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UNITED STATES NUCLEAR REGULATORY COMMISSION'S
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

3 + + + + +

4 582nd MEETING

5 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

6 (ACRS)

7 OPEN SESSION

8 + + + + +

9 **EXCERPTED PORTION**

10 + + + + +

11 THURSDAY

12 APRIL 7, 2011

13 + + + + +

14 ROCKVILLE, MARYLAND

15 + + + + +

16 The Advisory Committee met at the Nuclear
17 Regulatory Commission, Two White Flint North, Room
18 T2B3, 11545 Rockville Pike, at 8:30 a.m., Said Abdel-
19 Khalik, Chairman, presiding.

20 COMMITTEE MEMBERS:

21 SAID ABDEL-KHALIK, Chairman

22 J. SAM ARMIJO, Vice Chairman

23 JOHN W. STETKAR, Member-at-Large

24 SANJOY BANERJEE, Member

25 DENNIS C. BLEY, Member

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1 COMMITTEE MEMBERS: (cont'd)

2 CHARLES H. BROWN, Member

3 MICHAEL L. CORRADINI, Member

4 DANA A. POWERS, Member

5 HAROLD B. RAY, Member

6 JOY REMPE, Member

7 MICHAEL T. RYAN, Member

8 WILLIAM J. SHACK, Member

9 JOHN D. SIEBER, Member

10
11 NRC STAFF PRESENT:

12 SYED ALI, RES/SL

13 STEVEN ARNDT, NRR/DE

14 SURINDER ARORA, NRO/DNRL/NARP

15 ERIC BOWMAN

16 CRAIG ERLANGER, NSIR/DSP

17 PETER KANG, NRO/Electrical Engineering Branch

18 TIM KOBETZ, Reactor Inspection Branch

19 MICHAEL LAYTON, NSIR

20 ERIC LEE, NSIR

21 BRIAN McDERMOTT, NSIR/Division of Preparedness

22 and Response

23 TIMOTHY MOSSMAN, NRR/DE/EICB

24 WILLIAM RULAND, NRR/DSS

25 DANIEL J. SANTOS, NRO/DE

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1 NRC STAFF PRESENT: (cont'd)

2 RANDY SULLIVAN, NSIR

3 JOHN THORP

4 BARRY WESTREICH

5 GEORGE WILSON, NRR/Digital I&C Branch

6 DEREK WIDMAYER, Designated Federal Official

7
8 ALSO PRESENT:

9 JEAN-LUC BEGON, UniStar

10 MARK FINLEY, UniStar

11 GREG GIBSON, UniStar

12 GENE HUGHES, UniStar

13 TED MESSIER, AREVA NP

14 JOSH REINERT, AREVA NP

15 RICHARD SZOCH, UniStar

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P-R-O-C-E-E-D-I-N-G-S

(10:49 a.m.)

CHAIRMAN ABDEL-KHALIK: We're back in session.

We will now move to the next item on the agenda, a briefing from the NRC staff on the status of the response to the events at the Fukushima Daiichi Nuclear Power Plant following the tragic earthquake and tsunami in Japan.

This briefing will serve as the initiation of significant ACRS engagement on the followup activities and lessons learned from the Fukushima event in order to maintain public health and safety in the United States. The ACRS will have a new Subcommittee of the whole devoted to these activities, and plans to have regular engagement with the NRC task force evaluating the agency's response, as well as other stakeholders, as appropriate, to gain additional perspectives.

In accordance with the recently issued Commission Tasking Memorandum, the ACRS has been formally tasked by the Commission to review the report developed by the staff as part of the staff's longer term review. We will provide our evaluation of that effort in a separate ACRS letter report later this

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1 year.

2 The Commission tasking for ACRS on the
3 subject of Fukushima is thus far specific to the
4 evaluation of the staff's longer term review.
5 However, the ACRS, consistent with its charter, will
6 self-initiate activities to be appropriately informed
7 and properly prepared to provide the best possible
8 advice to the Commission on an ongoing basis.

9 Before we begin the briefing, I would like
10 to call for a moment of silence to honor victims of
11 the Japanese tragedy and to serve as a reminder to all
12 of us that nuclear technology is unique, requiring our
13 total, absolute, and unwavering commitment to nuclear
14 safety, public transparency, and professional
15 integrity.

16 (Whereupon, a moment of silence was observed.)

