USNRC Emergency Operations Center Status Update

March 15, 2011
Earthquake / Tsunami Status Update
Compiled by Executive Briefing Team

Caution – This information may be dated and is subject to constant change.

Changes/Additions from previous updates are underlined

USNRC Status

At 0946 EST, March 11, 2011, the NRC entered Monitoring Mode and the agency continues to monitor the unfolding events in Japan. The Headquarters Operations Center is staffed.

The two senior experts supporting USAID response efforts from the NRC are in Japan and have engaged with the US Ambassador's staff. Nine additional experts are in transit to Japan.

At 0550 EDT, March 14, 2011, the NRC experts in Japan reported that the Japanese have requested US technical assistance with cooling the Fukushima Daiichi Units 1, 2, and 3. The effort is being coordinated by the US Ambassador. At 0900 EDT (March 15, 2011), the Japanese government accepted DOE's Radiological Assistance Program (RAP) team assistance, which includes Aerial Measuring System (AMS) fly-overs.

The NRC is evaluating the current plant status information, and based on the information provided to date some fuel damage has occurred. The NRC is monitoring the restoration of cooling water to prevent additional fuel damage. Current information indicates that the structures that contain the reactor vessels remain intact.

On March 14, 2011, NRC performed preliminary analysis based on the information available from the Japanese authorities. The result indicated the protective measures implemented by the Japanese government, including evacuation, sheltering, and potassium iodide, are not inconsistent with the U.S. Protective Action Guidelines. The NRC does not expect the U.S. and its territories to experience any harmful levels of radioactivity.

NRC provided the White House with information on protective measures for NRC staff in Japan, being able to provide advice for other federal workers in Japan, and that US citizens in Japan should follow advice of the government of Japan.

NRC is also coordinating with the International Atomic Energy Agency.

Q & A's have been developed and shared with Regional State Liaison Officers to dialogue with State counterparts.

BS11

Earthquake/Tsunami Status Update March 15, 2011 1910 EDT

NRC has issued 6 press releases related to the earthquake and tsunami. These press releases can be found online at: http://www.nrc.gov/reading-rm/doc-collections/news/2011/

Status of NRC Licensee and Agreement State Facilities

At this time, NRC is discontinuing reporting status of NRC licensee and Agreement State facilities. NRC will resume this reporting should any issues arise related to earthquake or tsunami effects.

The Institute of Nuclear Power Operations (INPO) issued a Level 1 Event Report (highest level) to its members this afternoon. It identifies 4 actions, with due dates, and requires a written response. In general, the actions include walkdowns and verifications of aspects of facility capabilities to address B.5.b equipment and procedures, Severe Accident Management Guidelines (SAMGs), mitigation of station blackout (SBO) conditions, mitigation of internal and external flooding, and fire and flooding events that could be impacted by a concurrent seismic event.

Status of Japanese Facilities (This information is compiled from available sources, including press releases by the Tokyo Electric Power Company (TEPCO) and information from the International Atomic Energy Agency (IAEA)).

IAEA reports that at 1331 UTC on March 15, 2011 a 6.1 magnitude earthquake occurred in eastern Honshu, approximately 100 km from the Hamaoka nuclear power plant. Operational units at the plant remain in safe status after the earthquake.

Background:

There are 14 operational Boiling Water Reactors (BWRs) proximal to the earthquake zone (6 at Fukushima Daiichi, 4 at Fukushima Daini, 3 at Onagawa, and 1 at Tokai)

Current Understanding of Japanese Reactor Status

(This information is compiled from TEPCO press releases and IAEA information releases.)

Fukushima Daiichi

Japanese national government instructed evacuation for local residents within a 20km radius of the site boundary and sheltering in place out to 30 km for residents who stayed behind. IAEA confirms a no fly zone out to 30 km around the Fukushima Daiichi plant. As of 1830 EDT on March 15, 2011, there have been no updates to protective actions.

Japanese authorities classified the event at a Level 4 "Accident with Local Consequences" on the International Nuclear and Radiological Event Scale (INES) based on radioactive dose measurements at the site boundary exceeding limit values.

All available information indicates that the majority of releases from the Fukushima site have been carried out to sea by the prevailing winds. Forecast meteorological data for the 24 hour period (until 1700 EDT on March 16, 2011) indicates wind remaining toward offshore (N, NW).

Units 1, 2, and 3: shutdown due to earthquake
- At approximately 2300, March 14, Japan, Unit 2 core was again uncovered.

Units 4, 5, and 6: shutdown due to outage, prior to earthquake
All Units: all AC power on-site lost.
Operators and other personnel not directly involved in water injection have been evacuated. 40-50 persons have been left onsite to mitigate accident.

The following data was provided by the IAEA at 0912 EDT on March 15, 2011:

Data for Daiichi Units 1, 2 and 3 (as of 02:42 UTC)

Parameter	Unit	Fukushima Daiichi		
		Unit 1	Unit 2	Unit 3
Rector Pressure Vessel Pressure	MPa	0.072 (A) 0.185 (B)	0.315	0.244(A) 0.244 (B)
Drywell Pressure	KPa	315	155	415
Reactor Level	mm (above the top of active fuel)	-1700(A) -1700(B)	+400(A)	-1800(A) -2300(B)
Suppression Pool Temperature	°C	No Data	No Data	No Data
Suppression Pool Pressure	KPa	No Data	D/S	D/S

Unit 1
- Core damage occurred due to insufficient cooling water caused by loss of offsite power and onsite diesel generators following the tsunami
- As of 2200 JST (0900 EDT) on March 14, it is reported that sea water is being injected.
- Containment described as "functional."
- Hydrogen explosion from overheated fuel-water reaction has damaged reactor building roof.
- Sea water is being injected with reported stable cooling
- The spent fuel pool level is unknown
- High radiation levels reduced to 600 mSv/hour (60 mrem/hour) at 0200 EDT on March 15, 2011 at site gate. (Site gate is same for each unit).

Unit 2
- Core damage occurred due to insufficient cooling water caused by loss of offsite power and onsite diesel generators following the tsunami
- Reactor Core Isolation Cooling (RCIC) has failed.
- Hydrogen explosion from overheated fuel-water reaction damaged the reactor building

- Sea water injection restarted with reports of non-stable conditions.
- *There are reports of a loud sound at Unit 2 in the vicinity of the suppression chamber.* It was reported at 0730 EDT on March 15, 2011 that containment is intact (better than previously thought).
- High radiation levels reduced to 600 mSv/hour (60 mrem/hour) at 0200 EDT on March 15, 2011 at site gate. (Site gate is same for each unit).
- The spent fuel pool level is unknown

Unit 3
- Core damage due to insufficient cooling water caused by loss of offsite power and onsite diesel generators following the tsunami
- Sea water is being injected with reported stable cooling
- Hydrogen explosion from overheated fuel-water reaction has damaged reactor building roof.
- Primary containment described as "functional."
- There is no spent fuel pool information
- High radiation levels reduced to 600 mSv/hour (60 mrem/hour) at 0200 EDT on March 15, 2011 at site gate. (Site gate is same for each unit).

Unit 4
- First fire in the reactor building was a small generator lube oil fire. IAEA reports that fire was put out at 2200 EDT, March 14.
- High radiation levels reduced to 600 mSv/hour (60 mrem/hour) at 0200 EDT on March 15, 2011 at site gate. (Site gate is same for each unit).
- Second fire began 0545 EDT, March 15, 2011 in reactor building. Reports indicate that this fire is not yet contained. TEPCO is determining whether to use helicopter or fire truck to fight fire. Fuel reported to be uncovered.
- Radiation level in the area of unit 4 reported to be 30R/hour following second fire.
- There is a possible water loss from the spent fuel pool and operators are having difficulty providing adequate cooling and water level to the pool.
- There are reports of possible hydrogen explosion due to uncovered fuel in the spent fuel pool (awaiting visual confirmation).
- High radiation dose rates measured between Units 3 and 4, source is suspected to be the partially uncovered Unit 4 spent fuel pool.

Unit 5
- The reactor is stable.
- Spent fuel pool is reported to be heating up.

Unit 6
- The reactor is stable.
- Spent fuel pool is reported to be heating up.

Fukushima Daini

Japanese national government instructed evacuation for local residents within a 20km radius of the site boundary. As of 1510 EST (March 12, 2011), an estimated 30,000 people have been evacuated. Full evacuation is not complete. As of 1830 EDT on March 15, 2011, there have not been updates to this information. The Daini units have AC power, and were previously reported to have lost their ultimate heat sink.

Unit 1-4
- All units have stable offsite power
- All units are reported to be in cold shutdown with stable water level
- Latest TEPCO reports do not mention any problem with the ultimate heat sink

Onagawa

At 2145 CET (March 13, 2011), IAEA reported that Japanese authorities had informed it that radioactivity levels at the site boundary of the Onagawa Nuclear Power Plant have returned to normal background levels.

Unit 1-3
- All units are shutdown and stable
- The fire in the turbine building has been extinguished

NRC Evaluation of Radiation Measurements from the USS Ronald Reagan and USS George Washington

On the morning of March 13, 2011, Naval Reactors notified the NRC that dose rates were being measured from the flight deck of the USS Reagan that was ~130 nautical miles off the Japanese coast. Dose rates from the overhead "plume" were approximately 0.6 mrem per hour gamma with no measurable activity on the ship surfaces. The NRC had received an IAEA report showing dose rates of 100 mrem/hr up wind at the site boundary measured ~ 20 hours earlier and press reports for the previous day of plant venting. Given the meteorological conditions; wind speed of 3-5 mph and the calm 'Class D and E' weather stability for the 20-24 hour time period, a plume with low dose rates from the venting is credible at this location.

NRC staff believes that US Naval readings are not inconsistent based on reports and shine dose measurements received from Japanese officials during venting from Fukushima Daiichi Units 1, 2, and 3.

The Navy sent the contamination samples to a base in Japan to perform an isotopic analysis to determine the actual radio-nuclides. The principle radionuclides identified were iodine, cesium, and technetium, consistent with a release from a nuclear reactor.

The US 7th Fleet has repositioned its ships out of the downwind plume direction from the Fukushima Daiichi Nuclear Power Plant after detecting low level contamination in the air and on its aircraft operating in the area.

The US Navy identified radiological data from the USS George Washington located at Yokosuka Base at 0300 EDT on March 15, 2011 that showed an air sample of 7E-9 uCi/mL, from which the Navy estimated a TEDE of 1.5 mrem/hour and a thyroid CDE of 10 mrem/hour.

Reactor Safety Team Worst Case Analysis

Hypothetical Worst Case Daiichi Units 1, 2 and 3 Accident Sequence Based on our Knowledge of Current Plant Conditions

In this hypothetical event in which no cooling water is added to the core, the water level in the core will decrease, exposing the top of the core to a steam environment and a subsequent heat-up of the fuel rods. As the water continues to boil and recede toward the core bottom, the heat-up rate of the rods will increase rapidly resulting in fuel cladding failure and melt. With the continued lack of cooling water, the melting rods will relocate toward the bottom of the core and eventually into the lower plenum of the reactor vessel. Molten fuel and core debris entering the lower plenum will then cause the lower plenum liquid to boil. If cooling water is added to the drywell to a level above the top elevation of the lower plenum, lower head failure can be prevented. With no cooling water added to the drywell, the lower head will fail by creep rupture allowing molten fuel to enter the drywell. Moreover, the absence of cooling water to the drywell could also result in a containment failure. With cooling water added to the drywell, however, a containment venting capability is also needed to preclude failure from over-pressurization. A containment failure will result in a large radioactive release to the environment.

Please note that failure to add water to the core and drywell is a hypothetical worst case event that will result in containment failure and radioactive release to the environment.

Protective Measures Team (PMT) Worst Case Analysis

The PMT ran RASCAL offsite dose estimations for a hypothetical x-vessel core failure with loss of containment at a boiling water reactor (BWR) similar to Fukushima Daiichi Unit 2 with loss of containment. Two estimates were run: 1) no change in wind direction (wind toward Tokyo) and 2) with the predicted wind shift counterclockwise over the island and back out to sea. For the steady wind direction scenario, Protective Action Guides (PAGs) (>1 Rem Total Effective Dose Equivalent (TEDE) and >5 Rem Committed Dose Equivalent (CDE)) were exceeded at 50 miles beyond Unit 2. For the wind shift scenario, PAGs were exceeded between 30 to 40 miles.

Another RASCAL run with assumptions to model the Fukushima Unit 4 spent fuel pool (SFP) was updated to reflect a spent fuel inventory of 1331 bundles. Since observed meteorological data is unavailable, forecast meteorological data for the 24 hour release period, which indicate wind shifting offshore, were used. For the meteorological conditions utilized, at 20 miles, the PAG for TEDE is 1.4 rem, slightly above the 1 rem PAG. At 30 miles, the TEDE is 0.9 rem.

Reference

Units

1 rem (rem) = 1000 millirem (mrem)

1 Sievert (Sv) = 1000 millisieverts (mSv)

1 rem = 0.01 Sv = 10 mSv

USNRC Emergency Operations Center Status Update

March 19, 2011
Earthquake / Tsunami Status Update
Compiled by Executive Briefing Team

This report was changed to include NRC's current understanding of the ongoing situation in Japan. Historical and background information can be found in past reports.

NRC's Top Priorities

1) Facilitating a meeting of government and industry to engineer a solution. Kickoff meeting will be held on March 19, 2011. Industry participants expected to attend include, INPO, GE Hitachi, Bechtel, AREVA, Exelon, EPRI (Sunday), and Babcock (Sunday).

2) Continued assessment of radiological conditions, dose projections, and protective action recommendations.

2) Providing technical assistance to the Government of Japan. (U.S. [redacted] ador in Japan?)

3) Coordination with other U.S. Departments and Agencies, the Institute of Nuclear Power Operations(INPO), Bechtel, General Electric Hitachi (GEH), Tokyo Electric Power Company (TEPCO), and the Japanese military.

Status

At 0946 EST, March 11, 2011, the NRC entered Monitoring Mode and the agency continues to monitor the unfolding events in Japan. The Headquarters Operations Center is staffed 24/7.

A total of 10 NRC experts supporting USAID response efforts from the NRC are in Japan and have engaged with the US Ambassador and his staff. Tim Kolb coming home (b) (6) Staffing a relief team now.

NRC has issued numerous press releases related to the earthquake and tsunami. These press releases can be found online at: http://www.nrc.gov/reading-rm/doc-collections/news/2011/

At 0550 EDT, March 14, 2011, the NRC experts in Japan reported that the Japanese have requested US technical assistance with cooling the Fukushima Daiichi Units, as needed. The effort is being coordinated by the US Ambassador. At 0900 EDT, March 15, 2011, the Japanese government accepted DOE's Radiological Assistance Program (RAP) team assistance, which includes Aerial Measuring System (AMS) flyovers.

On March 16, NRC provided the White House with information on protective measures for NRC staff in Japan and information to provide advice for other federal workers in Japan. The current

B5/2

protective action recommendation for U.S. citizens residing within 50 miles (80 km) of the Fukushima Daiichi site is to evacuate. (do we now if this is happening?)

The US State Department has approved voluntary authorized departure of family members at the U.S. Embassy in Tokyo, the U.S. Consulate in Nagoya and the Foreign Service Institute in Yokohama.

Japanese Ministry of Defense has assumed the lead role in Japanese response activities. TEPCO is in an advisory role.

The U.S. Department of Energy and the U.S. Environmental Protection Agency are the Federal communicators for questions regarding possible domestic impacts from the events in Japan and on domestic monitoring.

Public Commission Meeting scheduled for Monday, March 21.

Status of NRC Licensee and Agreement State Facilities

NRC is discontinuing reporting status of NRC licensee and Agreement State facilities. NRC will resume this reporting should any issues arise related to earthquake or tsunami effects. NRC issued an Information Notice to the U.S. nuclear power reactor fleet.

The Institute of Nuclear Power Operations (INPO) issued a Level 1 Event Report (highest level) to its members on the afternoon of March 15, 2011. It identifies 4 actions, with due dates, and requires a written response. In general, the actions include walkdowns and verifications of aspects of facility capabilities to address B.5.b equipment and procedures, Severe Accident Management Guidelines (SAMGs), mitigation of station blackout (SBO) conditions, mitigation of internal and external flooding, and fire and flooding events that could be impacted by a concurrent seismic event.

The Nuclear Energy Institute (NEI) issued several fact sheets, the latest on March 17, 2011: "Perspective on Radiation Releases and Emergency Planning at U.S. Nuclear Power Plants"

Current Understanding of Japanese Facilities

(This information is compiled from TEPCO press releases, IAEA information releases, Federation of Electric Power Companies of Japan, Japan Atomic Industrial Forum, World Association of Nuclear Operators, the NRC in-country team and others.)

Fukushima Daiichi

Japanese national government instructed evacuation for local residents within a 20km radius of the site boundary and sheltering in place out to 30 km for residents who stayed behind. IAEA confirms a no-fly zone out to 30 km around the Fukushima Daiichi plant. As of 1830 EDT on March 15, 2011, there have been no updates to protective actions.

Japanese authorities have changed the classification of the event from a Level 4 to a Level 5 "Accident with Wider Consequences" on the International Nuclear and Radiological Event Scale (INES).

NHK media report on March 17, 0100 EDT stated that helicopter crews dumping water on Unit 3 reactor building reported dose rates at 375 R/hr at 300 ft. above the building.

All available information indicates that the majority of releases from the Fukushima site have been carried out to sea by the prevailing winds. Forecast meteorological data for the next 48 hour period (March 19 – 21) indicates wind headed offshore until Sunday, with a shift counter clockwise to onshore. This onshore shift remains predicted to last approximately 12 hours before shifting back offshore.

DOE Aerial Measurement Teams have completed two flyovers of the Daiichi site. NRC has received the data and the analyses, which support a concentration of ground deposition in the NW quadrant (from the plant site) also reported by MEXT field monitoring teams following the March 15 on-shore wind shift.

Fukushima Daiichi

STATUS as of 1500 EDT, March 17, 2011 - (0400 Japan)

Unit 1 – (NRC priority: 4)
Core Status: Damaged, extent undetermined
Core Cooling: RCS depressurized (Source: FEPC); sea water injected to cool core (Source: NISA)
Primary Containment: functional (Source: JAIF)
Secondary Containment: lost (visual)
Spent Fuel Pool: 292 bundles in pool (Source: GEH); water level unknown (Source: JAIF); fire trucks are supplying seawater for cooling spray

Unit 2 – (NRC priority: 3)
Core Status: damaged, extent undetermined
Core Cooling: RCS depressurized (Source: FEPC); sea water injected to cool core (Source: NISA)
Primary Containment: Possible Torus damage
Secondary Containment: Hole cut in side of fuel floor metal to reduce H_2 buildup. Steam coming from hole (visual).
Spent Fuel Pool: 587 bundles in pool (Source: GEH); fire trucks are supplying seawater for cooling spray

Unit 3 – (NRC priority: 1)
Core Status: Damaged, extent undetermined
Core Cooling: RCS depressurized (Source: FEPC); radiation released; sea water injected to cool core (Source: NISA)
Primary Containment: status unkown
Secondary Containment: lost (visual)

Spent Fuel Pool: 514 bundles in pool (Source: GEH); **Pool Dry (Source: NRC Team)**; helicopters flew to drop water and water cannon truck sprayed water on March 17 (Source: METI); fire trucks are supplying seawater for cooling spray

Unit 4 – (NRC priority: 2)
Core Status: offloaded
Core Cooling: N/A
Primary Containment: N/A
Secondary Containment: lost (visual)
Spent Fuel Pool: 1201 bundles in pool (Source: GEH); pool may be dry; damage to fuel rods suspected (Source: JAIF); water was dumped on site with water cannons; fire trucks are supplying seawater for cooling spray

Unit 5 – Shutdown since January 3, 2011 (NRC priority: 5)
Core Status: Core in RPV (Source: INPO)
Spent Fuel Pool: 950 bundles (Source: GEH);(rising temperature at ?rate) Unit 6 emergency diesel generator is available; fire truck spray has been staged

Unit 6 – Shutdown since August 14, 2010 (NRC priority: 6)
Core Status: Core in RPV (Source: INPO)
Spent Fuel Pool: 876 bundles (Source: GEH); (rising temperature at ?rate) Unit's emergency diesel generator is available.

Common Spent Fuel Pool (NRC priority: 7): 6,000 bundles (Source: GEH) located on land side of Unit 4 (visual)
Electrical Power (NRC priority: 7): Restoration from switchyard to Unit 2 480V in progress

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Other Plants

Fukushima Daini

- No changes to report

Onagawa

- No changes to report

Rokkasho

- No changes to report

Protective Measures Team (PMT)

The following is a synopsis of efforts and details of source team determination for use by NARAC in modeling potential exposure to US populations:

For the past week, the source terms used for estimating radiological consequences from the Fukushima site were based on loss-of-coolant accident assumptions (from NUREG-1465, the

alternative siting source term). An updated "worst-case" scenario was developed assuming each Fukushima reactor and spent fuel pool currently in jeopardy experiences a significant release, but using best-estimate accident progression assumptions. This scenario used insights from a contemporary consequence study that assumed a long-term station blackout (LTSBO) event modeled after a domestic BWR/4 Mark I nuclear power plant. For each reactor, the radionuclide source terms were generated using MELCOR and the standard isotopic abundances (Ci/MWt) were obtained from the MACCS2 manual after scaling to the Fukushima power levels. The release duration is assumed to be relatively short (one-half hour) based on a containment failure shortly after RPV breach.

The spent fuel pool inventories were based on ORIGEN results provided by GE for Unit 4, assuming a mix of 100 day and 500 day offloaded fuel. Source terms for Units 1, 2 and 3 were based on 500 day offloaded fuel. Release fractions were based on MELCOR calculations. The 8-hour release duration for Unit 4 was based on a MELCOR calculation. This 8-hour release duration was then doubled for Units 1, 2 and 3 assumptions because they did not have recently offloaded fuel, causing a slower escalation. Plume energies were developed for each spent fuel pool.

The overall timing (sequence) of releases from each unit are as follows: Unit 1 reactor at 15:36 on 3/12/2011; Unit 3 reactor at 11:15 on 3/14/2011; Unit 2 reactor at 06:15 on 3/15/2011; Unit 3 and 4 spent fuel pools at 6:15 on 3/16/2011 (assumed 24 hrs after previous reactor release); Unit 2 spent fuel pool at 6:15 on 3/17/2011 (assumed 24 hrs after previous spent fuel pool release); Unit 1 spent fuel pool at 6:15 on 3/18/2011 (assumed 24 hrs after previous spent fuel pool release).

The PMT is working with DOE/NARAC to refine source term models in an effort to develop dose projections beyond 50 miles. The 50 mile distinction is made because NRC RASCAL modeling is only capable to estimate dose values out to 50 miles. Therefore, NRC has the responsibility to develop source terms and dose projections within Japan, up to 50 miles from the reactor site, while DOE has the lead for dose projections beyond 50 miles and for the United States and territories.

