Ops Center.

Please provide the information I requested previously on your willingness to help. If you are not interested, unavailable or don't have relevant expertise to work in the Ops Center or go to Japan, please send a negative reply so we have a full accounting for the division.

Thanks!

---

**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

A1344

**Sent:** Wed Mar 16 07:41:18 2011

**Subject:** FW: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Here is the list of expertise the Op center is looking for.

---

**From:** Evans, Michele

**Sent:** Tuesday, March 15, 2011 5:53 PM

**To:** Hackett, Edwin; Brenner, Eliot; Schmidt, Rebecca; Powell, Amy; Droggitis, Spiros; Doane, Margaret; Mamish, Nader; Dyer, Jim; Brown, Milton; Greene, Kathryn; Stewart, Sharon; Howard, Patrick; Miller, Charles; Moore, Scott; Cohen, Miriam; Tracy, Glenn; Haney, Catherine; Dorman, Dan; Johnson, Michael; Holahan, Gary; Leeds, Eric; Boger, Bruce; Grobe, Jack; Zimmerman, Roy; Campbell, Andy; Sheron, Brian; Uhle, Jennifer; Dean, Bill; Lew, David; McCree, Victor; Wert, Leonard; Casto, Chuck; Satorius, Mark; Pederson, Cynthia; Collins, Elmo; Howell, Art; Muesle, Mary; Andersen, James; Akstulewicz, Brenda; Belmore, Nancy; Quesenberry, Jeannette; Kreuter, Jane; Armstrong, Janine; Hudson, Sharon; Ellis, Marv; Hasan, Nasreen; Ronewicz, Lynn; Schumann, Stacy; Daniels, Stanley; Casby, Marcia; Thomas, Loretta; Walker, Dwight; Sprogeris, Patricia; Schwarz, Sherry; Ross, Robin; Cohen, Shari; Riddick, Nicole; Flory, Shirley; Veltri, Debra; Matakas, Gina; ODaniell, Cynthia; Miles, Patricia; Lee, Pamela; Dubose, Sheila; Buckley, Patricia; Tomczak, Tammy; Owen, Lucy; Tannenbaum, Anita; Gusack, Barbara; Harrington, Holly; Ricketts, Paul; Howell, Linda; Higginbotham, Tina; Ross, Brenda; Boyce, Thomas (OIS); Schaeffer, James; Jackson, Donald

**Subject:** Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Everyone,

Please find attached 1) a list of current positions being staffed in the Ops Center and 2) the staff identified as available to support in Japan.

Regarding additional staff available to support in the ops center, the primary needs are for the specialized positions on the PMT and anyone with previous international experience in OIP.

Regarding support in Japan, please provide any updates/changes to the list by COB March 17. The target time frame for sending these staff members is March 27-April 9, so please consider that when considering staff to put on the list.

Thanks for your support.

*Michele*

## Gibson, Kathy

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 8:35 AM  
**To:** Schaffer, Steven  
**Subject:** Re: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Steve,  
Are you on a protective measures team? If not you should be because of your health physics expertise.

I'd like to add you to the Ops Center list for protective measures team, ok?

---

**From:** Schaffer, Steven  
**To:** Gibson, Kathy  
**Sent:** Wed Mar 16 08:27:46 2011  
**Subject:** RE: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Kathy,  
This is my negative reply.  
Steve

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 8:06 AM  
**To:** RES\_DSA  
**Subject:** Fw: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing  
**Importance:** High

More info on staffing the Ops Center.

Please provide the information I requested previously on your willingness to help. If you are not interested, unavailable or don't have relevant expertise to work in the Ops Center or go to Japan, please send a negative reply so we have a full accounting for the division.

Thanks!

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**To:** Hackett, Edwin; Brenner, Eliot; Schmidt, Rebecca; Powell, Amy; Droggitis, Spiros; Doane, Margaret; Mamish, Nader; Dyer, Jim; Brown, Milton; Greene, Kathryn; Stewart, Sharon; Howard, Patrick; Miller, Charles; Moore, Scott; Cohen, Miriam; Tracy, Glenn; Haney, Catherine; Dorman, Dan; Johnson, Michael; Holahan, Gary; Leeds, Eric; Boger, Bruce; Grobe, Jack; Zimmerman, Roy; Campbell, Andy; Sheron, Brian; Uhle, Jennifer; Dean, Bill; Lew, David; McCree, Victor; Wert, Leonard; Casto, Chuck; Satorius, Mark; Pederson, Cynthia; Collins, Elmo; Howell, Art; Muesse, Mary; Andersen, James; Akstulewicz, Brenda; Belmore, Nancy; Quesenberry, Jeannette; Kreuter, Jane; Armstrong, Janine; Hudson, Sharon; Ellis, Marv; Hasan, Nasreen; Ronewicz, Lynn; Schumann, Stacy; Daniels, Stanley; Casby, Marcia; Thomas, Loretta; Walker, Dwight; Sprogeris, Patricia; Schwarz, Sherry; Ross, Robin; Cohen, Shari; Riddick, Nicole; Flory, Shirley;



Veltri, Debra; Matakas, Gina; ODaniell, Cynthia; Miles, Patricia; Lee, Pamela; Dubose, Sheila; Buckley, Patricia; Tomczak, Tammy; Owen, Lucy; Tannenbaum, Anita; Gusack, Barbara; Harrington, Holly; Ricketts, Paul; Howell, Linda; Higginbotham, Tina; Ross, Brenda; Boyce, Thomas (OIS); Schaeffer, James; Jackson, Donald

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Everyone,

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Regarding support in Japan, please provide any updates/changes to the list by COB March 17. The target time frame for sending these staff members is March 27-April 9, so please consider that when considering staff to put on the list.

Thanks for your support.

*Michele*

## Gibson, Kathy

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 8:59 AM  
**To:** RES\_DSA  
**Subject:** Request for info

**Importance:** High

It seems I need to clarify my information request.

Please let Ken know 3 things:

Are you willing to work in the Ops Center (if asked)? If so what shifts?

Are you willing to go to Japan (if asked)?

We need this by noon.

What is your area of expertise?