17 CHAIRMAN ABDEL-KHALIK: Thank you. At
18 this time, I would like to call on Mr. Ruland to begin
19 the NRC presentation.

20 MR. RULAND: Thank you, and good morning,
21 Mr. Chairman, and members of the Advisory Committee on
22 Reactor Safeguards.

23 The staff has prepared a briefing on the
24 Fukushima events and some of the early implications of
25 those events. The earthquake and subsequent tsunami,

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1 which led to the core and -- which led to core and
2 spent fuel damage, is a significant tragedy for the
3 people of Japan. Our sympathy goes out to all of
4 those affected by this event.

5 While somewhat removed from the suffering
6 of the Japanese themselves, nevertheless, the NRC
7 staff, as nuclear safety professionals, feel the loss
8 personally. What we can do, however, is to focus on
9 learning the right lessons from this event. To that
10 end, we will briefly outline the event only to the
11 extent that it points to areas we will need to examine
12 for possible enhancements or improvements in our
13 regulations. We will follow that discussion with
14 highlights of some of the regulatory areas to be
15 reviewed.

16 We will try to answer any questions you
17 may have. However, since the event is still ongoing,
18 and much of the detailed information is not available,
19 or not easily confirmed, the implications for U.S.
20 plants will unfold in the weeks and months ahead.
21 Still, based on the information already available, and
22 as directed by the Commission, the staff has launched
23 the task force that you have already mentioned that we
24 will touch on briefly.

25 At a high level, we will be sure to pass

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1 along to the task force issues that may be raised at
2 this meeting, or we will get back to you with an
3 answer if we can. So let us begin.

4 Let me just briefly go over the agenda.
5 As you can see, there is a number of staff that are
6 going to be presenting their topics. We are going to
7 try to keep it -- make it quick, kind of march through
8 this promptly, because we know we have only two hours.

9 Again, the notion here is for us to just
10 touch on the areas that the staff is going to consider
11 or that has implications for our regulations. This is
12 by no means a comprehensive list, particularly given,
13 you know, the timing of this briefing.

14 So with that, I would ask John Thorp to
15 start us off with the sequence of events.

16 MR. THORP: Thank you, Bill. Good
17 morning. On March 11, 2011, at 2:46 p.m. Japan
18 Standard Time, a magnitude 9.0 earthquake struck off
19 the coast -- the eastern coast of Japan. According to
20 the U.S. Geological Survey, this earthquake was the
21 fourth largest in the world since 1900 and was the
22 largest ever recorded in Japan.

23 The earthquake resulted in a tsunami that
24 reportedly exceeded 32 feet in height in some
25 locations, as reported by the Japanese Nuclear

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1 Industrial and Safety Agency, our counterpart
2 regulatory agency in Japan. And note, this is one
3 report on the height of the tsunami. There have been
4 a range of wave heights reported in this event.

5 Next slide.

6 MEMBER POWERS: Do we know anything about
7 the seismicity of this particular area of Japan, so
8 that we -- I mean, it says it's the fourth largest
9 since 1900. But do we have a seismic hazard curve for
10 this part of the plant comparable to what we use for
11 the eastern United States?

12 MR. THORP: I don't have an answer for you
13 on that, but I believe that some of our staff will be
14 addressing seismic issues a little bit later in the
15 presentation, and they should be able to touch on
16 that.

17 MR. RULAND: Dana, I couldn't hear the
18 question. I'm sorry.

19 MR. THORP: History of seismicity in that
20 area.

21 MEMBER POWERS: Do we have an equivalent
22 of a seismic hazard curve of the types that we have
23 generated for central and eastern United States?

24 MR. RULAND: I think we will be able to at
25 least touch on the answer to that question.

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1 MEMBER CORRADINI: But just to follow up
2 Dana's question, though, but if you can't touch on it
3 today, I assume within the task force report that
4 would be something that we expect to see there.

5 MEMBER POWERS: Well, one of the things
6 that I found remarkable in the 2006 earthquake was the
7 understanding of the details of seismicity in a more
8 northerly part of Japan was not as detailed as I would
9 have expected. I wonder if it's a similar situation
10 here.

11 MR. RULAND: If we could -- we will have a
12 presentation on seismicity, so if we could kind of
13 move on. And if you don't mind, hold those questions,
14 so we can kind of go through this. Thank you.