The source term provided to NARAC was: (1) 25% of the total fuel in unit 2 released to the atmosphere, (2) 50% of the total spent fuel from unit 3 was released to the atmosphere, and (3) 100% of the total spent fuel was released to the atmosphere from unit 4. All 96 hour dose projections (Alaska, Hawaii, West Coast) are well below the 1 rem total effective dose (TED) Protective Action Guide (PAG) based on predicted Cs-137 deposition. Except for Alaska, all thyroid dose estimates are well below the EPA 5 rem PAG. The thyroid estimate is very conservative and does not consider intervention actions like distribution of potassium iodide, removing dairy cows from contaminated pastures, or interdicting milk or leafy vegetables contaminated with I-131.

The PMT has received information from several various sources regarding radiological conditions around the reactors. Some information (from March 17) around the plant indicates dose rates between 36 mr/hr and 65 mr/hr at approximately ½ mile from the site (over land). March 16 information recorded onsite indicated approximately 30 R/hr near the reactor buildings and an unconfirmed dose rate of 375 R/hr approximately 300 feet above the Unit 3 reactor (during a helicopter fly over). AMS fly over data on March 18 generally agrees with MESA supplied field monitoring team data out to approximately 30 km (18 miles) west of the site. Data

shows that ground level dose rates from deposition are highest in the NW quadrant, with 20 – 40 mr/hr readings (recorded by AMS) and 18 mr/hr (field team) readings between 20km and 30 km in that quadrant.

Department of Energy Aerial Monitoring operations were conducted on March 17-18, 2011. Two missions using fixed wing (C-12 aircraft) conducted parallel and serpentine patterns near the Fukushima nuclear power plant. A narrow band to the northwest, 13 to 20 miles from the site, has a high concentration of contaminated materials.
AMS information shows that dose rates from ground deposition exist between 20 and 30 km that would result in a whole body dose of greater than 1 REM over continuous exposure for 4 days. This information agrees with MEXT field measurements in the same area. The Government of Japan may want to consider extending their evacuation zone beyond the current 20 km (12 mile) radius.

International Response

- IAEA sent a two person team to conduct coordination activities and to take measurements. NRC communicated with IAEA to discuss the status and concerns.
- France has shared technical data with the NRC and publicly posted its assessment of projected doses in Tokyo on the IRSN website.
- Spain Parliament is still reviewing and deciding on support levels.
- Italy is interested in discussing what the USG is doing, and might be interested in helping in some way.
- China has offered to help.
- Russia has sent a team to Tokyo. The U.S. team has met with the Russians. (we heard the Russians went home?)

Reference

Units

1 rem (rem) = 1,000 millirem (mrem)
1 Sievert (Sv) = 1,000 milliSieverts (mSv) = 1,000,000 microsieverts (μSv)
1 rem = 0.01 Sv = 10 mSv

March 24, 2011 1515 EDT

Briefing Sheet
Fukushima Daiichi

In an early morning press conference on Thursday, March 24, NISA indicated that progress was being made in injecting fresh water into the reactors: fresh water is reportedly being injected into Unit 1—albeit using fire trucks. Seawater injection to the other units continues; however, the flow rate to the reactor pressure vessels in unknown. Containment integrity is questionable for all 3 units—particularly for Units 2 and 3. Pump cooling for Unit 5 reactor and spent fuel pool (RHR) stopped on Wednesday and TEPCO plans to re-establish today. (Source: NISA)

AC power cables installed from a nearby transmission line to Units 1&2. TEPCO is working to establish power to necessary cooling equipment (U2 first). Electrical power has been restored to the Unit 3 control room (Source: NHK World). Power cables connected to a load center in Unit 4. External AC power restored to Unit's 5 and 6. Unit 6 diesel generators running. 480 VAC power has been restored to portions of all 4 units, but limited capability to operate any equipment at this time.

Japan would like to share and coordinate all protective measures data. Their system – speedy – with rascal. Will coordinate with DOE/NR/ and others.

Indications of trace, but detectable amounts of I-131 are being reported at some nuclear plants in the U.S. (Ginna, Nine Mile, Palo Verde, SONGS, and Diablo Canyon, Columbia, Millstone). PMT is reviewing data sets. Industry has agreed to collect the data and provide to NRC for distribution with Federal Government (anticipate EPA lead). Iodine in drinking water issue is being worked with PMT and EPA on what the message will be. PMT briefed that the detected iodine levels in the rain water are substantially below the drinking water standards. RADnet is posting current monitoring data on web. This info in being integrated with data gathered from test band monitoring and reported to OSTP.

Chairman is continuing to work with others to establish a Senior level person as a focal point.

DOE has agreed the US should reach out to Japan as one voice only. To facilitate this, DOE (Pete Lyons and Steve Aoki) were provided a summary of the 1000 industry consortium call. In addition, NRC/RES will participate in a DOE call everyday from 1700 to 1800. This will help facilitate the one voice.

Naval Reactors requested an assessment of reactor core and spent fuel pool conditions. This would be developed and shared in a timely manner for the purposes of capturing what "could" happen, sharing it with the Japanese and opening the dialogue for what recommendations the U.S. would make if such conditions exist (such as filling the primary containment if fuel has the potential to go ex-vessel). NR specifically interested in assessing protective actions for U.S. personnel in Japan in this context.

March 24, 2011 1515 EDT

Per NRC Japan team, they have officially accepted the pumping system in Japan and they will be using it. Will move equipment tomorrow afternoon after training on it at base. They accepted the barges as well. No delivery date yet, worried about harbor damage.

The NRC Japan team reports that they have accepted 5 seats within the TEPCO EOC. Will show up there first time Friday morning (JST) with INPO rep..

INPO/DOE has accepted action to figure out how to remove spent fuel from the site. The Japanese provided a list of the things they would accept, including the million doses of KI, bottled water, rad. monitoring equipment, robotics and remote control equipment. DOD and DOE lead. There will be an actual list with parties identified developed 25 March.

3 workers exposed to 173 – 180 mSv (reported by NHK news time).

NARAC run on most plausible case needs to be coordinated before release. Current source term will be updated with most current information on plant status. Looking at in-country modeling (for US citizens) and cross ocean.

Provided latest seismic Q&A to NSIR (Daryl Johnson) for distribution to DHS secretary.

OPA is aware that Chuck Casto spoke with reporters last evening in Japan. Message was "we are here to help".

USNRC Emergency Operations Center Status Update

March 25, 2011
Earthquake / Tsunami Status Update
Compiled by Executive Briefing Team

This report includes NRC's current understanding of the ongoing situation in Japan. Historical and background information can be found in past reports.

NRC's Top Priorities

1) Continued assessment of radiological conditions, dose projections, and protective action recommendations.

2) Providing technical assistance to the U.S. Ambassador in Japan and the Japanese Government.

3) Coordination with other U.S. Departments and Agencies, the Institute of Nuclear Power Operations(INPO), Bechtel, General Electric Hitachi (GEH), Tokyo Electric Power Company (TEPCO), and the Japanese military.

Status

At 0946 EST, March 11, 2011, the NRC entered Monitoring Mode and the agency continues to monitor the unfolding events in Japan. The Headquarters Operations Center is staffed 24/7.

The team of NRC experts in Japan continues to support the US Ambassador and his staff.

NRC has issued numerous press releases related to the earthquake and tsunami. These press releases can be found online at: http://www.nrc.gov/reading-rm/doc-collections/news/2011/

On March 14, 2011, the NRC experts in Japan reported that the Japanese had requested US technical assistance for cooling the Fukushima Daiichi Units, as needed. The effort to provide assistance is being coordinated by the US Ambassador.

The current protective action recommendation for U.S. citizens residing within 50 miles (80 km) of the Fukushima Daiichi site is to evacuate.

One train of temporary cooling equipment has been transported to Yokota Air Force Base. Plans are being made for the U.S. Navy to provide two fresh water barges to the Daiichi site. TEPCO expects to swap to freshwater injection (from the Dam source) on Units 1-3 on 3/25.

B5/4

The NRC Reactor Safety Team has provided a set of recommendations pertaining to severe accident management strategies to the NRC team in Japan. The recommendations were coordinated with GEH, EPRI, INPO, Naval Reactors, and DOE.

The U.S. Department of Energy and the U.S. Environmental Protection Agency are the Federal communicators for questions regarding possible domestic impacts from the events in Japan and on domestic monitoring.

The Commission has established a senior level agency task force to conduct a methodical and systematic review of NRC processes and regulations with specific near-term and long-term objectives.

Status of NRC Licensee and Agreement State Facilities

No new information to report

Industry Consortium

No new information to report

Current Understanding of Japanese Facilities

(This information is compiled from the NRC in-country team, TEPCO press releases, NISA press releases, Japan Atomic Industrial Forum (JAIF) compiled data and assessments, International Atomic Energy Agency (IAEA) information releases, Federation of Electric Power Companies of Japan, World Association of Nuclear Operators, Department of Energy (DOE) and others.)

Fukushima Daiichi

The Japanese national government instructed evacuation for local residents within a 20km radius of the site boundary and sheltering in place out to 30 km. IAEA confirms a no-fly zone out to 30 km around the Fukushima Daiichi plant. There have been no updates to protective actions since March 15, 2011.

All available information indicates that the majority of releases from the Fukushima site have been carried out to sea by the prevailing winds.

Current forecast meteorological data through March 26, 2011 indicates prolonged onshore winds, shifting offshore on the morning of March 26.

The most recent survey data, from March 25, 2011, does not indicate any substantial change of dose measurements at the site.

STATUS as of 1800 EDT, March 25, 2011 - (0700 Japan, March 26)

Unit 1 – (NRC Priority: 1)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO).
The volume of sea water injected to cool the core has left enough salt to fill the lower plenum to the core plate (Source: GEH, US Industry).
Vessel temperatures 149C at bottom drain, 197C at FW nozzle (Source: NISA)
RPV at 65.7 psig (increasing trend), DW and torus pressure at 40 psig (decreasing trend) (Source: NISA).

Core Cooling: Fresh water injection initiated at 1537 hrs JDT 3/25, injecting through FW 120l/min or 31.7 g/m (Source: NISA).
Recirculation pump seals have likely failed. (Source: GEH)

Primary Containment: Not damaged, 40 psig (TEPCO was considering venting on 3/24)

Secondary Containment: Severely damaged (hydrogen explosion)

Spent Fuel Pool: Fuel covered, no seawater injected - (Source: JAIF, NISA, TEPCO)
The fuel in this pool is all over 12 years old and very little heat input (<0.1 MW) (Source: DOE).

Rad Levels: DW 4780 R/hr, Torus 3490 R/hr (source instruments unknown), Outside plant: 26mR/hr at gate (variable) (Source: US Industry)

Power: Electric power available, equipment testing in progress (Source: JAIF, NISA, TEPCO)
External AC power to the Main Control Room of Unit 1 became available at 11:30 JDT 3/24/2011. Lighting in Main Control Room operating in Unit 1 & Unit 3.

Unit 2 – (NRC Priority: 2)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO).
Suspect the volume of sea water injected to cool the core has left enough salt to fill the lower plenum to the core plate (Source: GEH, US Industry).

Core Cooling: Seawater injection through RHR via fire water, bottom head temperature 104C, feed water nozzle temperature 107C (Source: JAIF, NISA, TEPCO). Recirculation pump seals have likely failed. (Source: GEH)
Expect to go to freshwater late on 3/25

Primary Containment: Damage suspected (Source: JAIF, NISA, TEPCO)

Secondary Containment: Damaged (Source: JAIF, NISA, TEPCO), hole in refuel floor siding (Source: visual)

Spent Fuel Pool: Fuel covered, seawater injected on March 20, fuel pool temperature 52C (Source: JAIF, NISA, TEPCO)

Rad Levels: DW 4560 R/hr; Torus 154 R/hr (source instruments unknown); Outside plant: 26mR/hr at gate (variable) (Source: US Industry)

Power: External AC power has reached the unit, checking integrity of equipment before energizing.

Unit 3 – (NRC Priority: 3)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO).
Suspect the volume of sea water injected to cool the core has left enough salt to likely fill the lower plenum to the core plate (Source: GEH, US Industry).

Core Cooling: Freshwater injection via fire line initiated 1802 JDT 3/25/11 (Source: NISA)
Seawater injection through RHR, bottom head temperature 111C, FW nozzle

temperature: Unreliable (Source: JAIF, NISA 1800 JDT 3/25/11, TEPCO) Recirculation pump seals have likely failed. (Source: GEH); Expect to go freshwater cooling late on 3/25

Primary Containment: Damage suspected (Source: NISA, TEPCO). "Not damaged" (Source: JAIF). Need to resolve

Secondary Containment: Damaged (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Low water level (Source: JAIF, NISA, TEPCO), spraying and pumping sea water into the SFP via the Cooling and Purification Line (Source: NISA)

Rad Levels: DW 5100 R/hr, torus 150 R/hr (INPO source instruments unknown); Outside plant: 26mR/hr at gate (variable) (Source: US Industry); 100 R/hr debris outside Rx building (covered).

Power: External AC power has reached the unit, checking integrity of equipment before energizing.

Unit 4 – (NRC Priority: 4)

Core Status: Offloaded 105 days at time at accident (Source: JAIF, NISA, TEPCO)

Core Cooling: Not necessary (Source: JAIF, NISA, TEPCO)

Primary Containment: Not applicable (Source: JAIF, NISA, TEPCO)

Secondary Containment: Severely damaged, hydrogen explosion. (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Low water level, spraying with sea water, hydrogen from the fuel pool exploded, fuel pool is cool heating up very slowly (Source: JAIF, NISA, TEPCO) Temperature is unknown (Source: NISA).
Video was to be taken of SFP pool on 3/24 (?)

Power: External AC power has reached the unit, checking electrical integrity of equipment before energizing. (Source: JAIF, NISA, TEPCO)

Unit 5 – (NRC Priority: 6)

Core Status: In vessel (Source: JAIF, NISA, TEPCO)

Core Cooling: Functional (Source: JAIF, NISA, TEPCO)

Primary Containment: Functional (Source: JAIF, NISA, TEPCO)

Secondary Containment: Vent hole drilled in rooftop to avoid hydrogen build up (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Fuel pool cooling functional, temperature 37.9 C (Source: JAIF, NISA, TEPCO)

Power: External AC power supplying the unit, diesel generators available. (Source: JAIF, NISA, TEPCO)

Unit 6 – (NRC Priority: 5)

Core Status: In vessel (Source: JAIF, NISA, TEPCO)

Core Cooling: Functional (Source: JAIF, NISA, TEPCO)

Primary Containment: Functional (Source: JAIF, NISA, TEPCO)

Secondary Containment: Vent hole drilled in rooftop to avoid hydrogen build up (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Fuel pool cooling functional, temperature 22 C (Source: JAIF, NISA, TEPCO)

Power: External AC power supplying the unit, diesel generators available. (Source: JAIF, NISA, TEPCO)

Common Spent Fuel Pool (NRC priority: 7): 6,000 bundles (Source: GEH); water level maintained at 53°C (Source: NISA); water spray started at 2137 EDT March 20 (Source: NISA); normal cooling started 1805 JDT 3/24/2011 (Source: NISA)
Electrical Power (NRC priority: 7): Offsite power connected to Unit 2 auxiliary transformer / distribution panel; work continues on energizing equipment in Unit 2
Dry Cask Storage: Visual inspection revealed no problems. All casks are vertical casks manufactured by Hitachi Shipbuilding (Source: RST)

On March 25, 2011, NRC assigned revised priorities to Units 1 through 4. This was based on analysis by the Reactor Safety Team. Unit 1 is priority 1 based on the fact that primary containment integrity can still be preserved if the responders take the correct actions to inject to the RPV and Primary containment. Unit 2 is priority 2 because of the apparent damage to primary containment and the other barriers to release. This damage requires continued attention to cool the core and provide water to the primary containment to minimize potential for release. Unit 3 is priority 3, because primary containment may be okay but continued attention is required to pursue core cooling and injection. Unit 4 is priority 4 because progress has been made in addressing the spent fuel pool heat removal requirements and the SFP area has indicated temperatures of less than 100 °C.

Other Plants

No new information to report

Acronyms

atm – Atmosphere (unit of pressure)
DW – Drywell
EDG – Emergency Diesel Generator
FW – Feed Water
CS – Reactor Coolant System
RHR – Residual Heat Removal
RPV – Reactor Pressure Vessel
SFP – Spent Fuel Pool
TAF – Top of Active Fuel

Protective Measures Team (PMT) Update

The PMT continues to aggregate and assess available dose rate information from DOE Aerial Monitoring operations, the U.S. Navy, and TEPCO. Multi-day trending of available onsite monitors shows slightly declining dose rates over the past several days. On-site surveys of the exterior of the reactor buildings show dose rates of 60 mR/hr to 15 R/hr with the highest doses around reactor building 3.

Potential ingestion pathway radiation measurements made by the Japanese government on food from regions near the Daiichi site exceed the values established by the U.S. Food and Drug Administration (FDA). Tokyo government officials advised residents to stop giving tap water to infants based on radioactive levels.

The PMT continues to assess monitoring performed by U.S. assets, including EPA Radnet stations, and U.S. reactors. (b)(5)
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PMT confirmed reports that INPO had access to one million KI pills from ANBEX, Inc. (866-463-6754) at (b)(4)

The PMT is continuing efforts to develop reentry plans for short-term reentry and retrieval of personal effects. A long term reentry plan was developed on March 22, 2011 and was reviewed on March 24, 2011 with no changes recommended. The PMT is also working with the Environmental Protection Agency (EPA) with environmental data from US Nuclear Power plants.

The PMT has begun efforts to compile a comprehensive list of all PMT Rascal runs conducted since the onset of the crisis in Japan that have been supplied to NARAC. Runs are summarized in a matrix by date and reactor unit/ spent fuel pool, and percent fuel melt. Furthermore, the PMT is trending exposure rate data around the site based on Ministry of Education, Culture, Sports, Science and Technology (MEXT) data which is periodically sent to the PMT. The exposure rate data is being presented in a figure illustrating locations and trend data.

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Per IAEA 1700 UTC March 24, Radiation exposure on 3 TEPCO related workers was confirmed. They were working in the basement Unit 3 turbine building where contaminated water was on the floor. The radiation exposures of the 3 workers were 180 mSv, 179 mSv, and 173 mSv. Two of the workers had severely contaminated their feet and were transferred to the Fukushima Prefecture Medical University. Isotopic analysis received on March 25, 2011 from TEPCO indicates presence of contaminated water (I-131 and other isotopes) in the Unit 3 turbine building at levels indicating damaged fuel from the core.

Per METI (0630 JST) on March 24, radiation level at the main gate (approximately 3281 feet from the Unit 2 building) were 204.5 μSv/hr.

PMT has completed work with NARAC on the source term for Plausible Realistic Case model based on plant conditions as of March 24, 2011. Run was completed at 1400 EDT on March 25, 2011, and results have been verified by the PMT. The Plausible Realistic Case assumed partial melting of Unit 1 (70% core melt; 10%/day release), Unit 2 (33% core melt; a 5-inch sq. hole in containment), and Unit 3 (33% core melt; 100%/day release. The case did not assume any release from the spent fuel pools. Actual meteorological data and forecasts were used. Releases were assumed to occur over 12 days, and dose results were calculated for 14 days for locations in Japan. TEDE was greater than 5 rem out to around 2 miles and greater than 1 rem (TEDE PAG) out to around 8 miles from the plant. Adult thyroid dose was greater than 10 rem out to around 5.25 miles from the plant. Child thyroid dose was greater than 5 rem out to around 11 miles from the plant.

International Response

- The IAEA held a special session of the Board of Governors on March 21, 2011. Director General Amano provided a summary of his trip to Japan. The IAEA continues to have daily press and technical briefings.
- NRC has coordinated daily with the United Kingdom's Health and Safety Executive, Canadian Nuclear Safety Commission, and French Nuclear Safety Authority.
- France has publicly posted its assessment of projected doses in Tokyo on the French Radioprotection and Nuclear Safety Institute (IRSN) website.
- Taiwan staffed their Operations Center, beginning on Saturday, March 12th, and continues to do so.
- An Institute of Nuclear Power Operations (INPO) staff member has arrived in Tokyo and is coordinating with US government staff at the Embassy.
- NRC is coordinating with the State Department to provide the US Ambassador the plume analysis to share with the Japanese government.

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USNRC Emergency Operations Center Status Update

March 25, 2011
Earthquake / Tsunami Status Update
Compiled by Executive Briefing Team

This report includes NRC's current understanding of the ongoing situation in Japan. Historical and background information can be found in past reports.

NRC's Top Priorities

1) Continued assessment of radiological conditions, dose projections, and protective action recommendations.

2) Providing technical assistance to the U.S. Ambassador in Japan and the Japanese Government.

3) Coordination with other U.S. Departments and Agencies, the Institute of Nuclear Power Operations(INPO), Bechtel, General Electric Hitachi (GEH), Tokyo Electric Power Company (TEPCO), and the Japanese military.

Status

At 0946 EST, March 11, 2011, the NRC entered Monitoring Mode and the agency continues to monitor the unfolding events in Japan. The Headquarters Operations Center is staffed 24/7.

The team of NRC experts in Japan continues to support the US Ambassador and his staff.

NRC has issued numerous press releases related to the earthquake and tsunami. These press releases can be found online at: http://www.nrc.gov/reading-rm/doc-collections/news/2011/

On March 14, 2011, the NRC experts in Japan reported that the Japanese had requested US technical assistance for cooling the Fukushima Daiichi Units, as needed. The effort to provide assistance is being coordinated by the US Ambassador.

The current protective action recommendation for U.S. citizens residing within 50 miles (80 km) of the Fukushima Daiichi site is to evacuate.

One train of temporary cooling equipment has been transported to Yokota Air Force Base. Plans are being made for the U.S. Navy to provide two fresh water barges to the Daiichi site. TEPCO expects to swap to freshwater injection (from the Dam source) on Units 1-3 on 3/25.