A1346

## Beasley, Benjamin

---

**From:** Beasley, Benjamin  
**Sent:** Wednesday, March 16, 2011 9:58 AM  
**To:** Burnell, Scott; Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin  
**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles; Coyne, Kevin; Coe, Doug  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

We are checking the numbers. If you are working on a review on checking it, please let me know. I will coordinate our efforts to prevent duplication and assure we cover all the bases.

Ben

---

**From:** Burnell, Scott  
**Sent:** Wednesday, March 16, 2011 9:55 AM  
**To:** Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin; Beasley, Benjamin  
**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

Very probably so – but we can only provide factual corrections. We need to point to specific documents whenever possible to avoid a “that’s just your opinion” sort of response.

---

**From:** Manoly, Kamal  
**Sent:** Wednesday, March 16, 2011 9:53 AM  
**To:** Hiland, Patrick; Skeen, David; Stutzke, Martin; Beasley, Benjamin; Burnell, Scott  
**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates

It seems that he spun the information provided to support a biased point of view he already has and to make the story sensational!

---

**From:** Bill Dedman [mailto:Bill.Dedman@msnbc.com]  
**Sent:** Wednesday, March 16, 2011 6:44 AM  
**To:** Manoly, Kamal; Sheron, Brian; Hiland, Patrick; OPA Resource  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

This story is online now. If you see any error, please let me know right away.

Thanks,

Bill

[http://www.msnbc.msn.com/id/42103936/ns/world\\_news-asiapacific/](http://www.msnbc.msn.com/id/42103936/ns/world_news-asiapacific/)

---

**From:** Bill Dedman  
**Sent:** Tuesday, March 15, 2011 9:06 AM  
**To:** 'Kamal.Manoly@nrc.gov'; 'brian.sheron@nrc.gov'; 'patrick.hiland@nrc.gov'; 'OPA.Resource@nrc.gov'  
**Subject:** NBC deadline question for NRC on seismic hazard estimates

Good morning,

A1347

My name is Bill Dedman. I'm a reporter for NBC News and msnbc.com, writing an article today about:

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

I reached out to NRC Public Affairs yesterday but have not heard back, and my deadline is end-of-day today. I'm hoping to get on the phone today with someone from NRC to make sure I'm conveying this information accurately to the public. If nothing else, I'm hoping one of the technical people can help clarify the points below. My telephone number is 203-451-9995.

I've read Director Brian Sherron's memo of Sept. 2, 2010, to Mr. Patrick Hiland; the safety/risk assessment of August 2010; its appendices A through D; NRC Information Notice 2010-18; and the fact sheet from public affairs from November 2010.

I have these questions:

1. I'd like to make sure that I accurately place in layman's terms the seismic hazard estimates. I need to make sure that I'm understanding the nomenclature for expressing the seismic core-damage frequencies. Let's say there's an estimate expressed as "2.5E-06." (I'm looking at Table D-2 of the safety/risk assessment of August 2010.) I believe that this expression means the same as  $2.5 \times 10^{-06}$ , or 0.0000025, or 2.5 divided by one million. In layman's terms, that means an expectation, on average, of 2.5 events every million years, or once every 400,000 years. Similarly, "2.5E-05" would be 2.5 divided by 100,000, or 2.5 events every 100,000 years, on average, or once every 40,000 years. Is this correct?
2. These documents give updated probabilistic seismic hazard estimates for existing nuclear power plants in the Central and Eastern U.S. What document has the latest seismic hazard estimates (probabilistic or not) for existing nuclear power plants in the Western U.S.?
3. The documents refer to newer data on the way. Have NRC, USGS et al. released those? I'm referring to this: "New consensus seismic-hazard estimates will become available in late 2010 or early 2011 (these are a product of a joint NRC, U.S. Department of Energy, U.S. Geological Survey (USGS) and Electric Power Research Institute (EPRI) project). These consensus seismic hazard estimates will supersede the existing EPRI, Lawrence Livermore National Laboratory, and USGS hazard estimates used in the GI-199 Safety/Risk Assessment."
4. What is the timetable now for consideration of any regulatory changes from this research?

Thank you for your help.

Regards,

Bill Dedman

---

This e-mail message and attached documents are confidential; intended only for the named recipient(s) above and may contain information that is privileged, confidential, proprietary, and/or exempt from disclosure under applicable law. If the reader of this message is not the intended recipient, you are hereby notified that any unauthorized use, dissemination, distribution or copy of this communication is strictly prohibited. No waiver of privilege, confidence or otherwise is intended by virtue of this communication. If you have received this message in error, or are not the named recipient(s), please immediately notify the sender, destroy all copies and delete this e-mail message from your computer. Thank you.

## Beasley, Benjamin

---

**From:** Beasley, Benjamin  
**Sent:** Wednesday, March 16, 2011 9:59 AM  
**To:** Burnell, Scott  
**Cc:** Coyne, Kevin  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

Scott,

If we have any comments or corrections for the reporter, I will give them to you to forward.

Ben

---

**From:** Burnell, Scott  
**Sent:** Wednesday, March 16, 2011 9:55 AM  
**To:** Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin; Beasley, Benjamin  
**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

Very probably so – but we can only provide factual corrections. We need to point to specific documents whenever possible to avoid a “that’s just your opinion” sort of response.

---

**From:** Manoly, Kamal  
**Sent:** Wednesday, March 16, 2011 9:53 AM  
**To:** Hiland, Patrick; Skeen, David; Stutzke, Martin; Beasley, Benjamin; Burnell, Scott  
**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles  
**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates

It seems that he spun the information provided to support a biased point of view he already has and to make the story sensational!

---

**From:** Bill Dedman [<mailto:Bill.Dedman@msnbc.com>]  
**Sent:** Wednesday, March 16, 2011 6:44 AM  
**To:** Manoly, Kamal; Sheron, Brian; Hiland, Patrick; OPA Resource  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

This story is online now. If you see any error, please let me know right away.

Thanks,

Bill

[http://www.msnbc.msn.com/id/42103936/ns/world\\_news-asiapacific/](http://www.msnbc.msn.com/id/42103936/ns/world_news-asiapacific/)

---

**From:** Bill Dedman  
**Sent:** Tuesday, March 15, 2011 9:06 AM  
**To:** 'Kamal.Manoly@nrc.gov'; 'brian.sheron@nrc.gov'; 'patrick.hiland@nrc.gov'; 'OPA.Resource@nrc.gov'  
**Subject:** NBC deadline question for NRC on seismic hazard estimates

A1348

Good morning,

My name is Bill Dedman. I'm a reporter for NBC News and msnbc.com, writing an article today about:

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

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4. What is the timetable now for consideration of any regulatory changes from this research?