15 MR. THORP: Okay. Four nuclear power
16 stations were actually affected by this earthquake.
17 At Onagawa, the northernmost affected site, all three
18 units scrambled and are currently in cold shutdown.
19 The single unit at Tokai, the southernmost affected
20 site, also scrambled, and it is in cold shutdown.

21 The operating Fukushima Daiichi and
22 Fukushima Daini plants successfully scrambled after the
23 earthquake. However, the subsequent tsunami resulted
24 in a loss of heat sink at the Fukushima Daini, ichi
25 being one, ni being two, so this is the number two

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1 station that I'm referring to now.

2 This was categorized as an INES Level 3 or
3 serious incident. The Fukushima Daini operator was
4 eventually able to restore operation of seawater
5 pumps, but not before suppression pool temperatures
6 reached saturation conditions, necessitating the
7 declaration of an emergency action level and Japanese
8 officials ordering an evacuation of residents within
9 10 kilometers of the site. The Fukushima Daini
10 reactors are currently in cold shutdown and stable.

11 Now, the information that I will present
12 in the following slides is taken from various publicly
13 available press releases, primarily from our Japanese
14 counterpart, the nuclear regulator, NISA, and the
15 utility, the Tokyo Electric Power Company or TEPCO.

16 While assessment is a natural and ongoing
17 part of the agency's response to this event,
18 conclusions based on our assessments will not be
19 presented as part of my slides, because events are
20 still unfolding and the information that is available
21 to us, as Bill pointed out, is incomplete or, in some
22 instances, unconfirmed.

23 The agency task force assignment that will
24 be discussed later during this presentation includes
25 establishing a framework for the agency's review and

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1 assessment of this event.

2 Next slide, please.

3 Extended station blackout at Fukushima
4 Daiichi. Immediately following the earthquake, the
5 reactors at Fukushima Daiichi, Units 1, 2, and 3,
6 scrambled. The earthquake also caused a loss of
7 offsite power, resulting in the plants having to use
8 their emergency diesel generators.

9 About an hour after the earthquake, the
10 tsunami hit and inundated the underground emergency
11 diesel generator rooms, rendering the diesel
12 generators non-functional and initiating the extended
13 station blackout condition. It is not clear to what
14 extent the station's batteries contributed to
15 mitigating the station blackout with DC power.

16 Next slide.

17 Accident sequence. After the tsunami and
18 station blackout, core cooling was provided by an
19 isolation condenser system for Unit 1, and reactor
20 core isolation cooling, or RCIC, systems for Units 2
21 and 3. Continued operation of an isolation condenser
22 is dependent on the ability to refill the condenser
23 shell side with makeup water to serve as a heat sink.

24 During a station blackout, RCIC operation
25 is dependent on batteries to provide DC power to

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1 energize valve motors and control circuits. The
2 Japanese utility reported that they lost all cooling,
3 presumably after the isolation condenser boiled dry
4 for Unit 1, and the batteries providing power to RCIC
5 were exhausted for Units 2 and 3.

6 CHAIRMAN ABDEL-KHALIK: Now, operators can
7 take manual control of RCIC. Has that happened? Did
8 that happen at Fukushima?

9 MR. THORP: We don't have specific facts
10 that indicate exactly what the operator actions were
11 in response to manually operate RCIC. That is
12 something we will certainly look into as part of our
13 evaluations.

14 CHAIRMAN ABDEL-KHALIK: The operator
15 station manual control of RCIC, would that have
16 prolonged the time available to them to provide
17 cooling to the plants?

18 MR. RULAND: At this stage, we -- I mean,
19 clearly, if a RCIC system continued to operate, of
20 course it would provide cooling. But we have no
21 information about what happened.

22 MR. THORP: The regulator reported --
23 excuse me. We don't have definitive information on
24 exactly when or how long core cooling was lost for
25 each unit. The regulator reported that at some point

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1 in this sequence of events, Units 1, 2, and 3
2 commenced seawater injection.

3 MEMBER CORRADINI: Just to -- you said it,
4 but I want to make sure. So in terms of the timing of
5 what you just said, it's fuzzy.

6 MR. THORP: Yes, it is.

7 MEMBER CORRADINI: What's the range of
8 fuzzy? Not earlier than, and not later than. Do you
9 know that at least?

10 MR. THORP: I don't have specific details
11 for you this morning --

12 MEMBER CORRADINI: Okay.

13 MR. THORP: -- on that.

14 MEMBER ARMIJO: Were the batteries used
15 for spent fuel cooling in Unit 4? Since they didn't
16 have a core inside the reactor, did they try and keep
17 the pools cool using battery power on Unit 4?