B5/5

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STATUS as of 1800 EDT, March 25, 2011 - (0700 Japan, March 26)

Unit 1 – (NRC priority: 1)

Core Status: 400 fuel assemblies damaged, extent undetermined; RPV level ~1/2 of TAF (Source: JAIF); RPV pressure 65.7 psig (Source: NISA)

Core Cooling: RCS pressure: 58 psig (Source: NISA); RPV, DW, Torus pressure increasing (Source: NISA); fire truck providing seawater to core spray line to cool core (Source: NISA); recent information indicates that a second seawater injection path through a feedwater line was established; increased amount of water sprayed, leading to reduction in temperature of RPV from 400 to 172 °C; Expect to swap to freshwater injection from the Dam source on units 1-3 on 3/25 (Source: NRC Team per TEPCO); freshwater injection initiated (Source: NISA); vessel temp: Btm Head 148 C, FW nozzle 197 C (Source: NISA)

Primary Containment: functional, drywell pressure: 40 psig (Source: JAIF), TEPCO considering venting (Source: NISA)

Secondary Containment: lost during hydrogen explosion

Spent Fuel Pool: 292 bundles in pool (Source: GEH); water level unknown (Source: JAIF); time margin to uncovering fuel: 127 days; pool/area temp < 100°C (Source: NRC Team based on report from NISA, assuming pool intact)

Power: Offsite power line connected to Unit 1, power restoration ongoing (Source: IAEA)

Unit 2 – (NRC priority: 2)

Core Status: 548 fuel assemblies damaged, extent undetermined; RPV level ~1/3 of TAF (Source: JAIF); RPV pressure 12.3 psig (Source: NISA)

Core Cooling: RCS pressure 9.4 psia (Source: NISA); fire truck providing seawater to recirculation line to cool core (Source: NISA); Bottom Head Temperature: 104 °C (Source: NISA); Feedwater Nozzle Temperature: 107°C (Source: NISA); Expect to swap to freshwater injection from the Dam source on units 1-3 on 3/25 (Source: NRC Team per TEPCO)

Primary Containment: damaged, drywell pressure: 17.4 psig (Source: JAIF)

Secondary Containment: Blowout panel opened in side of reactor building to reduce hydrogen buildup; steam reported coming from hole (Source: visual/multiple media outlets)

Spent Fuel Pool: 587 bundles in pool (Source: GEH); time margin to uncovering fuel: 39 days (Source: NRC Team based on report from NISA, assuming pool intact); pool/area temp 52°C (Source: JAIF)

Power: offsite power restored to load-side power panel (Source: NISA); condition of pump motors and instrumentation being evaluated (Source: IAEA); restoration is ongoing

Unit 3 – (NRC priority: 3)

Core Status: 548 fuel assemblies damaged, extent undetermined; RPV level ~1/2 of TAF; RPV pressure 20 psig (Source: NISA)

Core Cooling: RCS Pressure: ~5 psig (Source: NISA); fire truck providing seawater to recirculation line to cool core (Source: NISA); Bottom Head Temperature: 111 °C (Source: JAIF, NISA, TEPCO); Feedwater Nozzle Temperature: 81 °C (Source: JAIF, NISA, TEPCO); Freshwater injection initiated at 10:02 JDT 3/25 (Source: NISA);

Primary Containment: unknown, had been thought damaged, JAIF stated that was not damaged on 3/25 (Source: JAIF)

Secondary Containment: lost during hydrogen explosion; white smoke (Source: IAEA)

Spent Fuel Pool: 514 bundles in pool (Source: GEH); water sprayed from ground several times (Source: NISA); time margin to uncovering fuel: 0 days (Source: NRC Team based on report from NISA, assuming pool intact); at 0250 EDT March 21, 2011, grey smoke was observed coming from the southeast corner of the Unit 3 SFP. Workers were evacuated. The smoke lessened 2 hours later (Source: IAEA) and news reports indicate that workers have returned. Extent of fuel coverage is undetermined. Attempts to cool using an internal cooling system (Source: NRC Team per TEPCO); seawater injection to SFP via Cooling and Purification Line, temp unknown
Power: power has been restored to Unit 3 control room.
Other: Black smoke was detected rising out of unit 3 building at ~1630 (Japan) on March 23, 2011, causing temporary evacuation of workers. Smoke continued through nightfall. (Source: NRC Team per TEPCO)

Unit 4 – (NRC priority: 4)
Core Status: offloaded to spent fuel pool
Core Cooling: N/A
Primary Containment: open for refueling operations
Secondary Containment: lost (visual)
Spent Fuel Pool: 1331 bundles in pool (Source: GEH & NISA); pool likely was dry at one point causing significant fuel damage; 3/24 water sprayed into pool to refill, SFP temperature unknown; sea water injection via fuel pool cooling system and water spray via concrete boom (Source: NISA)
Power: external electrical cable connected to power center; power has been restored to central control room (Source: NRC Team per TEPCO)

Unit 5 – Shutdown since January 3, 2011 (NRC priority: 5)
Core Status: 548 fuel assemblies – no damage; Cold Shutdown at 1430 JDT 3/20 (Source: NISA); RPV intact; RPV level +172 cm above TAF (Source: IAEA, March 20); temp 43 C (Source: NISA); offsite electrical power restored (Source: NISA)
Core Cooling: RHR providing cooling
Spent Fuel Pool: 946 bundles (Source: GEH); temperature: 37.9°C (Source: NISA); RHR pump repaired 3/24, cooling started 1634 JDT (Source: NISA)
Power: Switched from EDG to external power supply (Source: NISA)

Unit 6 – Shutdown since August 14, 2010 (NRC priority: 6)
Core Status: 764 fuel assemblies – no damage; Cold Shutdown at 1927 JDT 3/20 (Source NISA); RPV Intact; RPV level +276 cm above TAF (Source: NISA); temp 27°C (Source: NISA); offsite power restored
Core Cooling: RHR providing cooling
Spent Fuel Pool: 876 bundles (Source: GEH); temperature 22.0°C (Source: JAIF); injection to SFP via normal make-up water system; RHR is cooling SFP and RPV (Source: NISA)
Power: Switch from EDG to external power supply (Source: NISA); 2 unit EDGs available

Common Spent Fuel Pool (NRC priority: 7): 6,000 bundles (Source: GEH); water level maintained at 53°C (Source: NISA); water spray started at 2137 EDT March 20 (Source: NISA); normal cooling started 1805 JDT 3/24/2011 (Source: NISA)

Electrical Power (NRC priority: 7): Offsite power connected to Unit 2 auxiliary transformer / distribution panel; work continues on energizing equipment in Unit 2
Dry Cask Storage: Visual inspection revealed no problems. All casks are vertical casks manufactured by Hitachi Shipbuilding (Source: RST)

Other Plants

No new information to report

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Earthquake/Tsunami Status Update March 25, 2011 1800 EDT

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International Response

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On March 14, 2011, the NRC experts in Japan reported that the Japanese had requested US technical assistance for cooling the Fukushima Daiichi Units, as needed. The effort to provide assistance is being coordinated by the US Ambassador.

The current protective action recommendation for U.S. citizens residing within 50 miles (80 km) of the Fukushima Daiichi site is to evacuate.

One train of temporary cooling equipment has been transported to Yokota Air Force Base. Plans are being made for the U.S. Navy to provide two fresh water barges to the Daiichi site. TEPCO expects to swap to freshwater injection (from the Dam source) on Units 1-3 on 3/25.

B5/6

The NRC Reactor Safety Team has provided a set of recommendations pertaining to severe accident management strategies to the NRC team in Japan. The recommendations were coordinated with GEH, EPRI, INPO, Naval Reactors, and DOE.

The U.S. Department of Energy and the U.S. Environmental Protection Agency are the Federal communicators for questions regarding possible domestic impacts from the events in Japan and on domestic monitoring.

The Commission has established a senior level agency task force to conduct a methodical and systematic review of NRC processes and regulations with specific near-term and long-term objectives.

Status of NRC Licensee and Agreement State Facilities

No new information to report

Industry Consortium

No new information to report

Current Understanding of Japanese Facilities

(This information is compiled from the NRC in-country team, TEPCO press releases, NISA press releases, Japan Atomic Industrial Forum (JAIF) compiled data and assessments, International Atomic Energy Agency (IAEA) information releases, Federation of Electric Power Companies of Japan, World Association of Nuclear Operators, Department of Energy (DOE) and others.)

Fukushima Daiichi

The Japanese national government instructed evacuation for local residents within a 20km radius of the site boundary and sheltering in place out to 30 km. IAEA confirms a no-fly zone out to 30 km around the Fukushima Daiichi plant. There have been no updates to protective actions since March 15, 2011.

All available information indicates that the majority of releases from the Fukushima site have been carried out to sea by the prevailing winds.

Current forecast meteorological data through March 26, 2011 indicates prolonged onshore winds, shifting offshore on the morning of March 26.

The most recent survey data, from March 25, 2011, does not indicate any substantial change of dose measurements at the site.

STATUS as of 1800 EDT, March 25, 2011 - (0700 Japan, March 26)

Unit 1 - (NRC Priority: 1)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO).
The volume of sea water injected to cool the core has left enough salt to fill the lower plenum to the core plate (Source: GEH, US Industry).
Vessel temperatures 149C at bottom drain, 197C at FW nozzle (Source: NISA)
RPV at 65.7 psig (increasing trend), DW and torus pressure at 40 psig (decreasing trend) (Source: NISA).

Core Cooling: Fresh water injection initiated at 1537 hrs JDT 3/25, injecting through FW 120l/min or 31.7 g/m (Source: NISA).
Recirculation pump seals have likely failed. (Source: GEH)

Primary Containment: Not damaged, 40 psig (TEPCO was considering venting on 3/24)

Secondary Containment: Severely damaged (hydrogen explosion)

Spent Fuel Pool: Fuel covered, no seawater injected - (Source: JAIF, NISA, TEPCO)
The fuel in this pool is all over 12 years old and very little heat input (<0.1 MW) (Source: DOE).

Rad Levels: DW 4780 R/hr, Torus 3490 R/hr (source instruments unknown), Outside plant: 26mR/hr at gate (variable) (Source: US Industry)

Power: Electric power available, equipment testing in progress (Source: JAIF, NISA, TEPCO)
External AC power to the Main Control Room of Unit 1 became available at 11:30 JDT 3/24/2011. Lighting in Main Control Room operating in Unit 1 & Unit 3.

Unit 2 - (NRC Priority: 2)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO).
Suspect the volume of sea water injected to cool the core has left enough salt to fill the lower plenum to the core plate (Source: GEH, US Industry).

Core Cooling: Seawater injection through RHR via fire water, bottom head temperature 104C, feed water nozzle temperature 107C (Source: JAIF, NISA, TEPCO). Recirculation pump seals have likely failed. (Source: GEH)
Expect to go to freshwater late on 3/25

Primary Containment: Damage suspected (Source: JAIF, NISA, TEPCO)

Secondary Containment: Damaged (Source: JAIF, NISA, TEPCO), hole in refuel floor siding (Source: visual)

Spent Fuel Pool: Fuel covered, seawater injected on March 20, fuel pool temperature 52C (Source: JAIF, NISA, TEPCO)

Rad Levels: DW 4560 R/hr; Torus 154 R/hr (source instruments unknown); Outside plant: 26mR/hr at gate (variable) (Source: US Industry)

Power: External AC power has reached the unit, checking integrity of equipment before energizing.

Unit 3 - (NRC Priority: 3)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO).
Suspect the volume of sea water injected to cool the core has left enough salt to likely fill the lower plenum to the core plate (Source: GEH, US Industry).

Core Cooling: Freshwater injection via fire line initiated 1802 JDT 3/25/11 (Source: NISA)
Seawater injection through RHR, bottom head temperature 111C, FW nozzle

temperature: Unreliable (Source: JAIF, NISA 1800 JDT 3/25/11, TEPCO) Recirculation pump seals have likely failed. (Source: GEH); Expect to go freshwater cooling late on 3/25

Primary Containment: Damage suspected (Source: NISA, TEPCO). "Not damaged" (Source: JAIF). Need to resolve

Secondary Containment: Damaged (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Low water level (Source: JAIF, NISA, TEPCO), spraying and pumping sea water into the SFP via the Cooling and Purification Line (Source: NISA)

Rad Levels: DW 5100 R/hr, torus 150 R/hr (INPO source instruments unknown); Outside plant: 26mR/hr at gate (variable) (Source: US Industry); 100 R/hr debris outside Rx building (covered).

Power: External AC power has reached the unit, checking integrity of equipment before energizing.

Unit 4 – (NRC Priority: 4)

Core Status: Offloaded 105 days at time at accident (Source: JAIF, NISA, TEPCO)

Core Cooling: Not necessary (Source: JAIF, NISA, TEPCO)

Primary Containment: Not applicable (Source: JAIF, NISA, TEPCO)

Secondary Containment: Severely damaged, hydrogen explosion. (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Low water level, spraying with sea water, hydrogen from the fuel pool exploded, fuel pool is cool heating up very slowly (Source: JAIF, NISA, TEPCO) Temperature is unknown (Source: NISA).
Video was to be taken of SFP pool on 3/24 (?)

Power: External AC power has reached the unit, checking electrical integrity of equipment before energizing. (Source: JAIF, NISA, TEPCO)

Unit 5 – (NRC Priority: 6)

Core Status: In vessel (Source: JAIF, NISA, TEPCO)

Core Cooling: Functional (Source: JAIF, NISA, TEPCO)

Primary Containment: Functional (Source: JAIF, NISA, TEPCO)

Secondary Containment: Vent hole drilled in rooftop to avoid hydrogen build up (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Fuel pool cooling functional, temperature 37.9 C (Source: JAIF, NISA, TEPCO)

Power: External AC power supplying the unit, diesel generators available. (Source: JAIF, NISA, TEPCO)

Unit 6 – (NRC Priority: 5)

Core Status: In vessel (Source: JAIF, NISA, TEPCO)

Core Cooling: Functional (Source: JAIF, NISA, TEPCO)

Primary Containment: Functional (Source: JAIF, NISA, TEPCO)

Secondary Containment: Vent hole drilled in rooftop to avoid hydrogen build up (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Fuel pool cooling functional, temperature 22 C (Source: JAIF, NISA, TEPCO)

Power: External AC power supplying the unit, diesel generators available. (Source: JAIF, NISA, TEPCO)

Common Spent Fuel Pool (NRC priority: 7): 6,000 bundles (Source: GEH); water level maintained at 53°C (Source: NISA); water spray started at 2137 EDT March 20 (Source: NISA); normal cooling started 1805 JDT 3/24/2011 (Source: NISA)
Electrical Power (NRC priority: 7): Offsite power connected to Unit 2 auxiliary transformer / distribution panel; work continues on energizing equipment in Unit 2
Dry Cask Storage: Visual inspection revealed no problems. All casks are vertical casks manufactured by Hitachi Shipbuilding (Source: RST)

On March 25, 2011, NRC assigned revised priorities to Units 1 through 4. This was based on analysis by the Reactor Safety Team. Unit 1 is priority 1 based on the fact that primary containment integrity can still be preserved if the responders take the correct actions to inject to the RPV and Primary containment. Unit 2 is priority 2 because of the apparent damage to primary containment and the other barriers to release. This damage requires continued attention to cool the core and provide water to the primary containment to minimize potential for release. Unit 3 is priority 3, because primary containment may be okay but continued attention is required to pursue core cooling and injection. Unit 4 is priority 4 because progress has been made in addressing the spent fuel pool heat removal requirements and the SFP area has indicated temperatures of less than 100 °C.

Other Plants

No new information to report

Acronyms

atm – Atmosphere (unit of pressure)
DW – Drywell
EDG – Emergency Diesel Generator
FW – Feed Water
CS – Reactor Coolant System
RHR – Residual Heat Removal
RPV – Reactor Pressure Vessel
SFP – Spent Fuel Pool
TAF – Top of Active Fuel

Protective Measures Team (PMT) Update

The PMT continues to aggregate and assess available dose rate information from DOE Aerial Monitoring operations, the U.S. Navy, and TEPCO. Multi-day trending of available onsite monitors shows slightly declining dose rates over the past several days. On-site surveys of the exterior of the reactor buildings show dose rates of 60 mR/hr to 15 R/hr with the highest doses around reactor building 3.

Potential ingestion pathway radiation measurements made by the Japanese government on food from regions near the Daiichi site exceed the values established by the U.S. Food and Drug Administration (FDA). Tokyo government officials advised residents to stop giving tap water to infants based on radioactive levels.

The PMT continues to assess monitoring performed by U.S. assets, including EPA Radnet stations, and U.S. reactors. (b)(5)

(b)(5)

On March 24, 2011, the NRC recommended to OSTP, NARAC, and DOE that NARAC run a new Tokyo case. The RASCAL source terms were based upon the following major assumptions: Unit 1: assumed 70% core melt as provided by NRC RST and a 10% release rate/day as provided by the Japanese (translated report). Unit 2: assumed 33% core melt as before and a 5 in^2 hole in containment based on Japanese report. Unit 3: assumed 33% core melt as before and a 100% release rate/day based upon data provided by the Japanese. NRC held a teleconference with NARAC at 2230 on March 24, 2011 to confirm the above. NARAC results should be available on March 25, 2011 as directed by the White House.

PMT confirmed reports that INPO had access to one million KI pills from ANBEX, Inc. (866-463-6754) at (b)(4)

The PMT is continuing efforts to develop reentry plans for short-term reentry and retrieval of personal effects. A long term reentry plan was developed on March 22, 2011 and was reviewed on March 24, 2011 with no changes recommended. The PMT is also working with the Environmental Protection Agency (EPA) with environmental data from US Nuclear Power plants.

The PMT has begun efforts to compile a comprehensive list of all PMT Rascal runs conducted since the onset of the crisis in Japan that have been supplied to NARAC. Runs are summarized in a matrix by date and reactor unit/ spent fuel pool, and percent fuel melt. Furthermore, the PMT is trending exposure rate data around the site based on Ministry of Education, Culture, Sports, Science and Technology (MEXT) data which is periodically sent to the PMT. The exposure rate data is being presented in a figure illustrating locations and trend data.

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

Per IAEA 1700 UTC March 24, Radiation exposure on 3 TEPCO related workers was confirmed. They were working in the basement Unit 3 turbine building where contaminated water was on the floor. The radiation exposures of the 3 workers were 180 mSv, 179 mSv, and 173 mSv. Two of the workers had severely contaminated their feet and were transferred to the Fukushima Prefecture Medical University. Isotopic analysis received on March 25, 2011 from TEPCO indicates presence of contaminated water (I-131 and other isotopes) in the Unit 3 turbine building at levels indicating damaged fuel from the core.

Per METI (0630 JST) on March 24, radiation level at the main gate (approximately 3281 feet from the Unit 2 building) were 204.5 μSv/hr.

PMT has completed work with NARAC on the source term for Plausible Realistic Case model based on plant conditions as of March 24, 2011. Run was completed at 1400 EDT on March 25, 2011, and results have been verified by the PMT. The Plausible Realistic Case assumed partial melting of Unit 1 (70% core melt; 10%/day release), Unit 2 (33% core melt; a 5-inch sq. hole in containment), and Unit 3 (33% core melt; 100%/day release. The case did not assume any release from the spent fuel pools. Actual meteorological data and forecasts were used. Releases were assumed to occur over 12 days, and dose results were calculated for 14 days for locations in Japan. TEDE was greater than 5 rem out to around 2 miles and greater than 1 rem (TEDE PAG) out to around 8 miles from the plant. Adult thyroid dose was greater than 10 rem out to around 5.25 miles from the plant. Child thyroid dose was greater than 5 rem out to around 11 miles from the plant.

International Response

- The IAEA held a special session of the Board of Governors on March 21, 2011. Director General Amano provided a summary of his trip to Japan. The IAEA continues to have daily press and technical briefings.
- NRC has coordinated daily with the United Kingdom's Health and Safety Executive, Canadian Nuclear Safety Commission, and French Nuclear Safety Authority.
- France has publicly posted its assessment of projected doses in Tokyo on the French Radioprotection and Nuclear Safety Institute (IRSN) website.
- Taiwan staffed their Operations Center, beginning on Saturday, March 12th, and continues to do so.
- An Institute of Nuclear Power Operations (INPO) staff member has arrived in Tokyo and is coordinating with US government staff at the Embassy.
- NRC is coordinating with the State Department to provide the US Ambassador the plume analysis to share with the Japanese government.

Reference

Units

1 rem (rem) = 1,000 millirem (mrem)
1 Sievert (Sv) = 1,000 milliSieverts (mSv) = 1,000,000 microsieverts (μSv)
1 rem = 0.01 Sv = 10 mSv

March 25, 2011 0600 EDT

Briefing Sheet
Fukushima Daiichi

Plant status remains unchanged from status at 1515.

PMT is working with OSTP and EPA to properly manage and communicate all environmental data collected domestically, including iodine in drinking water. PMT briefed that the detected iodine levels in the rain water are substantially below the drinking water standards. RADnet is posting current monitoring data on web. This info is being integrated with data gathered from test band monitoring and reported to OSTP.

DOE has agreed the US should reach out to Japan as one voice only. To facilitate this, DOE (Pete Lyons and Steve Aoki) were provided a summary of the 1000 industry consortium call. In addition, NRC/RES will participate in a DOE call everyday from 1700 to 1800. This will help facilitate the one voice. Chairman is continuing to work with others to establish a Senior level person as a focal point.

Per NRC Japan team, Japan has officially accepted the pumping system at the air force base, and will be using it. Will move equipment tomorrow afternoon after receiving training on it at base. Japan also accepted and plans are being made for the U.S. Navy to provide two water barges as well. No delivery date yet, worried about possible harbor damage from earthquake. The NRC team also reports that they have accepted 5 seats within the TEPCO EOC. Will show up there first time Friday morning (JST) with INPO representative.

INPO/DOE has accepted action to figure out how to remove spent fuel from the site. The Japanese provided a list of the things they would accept, including the million doses of KI, bottled water, rad. monitoring equipment, robotics and remote control equipment. DOD and DOE lead. There will be an actual list with parties identified developed 25 March.

The NRC Reactor Safety Team has provided a set of recommendations pertaining to severe accident management strategies to the NRC team in Japan. The recommendations were coordinated with GEH, EPRI, INPO, Naval Reactors and DOE.

The NRC Protective Measures Team developed guidance, at the request of State Dept., to be provided to Americans such that they could temporarily re-enter the 50-mile evacuation zone (not to enter the Japanese 20 Km evacuation zone) for the purposes of retrieving personal effects. Guidance will soon be finalized and be provided to the NRC Japan team to get to the Ambassador.

BS/7

March 25, 2011 0600 EDT

Briefing Sheet
Fukushima Daiichi

Plant status updates:

- Freshwater injection to Units 1 and 3. (source is a reservoir)
- Flooding in turbine building of Unit 3. Found elevated iodine 131 and lanthanum 140 in samples indicating potential leakage from core.
- RHR pump on Unit 5 is restored.
- Status of electrical power unknown

PMT is working with NARAC on the right source term for dose runs. (Most plausible realistic [Tokyo] model based on information we know). Run is complete at 1400 and results are being verified..

DOE is taking the US lead in Japan on robotics and environmental issues.

Per NRC Japan team, one day training has been completed on the Bechtel pumping system. There will be an additional day training completed 26 March and then the Self Defense Force stands ready to move equipment out to the site.

Plans are ongoing for the U.S. Navy to provide two fresh water barges to the site as well. No delivery date has been established yet, as there are concerns about possible harbor damage from earthquake.

The NRC team (and INPO representative) went to the TEPCO EOC yesterday and will continue a presence there.

The Japanese government is discussing a list of the things they would accept for use. DOD and DOE have the lead. List of 17 items provided during the cabinet meeting for discussion within Japan ministries and then US government and industry.

The NRC Reactor Safety Team has provided a coordinated (GEH, EPRI, INPO, NR, DOE) set of recommendations pertaining to severe accident management strategies to the NRC team in Japan. . List was provided to NISA and will be discussed at TEPCO tomorrow.

NRC met with representatives from the National Emergency Management Association (NEMA) today regarding ongoing business (EP Rulemaking update). The State Emergency Directors uniformly expressed the desire for a Federal official to serve as the focus for USG messaging on the potential health effects to US States and Territories. NRC understands that DOE is taking this role, however a POC has not yet been identified.

B5/8

March 25, 2011 0600 EDT

Briefing Sheet
Fukushima Daiichi

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Per NRC Japan team, Japan has officially accepted the pumping system at the air force base, and will be using it. Will move equipment tomorrow afternoon after receiving training on it at base. Japan also accepted and plans are being made for the U.S. Navy to provide two water barges as well. No delivery date yet, worried about possible harbor damage from earthquake. The NRC team also reports that they have accepted 5 seats within the TEPCO EOC. Will show up there first time Friday morning (JST) with INPO representative.