Thank you for your help.

Regards,

Bill Dedman

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## Gibson, Kathy

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 10:14 AM  
**To:** Armstrong, Kenneth  
**Subject:** Fw: Request for info

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

**From:** Whitman, Josh  
**To:** Gibson, Kathy  
**Sent:** Wed Mar 16 10:08:50 2011  
**Subject:** RE: Request for info

Kathy,

I am willing to work in the Ops Center if asked. I have no shift preference (I could work any shift).

I am also willing to go to Japan if asked.

My area of expertise is systems analysis. I have also interned with TEPCO in 2005 at one of their Tokyo research offices for 3 months, although I speak very little Japanese and have not maintained any contacts.

Thanks,  
Josh Whitman

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 8:58 AM  
**To:** RES\_DSA  
**Subject:** Request for info

It seems I need to clarify my information request.

Please let Ken know 3 things:

Are you willing to work in the Ops Center (if asked)? If so what shifts?

Are you willing to go to Japan (if asked)?

We need this by noon.  
What is your area of expertise?

A/349

**Bano, Mahmooda**

---

**From:** Scott, Michael  
**Sent:** Tuesday, March 29, 2011 8:35 PM  
**To:** Nakanishi, Tony  
**Subject:** FW: Spent Fuel Pools - Structural Integrity

---

**From:** Sheikh, Abdul  
**Sent:** Tuesday, March 29, 2011 8:18 PM  
**To:** Scott, Michael  
**Cc:** Ali, Syed  
**Subject:** Spent Fuel Pools - Structural Integrity

Question for 11:00 AM meeting

Have you (TEPCO/NISA) determined the extent of damage to the concrete floors at Level 5, 4, 3 around the spent fuel pool (SFP). Damage to these concrete floor slabs may affect the ability of the SFP to be filled to the top. The SFP walls may behave as 13 meters (40 feet) high cantilevers supported from the Level 3 floor.

A/350



## Gibson, Kathy

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 10:18 AM  
**To:** Armstrong, Kenneth  
**Subject:** Fw: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

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

**From:** Bernard, Matthew  
**To:** Gibson, Kathy  
**Sent:** Wed Mar 16 08:48:15 2011  
**Subject:** RE: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

I do not have the proper expertise to work in these positions.

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 8:05 AM  
**To:** RES\_DSA  
**Subject:** Fw: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

More info on staffing the Ops Center.

Please provide the information I requested previously on your willingness to help. If you are not interested, unavailable or don't have relevant expertise to work in the Ops Center or go to Japan, please send a negative reply so we have a full accounting for the division.

Thanks!

---

**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:** Wed Mar 16 07:41:18 2011  
**Subject:** FW: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Here is the list of expertise the Op center is looking for.

**From:** Evans, Michele  
**Sent:** Tuesday, March 15, 2011 5:53 PM  
**To:** Hackett, Edwin; Brenner, Eliot; Schmidt, Rebecca; Powell, Amy; Droggitis, Spiros; Doane, Margaret; Mamish, Nader; Dyer, Jim; Brown, Milton; Greene, Kathryn; Stewart, Sharon; Howard, Patrick; Miller, Charles; Moore, Scott; Cohen, Miriam; Tracy, Glenn; Haney, Catherine; Dorman, Dan; Johnson, Michael; Holahan, Gary; Leeds, Eric; Boger, Bruce; Grobe, Jack; Zimmerman, Roy; Campbell, Andy; Sheron, Brian; Uhle, Jennifer; Dean, Bill; Lew, David; McCree, Victor; Wert, Leonard; Casto, Chuck; Satorius, Mark; Pederson, Cynthia; Collins, Elmo; Howell, Art; Muessle, Mary; Andersen, James; Akstulewicz, Brenda; Belmore, Nancy; Quesenberry, Jeannette; Kreuter, Jane; Armstrong, Janine; Hudson, Sharon; Ellis, Marv; Hasan, Nasreen; Ronewicz, Lynn; Schumann,

Stacy; Daniels, Stanley; Casby, Marcia; Thomas, Loretta; Walker, Dwight; Sprogeris, Patricia; Schwarz, Sherry; Ross, Robin; Cohen, Shari; Riddick, Nicole; Flory, Shirley; Veltri, Debra; Matakas, Gina; ODaniell, Cynthia; Miles, Patricia; Lee, Pamela; Dubose, Sheila; Buckley, Patricia; Tomczak, Tammy; Owen, Lucy; Tannenbaum, Anita; Gusack, Barbara; Harrington, Holly; Ricketts, Paul; Howell, Linda; Higginbotham, Tina; Ross, Brenda; Boyce, Thomas (OIS); Schaeffer, James; Jackson, Donald

Subject: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Everyone,

Please find attached 1) a list of current positions being staffed in the Ops Center and 2) the staff identified as available to support in Japan.

Regarding additional staff available to support in the ops center, the primary needs are for the specialized positions on the PMT and anyone with previous international experience in OIP.

Regarding support in Japan, please provide any updates/changes to the list by COB March 17. The target time frame for sending these staff members is March 27-April 9, so please consider that when considering staff to put on the list.

Thanks for your support.

Michele

## **Gibson, Kathy**

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 10:19 AM  
**To:** Armstrong, Kenneth  
**Subject:** Fw: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

---

**From:** Esmaili, Hossein  
**To:** Gibson, Kathy  
**Sent:** Wed Mar 16 08:41:08 2011  
**Subject:** RE: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Kathy,

I am on RST team at the OpCenter taking shifts (so far we have shifts thru this saturday but probably OpCenter will expand into next week).

hossein

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 8:05 AM  
**To:** RES\_DSA  
**Subject:** Fw: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

More info on staffing the Ops Center.

Please provide the information I requested previously on your willingness to help. If you are not interested, unavailable or don't have relevant expertise to work in the Ops Center or go to Japan, please send a negative reply so we have a full accounting for the division.

Thanks!