18 MR. THORP: We don't have information
19 on --

20 MEMBER ARMIJO: We don't know that?

21 MR. THORP: -- the answer to your
22 question.

23 MEMBER ARMIJO: Just one other top-level
24 question. Is there any information provided by the
25 Japanese on why Units 5 and 6 survived in a better

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1 state with --

2 MR. THORP: I have a couple of comments on
3 Units 5 and 6 as we move through that hopefully will
4 answer your question there.

5 Moving along, the loss of flow, and
6 presumably the inventory, some inventory in Units 1,
7 2, and 3, resulted in at least partial core uncovering.

8 Primary containment pressure increased, potentially
9 threatening the integrity of these structures, as
10 evidenced by the utility taking measures to reduce
11 pressure through venting.

12 The regulator reported that on 12 March,
13 as water level in Unit 1 reactor pressure vessel
14 lowered, fuel cladding interacted with the water and
15 generated hydrogen. This hydrogen accumulated outside
16 of the primary containment vessel and caused an
17 explosion in the reactor building. A similar --

18 MEMBER BANERJEE: How long was this period
19 from the initiation of the accident?

20 MR. THORP: Well, the accident started on
21 11 March, and this report from the regulator was that
22 on 12 March the gas buildup occurred, and then the
23 explosion occurred. I don't know exactly the
24 timeframe of the explosion.

25 MEMBER BANERJEE: So the timeframe -- you

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1 know when the explosion occurred, though, right?

2 MR. THORP: Yes.

3 MEMBER BANERJEE: You don't know when the
4 core started to produce hydrogen. That's what you're
5 saying.

6 MR. THORP: That's correct.

7 MEMBER SIEBER: How certain are we that
8 the hydrogen came from zirc water as opposed to a
9 couple of other --

10 MR. THORP: What we have is the report
11 from the regulator and their assessment that it was
12 generation based on zirc water reaction.

13 MEMBER SIEBER: Okay.

14 MR. THORP: A similar explosion was
15 reported by the regulator as having occurred in Unit 3
16 on 14 March. Two more explosions were reported in
17 Unit 2 and Unit 4 on 15 March. However, the exact
18 cause of these explosions is as of yet unconfirmed.
19 Open source imaging shows significant damage to the
20 Units 1, 3, and 4 reactor buildings. News videos
21 recorded the explosion in one or more of the units.

22 The utility reports that the Unit 2
23 explosion may have occurred within the suppression
24 chamber or torus, potentially damaging that unit's
25 primary containment.

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1 MEMBER CORRADINI: I'm sorry. So the last
2 statement you just made is confirmed or speculation?

3 MR. THORP: It's a report from the
4 utility.

5 MEMBER CORRADINI: And, again, the report
6 was -- where did it occur? Excuse me.

7 MR. THORP: That the Unit 2 explosion may
8 have occurred within the suppression chamber.

9 MEMBER CORRADINI: Within.

10 MR. THORP: Yes.

11 MEMBER CORRADINI: Okay.

12 MEMBER SHACK: Do we know how they tried
13 to do the venting?

14 MR. THORP: We don't have specific details
15 on the venting process they took.

16 MEMBER SHACK: So we don't know whether
17 they have hardened vents, sort of akin to what we
18 would expect.

19 MEMBER SIEBER: They apparently do not.

20 MR. THORP: It's not clear. We have been
21 told they don't. We have been told maybe they do, so
22 we have to find out.

23 MEMBER CORRADINI: So I'm going to ask you
24 something that is probably unfair, but -- so yesterday
25 in the House Energy and Commerce Committee,

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1 Congressman Markey claims he has an NRC report that
2 they had hardened vents. And I am trying to
3 understand where he got that and if it's true. So
4 what I'm hearing today is unclear.

5 MR. THORP: That's a totally unfair
6 question, right.

7 (Laughter.)

8 I really don't know.

9 MEMBER CORRADINI: Because Marty Virgilio
10 looked awful surprised when it was asked of him, and I
11 --

12 MR. THORP: Yes.

13 MEMBER CORRADINI: -- I want to get clear
14 what the facts are. And if we don't know the answer,
15 then we don't know the answer.

16 MR. THORP: We don't know the answer, but
17 that's certainly one of the questions that we will be
18 pursuing as part of our followup.

