

PAID  
[scribbled out text]

Release

**Bensi, Michelle**

---

**From:** Bensi, Michelle  
**Sent:** Tuesday, March 29, 2011 5:24 PM  
**To:** Kammerer, Annie  
**Subject:** public FAQ  
**Attachments:** Frequently asked questions related to the March 11 2011 Earthquake and Tsunami 3-29-2011.docx

The updated public FAQ document is attached for your review.  
The changes/additions that you requested have been made. I also found a couple typos that I corrected.

XXXX-199

Draft - OUO  
4/26/2011

Draft - ~~OUO~~

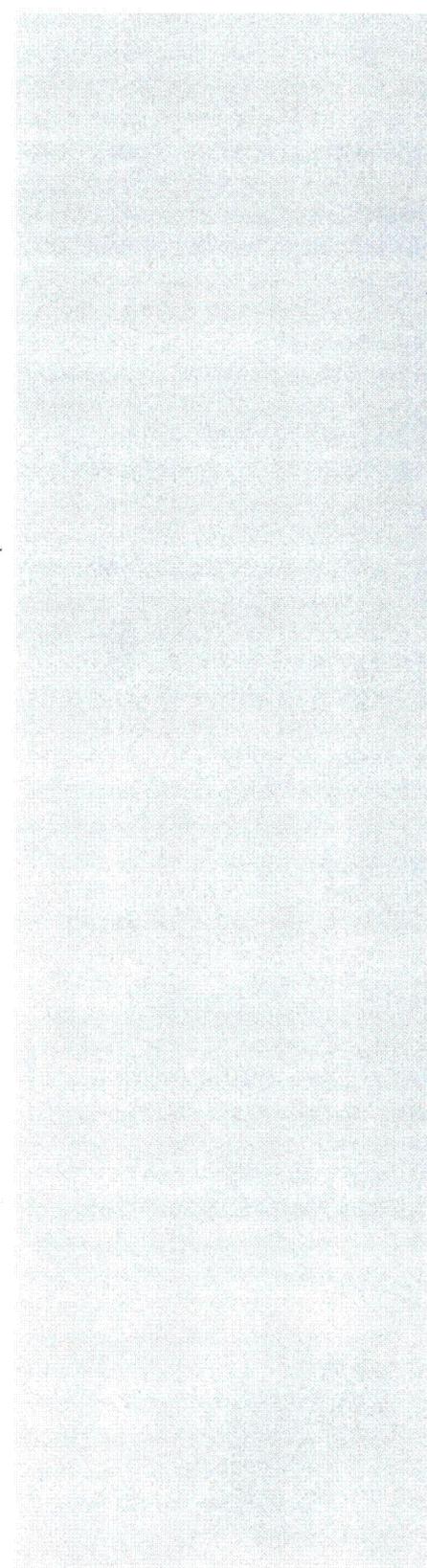
# NRC frequently asked questions related to the March 11, 2011 Japanese Earthquake and Tsunami

---

3-29-11 (DRAFT) Version

Compiled by Annie Kammerer, Jon Ake, ~~and~~ Cliff Munson, and Michelle Bensi for submission to OPA and NRR. We would appreciate getting an edited word file back to assure that the public comments and the internal document are consistent.

Printed 4/26/2011 9:23 AM 3/29/2011 2:19 PM Draft - OUO



List of Questions

1) Can an earthquake and tsunami as large as happened in Japan also happen here? .....1

2) Did the Japanese underestimate the size of the maximum credible earthquake that could affect the plants?.....1

3) How high was the tsunami at the Fukushima nuclear plants? Was it higher than was expected? 1

4) Was the damage to the Japanese nuclear plants mostly from the earthquake or the tsunami?.1

5) Have any lessons for US nuclear plants been identified? .....2

6) Was there any damage to US reactors from either the earthquake or the resulting tsunami?...2

7) Are radiation levels in the US expected to research amounts that are harmful to humans as a result of the events in Japan? .....2

8) How many US reactors are located in active earthquake zones?.....2

9) What level of earthquake hazard are the US reactors designed for?.....2

10) What magnitude earthquake are currently operating US nuclear plants designed to?.....3

11) Have the events in Japan changed our perception of earthquake risk to the nuclear plants in the US? .....3

12) Can significant damage to a nuclear plant like we saw in Japan happen in the US due to an earthquake? Are the Japanese nuclear plants similar to US nuclear plants?.....3

13) What is the likelihood of the design basis or "SSE" ground motions being exceeded over the life of a nuclear plant?.....4

14) Which reactors are located along coastal areas that could be affected by a tsunami? .....4

15) What is magnitude anyway? What is the Richter Scale? What is intensity? .....4

16) How do magnitude and ground motion relate to each other?.....5

17) What is Generic Issue 199 about?.....5

18) Does GI-199 provide rankings of US nuclear plants in terms of safety? .....5

19) What are the current findings of GI-199? .....5

20) What do you mean by "increased estimates of seismic hazards" at nuclear plant sites?.....6

21) Does the Seismic Core Damage Frequency represent a measurement of the risk of radiation release or only the risk of core damage (not accounting for additional containment)? .....6

22) Where can I get current information about Generic Issue 199? .....6

23) Could an accident sequence like the one at Japan's Fukushima Daiichi nuclear plants happen in the US? .....6

24) Are the spent fuel pools designed to resist earthquake shaking? .....7

Draft - ~~QAC~~

25) Does the NRC have a research program that studies seismic and tsunami issues? .....Z6

**1) Can an earthquake and tsunami as large as happened in Japan also happen here?**

~~This~~ The March 2011 Tohoku earthquake occurred on a "subduction zone," which is the type of tectonic region that produces earthquakes of the largest magnitude. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. Severe tsunamis like the one experienced in Japan are only produced by earthquakes occurring at this type of plate boundary. The only subduction zone ~~affecting that could affect~~ the continental US is the Cascadia subduction zone, which lies off the coasts of Oregon, Washington, and the northernmost portion of California. Consequently, a continental earthquake and tsunami as large as the one experienced in Japan could only happen in that coastal region. The only nuclear plant near the Cascadia subduction zone is the Columbia Generating Station. This plant is located a large distance from both the coast (approximately 225 miles) and the subduction zone (approximately 300 miles). Because of the distance between the plant and the Cascadia subduction zone, the strength of ground motion expected at the plant is far lower than the ground motion experienced at the Fukushima plants during the Tohoku earthquake. The large distance between the Columbia Generating Station and the coast also precludes the possibility of a tsunami affecting the plant. Outside of the Cascadia subduction zone, earthquakes are not expected to exceed a magnitude of approximately 8.25, which is significantly smaller than the magnitude of the Tohoku earthquake. Magnitude is measured on a log scale and ~~so thus~~ a magnitude 9 earthquake produces about ten times stronger shaking and releases about 31 times more energy than a magnitude 8 earthquake. See Question (15) for additional information about earthquake magnitude.

**2) Did the Japanese underestimate the size of the maximum credible earthquake that could affect the plants?**

The magnitude of the Tohoku earthquake was somewhat greater than was expected for the part of the subduction zone on which the ~~Tohoku~~ earthquake occurred. However, the Japanese nuclear plants were recently reassessed using ground motion levels similar to those that are believed to have occurred at the sites during the Tohoku earthquake. The ground motions against which the Japanese nuclear plants were reassessed were expected to result from earthquakes that were of smaller magnitude, but that were much closer to the sites.

**3) How high was the tsunami at the Fukushima nuclear plants? Was it higher than was expected?**

The tsunami modeling team at the National Oceanic and Atmospheric Administration's Pacific Marine Environmental Lab have estimated the wave height just offshore (at the 5 meter bathymetric line) to be approximately 8 meters in height at Fukushima Daiichi and approximately 7 meters in Fukushima Daini. This estimate is based on recordings from NOAA's Deep-ocean Assessment and Reporting of Tsunamis (DART) buoys and a high resolution numerical model developed for the tsunami warning system.

A recent estimate released by TEPCO indicates that the tsunami water at the Fukushima Daiichi site reached a height of 14 meters. The report also indicates that the design basis tsunami height was 5.7 meters and that the emergency diesel generators were located 10-13 meters above sea level. This data was provided by TEPCO and has not been confirmed by the NRC. Because a tsunami will rise up as it comes ashore, water level estimates of 8 meters offshore and 14 meters onshore are consistent.

**4) Was the damage to the Japanese nuclear plants mostly from the earthquake or the tsunami?**

Because this event occurred in Japan, it will be hard for NRC staff to understand exactly what happened until comprehensive assessments can be performed. Preliminary information suggests that important

## Draft - QWA

safety systems performed their required function in the period between the occurrence of the earthquake and the impact of the tsunami. It appears that the emergency diesel generators successfully started once offsite power was lost. Therefore, the tsunami appears to have played a key role in the loss of backup power sources at the site (including the diesel generators), ultimately resulting in a condition known as station blackout. The station blackout has been a critical factor in the ongoing problems experienced at Fukushima Daiichi nuclear plant.

### 5) Have any lessons for US nuclear plants been identified?

The NRC is in the process of following and reviewing the events in real time. This review will undoubtedly lead to the identification of issues that warrant further study. A complete understanding of lessons learned will require more information than is currently available to NRC staff.

### 6) Was there any damage to US reactors from either the earthquake or the resulting tsunami?

No.

### 7) Is radiation in the US expected to research levels that are harmful to humans as a result of the events in Japan?

No.

### 7)8) How many US reactors are located in active earthquake zones?

Although we often think of the US as having "active" and "non-active" earthquake zones, earthquakes can actually happen almost anywhere. Seismologists typically separate the US into low, moderate, and high seismicity zones. However, the point of separation for defining a seismic zone as having moderate versus low (or high) seismicity is a matter of scientific debate. The United States Geological Survey (USGS) provides an interpretation of seismic hazard in the US. The USGS Earthquake Hazards Program website provides information about earthquakes in the US and around the world: <http://earthquake.usgs.gov/>. USGS also provides earthquake hazard maps and data: <http://earthquake.usgs.gov/hazards/products/>.

In the US, there are approximately 9 nuclear plants located in moderate seismicity zones and two plants located in high seismicity zones. These numbers may vary slightly depending on the scientific interpretation of earthquake hazard that is used. The NRC requires that every nuclear plant be designed for site-specific earthquake ground motions that are appropriate for its location. In addition, the NRC has specified a minimum ground motion level to which nuclear plants must be designed.

### 8)9) What level of earthquake hazard are the US reactors designed for?

Each reactor is designed for a ground motion level that is determined on a site-specific basis. The existing nuclear plants were designed using a "deterministic" or "scenario earthquake" approach that accounted for the largest earthquakes expected in the area around the plant, without consideration of the likelihood of the earthquakes occurring. New reactors are designed using probabilistic techniques that characterize both the ground motion levels and associated uncertainty in the assessment of the seismic hazard at the proposed site. These probabilistic techniques account for the ground motions that may result from all potential seismic sources in the region around the site. Technically speaking, new nuclear plants are designed for the ground motion with an annual frequency of occurrence of  $1 * 10^{-4}$ /year- ~~$1 * 10^{-4}$ /year~~. This can be thought of as the ground motion that occurs every 10,000 years,

on average. One important aspect associated with the use of probabilistic seismic hazard and other risk-assessment techniques is that they account for beyond-design basis events. NRC's Generic Issue 199 (GI-199) project is using state-of-the-art probabilistic techniques to review the seismic safety of the existing plants. [see questions (17) to (22) 16 to 21 for more information about GI-199]

**9)10) What magnitude earthquake are currently operating US nuclear plants designed to?**

Ground motion is a function of both the magnitude of an earthquake, the distance from the ~~fault~~ earthquake source to the site, and other geologic characteristics. Nuclear plants, and in fact all engineered structures, are ~~actually~~ designed based on ground motion levels, not earthquake magnitudes. The existing nuclear plants were designed using a "deterministic" or "scenario earthquake" approach that accounted for the largest earthquakes expected in the area around the plant. A margin is further added to the predicted ground motions to provide ~~added~~ additional robustness.

Formatted: Font: Italic

**10)11) Have the events in Japan changed our perception of earthquake risk to the nuclear plants in the US?**

The NRC continues to determine that US nuclear plants are safe. The events transpiring in Japan following the Tohoku earthquake do not change the NRC's perception of earthquake hazard (i.e., ground motion levels) at US nuclear plants. It is too early to ~~tell what~~ understand the lessons ~~that will~~ may be learned from ~~this the~~ Tohoku earthquake. The NRC will look closely at all aspects of the response of the Fukushima plants to the earthquake and tsunami to determine if any actions need to be taken in US nuclear plants and if any changes are necessary to NRC regulations.

**11)12) Can significant damage to a nuclear plant like we see ~~saw~~ in Japan happen in the US due to an earthquake? Are the Japanese nuclear plants similar to US nuclear plants?**

All US nuclear plants are built to withstand environmental hazards, including earthquakes and tsunamis. ~~e~~Even nuclear plants that are located within areas with low and moderate seismic activity are designed for safety in the event of such natural disasters. In addition to the design of the plants, significant effort is devoted to emergency response planning and severe accident management. This approach is called defense-in-depth.

The Japanese facilities at Fukushima are similar in design to some US facilities. However, the NRC has required modifications to US plants since they were designed and built. Examples of these modifications include design changes to control hydrogen and pressure in the containment. The NRC also requires plants to have additional equipment and measures in place to mitigate damage stemming from large fires and explosions resulting from a beyond-design-basis event. The measures include providing core and spent fuel pool cooling and an additional means to power other equipment on site.

In addition, ~~in the 1980s,~~ the NRC instituted a rule ~~in the 1980s~~ that required nuclear plants to further assure that a loss of both offsite and onsite emergency AC power systems (a condition known as a station blackout) would not adversely affect public health and safety. As a result of this rule, all plants have (1) established station blackout coping and recovery procedures; (2) completed training for these procedures; (3) implemented modifications as necessary to cope with a station blackout; and (4) ensured a 4-16 hour coping capability. Subsequently, studies conducted by the NRC have shown that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in a significant risk reduction and have further enhanced defense-in-depth.

~~12)13)~~ What is the likelihood of the design basis or "SSE" ground motions being exceeded over the life of a nuclear plant?

The ground motion that is used as the seismic design basis at US nuclear plants is called the Safe Shutdown Earthquake ground motion (SSE). It is important to remember that structures, systems and components are required to have "adequate margin," meaning that they must ~~continue~~ be able to withstand shaking levels that are above the plant's design basis. In the mid to late 1990s, the NRC staff reviewed the potential for ground motions beyond the design basis as part of the Individual Plant Examination of External Events (IPEEE). From this review, the staff determined that seismic designs of operating nuclear plants in the US have adequate safety margins for withstanding earthquakes. Currently, the NRC is in the process of conducting GI-199 to again assess the resistance of US nuclear plants to earthquakes. Based on NRC's preliminary analyses to date, the mean probability of ground motions exceeding the SSE over the life of the plant, for the plants in the Central and Eastern United States, is less than about 1%.

~~13)14)~~ Which reactors are located along coastal areas that could be affected by a tsunami?

Many nuclear plants are located in coastal areas that could potentially be affected by a tsunami. Two nuclear plants, Diablo Canyon and San Onofre, are on the Pacific Coast, which is known to have a tsunami hazard. Two nuclear plants on the Gulf Coast, South Texas and Crystal River, could also be affected by tsunami. There are many nuclear plants on the Atlantic Coast or on rivers that may be affected by a tidal bore resulting from a tsunami. These include St. Lucie, Turkey Point, Brunswick, Oyster Creek, Millstone, Pilgrim, Seabrook, Calvert Cliffs, Salem/Hope Creek, and Surry. Tsunami on the Gulf and Atlantic Coasts occur, but are very rare. Generally, the flooding anticipated from hurricane storm surge exceeds the flooding expected from a tsunami for nuclear plants on the Atlantic and Gulf Coast. Regardless, all nuclear plants are designed to withstand the tsunami level appropriate for their site as well as other natural hazard such as earthquakes and hurricanes.

~~14)15)~~ What is magnitude anyway? What is the Richter Scale? What is intensity?

An earthquake's magnitude is a measure of the strength of the earthquake as determined from seismographic observations. Magnitude is essentially an objective, quantitative measure of the size of an earthquake. The magnitude can be expressed in various ways based on seismographic records (e.g., Richter Local Magnitude, Surface Wave Magnitude, Body Wave Magnitude, and Moment Magnitude). Currently, the most commonly used magnitude measurement is the Moment Magnitude,  $M_w$ , which is based on the strength of the rock that ruptured, the area of the fault that ruptured, and the average amount of slip. Moment magnitude is, therefore, a direct measure of the energy released during an earthquake. Because of the logarithmic basis of the scale, ~~Each~~ each whole number increase in magnitude corresponds to a tenfold increase in measured wave amplitude and about 31 times more energy.

Formatted: Font: Italic

The Richter magnitude scale was developed in 1935 by Charles F. Richter of the California Institute of Technology and was based on the behavior of a specific seismograph that was manufactured at that time. The instruments are no longer in use and the magnitude scale is, therefore, no longer used in the technical community. However, the Richter Scale is a term that is so commonly used by the public that scientists generally just answer questions about "Richter" magnitude by substituting moment magnitude without correcting the misunderstanding. Like moment magnitude, the Richter Scale is a logarithmic scale.

The intensity of an earthquake is a qualitative assessment of the effects of the earthquake at a particular location. The intensity is assigned ~~is~~ based on observed effects on humans, on human-built structures,

## Draft - ~~QWA~~

and on the earth's surface at a particular location. The most commonly used scale in the US is the Modified Mercalli Intensity (MMI) scale, which has values ranging from I to XII in the order of severity. MMI of I indicates an earthquake that was not felt except by a very few, whereas MMI of XII indicates total damage of all works of construction, either partially or completely. While an earthquake has only one magnitude, intensity depends on the effects at each particular location.

### ~~15)16)~~ How do magnitude and ground motion relate to each other?

The ground motion experienced at a particular location is a function of the magnitude of the earthquake, the distance from the fault to the location of interest, and other elements such as the geologic materials through which the waves pass.

### ~~16)17)~~ What is Generic Issue 199 about?

GI-199 investigates the safety and risk implications of updated earthquake-related data and models on existing nuclear plants. For some nuclear plants in the Central and Eastern United States, these updated data and models suggest that there has been a slight increase in the estimated probability that the earthquake ground motion experienced at the site during a future earthquake could will exceed the seismic design basis, while still low, is larger than previously estimated. While the updated data and models suggest that this probability has increased slightly relative to previous estimates, it is important to understand that, overall, this probability remains low.

### ~~17)18)~~ Does GI-199 provide rankings of US nuclear plants in terms of safety?

The NRC does not rank nuclear plants by seismic risk. The objective of the GI-199 Safety/Risk Assessment was to evaluate whether further investigations of seismic safety for operating reactors in the central and eastern US (CEUS) are warranted, consistent with NRC directives. The results of the GI-199 safety risk assessment should not be interpreted as definitive estimates of plant-specific seismic risk because some analyses were conservative, making the calculated risk higher than in reality. The nature of the information used in the analyses, makes these estimates useful only as a screening tool.

### ~~18)19)~~ What are the current findings of GI-199?

Currently operating nuclear plants in the US remain safe, with no need for immediate action. This determination is based on NRC staff reviews of updated seismic hazard information and the conclusions of the first safety/risk assessment stage of GI-199. Existing nuclear plants were designed, with considerable margin, to be able to withstand the ground motions from the "deterministic" or "scenario earthquake," that which accounted for the largest earthquakes expected in the area around the plant. The results of the GI-199 assessment demonstrate that the probability of exceeding the design basis ground motion may have increased at some sites, but only by a relatively small amount. In addition, the probabilities of seismic core damage are lower than the guidelines for taking immediate action. Although there is not an immediate safety concern, the NRC is focused on assuring safety even during even-very rare and extreme events. Therefore, the NRC has determined that assessment of updated seismic hazards and plant performance should continue. GI-199 originally focused on the 96 reactors located in the Central and Eastern United States. As a result of the Tohoku earthquake, the NRC has expanded the scope of the next stage of the GI-199 assessment activities to include all 104 operating reactors.

Draft - ~~000~~

~~19)~~20) What do you mean by "increased estimates of seismic hazards" at nuclear plant sites?

*Seismic hazard* (earthquake hazard) represents the chance (or probability) that a specific level of ground motion could be observed or exceeded at a given location. Our estimates of seismic hazard at some Central and Eastern United States locations, have changed based on results from recent research, indicating that earthquakes occurred more often in some locations than previously estimated. Our estimates of seismic hazard have also changed because the models used to predict the level of ground motion experienced at a site during an earthquake have improved. The increased estimates of seismic hazard at some locations in the Central and Eastern United States were discussed in a memorandum to the Commission, dated July 26, 2006. (The memorandum is available in the NRC Agencywide Documents Access and Management System [ADAMS] under Accession No. ML052360044). It is important to note that it is not the underlying seismic hazard that has changed, but rather our scientific ability to understand and assess the hazard that has improved.

~~20)~~21) Does the Seismic Core Damage Frequency represent a measurement of the risk of radiation release or only the risk of core damage (not accounting for additional containment)?

Seismic core damage frequency is the probability of damage to the core resulting from a seismic initiating event. It does not imply either a meltdown or the loss of containment, which is necessary for radiological release to occur. The likelihood of radiation release is far lower than the core damage frequency.

~~24)~~22) Where can I get current information about Generic Issue 199?

The public NRC Generic Issues Program (GIP) website (<http://www.nrc.gov/about-nrc/regulatory/generic-issues.html>) contains program information and documents, background and historical information, generic issue status information, and links to related programs. The latest Generic Issue Management Control System quarterly report, which has regularly updated GI-199 information, is publicly available at <http://www.nrc.gov/reading-rm/doc-collections/generic-issues/quarterly/index.html>. Additionally, the US Geological Survey provides data and results that are publicly available at <http://earthquake.usgs.gov/hazards/products/conterminous/2008/>.

~~22)~~23) Could an accident sequence like the one at Japan's Fukushima Daiichi nuclear plants happen in the US?

It is difficult to answer this question until we have a better understanding of the precise problems and conditions that faced the operators at Fukushima Daiichi. We do know, however, that Fukushima Daiichi Units 1-3 lost all offsite power and emergency diesel generators. This situation is called "station blackout." The Nuclear Regulatory Commission's detailed regulations address this scenario. US nuclear plants are designed to cope with a station blackout event that involves a loss of offsite power and onsite emergency power. In addition to design features, US nuclear plants are required to conduct a "coping" assessment, ~~perform~~ propose modifications if necessary, and develop a strategy to demonstrate to the NRC that they could maintain the plant in a safe condition during a station blackout scenario. These assessments, proposed modifications to the plant, and operating procedures were reviewed and approved by the NRC. Several plants added additional AC power sources to comply with this regulation. Additional information about the NRC's station blackout rule is contained in question-~~11~~(12).

In addition, in response to the terrorist events of September 11, 2001, the NRC issued an Interim Compensatory Measures (ICM) Order requiring licensees to take certain actions to mitigate severe accident scenarios such as aircraft impact. These scenarios include the complete loss of offsite power and all on-site emergency power sources.

Draft - ~~OND~~

~~23)~~24) Are the spent fuel pools designed to resist earthquake shaking?

Spent fuel pools are constructed of reinforced concrete, several feet thick, with a stainless steel liner to prevent leakage and maintain water quality. Due to their configuration, spent fuel pools are inherently structurally-rugged and are designed to the same seismic requirements and ground motion levels as the nuclear plant.

~~24)~~25) Does the NRC have a research program that ~~looks studies at~~ seismic and tsunami issues?

~~Insert answer here~~ There is an extensive seismic and structural research program ongoing at the NRC. The Office of Nuclear Regulatory Research has several ongoing projects related to seismic hazard assessment for the Central and Eastern US. Research topics include seismic source characterization, development of improved ground motion prediction equations, and design of practical procedures to standardize the application of probabilistic seismic hazard assessment to nuclear plants. The Office of Nuclear Regulatory Research also manages a tsunami research program that focuses on bringing state-of-the-art technical advances to the NRC regulatory process. Key focus areas of the program include landslide-induced tsunami, development of probabilistic methods of tsunami hazard assessment, and development of technical bases for new NRC guidance. Though the tsunami research program focuses on topics related specifically to nuclear facilities, more general scientific advances in assessment of tsunami hazard on the Atlantic Coast of the US has resulted from collaboration between NRC staff, the US Geological Survey (USGS), and the National Oceanic and Atmospheric Administration (NOAA). Information about the above programs and other NRC research activities can be found in NUREG-1925, which is available online at: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1925/r1/>.

NSIR

**From:** Wiggins, Jim  
**To:** Milligan, Patricia; Weber, Michael; Sheron, Brian  
**Cc:** Virgilio, Martin; Leeds, Eric; Johnson, Michael; Rihm, Roger; Miller, Charles  
**Subject:** Re: RESPONSE - News Article on SOARCA  
**Date:** Tuesday, March 29, 2011 2:47:37 PM  
**Attachments:** image001.png

---

Let's not get out too far ahead of Charlie Miller, task force that will take up all the associated issues raised in this email.

Might be a tough row to hough, but we need to resist stakeholder pressure to fix issues serially. That ould appear to go against Comm direction.

NSIR

**From:** Milligan, Patricia  
**To:** Weber, Michael; Sheron, Brian  
**Cc:** Virgilio, Martin; Leeds, Eric; Johnson, Michael; Wiggins, Jim; Rihm, Roger  
**Sent:** Tue Mar 29 12:26:08 2011  
**Subject:** RE: RESPONSE - News Article on SOARCA

I think we need to be prepared to address any questions that might come up regarding the EP planning basis in this regard. The planning basis (for the spectrum of accidents etc etc) would address offsite consequences for such an event at a single unit site, but the planning basis doesn't consider a simultaneous failure of multiple units at one site. (do we need a bigger exclusion area? Do we need a bigger LPZ, EPZ?) One could argue that this scenario (long term station blackout due to catastrophic earthquake) might equally impact two or more reactors at the same site. 10 CFR 100.11 does address multiple unit sites but unless there is reason that one reactor could impact the safety of the next, we consider them as independent units. Does the SOARCA long term station blackout due to catastrophic earthquake change that?

OEDO

**From:** Weber, Michael  
**Sent:** Tuesday, March 29, 2011 12:14 PM  
**To:** Sheron, Brian  
**Cc:** Virgilio, Martin; Leeds, Eric; Johnson, Michael; Wiggins, Jim; Rihm, Roger; Milligan, Patricia; Wittick, Brian; Brenner, Eliot; Hayden, Elizabeth; Schmidt, Rebecca; Powell, Amy; Muessele, Mary; Andersen, James; Bowman, Gregory  
**Subject:** RESPONSE - News Article on SOARCA

Thanks, Brian. I'll need to be prepared to respond to this concern in tomorrow morning's hearing and the Chairman will need to be prepared to respond at his hearings tomorrow. Please work with OEDO staff (Roger Rihm/Brian Wittick) to ensure that we develop a short-response by COB today that we can use tomorrow in case this comes up.

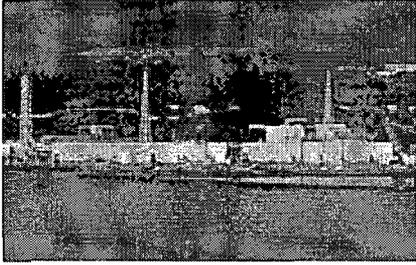
David Lochbaum reported at this morning's hearing that 93 of the U.S. plants only had a 4-hour coping capacity for SBO. The rest could cope for 8 hours. Is this valid? Does this taken into consideration the B5b mitigating measures? Was SBO considered among the scenarios that resulted in the U.S. decision to establish the nominal exposure pathway EPZ at 10 miles?

**AP IMPACT: Long blackouts pose risk to**

XXXX 4/00

# US reactors

**AP** Associated Press



*AP – Only Unit 2 is covered with white concrete housing, seen on left of an iron tower on right, at the stricken ...*

*By DINA CAPPIELLO, Associated Press Dina Cappiello, Associated Press – Tue Mar 29, 3:13 am ET*

WASHINGTON – Long before the nuclear emergency in Japan, U.S. regulators knew that a power failure lasting for days at an American nuclear plant, whatever the cause, could lead to a radioactive leak. Even so, they have only required the nation's 104 nuclear reactors to develop plans for dealing with much shorter blackouts on the assumption that power would be restored quickly.

In one nightmare simulation presented by the Nuclear Regulatory Commission in 2009, it would take less than a day for radiation to escape from a reactor at a Pennsylvania nuclear power plant after an earthquake, flood or fire knocked out all electrical power and there was no way to keep the reactors cool after backup battery power ran out. That plant, the Peach Bottom Atomic Power Station outside Lancaster, has reactors of the same older make and model as those releasing radiation at Japan's Fukushima Dai-ichi plant, which is using other means to try to cool the reactors.

And like Fukushima Dai-ichi, the Peach Bottom plant has enough battery power on site to power emergency cooling systems for eight hours. In Japan, that wasn't enough time for power to be restored. According to the International Atomic Energy Agency and the Nuclear Energy Institute trade association, three of the six reactors at the plant still can't get power to operate the emergency cooling systems. Two were shut down at the time. In the sixth, the fuel was removed completely and put in the spent fuel pool when it was shut down for maintenance at the time of the disaster. A week after the March 11 earthquake, diesel generators started supplying power to two other two reactors, Units 5 and 6, the groups said. The risk of a blackout leading to core damage, while extremely remote, exists at all U.S. nuclear power plants, and some are more susceptible than others, according to an Associated Press investigation. While regulators say they have confidence that measures adopted in the U.S. will prevent or significantly delay a core from melting and threatening a radioactive release, the events in Japan raise questions about whether U.S. power plants are as prepared as they could and should be.

"We didn't address a tsunami and an earthquake, but clearly we have known for some time that one of the weak links that makes accidents a little more likely is losing power," said Alan Kolaczowski, a retired nuclear engineer who worked on a federal risk analysis of Peach Bottom released in 1990 and is familiar with the updated risk analysis.

Risk analyses conducted by the plants in 1991-94 and published by the commission in 2003 show that the chances of such an event striking a U.S. power plant are remote, even at the plant where the risk is the highest, the Beaver Valley Power Station in Pennsylvania.

These long odds are among the reasons why the United States since the late 1980s has only

required nuclear power plants to cope with blackouts for four or eight hours, depending on the risk. That's about how much time batteries would last. After that, it is assumed that power would be restored. And so far, that's been the case.

Equipment put in place after the Sept. 11, 2001, terrorist attacks could buy more time. Otherwise, the reactor's radioactive core could begin to melt unless alternative cooling methods were employed. In Japan, the utility has tried using portable generators and dumped tons of seawater, among other things, on the reactors in an attempt to keep them cool.

A 2003 federal analysis looking at how to estimate the risk of containment failure said that should power be knocked out by an earthquake or tornado it "would be unlikely that power will be recovered in the time frame to prevent core meltdown."

In Japan, it was a one-two punch: first the earthquake, then the tsunami.

Tokyo Electric Power Co., the operator of the crippled plant, found other ways to cool the reactor core and so far avert a full-scale meltdown without electricity.

"Clearly the coping duration is an issue on the table now," said Biff Bradley, director of risk assessment for the Nuclear Energy Institute. "The industry and the Nuclear Regulatory Commission will have to go back in light of what we just observed and rethink station blackout duration."