---

**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  
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**To:** Hackett, Edwin; Brenner, Eliot; Schmidt, Rebecca; Powell, Amy; Droggitis, Spiros; Doane, Margaret; Mamish, Nader; Dyer, Jim; Brown, Milton; Greene, Kathryn; Stewart, Sharon; Howard, Patrick; Miller, Charles; Moore, Scott; Cohen, Miriam; Tracy, Glenn; Haney, Catherine; Dorman, Dan; Johnson, Michael; Holahan, Gary; Leeds, Eric; Boger, Bruce; Grobe, Jack; Zimmerman, Roy; Campbell, Andy; Sheron, Brian; Uhle, Jennifer; Dean, Bill; Lew, David; McCree, Victor; Wert, Leonard; Casto, Chuck; Satorius, Mark; Pederson, Cynthia; Collins, Elmo; Howell, Art; Muesle, Mary; Andersen, James; Akstulewicz, Brenda; Belmore, Nancy; Quesenberry, Jeannette; Kreuter, Jane; Armstrong, Janine; Hudson, Sharon; Ellis, Marv; Hasan, Nasreen; Ronewicz, Lynn; Schumann, Stacy; Daniels, Stanley; Casby, Marcia; Thomas, Loretta; Walker, Dwight; Sprogeris, Patricia; Schwarz, Sherry; Ross, Robin; Cohen, Shari; Riddick, Nicole; Flory, Shirley; Veltri, Debra; Matakas, Gina; ODaniell, Cynthia; Miles, Patricia; Lee, Pamela; Dubose, Sheila; Buckley, Patricia; Tomczak, Tammy; Owen, Lucy; Tannenbaum, Anita; Gusack, Barbara; Harrington, Holly; Ricketts, Paul; Howell, Linda;

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Thanks for your support.

*Michele*

## Gibson, Kathy

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 10:32 AM  
**To:** Huffert, Anthony  
**Subject:** Re: THuffert @ NRC Ops Center 3-16, 3-17

Thanks tony!

---

**From:** Huffert, Anthony  
**To:** Gibson, Kathy  
**Cc:** Scott, Michael; Tomon, John; Wach, Lisa; Greenwood, Carol  
**Sent:** Wed Mar 16 10:26:35 2011  
**Subject:** THuffert @ NRC Ops Center 3-16, 3-17

Kathy,

My next shift for the Protective Measures Team begins tonight, Wednesday March 16th, from 11 PM to 7 AM.

Tony

A/353

## Gibson, Kathy

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 10:32 AM  
**To:** Armstrong, Kenneth  
**Subject:** Fw: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

---

**From:** Corson, James  
**To:** Gibson, Kathy  
**Sent:** Wed Mar 16 10:30:50 2011  
**Subject:** RE: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

I am unavailable and do not have the relevant expertise.

---

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**Sent:** Wednesday, March 16, 2011 8:05 AM  
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**Subject:** Fw: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

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**To:** Case, Michael; Coe, Doug; Correia, Richard; Gibson, Kathy; Lui, Christiana; Richards, Stuart; Sangimino, Donna-Marie; Scott, Michael; Uhle, Jennifer; Valentin, Andrea  
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## Gibson, Kathy

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**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 10:39 AM  
**To:** Armstrong, Kenneth  
**Subject:** Fw: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

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**From:** Tene, Kimberly  
**To:** Gibson, Kathy  
**Cc:** Zaki, Tarek  
**Sent:** Wed Mar 16 10:38:40 2011  
**Subject:** RE: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Hi Kathy

Per your request I am responding that I don't believe I have the relevant expertise to work in the Ops center or go to Japan

*Kimberly Tene*  
[Kimberly.tene@nrc.gov](mailto:Kimberly.tene@nrc.gov)  
US NRC  
RES/DSA/NARB  
(301)-251-7533

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 8:06 AM  
**To:** RES\_DSA  
**Subject:** Fw: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing  
**Importance:** High

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**Sent:** Tuesday, March 15, 2011 5:53 PM

A/BSS



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**Beasley, Benjamin**

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**To:** Laur, Steven; Burnell, Scott; Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin  
**Cc:** Ferrante, Fernando; Chokshi, Niles; Coyne, Kevin; Coe, Doug  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

Of course. Scott Burnell has been involved and we are only talking to him, not any reporters.

Ben

---

**From:** Laur, Steven  
**Sent:** Wednesday, March 16, 2011 10:54 AM  
**To:** Burnell, Scott; Beasley, Benjamin; Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin  
**Cc:** Ferrante, Fernando; Chokshi, Niles; Coyne, Kevin; Coe, Doug  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

I have not looked at the article, but would recommend you get OPA involved at once (and not talk to this reporter without OPA involvement).

Note the timing of this article about seismic risk vis-à-vis the Japanese experience at Fukushima Daiichi and also our Ops Center e-mail saying we will NOT provide information on the Japanese event. While GI-199 is not the Japanese event, we should tread carefully!

Steven A. Laur  
NRR Division of Risk Assessment  
OWFN 10-C15  
(301) 415-2889  
steven.laur@nrc.gov

---

**From:** Burnell, Scott  
**Sent:** Wednesday, March 16, 2011 9:59 AM  
**To:** Beasley, Benjamin; Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin  
**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles; Coyne, Kevin; Coe, Doug  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

I'm waiting for a technical critique – may hand this off to other OPA once I see it. Thx.

---

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**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles; Coyne, Kevin; Coe, Doug  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

We are checking the numbers. If you are working on a review on checking it, please let me know. I will coordinate our efforts to prevent duplication and assure we cover all the bases.

Ben

---

**From:** Burnell, Scott  
**Sent:** Wednesday, March 16, 2011 9:55 AM  
**To:** Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin; Beasley, Benjamin

A1354

**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles

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**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles

**Subject:** FW: NBC deadline question for NRC on seismic hazard estimates

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---

**From:** Bill Dedman [mailto:Bill.Dedman@msnbc.com]

**Sent:** Wednesday, March 16, 2011 6:44 AM

**To:** Manoly, Kamal; Sheron, Brian; Hiland, Patrick; OPA Resource

**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

This story is online now. If you see any error, please let me know right away.