INPO/DOE has accepted action to figure out how to remove spent fuel from the site. The Japanese provided a list of the things they would accept, including the million doses of KI, bottled water, rad. monitoring equipment, robotics and remote control equipment. DOD and DOE lead. There will be an actual list with parties identified developed 25 March.

The NRC Reactor Safety Team has provided a set of recommendations pertaining to severe accident management strategies to the NRC team in Japan. The recommendations were coordinated with GEH, EPRI, INPO, Naval Reactors and DOE.

The NRC Protective Measures Team developed guidance, at the request of State Dept., to be provided to Americans such that they could temporarily re-enter the 50-mile evacuation zone (not to enter the Japanese 20 Km evacuation zone) for the purposes of retrieving personal effects. Guidance will soon be finalized and be provided to the NRC Japan team to get to the Ambassador.

The Liaison Team is nearing completion of assembling briefing information to support the Chairman meeting with the Japanese Ambassador at 11:00 a.m. this morning. The team has developed information, coordinating with the NRC Team in Japan, specifically related to effectiveness of coordination.

BS/19

USNRC Emergency Operations Center Status Update

March 26, 2011
Earthquake / Tsunami Status Update
Compiled by Executive Briefing Team

This report includes NRC's current understanding of the ongoing situation in Japan.

Fukushima Daiichi

STATUS as of 0430 EDT, March 26, 2011 - (1730 Japan, March 26)

Unit 1 - (NRC Priority: 1)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO).
The volume of sea water injected to cool the core has left enough salt to fill the lower plenum to the core plate (Source: GEH, US Industry).
Vessel temperatures 149C at bottom drain, 197C at FW nozzle (Source: NISA)
RPV at 65.7 psig (increasing trend), DW and torus pressure at 40 psig (decreasing trend) (Source: NISA).

Core Cooling: Fresh water injection initiated at 1537 hrs JDT 3/25, injecting through FW 120l/min or 31.7 g/m (Source: NISA).
Recirculation pump seals have likely failed. (Source: GEH)

Primary Containment: Not damaged, 40 psig (TEPCO was considering venting on 3/24)

Secondary Containment: Severely damaged (hydrogen explosion)

Spent Fuel Pool: Fuel covered, no seawater injected - (Source: JAIF, NISA, TEPCO)
The fuel in this pool is all over 12 years old and very little heat input (<0.1 MW) (Source: DOE).

Rad Levels: DW 4780 R/hr, Torus 3490 R/hr (source instruments unknown), Outside plant: 16mR/hr at main gate (slight trend downward) (Source: MEXT)

Power: Electric power available, equipment testing in progress (Source: JAIF, NISA, TEPCO)
External AC power to the Main Control Room of Unit 1 became available at 11:30 JDT 3/24/2011. Lighting operating in Main Control Room.

Unit 2 - (NRC Priority: 2)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO).
Suspect the volume of sea water injected to cool the core has left enough salt to fill the lower plenum to the core plate (Source: GEH, US Industry). Bottom head temperature 104C, feed water nozzle temperature 107C (Source: JAIF, NISA, TEPCO).

Core Cooling: Fresh water with boric acid injection as of 10:10 A.M. on March 26 (TEPCO),
Recirculation pump seals have likely failed. (Source: GEH)

Primary Containment: Damage suspected (Source: JAIF, NISA, TEPCO)

Secondary Containment: Damaged (Source: JAIF, NISA, TEPCO), hole in refuel floor siding (Source: visual)

Spent Fuel Pool: Fuel covered, seawater injected on March 20, fuel pool temperature 52C (Source: JAIF, NISA, TEPCO)

Rad Levels: DW 4560 R/hr; Torus 154 R/hr (source instruments unknown); Outside plant: 16mR/hr at main gate (slight trend downward) (Source: MEXT)

65/10

Power: External AC power has reached the unit, checking integrity of equipment before energizing.

Unit 3 – (NRC Priority: 3)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO). Suspect the volume of sea water injected to cool the core has left enough salt to likely fill the lower plenum to the core plate (Source: GEH, US Industry). Bottom head temperature 111C, FW nozzle temperature: Unreliable (Source: JAIF, NISA 1800 JDT 3/25/11, TEPCO)

Core Cooling: Freshwater injection via fire line initiated 1802 JDT 3/25/11 (Source: NISA) Seawater injection through RHR, Recirculation pump seals have likely failed. (Source: GEH)

Primary Containment: Damage suspected (Source: NISA, TEPCO). "Not damaged" (Source: JAIF). Need to resolve

Secondary Containment: Damaged (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Low water level (Source: JAIF, NISA, TEPCO), spraying and pumping sea water into the SFP via the Cooling and Purification Line (Source: NISA)

Rad Levels: DW 5100 R/hr, torus 150 R/hr (INPO source instruments unknown); Outside plant: 16mR/hr at main gate (slight trend downward) (Source: MEXT); 100 R/hr debris outside Rx building (covered).

Power: External AC power has reached the unit, checking integrity of equipment before energizing. Lighting operating in Main Control Room.

Unit 4 – (NRC Priority: 4)

Core Status: Offloaded 105 days at time at accident (Source: JAIF, NISA, TEPCO)

Core Cooling: Not necessary (Source: JAIF, NISA, TEPCO)

Primary Containment: Not applicable (Source: JAIF, NISA, TEPCO)

Secondary Containment: Severely damaged, hydrogen explosion. (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Low water level, spraying with sea water, hydrogen from the fuel pool exploded, fuel pool is cool heating up very slowly (Source: JAIF, NISA, TEPCO) Temperature is unknown (Source: NISA).
Video was to be taken of SFP pool on 3/24 (Source: unverified)

Power: External AC power has reached the unit, checking electrical integrity of equipment before energizing. (Source: JAIF, NISA, TEPCO)

Unit 5 – (NRC Priority: 5)

Core Status: In vessel (Source: JAIF, NISA, TEPCO)

Core Cooling: Functional (Source: JAIF, NISA, TEPCO)

Primary Containment: Functional (Source: JAIF, NISA, TEPCO)

Secondary Containment: Vent hole drilled in rooftop to avoid hydrogen build up (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Fuel pool cooling functional, RHR pump repaired, temperature 37.9 C (Source: JAIF, NISA, TEPCO)

Power: External AC power supplying the unit, diesel generators available. (Source: JAIF, NISA, TEPCO)

Unit 6 – (NRC Priority: 6)

Core Status: In vessel (Source: JAIF, NISA, TEPCO)

Core Cooling: Functional (Source: JAIF, NISA, TEPCO)
Primary Containment: Functional (Source: JAIF, NISA, TEPCO)
Secondary Containment: Vent hole drilled in rooftop to avoid hydrogen build up (Source: JAIF, NISA, TEPCO)
Spent Fuel Pool: Fuel pool cooling functional, temperature 22 C (Source: JAIF, NISA, TEPCO)
Power: External AC power supplying the unit, diesel generators available. (Source: JAIF, NISA, TEPCO)

Common Spent Fuel Pool (NRC priority: 7): 6,000 bundles (Source: GEH); water level maintained at 53°C (Source: NISA); water spray started at 2137 EDT March 20 (Source: NISA); normal cooling started 1805 JDT 3/24/2011 (Source: NISA)
Electrical Power (NRC priority: 7): Offsite power connected to Unit 2 auxiliary transformer / distribution panel; work continues on energizing equipment in Unit 2
Dry Cask Storage: Visual inspection revealed no problems. All casks are vertical casks manufactured by Hitachi Shipbuilding (Source: RST)

On March 25, 2011, NRC assigned revised priorities to Units 1 through 4. This was based on analysis by the Reactor Safety Team. Unit 1 is priority 1 based on the fact that primary containment integrity can still be preserved if the responders take the correct actions to inject to the RPV and Primary containment. Unit 2 is priority 2 because of the apparent damage to primary containment and the other barriers to release. This damage requires continued attention to cool the core and provide water to the primary containment to minimize potential for release. Unit 3 is priority 3, because primary containment may be okay but continued attention is required to pursue core cooling and injection. Unit 4 is priority 4 because progress has been made in addressing the spent fuel pool heat removal requirements and the SFP area has indicated temperatures of less than 100 °C.

Other Plants

No new information to report

Acronyms

atm – Atmosphere (unit of pressure)
EDG – Emergency Diesel Generator
RCS – Reactor Coolant System
RHR – Residual Heat Removal
RPV – Reactor Pressure Vessel
SFP – Spent Fuel Pool
TAF – Top of Active Fuel

March 26, 2011 0720 EDT

Briefing Sheet
Fukushima Daiichi

Plant status updates:

- Freshwater injection to Units 1 and 3. (source is a reservoir)
- Borated freshwater has started to be injected into Unit 2 (source is a reservoir)
- Flooding in turbine building of Unit 3. Found elevated iodine 131 and lanthanum 140 in samples indicating potential leakage from core.
- RHR pump on Unit 5 is restored.
- NISA update at 0500 EDT on 3/25, Electrical power is available up to all 6 units. For Units 1-4, the licensee is in the process of meggering and testing components to see which ones can be safely energized. Lights are on in the control rooms, and licensee is in the process of restoring ventilation.

Japanese government officials have recommended to residents living within 20 to 30 km of the site to voluntarily evacuate their homes—not because of changing conditions at the site—but because of increasingly difficult logistical issues.

Per NRC Japan team, one day training has been completed on the Bechtel pumping system. There will be an additional day training completed 26 March and then the Self Defense Force stands ready to move equipment out to the site.

The U.S. Navy is sending two fresh water barges to the site. The first barge has been delayed due to inclement weather, and there remain concerns about possible harbor damage from earthquake, which could make it difficult to dock.

The NRC Reactor Safety Team has provided a coordinated (GEH, EPRI, INPO, NR, DOE) set of recommendations pertaining to severe accident management strategies to the NRC team in Japan. . These recommendations were provided to the NRC Site Team. A slightly updated version will be discussed this morning on a conference call with the principals for the purpose of obtaining concurrence.

The Nuclear Energy Institute has volunteered to provide the NRC with environmental sampling data from U.S. nuclear power plants. The NRC is sharing this information with the EPA who is the central point of contact for this information. The public U.S. radiation monitoring data (RADNET) is posted on EPA's public website.

Chuck Casto and John Monninger travelling to J-Village, which is less than 10 miles from the site and tomorrow to do recon to see if we can get better information or provide better support.

Liaison team is working a task to create a roadmap that analyzes summaries of Deputies calls in U.S. and corresponding meetings in Japan. The goal is to ensure that roles and responsibilities for the responding Agencies are clear and understood, and to help ensure that no conflicting or inconsistent efforts are underway.

BS/17

March 28, 2011 0600 EDT

Briefing Sheet
Fukushima Daiichi

Plant status updates:

Freshwater injection to Units 1, 2, and 3—believed to be contributing to containment flooding.

Water in the Unit 1 turbine building lower level was pumped into a condenser bay. Significant contamination levels in lower levels of U2 and U3 turbine buildings (isotope analysis indicates communication with reactors).

Planning to install equipment to inert Unit 1 by March 30th.

One train of the Bechtel pumping system is being deployed to the site. One fresh water barge from USFJ was being moved to site. Plan is to dock, then resupply the barge from another that will be filled at a nearby port. The Japanese government has requested help with shielding, removal of spent fuel, and robotics. TEPCO has contracted with the Shaw Company for systems for decay heat removal and debris removal. (Source: Site Team).

The NRC Reactor Safety Team has provided a coordinated (GEH, EPRI, INPO, NR, DOE) set of recommendations pertaining to severe accident management strategies to the NRC team in Japan. In response to a request from the Ambassador, management from the contributing US Organizations has concurred on the strategies with industry providing further clarification. Further modifications to these recommendations may be considered if primary containment for Units 2 and 3 cannot be assured.

The EPA commented on NRC recommendations for temporary re-entry into evacuated areas. The comments were incorporated into the original paper, and the paper was re-sent to NSS (WH).

The Chairman is in Japan and meeting with a host of officials.

Japan has confirmed safety and location of 49 large sources and is working to locate 620 smaller sources.

LT is working to contact NSS (WH) to participate in calls requested by USPACOM regarding radiological conditions at the Fukushim Dai-ichi plants.

PMT is working on Japan embassy questions on 50 mile evacuation recommendation by US.

BS/12

March 28, 2011 2300 EDT

Briefing Sheet
Fukushima Daiichi

NISA press conference 20:45hrs 28 March – TEPCO injecting fresh water into Units 1, 2 and 3; transitioning to temporary electric pumps for injection (U1 and U3); Actions underway to pump water from flooded turbine building basements into condensers/other tanks. Actions taken, or in progress, to preclude contaminated water in "trenches" outside turbine buildings from reaching ocean.

The RST has developed a draft discussion paper on the Potential Leakage Paths to the Turbine Building. This paper was vetted internally and discussed with others (GEH, INPO, NR), comments will be incorporated prior to dispatch to site team. Site team advises that turbine bldg water levels are not increasing. TEPCO is considering pumping the water out of the Turbine building basement for cleanup and recovery.

Planning to install equipment to inert Unit 1 by 30 March.

One train of the Bechtel pumping system is being deployed to the site. Both barges are staged 40 miles from site conducting pump testing. Resupply barge from ship anchored at sea. The Japanese government has requested help with shielding, removal of spent fuel, and robotics. TEPCO has contracted with the Shaw Company for systems for decay heat removal and debris removal. (Source: Site Team).

NEI is serving as a focal point for collecting U.S. nuclear plant monitoring data in environmental samples, and is developing an online database with data from US plants. NEI has committed to providing NRC data until the protected web site is online and functioning (anticipated on 29 March). NRC is sharing data with EPA and DOE in the interim. Press release from PA Governor regarding I-131 found in rainwater may result in public interest, PMT working a dose assessment to provide perspective (sharing with EPA for review).

The NRC Reactor Safety Team has provided a coordinated (GEH, EPRI, INPO, NR, DOE) set of recommendations pertaining to severe accident management strategies to the NRC team in Japan. Revisions to the severe accident management strategies are being considered in light of Unit 2 and Unit 3 containment conditions, and environmental release concerns. Any revision will be fully vetted with all contributing parties.

The EPA commented on NRC recommendations for temporary re-entry into evacuated areas. The comments were incorporated into the original paper, and the paper was re-sent to NSS (WH). PMT participated in NSS sponsored call with Federal partners and no significant issues were raised. LT is checking with NSS regarding how paper will be provided to DOS.

ET director will provide PACOM the NRC's assessment of conditions at the Fukushim Dai-ichi plants during a 15:00hrs 29 March IPC call, and whether conditions are getting worse. Vince Holahan is traveling to PACOM to provide assessment assistance, arriving 02:30hrs 29 March EST, getting rest, then meeting with PACOM at 15:30 29 March EST.

The NRC/Consortium call is being re-established at 10:00hrs 29 March.

The Chairman is returning to U.S. at 11:05hrs 29 March.

b5/13

March 28, 2011 1500 EDT

Briefing Sheet
Fukushima Daiichi

Plant status updates:

Freshwater injection to Units 1, 2, and 3—believed to be contributing to containment flooding.

Water in the Unit 1 turbine building lower level was pumped into a condenser bay. Significant contamination levels in lower levels of U2 and U3 turbine buildings (isotope analysis indicates communication with reactors). *The RST has developed a draft discussion paper on the Potential Leakage Paths to the Turbine Building. This paper is being vetted internally, will be discussed with (GEH, INPO, NR) for comments prior to dispatch to site team. Site team advises that water levels are not increasing. TEPCO is considering pumping the water out of the Turbine building basement for cleanup and recovery.*

Planning to install equipment to inert Unit 1 by March 30th.

One train of the Bechtel pumping system is being deployed to the site. *Both barges are staged 40 miles from site conducting pump testing. Resupply barge from ship anchored at sea.* The Japanese government has requested help with shielding, removal of spent fuel, and robotics. TEPCO has contracted with the Shaw Company for systems for decay heat removal and debris removal. (Source: Site Team).

PMT-Add update from conf call regarding sharing of nuclear pwr plant site monitoring data.

The NRC Reactor Safety Team has provided a coordinated (GEH, EPRI, INPO, NR, DOE) set of recommendations pertaining to severe accident management strategies to the NRC team in Japan. *A revision to the severe accident management strategies is being drafted to consider execution challenges associated with access constraints to the reactor building due to high radiation levels. This revision will be fully vetted with all contributing parties.*

The EPA commented on NRC recommendations for temporary re-entry into evacuated areas. The comments were incorporated into the original paper, and the paper was re-sent to NSS (WH). *PMT is coordinating review of recommendations through series of calls this afternoon.*

LT is working to contact NSS (WH) to participate in calls requested by USPACOM regarding radiological conditions at the Fukushim Dai-ichi plants.

PMT is working on Japan embassy questions on 50 mile evacuation recommendation by US. *Provided responses provided back to Embassy.*

The NRC/Consortium call is being re-established at 10:00hrs 29, March.

The Chairman is returning to HQ's departing Japan early on 29 March..

BS/14

March 28, 2011 2000 EDT

Briefing Sheet
Fukushima Daiichi

Plant status updates:

Freshwater injection to Units 1, 2, and 3—believed to be contributing to containment flooding.

Water in the Unit 1 turbine building lower level was pumped into a condenser bay. Significant contamination levels in lower levels of U2 and U3 turbine buildings (isotope analysis indicates communication with reactors). The RST has developed a draft discussion paper on the Potential Leakage Paths to the Turbine Building. This paper was vetted internally and discussed with others (GEH, INPO, NR), comments will be incorporated prior to dispatch to site team. Site team advises that turbine bldg water levels are not increasing. TEPCO is considering pumping the water out of the Turbine building basement for cleanup and recovery.

Planning to install equipment to inert Unit 1 by March 30th.

One train of the Bechtel pumping system is being deployed to the site. Both barges are staged 40 miles from site conducting pump testing. Resupply barge from ship anchored at sea. The Japanese government has requested help with shielding, removal of spent fuel, and robotics. TEPCO has contracted with the Shaw Company for systems for decay heat removal and debris removal. (Source: Site Team).

PMT has engaged with NEI and other industry groups to share radiological information and concerns. NEI is serving as a focal point for collecting U.S. nuclear plant monitoring data in environmental samples, and is developing an online database with data from US plants. NEI has committed to providing NRC a table with information received until the protected web site is online and functioning.

The NRC Reactor Safety Team has provided a coordinated (GEH, EPRI, INPO, NR, DOE) set of recommendations pertaining to severe accident management strategies to the NRC team in Japan. Revisions to the severe accident management strategies are being considered to address Unit 2 and Unit 3 containment conditions, and environmental release concerns. Any revision will be fully vetted with all contributing parties.

The EPA commented on NRC recommendations for temporary re-entry into evacuated areas. The comments were incorporated into the original paper, and the paper was re-sent to NSS (WH). PMT participated in NSS (WH) call with Federal partners (CBP, EPA, OSTP, NOC, DNDO, DHS, NOAA, DOD, NIT, OSHA, FAA, CDC) and no significant issues concerning the paper were raised.

LT is working to contact NSS (WH) to participate in calls requested by USPACOM regarding radiological conditions at the Fukushim Dai-ichi plants.

PMT provided response to Japan embassy questions on 50 mile evacuation recommendation by US.

The NRC/Consortium call is being re-established at 10:00hrs 29, March.

The Chairman is returning to HQ's departing Japan early on 29 March..

BS/15

March 29, 2011 2300 EDT

Briefing Sheet
Fukushima Daiichi

TEPCO injecting fresh water into Units 1, 2 and 3; and *has transitioned* to temporary electric pumps for injection (all three units); Actions underway to pump water from flooded turbine building basements into condensers/other tanks. TEPCO plans to inject water into U-1 SFP from Cement Pumper truck on 30, March. Lighting returned to U-4 control room, currently no access due to dose rates. TEPCO is considering spraying Zeolite on the outside and interior of the Rx Bldgs in an effort to minimize re-suspension of fission products in the air but having difficulty planning application due to the elevated dose rates.

Highly radioactive water (approx 100 R/hr) found in a "trench" (pipe and cable chase) outside Unit 2; source of water unclear. TEPCO stated that this water is not flowing into the ocean, though the water will overflow this trench if it rises about 1 meter (trench is 4 meters deep). There is water in the trenches outside of Units 1 and 3 as well. Actions have been taken, or are in progress, to preclude contaminated water in trenches from reaching the ocean (e.g., sandbags, etc.).

TEPCO is planning to install equipment to inert Unit 1 by 31 March.

One train of the Bechtel pumping system is being deployed to the site. Both barges are being moved to the site (10 hr cruise), intending to arrive 30 March (some reports indicate barges have arrived). Resupply water ship anchored at sea. The GOJ has requested help with shielding, removal of spent fuel, and robotics. The NRC Site Team indicates that TEPCO has contracted with the Shaw Company for decay heat removal systems and debris removal.

NEI is collecting U.S. nuclear plant environmental monitoring sample data and has made an online database available for viewing by NRC and other agencies.

The RST has provided a coordinated (GEH, EPRI, INPO, NR, DOE) recommendations pertaining to severe accident management strategies to the NRC team in Japan. Revisions are being considered in light of suspected Unit 2 and Unit 3 core and containment conditions, and environmental release concerns. However, NRC continues to recommend inerting containment and controlled flooding of containment. On 30 March the RST plans to assemble experts to assess what possible means for an energetic release of fission products might remain, given extent of damage suspected to have already occurred.

The PMT evaluated information from TEPCO and NISA regarding levels of plutonium sampled on site. The levels (5.4X10-1 Bq/kg) are very low, and below background levels applicable to the eastern range of the Rocky Mountains (in the US) and also falls within a range of know plutonium background levels in Japan.

Next Deputies Committee meeting will be at 08:00hrs 30 March EST, NRC Chairman's attendance is requested and Deputies have expressed interest in NRC's assessment of conditions at the Fukushim Daiichi plants.

Vince Holahan has arrived in Hawaii to support PACOM, initial meeting at 07:30hrs 29 March (Local).

The NRC/Consortium call has been re-established. The request has been made that the Site team act as a clearinghouse reviewer for consistency of request to avoid duplication. The list will be shared with the stakeholders. The daily calls will be at 20:00hrs EDT to support having a Site Team member participate.

IAEA Director General is convening a meeting of the member states regarding the events at Fukushima. Seeking additional insight regarding the date, purpose and expected outcomes from Mark Schaeffer.

BS/16

March 30, 2011 1500 EDT

Briefing Sheet
Fukushima Daiichi

TEPCO injecting fresh water into Units 1, 2 and 3; and is using temporary electric pumps for injection (all three units). Actions are underway to pump water from flooded turbine building basements into condensers/other tanks. TEPCO plans to inject water into U-1 SFP from Cement Pumper truck on 30 March. Lighting returned to U-4 control room, however dose rates are preventing access. TEPCO is considering spraying Zeolite on the outside and interior of the Rx Bldgs in an effort to minimize re-suspension of fission products in the air but having difficulty planning application due to high dose rates.

Highly radioactive water (approx 100 R/hr) found in a "trench" (pipe and cable chase) outside Unit 2; source of water unclear. TEPCO stated that this water is not flowing into the ocean, though the water will overflow this trench if it rises about 1 meter (trench is 4 meters deep). There is water in the trenches outside of Units 1 and 3 as well. Actions have been taken, or are in progress, to preclude contaminated water in trenches from reaching the ocean (e.g., sandbags, etc.).