David Lochbaum, a former plant engineer and nuclear safety director at the advocacy group Union of Concerned Scientists, put it another way: "Japan shows what happens when you play beat-the-clock and lose."

Lochbaum plans to use the Japan disaster to press lawmakers and the nuclear power industry to do more when it comes to coping with prolonged blackouts, such as having temporary generators on site that can recharge batteries.

A complete loss of electrical power, generally speaking, poses a major problem for a nuclear power plant because the reactor core must be kept cool, and back-up cooling systems — mostly pumps that replenish the core with water — require massive amounts of power to work. Without the electrical grid, or diesel generators, batteries can be used for a time, but they will not last long with the power demands. And when the batteries die, the systems that control and monitor the plant can also go dark, making it difficult to ascertain water levels and the condition of the core.

One variable not considered in the NRC risk assessments of severe blackouts was cooling water in spent fuel pools, where rods once used in the reactor are placed. With limited resources, the commission decided to focus its analysis on the reactor fuel, which has the potential to release more radiation.

An analysis of individual plant risks released in 2003 by the NRC shows that for 39 of the 104 nuclear reactors, the risk of core damage from a blackout was greater than 1 in 100,000. At 45 other plants the risk is greater than 1 in 1 million, the threshold NRC is using to determine which severe accidents should be evaluated in its latest analysis.

The Beaver Valley Power Station, Unit 1, in Pennsylvania had the greatest risk of core melt — 6.5 in 100,000, according to the analysis. But that risk may have been reduced in subsequent years as NRC regulations required plants to do more to cope with blackouts.

Todd Schneider, a spokesman for FirstEnergy Nuclear Operating Co., which runs Beaver Creek, told the AP that batteries on site would last less than a week.

In 1988, eight years after labeling blackouts "an unresolved safety issue," the NRC required nuclear power plants to improve the reliability of their diesel generators, have more backup generators on site, and better train personnel to restore power. These steps would allow them to keep the core cool for four to eight hours if they lost all electrical power. By contrast, the newest generation of nuclear power plant, which is still awaiting approval, can last 72 hours without taking any action, and a minimum of seven days if water is supplied by other means to cooling pools.

Despite the added safety measures, a 1997 report found that blackouts — the loss of on-site and off-site electrical power — remained "a dominant contributor to the risk of core melt at some plants." The events of Sept. 11, 2001, further solidified that nuclear reactors might have to keep the core cool for a longer period without power. After 9/11, the commission issued regulations requiring that plants have portable power supplies for relief valves and be able to manually operate an emergency reactor cooling system when batteries go out.

The NRC says these steps, and others, have reduced the risk of core melt from station blackouts from the current fleet of nuclear plants.

For instance, preliminary results of the latest analysis of the risks to the Peach Bottom plant show that any release caused by a blackout there would be far less rapid and would release less radiation than previously thought, even without any actions being taken. With more time, people can be evacuated. The NRC says improved computer models, coupled with up-to-date information about the plant, resulted in the rosier outlook.

"When you simplify, you always err towards the worst possible circumstance," Scott Burnell, a spokesman for the Nuclear Regulatory Commission, said of the earlier studies. The latest work shows that "even in situations where everything is broken and you can't do anything else, these events take a long time to play out," he said. "Even when you get to releasing into environment, much less of it is released than actually thought."

Exelon Corp., the operator of the Peach Bottom plant, referred all detailed questions about its preparedness and the risk analysis back to the NRC. In a news release issued earlier this month, the company, which operates 10 nuclear power plants, said "all Exelon nuclear plants are able to safely shut down and keep the fuel cooled even without electricity from the grid." Other people, looking at the crisis unfolding in Japan, aren't so sure.

In the worst-case scenario, the NRC's 1990 risk assessment predicted that a core melt at Peach Bottom could begin in one hour if electrical power on- and off-site were lost, the diesel generators — the main back-up source of power for the pumps that keep the core cool with water — failed to work and other mitigating steps weren't taken.

"It is not a question that those things are definitely effective in this kind of scenario," said Richard Denning, a professor of nuclear engineering at Ohio State University, referring to the steps NRC has taken to prevent incidents. Denning had done work as a contractor on severe accident analyses for the NRC since 1975. He retired from Battelle Memorial Institute in 1995.

"They certainly could have made all the difference in this particular case," he said, referring to Japan. "That's assuming you have stored these things in a place that would not have been swept away by tsunami."

---

**From:** Chang, Richard

**Sent:** Tuesday, March 29, 2011 7:35 AM

**To:** Schaperow, Jason; Tinkler, Charles; Santiago, Patricia; Ghosh, Tina; Armstrong, Kenneth

**Subject:** FYI- News Article on SOARCA

[http://news.yahoo.com/s/ap/20110329/ap\\_on\\_re\\_us/us\\_us\\_japan\\_nuclear\\_blackouts\\_2](http://news.yahoo.com/s/ap/20110329/ap_on_re_us/us_us_japan_nuclear_blackouts_2)

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

## Riley (OCA), Timothy

---

**From:** LIA06 Hoc  
**Sent:** Tuesday, March 29, 2011 7:38 PM  
**To:** Riley (OCA), Timothy  
**Cc:** LIA08 Hoc; LIA12 Hoc  
**Subject:** FW: Followup from USAID call

Tim –

Responses to Sen. Halpin's staff's questions are provided below. Let us know if you need anything else.

Liaison Team Director  
U.S. Nuclear Regulatory Commission  
Operations Center

---

**From:** PMT09 Hoc  
**Sent:** Tuesday, March 29, 2011 7:31 PM  
**To:** LIA06 Hoc  
**Cc:** Hoc, PMT12; PMT03 Hoc; PMT02 Hoc; FOIA Response.hoc Resource  
**Subject:** RE: Followup from USAID call

---

**From:** LIA06 Hoc  
**Sent:** Tuesday, March 29, 2011 2:47 PM  
**To:** Hoc, PMT12  
**Cc:** Riley (OCA), Timothy  
**Subject:** Followup from USAID call

At the USAID call today, Sen. Halpin's staff had questions on a Reuters story on the Pu found in samples at the Fukushima Daiichi site.

### 1. What is the source of the PU

Although plutonium exists in trace amounts in nature, the majority of plutonium is man-made. Plutonium is a product of nuclear reactor operation and nuclear weapon detonations. Because of nuclear weapons testing during the cold war, trace quantities of plutonium are present in the environment.

Plutonium-239 (Pu-239) and other isotopes of plutonium (e.g., Pu-240, Pu-241) are created by neutron irradiation of the Uranium-238 (U-238) in nuclear reactors. The low enrichment fuel (LEU) used in most commercial reactors is U-238, enriched with U-235. Typically 1% of spent fuel removed from reactor cores is plutonium. There are reactor designs in which the U-238 fuel is enriched with Plutonium-239 obtained from re-processing spent reactor fuel. There are 32 mixed oxide fuel elements and 516 low enriched uranium fuel elements in the Fukushima Daiichi Unit 3 reactor core; the remaining reactors have all LEU fuel elements. Although MOX fuel has been used in U.S. reactor facilities in the past, there are currently no U.S. commercial reactors using MOX fuel.

### 2. Is it Pu-239

A press release issued by TEPCO provides results of plutonium measurement in soil at the Fukushima Daiichi Plant. This report identified isotopes Pu-238, and Pu-239+Pu-240. (Quantities of Pu-239 and Pu-240 are reported as "Pu-239+Pu-240.") The samples were obtained on the Fukushima site.

XXXX-401

### 3. Confirm the half-life

The half-life of Pu-238 is 87 years; Pu-239 is 24,000 years; Pu-240 is 6500 years.

### 4. What is the level of concern

The NRC believes that there is no immediate concern for public health and safety in Japan, for the following reasons.

- Although there are reported indications that the origin of the measured plutonium is within the Fukushima plant, the reported concentrations are comparable to that measured by routine environmental monitoring conducted prior to the earthquake. The highest Pu-239+Pu-240 concentration reported 1.2 Bq/kg of dry soil at 0.5 km from the Unit 1 and 2 exhaust stack. The Japanese Atomic Energy Research Institute reported in 2003 that 21 Japanese soil samples taken at different Japanese locations following the Chernobyl event ranged from 0.15 to 4.3 Bq/kg.
- In Report 129, the National Council on Radiation Protection and Measurements (NCRP) developed screening criteria for contaminated soil for several radionuclides. For Pu-239+Pu-240, the screening criteria were set at concentrations of 290 – 310 Bq/kg. The screening criteria are equivalent to a public dose of 25 mrem in a year of exposure.
- The International Atomic Energy Agency (IAEA) reported that the quantity of plutonium found does not exceed background levels tracked by Japan's Ministry of Education, Culture, Sports, Science, and Technology over the past 30 years.
- TEPCO estimated that an individual who ingested 1 kg of the contaminated soil would receive an internal radiation dose of approximately 0.3 micro Sievert (0.03 mrem).
- For comparison, a typical U.S. citizen receives an annual radiation dose of approximately 600 mrem from natural sources, medical imaging and treatment, industrial use, and consumer products.

Please provide to Tim Riley, OCA so he can transmit to the staffer.

Thank you

Liaison Team Director  
U.S. Nuclear Regulatory Commission  
Operations Center

## David Decker

---

**From:** Schwartzman, Jennifer  
**Sent:** Tuesday, March 29, 2011 12:25 PM  
**To:** Doane, Margaret; Decker, David  
**Cc:** Henderson, Karen  
**Subject:** OOU RE: Heads up re: likely questions from SAC Energy and Water  
**Attachments:** SAC QA.docx

OFFICIAL USE ONLY - LIMITED DISTRIBUTION

David,

Please see attached - our "meeting of the minds" on how to respond to these questions. They are a little long but there really is a lot of information to cover.

Please note that one thing that is not covered in our responses is the Convention on Assistance in the Event of a Nuclear Accident or Radiological Emergency. A country has to make a formal request for assistance under this Convention in order for the IAEA to take a lead coordinating role. The Japanese have opted not to make such a request. It's important for the Chairman to know this technicality in the event of follow-up questions. We don't want to be critical of the Japanese - it's their sovereign decision to make. But we also need to be factually honest about the limitations of the IAEA's role.

Let us know if you have any questions. Thanks!

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

**From:** Doane, Margaret  
**Sent:** Monday, March 28, 2011 5:52 PM  
**To:** Henderson, Karen; Schwartzman, Jennifer  
**Cc:** Decker, David; Rihm, Roger  
**Subject:** RE: Heads up re: likely questions from SAC Energy and Water  
**Importance:** High

Dave, can you give me a time tomorrow. Karen and Jen have gone for the day, but it will take them no time to write something up.

Margie

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

**From:** Decker, David  
**Sent:** Monday, March 28, 2011 5:34 PM  
**To:** Doane, Margaret; Rihm, Roger  
**Subject:** FW: Heads up re: likely questions from SAC Energy and Water

Margie and Roger,

Attached below are some initial "questions" that the SAC Subcommittee on Energy and Water Development sent to us as a "heads-up" of what might be asked at this Wednesday's hearing where the Chairman will be the NRC's representative. The first set of questions looks like it deals with international/IAEA type issues (Margie stuff), with the rest of them being more in the EDO world (Roger stuff). Whatever you can do tomorrow to provide talking points/one-pagers (anything really) to address these questions would greatly help the Chairman prepare for his hearing. If you can develop something, just e-mail it to me and we will provide it to the Chairman. Thanks!

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

**From:** Powell, Amy  
**Sent:** Monday, March 28, 2011 3:52 PM

To: Schmidt, Rebecca; Batkin, Joshua  
Cc: Decker, David  
Subject: Heads up re: likely questions from SAC Energy and Water

FYI, Doug Clapp just send an initial (partial) list of potential questions for Wednesday's SAC Energy and Water hearing - see below...

Amy

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

From: Clapp, Doug (Appropriations) [mailto:Doug\_Clapp@appro.senate.gov]  
Sent: Monday, March 28, 2011 2:59 PM  
To: Powell, Amy  
Subject: FW: this is what i have so far

Don't know what Matt will add but these are draft questions I've done up. When I have final list of questions I will send to you but unlikely to be until late tomorrow so wanted to give you early heads up.

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

From: Clapp, Doug (Appropriations)  
Sent: Monday, March 28, 2011 2:53 PM  
To: Nelson, Matthew (Feinstein)  
Subject: this is what i have so far

#### FIRST PANEL QUESTIONS

##### Failure of IAEA to Lead and Provide Information:

Chairman Jaczko, there has been significant confusion created by conflicting information and inadequate information coming out of Japan. Clearly the nature of the nuclear crisis creates most of this confusion, but some attribute a portion of the problem to the utility and Japanese government.

The rest of the world is left to sift through conflicting information and conduct remote independent radiation monitoring to try to assess the situation. This appears to be a problem.

- \* Does the International Atomic Energy Agency have a role to play in assuring governments adequately share information?
- \* Does the IAEA have a role in assuring international assessments of radiation levels?
- \* Do you feel the international community is better prepared since Chernobyl, and if so, how has that been demonstrated with the event at Daiichi?

##### NAS Study on Spent Fuel

Chairman Jaczko, in 2006 a National Academy of Sciences committee completed a report requested by the NRC and Department of Homeland Security related to safety of spent nuclear fuel. Matt Bunn of Harvard wrote an op-ed this past week that two recommendations from that NAS report were to 1) put old fuel next to new fuel in the spent fuel pools, and 2) add sprayers over the pools in case cooling water was lost for whatever reason. He says the NRC did not implement these recommendations.

\* Can you tell me if Mr. Bunn is correct, and if so, why the NRC did not implement these two safety recommendations made by the NAS report?

\* Are there other suggestions from the NAS, or other entities, that the NRC has not implemented that you are willing to reconsider in light of events at Daiichi?

#### Independent Assessment of Nuclear Power Safety in the United States

Chairman Jaczko, I want to thank you and the people of your agency for the hard work and long hours many of you have been putting in since March 11. I further want to say that I believe the women and men of your agency work hard every day to keep our power plants safe. So, in no way do I want you or the workforce of the NRC to take this question as a slight.

\* Do you believe there is value in having an independent assessment of nuclear power safety in the United States?

#### Design Basis Reassessment

Chairman Jaczko, in the past four years there has been earthquakes in Japan that have exceeded the design basis for nuclear plants in the vicinity of the earthquakes.

\* How confident are you that our design basis for U.S. plants is sufficient?

\* Why were the Japanese so wrong on their assumptions of the possible maximum earthquake and tsunami events?

#### Relicensing not including seismic and tsunami

Chairman Jaczko, I understand from my trip to Diablo Canyon that the relicensing process does not include a review of seismic and tsunami threats. Rather that relicensing is focused more on the aging of materials and equipment. The plant operators and NRC personnel on the trip explained that seismic and tsunami issues are considered on a continuing basis and thus do not need to be part of the relicensing.

I find this a little confusing. I understand relicensing should consider aging of materials and equipment as 20 to 40 years have passed since the initial license. But our information relative to seismic and tsunami threats has also changed over this time.

\* If seismic and tsunami issues are not considered during relicensing, what guarantee do we have that the NRC is adequately considering these issues at any other time?

\* If not considered during relicensing, does the burden fall to the federal government to prove there is a need to modify the license due to seismic or tsunami information or does that burden get put on the plant operator?

**David Decker**

---

**From:** Powell, Amy  
**Sent:** Tuesday, March 29, 2011 10:08 AM  
**To:** Batkin, Joshua; Nieh, Ho; Bubar, Patrice; Sharkey, Jeffrey; Sosa, Belkys  
**Cc:** Schmidt, Rebecca; Bradford, Anna; Belmore, Nancy; Shane, Raeann; Decker, David  
**Subject:** Checking in re: testimony for this week's hearings

**Importance:** High

Hi all –

First, thank you so much for working with our office to quickly provide comments on the draft testimonies that have been coming up to you since last week. Given the full dance card of hearings, we really appreciate it.

We are still waiting to hear from several offices on two sets of testimony that are due in final form to subcommittees today:

**Senate Appropriations Subcommittee on Energy & Water – Nuclear Safety in Light of Events in Japan**  
OCA point of contact: David Decker

**House Transportation & Infrastructure Subcommittee on Economic Development, Public Buildings, & Emergency Management – Emergency Preparedness & Management**  
OCA point of contact: Raeann Shane

One last item The *last* of the draft testimonies for the week was delivered to your office earlier this morning: the written testimony for Thursday's FY12 budget hearing with House Appropriations Subcommittee on Energy and Water. Save for the introductory paragraph, the text is the same as prepared for the March 16<sup>th</sup> House Energy and Commerce subcommittees' scheduled budget hearing and has received OMB clearance.

Thanks again for working with us on this compressed, jammed packed schedule.

Amy

Amy Powell  
Associate Director  
U. S. Nuclear Regulatory Commission  
Office of Congressional Affairs  
Phone: 301-415-1673

XXXX - HOB

---

**From:** LIA05 Hoc  
**Sent:** Wednesday, March 30, 2011 4:32 PM  
**To:** FOIA Response.hoc Resource  
**Subject:** FW:  
**Attachments:** FW: Additional help - FW: NRC Federal Liaison Team

Bonnie Sheffield Dayshift 0700-1500  
Ken Wierman Nightshift 1500-2300  
FEMA REP Liaison  
NRC Operations Center  
(301) 816-5187

\*\*\*\*\*FOR OFFICIAL USE ONLY\*\*\*\*\*  
**DO NOT RELEASE OUTSIDE OF THE FEDERAL FAMILY**

---

**From:** LIA08 Hoc  
**Sent:** Saturday, March 19, 2011 7:30 PM  
**To:** Marc.Brooks@dhs.gov  
**Cc:** LIA06 Hoc; LIA05 Hoc  
**Subject:**

Hi Mark,

We got an email from Mr. Conklin this morning indicating that he would call the Director of the Liaison Team. According to our log, that call was not made. There still needs to be some discussion of clearance and badging for Rachel. In addition, we already have a FEMA rep with us, so we should discuss the value of having another rep from DHS. The Liaison Team Director can be reached at 301-816-5188.

Thanks,

Rani Franovich

Liaison Team Coordinator, USNRC

XXXX-404

**Riley (OCA), Timothy**

---

**From:** Powell, Amy  
**Sent:** Wednesday, March 30, 2011 10:42 AM  
**To:** OCA Distribution  
**Subject:** NEW HEARING APRIL 6th: House Energy and Commerce, Subcommittee on Oversight and Investigations

FYI, House Energy and Commerce Committee, Subcommittee on Oversight and Investigations will hold a hearing on Wednesday, April 6<sup>th</sup> on U.S. government response to Fukushima Daiichi power plant incident, including plans for review of safety at U.S. plants. Jeannette is working on profiles; Roger in OEDO is "refreshing" Bill Borchardt's statement from yesterday for use as written testimony. Either Marty Virgilio or Eric Leeds will be the NRC witness.

Amy Powell  
Associate Director  
U. S. Nuclear Regulatory Commission  
Office of Congressional Affairs  
Phone: 301-415-1673

XXXX-405

**Riley (OCA), Timothy**

---

**From:** LIA06 Hoc  
**Sent:** Wednesday, March 30, 2011 12:24 PM  
**To:** Riley (OCA), Timothy  
**Cc:** LIA06 Hoc  
**Subject:** USAID call

Tim – at the USAID call yesterday it was agreed that the calls would scale back to once per week. When would that happen and what day will it occur? Also, please confirm that this call includes Congressional staffers.

Thanks – Allen

Liaison Team Director  
U.S. Nuclear Regulatory Commission  
Operations Center

*XXXX-Hoc*

**Riley (OCA), Timothy**

---

**From:** Powell, Amy  
**Sent:** Wednesday, March 30, 2011 12:36 PM  
**To:** Riley (OCA), Timothy  
**Cc:** Shane, Raeann  
**Subject:** FW: trenches at fukushima

Here is Sen. Bingaman's staffer's request:

---

**From:** Epstein, Jonathan (Bingaman) [[mailto:Jonathan\\_Epstein@bingaman.senate.gov](mailto:Jonathan_Epstein@bingaman.senate.gov)]  
**Sent:** Wednesday, March 30, 2011 10:01 AM  
**To:** Powell, Amy  
**Cc:** Shane, Raeann; Edwards, Isaac (Energy)  
**Subject:** trenches at fukushima

Amy- can you ask around to see if staff has any diagrams of trenches / basements typical of Fukushima where the water is flooding?

It obviously does not have to be Fukushima but I assume these structures are somewhat common amongst other plants.

I would like to have something to show Jeff more as an example.

Thanks

XXXX-407

## Riley (OCA), Timothy

---

**From:** Droggitis, Spiros  
**Sent:** Wednesday, March 30, 2011 12:43 PM  
**To:** RST01 Hoc; inpoercassistance@inpo.org  
**Cc:** Riley (OCA), Timothy; Weil, Jenny  
**Subject:** FW: Constituent solution for Fukushima reactors  
**Attachments:** image001.gif; image002.gif; image003.gif; image004.gif

The following is a suggestion from a constituent of Congressman Doggett for your consideration. Thanks, Spiros Droggitis

---

**From:** Hupart, Ruth [<mailto:Ruth.Hupart@mail.house.gov>]  
**Sent:** Wednesday, March 30, 2011 12:24 PM  
**To:** Droggitis, Spiros  
**Subject:** Constituent solution for Fukushima reactors

Dear Spiros,

This is the information we received from our constituent. Thanks for taking a look.

Ruth

Ruth Hupart  
Legislative Assistant  
Office of Congressman Lloyd Doggett (TX-25)  
201 Cannon House Office Bldg.  
Tel.: (202) 225.4865  
Fax: (202) 225.3073



**Sign up for Lloyd's List [Here](#)**

Thank you for your response and interest in the ORIE/CryoRain technology for cooling the Fukushima reactor containment vessels. As requested per conversation with your D.C. staff today, the links are being re-sent:

<http://fukushimareactormeltdown.weebly.com/> (aerial photos supplied by US Army)

<http://www.prlog.org/11384663-independent-scientists-propose-use-of-cry-orain-technology-to-mitigate-reactor-meltdowns-in-japan.html>

Liquid Nitrogen application removes the oxygen thus creating an environment where the molecular activity is halted or frozen. The ORIE (Optical Remote Image Enhancement) technology, which also utilizes the science of "Spectrography", identifies the mounting and dangerous molecular activity inside the cracked containment vessels, including the radiation levels, where no other imaging technology can go. These two technologies, when used in conjunction with one another, can mitigate the meltdown status thus inhibiting further radiation release into the environment.

We require assistance with connecting to the appropriate authorities i.e. TEPCO, Japanese PM office, Japanese Nuclear Officials. Our efforts to inform and contact various stakeholding agencies (NRC, IAEA, etc) have resulted in no progress whatsoever.

Our team is formulating logistical strategies and stands ready to mobilize.

Thank you in advance for your immediate assistance in this most urgent of humanitarian and environmental issues.

Joy Mann Simmons for Constituent Ronald Stewart Montgomery  
478-244-2131

---

**From:** LIA05 Hoc  
**Sent:** Wednesday, March 30, 2011 4:11 PM  
**To:** FOIA Response.hoc Resource  
**Subject:** FW: UPDATE re: interagency briefing tomorrow at 1pm

Bonnie Sheffield Dayshift 0700-1500  
Ken Wierman Nightshift 1500-2300  
FEMA REP Liaison  
NRC Operations Center  
(301) 816-5187

\*\*\*\*\*FOR OFFICIAL USE ONLY\*\*\*\*\*  
**DO NOT RELEASE OUTSIDE OF THE FEDERAL FAMILY**

---

**From:** Weber, Michael  
**Sent:** Monday, March 14, 2011 7:59 PM  
**To:** Borchardt, Bill  
**Cc:** LIA05 Hoc; ET01 Hoc; Powell, Amy; Schmidt, Rebecca; Dorman, Dan  
**Subject:** Response - UPDATE re: interagency briefing tomorrow at 1pm

Got it. Liaison Team - note the assignment and initiate a coordinated set of talking points that we can present to Bill tomorrow morning. Please arrange a briefing for Bill tomorrow morning in the Ops Center.

ET Support - please create a log to keep track of assignments and track through to completion. Add this assignment to the list.

Thanks

---

**From:** Borchardt, Bill  
**To:** HOO Hoc; Grobe, Jack; Dorman, Dan; Weber, Michael  
**Cc:** Powell, Amy; Schmidt, Rebecca; Batkin, Joshua; Virgilio, Martin; Rihm, Roger  
**Sent:** Mon Mar 14 16:58:23 2011  
**Subject:** FW: UPDATE re: interagency briefing tomorrow at 1pm

I request the ET in the Ops Center to prepare talking points for my use during this meeting. I would also like an updated status report Tues AM. You might want to start with the briefing sheet Marty used to brief congressional staff this afternoon.

---

**From:** Powell, Amy  
**Sent:** Monday, March 14, 2011 4:15 PM  
**To:** Borchardt, Bill  
**Cc:** Schmidt, Rebecca; Batkin, Joshua; Taylor, Renee; Virgilio, Martin  
**Subject:** UPDATE re: interagency briefing tomorrow at 1pm

Bill -

We just got some additional information about tomorrow's interagency briefing that the White House is arranging with both Senate and House Leadership and Committees. The briefing will be at **1pm on the Senate side (room TBD)**. There will be one briefing that will include staff from both the House and Senate; with both chambers in session, I would not be surprised if a few Members came as well.

Either Becky or I will go down with you – I'll pass along additional information as I get it.

Thanks,  
Amy

Amy Powell  
Associate Director  
U. S. Nuclear Regulatory Commission  
Office of Congressional Affairs  
Phone: 301-415-1673

---

**From:** LIA05 Hoc  
**Sent:** Wednesday, March 30, 2011 4:32 PM  
**To:** FOIA Response.hoc Resource  
**Subject:** FW: DHS Liaison QUESTION

Bonnie Sheffield Dayshift 0700-1500  
Ken Wierman Nightshift 1500-2300  
FEMA REP Liaison  
NRC Operations Center  
(301) 816-5187

\*\*\*\*\*FOR OFFICIAL USE ONLY\*\*\*\*\*  
**DO NOT RELEASE OUTSIDE OF THE FEDERAL FAMILY**

---

**From:** Quinn, Vanessa [mailto:Vanessa.Quinn@dhs.gov]  
**Sent:** Saturday, March 19, 2011 8:56 PM  
**To:** Ralston, Michelle; LIA05 Hoc; Seward, Andrew; Sherwood, Harry; Horwitz, Steve; Greten, Timothy; Quinn, Vanessa  
**Subject:** Re: DHS Liaison QUESTION

if you are unable to get Marc, let me know and I will call Craig Conklin.  
Vanessa E. Quinn  
Branch Chief, REP Program  
Technological Hazards Division  
National Preparedness Directorate  
DHS/FEMA

---

**From:** Ralston, Michelle <Michelle.Ralston@dhs.gov>  
**To:** LIA05.Hoc@nrc.gov <LIA05.Hoc@nrc.gov>; Seward, Andrew <Andrew.Seward1@dhs.gov>; Sherwood, Harry <harry.sherwood@dhs.gov>; Horwitz, Steve <steve.horwitz@dhs.gov>; Greten, Timothy <Timothy.Greten@dhs.gov>; Quinn, Vanessa <Vanessa.Quinn@dhs.gov>  
**Sent:** Sat Mar 19 17:50:01 2011  
**Subject:** Re: DHS Liaison QUESTION

I would recommend you reach out to Mr. Marc Brooks.

([marc.brooks@dhs.gov](mailto:marc.brooks@dhs.gov))

Respectfully,

Michelle Ralston

(202) 280-9304

---

**From:** prvs=052525006=LIA05.Hoc@nrc.gov <prvs=052525006=LIA05.Hoc@nrc.gov>  
**To:** Andrew Seward <Andrew.Seward1@dhs.gov>; Harry Sherwood <harry.sherwood@dhs.gov>; Michelle Ralston <Michelle.Ralston@dhs.gov>; Steve Horwitz <steve.horwitz@dhs.gov>; Tim Greten <Timothy.Greten@dhs.gov>

XXXX-410

---

**From:** LIA05 Hoc  
**Sent:** Wednesday, March 30, 2011 4:27 PM  
**To:** FOIA Response.hoc Resource  
**Subject:** FW: FYI- HPS Update on Japan

Bonnie Sheffield Dayshift 0700-1500  
Ken Wierman Nightshift 1500-2300  
FEMA REP Liaison  
NRC Operations Center  
(301) 816-5187

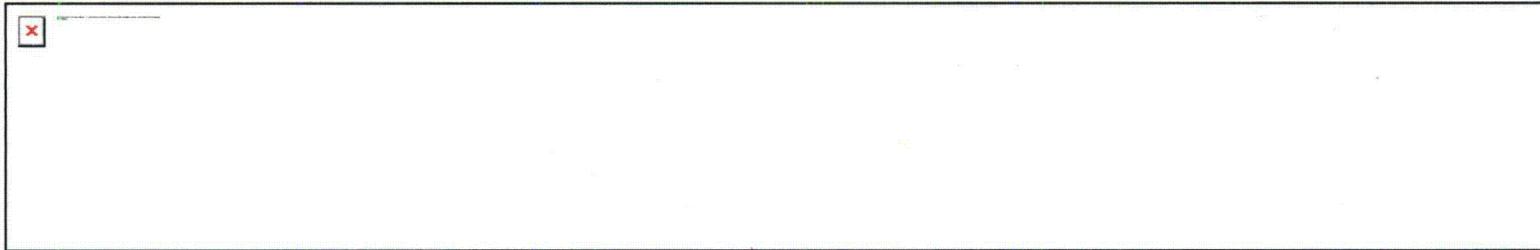
\*\*\*\*\*FOR OFFICIAL USE ONLY\*\*\*\*\*  
**DO NOT RELEASE OUTSIDE OF THE FEDERAL FAMILY**

---

**From:** Weber, Michael  
**Sent:** Friday, March 18, 2011 5:03 PM  
**To:** LIA05 Hoc; McIntyre, David  
**Subject:** FYI- HPS Update on Japan

---

**From:** HPS Headquarters [mailto:HPS@BurkInc.com]  
**Sent:** Friday, March 18, 2011 11:12 AM  
**To:** Weber, Michael  
**Subject:** HPS Update on Japan



## HPS Update on Japan

Dear HPS Members:

Make sure you are aware of the terrible situation in Japan. The HPS is working on multiple fronts to collect credible information on the nuclear incident, and distribute that information through mainstream and social media outlets and the HPS Web site.

KXXX-4/11

are your frustration with the misinformation and sensationalism presented by much of the mainstream media. We don't often advertise our efforts, but the HPS maintains an active media liaison and outreach effort all year around; not just during a crisis. My Classic and Howard Dickson are leading this charge. I would like to report to you a sampling of their efforts:

have communicated with our professional counterparts at the Japan Health Physics Society to offer our assistance and express support for their courageous efforts.

have set up a special page on Facebook© (<http://www.facebook.com/topic.php?topic=826&post=2780&uid=157387224301493#post2780> ) to consolidate media reports and provide additional information, which we believe would be of interest to our audience (uncut and unedited for rapidity of availability).

are also working to organize television appearances and other media communications for our members to present an alternative perspective on the situation, but with emphasis on radiation safety. We will never be able to respond with the speed of the mainstream media, nor have comparable resources to compete with them, but we will have the information right.

encourage you to refer the public to our website for the most credible information and links. <http://hps.org/fukushima/>

most importantly, I encourage you to donate to the Japan relief efforts through the American Red Cross at: [http://american.redcross.org/site/PageServer?pagename=ntld\\_main&s\\_src=RSG000000000&s\\_subsrc=RCO\\_ResponseStateSection](http://american.redcross.org/site/PageServer?pagename=ntld_main&s_src=RSG000000000&s_subsrc=RCO_ResponseStateSection)

please let me know what other actions our Society should be taking during this nuclear incident.

know that many of you have also been doing interviews with reporters and we very much appreciate your efforts to get good scientific facts in front of the public. Please take the time to tell Kelly ([media@hps.org](mailto:media@hps.org)) who you interviewed with and the topic, so we can collect all members efforts for historical purposes.