Thanks,

Bill

[http://www.msnbc.msn.com/id/42103936/ns/world\\_news-asiapacific/](http://www.msnbc.msn.com/id/42103936/ns/world_news-asiapacific/)

---

**From:** Bill Dedman

**Sent:** Tuesday, March 15, 2011 9:06 AM

**To:** 'Kamal.Manoly@nrc.gov'; 'brian.sheron@nrc.gov'; 'patrick.hiland@nrc.gov'; 'OPA.Resource@nrc.gov'

**Subject:** NBC deadline question for NRC on seismic hazard estimates

Good morning,

My name is Bill Dedman. I'm a reporter for NBC News and msnbc.com, writing an article today about:

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

I reached out to NRC Public Affairs yesterday but have not heard back, and my deadline is end-of-day today. I'm hoping to get on the phone today with someone from NRC to make sure I'm conveying this information accurately to the public. If nothing else, I'm hoping one of the technical people can help clarify the points below. My telephone number is 203-451-9995.

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I have these questions:

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4. What is the timetable now for consideration of any regulatory changes from this research?

Thank you for your help.

Regards,

Bill Dedman

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## **Beasley, Benjamin**

---

**From:** Beasley, Benjamin  
**Sent:** Wednesday, March 16, 2011 11:50 AM  
**To:** Burnell, Scott  
**Subject:** Re: NBC deadline question for NRC on seismic hazard estimates

We have found no inaccuracies yet. I am checking one last thing.

Benjamin Beasley  
Sent from an NRC Blackberry.

---

**From:** Burnell, Scott  
**To:** Beasley, Benjamin  
**Sent:** Wed Mar 16 11:48:53 2011  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

Ben;

Just another nudge – I really need a staff response to forward to other OPAs – can't leave OPS CTR. Thanks.

Scott

---

**From:** Beasley, Benjamin  
**Sent:** Wednesday, March 16, 2011 11:19 AM  
**To:** Laur, Steven; Burnell, Scott; Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin  
**Cc:** Ferrante, Fernando; Chokshi, Nilesh; Coyne, Kevin; Coe, Doug  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

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**From:** Laur, Steven  
**Sent:** Wednesday, March 16, 2011 10:54 AM  
**To:** Burnell, Scott; Beasley, Benjamin; Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin  
**Cc:** Ferrante, Fernando; Chokshi, Nilesh; Coyne, Kevin; Coe, Doug  
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Steven A. Laur  
NRR Division of Risk Assessment  
OWFN 10-C15  
(301) 415-2889  
steven.laur@nrc.gov

A/357

**From:** Burnell, Scott  
**Sent:** Wednesday, March 16, 2011 9:59 AM  
**To:** Beasley, Benjamin; Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin  
**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles;h; Coyne, Kevin; Coe, Doug  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

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**From:** Beasley, Benjamin  
**Sent:** Wednesday, March 16, 2011 9:58 AM  
**To:** Burnell, Scott; Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin  
**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles;h; Coyne, Kevin; Coe, Doug  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

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**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles;h  
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Regards,

Bill Dedman

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## Beasley, Benjamin

---

**From:** Beasley, Benjamin  
**Sent:** Wednesday, March 16, 2011 11:54 AM  
**To:** Burnell, Scott  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

Can you give me a quick call? 251-7676

---

**From:** Burnell, Scott  
**Sent:** Wednesday, March 16, 2011 11:49 AM  
**To:** Beasley, Benjamin  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

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**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

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**Sent:** Wednesday, March 16, 2011 10:54 AM  
**To:** Burnell, Scott; Beasley, Benjamin; Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin  
**Cc:** Ferrante, Fernando; Chokshi, Niles; Coyne, Kevin; Coe, Doug  
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**To:** Beasley, Benjamin; Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin

**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles; Coyne, Kevin; Coe, Doug  
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**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles  
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## Beasley, Benjamin

---

**From:** Beasley, Benjamin  
**Sent:** Wednesday, March 16, 2011 12:31 PM  
**To:** Burnell, Scott; Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin  
**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles; Coyne, Kevin; Ake, Jon  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates

Scott,

I have received no concerns or corrections regarding the MSNBC article. The only item potentially worth bothering over is a mischaracterization of why some plants did a PRA and others did a Seismic Margins analysis. An excerpt from the article and my observation are provided below.

Ben

**Article:**

"One problem is a lack of data about the nuclear reactors themselves. The NRC task force said the agency has detailed data on what it calls plant fragility — the probability that the expected earthquake would damage the reactor's core — for only one-third of the nation's nuclear plants. That's because only the plants that had been thought to be in areas of higher seismic risk had done detailed studies. For the rest, the scientists had to estimate from other information submitted by plant operators."

**Correction:**

The NRC task force had more information for some plants than for others. The difference is based on the type of analysis the plant operator chose to use. Two thirds of the plant operators used a bounding analysis while the other third performed a more detailed analysis. The choice of analysis method was not connected to an area of higher seismic risk.

---

**From:** Burnell, Scott  
**Sent:** Wednesday, March 16, 2011 11:11 AM  
**To:** Manoly, Kamal; Hiland, Patrick; Skeen, David; Stutzke, Martin; Beasley, Benjamin  
**Cc:** Ferrante, Fernando; Laur, Steven; Chokshi, Niles  
**Subject:** RE: NBC deadline question for NRC on seismic hazard estimates  
**Importance:** High

Folks;

The expected calls are coming in – We need a better response ASAP! Thanks!

Scott

---

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**To:** Hiland, Patrick; Skeen, David; Stutzke, Martin; Beasley, Benjamin; Burnell, Scott  
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## Gibson, Kathy

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 1:49 PM  
**To:** Lewis, Doris  
**Subject:** Fw: RASCAL Dose Assessment person for this evening and tomorrow

Please survey HEB staff(including Sami) and let me know who all can run RASCAL.

---

**From:** Sheron, Brian  
**To:** Gibson, Kathy; Scott, Michael  
**Sent:** Wed Mar 16 13:45:52 2011  
**Subject:** FW: RASCAL Dose Assessment person for this evening and tomorrow

What about Sami?

---

**From:** Moore, Scott  
**Sent:** Wednesday, March 16, 2011 1:35 PM  
**To:** Evans, Michele; OST02 HOC  
**Cc:** Tracy, Glenn; Cohen, Miriam; Uhle, Jennifer; Sheron, Brian; Deegan, George  
**Subject:** RASCAL Dose Assessment person for this evening and tomorrow

Michelle:

You asked for additional people to support RASCAL in the Ops Center for the 11-7 shift this evening, and the 7-3 shift tomorrow. We are checking our staff that may have experience with RASCAL, but are finding that many are already working the Operations Center on the Protective Measures team, in assigned roles. FSME will continue looking.