TEPCO is planning to install equipment to inert Unit 1 by 31 March.

One train of the Bechtel pumping system is being deployed to the site. Both barges are being moved to the site (10 hr cruise), intending to arrive 30 March (some reports indicate that barges have arrived). Resupply water ship anchored at sea. The GOJ has requested help with shielding, removal of spent fuel, and robotics. The NRC Site Team indicates that TEPCO has contracted with the Shaw Company for decay heat removal systems and debris removal.

NEI is collecting U.S. nuclear plant environmental monitoring sample data and has made an online database available for viewing by NRC and other agencies.

The RST has provided coordinated (GEH, EPRI, INPO, NR, DOE) recommendations pertaining to severe accident management strategies to the NRC team in Japan. Revisions are being considered in light of suspected Unit 2 and Unit 3 core and containment conditions, and environmental release concerns. NRC continues to recommend inerting containment and controlled flooding of containment. On 30 March the RST plans to assemble experts to assess what possible means for an energetic release of fission products might remain, given the extent of damage suspected to have already occurred.

Deputies Committee meeting at 08:00hrs 30 March EST, *Chairman updated all regarding his visit to Japan. Identified US continues to support recommendation to follow SAMGs. TEPCO working level priorities consistent with recommendations. A single dose modeling has been requested to minimize confusion. NRC working with NARAC to provide.*

Vince Holahan arrived in Hawaii to support PACOM, working out of a SCIF. Routine call-in time to NRC HQ is being established since Vince can't have his BlackBerry in the SCIF. *Vince has contacted PMT but still no "permanent" comm link.*

The daily calls will be at 20:00hrs EDT to support having a Site Team member participates. Still working to get another entity to lead this effort (i.e., vice NRC). The list will be shared with the stakeholders. This discussion is anticipated to be led/facilitated by the ET Director.

IAEA Director General is convening a meeting of the member states regarding the events at Fukushima. Seeking additional insight regarding the date, purpose and expected outcomes from Mark Schaeffer.

Chuck Casto is attempting to sort out some roles & responsibilities issues with other agency representatives that have recently arrived in Japan (e.g, DOE/Sandia NL, Naval Reactors).

BS/17

March 30, 2011 1500 EDT

PMT has discussed the U.S. Ambassador in Japan request for a forward looking pessimistic scenario calculation with DOE/NIT and with NARAC. We have forwarded the request to White House for action agreement. Source term will be developed with RES staff to more accurately reflect changes for decay and events since the beginning of event.

Continued review of DOE measurements (aerial and ground based) in areas around site shows downward trend in exposures.

March 30, 2011 1500 EDT

Briefing Sheet
Fukushima Daiichi

TEPCO plans to inject water into U-1 SFP from Cement Pumper truck on 30 March. Lighting returned to U-4 control room, however dose rates are preventing access. TEPCO is considering spraying Zeolite on the outside and interior of the Rx Bldgs in an effort to minimize re-suspension of fission products in the air but having difficulty planning application due to high dose rates.

Highly radioactive water (approx 100 R/hr) found in a "trench" (pipe and cable chase) outside Unit 2; source of water unclear. TEPCO stated that this water is not flowing into the ocean, though the water will overflow this trench if it rises about 1 meter (trench is 4 meters deep). There is water in the trenches outside of Units 1 and 3 as well. Actions have been taken, or are in progress, to preclude contaminated water in trenches from reaching the ocean (e.g., sandbags, etc.).

TEPCO is planning to install equipment to inert Unit 1 by 31 March.

One train of the Bechtel pumping system is being deployed to the site. Both barges are being moved to the site (10 hr cruise), intending to arrive 30 March (some reports indicate that barges have arrived). Resupply water ship anchored at sea. The GOJ has requested help with shielding, removal of spent fuel, and robotics. The NRC Site Team indicates that TEPCO has contracted with the Shaw Company for decay heat removal systems and debris removal.

NEI is collecting U.S. nuclear plant environmental monitoring sample data and has made an online database available for viewing by NRC and other agencies.

The RST has provided coordinated (GEH, EPRI, INPO, NR, DOE) recommendations pertaining to severe accident management strategies to the NRC team in Japan. Revisions are being considered in light of suspected Unit 2 and Unit 3 core and containment conditions, and environmental release concerns. NRC continues to recommend inerting containment and controlled flooding of containment. On 30 March the RST plans to assemble experts to assess what possible means for an energetic release of fission products might remain, given the extent of damage suspected to have already occurred.

Deputies Committee meeting at 08:00hrs 30 March EST, *Chairman updated all regarding his visit to Japan. Identified US continues to support recommendation to follow SAMGs. TEPCO working level priorities consistent with recommendations. There was agreement to use a single dose model in order to minimize confusion.*

Vince Holahan arrived in Hawaii to support PACOM, working out of a SCIF. Routine call-in time to NRC HQ is being established since Vince can't have his BlackBerry in the SCIF. *Vince has contacted PMT with a "permanent" comm link.*

The daily calls will be at 20:00hrs EDT to support having a Site Team member participates. Still working to get another entity to lead this effort (i.e., vice NRC). The list will be shared with the stakeholders. This discussion is anticipated to be led/facilitated by the ET Director.

IAEA Director General is convening a meeting of the member states regarding the events at Fukushima. Seeking additional insight regarding the date, purpose and expected outcomes from Mark Schaeffer.

Chuck Casto is attempting to sort out some roles & responsibilities issues with other agency representatives that have recently arrived in Japan (e.g, DOE/Sandia NL, Naval Reactors).

B5/18

March 30, 2011 2300 EDT

Briefing Sheet
Fukushima Daiichi

No significant changes in plant conditions reported.

Highly radioactive water (approx 100 R/hr) found in a "trench" (pipe and cable chase) outside Unit 2; source of water unclear. TEPCO stated that this water is not flowing into the ocean, though the water will overflow this trench if it rises about 1 meter (trench is 4 meters deep). There is water in the trenches outside of Units 1 and 3 as well. Actions have been taken, or are in progress, to preclude contaminated water in trenches from reaching the ocean (e.g., sandbags, etc.).

TEPCO is planning to install equipment to inert Unit 1 by 31 March.

One train of the Bechtel pumping system is being deployed to the site. First barge to arrive 14:00hrs 31 March JT. Second barge being outfit with a higher capacity transfer pump at Ohama, prior to final move to Fukushima site.

NEI is collecting U.S. nuclear plant environmental monitoring sample data and has made an online database available for viewing by NRC and other agencies.

The RST working to coordinate (GEH, EPRI, INPO, NR, DOE) updated recommendations pertaining to severe accident management strategies. Revisions are being considered in light of suspected Unit 2 and Unit 3 core and containment conditions, and environmental release concerns. RST has coordinated with NRC Office of Research to assess what possible means for an energetic release of fission products might remain, given the extent of damage suspected to have already occurred – results expected in approximately one week.

Vince Holahan supporting PACOM and communicating with PMT and RST as needed.

Path forward on coordination of USG support gaining clarity. US Embassy in Japan plans to consolidate list of support requested by GOJ. USG representatives in Japan working to establish a "requirements validation process" for review and processing official requests from GOJ. Consortium daily calls planned for 20:00hrs EDT to enable Japan Team participation, and conceptually would work from the consolidated list.

IAEA Director General is convening a meeting of the member states regarding the events at Fukushima. Seeking additional insight regarding the date, purpose and expected outcomes from Mark Schaeffer.

Chuck Casto is attempting to sort out some roles & responsibilities issues with other agency representatives that have recently arrived in Japan (e.g, DOE/Sandia NL, Naval Reactors).

U.S. Ambassador in Japan request for a forward looking pessimistic scenario calculation; PMT has discussed with DOE/NIT and with NARAC. Request has been forwarded to White House to gain alignment prior to moving forward. Source term will be developed with RES staff to more accurately reflect changes for decay and events since the beginning of event.

Continued review of DOE measurements (aerial and ground based) in areas around site shows downward trend in exposures. IAEA reports I-131 and Cs-137 levels in soil sampled at Iitate village, 40 km NW of Fukushima, which exceeds IAEA operational criteria for evacuation. IAEA reports Japan is assessing these results.

B5/19

USNRC Emergency Operations Center Status Update

March 31, 2011
Earthquake / Tsunami Status Update
Compiled by Executive Briefing Team

This report includes NRC's current understanding of the ongoing situation in Japan. Historical and background information can be found in past reports.

NRC's Top Priorities

1) Continued assessment of radiological conditions, dose projections, and protective action recommendations.

2) Providing technical assistance to the US Ambassador in Japan and the Japanese Government, including a particular focus on the Unit 1 drywell and the Unit 3 and 4 spent fuel pools.

3) Coordination with other US Departments and Agencies, the Institute of Nuclear Power Operations(INPO), Bechtel, General Electric Hitachi (GEH), Tokyo Electric Power Company (TEPCO), and the Japanese military.

Status

At 0946 EST, March 11, 2011, the NRC entered Monitoring Mode and the agency continues to monitor the unfolding events in Japan. The Headquarters Operations Center is staffed 24/7.

The team of NRC experts in Japan continues to support the US Ambassador and his staff.

NRC has issued numerous press releases related to the earthquake and tsunami. These press releases can be found online at: http://www.nrc.gov/reading-rm/doc-collections/news/2011/

On March 14, 2011, the NRC experts in Japan reported that the Japanese had requested US technical assistance for cooling the Fukushima Daiichi Units, as needed. The effort to provide assistance is being coordinated by the US Ambassador.

The current protective action recommendation for US citizens residing within 50 miles (80 km) of the Fukushima Daiichi site is to evacuate.

One train of temporary cooling equipment has been transported to Yokota Air Force Base. Two fresh water barges from the US Navy are en route to the Daiichi site.

The NRC Reactor Safety Team is working on a draft revision to the recommendations pertaining to severe accident management strategies to the NRC team in Japan. The recommendations are being coordinated with GEH, EPRI, INPO, Naval Reactors, and DOE. The purpose of the proposed revision is to reflect changes in plant conditions and provide clarifications of the original recommendations.

b5/b2D

The US Department of Energy and the US Environmental Protection Agency are the Federal communicators for questions regarding possible domestic impacts from the events in Japan and on domestic monitoring.

In its March 29 Situation Report #30, the US Department of State indicated that the Japan Task Force has disbanded. No further situation reports will be issued from the State Department. NRC believes that this change is the result of sufficient information flow through other channels.

The Commission has established a senior level agency task force to conduct a methodical and systematic review of NRC processes and regulations with specific near-term and long-term objectives.

Status of NRC Licensee and Agreement State Facilities

Air sample and standing water sample results from US nuclear plant licensees have been entered into a password protected database established by the Nuclear Energy Institute (NEI). NRC and federal partners have access to the plant data.

Industry Consortium / Contractor Activities

NRC/Consortium calls have been re-established and are now held daily at 2000 EDT. The NRC Site Team in Japan is serving as a clearinghouse by reviewing several lists of material requests and action items from the Japanese Government and combining them into a central list to avoid duplication. This central list will be distributed once the NRC Site Team has coordinated with the US Embassy and will be discussed during the next Consortium Call to be held on Thursday, March 31st at 2000hrs EDT.

The Shaw Group has entered into an agreement with Westinghouse, Babcock and Wilcox, and Toshiba to provide support to TEPCO. They are ramping up staff in Japan and have developed a program with short, medium, and long range goals. The short term effort includes expertise in BWRs and environmental remediation.

Current Understanding of Japanese Facilities

(This information is compiled from the NRC in-country team, TEPCO press releases, NISA press releases, Japan Atomic Industrial Forum (JAIF) compiled data and assessments, International Atomic Energy Agency (IAEA) information releases, Federation of Electric Power Companies of Japan, World Association of Nuclear Operators, Department of Energy (DOE) and others.)

IAEA reported an earthquake of magnitude 6.5 occurred at 2223 UTC March 27 near the east coast of Honshu, Japan. The Onagawa NPP is the closest plant to the epicenter. The three reactor units at Onagawa NPP remain in cold shutdown following March 11 earthquake. No abnormal radiation readings observed on the Onagawa site. As of 0230 UTC March 28, no report of any issue at Fukushima Daiichi, Fukushima Daini, or Tokai NPPs related to this earthquake.

Earthquake/Tsunami Status Update March 31, 2011 0430 EDT

Fukushima Daiichi

The Japanese national government instructed evacuation for local residents within a 20km radius of the site boundary and sheltering in place out to 30 km. IAEA confirms a no-fly zone out to 30 km around the Fukushima Daiichi plant. Japanese government officials have recommended to residents living within 20 to 30 km of the site to voluntarily evacuate their homes – not because of changing conditions at the site – but because of increasingly difficult logistical issues.

Meteorological information obtained by PMT through NARAC and other sources indicate that a 360 degree wind shift has occurred over the duration of the accident (on March 11).

Current forecast meteorological data appears to indicate that winds are primarily from the west (headed offshore) and should generally continue offshore through Wednesday, March 30, 2011.

STATUS as of 1800 EDT, March 30, 2011 - (0700 Japan, March 31)

Unit 1 – (NRC Priority: 1)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO).
The volume of sea water injected to cool the core has left enough salt to fill the lower plenum to the core plate (Source: GEH, US Industry).
Vessel temperatures 131°C at bottom drain, 270°C at FW nozzle (Source: US Industry 3/30)
RPV at 55.5 psig (Source: US Industry 3/30), DW and torus pressure at 19.4 psig (Source: US Industry 3/30).

Core Cooling: Fresh water injection initiated at 1537 JST on March 25, injecting through FW 37.4 gpm (Source: NISA).
Recirculation pump seals have likely failed. (Source: GEH)

Primary Containment: Functional, 19.4 psig (Source: US Industry 3/30) Pumping water from turbine building basement to main condenser (Source: IAEA 3/29)

Secondary Containment: Severely damaged (hydrogen explosion)

Spent Fuel Pool: Temperature and level unconfirmed; white smoke being emitted as of 0630 JST on March 29 (Source: TEPCO 3/29). Considering injecting water (Source: JAIF 3/28).
All fuels in this pool are over 12 years old and have very little heat input (<0.1 MW) (Source: DOE).

Rad Levels: DW 3710 R/hr (increasing trend) (Source: US Industry 3/30), Torus 1900 R/hr (source instruments unknown), Outside plant: 11.3 mR/hr at main gate (slight trend downward) (Source: MEXT)

Power: On external power (Source: NISA); equipment testing in progress (Source: JAIF, NISA, TEPCO). External AC power to the Main Control Room of Unit 1 became available at 1130 JST on March 24, 2011. Lighting operating in Main Control Room.

Unit 2 – (NRC Priority: 2)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO).
Bottom head temperature 132.7°C (increasing trend) (Source: US Industry 3/30), feed water nozzle temperature 172.2°C (increasing trend) (Source: US Industry 3/30). RVP pressure -4.6 psig (Source: JAIF 3/29). DW pressure 0 psig (Source: NISA 3/29).

Core Cooling: Non-borated fresh water as of 1800 JST on March 30 (Source: US Industry 3/30). 7 m^3/h or 31 gpm (Source: NISA 3/29), recirculation pump seals have likely failed. (Source: GEH)

Primary Containment: Damage suspected (Source: JAIF, NISA, TEPCO). Pressure: 0 psig (Source: NISA 3/29)

Secondary Containment: Damaged (Source: JAIF, NISA, TEPCO), blowout panels removed from side of reactor building to reduce hydrogen buildup (Source: visual)

Spent Fuel Pool: Fuel covered, freshwater periodically injected via fuel pool cooling system (Source: TEPCO 3/29), fuel pool temperature 46°C (Source: US Industry 3/30); Pool may be overflowing based on observations of water in adjacent areas (Source: NRC Team); white smoke being emitted as of 1830 EDT on March 27 (Source: IAEA 3/28) – confirmed (Source: TEPCO 3/29)

Rad Levels: DW 3990 R/hr (Source: US Industry 3/30); Torus 128 R/hr (source instruments unknown) (Source: US Industry 3/30); Outside plant: 12 mR/hr at main gate (slight trend downward) (Source: MEXT)

Power: External AC power has reached the unit; checking integrity of equipment before energizing. Power distribution panels connected (IAEA 3/27)

Unit 3 – (NRC Priority: 3)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO). Bottom head temperature 116.1°C (decreasing trend) (Source: US Industry 3/30), FW nozzle temperature: 75.6°C (Source: US Industry 3/30). RVP pressure -3.7 psig (Source: JAIF 3/29). RPV level ~2/3 TAF (Source: IAEA 3/28). DW pressure 0.8 psig (Source: US Industry 3/30).

Core Cooling: Freshwater injection via fire line initiated, 52.8 gpm via temporary electrical pump on 1802 JST March 25 (Source: IAEA 3/29). Recirculation pump seals have likely failed. (Source: GEH)

Primary Containment: Japanese report functional, NRC assessment is that damage is suspected

Secondary Containment: Damaged (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Low water level (Source: JAIF, NISA, TEPCO), spraying ocean water periodically into SFP (Source: TEPCO 3/29). White smoke being emitted as of 0630 JST on March 29 (Source: NISA 3/29).

Rad Levels: DW 2760 R/hr (decreasing trend) (Source: US Industry 3/30), torus 111 R/hr (decreasing trend) (source instruments unknown) (Source: US Industry 3/30); Outside plant: 12 mR/hr at main gate (slight trend downward) (Source: MEXT); 100 R/hr debris outside Rx building (covered).

Power: External AC power has reached the unit; checking integrity of equipment before energizing. Lighting operating in Main Control Room.

Unit 4 – (NRC Priority: 4)

Core Status: Offloaded 105 days at time of accident (Source: JAIF, NISA, TEPCO)

Core Cooling: Not necessary (Source: JAIF, NISA, TEPCO)

Primary Containment: Not applicable (Source: JAIF, NISA, TEPCO)

Secondary Containment: Severely damaged from hydrogen explosion. (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Low water level, planning to spray fresh water on March 30, hydrogen from the fuel pool exploded, fuel pool is cool heating up very slowly (Source: JAIF, NISA, TEPCO) Temperature is unknown (Source: NISA). Planning to pump fresh water (Source: IAEA 3/28). White smoke confirmed 0630 JST on March 29 (Source: NISA 3/29).

Note: There is differing information on the current inventory of water in the Unit 4 SFP. While TEPCO is reporting level indication and some visual/thermography indication of a

large current inventory, there is conflicting evidence indicating that the pool can only successfully retain much less inventory than normal. These contrary indicators include: steam that is emitted immediately when new water is added to the pool; physical damage to the structure that supports the pool; and the NRC's assessment of the post-earthquake timeline of events that led to the explosion in Unit 4. In summary, while there may be 3 to 6 days of inventory in the pool, there may also be much less inventory. TEPCO has successfully waited at least two days between additions of water to the Unit 4 pool without there being evidence of energetic new release from the pool.

Power: External AC power has reached the unit; checking electrical integrity of equipment before energizing. (Source: JAIF, NISA, TEPCO) Power distribution panels connected (IAEA 3/27)

Unit 5 – (NRC Priority: 5)

Core Status: In vessel (Source: JAIF, NISA, TEPCO), temperature 35°C (Source: JAIF 3/29)

Core Cooling: Functional (Source: JAIF, NISA, TEPCO)

Primary Containment: Functional (Source: JAIF, NISA, TEPCO)

Secondary Containment: Vent hole drilled in rooftop to avoid hydrogen build up (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Fuel pool cooling functional, RHR pump repaired, temperature 37.2°C (Source: US Industry 3/30)

Power: External AC power supplying the unit, diesel generators available. (Source: JAIF, NISA, TEPCO)

Unit 6 – (NRC Priority: 6)

Core Status: In vessel (Source: JAIF, NISA, TEPCO), temperature 37°C (decreasing trend) (Source: US Industry 3/30)

Core Cooling: Functional (Source: JAIF, NISA, TEPCO)

Primary Containment: Functional (Source: JAIF, NISA, TEPCO)

Secondary Containment: Vent hole drilled in rooftop to avoid hydrogen build up (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Fuel pool cooling functional, temperature 26.5°C (increasing trend) (Source: US Industry 3/30)

Power: External AC power supplying the unit, diesel generators available. (Source: JAIF, NISA, TEPCO)

Common Spent Fuel Pool (NRC priority: 7): 6,000 bundles (Source: GEH); water level maintained at 32.2°C (decreasing trend) (Source: US Industry 3/30); normal cooling started 1805 JST March 24 (Source: NISA)

Electrical Power (NRC priority: 7): Offsite power connected to Unit 2 auxiliary transformer / distribution panel; work continues on energizing equipment in Unit 2.

Dry Cask Storage: Visual inspection revealed no problems. All casks are vertical casks manufactured by Hitachi Shipbuilding (Source: RST)

NRC priorities are based on analyses by the Reactor Safety Team. Unit 1 is priority 1 based on the fact that primary containment integrity can still be preserved if the responders take the correct actions to inject to the RPV and Primary containment. Unit 2 is priority 2 because of the apparent damage to primary containment and the other barriers to release. This damage requires continued attention to cool the core and provide water to the primary containment to minimize potential for release. Unit 3 is priority 3, because primary containment may be okay but continued attention is required to pursue core cooling and injection. Unit 4 is priority 4

because progress has been made in addressing the spent fuel pool heat removal requirements and the SFP area has indicated temperatures of less than 100°C.

Other Plants

No new information to report

Acronyms

atm – Atmosphere (unit of pressure)
DW – Drywell
EDG – Emergency Diesel Generator
FW – Feed Water
CS – Reactor Coolant System
RHR – Residual Heat Removal
RPV – Reactor Pressure Vessel
SFP – Spent Fuel Pool
TAF – Top of Active Fuel

Protective Measures Team (PMT) Update

On March 30, the PMT received a request from the NRC Japan Team for dose projections using (1) current conditions, and (2) pessimistic scenario (not worst case), to address return of US personnel to metropolitan Tokyo after April 15. The projections are needed by the US Ambassador to Japan by Wednesday (4/6/11) - draft requested by Sunday (4/3/11). PMT responded that this would require a NARAC run by DOE (per ET). NRC has forwarded this request to the White House and awaits direction to develop and run dose models. NRC's Office of Research is developing a source term and expects to have it ready on April 1.

The PMT continues to aggregate and assess available dose rate information from DOE Aerial Monitoring operations, the US Navy, and TEPCO. Multi-day trending of available onsite monitors shows slightly declining dose rates over the past several days. Based upon information received on March 28, dose rates at the west gate were about 12 mR/hr (Source: MEXT). This shows a continued slight trend downward. Historical MEXT data does appear to show slight increases in dose rates (2 – 3 mR/hr) when wind shifts such that monitors are downwind of the site.

The PMT is trending exposure rate data around the site based on Ministry of Education, Culture, Sports, Science and Technology (MEXT) data which is periodically sent to the PMT. A downward trend can be clearly seen at monitoring points northwest of the site, in the area that originally exceeded the evacuation PAG.

The PMT evaluated information from TEPCO and NISA regarding levels of Plutonium sampled on site. The levels (5.4X10-1 Bq/kg) are very low, and below background levels applicable to the eastern range of the Rocky Mountains (in the US). This measurement falls within a range of known plutonium background levels in Japan.