Overall, please keep the people of Japan in your thoughts and prayers.

Respectfully,

Maher

---

**From:** LIA05 Hoc  
**Sent:** Wednesday, March 30, 2011 4:07 PM  
**To:** FOIA Response.hoc Resource  
**Subject:** FW: Tsunami info

Bonnie Sheffield Dayshift 0700-1500  
Ken Wierman Nightshift 1500-2300  
FEMA REP Liaison  
NRC Operations Center  
(301) 816-5187

\*\*\*\*\*FOR OFFICIAL USE ONLY\*\*\*\*\*  
**DO NOT RELEASE OUTSIDE OF THE FEDERAL FAMILY**

---

**From:** Blount, Tom  
**Sent:** Friday, March 11, 2011 11:10 PM  
**To:** LIA01 Hoc  
**Cc:** LIA05 Hoc  
**Subject:** Tsunami info

Fyi  
Sent from Tom Blount's NRC BB

---

**From:** Kammerer, Annie  
**To:** Blount, Tom  
**Cc:** Evans, Michele  
**Sent:** Fri Mar 11 22:30:56 2011  
**Subject:** RE:

There are some problems with the original text. Also, some of this is only true of existing plants, not new reactors.  
Here's an edit...

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 tsunami. The design of US nuclear power plants 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. The design also 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 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 basis earthquake intensity and magnitudes for U.S. plants.

If an earthquake of the magnitude recently experienced off the coast of Japan were to occur in close proximity to a plant in the United States, it would likely exceed the SSE earthquake ground motion for any of the U.S. plants, with the possible exception of Diablo Canyon. The likelihood of an SSE earthquake ground motion occurring at a U.S. nuclear power plant is once in every 100,000 years on average.

The coastal plants in the United States are designed to withstand tsunamis based on credible flooding scenarios included in the General design criteria. The intake structures of the coastal facilities on the West Coast, are significantly robust and strengthened to be able to withstand a credible tsunami. Significant tsunamis, beyond the existing design bases flood considerations, are unlikely at facilities located on the Atlantic and Gulf Coasts.

---

**From:** Blount, Tom  
**Sent:** Friday, March 11, 2011 10:12 PM  
**To:** Kammerer, Annie  
**Cc:** Evans, Michele  
**Subject:** Fw:

Fyi  
Sent from Tom Blount's NRC BB

---

**From:** McGinty, Tim  
**To:** Blount, Tom  
**Sent:** Fri Mar 11 18:51:27 2011  
**Subject:** Fw:

Quick file provided to Chairman prior to briefing.

Sent from my NRC blackberry  
Tim McGinty  
202-669-4066

**From:** McGinty, Tim  
**To:** Batkin, Joshua  
**Sent:** Fri Mar 11 17:18:50 2011  
**Subject:** FW:

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 basis earthquake intensity and magnitudes for U.S. plants.

If an earthquake of the magnitude recently experienced off the coast of Japan were to occur in close proximity to a plant in the United States, it would likely exceed the SSE earthquake for all U.S. plants with the possible exception of Diablo Canyon. The likelihood of an SSE earthquake occurring at a U.S. nuclear power plant is once in every 100,000 years.

The coastal plants in the United States are designed to withstand tsunamis based on credible flooding scenarios included in the General design criteria. The intake structures, in particular of the coastal facilities on the West Coast, are significantly robust and strengthened to be able to withstand a credible tsunami. Significant tsunamis, beyond the existing design bases flood considerations, are unlikely at facilities located on the Atlantic and Gulf Coasts.

## David Decker

---

**From:** Ciarcia, Ray (HSGAC) [Ray\_Ciarcia@hsgac.senate.gov]  
**Sent:** Wednesday, March 30, 2011 12:53 PM  
**To:** Decker, David  
**Subject:** RE: Nuclear sector security/safety

Thanks – that sounds good. We're generally free next week and the week after – let us know what times are good for you.

-Ray

Raymond Ciarcia  
202.228.3901

Subcommittee on Oversight of Government Management,  
the Federal Workforce, and the District of Columbia  
U.S. Senate Committee on Homeland Security and Governmental Affairs  
601 Hart Senate Office Building  
Washington, DC 20510

THE INFORMATION IN THIS MESSAGE IS CONFIDENTIAL. This email message, including any attachment, may contain confidential information intended for a specific individual and purpose. If you are not the named and intended recipient, or have had this email or an attachment forwarded to you, you are not to read it or any attachment, are prohibited from disseminating and/or copying it, should call us immediately at 202-224-4551, and delete it and any attachment from your system.

---

**From:** Decker, David [mailto:David.Decker@nrc.gov]  
**Sent:** Wednesday, March 30, 2011 12:18 PM  
**To:** Ciarcia, Ray (HSGAC)  
**Subject:** RE: Nuclear sector security/safety

Ray,  
I'm sorry for the delay in getting back to you, and I'd be happy to touch base with the right staff here in our office of Nuclear Security and Incident Response to set up a time to talk to you about NRC/DHS cooperation in the security world, and emergency preparedness.

David

---

**From:** Ciarcia, Ray (HSGAC) [mailto:Ray\_Ciarcia@hsgac.senate.gov]  
**Sent:** Tuesday, March 29, 2011 5:26 PM  
**To:** Decker, David  
**Subject:** FW: Nuclear sector security/safety

David,

I wanted to follow up on the topic of NRC-DHS cooperation with respect to nuclear power facility security and disaster preparedness. I can imagine that ongoing events and renewed interest in nuclear safety are keeping you busy, but let me know if you have an opportunity to meet at some point.

Thanks,  
-Ray

XXXX-HIB

Raymond Ciarcia  
202.228.3901

Subcommittee on Oversight of Government Management,  
the Federal Workforce, and the District of Columbia  
U.S. Senate Committee on Homeland Security and Governmental Affairs  
601 Hart Senate Office Building  
Washington, DC 20510

THE INFORMATION IN THIS MESSAGE IS CONFIDENTIAL. This email message, including any attachment, may contain confidential information intended for a specific individual and purpose. If you are not the named and intended recipient, or have had this email or an attachment forwarded to you, you are not to read it or any attachment, are prohibited from disseminating and/or copying it, should call us immediately at 202-224-4551, and delete it and any attachment from your system.

---

**From:** Ciarcia, Ray (HSGAC)  
**Sent:** Monday, March 14, 2011 10:37 AM  
**To:** 'david.decker@nrc.gov'  
**Cc:** Tamarkin, Eric (HSGAC)  
**Subject:** Nuclear sector security/safety

David,

I am new to Senator Akaka's Subcommittee on Oversight staff under the Senate Homeland Security Committee. Based on Joel's notes, I believe you may have met or corresponded with Joel Spangenberg from our subcommittee on the topic of nuclear sector security. Joel has since moved on and Eric and I are working the issues he had worked in the past, including nuclear security.

I am very interested in meeting with you to continue our efforts to understand the security stance of domestic nuclear facilities, including NRC's collaboration with DHS to understand the threat scenario and assist FEMA in preparing for a nuclear emergency.

Furthermore, in light of recent events in Japan, I am especially interested in understanding the extent to which NRC ensures that domestic reactors are adequately designed and prepared for earthquake and tsunami events. For example, recent news reports have raised concerns about the vulnerability of the California Diablo Canyon plant to both severe earthquakes and tsunamis.

If you are located the DC area, would you be able to meet with us in the near future to discuss the above topics? If so, we are generally free the latter half of this week and next.

Thank you,  
-Ray

Raymond Ciarcia  
202.228.3901

Subcommittee on Oversight of Government Management,  
the Federal Workforce, and the District of Columbia  
U.S. Senate Committee on Homeland Security and Governmental Affairs  
601 Hart Senate Office Building  
Washington, DC 20510

THE INFORMATION IN THIS MESSAGE IS CONFIDENTIAL. This email message, including any attachment, may contain confidential information intended for a specific individual and purpose. If you are not the named and intended recipient, or have had this email or an attachment forwarded to you, you are not to read it or any attachment, are prohibited from disseminating and/or copying it, should call us immediately at 202-224-4551, and delete it and any attachment from your system.

**Riley (OCA), Timothy**

---

**From:** Powell, Amy  
**Sent:** Wednesday, March 30, 2011 12:36 PM  
**To:** Riley (OCA), Timothy  
**Cc:** Shane, Raeann  
**Subject:** FW: trenches at fukushima

Here is Sen. Bingaman's staffer's request:

---

**From:** Epstein, Jonathan (Bingaman) [[mailto:Jonathan\\_Epstein@bingaman.senate.gov](mailto:Jonathan_Epstein@bingaman.senate.gov)]  
**Sent:** Wednesday, March 30, 2011 10:01 AM  
**To:** Powell, Amy  
**Cc:** Shane, Raeann; Edwards, Isaac (Energy)  
**Subject:** trenches at fukushima

Amy- can you ask around to see if staff has any diagrams of trenches / basements typical of Fukushima where the water is flooding?

It obviously does not have to be Fukushima but I assume these structures are somewhat common amongst other plants.

I would like to have something to show Jeff more as an example.

Thanks

XXXX 4/14

---

**From:** LIA05 Hoc  
**Sent:** Thursday, March 31, 2011 4:05 PM  
**To:** FOIA Response.hoc Resource  
**Subject:** FW: COMMUNICATIONS WITH EPA

Bonnie Sheffield Dayshift 0700-1500  
Ken Wierman Nightshift 1500-2300  
FEMA REP Liaison  
NRC Operations Center  
(301) 816-5187

\*\*\*\*\*FOR OFFICIAL USE ONLY\*\*\*\*\*  
**DO NOT RELEASE OUTSIDE OF THE FEDERAL FAMILY**

---

**From:** LIA06 Hoc  
**Sent:** Wednesday, March 30, 2011 8:31 AM  
**To:** LIA04 Hoc  
**Cc:** LIA05 Hoc  
**Subject:** RE: COMMUNICATIONS WITH EPA

Here is the email that I discussed. Regarding any information that the states may find. We agreed that the states should provide that information to EPA. Mr. Clark also indicated that if a State would like to contact EPA directly, they should contact an EPA regional office.  
See the note below for additional info. From the list below it is not clear that the NRC State Liaison Officers were notified.

Thanks – Allen  
Liaison Team Director  
U.S. Nuclear Regulatory Commission  
Operations Center

---

**From:** LIA04 Hoc  
**Sent:** Tuesday, March 29, 2011 1:12 PM  
**To:** Easson, Stuart; Flannery, Cindy; LIA04 Hoc; Lukes, Kim; Maupin, Cardelia; Noonan, Amanda; OST05 Hoc; Rautzen, William; Rivera, Alison; Ryan, Michelle; Turtill, Richard; Virgilio, Rosetta  
**Cc:** LIA08 Hoc; LIA06 Hoc; LIA01 Hoc; LIA11 Hoc; Hoc, PMT12; OST05 Hoc; LIA04 Hoc; PMT01 Hoc  
**Subject:** COMMUNICATIONS WITH EPA  
**Importance:** High

I was directed by the PMT (Dr. Cool) to contact Mr. Ray Clark (202-329-5683) of EPA to follow-up on a question raised at the 1100 Radiological Status & Implications Call. During the call, industry asked whether the States were coordinating environmental monitoring information with the NRC. I confirmed to EPA that the State information was being coordinated with EPA staff (Edward Tupin).

Mr. Clark indicated that since EPA staff on the Japan event rotate, EPA would like us to send any future environmental information to: [EOC\\_Environmental\\_Unit@epamail.epa.gov](mailto:EOC_Environmental_Unit@epamail.epa.gov). He asked how NRC was coordinating the Japan event with

the States. I informed him of the following NRC/State interaction methods on the issue: (1) NRC Regional State Officers; (2) all state letters; and (3) Tuesday and Thursday HHS hosted conference calls. In addition, Mr. Clark indicated that if a State would like to contact EPA directly, they should contact an EPA regional office.

**Riley (OCA), Timothy**

---

**From:** Powell, Amy  
**Sent:** Thursday, March 31, 2011 2:56 PM  
**To:** Rihm, Roger; Landau, Mindy  
**Cc:** Schmidt, Rebecca; Riley (OCA), Timothy  
**Subject:** OCA tweaks and concurrence  
**Attachments:** Template for Japan responses - OCA edits for concurrence.docx

Hi Roger and Mindy –

Thanks for drafting the proposed template to be the base of responses to incoming Congressional letters related to the events in Japan. Attached is the doc with some small edits from here. With these edits, OCA concurs.

Thanks for all of your work with us,  
Amy

Amy Powell  
Associate Director  
U. S. Nuclear Regulatory Commission  
Office of Congressional Affairs  
Phone: 301-415-1673

XXXX-4/16

**Wagner, Katie**

---

**From:** Wagner, Katie  
**Sent:** Thursday, March 31, 2011 12:24 PM  
**To:** Flanagan, Michelle  
**Subject:** FW: draft a response to Robert Caron on using liquid helium cooling

Any add'l info to add about the origin of this request?

---

**From:** Lee, Richard  
**Sent:** Thursday, March 31, 2011 12:23 PM  
**To:** Wagner, Katie  
**Subject:** RE: draft a response to Robert Caron on using liquid helium cooling

Request came from the EDO to draft a response for the Chairman. I don't have the covered sheet. Please check with Michelle.  
Thx,

---

**From:** Wagner, Katie  
**Sent:** Thursday, March 31, 2011 11:24 AM  
**To:** Lee, Richard  
**Subject:** RE: draft a response to Robert Caron on using liquid helium cooling

Richard,

Who requested that RES respond to this? The letter from R. Caron is addressed to President Obama. My best guess is that the Chairman's office requested a response to this . . .

Thanks,  
Katie

---

**From:** Lee, Richard  
**Sent:** Thursday, March 31, 2011 8:16 AM  
**To:** Wagner, Katie  
**Cc:** Flanagan, Michelle  
**Subject:** FW: draft a response to Robert Caron on using liquid helium cooling

Katie:  
Please log in on our sharepoint site.  
Received: 03/30  
Assigned to Michelle Flanagan  
Draft response letter has been written 03/30  
Carol Greenwood is putting the draft into the correct format for Chairman to send a response back to Robert Caron.

Thx, Richard

---

**From:** Flanagan, Michelle  
**Sent:** Wednesday, March 30, 2011 4:35 PM  
**To:** Greenwood, Carol  
**Cc:** Lee, Richard  
**Subject:** FW: draft a response to Robert Caron on using liquid helium cooling

Carol,

Attached is a draft letter (letter.doc) for the Chairman to Robert Caron in response to his letter of 3/21/2011 (also attached). I'm not sure how to format the headers for correspondence from the chairman, nor am I certain how to form the concurrence block, but Richard told me the concurrence should be: MFlanagan, KGibson, BSheron, MWeber, BBorchard, Chairman

Will you prepare a concurrence package for this response letter?

Thank you!  
-Michelle

---

**From:** Lee, Richard  
**Sent:** Wednesday, March 30, 2011 1:49 PM  
**To:** Flanagan, Michelle  
**Subject:** draft a response to Robert Caron on using liquid helium cooling

Michelle:

Please draft a letter for the Chairman to Robert Caron in response to his letter built around the following points.

Thank you for your suggestion of using liquid helium as a coolant for the reactors and spent fuel pools at Fukushima. Whereas liquid helium has a very low heat temperature, it has a very small heat capacity and the heat of vaporization (84.5 Joules per mole) is modest. It would require, then, quite a lot of liquid helium on a continuing basis to first cool the fuel and then to prevent decay energy from reheating the fuel. We estimate that each megawatt of decay heat would require 47 kg of liquid helium every second, or about 4 million kg per day. This might well tax the transport ability to the site. As a long term strategy, it might tax the ability to supply liquid helium. We will continue to look for opportunities to utilize your suggestion. Thank you very much.

Thanks, Richard

Concurrence: MFlanagan, KGibson, BSheron, MWeber, BBorchard, Chairman

---

**From:** LIA05 Hoc  
**Sent:** Thursday, March 31, 2011 11:35 AM  
**To:** LIA11 Hoc; LIA04 Hoc  
**Subject:** FW: INQUIRY: FOX Business Channel on population around nuclear power plants

Bonnie Sheffield Dayshift 0700-1500  
Ken Wierman Nightshift 1500-2300  
FEMA REP Liaison  
NRC Operations Center  
(301) 816-5187

\*\*\*\*\*FOR OFFICIAL USE ONLY\*\*\*\*\*  
**DO NOT RELEASE OUTSIDE OF THE FEDERAL FAMILY**

---

**From:** LIA01 Hoc  
**Sent:** Tuesday, March 29, 2011 4:54 PM  
**To:** LIA05 Hoc  
**Subject:** FW: INQUIRY: FOX Business Channel on population around nuclear power plants

---

**From:** Kahler, Carolyn  
**Sent:** Tuesday, March 29, 2011 4:24 PM  
**To:** LIA01 Hoc; LIA11 Hoc  
**Subject:** RE: INQUIRY: FOX Business Channel on population around nuclear power plants

Lisa,

I sent this to your webmail account. After speaking with Joe, I understand that this should go through you in the Ops Center. Please read below, sorry if you got this already and thank you!

Carolyn

---

**From:** Kahler, Carolyn  
**Sent:** Tuesday, March 29, 2011 3:42 PM  
**To:** Anderson, Joseph  
**Cc:** Wright, Lisa (Gibney)  
**Subject:** FW: INQUIRY: FOX Business Channel on population around nuclear power plants

Hi Joe,

FEMA is attempting to confirm or correct the language below. Would we have this information available (i.e. who in EP should I talk to about this?).

"According to FEMA data, about 8 percent of the American population lives within 20 miles of a nuclear power plant; and about 1.7 percent lives within 10 miles."

This quote came from this article, which also quotes Trish Milligan numerous times - <http://politifact.com/truth-o-meter/statements/2011/mar/24/lawrence-odonnell/msnbcs-lawrence-odonnell-most-americans-live-withi/>

Sincerely,

Carolyn

---

**From:** Horwitz, Steve [mailto:steve.horwitz@dhs.gov]  
**Sent:** Tuesday, March 29, 2011 2:47 PM  
**To:** Kahler, Carolyn  
**Subject:** FW: INQUIRY: FOX Business Channel on population around nuclear power plants

**Carolyn, see query from FOX below. Michelle believes you may be able to verify the numbers. Thanks/Steve**

---

**From:** Ralston, Michelle [mailto:Michelle.Ralston@dhs.gov]  
**Sent:** Tuesday, March 29, 2011 2:37 PM  
**To:** Horwitz, Steve  
**Subject:** Re: INQUIRY: FOX Business Channel on population around nuclear power plants

Steve,

To verify this data, call Karolyn Kahler. The NRC most definitely has this data.

Respectfully,

Michelle Ralston

(202) 280-9304

---

**From:** Horwitz, Steve <steve.horwitz@dhs.gov>  
**To:** Purvis, James <james.purvis@dhs.gov>; Fontenot, Rebecca <Rebecca.Fontenot@dhs.gov>  
**Cc:** Michelle Ralston <Michelle.Ralston@dhs.gov>  
**Sent:** Tue Mar 29 14:33:00 2011  
**Subject:** FW: INQUIRY: FOX Business Channel on population around nuclear power plants

JAMES/REBECCA –

Any chance one of you can confirm or correct language highlighted below. OR at least, the 8% number. Data said to come from FEMA website, though I haven't found it.

Thanks/sh

---

**From:** O'Boyle, Seamus  
**Sent:** Tuesday, March 29, 2011 1:24 PM  
**To:** Ralston, Michelle; Horwitz, Steve  
**Subject:** FW: INQUIRY: FOX Business Channel on population around nuclear power plants

Steve and Michelle:

Please see the e-mails below. Can you provide the answer to Brad's question?

Thanks,  
Seamus

---

**From:** Carroll, Bradley

**Sent:** Tuesday, March 29, 2011 12:35 PM

**To:** Olsen, Mary; 'Racusen, Rachel'; Kirin, Alexandra; O'Boyle, Seamus

**Subject:** RE: INQUIRY: FOX Business Channel on population around nuclear power plants

Ok – looping Seamus. Seamus, are those facts that are available on the website or old report somewhere – specifically...

“According to FEMA data, about 8 percent of the American population lives within 20 miles of a nuclear power plant; and about 1.7 percent lives within 10 miles.”

**From:** [Google Alerts](#)  
**To:** [Burnell, Scott](#)  
**Subject:** Google Alert - "Nuclear Regulatory Commission"  
**Date:** Thursday, April 07, 2011 4:29:01 PM

---

**News**

**3 new results for "Nuclear Regulatory Commission"**

[Leaked Docs Show U.S. Regulators Doubt Nuclear Safety](#)

Democracy Now

In internal emails and memos, **Nuclear Regulatory Commission** members have questioned back-up plans to maintain cooling systems in case main power sources fail. A July 2010 memo assessing Exelon Corp's Peach Bottom nuclear plant in Delta, Pennsylvania, ...

[See all stories on this topic »](#)

[Small Amounts Of Japan Radiation Reaches Kansas](#)

KAKE

According to the Environmental Protection Agency (EPA), the **Nuclear Regulatory Commission** (NCR) and other federal agencies, these types of findings are being found all across the country and are far below levels of human health concern, including for ...

[See all stories on this topic »](#)

[Westinghouse touts next generation of nuke plants](#)

Westport-News

North Carolina Waste Awareness and Reduction Network, which represents a group of watchdog organizations, on Wednesday asked the US **Nuclear Regulatory Commission** to stop its review of the AP1000 design until what the group considers design problems are ...

[See all stories on this topic »](#)

---

Tip: Use a minus sign (-) in front of terms in your query that you want to exclude. [Learn more.](#)

[Remove](#) this alert.

[Create](#) another alert.

[Manage](#) your alerts.

XXXX-419

**From:** [Google Alerts](#)  
**To:** [Burnell, Scott](#)  
**Subject:** Google Alert - "Nuclear Regulatory Commission"  
**Date:** Thursday, April 07, 2011 1:24:04 PM

---

**News**

**3 new results for "Nuclear Regulatory Commission"**

[Western Pa. nuke plant once had submerged cables](#)

Beaver County Times

A FirstEnergy Corp. spokesman tells the Beaver County Times that the **Nuclear Regulatory Commission** approved the corrections during a recent license renewal process at the Beaver Valley Nuclear Power Station in Shippingport. An NRC report in December ...

[See all stories on this topic »](#)

[Japan Update 4-07: Nuclear Crisis Continues at Fukushima Daiichi](#)

Gather.com

The **Nuclear Regulatory Commission** (NRC) of the USA said yesterday that it believes that the core of Reactor #2 has "...probably leaked from its steel pressure vessel into the bottom of the containment structure..." There are indications that this may ...

[See all stories on this topic »](#)

[Nuclear plant in 'right direction'](#)

Omaha World-Herald

"Our early insights are that you are heading in the right direction," Troy Pruett, a regional deputy director for the **Nuclear Regulatory Commission**, told officials with the Omaha Public Power District. The utility owns the Fort Calhoun Nuclear Station, ...

[See all stories on this topic »](#)

---

Tip: Use quotes ("like this") around a set of words in your query to match them exactly. [Learn more.](#)

[Remove](#) this alert.  
[Create](#) another alert.  
[Manage](#) your alerts.

XXXX-420

**From:** [Savannah Daily News](#)  
**To:** [Burnell, Scott](#)  
**Subject:** Savannah Daily News Breaking News  
**Date:** Thursday, April 07, 2011 2:08:56 PM

---



---

**THE LATEST LISTS ARE HERE!!** To order your copy of the **20 Leading Tour Companies** (in Excel or PDF format) [click here](#) or call The Savannah Business Journal Circulation Dept. at **912-351-9122, ext. 32** or e-mail at [<>. More great Lists to come](#)  
[Book of Lists is Here](#)

---

**Have you read the news?** Check out [SavannahBusinessJournal.com](#) every Monday for the latest in what's going on the Savannah business community!  
[SavannahBusinessJournal.com](#)

---

## News

---

### **Beaufort Regional Chamber Names Interim President**

April 6, 2011 - Jimmy Boozer, chairman of the board of directors of the Beaufort Regional Chamber of Commerce has announced that Blakely Williams...

### **SDBA Supports Broughton Street Organization**

April 6, 2011 - The Savannah Citizens For a Better Broughton Street is a new organization dedicated to making Savannah's Broughton Street the best...

### **SCAD Alum a Finalist in NASA Song Competition**

April 5, 2011 - Savannah College of Art and Design alum Ryan E. McCullough (B.F.A., sound design, 2011) was named a top 10 finalist...

### **Two UGA Foundations Plan Merger to Cut Overhead, Confusion**

April 6, 2011 - After five years of contention and confusion, the two dueling University of Georgia foundations...

### **Emergency Outdoor Warning Siren Test This Week**

April 6, 2011 - The Chatham Emergency Management Agency will conduct the monthly scheduled test of Chatham County's emergency warning siren system...

### **SCMPD Helps With Operation Welcome Home**

April 6, 2011 - Savannah - Chatham Metro Police are asking for the public's assistance with Operation Welcome Home.

### **CEMA to Conduct Emergency Operations Center Training**

April 6, 2011 - Chatham Emergency Management Agency (CEMA) will conduct a one-day training session for nearly 40 people...

## **Business Report & Journal**

---

### **New Hires at Hilton Head Law Firms**

April 6, 2011 - The Law Offices of Catherine West Olivetti, LLC, a leading law firm on Hilton Head Island,

XXXXX  
HAW

S.C., has announced two new staff members.

### **GA DOT Awards 40 New Construction Contracts**

April 6, 2011 - The Georgia Department of Transportation has awarded 40 new contracts valued in excess of \$61 million...

### **Georgia & The South**

---

### **2011 Community Shred-a-thon Set for April 16**

April 6, 2011 - With Georgia being ranked #7 in the nation for identity theft by the Federal Trade Commission...

### **Coastal Family**

---

### **Find Fanciful Fairy and Gnome Homes at Oatland**

April 6, 2011 - Savannah, Put your wings and pointed ears on and come to Oatland Island Wildlife Center for a day of enchantment...

### **UGA Cooperative Extension-Chatham County Announces Chick Hatchery**

April 7, 2011 - Looking for something for children and adults to do this Spring Break? Visit the Oglethorpe Mall Macy's court to watch the baby chicks hatch.

---

You received this e-mail because you subscribed to the electronic newsletter for Savannah Daily News (<http://savdailynews.com>).

[Unsubscribe](#)

[Change your subscription options](#)

**From:** [Savannah Daily News](#)  
**To:** [Burnell, Scott](#)  
**Subject:** Savannah Daily News Breaking News  
**Date:** Thursday, April 07, 2011 1:04:53 PM

---



---

**THE LATEST LISTS ARE HERE!!** To order your copy of the **20 Leading Tour Companies** (in Excel or PDF format) [click here](#) or call The Savannah Business Journal Circulation Dept. at **912-351-9122, ext. 32** or e-mail at [<=>](#). ***More great Lists to come***  
[Book of Lists is Here](#)

---

**Have you read the news?** Check out [SavannahBusinessJournal.com](#) every Monday for the latest in what's going on the Savannah business community!  
[SavannahBusinessJournal.com](#)

---

## **News**

---

### **The LNG Trucking Argument: Probability vs. Volatility, Part 1**

April 7, 2011 - As the much publicized controversy around trucking large quantities of liquefied natural gas (LNG) through the busy streets...

### **Foreclosure Rates in Savannah Increase**

April 7, 2011 - Foreclosure rates in Savannah have increased for the month of January over the same period last year, according to CoreLogic.

### **Morris Publishing Group Tells SEC: \$54 Million Accounting Error on Last Year's Financial Reports**

April 7, 2011 - Morris Publishing Group, LLC, owners of the Savannah Morning, is a week late in filing it's 2010 Annual Report...

### **Coastal Georgia Affiliate of Susan G. Komen for the Cure® Awards Community Grants to Educate, Save Lives**

April 7, 2011 - Determined to save lives and end breast cancer forever, the Coastal Georgia Affiliate of Susan G. Komen for the Cure® has awarded 10 grants...

### **South Carolina Joins Initiative Guiding Low-Income Youth to Energy Jobs**

April 7, 2011 - South Carolina has joined eight other states in a Center for Energy Workforce Development initiative...

### **The Ford Plantation to Host Bethesda Home for Boys Catfish Roundup on April 7**

April 7, 2011 - The Ford Plantation, a luxury community and sporting club located in Richmond Hill, will host the Bethesda Home for Boys Catfish Roundup today...

### **Great Savannah Cleanup Moves to the Broughton Street Corridor Friday**

April 7, 2011 - The City of Savannah is joining forces with Savannah Development and Renewal Authority, Keep Savannah Beautiful and...

### **Savannah Receives 25th Straight Tree City USA Designation**

April 7, 2011 - For the 25th straight year the Arbor Day Foundation has named Savannah a Tree City USA for

its comprehensive efforts...

## **Georgia & The South**

---

### **Fitness Training Center Introduces Cow-pooling**

April 7, 2011 - The Crossfit Hyperformance Gym in Savannah is introducing a new service: cow-pooling.

---

You received this e-mail because you subscribed to the electronic newsletter for Savannah Daily News (<http://savidailynews.com> ).

[Unsubscribe](#)

[Change your subscription options](#)

**From:** [Google Alerts](#)  
**To:** [Burnell, Scott](#)  
**Subject:** Google Alert - "Nuclear Regulatory Commission"  
**Date:** Monday, April 11, 2011 10:28:32 PM

---

**News**

**1 new result for "Nuclear Regulatory Commission"**

[Nuclear Nation](#)

The BQB

It's been precisely a month to the day since the earthquake that led to the devastation of Japan, however mere days since President Obama ordered the **Nuclear Regulatory Commission** (NRC) to evaluate the earthquake risk to every nuclear power plant in ...

[See all stories on this topic »](#)

---

This as-it-happens Google Alert is brought to you by Google.

[Remove this alert.](#)

[Create another alert.](#)

[Manage your alerts.](#)

XHX HAB

**From:** [Google Alerts](#)  
**To:** [Burnell, Scott](#)  
**Subject:** Google Alert - "Nuclear Regulatory Commission"  
**Date:** Monday, April 11, 2011 11:47:10 PM

---

**News**

**3 new results for "Nuclear Regulatory Commission"**

[NRC: Japan nuke crisis 'static' but not yet stable](#)

Argus Press

**Nuclear Regulatory Commission** Chairman Gregory B. Jaczko speaks to reporters during an interview with The Associated Press in Washington, Monday, April 11, 2011. (AP Photo/Susan Walsh) 1 Keep it Clean. Please avoid obscene, vulgar, lewd, ...

[See all stories on this topic »](#)

[Riverkeeper criticizes NRC over Indian Point relicensing procedure](#)

EmpireStateNews.net

WHITE PLAINS – The executive director of the Riverkeeper environmental group Monday criticized the **Nuclear Regulatory Commission**, claiming the agency that will determine whether or not to relicense Indian Point, is not willing to budge on its criteria. ...