In addition, you may want to look into the following:

OHR offers a course in RASCAL. I believe that the most recent one was offered in Region I, and all of the attendees may have been from the Region, so that may not help you for shifts this evening, but if OHR could provide you with a list of staff who have completed the RASCAL course who are here, at HQ, then that could give you a group from which to draw upon.

Finally, Dr. Sami Sherbini, who is assigned to RES and was formerly of FSME, is well versed in dose assessment and codes, and may have RASCAL experience. He came to mind. You would need to talk to RES about Sami's availability.

We will still get back to you with an answer from FSME, in follow up to the conference call yesterday, but I wanted you to be aware of the RASCAL course and Sherbini.

Scott  
x7875

A/360

## Beasley, Benjamin

---

**From:** Beasley, Benjamin  
**Sent:** Wednesday, March 16, 2011 2:05 PM  
**To:** Burnell, Scott  
**Subject:** FW: Article on GI-199

Scott,

Shall I leave this for you to handle?

Ben

---

**From:** KEITHLINE, Kimberly [<mailto:kak@nei.org>]  
**Sent:** Wednesday, March 16, 2011 1:47 PM  
**To:** Beasley, Benjamin  
**Subject:** RE: Article on GI-199

Ben,


Has NRC provided any comments back to MSNBC?

Kimberly



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Sent through mail.messaging.microsoft.com

A1361



## Gibson, Kathy

---

**From:** Gibson, Kathy  
**Sent:** Wednesday, March 16, 2011 2:09 PM  
**To:** McGinty, Tim  
**Subject:** Re: Query: Willing/Able to Serve on the Liaison Team in the Operations Center

I'm already slated for the PMT. Have you thought about tapping SESCDP grads that haven't been placed?

---

**From:** McGinty, Tim  
**To:** Akstulewicz, Frank; Bergman, Thomas; Madden, Patrick; Richards, Stuart; Gibson, Kathy; Correia, Richard; Delligatti, Mark; Webber, Robert; Persinko, Andrew; Davis, Jack; Bailey, Marissa; Weaver, Doug; Adams, John  
**Cc:** Evans, Michele; OST02 HOC; Thaggard, Mark; Tschiltz, Michael; Blount, Tom; Lombard, Mark; Jones, Cynthia; Giitter, Joseph; Temple, Jeffrey; LIA06 Hoc; LIA08 Hoc; McDermott, Brian; Morris, Scott; Bower, Anthony  
**Sent:** Wed Mar 16 13:44:52 2011  
**Subject:** Query: Willing/Able to Serve on the Liaison Team in the Operations Center

Colleagues – I am reaching out to you directly to see if you can, and would be interested, in joining the Liaison Team (LT) in the Operations Center as a Director and/or Deputy Director.

If you already have a defined incident response roll, please disregard this query.

To get to the point: The LT currently only has a handful of "Directors". Since we need to staff the Ops Center 24/7, perhaps for an extended period of time (see below from the NSIR Acting Deputy Director), I am "recruiting" among colleagues who may be able and interested in helping. Since this is an ongoing event on foreign soil, the LT has actually been actively involved. We need additional help to staff the LT leadership position for the next month.

If you are interested and able to help, please email the LT Coordinator (Jeff Temple), Anthony Bower and myself. There is no need to "reply to all", or to reply at all, as the Incident Response activity continues to be on a voluntary basis.

I think the LT only needs 2 or 3 additional volunteers to establish enough capability to allow for a rotating shiftwork watchbill that will also give us some flexibility to do our normal jobs part time as well. If you can do it, I would expect the process to be to "shadow" one of the LT Directors at shift change and perhaps for a couple hours to observe team activities, a half-hour brief by the Coordinator, and to review the LT Directors procedure.

Thanks for your consideration - Tim

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**From:** OST02 HOC  
**Sent:** Tuesday, March 15, 2011 6:28 PM  
**To:** Thaggard, Mark; Blount, Tom; McGinty, Tim; Tschiltz, Michael  
**Cc:** Evans, Michele  
**Subject:** Staffing Ops Center 24/7  
**Importance:** High

### Liaison Team Directors:

Per EDO direction we plan to staff the Ops Center 24/7 while we have staff dispatched in Japan. And we are currently planning to identify a second team to send to Japan in about 2 weeks, with the idea that they may stay there for an additional two weeks. That would take us out to April 10 or so.

Staffing in the IRC will remain at the current levels for potentially another week. Possibly we will be able to scale back somewhat at that point. The intent is to develop a schedule through April 10 at this point. The immediate focus is to staff for the first week, starting Saturday March 19.

We'd like to have a little more consistency in the staffing of most positions. So we'd like to staff the Liaison Team Director in 4 day blocks, three shifts each day, starting March 19.

Tim McGinty has offered to take the lead to coordinate among the potential Liaison Team Directors to fill the schedule. Please work with him and provide at least the schedule for the first four day block by COB Wednesday March 16.

*Michele*

**Bano, Mahmooda**

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**From:** Scott, Michael  
**Sent:** Thursday, March 31, 2011 7:51 PM  
**To:** RST01 Hoc  
**Cc:** Taylor, Robert; Blamey, Alan; Giessner, John  
**Subject:** RE: PDF of RST Assessment REV 1 + QUESTION ON UNIT 2

We will ask. Heard about the pump, not the hoses.

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**From:** RST01 Hoc  
**Sent:** Thursday, March 31, 2011 7:28 PM  
**To:** Scott, Michael  
**Cc:** RST07 Hoc; RST09 Hoc; Hoc, RST16; RST01 Hoc  
**Subject:** PDF of RST Assessment REV 1 + QUESTION ON UNIT 2

Mike,

Please see attached.

QUESTION: We have a status table that shows for Unit 2 that the temporary electric motor driven pump has failed, and when the crew started to try to use fire fighting hoses, the hoses split or began leaking, so water injection seems to have stopped on Unit 2. Is this true, or does your team have a better picture of this situation on Unit 2?