19 MEMBER SIEBER: Yes. The photos I saw --

20 MR. RULAND: Yes. We take, obviously,
21 what we say very seriously, and we want it to be
22 absolutely credible. So --

23 MEMBER CORRADINI: The reason I -- no, the
24 reason I ask that is because Marty's response was, "We
25 don't know." And he was told he was wrong, and I

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1 thought -- and the source of that was NRC, and I
2 thought that didn't make sense to me, and I wanted to
3 make sure at least I think -- at least somebody ought
4 to followup as to why these incorrect facts are
5 getting out.

6 MR. RULAND: You might have read some
7 press information about a document, a New York Times
8 article yesterday, you know, quoting a document from
9 the NRC. And I would submit that the people that are
10 quoting that document don't understand the context
11 that that document --

12 MEMBER CORRADINI: Fine, okay.

13 MR. RULAND: -- was produced.

14 MEMBER CORRADINI: Thank you. Fine.

15 MEMBER SIEBER: I have a quick question.
16 You had a torus explosion, presumably in Unit 2. That
17 was from the inside of the torus?

18 MR. THORP: It's not clear whether it was
19 just outside the torus or whether it was inside the
20 torus.

21 MEMBER SIEBER: Okay. But the inside of
22 the torus ordinarily would be under a nitrogen blanket
23 in that type of reactor, right?

24 MEMBER ARMIJO: Until it's vented, yes.

25 MEMBER SIEBER: And so --

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1 MEMBER CORRADINI: I was going to followup
2 my question. You're thinking the same thing I am. I
3 can understand it near, but not in.

4 MEMBER SIEBER: Yes, I guess we don't know
5 the answer to that right now.

6 MR. THORP: No, we don't.

7 MR. RULAND: Correct.

8 MR. THORP: Okay. Next slide. The status
9 on Units 1, 2, and 3 -- note, your particular
10 handouts, the hard copies that you have, may look a
11 little bit different than what is displayed on the
12 screen. I deleted the date 5 April, because I tried
13 to obtain the latest status as of this morning, so I
14 have got a couple of pieces of information that are
15 later than April 5th.

16 The regulator had reported that the
17 Units 1, 2, and 3 reactor cores are likely damaged, as
18 evidenced by the presence of iodine and cesium in the
19 environmental monitoring samples they have taken.
20 Additionally, TEPCO, Tokyo Electric Power Company, has
21 announced publicly that they estimate the core damage
22 in Unit 1 as 70 percent; Unit 2, 30 percent; and
23 Unit 3, 25 percent. These figures were based in their
24 statement on radiation levels that they measured in
25 the units on March 14th and 15th.

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1 MEMBER BLEY: We don't know what that
2 means, right?

3 (Laughter.)

4 I certainly don't know what that means.

5 MEMBER CORRADINI: So just to give you a
6 historical connection, if I remember correctly, the
7 few days following TMI, a number of laboratories were
8 asked to do analyses, and all came in with a damage
9 based on zirc water reaction of something on the order
10 of 50 to 70 percent. Is that -- I'm trying to
11 understand what that means. Is it a zirc water
12 reaction analysis? Is it a radioisotope analysis?
13 What is it?

14 MR. THORP: We don't really know. They
15 indicated it was based on radiation levels that they
16 had --

17 MEMBER SIEBER: So you can't prove that.

18 MR. THORP: That's right. Now, the use of
19 seawater for core cooling was taken for several days,
20 and resulted in some degree, we believe, of salt
21 buildup within the reactor pressure vessels for these
22 units. They have switched to fresh water cooling.

23 We learned from a Japanese television news
24 report on Tuesday, 5 April, that a safety relief valve
25 on Unit 1 was believed to be stuck open. But we have

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1 not obtained other or subsequent reports on the status
2 of this valve on Unit 1. We do --

3 MEMBER REMPE: Excuse me. What date would
4 they claim it had started to be stuck open?

5 MR. THORP: April 5th.

6 MEMBER REMPE: Okay.

7 MR. THORP: Nitrogen inerting of Unit 1
8 primary containment, those operations were conducted
9 on Wednesday, 6 April, yesterday, commencing at
10 10:30 p.m. Japan Standard Time.

11 MEMBER CORRADINI: I'm getting ahead of
12 you -- I apologize -- but -- so do they have
13 instrumentation that they can actually see a pressure
14 change with this injection?