[See all stories on this topic »](#)

[Massachusetts nuclear sites face increased scrutiny](#)

The Massachusetts Daily Collegian

Governor Deval Patrick, Massachusetts Senate President Therese Murray, and House Speaker Robert DeLeo have signed a letter calling for the United States **Nuclear Regulatory Commission** (NRC) not to proceed with the Plymouth, Mass., Pilgrim Nuclear ...

[See all stories on this topic »](#)



[The  
Massachusetts  
Daily Collegian](#)

---

Tip: Use a minus sign (-) in front of terms in your query that you want to exclude. [Learn more.](#)

[Remove](#) this alert.

[Create](#) another alert.

[Manage](#) your alerts.

*Handwritten signature in blue ink: KKH-HA4*

---

**From:** OST01 HOC  
**Sent:** Monday, April 18, 2011 10:53 AM  
**To:** Skeen, David  
**Subject:** FW: TEPCO "Roadmap towards Restoration"  
**Attachments:** TEPCO.zip; NRC Site Team Quick Look Assessment of TEPCO Roadmap.docx

New Task created for NRR, see message below;

R. Clyde Ragland  
Executive Support Team  
US Nuclear Regulatory Commission  
email: [ost01hoc@nrc.gov](mailto:ost01hoc@nrc.gov)  
Desk Ph: 301-816-5111

---

**From:** OST01 HOC  
**Sent:** Sunday, April 17, 2011 8:02 PM  
**To:** Hiland, Patrick; Ruland, William  
**Cc:** Boger, Bruce  
**Subject:** FW: TEPCO "Roadmap towards Restoration"

New Task created for NRR, see message below;

---

**From:** Boger, Bruce  
**Sent:** Sunday, April 17, 2011 6:11 PM  
**To:** OST01 HOC  
**Cc:** RST01 Hoc; Hoc, PMT12; LIA08 Hoc; Zimmerman, Roy; Uhle, Jennifer; Tracy, Glenn; Andersen, James; Reynolds, Steven  
**Subject:** FW: TEPCO "Roadmap towards Restoration"

Please create a new tasker for NRR to provide comments on the attached TEPCO roadmap. Quick look comments provided to the Ambassador and Secretary Clinton were quickly coordinated this morning and are also attached. Deeper consideration is desired. High priority for now, subject to the determination of a due date by the Japan Team. Send to NRR POC Pat Hiland and Bill Ruland. Thanks.

---

**From:** Zimmerman, Roy  
**Sent:** Sunday, April 17, 2011 9:01 AM  
**To:** Virgilio, Martin; Weber, Michael; Boger, Bruce; Wiggins, Jim  
**Subject:** FW: TEPCO "Roadmap towards Restoration"

---

**From:** OST01 HOC  
**Sent:** Sunday, April 17, 2011 5:37 AM  
**To:** Castleman, Patrick; Orders, William; Franovich, Mike; Hipschman, Thomas; Snodderly, Michael  
**Cc:** Hoc, PMT12; RST01 Hoc; LIA08 Hoc; Tracy, Glenn; Zimmerman, Roy  
**Subject:** TEPCO "Roadmap towards Restoration"

On April 17, TEPCO presented the attached Roadmap to Restoration, and METI provided a subsequent statement. DOS has requested NRC's thoughts on the plan through brief, high-level

XXXX-425

bullets to be used by the SoS upon her return to the US. The HOC Team and Japan Team are drafting points at this time. Requested by noon, Sunday 4/17 to DOS Embassy.

---

**From:** PROTOCOLOFFICE-EM [mailto:protocoloffice-em@mofa.go.jp]

**Sent:** Sunday, April 17, 2011 4:43 PM

**To:** PROTOCOLOFFICE-EM

**Subject:** Urgent: Roadmap towards Restoration

## URGENT (15:50) Sunday 17 April 2011

To All Missions (Embassies, Consular posts and International Organizations in Japan)

Please find attached the "Roadmap towards Restoration from the Accident at Fukushima Daiichi Nuclear Power Station", that was made public at the press conference by Mr. Tsunehisa Katsumata, Chairman of the Tokyo Electric Power Company (TEPCO) at TEPCO headquarters at 3 pm today.

Please also find attached the statement by Mr. Banri Kaieda, Minister of Economy, Trade and Industry at the press conference at METI following the announcement of the Roadmap by TEPCO.

The Missions are kindly requested to forward this message to their headquarters as soon as possible.

Contact: International Nuclear Energy Cooperation Division, Tel 03-5501-8227

## NRC SITE TEAM QUICK-LOOK REVIEW OF THE TEPCO “ROADMAP TO RESTORATION”

April 17, 2011

This document is a Quick-Look review by the NRC Site Team of the TEPCO Roadmap Plan released today. In the near term a more comprehensive assessment of the Roadmap will be conducted by the NRC staff. On April 17, 2011, TEPCO announced publically their “Roadmap towards Restoration from the Accident at Fukushima Daiichi Nuclear Power Station.” The Roadmap has a basic policy of “bringing the reactors and spent fuel pools to a stable cooling condition and mitigating the release of radioactive materials.” It is a Two-Step Plan. Step 1 is a three-month plan to reduce radiation levels at the site. Step 2 is aimed at controlling radiation releases and radiation doses so that they are “significantly held down.” Step 2, is set for about three to six months after completing Step 1.

Coincident with the release of the TEPCO document, Minister of Economy, Trade and Industry (METI), Mr. Banri Kaidea, released a statement. That statement suggests that TEPCO “ensure early implementation of the Roadmap.” Also, that after Step 2, the government will review the “deliberate evacuation area” (evacuation) and the “evacuation prepared area” (sheltering) to determine whether residents can return to the evacuated areas.

The TEPCO Roadmap consists of three immediate action targets. They include actions to: 1. Cool the reactors and spent fuel pools, 2. Contain, process contaminated water and mitigate the release of radioactive material, and 3. Monitor and decontaminate the nuclear site and the surrounding areas.

The NRC Site Team quick-look review of the Roadmap concludes the following:

- It is encouraging that the Roadmap lays out a strategy
- Public disclosure of the Roadmap is very positive

- Actions and countermeasures are necessary for any plan to succeed. The TEPCO Roadmap contains such actions and countermeasures that could lead to achieving the Roadmap goals
- The NRC Site Team has identified areas of enhancements for consideration by the Government of Japan and TEPCO that may improve the effectiveness of the Roadmap. Those areas included the timing for certain activities and stabilizing actions relating to improved reactor and spent fuel pool safety
- The NRC and its partners will continue to provide their assistance and support to the resolution of the incident. We believe an enhanced Roadmap should provide a path forward to reach stable plant conditions, significantly reduce radiation levels, and provide proper controls for ingestion pathway activities, e.g., agricultural, fishing and habitation

Roadmap towards Restoration from the Accident  
at Fukushima Daiichi Nuclear Power Station

April 17th, 2011  
Tokyo Electric Power Company

With regard to the accident at Fukushima Daiichi Nuclear Power Station due to the Tohoku-Chihou-Taiheiyo-Oki Earthquake occurred on Friday, March 11th, 2011, we are currently making our utmost effort to bring the situation under control. This announcement is to notify the roadmap that we have put together towards restoration from the accident.

1. Basic Policy

By bringing the reactors and spent fuel pools to a stable cooling condition and mitigating the release of radioactive materials, we will make every effort to enable evacuees to return to their homes and for all citizens to be able to secure a sound life.

2. Targets

Based on the basic policy, the following two steps are set as targets: "Radiation dose is in steady decline" as "Step 1" and "Release of radioactive materials is under control and radiation dose is being significantly held down" as "Step 2." Target achievement dates are tentatively set as follows: "Step 1" is set at around 3 months and "Step 2" is set at around 3 to 6 months after achieving Step 1.

3. Immediate Actions

Immediate actions were divided into three groups, namely, "I. Cooling", "II. Mitigation", "III. Monitoring and Decontamination." For the following five issues—"Cooling the Reactors," "Cooling the Spent Fuel Pools," "Containment, Storage, Processing, and Reuse of Water Contaminated by Radioactive Materials (Accumulated Water)," "Mitigation of Release of Radioactive Materials to Atmosphere and from Soil," and "Measurement, Reduction and Announcement of Radiation Dose in Evacuation Order/Planned Evacuation/ Emergency Evacuation Preparation Areas"—targets are set for each of the five issues and various countermeasures will be implemented simultaneously.

Please see the attachment for detailed actions.

We would like to deeply apologize again for the grave inconvenience and anxiety that the broad public has been suffering due to the accident at the Fukushima Daiichi Nuclear Power Station. We will continue to make every endeavor to bring the situation under control.

## Roadmap towards Restoration from the Accident at Fukushima Daiichi Nuclear Power Station

### 1. Basic Policy

By bringing the reactors and spent fuel pools to a stable cooling condition and mitigating the release of radioactive materials, we will make every effort to enable evacuees to return to their homes and for all citizens to be able to secure a sound life.

### 2. Targets

- Based on the basic policy, the following two steps are set as targets:
  - Step 1: Radiation dose is in steady decline.
  - Step 2: Release of radioactive materials is under control and radiation dose is being significantly held down.
 (Note) Issues after Step 2 will be categorized as "Mid-term issues".
- Target achievement dates are tentatively set as follows, although there will still be various uncertainties and risks:
  - Step 1: around 3 months
  - Step 2: around 3 to 6 months (after achieving Step 1)
 (Note) Announcements will be made as soon as timing of step-wise target achievement or quantitative prospects are determined, as well as if revisions to the targets or achievement dates become necessary.

### 3. Immediate Actions

- In order to achieve the above targets, immediate actions were divided into 3 groups with targets set for each of the 5 issues. Various countermeasures will be implemented simultaneously. (See the table in right.)
- In order to achieve Step 1, overcoming the following two issues that are currently being addressed will be critical:
  - Prevention of hydrogen explosion inside the primary containment vessel (hereafter, PCV) (Units 1 to 3.)
    - Cooling the reactor by injecting fresh water into the reactor increases the chance of steam condensation, leading to a concern of potentially triggering a hydrogen explosion.
    - Nitrogen gas will be injected into the PCV of each unit to keep the concentration of hydrogen and oxygen below flammability limit.
  - Prevention of release of contaminated water with high radiation level outside of the site boundary (Unit 2.)
    - While cooling the reactor by injecting fresh water, accumulation of contaminated water with high radiation level in the turbine building is increasing (possible release to outside of the site boundary.)
    - Actions will be taken against accumulated water to (1) secure several storage places and (2) install facilities to process the contaminated water and reduce the radiation dose, among others.

Roadmap for Immediate Actions

Areas	Issues	Targets and Countermeasures	
		Step 1	Step 2
I. Cooling	(1) Cooling the Reactors	① <b>Maintain stable cooling</b> <ul style="list-style-type: none"> <li>Nitrogen gas injection</li> <li>Flooding up to top of active fuel</li> <li>Examination and implementation of heat exchange function</li> </ul> ② <b>(Unit 2) Cool the reactor while controlling the increase of accumulated water until the PCV is sealed</b>	③ <b>Achieve cold shutdown condition (sufficient cooling is achieved depending on the status of each unit.)</b> <ul style="list-style-type: none"> <li>Maintain and reinforce various countermeasures in Step 1.</li> </ul>
	(2) Cooling the Spent Fuel Pools	④ <b>Maintain stable cooling</b> <ul style="list-style-type: none"> <li>Enhance reliability of water injection</li> <li>Restore coolant circulation system</li> <li>(Unit 4) Install supporting structure</li> </ul>	⑤ <b>Maintain more stable cooling function by keeping a certain level of water.</b> <ul style="list-style-type: none"> <li>Remote control of coolant injection operation</li> <li>Examination and implementation of heat exchange function</li> </ul>
II. Mitigation	(3) Containment, Storage, Processing, and Reuse of Water Contaminated by Radioactive Materials (Accumulated Water)	⑥ <b>Secure sufficient storage place to prevent water with high radiation level from being released out of the site boundary.</b> <ul style="list-style-type: none"> <li>Installation of storage/processing facilities.</li> </ul> ⑦ <b>Store and process water with low radiation level.</b> <ul style="list-style-type: none"> <li>Installation of storage facilities/decontamination/processing.</li> </ul>	⑧ <b>Decrease the total amount of contaminated water.</b> <ul style="list-style-type: none"> <li>Expansion of storage/processing facilities</li> <li>Decontamination/Desalt processing (reuse), etc.</li> </ul>
	(4) Mitigation of Release of Radioactive Materials to Atmosphere and from Soil	⑨ <b>Prevent scattering of radioactive materials on buildings and ground.</b> <ul style="list-style-type: none"> <li>Dispersion of inhibitor</li> <li>Removal of debris</li> <li>Installing reactor building cover</li> </ul>	⑩ <b>Cover the entire buildings (as temporary measure).</b>
III. Monitoring/Decontamination	(5) Measurement, Reduction and Announcement of Radiation Dose in Evacuation Order/Planned Evacuation/Emergency Evacuation Preparation Areas	⑪ <b>Expand/enhance monitoring and inform of results fast and accurately.</b> <ul style="list-style-type: none"> <li>Examination and implementation of monitoring methods.</li> </ul>	⑫ <b>Sufficiently reduce radiation dose in evacuation order / planned evacuation / emergency evacuation preparation areas.</b> <ul style="list-style-type: none"> <li>Decontamination/monitoring of homecoming residences.</li> </ul>
	(Note) With regard to radiation dose monitoring and reduction measures in evacuation order/planned evacuation/emergency evacuation preparation areas, we will take every measure through thorough coordination with the national government and by consultation with the prefectural and municipal governments.		

## Roadmap towards Restoration from the Accident at Fukushima Daiichi Nuclear Power Station

**Basic Policy:** By bringing the reactors and spent fuel pools to a stable cooling condition and mitigating the release of radioactive materials, we will make every effort to enable evacuees to return to their homes and for all citizens to be able to secure a sound life.

Areas	Issues	Current Status (as of April 16 <sup>th</sup> )	Targets, Countermeasures and Risks		Mid-term Issues
			<Step 1 (around 3 months)> Radiation dose is in steady decline.	<Step 2 (around 3 to 6 months)*> Release of radioactive materials is under control and radiation dose is being significantly held down. * After achieving Step 1	
I. Cooling	(1) Cooling the Reactors	<p><b>Current Status [1] (Units 1 to 3) Cooling achieved by water injection while there is partial damage to fuel pellets.</b></p> <p>⇒ Continued injection of fresh water and further cooling measures are required.</p> <p>Countermeasure [1]: Injecting fresh water into the RPV by pumps.</p> <p>Risk [1]: Possibility of hydrogen explosion due to condensation of steam in the PCV when cooled, leading to increased hydrogen concentration.</p> <p>Countermeasure [2]: Injecting nitrogen gas into the PCV (start from Unit 1).</p> <p>Countermeasure [3]: Consideration of flooding the PCV up to the top of active fuel.</p> <p><b>Current Status [2] (Units 1 to 3) High likelihood of small leakage of steam containing radioactive materials through the gap of PCV caused by high temperature.</b></p> <p>⇒ Lowering the amount of steam through cooling and implementation of leakage prevention are required.</p> <p>Countermeasure [4]: Lower the amount of steam generated by sufficiently cooling the reactor (to be achieved by measures in Steps 1 and 2).</p> <p>Countermeasure [5]: Consideration of shielding the leakage by covering the reactor building (coordinate with issue [4]).</p> <p><b>Current Status [3] (Unit 2) Large amount of water leakage, indicating high likelihood of PCV damage.</b></p> <p>⇒ Repairing the damaged location is required.</p> <p>⇒ Need to control the amount of water injection since leakage increases as injection increases.</p> <p>Countermeasure [6]: Consideration of sealing the damaged location (e.g., filling with grout (glutinous cement)).</p> <p>Countermeasure [7]: Cooling at minimum water injection rate (control the leakage of contaminated water).</p> <p>Risk [2]: Possibility of prolonged work of sealing the damaged location (→ countermeasures [12] and [14]).</p> <p><b>Current Status [4] Secured multiple off-site power (1 system each from TEPCO and Tohoku EPCO) and deployed backup power (generator cars / emergency generators)</b></p> <p>Risk [3]: Possibility of (partial) loss of power from the grid caused by ensuring aftershocks and lightning in summer.</p> <p>Countermeasure [8]: Install interconnecting lines of offsite power soon.</p>	<p><b>Target [1] (Unit 1 to 3) Maintain stable cooling.</b></p> <p>Countermeasure [9]: Flood the PCV up to the top of active fuel.</p> <p>Countermeasure [10]: Reduce the amount of radioactive materials (utilization of standby gas treatment system (filter), etc.) when PCV venting (release of steam containing radioactive materials into the atmosphere).</p> <p>Countermeasure [11]: Continue preventing hydrogen explosion by injecting nitrogen into the PCV.</p> <p>Risk [4]: Increase in water leakage into the turbine building in the process of flooding the PCV.</p> <p>Countermeasure [12]: Consideration and implementation of measures to hold down water inflow (e.g., circulating the water back into the RPV by storing and processing the accumulated water in the turbine building).</p> <p>Countermeasure [13]: Consideration of recovering heat-exchange function for the reactor (installing heat exchangers).</p> <p>Risk [5]: Possibility of prolonged work in high-dose level area (→ keep countermeasures [9] and [12]).</p> <p><b>Target [2] (Unit 2) Cool the reactor while controlling the increase of accumulated water until PCV is sealed.</b></p> <p>Countermeasure [14]: Continue cooling by current minimum injection rate.</p> <p>Countermeasure [15]: Continuous prevention of hydrogen explosion by nitrogen injection into the PCV.</p> <p>Countermeasure [16]: Continue consideration and implementation of sealing measure at damaged location. Implement cooling measures similar to those for Units 1 and 3 once the damaged location is sealed.</p> <p>Risk [2]: Possibility of prolonged work of sealing the damaged location. (→ continue countermeasures [12] and [14]).</p>	<p><b>Target [3] Achieve cold shutdown condition (sufficient cooling is achieved depending on the status of each unit.)</b></p> <p>Countermeasure [17]: Maintain and enhance countermeasures in Step 1 if needed.</p>	<p><b>Issue [1] Prevention of breakage, clogging and water leakage of structural materials (reactor and pipes, etc.) due to corrosion caused by salt.</b></p>

Note: Reactor pressure vessel is denoted as "RPV" and primary containment vessel is denoted as "PCV"

Areas	Issues	Current Status (as of April 16 <sup>th</sup> )	Targets, Countermeasures and Risks		Mid-term Issues
			<Step 1 (around 3 months)> Radiation dose is in steady decline.	<Step 2 (around 3 to 6 months*)> Release of radioactive materials is under control and radiation dose is being significantly held down. * After achieving Step 1	
I. Cooling	(2) Cooling the Spent Fuel Pools	<p><b>Current Status [5]: Fresh water is injected from outside for Units 1, 3, 4 and through normal cooling line for Unit 2.</b></p> <p>⇒ Reduction of worker exposure and countermeasures for aftershocks are required.</p> <p>Countermeasure [18]: Consideration/implementation of improving reliability of external water injection by concrete pumps ("Giraffe", etc.)/switch to remote-controlled operation.</p> <p><b>Current Status [6]: Confirmation of release of radioactive materials from the pool</b></p> <p>Countermeasure [19]: Sampling and measurement of steam/pool water by "Giraffe", etc.</p> <p>⇒ Most fuels in Unit 4 have been confirmed intact according to the result of pool water analysis.</p> <p><b>Current Status [7]: Walls of the building supporting the pool have been damaged.</b></p> <p>⇒ Tolerance evaluation is especially needed for Unit 4.</p> <p>Countermeasure [20]: Seismic tolerance assessment of Unit 4.</p> <p>⇒ A certain level of seismic tolerance has been confirmed.</p> <p>Countermeasure [21]: Continue monitoring and examine necessary countermeasures (→ countermeasure [26]).</p>	<p><b>Target [4]: Maintain stable cooling.</b></p> <p>Countermeasure [22]: Continuation of water injection by "Giraffe", etc. (reliability improvement (enhanced durability of hoses)/switch to remote-controlled operation).</p> <p>Countermeasure [23]: Add cooling function to normal Fuel Pool Cooling system and continue injecting water for Unit 2.</p> <p>Countermeasure [24]: Examination and implementation of restoration of normal cooling system for Units 1, 3, and 4.</p> <p>Risk [6]: Possibility of inability to restore normal cooling line due to damages to the building.</p> <p>Countermeasure [25]: Examination and implementation of installing heat exchangers.</p> <p>Countermeasure [26]: (Unit 4) Installation of supporting structure under the bottom of the pool.</p>	<p><b>Target [5]: Maintain more stable cooling function by keeping a certain level of water.</b></p> <p>Countermeasure [27]: Cooling by installation of heat exchangers.</p> <p>Countermeasure [28]: Expansion of remote-controlled operation areas of "Giraffe", etc.</p>	<p><b>Issue [2]: Removal of fuels (including Units 5 &amp; 6.)</b></p>
		II. Mitigation	(3) Containment, Storage, Processing, and Reuse of Water Contaminated by Radioactive Materials (Accumulated Water)	<p><b>Current Status [8]: Leakage of high radiation-level contaminated water assumed to have originated from Unit 2 reactor occurred, but was subsequently stopped.</b></p> <p>Countermeasure [29]: Identify leakage path and examine and implement preventive measures.</p> <ul style="list-style-type: none"> <li>• Placing caulings with radioactive material adsorption material (zeolite) in the bay.</li> <li>• Installing fences in the bay to prevent contamination from spreading (sh. fence).</li> <li>• Blockage between trenches and buildings, etc.</li> </ul> <p><b>Current Status [9]: Leakage and accumulation of high radiation level contaminated water at Unit 2's turbine building, vertical shafts and trenches.</b></p> <p>Countermeasure [30]: Transferring accumulated water to facilities that can store it (Condenser and Centralized Waste Treatment Facility).</p> <p>Countermeasure [31]: Preparing decontamination and desalt of transferred accumulated water. (→ Countermeasure [38]).</p> <p>Countermeasure [32]: Preparing to install tanks.</p> <p><b>Current Status [10]: Increase of storage volume of water with low radiation level.</b></p> <p>Countermeasure [33]: Preparing to store with tanks and barges.</p> <p>Countermeasure [34]: Preparing for decontamination and desalt of contaminated water. (→ Countermeasure [41]).</p> <p>Countermeasure [35]: Preparing to install a reservoir.</p> <p><b>Current Status [11]: High likelihood of underground water around the building (sub-drainage water) to be contaminated.</b></p> <p>Countermeasure [36]: Preparing to decontaminate sub-drainage water after being pumped up.</p>	<p><b>Target [6]: Secure sufficient storage place to prevent water with high radiation level from being released out of the site boundary.</b></p> <p>Countermeasure [37]: Utilization of "Centralized Waste Treatment Facility", etc. to store water.</p> <p>Countermeasure [38]: Install water processing facilities, decontaminate and desalt highly-contaminated water and store in tanks.</p> <p>Risk [7]: Possibility of delay in installing water processing facilities or poor operating performance of the facilities.</p> <p>Countermeasure [39]: Examination and implementation of backup measures (installation of additional tanks or pools or leakage prevention by coagulator, etc.)</p> <p><b>Target [7]: Store and process water with low radiation level.</b></p> <p>Countermeasure [40]: Increase storage capacity by adding tanks, barges, Megatank, etc.</p> <p>Countermeasure [41]: Decontaminating contaminated water using decontaminants to below acceptable criteria.</p>

Areas	Issues	Current Status (as of April 16 <sup>th</sup> )	Targets, Countermeasures and Risks		Mid-term Issues
			<Step 1 (around 3 months)> Radiation dose is in steady decline.	<Step 2 (around 3 to 6 months*)> Release of radioactive materials is under control and radiation dose is being significantly held down. * After achieving Step 1	
II. Mitigation	(4) Mitigation of Release of Radioactive Materials to Atmosphere and from Soil	<p><b>Current Status [12]: Debris are scattered outside the buildings and radioactive materials are being scattered.</b></p> <p>Countermeasure [47]: Inhibit scattering of radioactive materials by full-scale dispersion of inhibitor after confirming its performance by test.</p> <p>Countermeasure [48]: Prevent rain water contamination by dispersion of inhibitor.</p> <p>Countermeasure [49]: Removal of debris.</p> <p>Countermeasure [50]: Examination and implementation of basic design for reactor building cover and full-fledged measure (container with concrete roof and wall, etc.)</p> <p>Countermeasure [51]: Consideration of solidification, substitution and cleansing of contaminated soil (mid-term issues.)</p>	<p><b>Target [9]: Prevent scattering of radioactive materials on buildings and ground.</b></p> <p>Countermeasure [52]: Improvement of work condition by expanding application and dispersion of inhibitors to the ground and buildings.</p> <p>Countermeasure [53]: Continue removal of debris.</p> <p>Countermeasure [54]: Begin installing reactor building cover (with ventilator and filter.)</p> <p>Risk [8]: Considerable reduction of radiation dose is a prerequisite to launch construction. (→continue countermeasure [52] and [53].)</p>	<p><b>Target [10]: Cover the entire buildings (as temporary measure).</b></p> <p>Countermeasure [55]: Complete installing reactor building covers (Units 1, 3, 4.)</p> <p>Risk [9]: Possibility of cover being damaged by a huge typhoon.</p> <p>Countermeasure [56]: Begin detailed design of full-fledged measure (container with concrete roof and wall, etc.)</p>	<p><b>Issue [4]: Cover the entire building (as full-fledged measure)</b></p> <p>Issue [5]: Solidification, substitution and cleansing of contaminated soil.</p>
		<p><b>Current status [13]: Monitoring of radiation dose in and out of the power station is carried out.</b></p> <p>Countermeasure [57]: Monitoring sea water, soil and atmosphere within the site boundary (25 locations.)</p> <p>Countermeasure [58]: Monitoring radiation dose at the site boundary (12 locations.)</p> <p>Countermeasure [59]: Consideration of monitoring methods in evacuation order/planned evacuation/emergency evacuation preparation areas. (→countermeasure [60] to [63])</p>	<p><b>Target [11]: Expand/enhance monitoring and inform of results fast and accurately.</b></p> <p>Countermeasure [60]: Consideration and implementation of monitoring methods in evacuation order / planned evacuation / emergency evacuation preparation areas (in cooperation and consultation with national/prefectural/municipal governments.)</p> <p>Countermeasure [61]: Announce accurately monitoring results of long half-life residue radioactive materials such as cesium 137.</p>	<p><b>Target [12]: Sufficiently reduce radiation dose in evacuation order / planned evacuation / emergency evacuation preparation areas.</b></p> <p>Countermeasure [62]: Monitoring of homecoming residences (in cooperation and consultation with national / prefectural / municipal governments.)</p> <p>Countermeasure [63]: Examination and implementation of necessary measures to reduce radiation dose (decontamination of homecoming residences and soil surface) (in cooperation and consultation with national/prefectural/municipal governments.)</p>	<p>Issue [6]: Continue monitoring and informing environmental safety.</p>
III. Monitoring/ Decontamination	(5) Measurement, Reduction and Announcement of Radiation Dose in Evacuation Order/Planned Evacuation/Emergency Evacuation Preparation Areas	<p>(Note) With regard to radiation dose monitoring and reduction measures in evacuation order/planned evacuation/emergency evacuation preparation areas, we will take every measure through cooperation with the national government and by consultation with the prefectural and municipal governments.</p>			

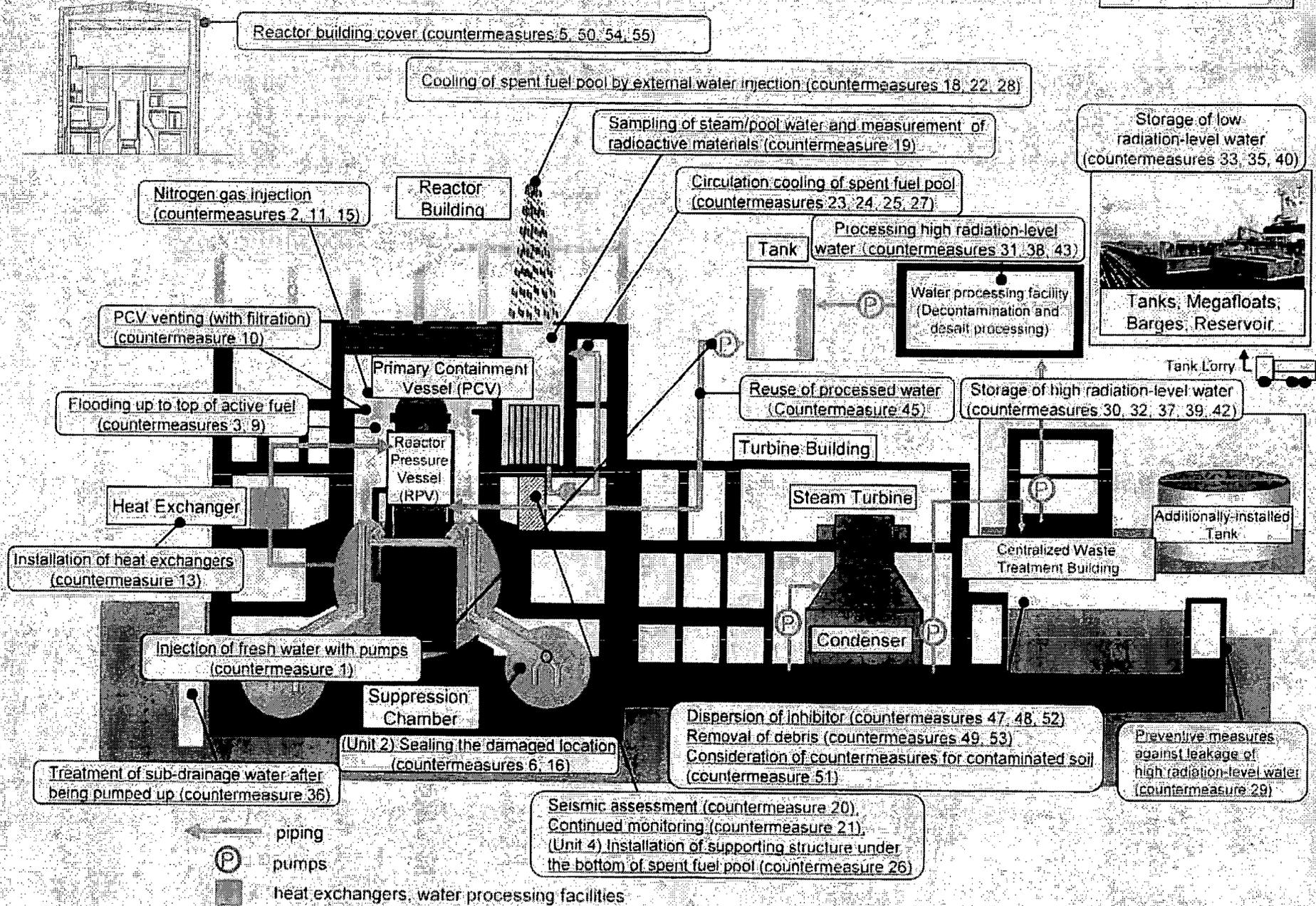
# Roadmap for Immediate Actions (Issues / Targets / Major Countermeasures)

Reference 1

		Current Status	STEP1	STEP2	Mid-term Issues
I Cooling	(1) Reactors	Injecting fresh water	Nitrogen gas injection (Unit 1-3) Flooding up to top of active fuel Examination and implementation of heat exchange function (Unit 2) Sealing the damaged location	Stable cooling Flooding up to top of active fuel	Cool shutdown condition Prevention of breakage of structural materials, etc.
	(2) Spent Fuel Pools	Injecting fresh water	Enhance reliability of water injection Restore coolant circulation system (Unit 4) Install supporting structure	Stable cooling Remote control of water injection Examination and implementation of heat exchange function	More stable cooling Removal of fuels
II Mitigation	(3) Accumulated Water	Transferring water with high radiation level Storing water with low radiation level	Secure storage place Installation of storage / processing facilities Installation of storage facilities / decontamination processing	Damaged contaminated water Expansion of storage / processing facilities Decontamination / Desalt processing (reuse), etc.	Installation of full-fledged water treatment facilities
	(4) Atmosphere / Soil		Dispersion of inhibitor Removal of debris	Installing reactor building cover	Installation of reactor building cover (container with concrete) Solidification of contaminated soil, etc.
III Decontamination	(5) Measurement, Reduction and Arrangement	Monitoring of radiation dose in and out of the power station	Expand/enhance monitoring and inform of results fast and accurately	Sufficiently reduce radiation dose in evacuation order / planned evacuation / emergency evacuation preparation areas	Continue monitoring and informing environmental safety

# Overview of Major Countermeasures in the Power Station

Reference 2



Statement of Mr. Banri Kaieda, Minister of Economy, Trade and Industry at the press conference following the announcement of Roadmap by Tokyo Electric Power Company (TEPCO)

1. Presentation at the earliest possible date of a roadmap towards settling the situation at Fukushima Daiichi Nuclear Power Station has been requested by people home and abroad, especially the residents around Fukushima Daiichi Nuclear Power Station.