John Thorp

A/363

## Jimenez, Juan

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**From:** Jimenez, Juan  
**Sent:** Wednesday, March 30, 2011 3:41 PM  
**To:** Wagner, Katie  
**Subject:** RE: Sharepoint

Alright, its done, sorry about that

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**From:** Wagner, Katie  
**Sent:** Wednesday, March 30, 2011 3:30 PM  
**To:** Jimenez, Juan  
**Subject:** RE: Sharepoint

Awesome, thanks! One more thing, I just marked an item as "Ongoing" and didn't see it pop up in the "Other" report, could you add that to the "Other" report?

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**From:** Jimenez, Juan  
**Sent:** Wednesday, March 30, 2011 3:06 PM  
**To:** Wagner, Katie  
**Subject:** RE: Sharepoint

Alright, its done

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**From:** Wagner, Katie  
**Sent:** Wednesday, March 30, 2011 1:42 PM  
**To:** Jimenez, Juan  
**Subject:** Sharepoint

Hi Juan,

Could you please add "Ongoing" as a status?

Also, I was thinking that especially for the "Pending" and "Complete" Sharepoint reports it may be helpful to add that to the heading at the top of the page on the report like "Status of Japan-Related Requests: Pending Requests" and "Status of Japan-Related Requests: Completed Requests".

Thank you in advance for your help!

Katie

A1364

**Bano, Mahmooda**

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**From:** Scott, Michael  
**Sent:** Thursday, March 31, 2011 8:57 PM  
**To:** Nakanishi, Tony; Giessner, John; Taylor, Robert  
**Subject:** RE: Running minutes for 1100 NISA/TEPCO meetings

You did a GREAT job with this – thanks!

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**From:** Nakanishi, Tony  
**Sent:** Thursday, March 31, 2011 7:45 PM  
**To:** Scott, Michael; Giessner, John; Taylor, Robert  
**Subject:** Running minutes for 1100 NISA/TEPCO meetings

A/365

**Jimenez, Juan**

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**From:** Wagner, Katie  
**Sent:** Tuesday, April 05, 2011 2:20 PM  
**To:** Jimenez, Juan  
**Subject:** RE: Sharepoint status

It is, I checked this a.m. Thanks!!!

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**From:** Jimenez, Juan  
**Sent:** Tuesday, April 05, 2011 8:24 AM  
**To:** Wagner, Katie  
**Subject:** RE: Sharepoint status

Ok it should be working now

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**From:** Wagner, Katie  
**Sent:** Tuesday, April 05, 2011 8:18 AM  
**To:** Jimenez, Juan  
**Subject:** RE: Sharepoint status

Ok, I just changed the status of 2 items to "On Hold" ☺

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**From:** Jimenez, Juan  
**Sent:** Tuesday, April 05, 2011 7:30 AM  
**To:** Wagner, Katie  
**Subject:** RE: Sharepoint status

Ok I added the On Hold Option but you will have to add the On Hold item so I can modify the reports filter.

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**From:** Wagner, Katie  
**Sent:** Monday, April 04, 2011 3:50 PM  
**To:** Jimenez, Juan  
**Subject:** Sharepoint status

Hi Juan,

Could you please add a new status called "On Hold" to the Japan Sharepoint page? I would like items with this status to show up on the "Other" report versus having a separate "On Hold" report.

Thanks!  
Katie

**From:**  
**Sent:**  
**To:**  
**Subject:**

A/36 to

**Lee, Richard**

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**From:** Lee, Richard  
**Sent:** Wednesday, April 13, 2011 1:21 PM  
**To:** 'Bob Budnitz'  
**Subject:** RE: Italian report on the earthquake itself

Thanks, Bob.  
I will provide a copy to Dana..  
Best,  
Richard

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

**From:** Bob Budnitz [mailto:rjbudnitz@lbl.gov]  
**Sent:** Wednesday, April 13, 2011 12:16 PM  
**To:** Adams, Ian  
**Cc:** Richard L Garwin; Brinkman, Bill; Narendra, Blake; Hurlbut, Brandon; Sheron, Brian; Smith, Haley; McFarlane, Harold; Kelly, John E (NE); Grossenbacher, John (INL); Pitzer, Karrie S.; Chambers, Megan (S4); Owens, Missy; Miller, Neile; Fitzgerald, Paige; Peterson, Per; Lyons, Peter; Finck, Phillip; Garwin, Dick (EOP); Lee, Richard; Szilard, Ronaldo; Steve Fetter; Aoki, Steven; Binkley, Steve; Mustin, Tracy  
**Subject:** Italian report on the earthquake itself

**TO:** Colleagues as shown  
**FROM:** Bob Budnitz (LBNL)

One of my colleagues at UC-Berkeley and LBNL, Professor Bozidar Stojadinovic in the Dept. of Civil and Environmental Engineering, just sent me the attached report from a group in Italy (Univ. di Napoli) --- an examination of the seismic data from the earthquake itself. For your information.

Bob Budnitz

A1367

**Dion, Jeanne**

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**From:** Sheron, Brian  
**Sent:** Wednesday, March 16, 2011 9:17 PM  
**To:** Sangimino, Donna-Marie  
**Cc:** Valentin, Andrea; Dion, Jeanne  
**Subject:** RE: Request for staff that can support OIP .... Additional Staff requirements outside Ops Center Long Term Staffing

Agreed.

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**From:** Sangimino, Donna-Marie  
**Sent:** Wednesday, March 16, 2011 4:53 PM  
**To:** Sheron, Brian  
**Cc:** Valentin, Andrea; Dion, Jeanne  
**Subject:** RE: Request for staff that can support OIP .... Additional Staff requirements outside Ops Center Long Term Staffing

Brian,

After discussing the options within the IPT, I'd like to suggest that we (Wendy, Jeff and I) not staff the op center or OIP. Jeff is going to the CNS meeting in Vienna the first two weeks of April, Wendy is pressed with a variety of foreign travel and international agreement tickets and I'm just returning from the PMDA rotation trying to get back up to speed on outstanding international issues. I will defer to your judgment – if you deem it appropriate that RES pony up a body for international support we will adjust and do so.