International Response

- The IAEA held a special session of the Board of Governors on March 21, 2011. Director General Amano provided a summary of his trip to Japan. The IAEA continues to have daily press and technical briefings.
- NRC has daily teleconferences with the United Kingdom's Health and Safety Executive, Canadian Nuclear Safety Commission, and French Nuclear Safety Authority.
- France has publicly posted its assessment of projected doses in Tokyo on the French Radioprotection and Nuclear Safety Institute (IRSN) website.
- Taiwan staffed their Operations Center, beginning on March 12, and continues to do so. They are providing information on assumptions for the source term and expect NRC reciprocity. Staff should consult with international liaisons before sending information to Taiwan.
- An Institute of Nuclear Power Operations (INPO) staff member has arrived in Tokyo and is coordinating with US government staff at the Embassy.
- NRC is coordinating with the State Department to provide the US Ambassador the plume analysis to share with the Japanese government. The State Department Task Force disbanded at 0830 EDT on March 29, 2011.

Reference

Units

1 rem (rem) = 1,000 millirem (mrem)
1 Sievert (Sv) = 1,000 milliSieverts (mSv) = 1,000,000 microsieverts (μSv)
1 rem = 0.01 Sv = 10 mSv
1 Sv = 100 rem

March 31, 2011 1500 EDT

Briefing Sheet
Fukushima Daiichi

No significant changes in plant conditions reported.

Highly radioactive water (approx 100 R/hr) found in a "trench" (pipe and cable chase) outside Unit 2; source of water unclear. TEPCO stated that this water is not flowing into the ocean, though the water will overflow this trench if it rises about 1 meter (trench is 4 meters deep). There is water in the trenches outside of Units 1 and 3 as well. Actions have been taken, or are in progress, to preclude contaminated water in trenches from reaching the ocean (e.g., sandbags, etc.).

Inerting of the Unit 1 containment was originally planned for Thursday, 31 March, but has been postponed for several days, while TEPCO continues to evaluate the best means for accomplishing this.

One train of the Bechtel pumping system is on site. In addition, the first barge carrying fresh water is also on site. The second barge is being outfit with a higher capacity transfer pump at Ohama, prior to final move to Fukushima site.

NEI is collecting U.S. nuclear plant environmental monitoring sample data and has made an online database available for viewing by NRC and other agencies.

The RST has coordinated (with GEH, EPRI, INPO, NR, and DOE) updated recommendations pertaining to severe accident management strategies and issued a revision to the previous assessment document. The revisions address suspected Unit 2 and Unit 3 core and containment conditions, and environmental release concerns. RST is coordinating with the NRC Office of Research to assess what possible means for an energetic release of fission products might remain, given the extent of damage suspected to have already occurred.

Vince Holahan supporting PACOM and communicating with PMT and RST as needed.

Path forward on coordination of USG support gaining clarity. US Embassy in Japan plans to consolidate list of support requested by GOJ. USG representatives in Japan working to establish a "requirements validation process" for review and processing official requests from GOJ. Consortium daily calls planned for 20:00hrs EDT to enable Japan Team participation, and conceptually would work from the consolidated list.

IAEA Director General is convening a meeting of the member states regarding the events at Fukushima. Seeking additional insight regarding the date, purpose and expected outcomes from Mark Schaeffer.

U.S. Ambassador in Japan request for a forward looking pessimistic scenario calculation; PMT has discussed with DOE/NIT and with NARAC. Request has been forwarded to White House to gain alignment prior to moving forward. Source term will be developed with RES staff to more accurately reflect changes for decay and events since the beginning of event.

Continued review of DOE measurements (aerial and ground based) in areas around site shows downward trend in exposures. IAEA reports I-131 and Cs-137 levels in soil sampled at Iitate village, 40 km NW of Fukushima, which exceeds IAEA operational criteria for evacuation. IAEA reports Japan is assessing these results. PMT calculates (RASCAL) that the contamination levels reported would result in exposure that exceeds the annual relocation dose, but not the immediate evacuation dose. The IAEA report seems to indicate immediate evacuation was appropriate. PMT staff contacted the IAEA (IEC) and were told that no additional information would be forthcoming.

HHS indicated that KI would be shipped out to Japan on April 1st (March 31st USAID call.)

BS/31

March 31, 2011 1500 EDT

April 1, 2011 1000 EDT

Briefing Sheet
Fukushima Daiichi

ET Overview and Priorities:

No significant changes in plant conditions reported.

- Focused on coordination with other principal stakeholders.
- Preparing Chairman talking points for Dep. meeting this morning.
- Reviewed assessment from Dep Assist SecDef. Shared insight with Chairman

RST Overview and Priorities:

- Preparing for Assessment members discussion on recommendations @ 11:00 hrs
- Continue to evaluate/assess SFP next steps recommendations for development of document.

PMT Overview and Priorities:

LT Overview and Priorities:

BS/22

April 1, 2011 1000 EDT

Briefing Sheet
Fukushima Daiichi

ET Overview and Priorities:

No significant changes in plant conditions reported.

- Focused on coordination with other principal stakeholders.
- Preparing Chairman talking points for Dep. meeting this morning.
- Reviewed assessment from Dep Assist SecDef. Shared insight with Chairman

RST Overview and Priorities:

- Preparing for Assessment members discussion on recommendations @ 11:00 hrs
- Continue to evaluate/assess SFP next steps recommendations for development of document.

PMT Overview and Priorities:

LT Overview and Priorities:

- LT to coordinate 1800 daily Consortium meeting. Actions include provision of minutes of the previous meeting and a GOJ Material Request matrix out to all participants each day by 0800hours. Participants will provide updates to NRC by 1300 hours. LT will send updated matrix and meeting agenda to all participants by 1600 hours each day in preparation for 1800 hours phone call.

- LT to participate in the ESF8 meeting at 1100 hours with HHS Secretary's Operation Center. Meeting is an interagency discussion of public health & medical service issues.

- LT to monitor and participate if requested (not currently on the speaking agenda) on 1800 hours White House briefing call with Governors offices in all States and Territories concerning the effects of the situation in Japan and the Federal Government's response.

B5/23

April 1, 2011 1000 EDT

Briefing Sheet
Fukushima Daiichi

ET Overview and Priorities:

No significant changes in plant conditions reported.

- Focused on coordination with other principal stakeholders.
- Preparing Chairman talking points for Dep. meeting this morning.
- Reviewed assessment from Dep Assist SecDef. Shared insight with Chairman

RST Overview and Priorities:

- Preparing for Assessment members discussion on recommendations @ 11:00 hrs
- Continue to evaluate/assess SFP next steps recommendations for development of document.

PMT Overview and Priorities:

- Assist NRR with preparation of Office Director brief to National Governor's Association
- Provide leading indicators or trends as plant conditions change at the site to NSS/OSTP and PACOM to facilitate decision making regarding protective actions for U.S. personnel by coordinating with PACOM via Vince Holahan.
- PMT is coordinating with EPA to suggest that they deploy their portable RADNET monitors to Japan to obtain better monitoring and air sample data.

LT Overview and Priorities:

BS124

April 3, 2011 2300 EDT

Briefing Sheet
Fukushima Daiichi

ET Overview and Priorities:

- U-1 containment pressure is slowly decreasing (pressure now 7.8 psig) due to unspecified leak (Site team indicates TEPCO estimates 10-30% leakage rate).
- Unit 1 containment inerting has been postponed (after 4/9). One train of the Bechtel pumping system is now on the Fukushima site, along with both fresh water barges.
- Site Team developing global assessment using prior assessments/field data; supports high-level discussion on protective actions, to be cleared by NRC, & given to US and Japanese Govt high level .

RST Overview and Priorities:

- Venting containment and mitigating strategies position paper delivered to Site Team. INPO representative at the TEPCO ERC, says TEPCO believes the leakage in the Unit 1 containment may be due to the drywell O-Ring. RST is working on recommendation regarding optimizing feed rate to unit !given current TEPCO strategy.
- Working with industry experts on recent questions (Elmo) to provide any recommendations to minimize the probability of an energetic event if Japan continues with current feed/bleed operations. INPO & NRC provided initial strawman. Site Team comments received. Updates from industry experts received on 3 April. Team working on alternate methods for introducing nitrogen into the system based on requests for assessment by TEPCO.
- Working on the SFP assessment paper to develop more specific strategies and recommendations for the spent fuel pools. Working draft has been provided to industry experts for further development.

PMT Overview and Priorities:

- Japanese authority is now encouraging evacuation between 20 – 30 km.
- As of April 1st, all restrictions on the consumption of drinking water by adults in the Fukushima prefecture have been lifted. The only remaining restriction on water consumption is for children in Litate.
- TEPCO confirmed dose rates of 100 R/hr from cable storage pit located next to Unit 2 discharge point, with a crack of approximately 20 cm on the sidewall and leaking directly to the sea. News reports indicate the flow of this water is approximately 2 L/sec. News reports indicated TEPCO used a polymer absorbent high pressure inject that was not successful in slowing the leak.
- Continue assessment of radiological conditions, dose projections and protective action recommendations. Available dose information continues to show downward trends. Plan to work with NOAA on ocean plume modeling once the contact is made.
- Determine if there are any radiological indications from decreased pressure in Unit 1.
- The Principals approved the higher number (DHS favored) for acceptable gross βγ surface contamination on cargo containers and consumer goods - 4 Bq/cm^2. Notes from these Deputies and Principals Meetings will be kept in the WEB EOC "ET Miscellaneous Document Collection" tab.
- Deployment of EPA RADNET monitors in Japan to help provide confidence of safety in country for U,S, citizens, military, and dependents will be discussed at the Deputy's meeting on 4 April.
- Consider-issues to be addressed in order to return US citizens back to areas beyond the 50 mile EPZ; NSC has directed that NARAC will not run a source term review because previous runs have bounded the dose projections and there would be minimal additional value.

LT Overview and Priorities:

- IAEA's Incident and Emergency Centre (IEC) is tracking offers for assistance; database posted on ENAC. They need input from countries, including the U.S. LT provided the list to Mark Schaffer in Vienna who will clear release of the list through UNVIE to IAEA.
- Mr. Howard (U.S. Embassy Tokyo) is DOS "gate keeper" for requested items/assistance list.

BS125

April 5, 2011 1500 EDT

Briefing Sheet
Fukushima Daiichi

ET Overview and Priorities:

- U-1 containment pressure is slowly decreasing (pressure now 7.8 psig) due to unspecified leak (Site team indicates TEPCO estimates 10-30% leakage rate).
- Unit 1 containment inerting preparations have been made, awaiting procedure updates.
- Site Team developing global assessment using prior assessments/field data; supports high-level discussion on protective actions, to be cleared by NRC, & given to US and Japanese Govt high level.
- Leakage of highly contaminated water into the sea from near the Unit 2 discharge point continues.
- Japan is dumping low-level radioactive water from the central radwaste tank into the sea to make room for higher activity water from the Unit 2 turbine building. Smaller quantity of low-level radioactive water is also being dumped into the sea from drain pits of Units 5 and 6 to reduce flooding of important structures and equipment.

RST Overview and Priorities:

- RST and industry consortium continue to recommend TEPCO increase the Unit 1 feed rate. Per 03:00hrs 5 April EDT telecon with site team, TEPCO is aware of the recommendation and at this time is not changing the feed flow rate. The consortium document, "Additional Measures in Light of TEPCO Current Strategies," includes this issue and was sent to the site team at 01:00hrs EDT.
- SFP white paper has been completed and sent to site team and consortium members for final comments and concurrence. RST plans to finalize and provide to site team by 19:00hrs 6 April EDT.
- RST continuing to work with consortium on defining "stable" site conditions.
- RST should establish new roles and responsibilities regarding the industry consortium now that INPO has established clear communication paths and points of contact with TEPCO. The industry consortium should deal directly with TEPCO on all technical assessment requests and the NRC RST should focus on supporting the site team in advising the Japanese regulator, NISA as requested.

PMT Overview and Priorities:

- Continue assessment of radiological conditions, dose projections and protective action recommendations. Available dose information continues to show downward trends.
- A copy of the 16 March RASCAL run inputs and assumed plant conditions/meteorology (the results of which used to make protective action recommendation) were provided to Chairman's office and OCA.
- The PMT has identified an NRC staff person to participate in the U.S. government efforts supporting plume modeling in Ocean.
- PMT and Site Team provided comments on draft DOS memo regarding returning US citizens back to areas beyond the 50 mile EPZ.
- NSC has directed that NARAC will not run a source term review because previous runs have bounded the dose projections and there would be minimal additional value.
- Two SNL severe accident experts are supporting the Japanese site team. Any source terms will be provided to PMT for review.
- NRC site team has access to information on the planned discharges into the sea but has no specific radiological information (nuclides or levels) from the uncontrolled leaks into the ocean.

LT Overview and Priorities:

- IAEA's Incident and Emergency Centre (IEC) is tracking offers for assistance; database posted on ENAC. LT provided U.S. list to Mark Schaffer in Vienna who will clear release of the list through UNVIE to IAEA.
- CDC will have an employee embedded with the LT on 4/5. The specific role of the individual is undefined.
- Maintain a database of any actions assigned to the NRC during Deputies Committee or Principals meetings.

BS/26

USNRC Emergency Operations Center Status Update

April 5, 2011
Earthquake / Tsunami Status Update
Compiled by Executive Briefing Team

This report includes NRC's current understanding of the ongoing situation in Japan. Historical and background information can be found in past reports.

NRC's Top Priorities

1) Continued assessment of radiological conditions, dose projections, and protective action recommendations. Currently, the NRC Japan Team reports that no PMT additional support or actions are being requested (offsite radiological assessments, RASCAL source term updates).

2) Providing technical assistance
to the US Ambassador in Japan and the Japanese Government, including a particular focus on the Unit 1 drywell and the Unit 3 and 4 spent fuel pools.

3) Coordination with other US Departments and Agencies, the Institute of Nuclear Power Operations(INPO), Bechtel, General Electric Hitachi (GEH), Tokyo Electric Power Company (TEPCO), and the Japanese military.

Status

At 0946 EST, March 11, 2011, the NRC entered Monitoring Mode and the agency continues to monitor the unfolding events in Japan. The Headquarters Operations Center is staffed 24/7.

The team of NRC experts in Japan continues to support the US Ambassador and his staff.

NRC has issued numerous press releases related to the earthquake and tsunami. These press releases can be found online at: http://www.nrc.gov/reading-rm/doc-collections/news/2011/

On March 14, 2011, the NRC experts in Japan reported that the Japanese had requested US technical assistance for cooling the Fukushima Daiichi Units, as needed. The effort to provide assistance is being coordinated by the US Ambassador.

The current protective action recommendation for US citizens residing within 50 miles (80 km) of the Fukushima Daiichi site is to evacuate.

One train of the Bechtel pumping system is on site. The first barge carrying fresh water is also on site. The second barge arrived on site April 2 for transfer to the "Filtered Water Tank." (Source: IAEA).

The NRC Reactor Safety Team completed an assessment and recommendations for the Fukushima Daiichi units based on the severe accident management guidelines. The

BS127

assessment included the input and concurrence of INPO, GEH, EPRI, Naval Reactors, and DOE/NE. This document has been provided to the NRC Site Team in Japan.

The US Department of Energy and the US Environmental Protection Agency are the Federal communicators for questions regarding possible domestic impacts from the events in Japan and on domestic monitoring.

The Commission established a senior level agency task force to conduct a methodical and systematic review of NRC processes and regulations with specific near-term and long-term objectives.

Status of NRC Licensee and Agreement State Facilities

Air sample and standing water sample results from US nuclear plant licensees have been entered into a password protected database established by the Nuclear Energy Institute (NEI). NRC and Federal partners have access to the plant data.

Industry Consortium / Contractor Activities

NRC/Consortium calls have been re-established and are now held daily at 2000 EDT. The NRC Site Team in Japan is serving as a clearinghouse by reviewing several lists of material requests and action items from the Japanese Government and combining them into a central list to avoid duplication. This central list has been distributed and the NRC Site Team is coordinating with the US Embassy. International liaisons have suggested that the U.S. Embassy take the lead in communicating to International Atomic Energy Agency (IAEA) all U.S. assistance to Japan and coordinating that assistance if DOS-HQ is agreeable. It was discussed in the Agency Deputies meeting today that DOE is the lead for interagency technical support to Japan.

Current Understanding of Japanese Facilities

(This information is compiled from the NRC in-country team, TEPCO press releases, NISA press releases, Japan Atomic Industrial Forum (JAIF) compiled data and assessments, IAEA information releases, Federation of Electric Power Companies of Japan, World Association of Nuclear Operators, Department of Energy (DOE) and others.)

Fukushima Daiichi

The Japanese national government is now encouraging evacuation for local residents within the 20-30 km radius of the site boundary. This is a slight change from the previous voluntary evacuation with shelter in place for the 20-30 km zone. IAEA confirms a no-fly zone out to 30 km around the Fukushima Daiichi plant.

Current meteorological data (at 0200 EDT, 4/4) indicate that the winds are from the NW and are predicted to shift from the SE until 0700 on 4/5, then from the NW through the morning of 4/12.

STATUS as of 0430 EDT, April 5, 2011 - (1730 Japan, April 5)

Unit 1 – (NRC Priority: 1)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO).
The volume of sea water injected to cool the core has left enough salt to fill the lower plenum to the core plate (Source: GEH, US Industry).
Vessel temperatures 113°C at bottom drain, 243°C at FW nozzle (Source: TEPCO 4/4).
RPV pressure (Ch A: 44 psig, Ch B: 85.8 psig) (Source: TEPCO 4/4).

Core Cooling: Fresh water injection via fire extension line to FW line at 26.4 gpm(Source: TEPCO 4/4). Recirculation pump seals have likely failed. (Source: GEH)

Primary Containment: Damage suspected, slow leakage, DW and torus pressure at 7.8 psig (Source: TEPCO 4/4). Losing 10-30% drywell volume per day (Source: TEPCO via Site Team 4/2).

Secondary Containment: Severely damaged (hydrogen explosion)

Spent Fuel Pool: Temperature is at 10°C (unconfirmed). Periodic freshwater spray using concrete pump truck (Source: DOE 4/3). SFP has 292 assemblies with last transfer of 64 assemblies from reactor to SFP in March 2010 (Source: GEH 4/2).

Rad Levels: DW 3830 R/hr, Torus 1340 R/hr (Source: TEPCO 4/4), Outside site at plant gate(s): 12 mR/hr at main gate (steady) (Source: MEXT).

Power: On external power (Source: NISA); equipment testing in progress (Source: JAIF, NISA, TEPCO). External AC power to the Main Control Room of Unit 1 lighting and instrument power is available.

Unit 2 – (NRC Priority: 2)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO).
Bottom head temperature 137°C (Site Team 3/31), feed water nozzle temperature 140.3°C (Source: TEPCO 4/4). RPV pressure -1.8 psig (Source: IAEA 4/3).

Core Cooling: Fresh water injecting at 35 gpm fire line (Source: NISA 4/3)

Primary Containment: Damage suspected (Source: JAIF, NISA, TEPCO). Pressure: .5 psig (Source: TEPCO 4/4)

Secondary Containment: Damaged (Source: JAIF, NISA, TEPCO), blowout panels removed from side of reactor building to reduce hydrogen buildup (Source: visual)

Spent Fuel Pool: Full fresh water injection continuing (Source: DOE 4/3), fuel pool temperature 48°C (Source: TEPCO 4/4).

Rad Levels: DW 3340 R/hr (Source: TEPCO 4/4); Torus 91 R/hr (Source: TEPCO 4/4); Outside site at plant gate(s): 12 mR/hr at main gate (steady) (Source: MEXT); > 100 R/hr at discharge to sea (Source: IAEA 4/3)

Power: On offsite power (NISA 4/3)

Unit 3 – (NRC Priority: 3)

Core Status: Damaged, fuel partially or fully exposed (Source: JAIF, NISA, TEPCO).
Bottom head temperature 114°C, FW nozzle temperature: 89.8°C (Source: TEPCO 4/4).
RPV pressure 1.0 psig (Source: TEPCO 4/4). RPV level ~2/5 TAF (Source: IAEA 4/3).

Core Cooling: Freshwater injection via fire line at 30.8 gpm via temporary electrical pump (Source: TEPCO 4/4). Recirculation pump seals have likely failed. (Source: GEH)

Primary Containment: NRC assessment is that damage is suspected. Pressure: 0.9 psig (Source: TEPCO 4/4).

Secondary Containment: Damaged (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Low water level. Temperature 56°C estimated (Source: JAIF 4/3). Spraying fresh water periodically into SFP (Source: DOE 4/3). Intermittent steam-like substance emitting from SFP 1,2,3,4 from injection/spray (Source: JAIF 4/1).
Rad Levels: DW 2750 R/hr (Source: Site Team 3/31), torus 100 R/hr (Site Team 4/1); Outside site at plant gate(s): 12 mR/hr at main gate (steady) (Source: MEXT); 100 R/hr debris outside Rx building (covered).
Power: On offsite power (NISA 4/3)

Unit 4 - (NRC Priority: 4)
Core Status: Offloaded 105 days at time of accident (Source: JAIF, NISA, TEPCO)
Core Cooling: Not necessary (Source: JAIF, NISA, TEPCO)
Primary Containment: Not applicable (Source: JAIF, NISA, TEPCO)
Secondary Containment: Severely damaged from hydrogen explosion. (Source: JAIF, NISA, TEPCO)
Spent Fuel Pool: Temperature 42°C (Source: JAIF 4/3); periodic freshwater injection via an extended boom (Source: JAIF 3/31). Hydrogen from the fuel pool exploded on March 15 (Source: JAIF 3/31). Intermittent steam-like substance emitting from SFP from injection/spray (Source: JAIF 4/1).
Power: On offsite AC power (DOE 4/3)

Unit 5 – (NRC Priority: 5)
Core Status: In vessel (Source: JAIF, NISA, TEPCO), temperature 29.9°C (Source: TEPCO 4/4)
Core Cooling: Functional (Source: JAIF, NISA, TEPCO)
Primary Containment: Functional (Source: JAIF, NISA, TEPCO)
Secondary Containment: Vent hole drilled in rooftop to avoid hydrogen build up (Source: JAIF, NISA, TEPCO)
Spent Fuel Pool: Fuel pool cooling functional, RHR pump repaired, temperature 36.1°C (Source: TEPCO 4/4)
Power: External AC power supplying the unit, diesel generators available. (Source: JAIF, NISA, TEPCO)

Unit 6 – (NRC Priority: 6)
Core Status: In vessel (Source: JAIF, NISA, TEPCO), temperature 48°C (Source: TEPCO 4/4)
Core Cooling: Functional (Source: JAIF, NISA, TEPCO)
Primary Containment: Functional (Source: JAIF, NISA, TEPCO)
Secondary Containment: Vent hole drilled in rooftop to avoid hydrogen build up (Source: JAIF, NISA, TEPCO)
Spent Fuel Pool: Fuel pool cooling functional, temperature 21.5°C (Source: TEPCO 4/4)
Power: External AC power supplying the unit, diesel generators available. (Source: JAIF, NISA, TEPCO)
Common Spent Fuel Pool (NRC priority: 7): 6,000 bundles (Source: GEH); water level maintained at 32°C (decreasing trend) (Source: US Industry 3/30); normal cooling started 1805 JST March 24 (Source: NISA)
Electrical Power (NRC priority: 7): Offsite power connected to Unit 2 auxiliary transformer / distribution panel; work continues on energizing equipment in Unit 2.
Dry Cask Storage: Visual inspection revealed no problems. All casks are vertical casks manufactured by Hitachi Shipbuilding (Source: RST).