TEPCO has just released this roadmap, which is an important step forward. Taking this opportunity, we would like to move from the "emergency response phase" up until now to the "planned & stabilizing action phase" in which the settlement of the situation will be aimed under the solid roadmap.

2. In response to the release of the roadmap.

- (1) The Government will request TEPCO to ensure the implementation of this roadmap steadily and as early as possible. To this end, the Nuclear and Industrial Safety Agency and others will make regular follow-up, monitoring of the progress of the works and necessary safety checks;

- (2) The Government will request TEPCO to ensure the mobilization and deployment of workers, the procurement and preparation of equipment and materials, and the arrangement of accommodation and other facilities, which are necessary to ensure implementation of the roadmap;

- (3) At the end of Step 2, the release of radioactive materials will be under control. At this stage, the Government will, following advices of the Nuclear Safety Commission of Japan, review the "Deliberate Evacuation Area" and the "Evacuation Prepared Area". Up until that time, we will consider the details of review criteria, and will decontaminate the widest possible area.

By implementing this, we would like to announce, within 6 to 9 months as our target, to the residents of some of the areas whether they will be able to come home.

(Division in Charge)

Nuclear and Industrial Safety Agency  
Nuclear Safety, Public Relations and Training Division

**Quayle, Lisa**

---

**From:** Scott, Michael  
**Sent:** Friday, April 01, 2011 5:43 PM  
**To:** Monninger, John; Casto, Chuck; Collins, Elmo; Giessner, John; Taylor, Robert; Blamey, Alan; Ali, Syed; Sheikh, Abdul; Dorman, Dan  
**Subject:** FW: Good info.  
**Attachments:** Fukuchima\_eng\_20110320.pps

Another accident slide show FYI

---

**From:** Gibson, Kathy  
**Sent:** Friday, April 01, 2011 6:03 PM  
**To:** RES\_DSA  
**Subject:** Fw: Good info.

Gives a good description of the accident progression on all of the Fukushima units.

---

**From:** Uhle, Jennifer  
**To:** Johnson, Michael; Sheron, Brian; Gibson, Kathy  
**Sent:** Sun Mar 27 02:37:04 2011  
**Subject:** FW: Good info.

---

**From:** OST01 HOC  
**Sent:** Saturday, March 26, 2011 11:49 PM  
**To:** Miller, Chris; Uhle, Jennifer; Virgilio, Martin  
**Cc:** FOIA Response.hoc Resource  
**Subject:** FW: Good info.

Gives a good description of the accident progression on all of the units.

Steve Campbell  
EST Coordinator

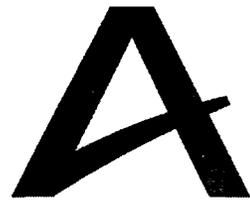
---

**From:** Jervey, Richard  
**Sent:** Saturday, March 26, 2011 11:15 PM  
**To:** OST01 HOC; RST02 Hoc  
**Subject:** FW: Good info.

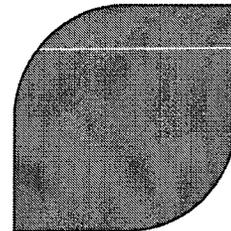
Regards,

R. A. Jervey  
RES/DE/RGDB  
CS2A07  
301/251-7404

*XXXX Hög*



**AREVA**



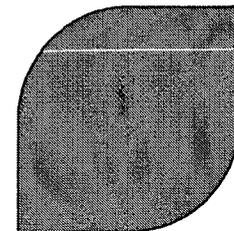
# The Fukushima Daiichi Incident

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

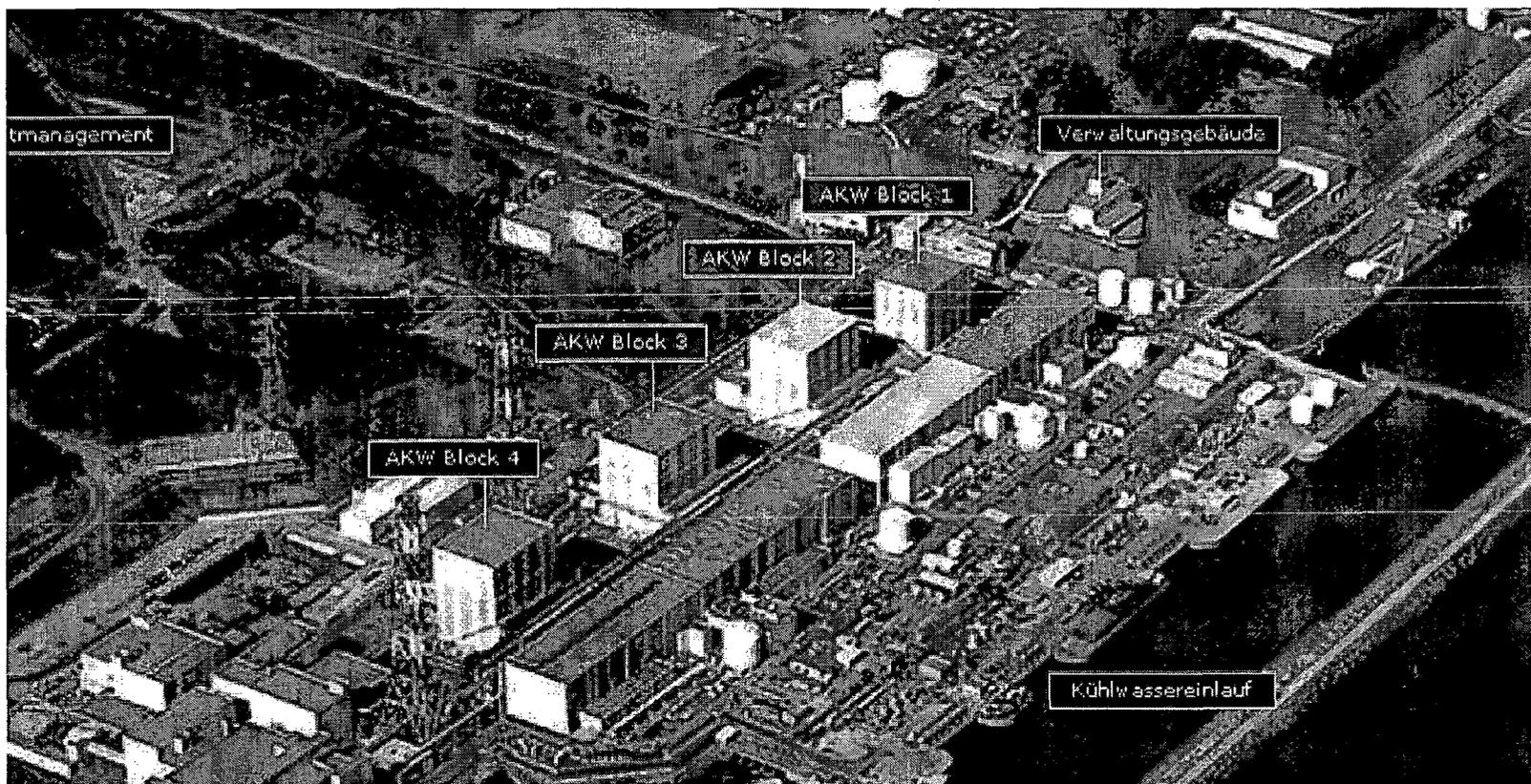
# The Fukushima Daiichi Incident

## 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

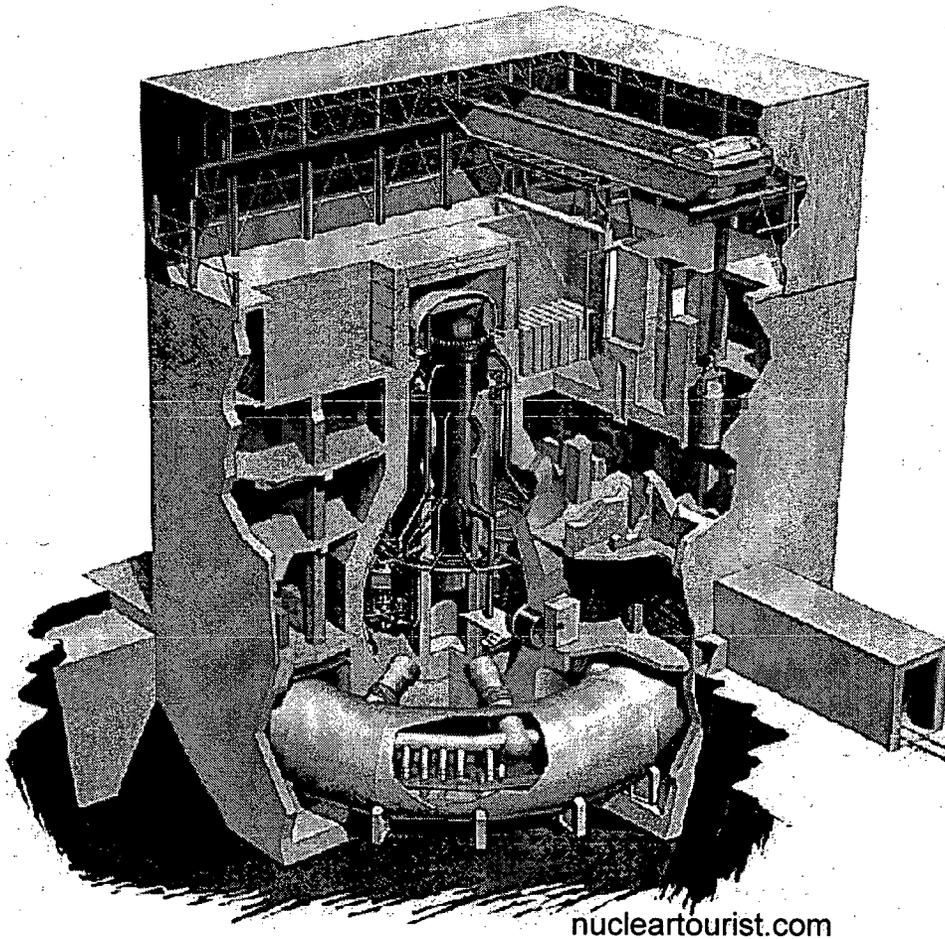


# The Fukushima Daiichi Incident

## 1. Plant Design

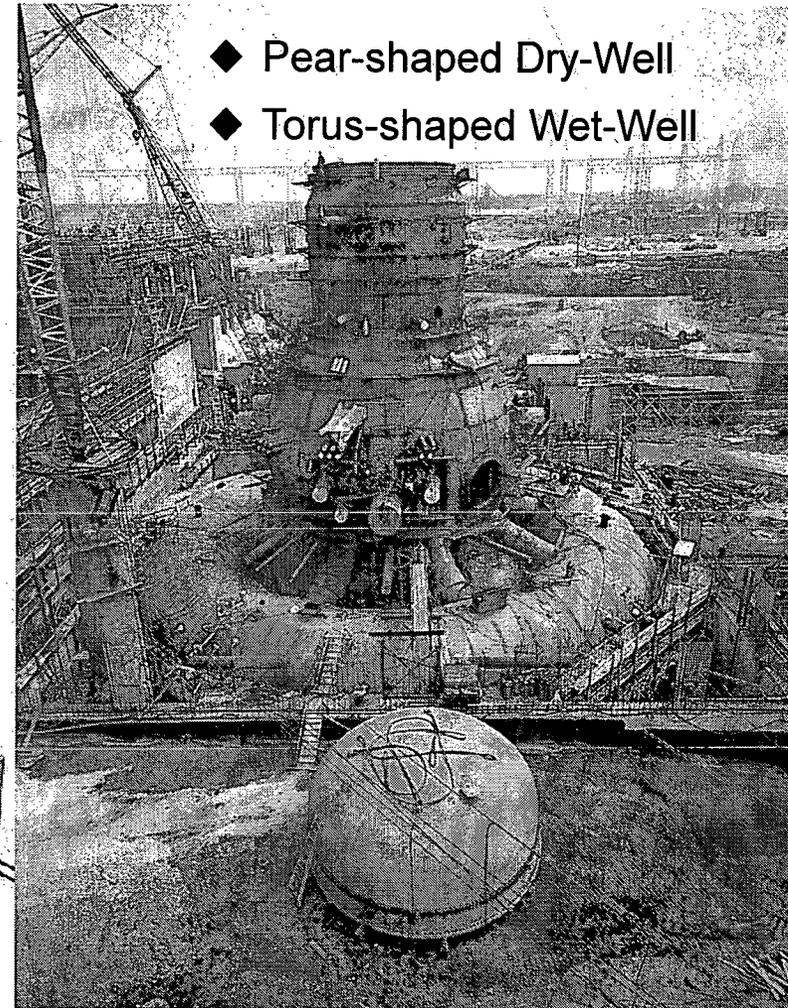
### ► Building structure

- ◆ Concrete Building
- ◆ Steel-framed Service Floor



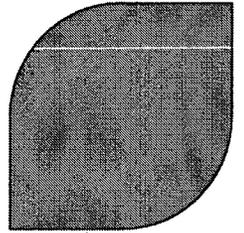
### ► Containment

- ◆ Pear-shaped Dry-Well
- ◆ Torus-shaped Wet-Well

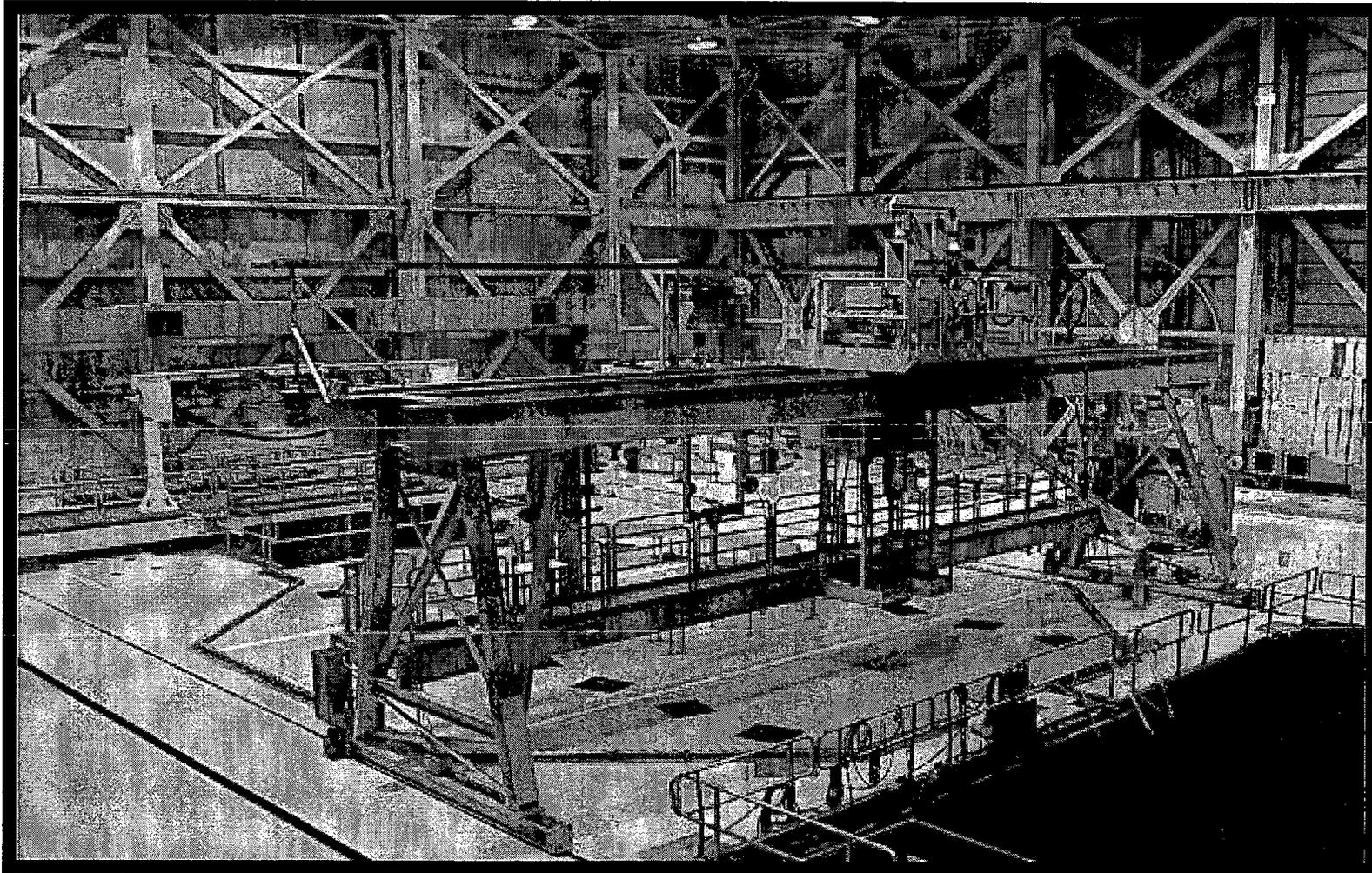


# The Fukushima Daiichi Incident

## 1. Plant Design

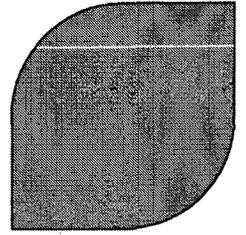


### ► Service Floor

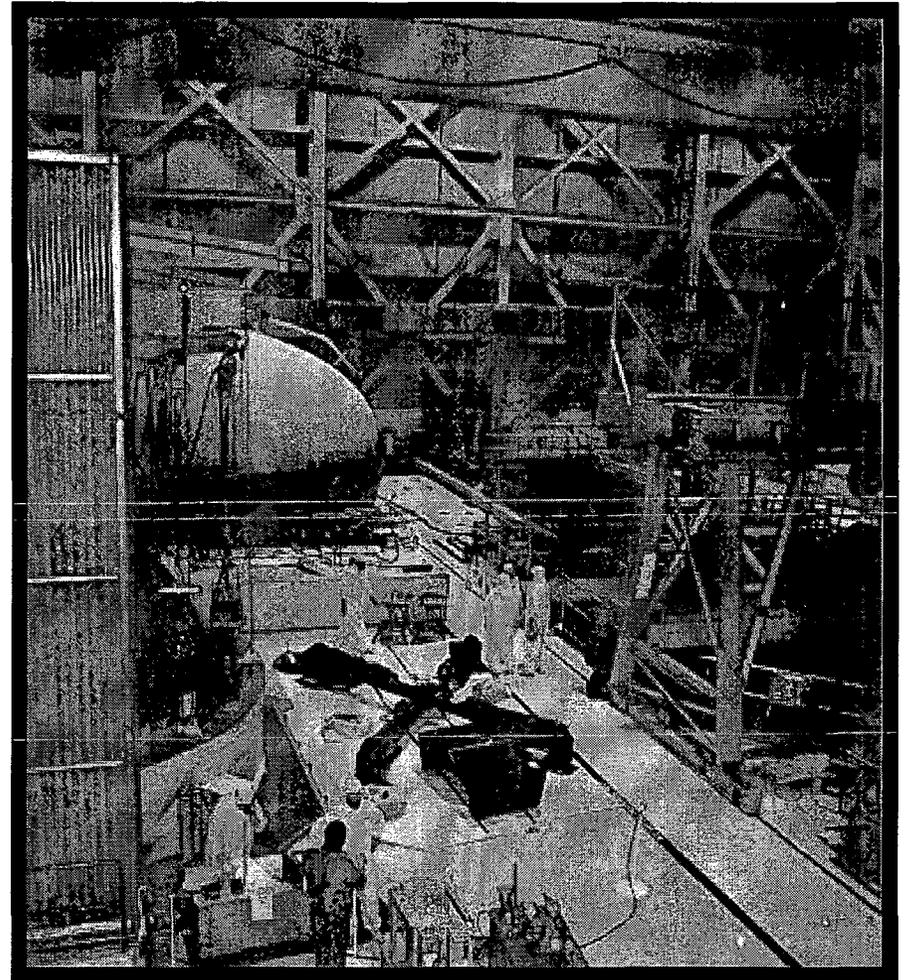
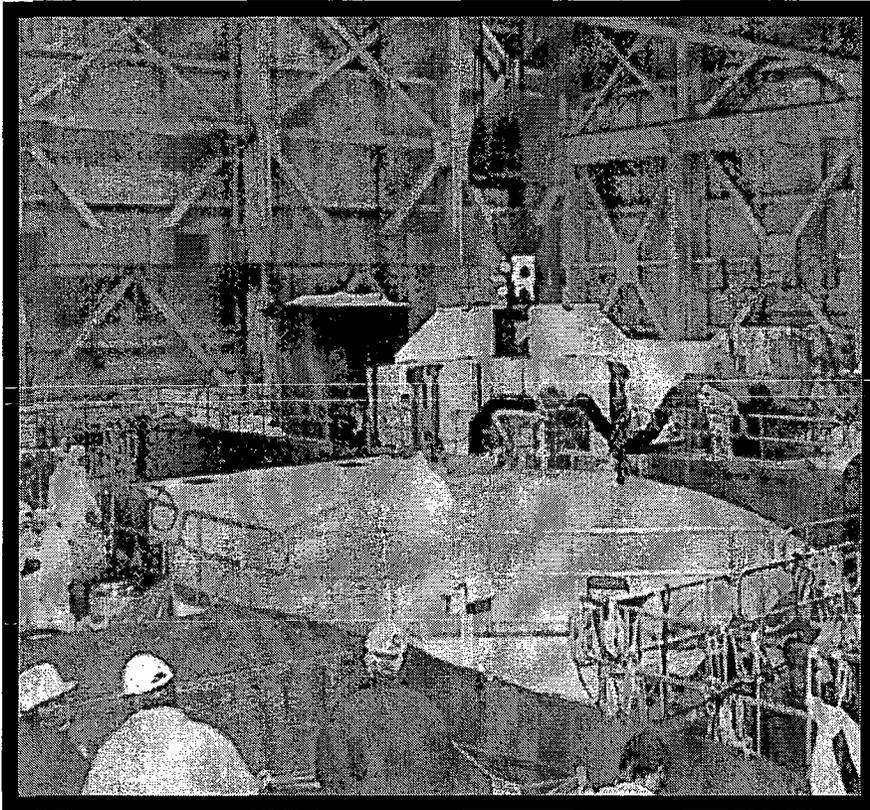


# The Fukushima Daiichi Incident

## 1. Plant Design



- ▶ Lifting the Containment closure head



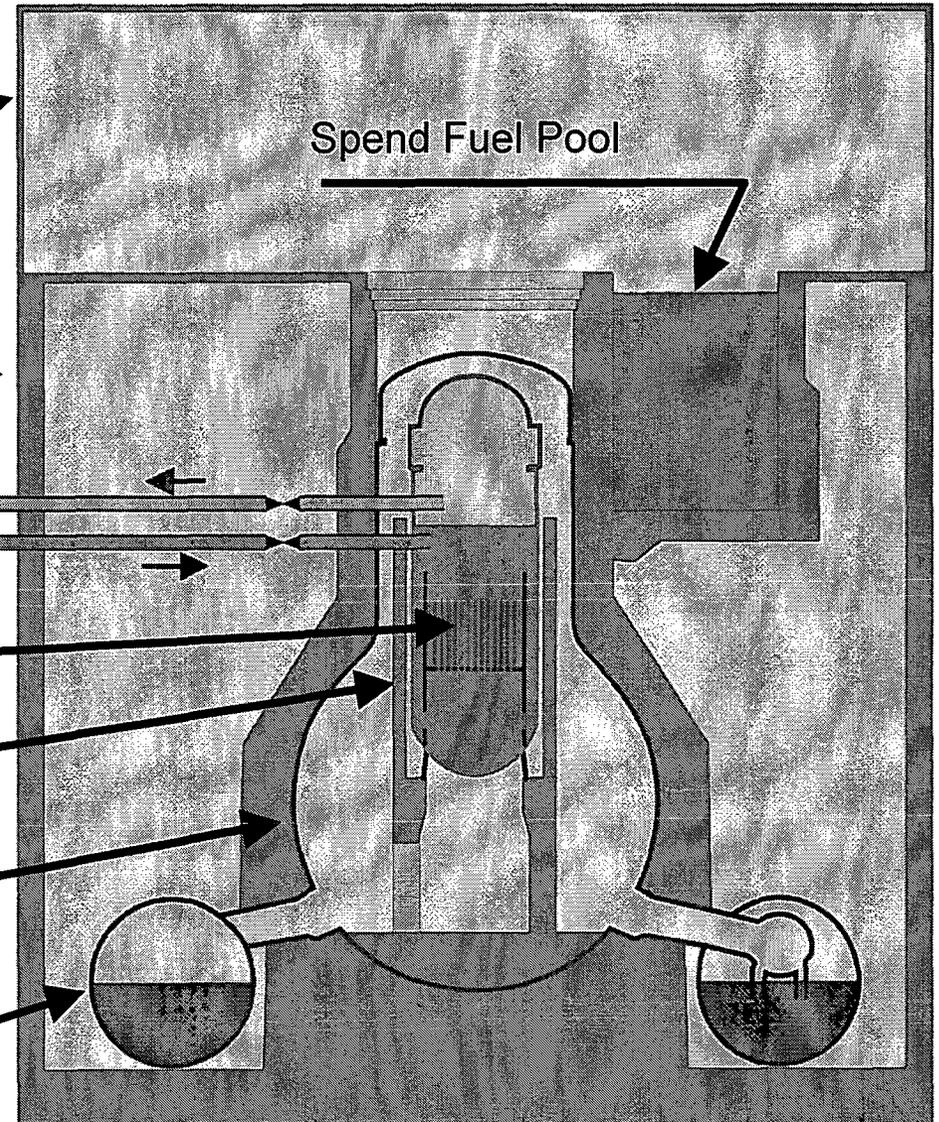
# The Fukushima Daiichi Incident

## 1. Plant Design

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

Fresh Steam line  
Main Feedwater

Spent Fuel Pool



# The Fukushima Daiichi Incident

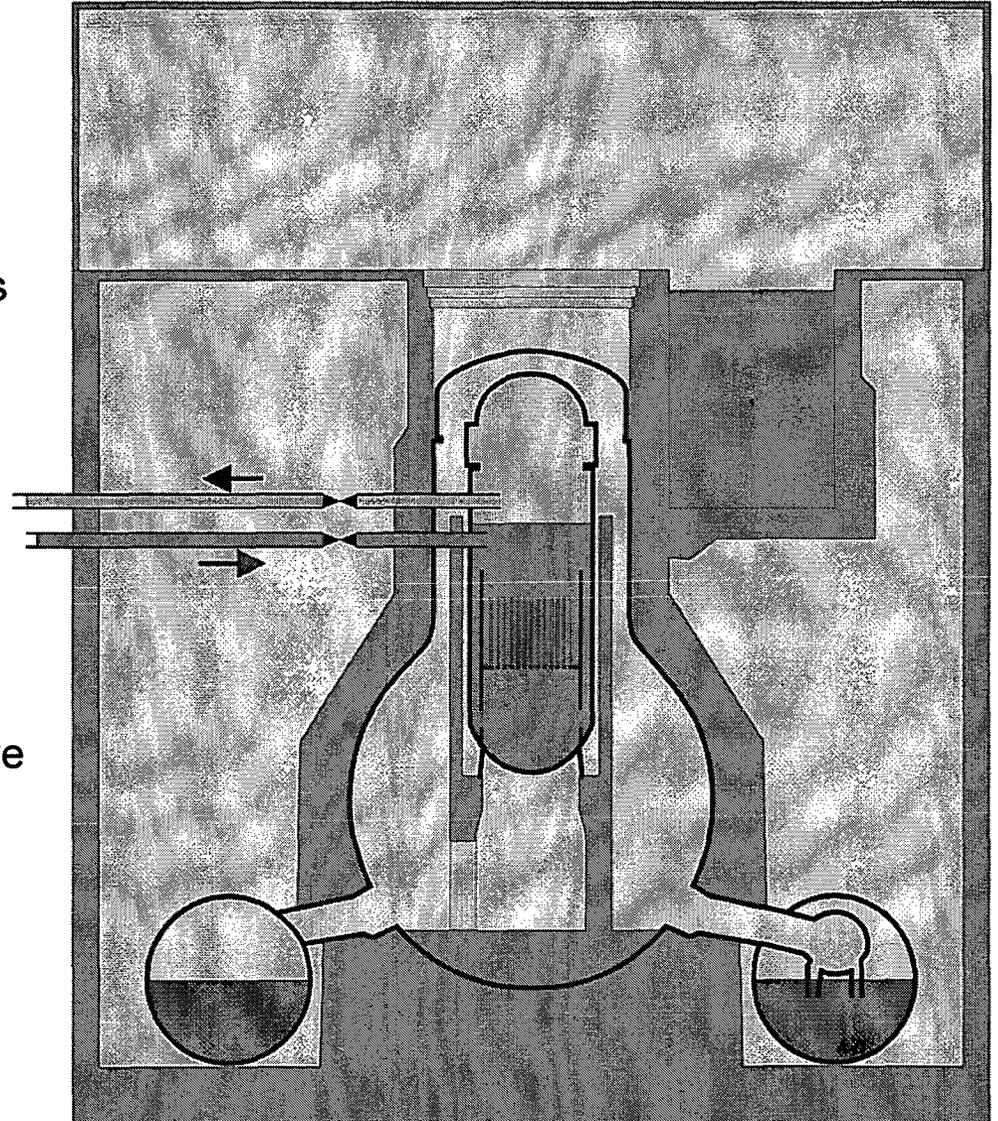
## 2. Accident progression

▶ 11.3.2011 14:46 - Earthquake

- ◆ Magnitude 9
- ◆ Power grid in northern Japan fails
- ◆ Reactors itself are mainly undamaged