Thanks

Donna-Marie

**From:** Sheron, Brian  
**Sent:** Wednesday, March 16, 2011 10:35 AM  
**To:** Sangimino, Donna-Marie  
**Cc:** Valentin, Andrea; Dion, Jeanne  
**Subject:** RE: Request for staff that can support OIP .... Additional Staff requirements outside Ops Center Long Term Staffing

Send me the names. We are getting two requests from two different sources, and I'm not sure they are talking to each other.

**From:** Sangimino, Donna-Marie  
**Sent:** Wednesday, March 16, 2011 9:52 AM  
**To:** Sheron, Brian  
**Cc:** Valentin, Andrea; Dion, Jeanne  
**Subject:** FW: Request for staff that can support OIP .... Additional Staff requirements outside Ops Center Long Term Staffing  
**Importance:** High

Brian,

As discussed at our 845, I'll forward proposed names suitable for assisting OIP and the international liaison position at the Ops Ctr to Jeanne by 3pm today.

Donna-Marie

A/319



From: Williams, Shawn  
Sent: Wednesday, March 16, 2011 9:34 AM  
To: ICWG  
Subject: FW: Request for staff that can support OIP .... Additional Staff requirements outside Ops Center Long Term Staffing  
Importance: High

fyi

From: Muessle, Mary  
Sent: Wednesday, March 16, 2011 9:32 AM  
To: Evans, Michele; Hackett, Edwin; Brenner, Eliot; Schmidt, Rebecca; Powell, Amy; Droggitis, Spiros; Doane, Margaret; Mamish, Nader; Dyer, Jim; Brown, Milton; Greene, Kathryn; Stewart, Sharon; Howard, Patrick; Miller, Charles; Moore, Scott; Cohen, Miriam; Tracy, Glenn; Haney, Catherine; Dorman, Dan; Johnson, Michael; Holahan, Gary; Leeds, Eric; Boger, Bruce; Grobe, Jack; Zimmerman, Roy; Campbell, Andy; Sheron, Brian; Uhle, Jennifer; Dean, Bill; Lew, David; McCree, Victor; Wert, Leonard; Casto, Chuck; Satorius, Mark; Pederson, Cynthia; Collins, Elmo; Howell, Art; Andersen, James; Akstulewicz, Brenda; Belmore, Nancy; Quesenberry, Jeannette; Kreuter, Jane; Armstrong, Janine; Hudson, Sharon; Ellis, Marv; Hasan, Nasreen; Ronewicz, Lynn; Schumann, Stacy; Daniels, Stanley; Casby, Marcia; Thomas, Loretta; Walker, Dwight; Sprogeris, Patricia; Schwarz, Sherry; Ross, Robin; Cohen, Shari; Riddick, Nicole; Flory, Shirley; Veltri, Debra; Matakas, Gina; ODaniell, Cynthia; Miles, Patricia; Lee, Pamela; Dubose, Sheila; Buckley, Patricia; Tomczak, Tammy; Owen, Lucy; Tannenbaum, Anita; Gusack, Barbara; Harrington, Holly; Ricketts, Paul; Howell, Linda; Higginbotham, Tina; Ross, Brenda; Boyce, Thomas (OIS); Schaeffer, James; Jackson, Donald  
Cc: Williams, Shawn; Andersen, James; Ramsey, Jack  
Subject: Additional Staff requirements outside Ops Center Long Term Staffing  
Importance: High

OPA and OIP expect large call volumes today and in the next few weeks given expected news from Japan. OIP is looking for names of people who have desk officer or other OIP or international experience to assist them in the event that current staff cannot meet the work demands for call inquiries as well as ongoing international work. Please provide Shawn Williams and I a list of names that could serve to help OIP in this capacity and their general availability over the next week and month. It is difficult to determine the need level at this time, but as in the Op Center, it is anticipated OIP will have for an additional month. We would like the list of names by COB today.

Thanks  
Mary

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

From: Evans, Michele  
Sent: Tuesday, March 15, 2011 5:53 PM  
To: Hackett, Edwin; Brenner, Eliot; Schmidt, Rebecca; Powell, Amy; Droggitis, Spiros; Doane, Margaret; Mamish, Nader; Dyer, Jim; Brown, Milton; Greene, Kathryn; Stewart, Sharon; Howard, Patrick; Miller, Charles; Moore, Scott; Cohen, Miriam; Tracy, Glenn; Haney, Catherine; Dorman, Dan; Johnson, Michael; Holahan, Gary; Leeds, Eric; Boger, Bruce; Grobe, Jack; Zimmerman, Roy; Campbell, Andy; Sheron, Brian; Uhle, Jennifer; Dean, Bill; Lew, David; McCree, Victor; Wert, Leonard; Casto, Chuck; Satorius, Mark; Pederson, Cynthia; Collins, Elmo; Howell, Art; Muessle, Mary; Andersen, James; Akstulewicz, Brenda; Belmore, Nancy; Quesenberry, Jeannette; Kreuter, Jane; Armstrong, Janine; Hudson, Sharon; Ellis, Marv; Hasan, Nasreen; Ronewicz, Lynn; Schumann, Stacy; Daniels, Stanley; Casby, Marcia; Thomas, Loretta; Walker, Dwight;

Sprogeris, Patricia; Schwarz, Sherry; Ross, Robin; Cohen, Shari; Riddick, Nicole; Flory, Shirley; Veltri, Debra; Matakas, Gina; ODaniell, Cynthia; Miles, Patricia; Lee, Pamela; Dubose, Sheila; Buckley, Patricia; Tomczak, Tammy; Owen, Lucy; Tannenbaum, Anita; Gusack, Barbara; Harrington, Holly; Ricketts, Paul; Howell, Linda; Higginbotham, Tina; Ross, Brenda; Boyce, Thomas (OIS); Schaeffer, James; Jackson, Donald  
Subject: Follow-up from 4 pm teleconference on Ops Center Long Term Staffing

Everyone,

Please find attached 1) a list of current positions being staffed in the Ops Center and 2) the staff identified as available to support in Japan.

Regarding additional staff available to support in the ops center, the primary needs are for the specialized positions on the PMT and anyone with previous international experience in OIP.

Regarding support in Japan, please provide any updates/changes to the list by COB March 17. The target time frame for sending these staff members is March 27-April 9, so please consider that when considering staff to put on the list.

Thanks for your support.

Michele