15 MR. THORP: It's not clear what
16 instrumentation they have and how reliable the
17 instrumentation they have is.

18 MEMBER CORRADINI: And so the reason --
19 public reason given for this injection is?

20 MR. THORP: Well, their containments are
21 supposed to be inerted anyway. So their concern is to
22 inert the containment, so that if they have to vent
23 they will minimize the possibility of hydrogen
24 explosion.

25 MR. RULAND: And the inerting is happening

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1 in Unit 1, correct?

2 MR. THORP: Unit 1. That's correct.

3 MEMBER BANERJEE: Can you explain that to
4 me? I was also puzzled by that. How does injecting
5 nitrogen --

6 MR. THORP: It's not clear to me. I don't
7 want to dwell on it. It was --

8 MR. RULAND: What was the question?

9 MR. THORP: It was a discussion of partial
10 pressures. He doesn't understand why injection of
11 nitrogen would necessarily be a mitigating factor for
12 the potential for explosion.

13 MEMBER POWERS: It's a well-known
14 phenomenon that injection with nitrogen, getting it up
15 over 70 percent, interferes in the propagation of a
16 deflagration front, because -- simply because of heat
17 capacity.

18 MEMBER BANERJEE: So is that -- the
19 containment is supposed to be inerted, at least the
20 primary containment. So the point you are making,
21 Dana, is if it issues as a mixed stream of nitrogen
22 and hydrogen, that changes the deflagration of --

23 MEMBER POWERS: I believe the concern is
24 that the hydrogen within the drywell may be
25 accompanied by oxygen that exolved from the seawater

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1 that has been pumped in, subsequently leaked through
2 the -- into the drywell, and so they want any
3 hydrogen/oxygen mixture to be inerted.

4 MEMBER BANERJEE: Okay.

5 MEMBER POWERS: Right now it is probably
6 steam-inerted. But if you start putting cold water
7 in, you are going to eliminate the steam-inerting, so
8 they replace it with nitrogen-inerting and get it back
9 to the condition that it was designed to be in -- that
10 is, inerted.

11 MEMBER BANERJEE: Okay. Thanks.

12 MEMBER SIEBER: In order to re-inert
13 Unit 1 containment, did they actually have to vent the
14 containment?

15 MR. THORP: I don't know the specific
16 sequence of steps taken.

17 MEMBER SIEBER: To replace whatever is in
18 there with fresh nitrogen. Otherwise, pressures will
19 drop and --

20 MR. THORP: Right.

21 MEMBER SIEBER: -- I would have seen that
22 on the charts I read, and I didn't.

23 MR. THORP: Right. I don't know the
24 specific sequence of steps they took.

25 MEMBER CORRADINI: If I might just --

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1 again, I think you're going to say you're not sure,
2 but they are -- the procedures of venting are not -- I
3 know that they occurred over the first few days. Is
4 there still venting going on, or is that unclear also?

5 MR. THORP: That's also unclear, and
6 certainly the report that the safety relief valve was
7 stuck open is one indicator that perhaps they are
8 having to deal with that, but --

9 MEMBER CORRADINI: On Unit 1.

10 MR. THORP: -- it's unclear. On Unit 1.

11 MEMBER CORRADINI: The only reason I ask
12 the question is, from the same public sources I think
13 we are all looking at, Unit 1 is the only one that is
14 showing pressurized.

15 MR. RULAND: That's correct.

16 MEMBER CORRADINI: Okay, fine.

17 MR. RULAND: It's about seven pounds I
18 think, the last time I saw the number.

19 MEMBER ARMIJO: John, just a real basic
20 question. Do we have reasonably up-to-date drawings
21 of the Japanese plants and -- so that we can compare
22 them with the U.S. plants? You know, BWR4, Mark 1's,
23 BWR3's.

24 MR. THORP: I think we have been working
25 to obtain materials that -- from our staff that are

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1 stationed in Japan. We call them the site team or the
2 Japan detachment.

3 Bill, I don't know if you have other
4 comments on that.

5 MR. RULAND: Everybody knows this plant
6 was built by General Electric, so I would imagine
7 General Electric has the drawings and --

8 MEMBER ARMIJO: I've been there, you know,
9 and I --

10 MR. RULAND: Right.

11 MEMBER ARMIJO: -- from a hazy
12 recollection, they were very similar, if not
13 identical, to the U.S. plants. But I have heard all
14 sorts of stories that they were different, and I had
15 wondered -- I would like to know if the NRC has
16 drawings of the plants as they currently exist.