▶ SCRAM

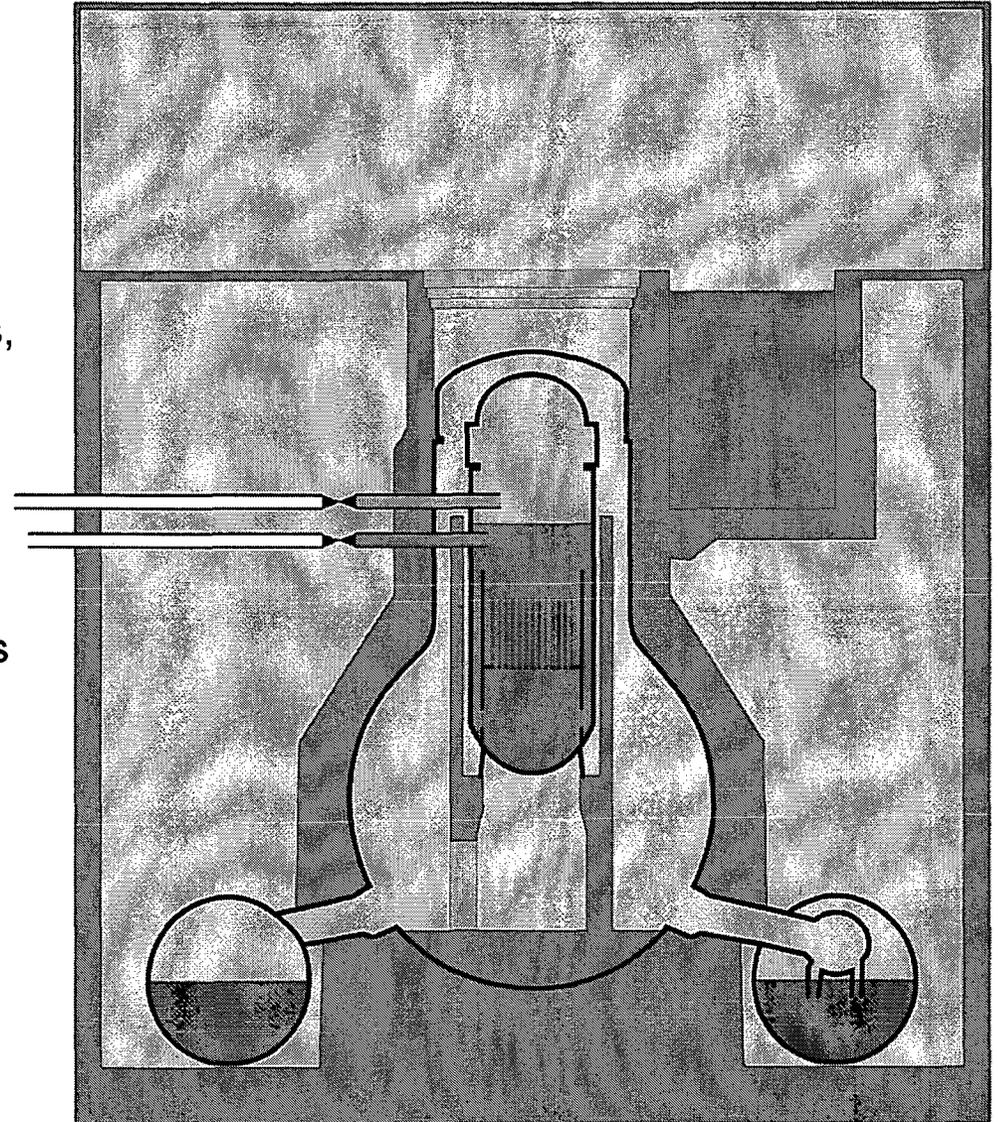
- ◆ Power generation due to Fission of Uranium stops
- ◆ Heat generation due to radioactive Decay of Fission Products
  - After Scram ~6%
  - After 1 Day ~1%
  - After 5 Days ~0.5%



# The Fukushima Daiichi Incident

## 2. Accident progression

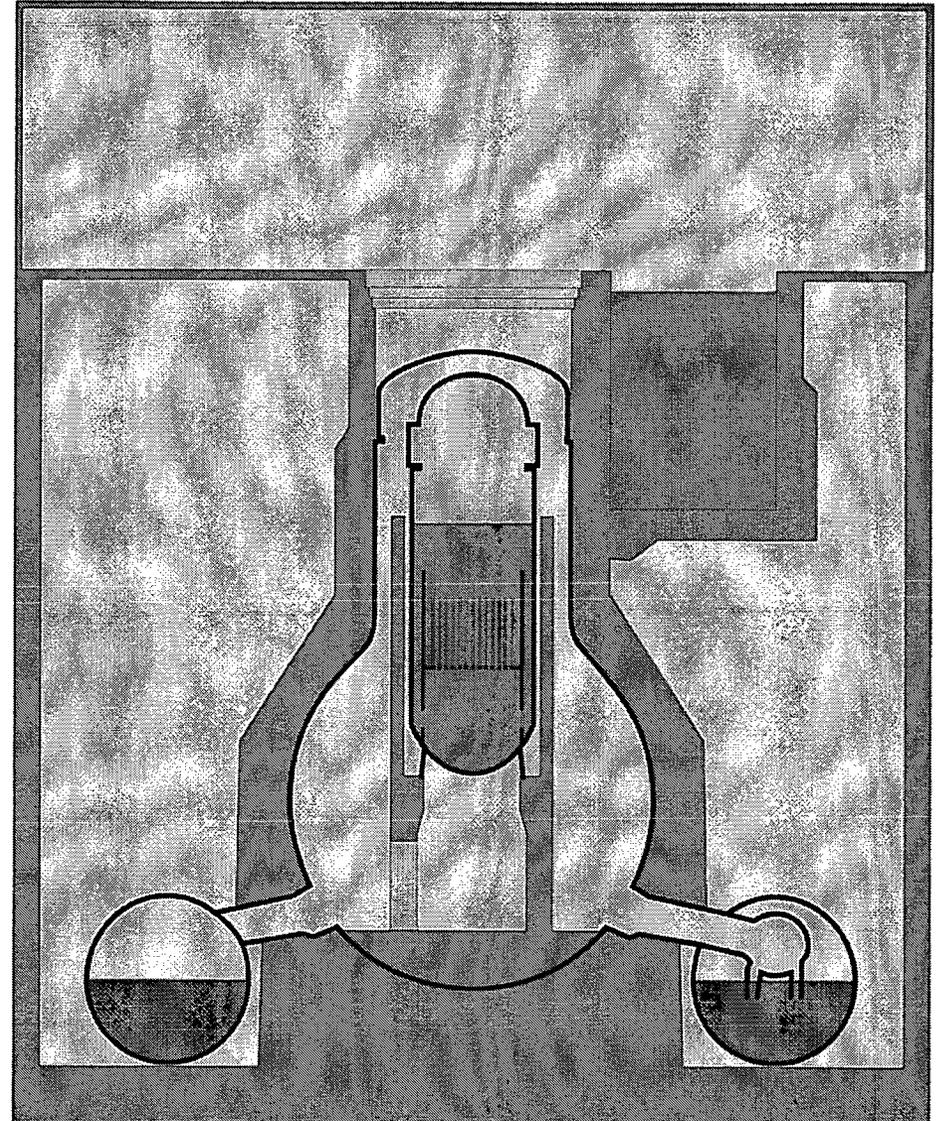
- ▶ Containment Isolation
  - ◆ Closing of all non-safety related Penetrations of the containment
  - ◆ Cuts off Machine hall
  - ◆ If containment isolation succeeds, a large early release of fission products is highly unlikely
  
- ▶ Diesel generators start
  - ◆ Emergency Core cooling systems are supplied
  
- ▶ Plant is in a stable save state



# The Fukushima Daiichi Incident

## 2. Accident progression

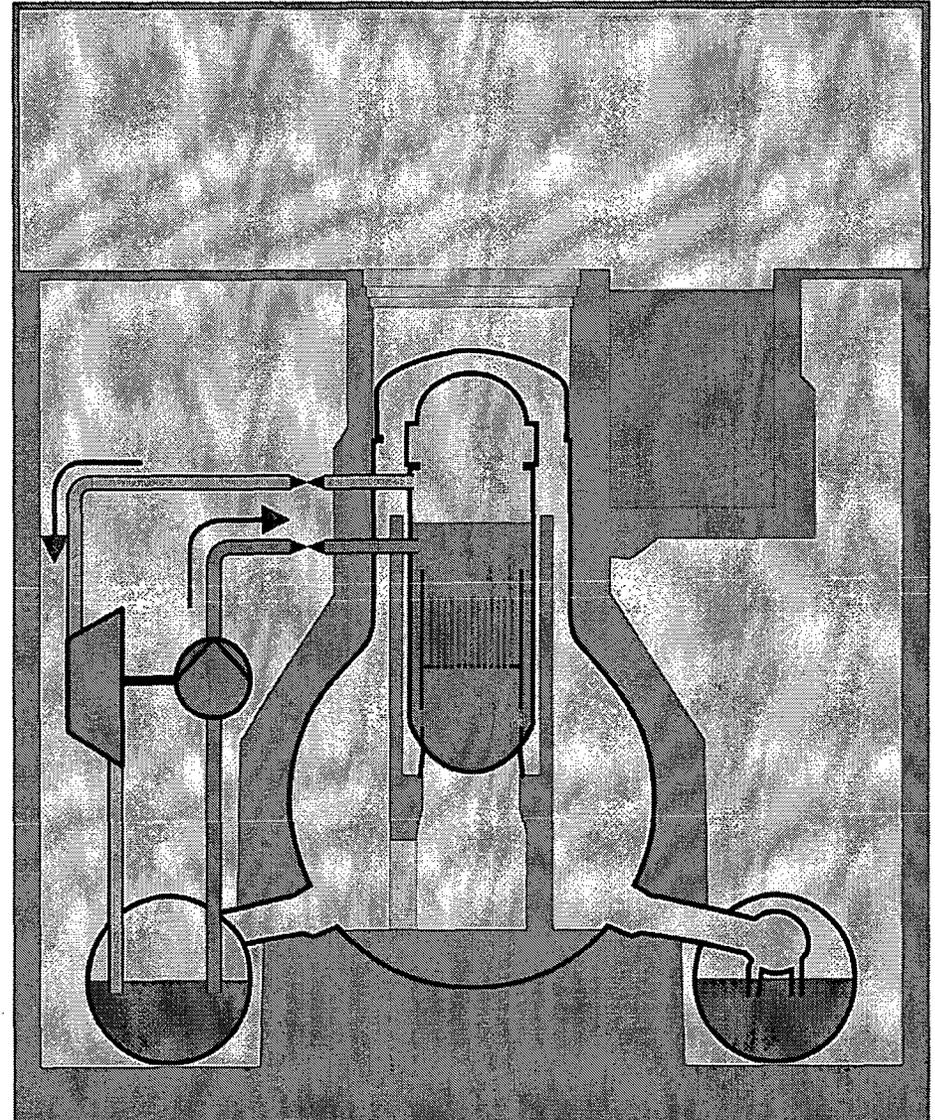
- ▶ 11.3. 15:41 Tsunami hits the plant
  - ◆ Plant Design for Tsunami height of up to 6.5m
  - ◆ Actual Tsunami height >7m
  - ◆ Flooding of
    - Diesel Generators and/or
    - Essential service water building cooling the generators
  
- ▶ Station Blackout
  - ◆ Common cause failure of the power supply
  - ◆ Only Batteries are still available
  - ◆ Failure of all but one Emergency core cooling systems



# The Fukushima Daiichi Incident

## 2. Accident progression

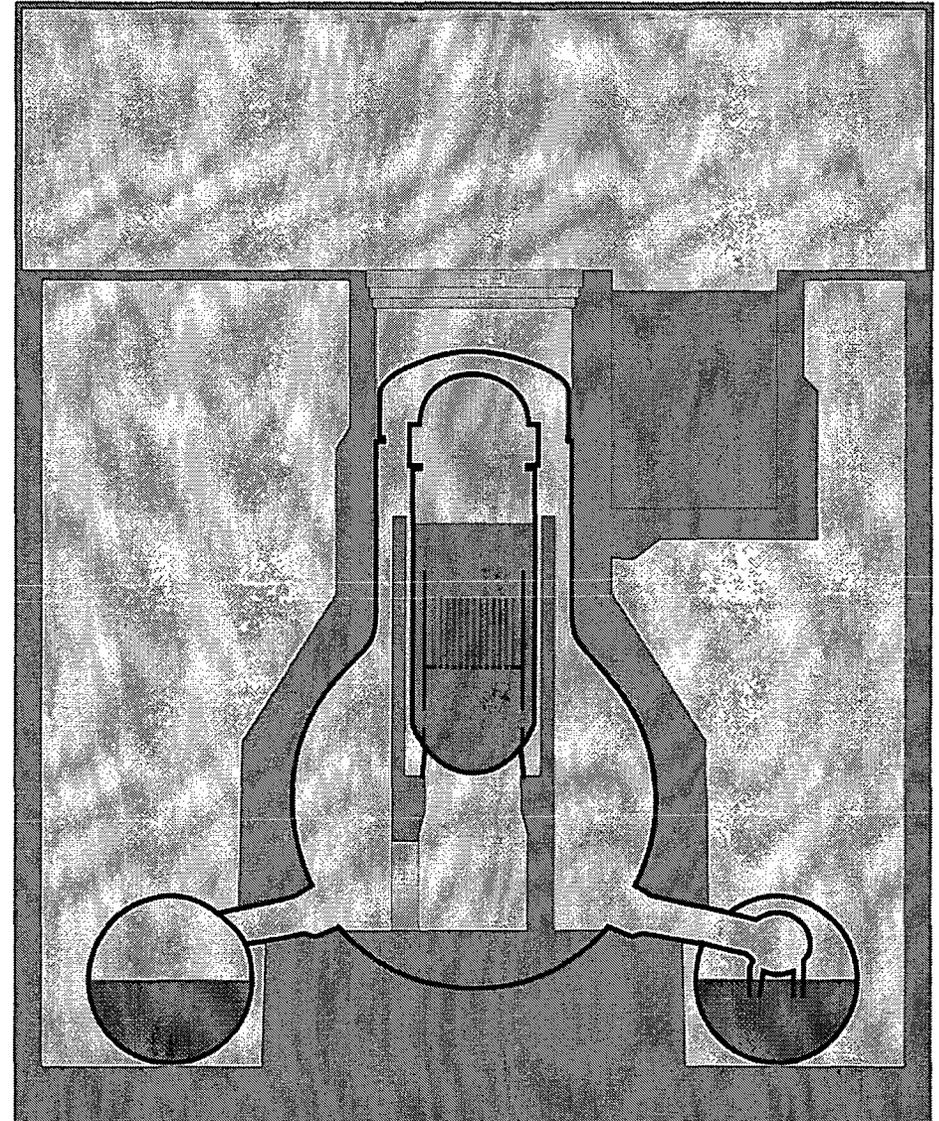
- ▶ Reactor Core Isolation Pump still available
  - ◆ Steam from the Reactor drives a Turbine
  - ◆ Steam gets condensed in the Wet-Well
  - ◆ Turbine drives a Pump
  - ◆ Water from the Wet-Well gets pumped in Reactor
  - ◆ Necessary:
    - Battery power
    - Temperature in the wet-well must be below 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

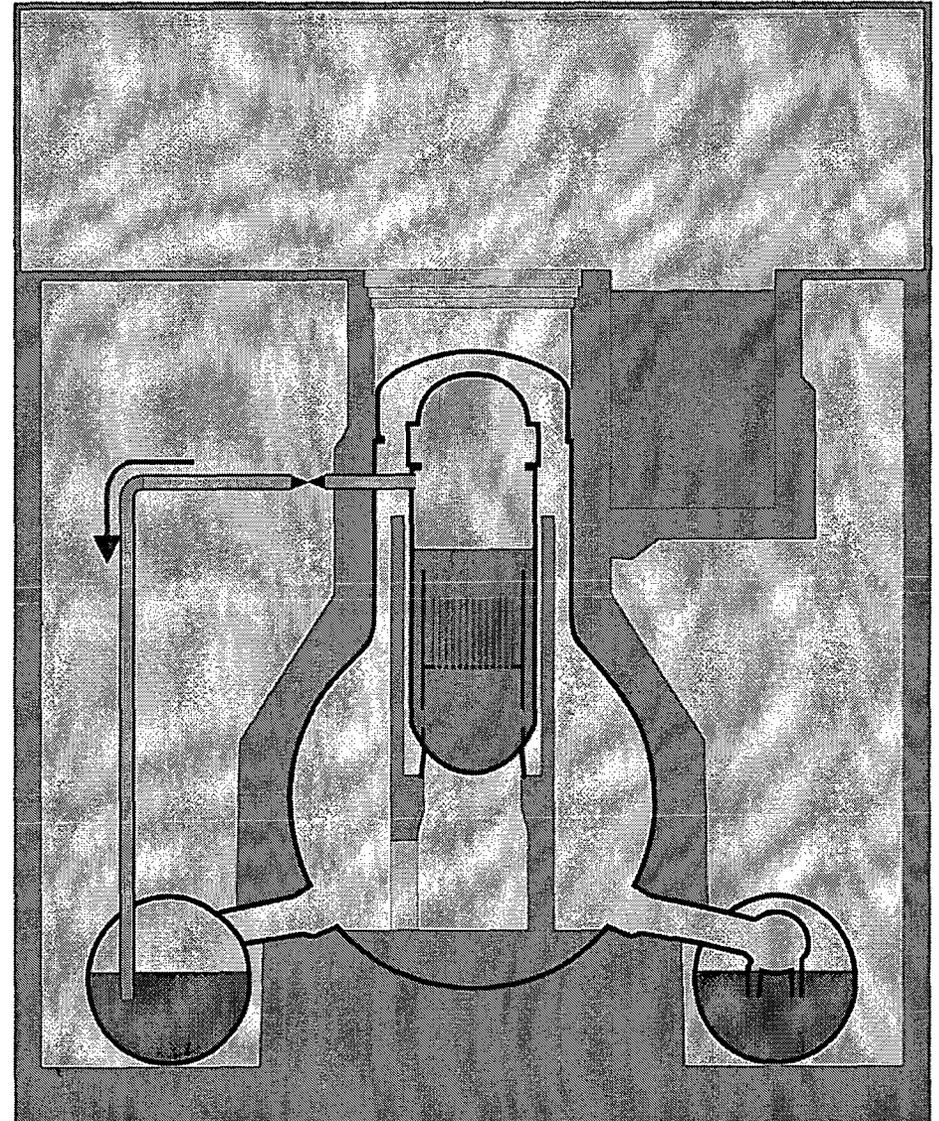
- ▶ Reactor Isolation pump stops
  - ◆ 11.3. 16:36 in Unit 1 (Batteries empty)
  - ◆ 14.3. 13:25 in Unit 2 (Pump failure)
  - ◆ 13.3. 2:44 in Unit 3 (Batteries empty)
  
- ▶ Decay Heat produces still steam in Reactor pressure Vessel
  - ◆ Pressure rising
  
- ▶ Opening the steam relieve valves
  - ◆ Discharge Steam into the Wet-Well
  
- ▶ Descending of the Liquid Level in the Reactor pressure vessel



# The Fukushima Daiichi Incident

## 2. Accident progression

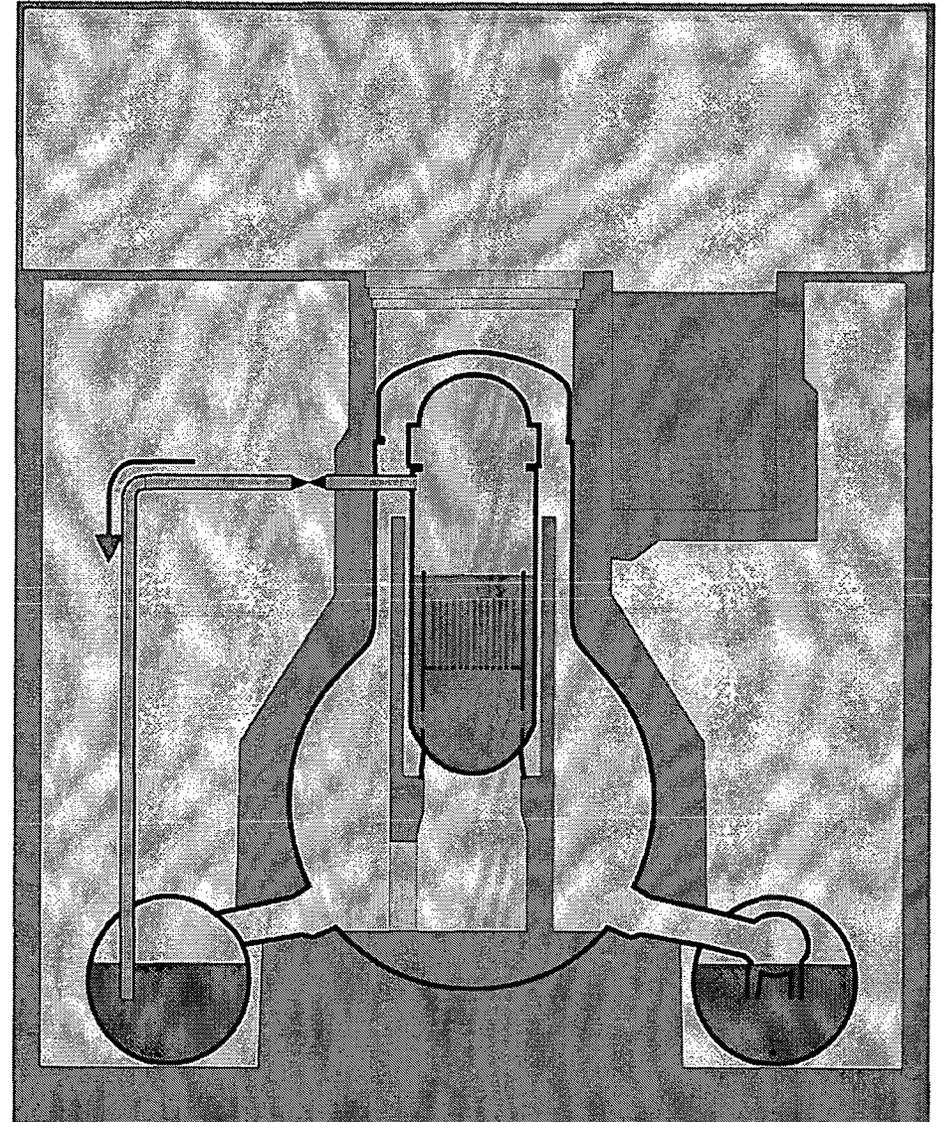
- ▶ Reactor Isolation pump stops
  - ◆ 11.3. 16:36 in Unit 1 (Batteries empty)
  - ◆ 14.3. 13:25 in Unit 2 (Pump failure)
  - ◆ 13.3. 2:44 in Unit 3 (Batteries empty)
- ▶ Decay Heat produces still steam in Reactor pressure Vessel
  - ◆ Pressure rising
- ▶ Opening the steam relieve valves
  - ◆ Discharge Steam into the Wet-Well
- ▶ Descending of the Liquid Level in the Reactor pressure vessel



# The Fukushima Daiichi Incident

## 2. Accident progression

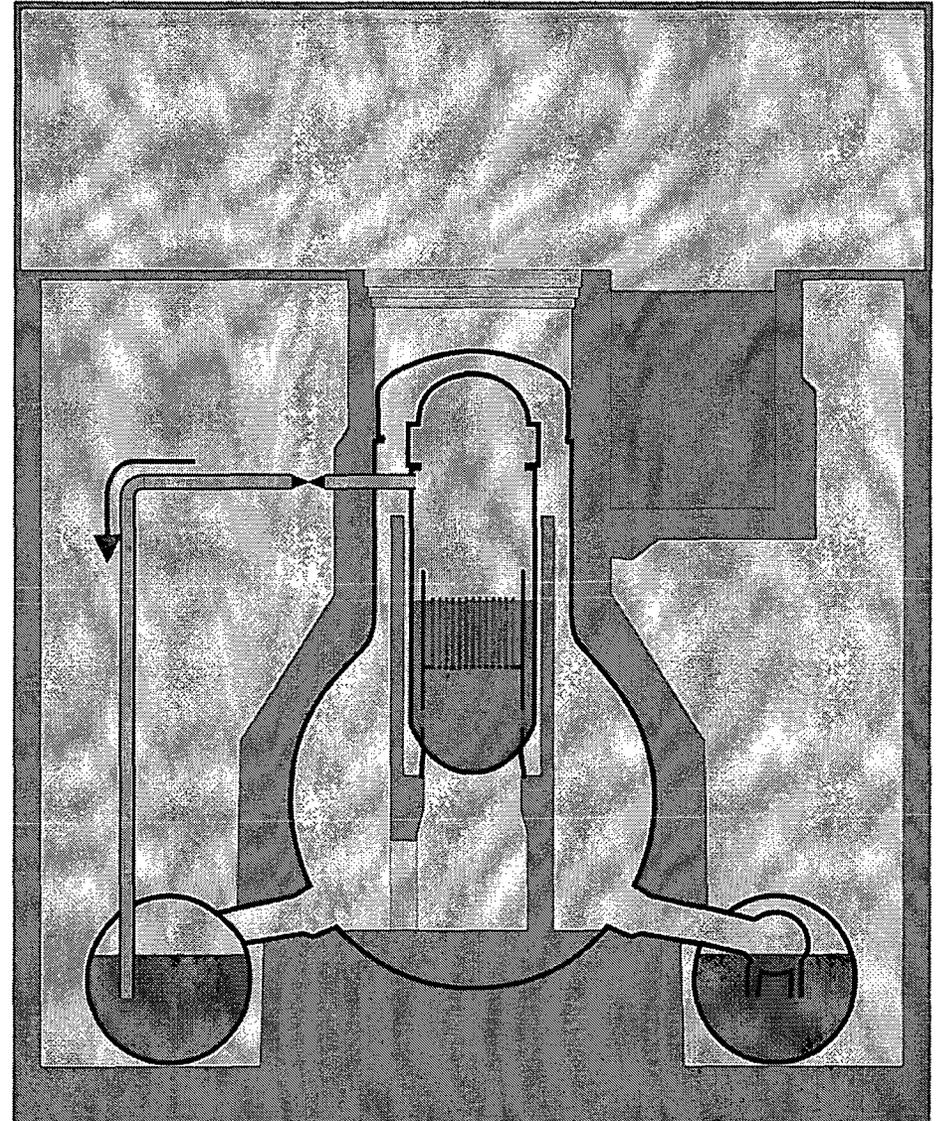
- ▶ Reactor Isolation pump stops
  - ◆ 11.3. 16:36 in Unit 1 (Batteries empty)
  - ◆ 14.3. 13:25 in Unit 2 (Pump failure)
  - ◆ 13.3. 2:44 in Unit 3 (Batteries empty)
- ▶ Decay Heat produces still steam in Reactor pressure Vessel
  - ◆ Pressure rising
- ▶ Opening the steam relieve valves
  - ◆ Discharge Steam into the Wet-Well
- ▶ Descending of the Liquid Level in the Reactor pressure vessel



# The Fukushima Daiichi Incident

## 2. Accident progression

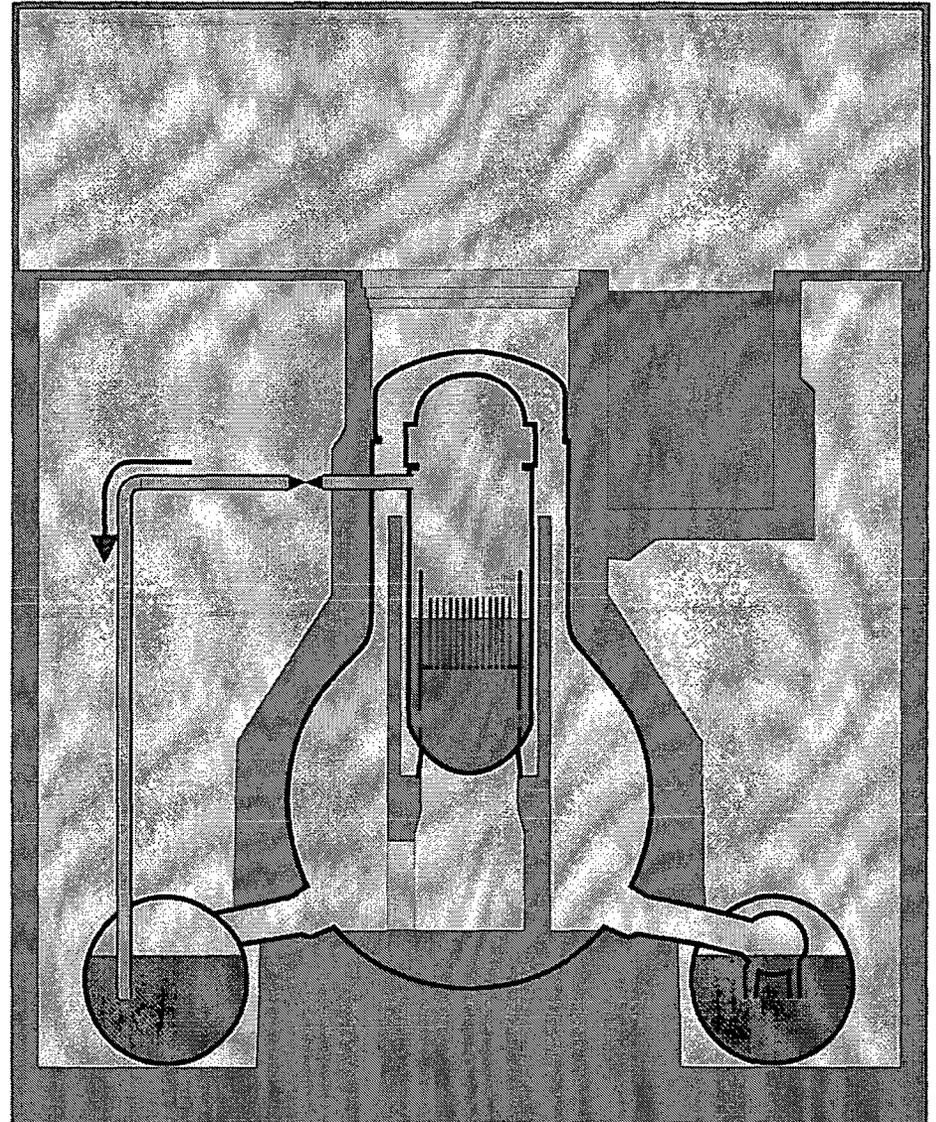
- ▶ Reactor Isolation pump stops
  - ◆ 11.3. 16:36 in Unit 1 (Batteries empty)
  - ◆ 14.3. 13:25 in Unit 2 (Pump failure)
  - ◆ 13.3. 2:44 in Unit 3 (Batteries empty)
- ▶ Decay Heat produces still steam in Reactor pressure Vessel
  - ◆ Pressure rising
- ▶ Opening the steam relieve valves
  - ◆ Discharge Steam into the Wet-Well
- ▶ Descending of the Liquid Level in the Reactor pressure vessel