NRC priorities are based on analyses by the Reactor Safety Team. Unit 1 is priority 1 based on the fact that primary containment functionality, though degraded, can still be preserved if the responders take actions to inject to the RPV and primary containment. Unit 2 is priority 2 because of the apparent damage to primary containment and the other barriers to release. This damage requires continued attention to cool the core and provide water to the primary containment to minimize potential for release. Unit 3 is priority 3 because primary containment may be nominally functional but continued attention is required to pursue core cooling and injection. Unit 4 is priority 4 because progress has been made in addressing the spent fuel pool heat removal requirements, and the SFP area has indicated temperatures of less than 100°C.

Other Plants

No new information to report

Protective Measures Team (PMT) Update

The PMT continues to assess available dose rate information from DOE Aerial Monitoring operations, the US Navy, and TEPCO. Multi-day trending of available onsite monitors shows slightly declining dose rates over the past several days. Based upon information received on April 3, dose rates at the west gate were about 8.6 mR/hr (Source: JAIF). This shows a generally steady trend. A downward trend can be seen at various MEXT monitoring points northwest of the site, in the area that originally exceeded the evacuation PAG.

A white paper is being developed for the return of U.S. citizens to the Tokyo area. The paper will be finalized by April 6. PMT will provide input on the draft when the paper is received.

TEPCO confirmed dose rates greater than 100 R/hr from cable storage pit located next to Unit 2 discharge point.

An IAEA report on April 4 reported that among the workers at the Fukushima Daiichi plant, 21 workers have received doses exceeding 100mSv (10 rem). No worker has received a dose above Japan's guidance value of 250 mSv (25 rem) for restricting the exposure of emergency workers. News reports state that two workers missing had been found dead from tsunami related injuries on-site in Unit 4.

An IAEA report on April 4 documented NISA information that between March 26 – 30, thyroid monitoring was performed on 946 children, with all measurements below established criteria.

On April 4, IAEA reported the following regarding ingestion related restrictions:

"As of 3 April, the Ministry of Health, Labour and Welfare reported that the current restrictions on the distribution and consumption of foodstuffs remains in place and have not been extended to cover either other foodstuffs or other areas.

The Ministry of Agriculture, Forestry and Fisheries of Japan informed the IAEA that, because of winter conditions, most cattle, pigs and chickens are presently kept indoors. Animals are primarily fed on dried grass, silage and stored grain that has not been contaminated by the releases from the Fukushima Daiichi NPP. In addition, farmers have been advised to take

additional measures to prevent the direct deposition of radionuclides on drinking water provided to cattle.

As of 1 April, restrictions have been lifted on the consumption of drinking water by adults in Iitate; the restriction now applies to infants only. According to the latest update as of April 3, restrictions on the consumption of drinking water remain only in Iitate for infants only. The restriction in all other earlier reported locations for the prefecture of Fukushima have been lifted."

International Response

- The IAEA has announced that it will hold a high-level conference on preliminary lessons learned from Fukushima on June 20-24, 2011. Information is available at www.iaea.org.
- NRC has daily teleconferences with the United Kingdom's Health and Safety Executive, Canadian Nuclear Safety Commission, and French Nuclear Safety Authority. The group agreed to let IAEA and Finland also participate.
- France has publicly posted its assessment of projected doses in Tokyo on the French Radioprotection and Nuclear Safety Institute (IRSN) website.
- The NRC RST and PMT will have a call with Taiwan early next week to discuss current status and source term issues.
- An Institute of Nuclear Power Operations (INPO) staff member has arrived in Tokyo and is coordinating with US government staff at the Embassy.

Reference

Units

1 rem (rem) = 1,000 millirem (mrem)
1 Sievert (Sv) = 1,000 milliSieverts (mSv) = 1,000,000 microsieverts (μSv)
1 rem = 0.01 Sv = 10 mSv
1 Sv = 100 rem

Reactor Abbreviations

atm – Atmosphere (unit of pressure)
DW – Drywell
FW – Feed Water
gpm – gallons per minute
RHR – Residual Heat Removal
RPV – Reactor Pressure Vessel
SFP – Spent Fuel Pool
TAF – Top of Active Fuel

April 7, 2011 0600 EDT

Briefing Sheet
Fukushima Daiichi

ET Overview and Priorities:

- U-1 containment pressure is slowly decreasing (pressure now 7.0 psig) due to unspecified leak (Site Team indicates TEPCO estimates 10-30% leakage rate).
- TEPCO began filling Unit 1 containment with nitrogen (DOE)
- Site Team developing "current state" assessment using prior assessments/field data; supports high-level discussion on protective actions, to be cleared by NRC, and given to US and GoJ high level. Plan is to include Sandia NL MELCOR and MACCS assessments (under development).

RST Overview and Priorities:

- Responded to CDC request for high level information on the accident
- RST continuing to work with consortium on defining "stable" site conditions, draft document has been circulated. Document requested by Site Team to support alignment with NISA.
- RST is evaluating roles and responsibilities regarding the industry consortium now that INPO has established clear communication paths and points of contact with TEPCO.
- SFP white paper has been drafted and sent to site team and consortium members for comments. Comments are due back with concurrence at 1000 EDT on Thursday April 7th.
- RST drafted "one-pagers" on RPV injection rate and containment fill. These draft documents have been shared with the technical consortium and sent to the site team.
- Will be coordinating with OPA, OCA, OGC and NRR to consider options associated with multiple requests for RST Assessment(s) based on an article in the NY Times. Also, coordinating with OPA regarding responding to recent media requests around the release of an NRC email on status of the Unit 2 core and reactor vessel.
- Goop document sent to the site.

PMT Overview and Priorities:

- Continue assessment of radiological conditions, dose projections and protective action recommendations. Available dose information continues to show downward trends.
- Working with EPA staff to determine if EPA plans to deploy RADNET monitors within Japan. Preliminary answer is that EPA is focused on the long term planning and does not intend to deploy RADNET monitors to Japan, however, they will check back with the NRC/PMT after discussing with EPA management.
- To support Sandia National Laboratories offsite dose estimates using MACCS, a one year historical data bank of meteorlogical conditions in Japan needs to be obtained. NOAA may have this information and PMT will attempt to contact to obtain it.

LT Overview and Priorities:

- IAEA's Incident and Emergency Centre (IEC) is tracking offers for assistance; database posted on ENAC. LT provided U.S. list to Mark Schaffer in Vienna who will clear release of the list through UNVIE to IAEA.
- ~~Maintain a database of any~~Track actions assigned to the NRC during Deputies Committee or Principals meeting (ongoing).
- USAID has requested information on NRC site team regarding roles and responsibilities and time in service, likely from a cost and budget perspective. The NRC team in Japan has provided a list of names assigned to each team there (mirroring the ET, LT, RST, and PMT).

BS/2-8

April 7, 2011 0600 EDT

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- Jim Dyer will be attending (in person) with a representative from NSIR.
- NRC/Consortium calls have been re-established and are now held daily at 2000 EDT. The NRC Site Team in Japan is serving as a clearinghouse by reviewing material and assistance requests from the Japanese Government (GoJ) and combining them into a central list to avoid duplication.
- The U.S. Embassy is working to consolidate the consortium list with the Embassy list so the Embassy can take over maintenance of the consolidated list by the end of this week (4/8/11). GoJ has been asked to prioritize all requests on the list. Meetings continue daily between the Embassy team (supported by NRC and DOE) and the GoJ to discuss GoJ requests for assistance and equipment. International liaisons have suggested that the U.S. Embassy take the lead in communicating to International Atomic Energy Agency (IAEA) all U.S. assistance to Japan and coordinating that assistance if DOS-HQ is agreeable. It was discussed in the Agency Deputies meeting earlier in the week that DOE is the lead for interagency technical support to Japan.
- LT received a request from the governments of Canada, the UK and Finland to have the RST share their "Stability Document," which the RST has discussed during their daily call with these governments. The request was sent to the DEDOs for guidance on 4/7/11.

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April 7, 2011 1500 EDT

Briefing Sheet
Fukushima Daiichi

ET Overview and Priorities

- TEPCO continues nitrogen inerting of Unit 1. GE has proposed we take a look at how what is happening in Unit 1 would change our assessment.
- No changes reported for other units
- A 7.4 magnitude earthquake occurred this morning. A Tsunami warning was issued but later rescinded. The site was evacuated in response to the warning to leave coastal areas and go to higher ground. Eventually site personnel were returned to the site.

RST Overview and Priorities

- Working on answering questions from site team about the potential to use a slurry mixture in the spent-fuel pools. An answer is desired by 5:00 EDT but will not be ready. The RST will share the draft information currently in circulation with the consortium with the site team.
- An issue was raised at the congressional hearing yesterday by Congressman Markey who asked Marty Virgilio if any of the core had exited the reactor vessel. Chuck Castro confirmed the RST understanding but indicated the Japanese would say the vessel was in tact.

PMT Overview and Priorities

- It was decided to provide the site team with the results of the RASCAL runs associated with the 50-mile evacuation recommendation.
- Vince Holahan has requested some information for PACCOM. Examples include guidance on the return of U.S. citizens and the report cited in the NY Times article on Wednesday, April 6, 2011. Also PACCOM has 60 questions that NRC is trying to get.
- We continue to request EPA show us the radiation maps it has of Japan.

LT Overview and Priorities

- There was a meeting this morning on how to handle the report in the NY Times article. A FOIA request for the report was submitted this morning and it was agreed we would follow the FOIA process. The LT is working on talking points for the next Deputy's meeting to address lessons learned and corrective actions.
- There is a meeting at 3:00, April 7, 2011 with OMB and Jim Dyer to discuss supplemental funding from the Japan event. We have not received any feedback from this meeting.
- Logistics for the 4th team to Japan are being put in place, with the first individual to go Saturday, April 9, 2011. Conference call with Chairman Jaczko, Chuck Casto, and the ET indicated the size of the team will be set at eleven (two additional) and stay time will be three weeks.
- Developing list of actions and responsible organization to ensure commitments from the Deputy Committee and implemented. The draft was completed and given to Marty Virgilio at approximately 1830 EDT on April 7, 2011.

BS/29

~~OFFICIAL USE ONLY~~

April 8, 2011 2200 EDT

Briefing Sheet
Fukushima Daiichi

ET Overview and Priorities

- No significant changes on status of reactors
- OEDO memo was approved for Ops Center reduced staffing. New structure to be developed/implemented by NSIR & ET Director.
- Teams should be reminded naval reactors staff are not on shift work
- The pace of FOIA/Congressional inquiries has gone up.

RST Overview and Priorities

- Briefing material for Chuck Castro to use with Secretary of State Clinton is being prepared. Second tier priority, meeting is anticipated the week of 17 April. Consider engaging OCA to support Ops Ctr lead to ensure meeting the Secretary's needs.
- RST is considering a revision to its assessment now that inerting has begun. There is currently a revision 1.
- The SFP assessment is with the site team for review.
- The perspective on the use of slurry in the SFP has been provided to the site team.
- Received final feedback from NRR on stable plant conditions document.
- Receiving information about water level (which unit/water where, containment/rx bldg?). Appears to be above the floor but not above the vessel.

PMT Overview and Priorities

- PMT has lead to develop the "composite" document crafted, input from RST. Covers the 3 issues, 1. Grab n Go criteria, 2. Defining 50-mile EPZ re-entry criteria, and 3. Defining stable conditions for Rx.
- There is a question about whether we can provide the draft Ambassador report on reentry to PACOM. The decision was to first see if PACOM had the report.
- We provided the final Q&A on the difference between NRC and DOE on difference in the evacuation zone distances on April 8, 2011

LT Overview and Priorities

- . The LT will prepare an executive summary/1-pager to support the "composite" document.
- The site team asked if the 8:00 call would be held today given DOE and DOD will not be participating. The response is that the call is only facilitated by Headquarters not desired by HQ. The site team was told that we will support the call if the site team believes it is needed.
- Ensure SitRep is not provided to States. Document is OUO, not for sharing outside Fed. family.

BS/30

April 10, 2011 2200 EDT

Briefing Sheet
Fukushima Daiichi

ET Overview and Priorities

- No significant changes on status of reactors
- Documents are in Web EOC under ET Miscellaneous documents collection.
- "Major Document Matrix" updated to include "Purpose" of each. Need to maintain current.
- Considerable concern has been raised by NR regarding T/O items being "dropped" which could lead to major configuration control challenges.
- Reduced USAID staffing in support of the Japanese effort may pose challenges with making travel arrangements for staff going to Japan.
- Alternative Ops Center strategy beginning 0700 to 1500 shift, Monday 4/11/11. Three shifts, six staff w/Office support. Commissioners' Assistants briefings will be Tuesdays and Thursdays 1000 EDT.
- Transition Plan to modify Ops Center operations finalized. Messaging-NRC is not reducing its involvement, but is realigning its functions to better serve stakeholders.
- SitRep will continue to be provided in current form, but update frequency will be reduced to once per day at 1800 EDT.

RST Overview and Priorities

- Briefing material for Secretary of State Clinton developed by site team. Meeting is anticipated the week of 17 April.
- Rev 2 of the RST Assessment Document is work in progress. GEH will provide comments on Monday 4/11/11. Comments provided by the Japan Team.
- Ed Fuller provided analysis of U2 core ex-vessel events. Providing analysis to Site Team, NR, GEH, and INPO. Comments due Monday,4/11.
- Global assessment draft received from Mike Hay 4/9/11 @ 2115. Site team needs a 24-hour turn around. Input provided to team on 4/9-10 mid shift.

PMT Overview and Priorities

- PMT developed the "composite" document drafted, with input from RST. Will coordinate with other agencies on Monday 4/11/11. T. Milligan also providing talking Pts for same. Draft of the document **to be** provided to Marty Virgilio and Vince Holahan for comments.

LT Overview and Priorities

- The next consortium call will be Monday 4/11/11at 2000 EDT.

BS/31

USNRC Emergency Operations Center Status Update

April 11, 2011
Earthquake / Tsunami Status Update
Compiled by Executive Briefing Team

This report includes NRC's current understanding of the ongoing situation in Japan. Historical and background information can be found in past reports.

NRC's Top Priorities

1) Continued assessment of plant and radiological conditions, dose projections, and protective action recommendations.

2) Providing technical assistance to the US Ambassador in Japan and the Japanese Government.

3) Coordination with other US Departments and Agencies, the Institute of Nuclear Power Operations (INPO), Bechtel, General Electric Hitachi (GEH), Tokyo Electric Power Company (TEPCO), and the Japanese military.

Status

At 0946 EST, March 11, 2011, the NRC entered Monitoring Mode, and the agency continues to monitor the unfolding events in Japan. In that the situation is not yet stable, NRC continues its 24-7 support in HQ and a fully-engaged site team in Japan. During the week of April 11th, NRC will be increasing the size and adjusting the skill set of its site team to better support the work activities in Japan. In an effort to better provide NRC HQ support, on April 11, NRC will be transitioning a great portion of its HQ support to Japan to its line organizations, resulting in a reduction in the HQ Operations Center staffing. The HQ Operations Center will continue to have a core team of managers and experts 24/7.

Press releases related to the situation in Japan can be found online at: http://www.nrc.gov/reading-rm/doc-collections/news/2011/.

On March 14, 2011, the NRC experts in Japan reported that the Japanese had requested US technical assistance for cooling the Fukushima Daiichi Units, as needed. The effort to provide assistance is being coordinated by the US Ambassador.

The current protective action recommendation for US citizens residing within 50 miles (80 km) of the Fukushima Daiichi site is to evacuate.

One pump that was deployed to the site is being used to pump fresh water from one of the barges to a clean water holding tank as a source of fresh water to cool the reactors and the spent fuel pools. A second pump is ready as a spare, if necessary.

BS/32

The site team continues to work with TEPCO to strengthen the reliability of the reactor and spent fuel pool cooling.

The NRC Reactor Safety Team (RST) completed an assessment and recommendations for the Fukushima Daiichi units based on the severe accident management guidelines. The assessment included the input and concurrence of INPO, GEH, Electric Power Research Institute EPRI), Naval Reactors, and US Department of Energy Office of Nuclear Energy (DOE/NE). This document has been provided to the NRC Site Team in Japan. The document is now being cited in the news media (New York Times). NRC is evaluating what steps may be appropriate to address an OUO document being provided to the public. An updated assessment is underway to account for current plant conditions (e.g., inerting Unit 1 drywell and status of the fuel in the Unit 2 reactor vessel).

The RST is seeking peer review of an analysis of the reactor vessel and core conditions for Unit 2.

The site team, with support from Sandia, continues its analysis of the potential for a release and time lines should a release occur.

The US DOE and the US Environmental Protection Agency are the Federal communicators for questions regarding possible domestic impacts from the events in Japan and on domestic monitoring.

The Commission established a senior-level agency task force to conduct a systematic review of NRC processes and regulations with specific near-term and long-term objectives.

Status of NRC Licensee and Agreement State Facilities

Air sample and standing water sample results from US nuclear plant licensees have been entered into a password protected database established by the Nuclear Energy Institute (NEI). NRC and Federal partners have access to the plant data.

Industry Consortium / Contractor Activities

The industry consortium is comprised of government and industry representatives working to respond to Government of Japan (GoJ) requests for material and assistance. Consortium calls are held at 2000 EDT on days agreed to by the consortium. The NRC Site Team is assisting the US Embassy in Japan review and validate material and assistance requests from the GoJ. The NRC Site Team is maintaining and distributing the validated US Embassy list, which is planned to be transferred to the US Embassy (Tim Cipullo at the US Embassy - Tokyo's Econ Section) in the near future. At that point, the US Embassy will revise the list as input is received and send it out prior to consortium meetings. Meetings continue between the Embassy team (supported by NRC and DOE) and the GoJ to discuss GoJ requests for assistance and equipment, including priorities. International liaisons have suggested that the US Embassy take the lead in communicating to the International Atomic Energy Agency (IAEA) all US assistance to Japan and coordinating that assistance if the US Department of State HQ agrees.

Current Understanding of Japanese Facilities

(This information is compiled from the NRC in-country team, TEPCO press releases, NISA press releases, Japan Atomic Industrial Forum (JAIF) compiled data and assessments, IAEA information releases, Federation of Electric Power Companies of Japan, World Association of Nuclear Operators, DOE and others.)

Fukushima Daiichi

The Japanese national government has encouraged evacuation for local residents within the 20-30 km radius of the site boundary. This is a slight change from the previous voluntary evacuation with shelter in place for the 20-30 km zone. IAEA confirms a no-fly zone out to 30 km around the Fukushima Daiichi plant. No additional damage has been reported as a result of the April 7th magnitude 7.1 aftershock.

STATUS as of 0430 EDT, April 11, 2011 (1730 Japan, April 11)

Unit 1 – (NRC Priority: 1)

Core Status: Estimated 70% damage (Source: TEPCO), fuel partially or fully exposed (Source: JAIF, NISA, TEPCO). RPV level ½ TAF (NISA 4/8). The volume of sea water injected to cool the core has left enough salt to fill the lower plenum to the core plate (Source: GEH, US Industry). Vessel temperatures 119°C at bottom drain, 246°C at FW nozzle (Source: NISA 4/9). RPV pressure (Ch A: 59 psig, Ch B: 119 psig) (Source: NISA 4/10).

Core Cooling: Fresh water injection via fire extension line to FW line at 26.4 gpm (Source: NISA 4/9). Recirculation pump seals have likely failed (Source: GEH). Stuck open SRV (Source: Site Team, confirmed by TEPCO 4/7). Began injecting nitrogen (N_2) to drywell at 0130 Japan time on April 7 (Source: IAEA, 4/7).

Primary Containment: Damage suspected, slow leakage, DW pressure increased to 12.9 psig, torus pressure at 8.5 psig and slowly increasing from N_2 injection (Source: NISA 4/9). Losing 10-30% drywell volume per day (Source: TEPCO via Site Team 4/2).

Secondary Containment: Severely damaged (hydrogen explosion)

Spent Fuel Pool: Temperature is at 24°C (Source: JAIF 4/6, uncertain, overhead thermography). Periodic freshwater spray using concrete pump truck (Source: DOE 4/3). SFP has 292 assemblies with last transfer of 64 assemblies from reactor to SFP in March 2010 (Source: GEH 4/2).

Rad Levels: DW: 6830 R/hr (Source: NISA 4/8), Reported instrument failure (Source: INPO 4/8), Torus: 1190 R/hr (Source: NISA 4/9), Outside site at plant gate(s): 4 mR/hr at west gate (very slight trend downward) (Source: JAIF).

Power: On external power (Source: NISA); equipment testing in progress (Source: JAIF, NISA, TEPCO). External AC power to the Main Control Room lighting and instrument.

Unit 2 – (NRC Priority: 2)

Core Status: Estimated 30% damage (Source: TEPCO), fuel partially or fully exposed (Source: JAIF, NISA, TEPCO). RPV Level 3/5 TAF (NISA 4/8) Bottom head temperature not available (TEPCO), feed water nozzle temperature 146.0°C (Source: NISA 4/9). RPV pressure: Ch A: -2.6 psig, Ch B: -4.0 psig (Source NISA 4/9). Stabilized at atmospheric pressure since 3/18/11 (Source: IAEA 4/9). Site Team believes a SRV is stuck open, but TEPCO opinion currently differs. May begin injecting nitrogen (Source: NHK).

Core Cooling: Fresh water injecting at 30.8 gpm fire line (Source: NISA 4/8).

Primary Containment: Damage suspected (Source: JAIF, NISA, TEPCO). DW Pressure: -0.9 psig (Source: NISA 4/9).

Secondary Containment: Damaged (Source: JAIF, NISA, TEPCO), blowout panels removed from side of reactor building to reduce hydrogen buildup (Source: visual).

Spent Fuel Pool: Full fresh water injection continuing (Source: IAEA 4/5), fuel pool temperature 53°C (Source: DOE 4/9). 36 tons of water added 4/7 (Source: Site Team 4/8).

Rad Levels: DW: 2920 R/hr (Source: NISA 4/9); Torus 74.3 R/hr (Source: NISA 4/9); Outside site at plant gate(s): 4 mR/hr at west gate (very slight trend downward) (Source: JAIF); >100 R/hr at discharge to sea (Source: IAEA 4/3). The leak of contaminated water into the ocean has been stopped (Source: Multiple Reports).

Power: On offsite power (NISA 4/3)

Unit 3 – (NRC Priority: 3)

Core Status: Estimated 25% damage (Source: TEPCO), fuel partially or fully exposed (Source: JAIF, NISA, TEPCO). Bottom head temperature 109.8°C, FW nozzle temperature: 89°C (Source: NISA 4/9). RPV pressure Ch A: -1.6 psig, Ch B: -11.5 psig (Source: NISA 4/9). RPV level ~2/5 TAF (Source: NISA 4/8). Stabilized at atmospheric pressure since 3/22/11 (Source: IAEA 4/9).

Core Cooling: Freshwater injection via fire line at 30.8 gpm via temporary electrical pump (Source: NISA 4/8). Recirculation pump seals have likely failed (Source: GEH).