# The Fukushima Daiichi Incident

## 2. Accident progression

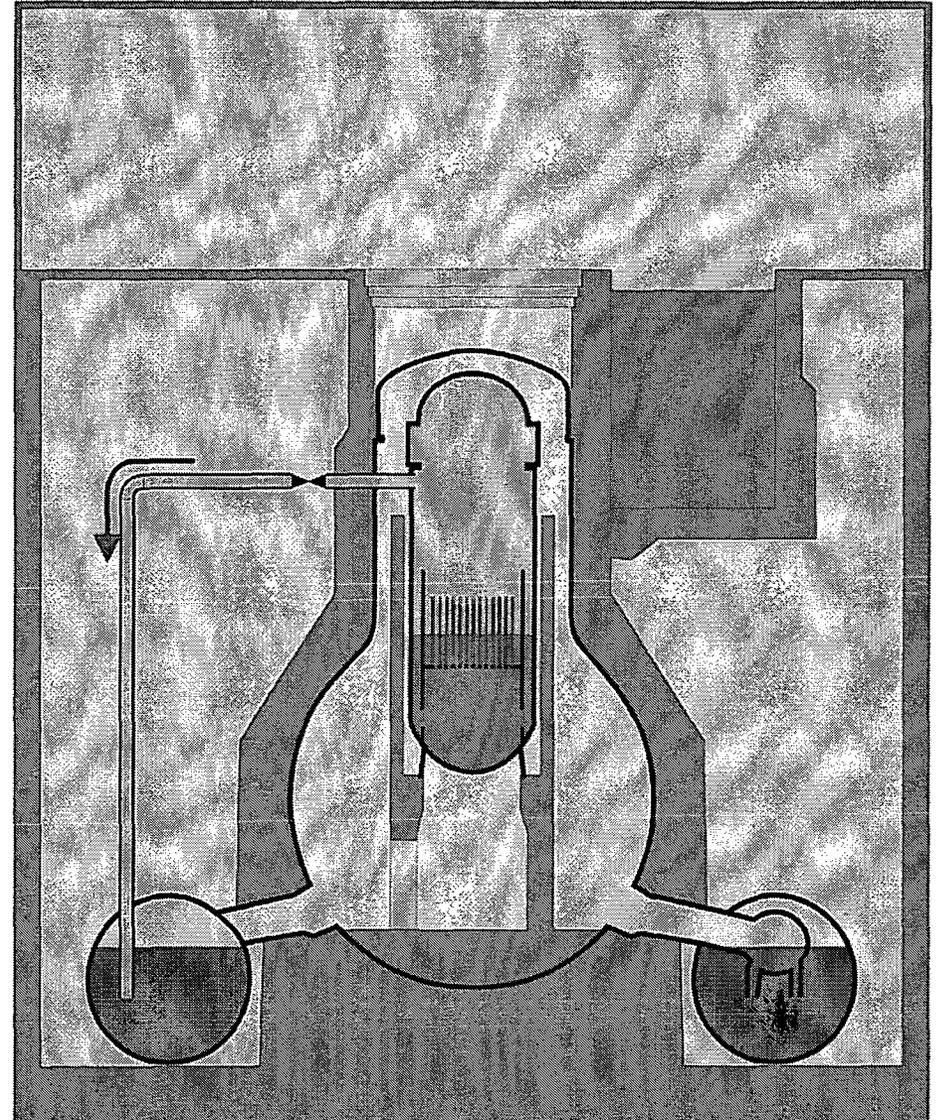
- ▶ Reactor Isolation pump stops
  - ◆ 11.3. 16:36 in Unit 1 (Batteries empty)
  - ◆ 14.3. 13:25 in Unit 2 (Pump failure)
  - ◆ 13.3. 2:44 in Unit 3 (Batteries empty)
- ▶ Decay Heat produces still steam in Reactor pressure Vessel
  - ◆ Pressure rising
- ▶ Opening the steam relieve valves
  - ◆ Discharge Steam into the Wet-Well
- ▶ Descending of the Liquid Level in the Reactor pressure vessel



# The Fukushima Daiichi Incident

## 2. Accident progression

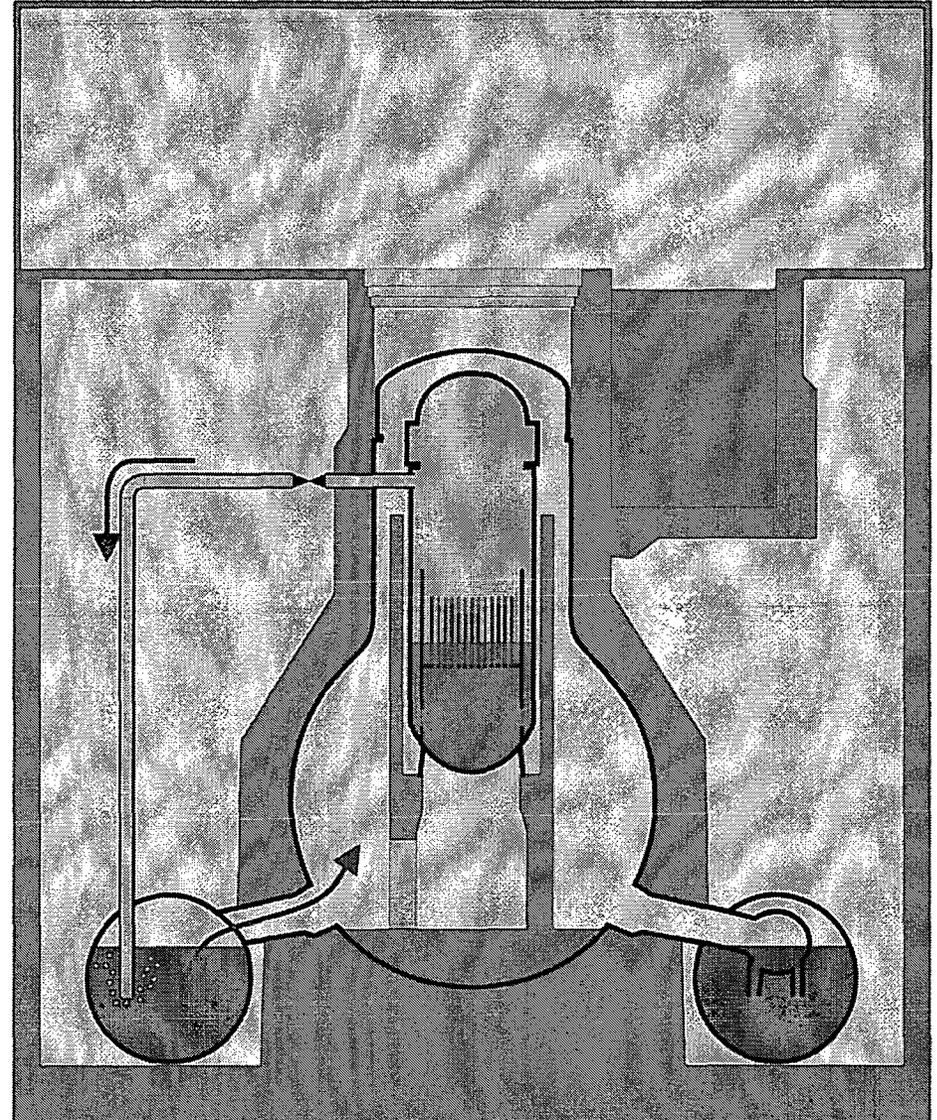
- ▶ Measured, and here referenced Liquid level is the collapsed level. The actual liquid level lies higher due to the steam bubbles in the liquid
- ▶ ~50% of the core exposed
  - ◆ Cladding temperatures rise, but still no significant core damage
- ▶ ~2/3 of the core exposed
  - ◆ Cladding temperature 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

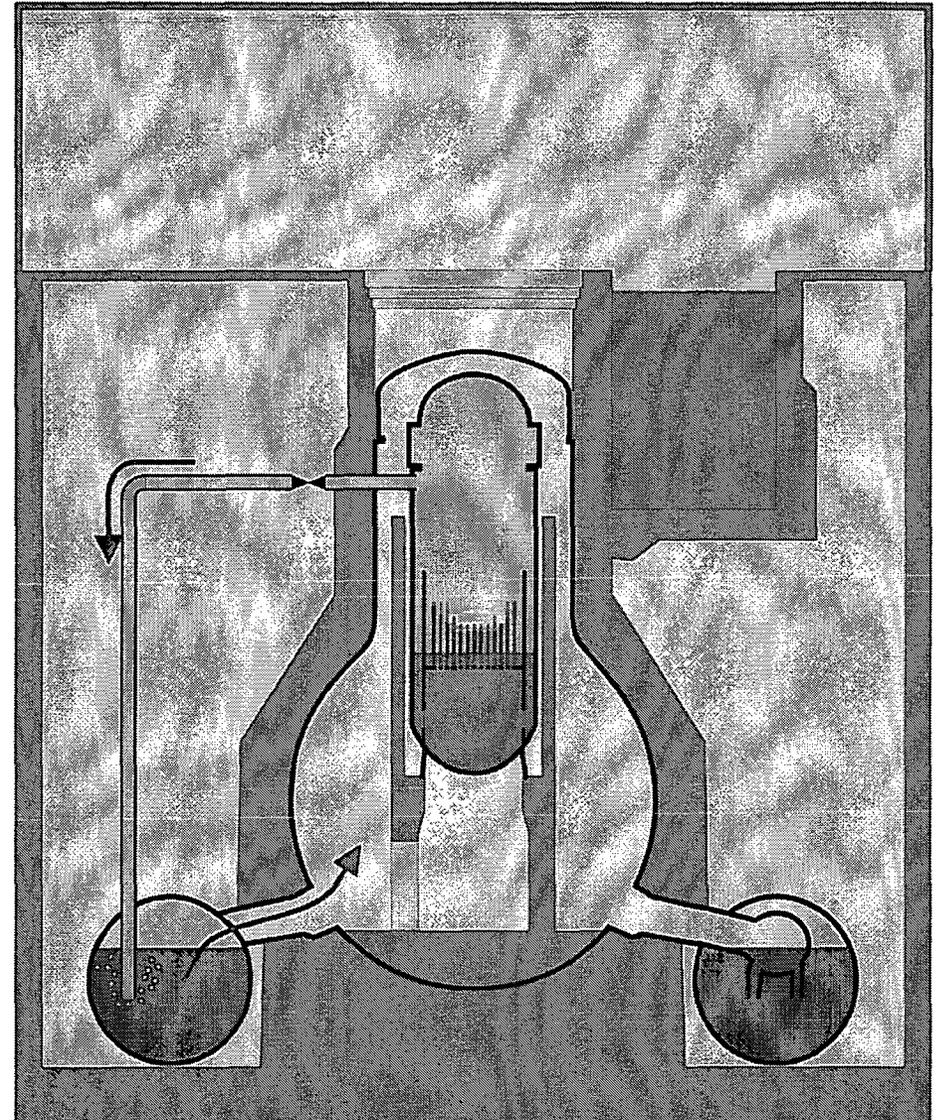
- ▶ ~3/4 of the core exposed
  - ◆ Cladding exceeds ~1200°C
  - ◆ Zirconium in the cladding starts to burn under Steam atmosphere
  - ◆  $\text{Zr} + 2\text{H}_2\text{O} \rightarrow \text{ZrO}_2 + 2\text{H}_2$
  - ◆ Exothermal reaction further heats the core
  - ◆ Generation of hydrogen
    - Unit 1: 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

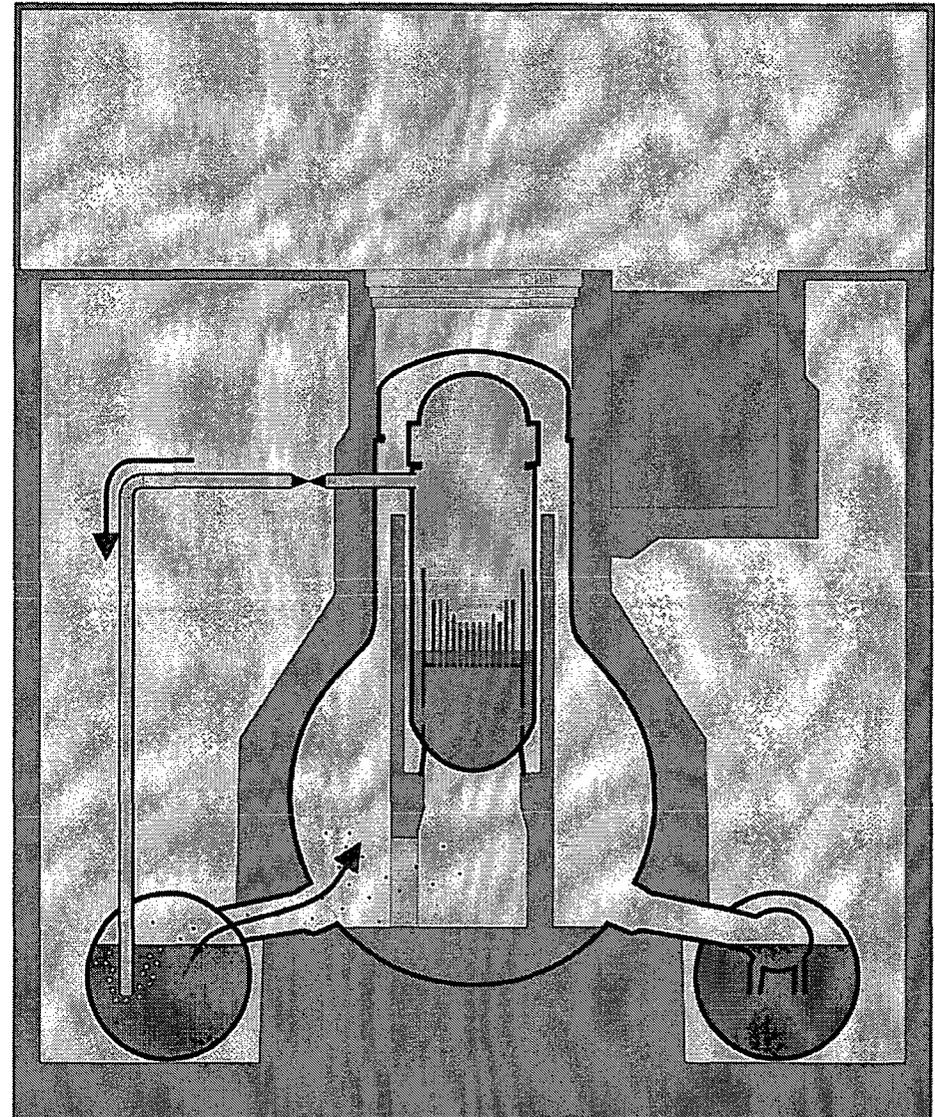
- ▶ at ~1800°C [Unit 1,2,3]
  - ◆ Melting of the Cladding
  - ◆ Melting of the steel structures
  
- ▶ at ~2500°C [Block 1,2]
  - ◆ Breaking of the fuel rods
  - ◆ debris bed inside the core
  
- ▶ at ~2700°C [Block 1]
  - ◆ Melting of Uranium-Zirconium eutectics
  
- ▶ Restoration of the water supply 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

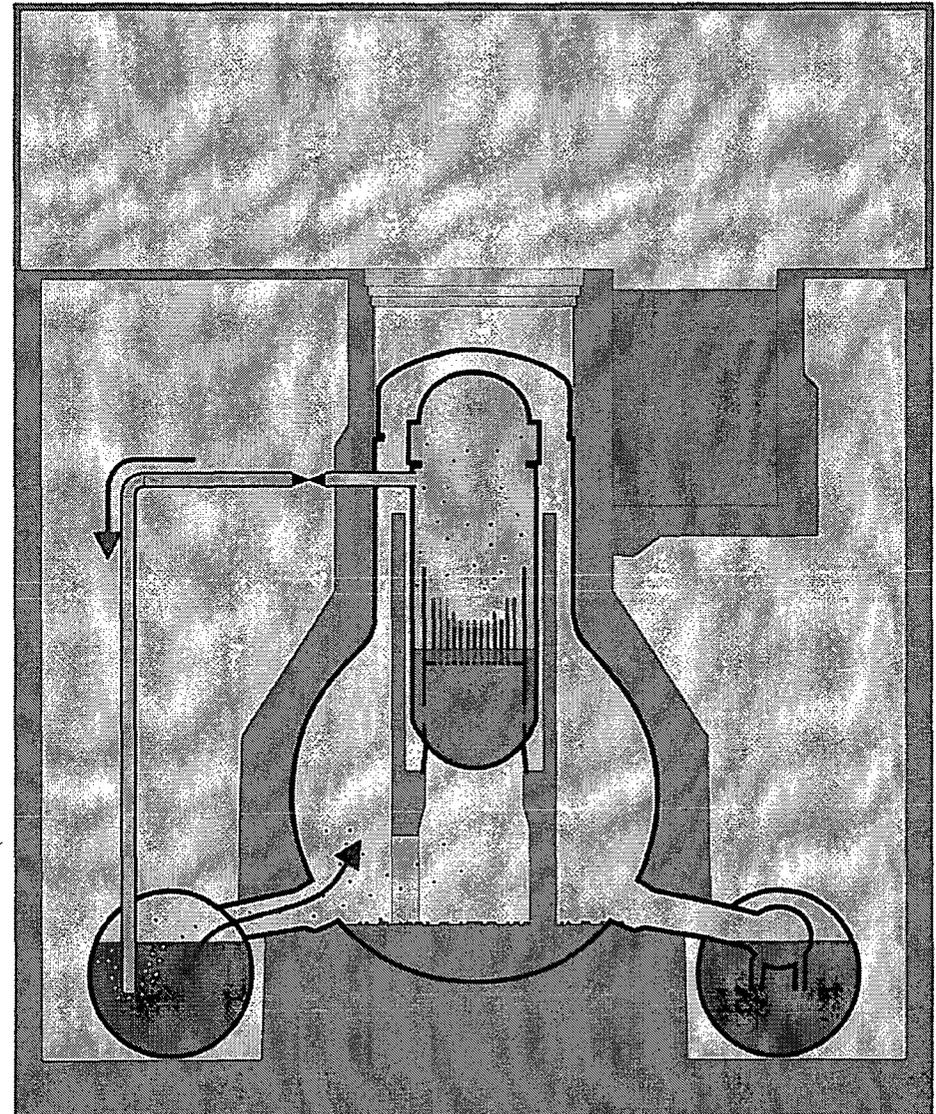
- ▶ Release of fission products during melt down
  - ◆ Xenon, Cesium, Iodine,...
  - ◆ Uranium/Plutonium remain in core
  - ◆ Fission products condensate to airborne Aerosols
- ▶ Discharge through valves into water of the condensation chamber
  - ◆ Pool scrubbing binds a fraction of Aerosols in the water
- ▶ Xenon and remaining aerosols enter the Dry-Well
  - ◆ Deposition of aerosols on surfaces further decontaminates air



# The Fukushima Daiichi Incident

## 2. Accident progression

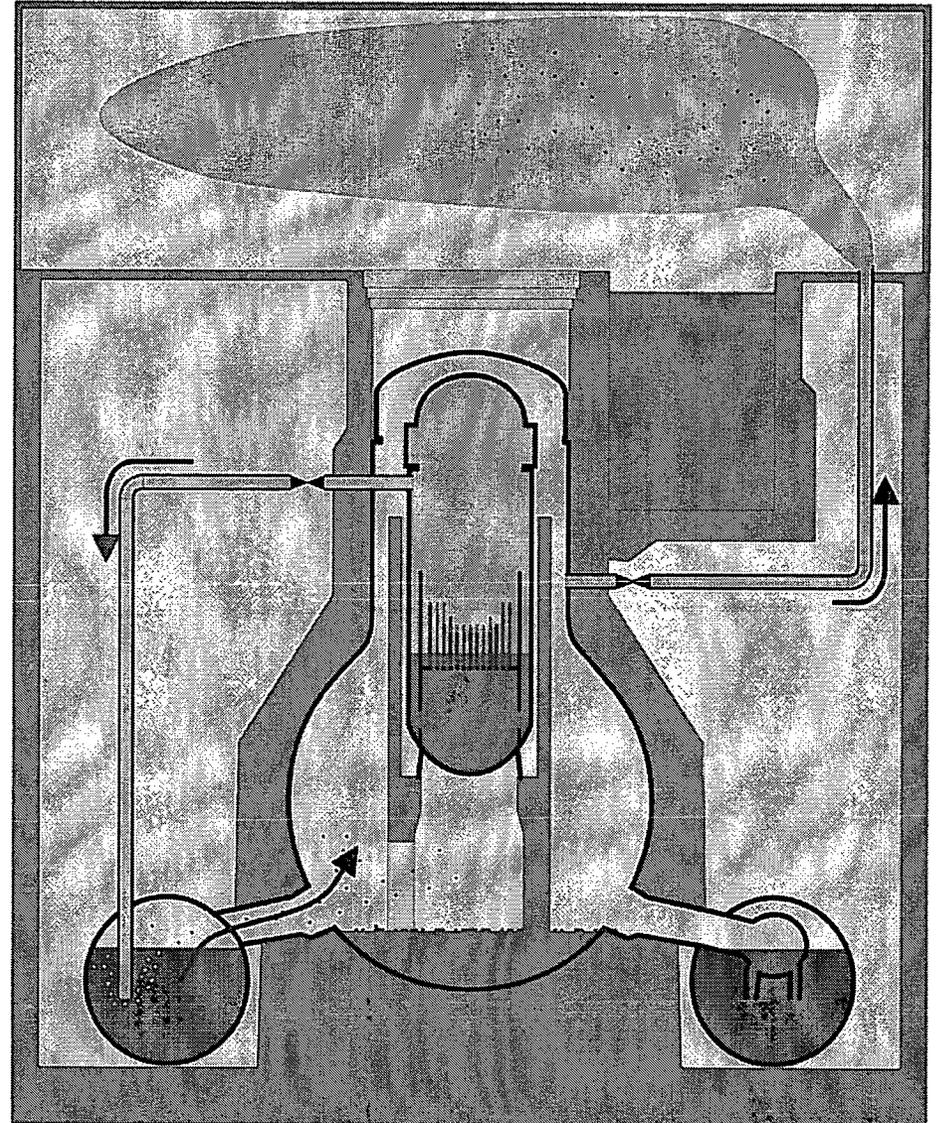
- ▶ Containment
  - ◆ Last barrier between Fission Products and Environment
  - ◆ Wall thickness ~3cm
  - ◆ Design Pressure 4-5bar
  
- ▶ Actual pressure up to 8 bars
  - ◆ Normal inert gas filling (Nitrogen)
  - ◆ Hydrogen from core oxidation
  - ◆ Boiling condensation chamber (like a pressure cooker)
  
- ▶ 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 und 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

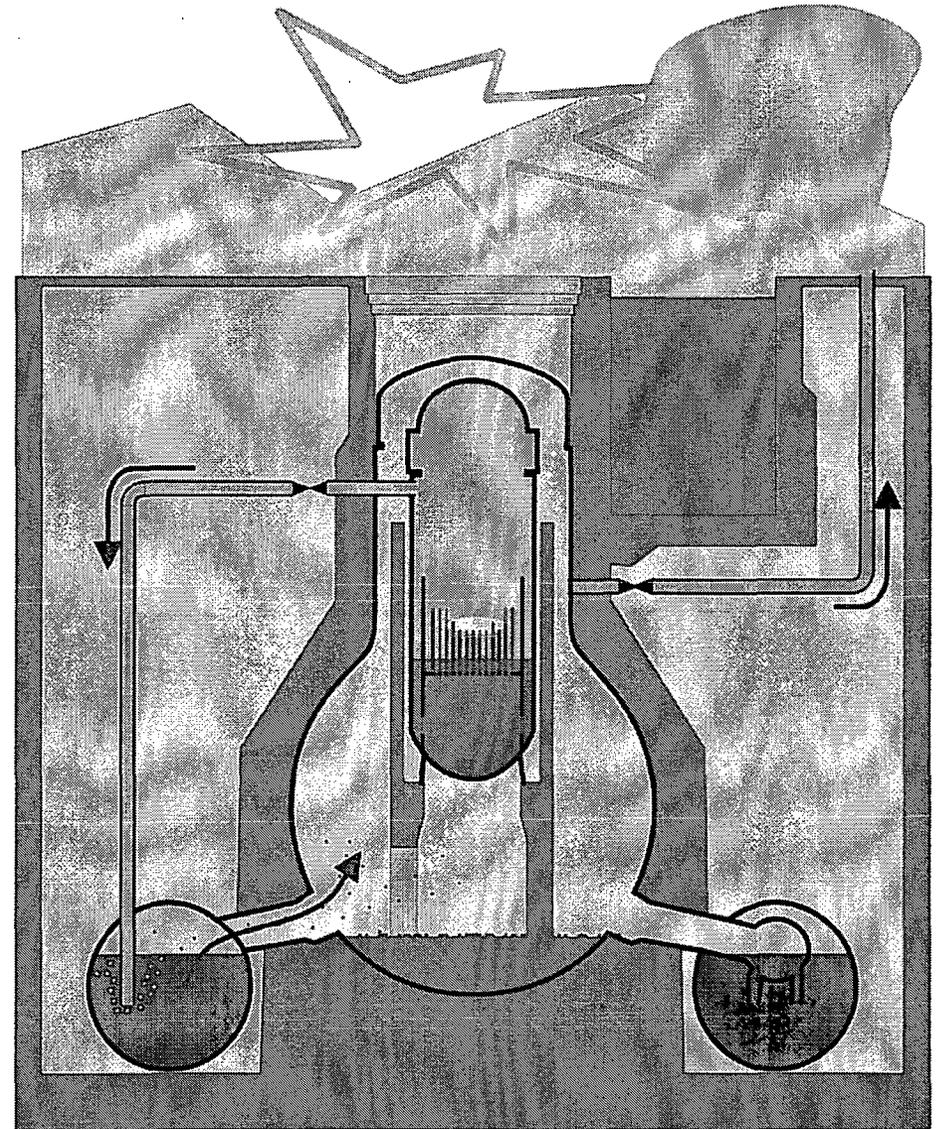
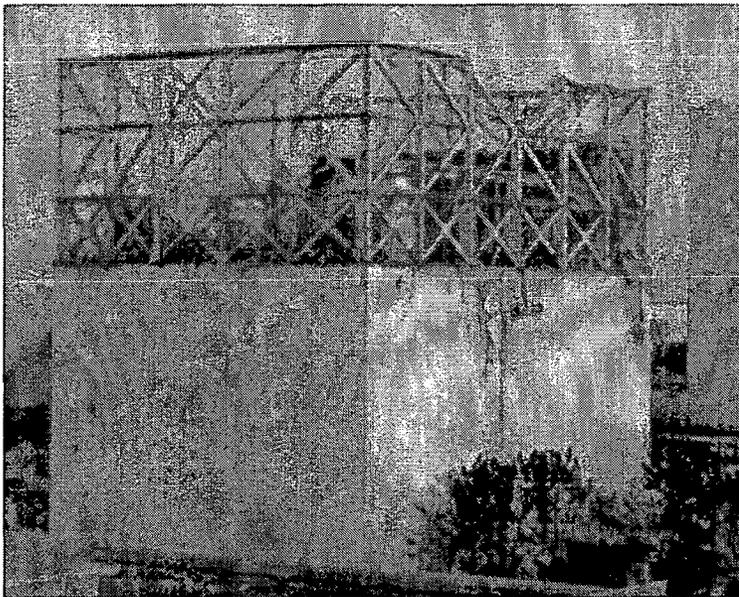


# The Fukushima Daiichi Incident

## 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



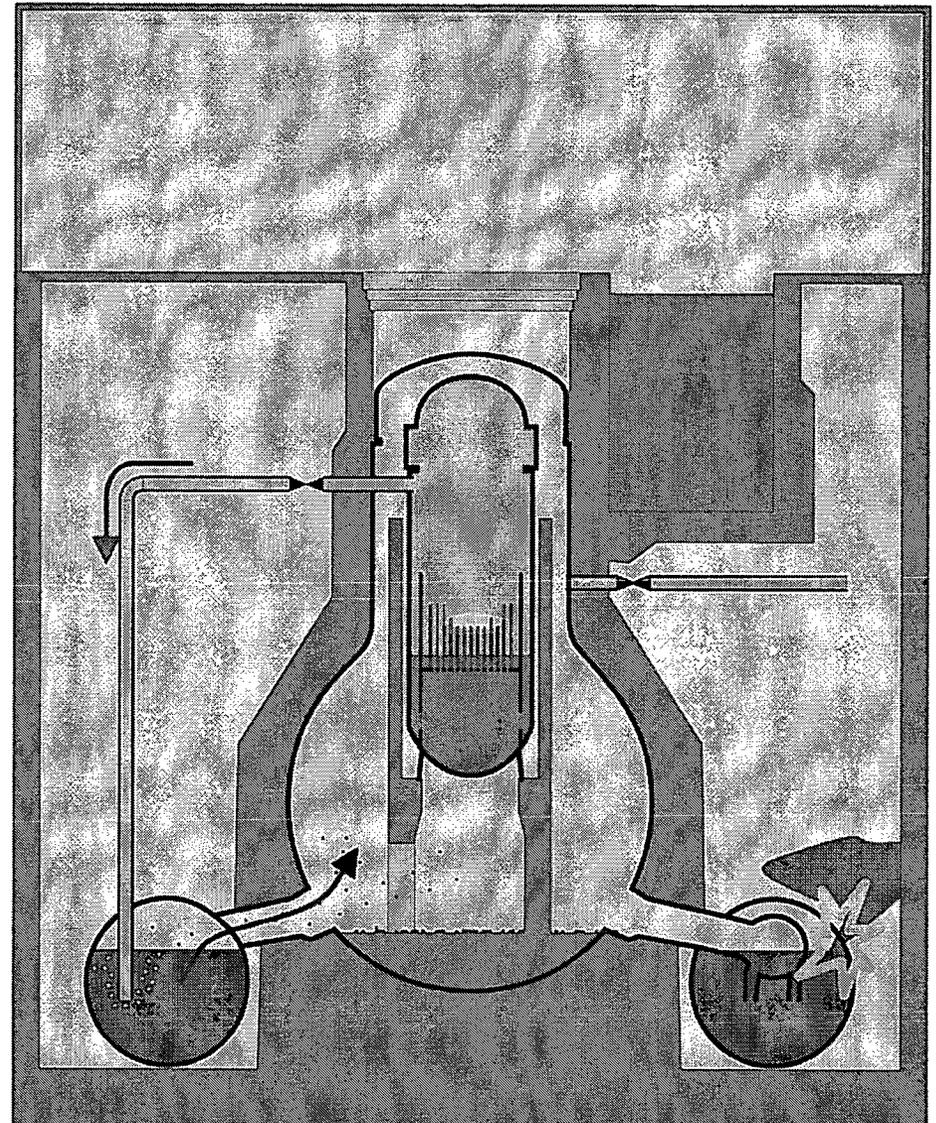
# The Fukushima Daiichi Incident

## 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

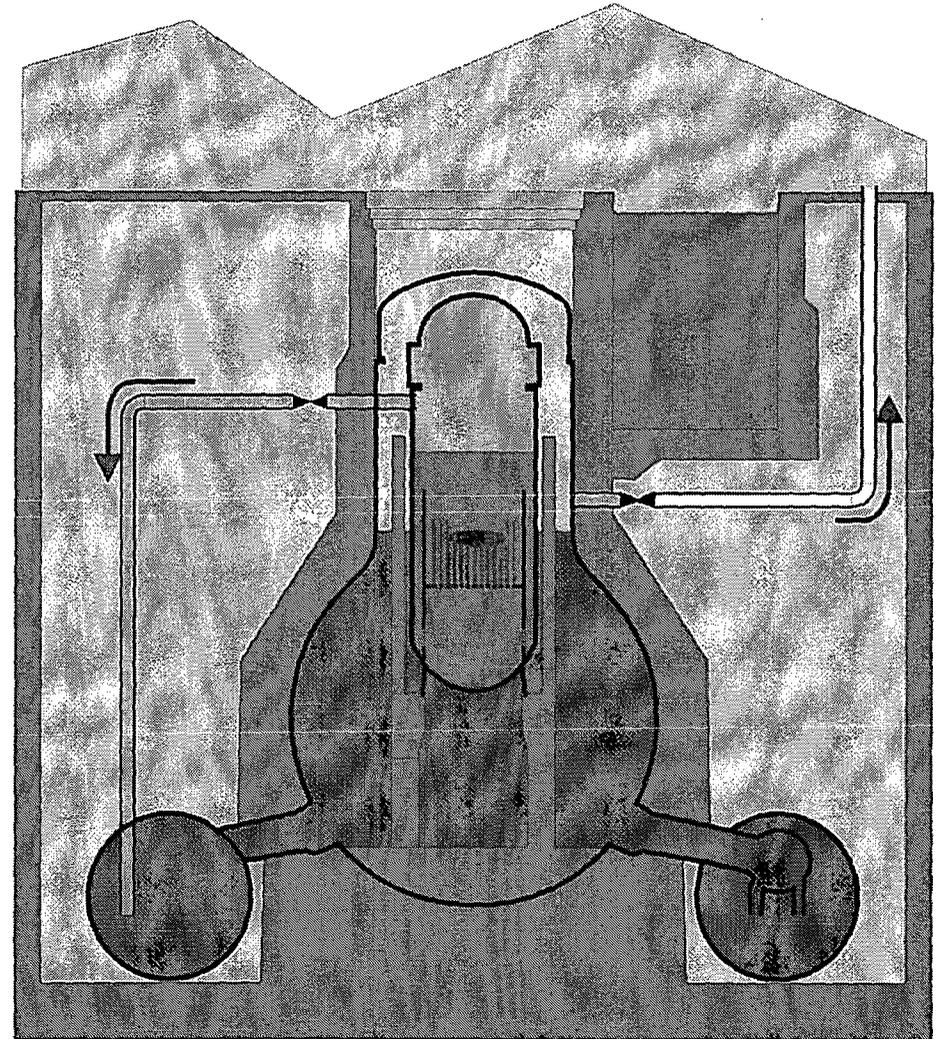
- No clear information's why Unit 2 behaved differently



# The Fukushima Daiichi Incident

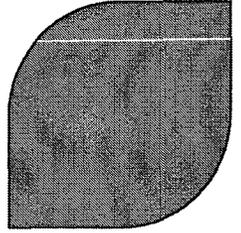
## 2. Accident progression

- ▶ 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

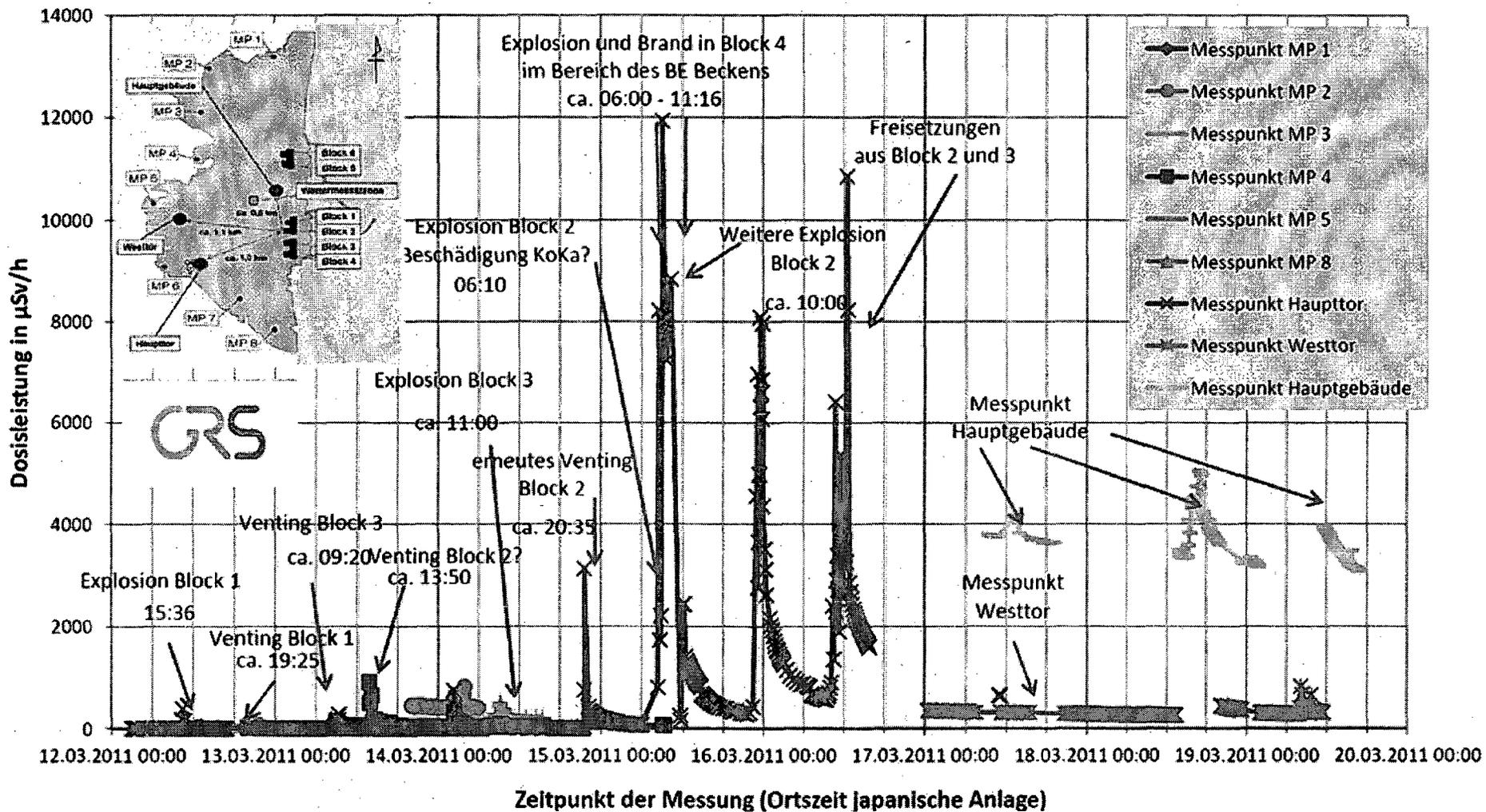
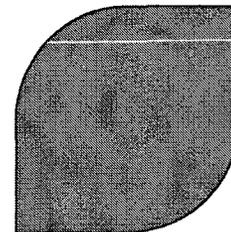
#### ◆ After Explosion in Unit 2 (Damage of the Containment)

- 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

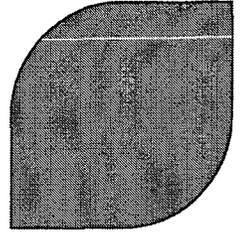
# The Fukushima Daiichi Incident

## 3. Radiological releases



# The Fukushima Daiichi Incident

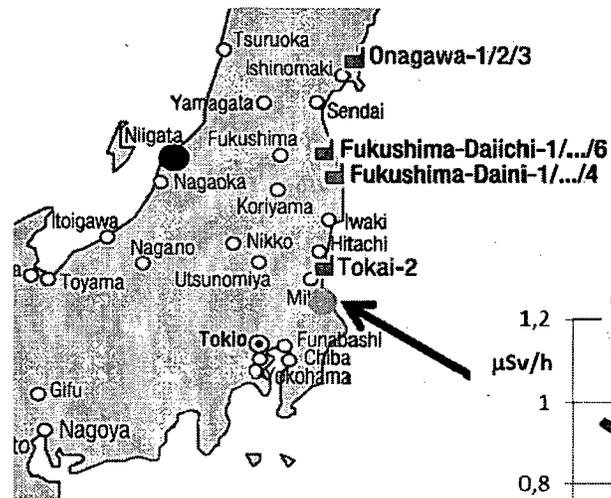
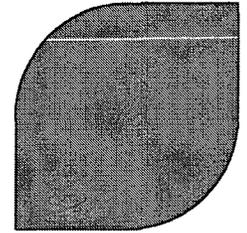
## 3. Radiological releases



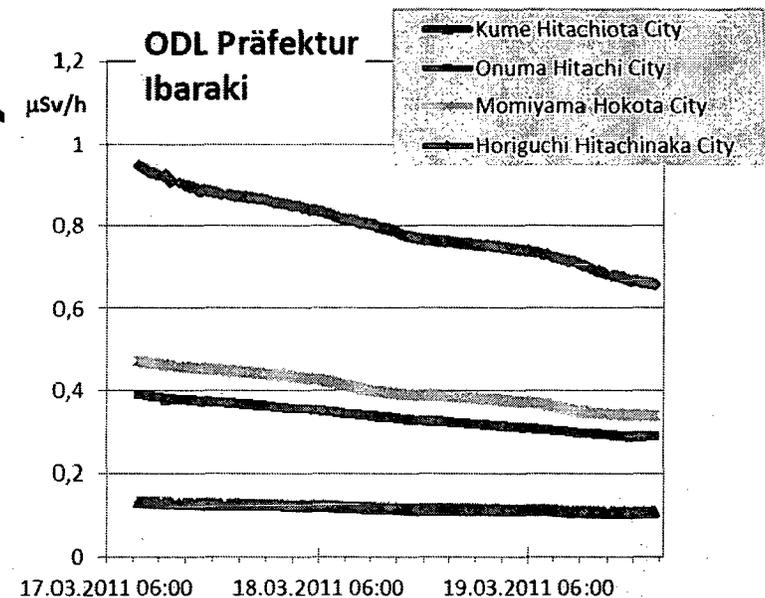
- ▶ Outside the Plant site
  - ◆ As reactor building mostly intact  
=> reduced release of Aerosols (not Chernobyl-like)
  - ◆ Fission product release in steam  
=> fast Aerosol grows, large fraction falls down in the proximity of the plant
  - ◆ Main contribution to the radioactive dose outside plant 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

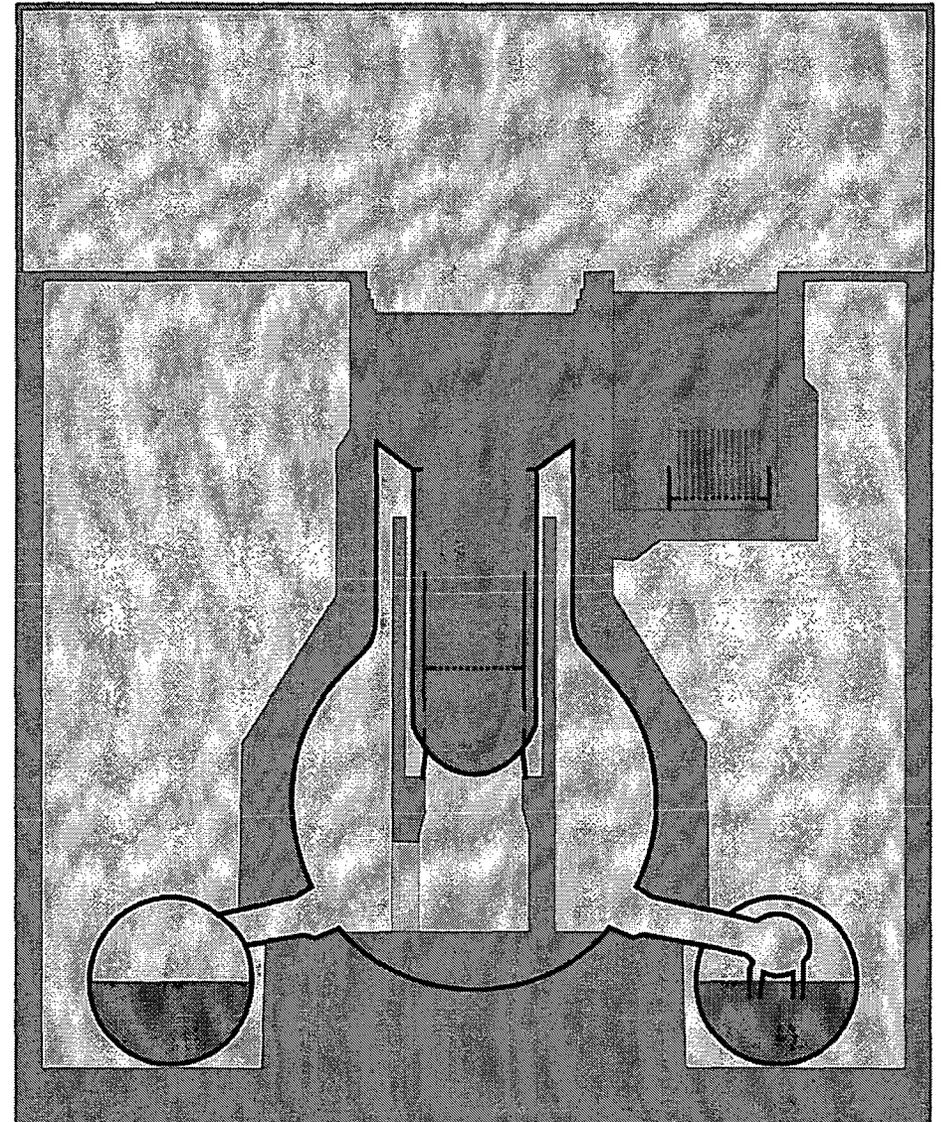


- ▶ ~50km around the plant
  - ◆ Control of Crop / Dairy products
  - ◆ Usage of Iodine pills  
(Caution, pills can interfere with heart medicine)

# The Fukushima Daiichi Incident

## 4. Spent fuel pools

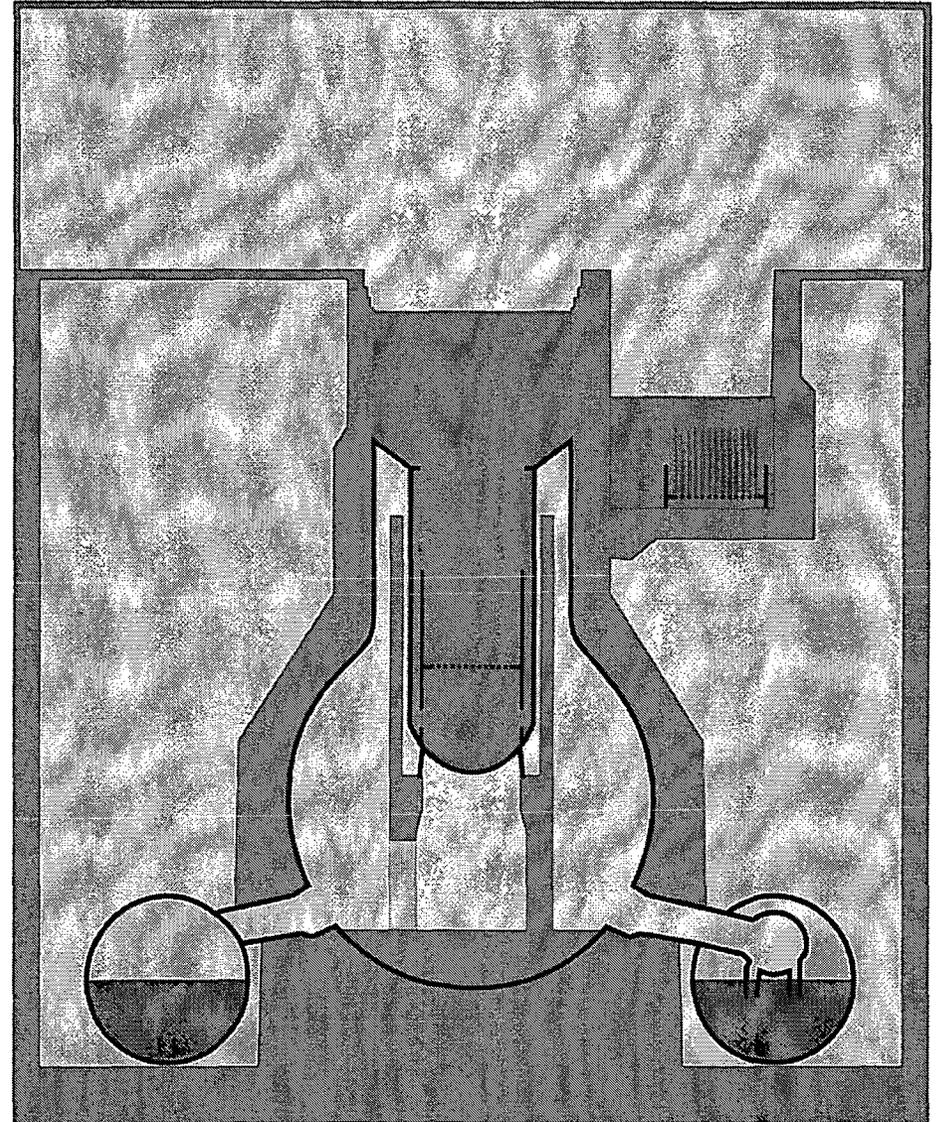
- ▶ Spent fuel stored in Pool on Reactor service floor
  - ◆ Due to maintenance in Unit 4 entire core stored in Fuel pool
  - ◆ Dry-out of the pools
    - Unit 4: in 10 days
    - Unit 1-3,5,6 in few weeks
  - ◆ Leakage of the pools due to Earthquake?
  
- ▶ Consequences
  - ◆ Core melt „on fresh air “
  - ◆ Nearly no retention of fission products
  - ◆ Large release



# The Fukushima Daiichi Incident

## 4. Spend fuel pools

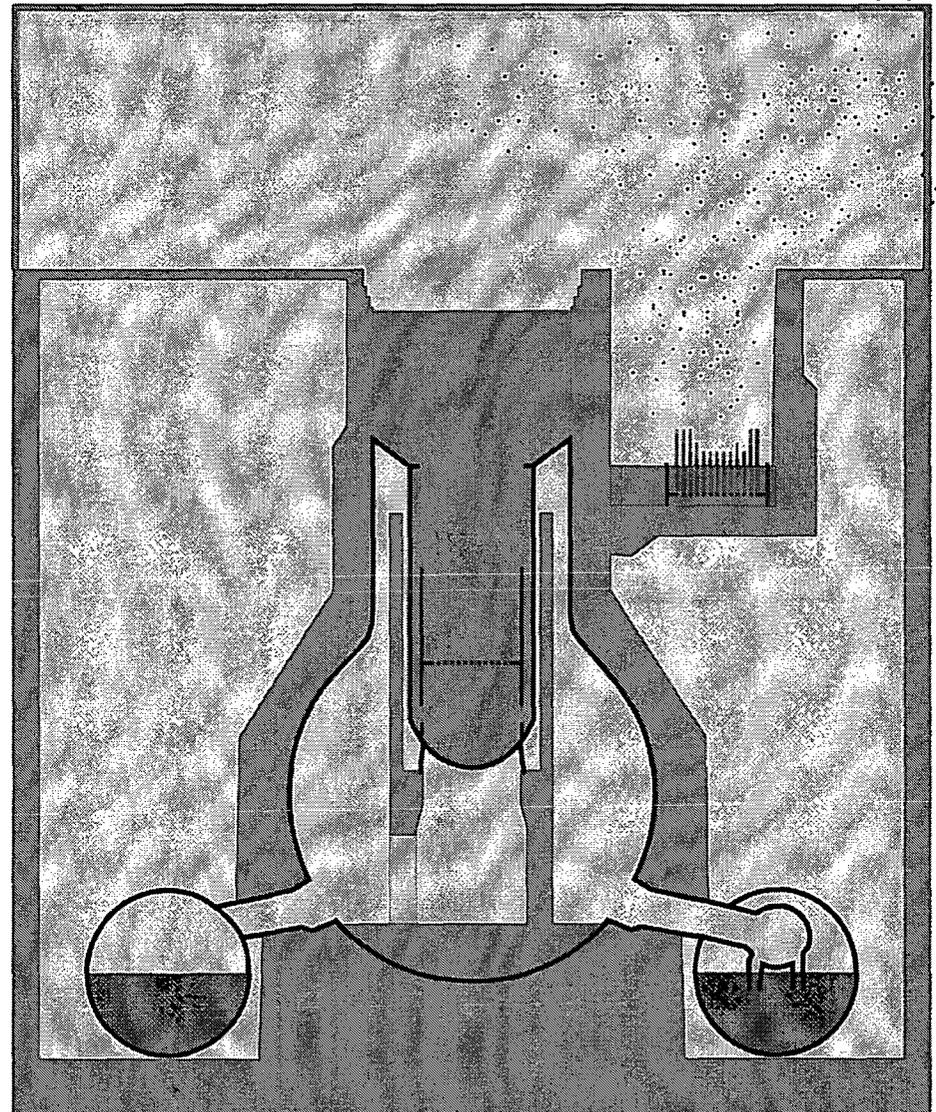
- ▶ Spend fuel stored in Pool on Reactor service floor
  - ◆ Due to maintenance in Unit 4 entire core stored in Fuel pool
  - ◆ Dry-out of the pools
    - Unit 4: in 10 days
    - Unit 1-3,5,6 in few weeks
  - ◆ **Leakage of the pools due to Earthquake?**
  
- ▶ Consequences
  - ◆ Core melt „on fresh air “
  - ◆ Nearly no retention of fission products
  - ◆ Large release



# The Fukushima Daiichi Incident

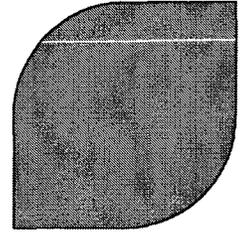
## 4. Spent fuel pools

- ▶ 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
  
- ▶ **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

---

**From:** LIA05 Hoc  
**Sent:** Friday, April 01, 2011 8:56 AM  
**To:** Dan Feighert  
**Subject:** FW: INQUIRY: FOX Business Channel on population around nuclear power plants

Bonnie Sheffield Dayshift 0700-1500  
Ken Wierman Nightshift 1500-2300  
FEMA REP Liaison  
NRC Operations Center  
(301) 816-5187

\*\*\*\*\*FOR OFFICIAL USE ONLY\*\*\*\*\*  
**DO NOT RELEASE OUTSIDE OF THE FEDERAL FAMILY**

---

**From:** LIA01 Hoc  
**Sent:** Tuesday, March 29, 2011 4:54 PM  
**To:** LIA05 Hoc  
**Subject:** FW: INQUIRY: FOX Business Channel on population around nuclear power plants

---

**From:** Kahler, Carolyn  
**Sent:** Tuesday, March 29, 2011 4:24 PM  
**To:** LIA01 Hoc; LIA11 Hoc  
**Subject:** RE: INQUIRY: FOX Business Channel on population around nuclear power plants

Lisa,

I sent this to your webmail account. After speaking with Joe, I understand that this should go through you in the Ops Center. Please read below, sorry if you got this already and thank you!

Carolyn

---

**From:** Kahler, Carolyn  
**Sent:** Tuesday, March 29, 2011 3:42 PM  
**To:** Anderson, Joseph  
**Cc:** Wright, Lisa (Gibney)  
**Subject:** FW: INQUIRY: FOX Business Channel on population around nuclear power plants

Hi Joe,

FEMA is attempting to confirm or correct the language below. Would we have this information available (i.e. who in EP should I talk to about this?).

"According to FEMA data, about 8 percent of the American population lives within 20 miles of a nuclear power plant; and about 1.7 percent lives within 10 miles."

This quote came from this article, which also quotes Trish Milligan numerous times - <http://politifact.com/truth-o-meter/statements/2011/mar/24/lawrence-odonnell/msnbcs-lawrence-odonnell-most-americans-live-withi/>

Sincerely,

Carolyn

---

**From:** Horwitz, Steve [mailto:steve.horwitz@dhs.gov]  
**Sent:** Tuesday, March 29, 2011 2:47 PM  
**To:** Kahler, Carolyn  
**Subject:** FW: INQUIRY: FOX Business Channel on population around nuclear power plants

**Carolyn, see query from FOX below. Michelle believes you may be able to verify the numbers. Thanks/Steve**

---

**From:** Ralston, Michelle [mailto:Michelle.Ralston@dhs.gov]  
**Sent:** Tuesday, March 29, 2011 2:37 PM  
**To:** Horwitz, Steve  
**Subject:** Re: INQUIRY: FOX Business Channel on population around nuclear power plants

Steve,

To verify this data, call Karolyn Kahler. The NRC most definitely has this data.

Respectfully,

Michelle Ralston

(202) 280-9304

---

**From:** Horwitz, Steve <steve.horwitz@dhs.gov>  
**To:** Purvis, James <james.purvis@dhs.gov>; Fontenot, Rebecca <Rebecca.Fontenot@dhs.gov>  
**Cc:** Michelle Ralston <Michelle.Ralston@dhs.gov>  
**Sent:** Tue Mar 29 14:33:00 2011  
**Subject:** FW: INQUIRY: FOX Business Channel on population around nuclear power plants

JAMES/REBECCA –

Any chance one of you can confirm or correct language highlighted below. OR at least, the 8% number. Data said to come from FEMA website, though I haven't found it.

Thanks/sh

---

**From:** O'Boyle, Seamus  
**Sent:** Tuesday, March 29, 2011 1:24 PM  
**To:** Ralston, Michelle; Horwitz, Steve  
**Subject:** FW: INQUIRY: FOX Business Channel on population around nuclear power plants

Steve and Michelle:

Please see the e-mails below. Can you provide the answer to Brad's question?

Thanks,  
Seamus

---

**From:** Carroll, Bradley

**Sent:** Tuesday, March 29, 2011 12:35 PM

**To:** Olsen, Mary; 'Racusen, Rachel'; Kirin, Alexandra; O'Boyle, Seamus

**Subject:** RE: INQUIRY: FOX Business Channel on population around nuclear power plants

Ok – looping Seamus. Seamus, are those facts that are available on the website or old report somewhere – specifically...

“According to FEMA data, about 8 percent of the American population lives within 20 miles of a nuclear power plant; and about 1.7 percent lives within 10 miles.”

---

**From:** Taylor, Robert  
**Sent:** Tuesday, April 05, 2011 1:05 AM  
**To:** Hoc, PMT12  
**Cc:** RST02 Hoc  
**Subject:** RE: QUERY - NRC's Daily Assesment of Conditions at Fukushima Daiichi

We have agreed to provide the daily assessment to RST01 which will further distribute within the Ops Center.

---

**From:** Hoc, PMT12  
**Sent:** Monday, April 04, 2011 7:29 AM  
**To:** Taylor, Robert  
**Cc:** RST02 Hoc  
**Subject:** FW: QUERY - NRC's Daily Assesment of Conditions at Fukushima Daiichi

Hey Rob. Can you please add the PMT and RST to the distribution list for this report? Thanks.

[PMT12.hoc@nrc.gov](mailto:PMT12.hoc@nrc.gov)  
[RST02.hoc@nrc.gov](mailto:RST02.hoc@nrc.gov)

---

**From:** Weber, Michael  
**Sent:** Monday, April 04, 2011 7:00 AM  
**To:** Carpenter, Cynthia  
**Cc:** McDermott, Brian; Sheron, Brian; ET05 Hoc; ET01 Hoc; OST02 HOC; FOIA Response.hoc Resource; RST01 Hoc; PMT01 Hoc; Hoc, PMT12; LIA06 Hoc; LIA08 Hoc; LIA07 Hoc; Virgilio, Martin; Borchardt, Bill  
**Subject:** QUERY - NRC's Daily Assesment of Conditions at Fukushima Daiichi

Good morning, Cindi. Has the attached two-page summary been coordinated with the Ops Center staff? Are we aligned with our team in Japan?

---

**From:** Taylor, Robert  
**Sent:** Monday, April 04, 2011 2:56 AM  
**To:** Jaczko, Gregory  
**Cc:** Borchardt, Bill; Virgilio, Martin; Weber, Michael; Holahan, Vincent; Casto, Chuck; Leeds, Eric  
**Subject:** NRC's Daily Assesment of Conditions at Fukushima Daiichi

Dear Mr. Chairman,

Attached please find the NRC Japan Team's Daily Assessment of conditions at the Fukushima Daiichi nuclear power plants and spent fuel pools.

There is only one change of note for today. This involves TEPCO's throttling back of injection flow to the Unit 1 reactor. The team's assessment is that this reduces the margin available to ensure adequate cooling flow to the core and is reflected with a down arrow on the attached.

If you have any questions, please don't hesitate to ask.

Best regards,  
Rob Taylor  
NRC Japan Team

---

**From:** RST01 Hoc  
**Sent:** Monday, April 04, 2011 7:45 PM  
**To:** Hoc, RST16; RST06 Hoc  
**Subject:** FW: QUERY - NRC's Daily Assesment of Conditions at Fukushima Daiichi

---

**From:** Carpenter, Cynthia  
**Sent:** Monday, April 04, 2011 7:18 PM  
**To:** Weber, Michael  
**Cc:** McDermott, Brian; Sheron, Brian; FOIA Response.hoc Resource; RST01 Hoc; Virgilio, Martin; Borchardt, Bill; Johnson, Michael; Giitter, Joseph  
**Subject:** RE: QUERY - NRC's Daily Assesment of Conditions at Fukushima Daiichi

Mike

To answer your question below – the attached two-page summary was not coordinated with the Ops Center staff, including the RST; they were unaware of its development.

The RST discussed the chart with the site team this evening. The site team was requested to develop the chart by Chuck Casto as a visual means to provide a high level overview of the status of conditions on the RPV, containment and SFPs. Distribution is limited to the Chairman, EDO, DEDOs and a select few others, per Chuck Casto's request. It was agreed though, in the future, the chart would be sent to the RST for information (not coordination). The RST did discuss the contents of the chart, including why the U4 SFP is colored red and marked "failed" and what this means exactly.

---

**From:** Weber, Michael  
**Sent:** Monday, April 04, 2011 7:00 AM  
**To:** Carpenter, Cynthia  
**Cc:** McDermott, Brian; Sheron, Brian; ET05 Hoc; ET01 Hoc; OST02 HOC; FOIA Response.hoc Resource; RST01 Hoc; PMT01 Hoc; Hoc, PMT12; LIA06 Hoc; LIA08 Hoc; LIA07 Hoc; Virgilio, Martin; Borchardt, Bill  
**Subject:** QUERY - NRC's Daily Assesment of Conditions at Fukushima Daiichi

Good morning, Cindi. Has the attached two-page summary been coordinated with the Ops Center staff? Are we aligned with our team in Japan?

---

**From:** Taylor, Robert  
**Sent:** Monday, April 04, 2011 2:56 AM  
**To:** Jaczko, Gregory  
**Cc:** Borchardt, Bill; Virgilio, Martin; Weber, Michael; Holahan, Vincent; Casto, Chuck; Leeds, Eric  
**Subject:** NRC's Daily Assesment of Conditions at Fukushima Daiichi

Dear Mr. Chairman,

Attached please find the NRC Japan Team's Daily Assessment of conditions at the Fukushima Daiichi nuclear power plants and spent fuel pools.

There is only one change of note for today. This involves TEPCO's throttling back of injection flow to the Unit 1 reactor. The team's assessment is that this reduces the margin available to ensure adequate cooling flow to the core and is reflected with a down arrow on the attached.

If you have any questions, please don't hesitate to ask.

Best regards,  
Rob Taylor  
NRC Japan Team