Primary Containment: NRC assessment is that damage is suspected. Drywell Pressure: 0.6 psig and Torus Pressure 10.2 psig (Source: NISA 4/8). May begin to inject nitrogen (Source: NHK).

Secondary Containment: Damaged (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Low water level. Temperature 60°C estimated (Source: JAIF 4/6, uncertain, overhead thermography). Freshwater injection via SF cooling system and spraying fresh water periodically into SFP (Source: IAEA 4/5). Fresh water sprayed via concrete pump on 4/8 (Source: TEPCO 4/9).

Rad Levels: DW: 1840 R/hr, Torus: 71.7 R/hr (Source: NISA 4/9); Outside site at plant gate(s): 4.0 mR/hr at west gate (very slight trend downward) (Source: JAIF); 100 R/hr debris outside Rx building (covered).

Power: On offsite power (NISA 4/3)

Unit 4 – (NRC Priority: 4)

Core Status: Offloaded 105 days at time of accident (Source: JAIF, NISA, TEPCO)

Core Cooling: Not necessary (Source: JAIF, NISA, TEPCO)

Primary Containment: Not applicable (Source: JAIF, NISA, TEPCO)

Secondary Containment: Severely damaged from hydrogen explosion. (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Temperature 57°C (Source: JAIF 4/7, uncertain, overhead thermography); 38 tons of water added 4/7 via concrete pump. Freshwater added via concrete pump 4/9, additional spraying as needed (Source: TEPCO 4/9). Hydrogen from the fuel pool exploded on March 15 (Source: JAIF 3/31). Intermittent steam-like substance emitting from SFP from injection/spray (Source: JAIF 4/1). Level trending down (Source: Site Team 4/6). TEPCO considering adding sand slurry to SFP (Source: Site Team 4/7).

Power: On offsite AC power (DOE 4/3)

Unit 5 – (NRC Priority: 5)

Core Status: In vessel (Source: JAIF, NISA, TEPCO), temperature 50.9°C (increasing) (Source: NISA 4/9)

Core Cooling: Functional (Source: JAIF, NISA, TEPCO)
Primary Containment: Functional (Source: JAIF, NISA, TEPCO)
Secondary Containment: Vent hole drilled in rooftop to avoid hydrogen build up (Source: JAIF, NISA, TEPCO)
Spent Fuel Pool: Fuel pool cooling functional, RHR pump repaired, temperature 31.8°C (Source: NISA 4/9)
Power: External AC power supplying the unit, diesel generators available (Source: JAIF, NISA, TEPCO).
Other: Groundwater leaking into turbine basement drain pits; being pumped into ocean (Source: TEPCO 4/5).

Unit 6 – (NRC Priority: 6)
Core Status: In vessel (Source: JAIF, NISA, TEPCO), temperature 23.1°C (Source: NISA 4/9)
Core Cooling: Functional (Source: JAIF, NISA, TEPCO)
Primary Containment: Functional (Source: JAIF, NISA, TEPCO)
Secondary Containment: Vent hole drilled in rooftop to avoid hydrogen build up (Source: JAIF, NISA, TEPCO)
Spent Fuel Pool: Fuel pool cooling functional, temperature 23.0°C (Source: NISA 4/9)
Power: External AC power supplying the unit, diesel generators available. (Source: JAIF, NISA, TEPCO)
Other: Groundwater leaking into turbine basement drain pits; being pumped into ocean (Source: TEPCO 4/5).

Common Spent Fuel Pool (NRC priority: 7): 6,000 bundles (Source: GEH); water maintained at 32°C (Source: IAEA 4/7); normal cooling started 1805 JST March 24 (Source: NISA).
Electrical Power (NRC priority: 7): Offsite power connected to Unit 2 auxiliary transformer / distribution panel; work continues on energizing equipment in Unit 2.
Dry Cask Storage: Visual inspection revealed no problems. All casks are vertical casks manufactured by Hitachi Shipbuilding (Source: RST).

The leak of contaminated water into the ocean has been stopped (Source: Multiple Reports).

NRC priorities are based on analyses by the Reactor Safety Team. Unit 1 is priority 1 based on the belief that primary containment functionality, though degraded, can still be preserved if the responders take actions to inject to the RPV and primary containment. Unit 2 is priority 2 because of the apparent damage to primary containment and the other barriers to release. This damage requires continued attention to cool the core and provide water to the primary containment to minimize potential for release. Unit 3 is priority 3 because primary containment may be nominally functional but continued attention is required to pursue core cooling and injection. Unit 4 is priority 4 because progress has been made in addressing the spent fuel pool heat removal requirements, and the SFP area has indicated temperatures of less than 100°C.

Other Plants

No new information to report.

Protective Measures Team (PMT) Update

The PMT continues to assess available dose rate information from DOE AMS data, the US Navy, TEPCO, and MEXT. Multi-day trending of available onsite monitors shows slightly

declining dose rates over the past several days. On April 10, 2011 dose rates at the west gate were about 4.3 mR/hr (Source: Japan Ministry of Foreign Affairs and IAEA). PMT is trending near-site dose rates using the MOFA/IAEA data and will use this source in the future.

DOE continues to take field measurements around the site. To date, over 126,000 field measurements have been taken by DOE teams.

The PMT was requested to support NOAA with information on the source term released. This will be used to assist in ocean modeling. The PMT has provided NOAA with the 20-nuclide source term that was used in the analysis that was called "Plausible Realistic Case (PRC) V3, which has been vetted by DOE/ NIT, OSTP and NARAC.

PMT finalized the "Summary of Radiological Hazards in Japan," which was provided to the Japan Site Team.

"Guidance for Return (Short Term and Permanent Re-entry) of US Citizens to Areas around Fukushima Daiichi NPP" continues to be developed with the RST. Additionally a "Global Assessment Document" is being developed with PMT input, portions of which will be used to brief Secretary of State Clinton upon her visit to Japan.

International Response

- Secretary of State Clinton tentatively visiting Japan on April 18, 2011.
- The IAEA has announced that it will hold a high-level conference on preliminary lessons learned from Fukushima on June 20-24, 2011. Information is available at www.iaea.org.
- NRC has daily teleconferences with the United Kingdom's Health and Safety Executive, the Canadian Nuclear Safety Commission, and the French Nuclear Safety Authority. IAEA and Finland also participate intermittently.
- France has publicly posted its assessment of projected doses in Tokyo on the French Radioprotection and Nuclear Safety Institute (IRSN) website.
- The NRC RST and PMT will have a call with Taiwan early in the week of April 11th to discuss current status and source term issues.
- An Institute of Nuclear Power Operations (INPO) staff member in Tokyo is coordinating with US Government staff at the US Embassy concerning equipment requests.

Reference

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1 rem (rem) = 1,000 millirem (mrem)
1 Sievert (Sv) = 1,000 milliSieverts (mSv) = 1,000,000 microsieverts (μSv)
1 rem = 0.01 Sv = 10 mSv
1 Sv = 100 rem

Reactor Abbreviations

atm – Atmosphere (unit of pressure)
DW – Drywell
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gpm – gallons per minute
RHR – Residual Heat Removal
SFP – Spent Fuel Pool
SRV – Safety Relief Valve
TAF – Top of Active Fuel
RPV – Reactor Pressure Vessel

USNRC Emergency Operations Center Status Update

April 19, 2011
Earthquake / Tsunami Status Update
Compiled by Executive Briefing Team

This report includes NRC's current understanding of the ongoing situation in Japan. Historical and background information can be found in past reports.

NRC's Top Priorities

1) Continued assessment of plant and radiological conditions and protective action recommendations.

2) Providing technical assistance to the US Ambassador in Japan and the Japanese Government.

3) Coordination with other US Departments and Agencies, the Institute of Nuclear Power Operations (INPO), Bechtel, General Electric Hitachi (GEH), Tokyo Electric Power Company (TEPCO), and the Japanese military.

Status

At 0946 EST, March 11, 2011, the NRC entered Monitoring Mode, and the agency continues to monitor the unfolding events in Japan. In that the situation is not yet stable, NRC continues its 24 hour support in headquarters and a fully-engaged site team in Japan. During the week of April 11th, NRC increased the size and adjusted the skill set of its site team to better support the work activities in Japan. On April 11, NRC transitioned a great portion of its response support efforts to its line organizations. A core team of managers and experts will continue to staff the Headquarters Operations Center on a 24 hour basis.

Press releases related to the situation in Japan can be found online at: http://www.nrc.gov/reading-rm/doc-collections/news/2011/.

The current protective action recommendation for US citizens residing within 50 miles (80 km) of the Fukushima Daiichi site is to evacuate. The NRC continues to evaluate this recommendation.

To account for current plant conditions (e.g., inerting Unit 1 drywell and status of the fuel in the reactor vessels), the NRC Reactor Safety Team (RST) is updating an assessment and recommendations for the Fukushima Daiichi units based on the severe accident management guidelines. The initial assessment included the input and concurrence of INPO, GEH, Electric Power Research Institute EPRI), Naval Reactors, and US Department of Energy Office of Nuclear Energy (DOE/NE) and was provided to the NRC Site Team in Japan.

The RST is seeking peer review of an analysis of the reactor vessel and core conditions for Unit 2.

B5/3

The site team, with support from Sandia, continues its analysis of the potential for a release and time lines should a release occur.

The US DOE and the US Environmental Protection Agency are the Federal communicators for questions regarding possible domestic impacts from the events in Japan and on domestic monitoring.

The Commission established a senior-level agency task force to conduct a systematic review of NRC processes and regulations with specific near-term and long-term objectives.

Status of NRC Licensee and Agreement State Facilities

Air sample and standing water sample results from US nuclear plant licensees have been entered into a password protected database established by the Nuclear Energy Institute (NEI). NRC and Federal partners have access to the plant data.

Industry Consortium / Contractor Activities

The industry consortium is composed of government and industry representatives working to respond to Government of Japan (GoJ) requests for material and assistance. Consortium calls are typically held daily on technical issues at 11:00 GDT and are held at 2000 EDT on days agreed to by the consortium for topics including supply needs by GoJ.

Current Understanding of Japanese Facilities

(This information is compiled from the NRC in-country team, TEPCO press releases, Japanese Nuclear and Industrial Safety Agency (NISA) press releases, Japan Atomic Industrial Forum (JAIF) compiled data and assessments, IAEA information releases, Federation of Electric Power Companies of Japan, World Association of Nuclear Operators, DOE and others.)

Fukushima Daiichi

The Japanese national government has encouraged evacuation for local residents in some areas within the 20-30 km of the site boundary. This is a slight change from the previous voluntary evacuation with shelter in place for the 20-30 km zone. IAEA confirms a no-fly zone out to 30 km around the Fukushima Daiichi plant. The Japanese government announced that it is revising the emergency plans for Fukushima Daiichi to establish potential evacuation zones in case of another emergency. The Chief Cabinet Secretary indicated this is being done because plant conditions are not yet stable.

On April 12, 2011, NISA raised the rating for the events at the Fukushima Daiichi site on the International Nuclear and Radiological Event Scale (INES) from 5, "Accident with Wider Consequences," to 7, "Major Accident," citing calculations by both NISA and the Nuclear Safety Commission of Japan (NSC) of radioactive materials released from the Fukushima Daiichi reactors. This new provisional rating considers the accidents that occurred at Units 1, 2, and 3 as a single event on INES. The provisional INES level 3 rating assigned for Unit 4 still applies.

NISA notes that while an INES rating of 7 is the same as that of the Chernobyl accident, their current estimated amount of radioactive materials released is approximately 10% of the amount from the Chernobyl accident. (Source: NISA and IAEA 4/12)

Groundwater sampling near Units 1 & 2 showed increased radiation levels 6-38 times greater than previous measurements, based on isotope. Groundwater flow leads the ocean (Source: Site Team 4/15). TEPCO completed pumping out low-level liquid radwaste from the common-area radwaste building and applied sealant. TEPCO is transferring highly radioactive water from the Unit 2 turbine building basement to the radwaste facility; expecting 26 days to complete. (Source: Site Team 4/19).

TEPCO expects to have a tanker barge available by mid-May that will be able to hold 27,000 Tons of liquid radwaste, giving them a total of 60,400 Tons of liquid radwaste storage capacity. TEPCO estimates that a total of 50,000 Tons of highly contaminated liquid radwaste will have been generated onsite by the end of May. (Source: Site Team 4/16).

As of April 14 at 21:30 UTC white smoke was still observed coming from Units 2, 3 and 4 (Source: IAEA 4/16).

On April 17, TEPCO released a document titled "*Roadmap towards Restoration from the Accident at Fukushima Daiichi Nuclear Power Station*." This document sets out a two-phase action plan to bring "the reactors and spent fuel pools to a stable cooling condition and [mitigate] the release of radioactive materials …." This plan envisions actions over the next six to nine months. (Source: TEPCO 4/17). Staff is currently reviewing the document and seeking Consortium input.

Unit 1 drywell continues to fill with water and is expected to reach TAF by April 27. Debris cleanup continues and Zeolite is being placed around site to absorb Cesium. (Source: Site Team 4/17).

TEPCO is considering adding boric acid to the core cooling water.

TEPCO is considering: 1) entombment of the Unit 2 reactor building to stop leakage believed to be emanating from the suppression pool, 2) trying to ascertain whether the water in the Unit 2 basement may be coming from another unit, 3) requesting US assistance and expertise with processing high level radwaste , and 4) finding inerting_Unit 3 drywell difficult due to high rad levels and debris in the area.

STATUS as of 1200 EDT, April 19, 2011 (0100 Japan, April 20)

Unit 1 – (NRC Priority: 1)

Core Status: Estimated 70% damage (Source: TEPCO), fuel partially or fully exposed (Source: JAIF, NISA, TEPCO). RPV level ½ TAF (NISA 4/8). The volume of sea water injected to cool the core has left enough salt to fill the lower plenum to the core plate (Source: GEH, US Industry). Vessel temperatures 115.2ºC at bottom drain, 170.2ºC at FW nozzle (Source: IAEA 4/18). RPV pressure (Ch A: 62 psig, Ch B: 141 psig) (Source: TEPCO 4/16).

Core Cooling: Fresh water injection via temporary electrical pump to FW line at 26.4 gpm (Source: Site Team 4/14). Recirculation pump seals have likely failed (Source: GEH).

Stuck open SRV (Source: Site Team, confirmed by TEPCO 4/7). Began injecting nitrogen (N_2) to drywell at 0130 Japan time on April 7 (Source: IAEA, 4/7).

Primary Containment: Damage suspected, slow leakage, DW pressure increased to 13 psig, torus pressure at 10 psig and slowly increasing from N_2 injection (Source: IAEA 4/16).

Secondary Containment: Severely damaged (hydrogen explosion)

Spent Fuel Pool: Temperature is at 36ºC (Source: IAEA 4/16, uncertain, overhead thermography). Periodic freshwater spray using concrete pump truck (Source: DOE 4/3). SFP has 292 assemblies with last transfer of 64 assemblies from reactor to SFP in March 2010 (Source: GEH 4/2).

Rad Levels: DW: 6830 R/hr (Source: NISA 4/8), Reported instrument failure (Source: INPO 4/8), Torus: 1040 R/hr (Source: TEPCO 4/12), Outside site at plant gate(s): 4 mR/hr at west gate (very slight trend downward) (Source: JAIF).

Power: On external power (Source: NISA); equipment testing in progress (Source: JAIF, NISA, TEPCO).

Unit 2 – (NRC Priority: 2)

Core Status: Estimated 30% damage (Source: TEPCO), fuel partially or fully exposed (Source: JAIF, NISA, TEPCO). RPV Level 3/5 TAF (NISA 4/8) Bottom head temperature 115.3ºC (Source: NISA 4/16), feed water nozzle temperature 140.8ºC (Source: IAEA 4/18). RPV pressure: Ch A: -3.3 psig, Ch B: -2.6 psig (Source: TEPCO 4/13). Stabilized at atmospheric pressure since 3/18/11 (Source: IAEA 4/9). May begin injecting nitrogen on April 20, 2011 (Source: NHK).

Core Cooling: Fresh water injecting at 29.5 gpm (Source: IAEA 4/6).

Primary Containment: Damage suspected (Source: JAIF, NISA, TEPCO). DW Pressure: -1.6 psig (Source: TEPCO 4/13).

Secondary Containment: Damaged (Source: JAIF, NISA, TEPCO), blowout panels removed from side of reactor building to reduce hydrogen buildup (Source: visual).

Spent Fuel Pool: Full fresh water injection continuing (Source: IAEA 4/5), fuel pool temperature 41ºC (Source: IAEA 4/18). 60 Tons of fresh water added 4/10 (Source: IAEA 4/14).

Rad Levels: DW: 2810 R/hr (Source: TEPCO 4/12); Torus 68.1 R/hr (Source: TEPCO 4/12); Outside site at plant gate(s): 4 mR/hr at west gate (very slight trend downward) (Source: JAIF). The leak of contaminated water into the ocean has been stopped (Source: Multiple Reports).

Power: On offsite power (Source: NISA 4/3)

Unit 3 – (NRC Priority: 3)

Core Status: Estimated 25% damage (Source: TEPCO), fuel partially or fully exposed (Source: JAIF, NISA, TEPCO). Bottom head temperature 112.7ºC, FW nozzle temperature: 101.5ºC (Source: IAEA 4/18). RPV pressure Ch A: -4.4 psig, Ch B: -12.4 psig (Source: NISA 4/16). RPV level ~2/5 TAF (Source: NISA 4/8). Stabilized at atmospheric pressure since 3/22/11 (Source: IAEA 4/9).

Core Cooling: Freshwater injection via fire line at 30.8 gpm via temporary electrical pump (Source: Site Team 4/14). Recirculation pump seals have likely failed (Source: GEH).

Primary Containment: Damage suspected. Drywell Pressure: 0.6 psig and Torus Pressure 9.8 psig (Source: TEPCO 4/12). Drywell Temperature: 270°C (Site Team 4/16). Nitrogen injection delayed due to problems accessing equipment (Source: NHK).

Secondary Containment: Damaged (Source: JAIF, NISA, TEPCO)

Spent Fuel Pool: Low water level. Temperature 59ºC estimated (Source: IAEA 4/16, uncertain overhead thermography from 4/15). Fresh water sprayed via concrete pump on 4/8 (Source: TEPCO 4/9). ~35 Tons added (IAEA 4/14).

Rad Levels: DW: 1710 R/hr, Torus: 67.1 R/hr (Source: TEPCO 4/12); Outside site at plant gate(s): 4.0 mR/hr at west gate (very slight trend downward) (Source: JAIF); 100 R/hr debris outside Rx building (covered).
Power: On offsite power (Source: NISA 4/3)

Unit 4 – (NRC Priority: 4)
Core Status: Offloaded 105 days at time of accident (Source: JAIF, NISA, TEPCO).
Core Cooling: Not necessary (Source: JAIF, NISA, TEPCO).
Primary Containment: Not applicable (Source: JAIF, NISA, TEPCO).
Secondary Containment: Severely damaged from hydrogen explosion (Source: JAIF, NISA, TEPCO).
Spent Fuel Pool: Temperature 37°C (Source: JAIF 4/12, uncertain, overhead thermography). Freshwater added via concrete pump 4/9, additional spraying as needed (Source: TEPCO 4/9). 195 Tons fresh water added 4/12 (Source: IAEA 4/14). Fresh water spraying restarted by concrete pump truck on 4/15 (Source: IAEA 4/16). Water level ~2.5m above top of fuel (Source: TEPCO, uncertain). The extent of fuel damage, if any, is uncertain. Analyzed isotope levels from the pool may not be indicative of the actual state of fuel in the pool and may be more indicative of the isotopes from the water sprayed into the pool. Further sampling has been suggested by the NRC Site Team, but due to the complexity of obtaining samples from the pool, TEPCO has not planned further sampling.
Power: On offsite AC power (Source: DOE 4/3)

Unit 5 – (NRC Priority: 5)
Unit 5 remains in stable cold shutdown, with offsite power.

Unit 6 – (NRC Priority: 6)
Unit 6 remains in stable cold shutdown, with offsite power.

NRC priorities are based on analyses by the Reactor Safety Team. Unit 1 is priority 1 based on the belief that primary containment functionality, though degraded, can still be preserved if the responders take actions to inject to the RPV and primary containment. Unit 2 is priority 2 because of the apparent damage to primary containment and the other barriers to release. This damage requires continued attention to cool the core and provide water to the primary containment to minimize potential for release. Unit 3 is priority 3 because primary containment may be nominally functional but continued attention is required to pursue core cooling and injection.

Other Plants

There was no reported impact from the April 11, 2011 earthquake on other facilities.

Protective Measures Team (PMT) Update

The PMT continues to assess available dose rate information from DOE AMS data, the US Navy, TEPCO, and MEXT.

The PMT is the NRC Headquarters Operations Center point of contact for a "composite" document that takes conditions such as plant stability, radiological conditions, and local infrastructure into consideration in order to re-evaluate the current 50-mile evacuation

recommendations. The PMT will vet this document through Federal partners. The lead within NRC is the Office of Nuclear Security and Incident Response (NSIR) with NRR Support.

The PMT is coordinating a request from NARAC to review source terms and will assign line organization staff to fulfill this request.

As requested by the Japan Site Team, the PMT is coordinating the review of Japan's emergency preparedness, planning and programs to identify differences between the U.S. and Japan approaches to protective measures.

On April 19, 2011, DOE stated in their 0600 Japan Earthquake Response Situation Report that a remote controlled robot investigated Unit 1 and 3 Reactor Buildings. Radiation readings reported as high as 57 millisieverts (5.7Rem/hour). (Source: DOE 4/19).

On April 17, 2011, DOE stated in their 0600 Japan Earthquake Response Situation Report that all aerial measurements at US facilities in Japan were less than 32 μR/hr – a level that poses no known health risk. (Source: DOE 4/17).

International Response

- The US Embassy in Japan is preparing for the return shortly of US citizens who voluntarily relocated from the Tokyo area and has issued a travel alert on the subject that can be found online at: http://japan.usembassy.gov/e/acs/tacs-alert20110415.html.
- The IAEA has announced that it will hold a high-level conference on preliminary lessons learned from Fukushima on June 20-24, 2011. Information is available at www.iaea.org.
- NRC has daily teleconferences with the United Kingdom's Health and Safety Executive, the Canadian Nuclear Safety Commission, and the French Nuclear Safety Authority. IAEA and Finland also participate intermittently.
- An Institute of Nuclear Power Operations (INPO) staff member in Tokyo is coordinating with US Government staff at the US Embassy concerning equipment requests.

Reference

Units

1 rem (rem) = 1,000 millirem (mrem)
1 Sievert (Sv) = 1,000 milliSieverts (mSv) = 1,000,000 microsieverts (μSv)
1 rem = 0.01 Sv = 10 mSv
1 Sv = 100 rem
$T_F = (9/5 \times T_C + 32)$
1Kilometer (km) = 0.62 mile (mi)

Reactor Abbreviations

atm – Atmosphere (unit of pressure)
DW – Drywell
FW – Feed Water
gpm – gallons per minute
RHR – Residual Heat Removal
SFP – Spent Fuel Pool
SRV – Safety Relief Valve
TAF – Top of Active Fuel
RPV – Reactor Pressure Vessel