17 The other thing I know about the Japanese,
18 they were very careful to follow the safety upgrades
19 that the NRC required in the U.S. plants, but I have
20 heard otherwise. So I'm probably in the same state as
21 you may be, and I'm not sure what I can rely on.

22 MR. RULAND: Yes. One of the things the
23 staff is sensitive for -- is sensitive about is when
24 we -- we don't want to divert the Japanese attention
25 on their primary responsibilities to get the plant

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1 under control. Basically, you know, stop working on
2 what you're doing and, you know, come brief us.
3 That's not where we're at.

4 MEMBER ARMIJO: Send us your drawings,
5 while you're busy --

6 MR. RULAND: And so that has been, you
7 know, some of the reason, you know, the data stream we
8 have is slow. But I'm sure in the weeks and months
9 ahead, you know, we will be, you know, trying to get
10 that information.

11 MEMBER ARMIJO: Okay.

12 MEMBER SIEBER: When I looked at aerial
13 photographs, the vents did not appear to be hardened.

14 You can actually see them. And that leads to the
15 conclusion that the explosion probably occurred in the
16 outer shell of the containment building out in the
17 primary containment, but the concrete structure --
18 concrete and sheet metal structure above that, and
19 vent pipes -- it's hard to tell which unit you were
20 looking at that the vent pipes appeared to be broken,
21 and the building -- most of the building outside
22 covering is missing.

23 And with a hardened vent -- the vent,
24 prior to the venting operation, still filled with
25 oxygen, so the chance of a deflagration inside the

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1 vent is real, if you vent hydrogen through that.

2 MR. THORP: Let's see, to continue, I
3 don't -- I took that as a statement, not a question.

4 MEMBER SIEBER: It's a statement.

5 MR. THORP: Okay. Thank you. All the
6 units are using cooling pumps that are powered by
7 offsite power sources as of April 3rd. I apologize if
8 I am repeating myself.

9 Freshwater is being injected through
10 various means, including the feedwater and low
11 pressure coolant injection systems. There are reports
12 of high radiation levels, in the thousands of r,
13 inside the primary containments, as I had noted above.

14 While the radiation levels are high, they
15 have trended downward. As a result of the significant
16 dose rates onsite, several workers have received
17 higher than normal doses. However, there have been no
18 reports of workers exceeding regulatory dose limits
19 for response to emergencies.

20 MEMBER SIEBER: That's 10 for equipment,
21 25 for rem.

22 MR. THORP: I have seen a 25 rem limit for
23 a response to emergencies, and there are lower limits,
24 their normal regulatory limits, for exposure,
25 occupational exposure.

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1 MEMBER SIEBER: Well, there's two -- 10
2 and 25 -- is the three.

3 MEMBER REMPE: They increased it
4 periodically. It's my understanding that they went to
5 higher levels as this accident progressed.

6 MEMBER SIEBER: I'd rather two instances
7 over ten.

8 MEMBER RYAN: There's probably a little
9 bit of detail there in terms of the folks who get --
10 their feet have been exposed, and that's a local skin
11 dose as opposed to a whole body --

12 MR. THORP: Extremities dose, yes.

13 MEMBER RYAN: So I think it's -- you've
14 got to lay out all of the details to really understand
15 what the number means and in what context.

16 CHAIRMAN ABDEL-KHALIK: John, please
17 continue.

18 MR. THORP: Okay. Thank you. I'll try
19 and move along.

20 The Unit 4 reactor core was offloaded into
21 the spent fuel pool about three months prior to the
22 earthquake. The Unit 4 explosion that occurred on
23 15 March caused significant damage to the reactor
24 building. Since the spent fuel pool cooling system is
25 not functional, cooling and makeup water is being

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1 provided by injection of fresh water from a concrete
2 pumper truck.

3 Units 5 and 6 did not experience an
4 extended station blackout condition following the
5 earthquake and tsunami, although Unit 5 may have
6 experienced loss of all AC power for a period of time.

7 These two units are in cold shutdown, and shutdown
8 cooling systems are operating normally for Units 5 and
9 6.

10 MEMBER CORRADINI: Can we go back to Sam's
11 question about -- I'm sorry, but Sam asked something,
12 and you were going to defer him. So this is --

13 MEMBER ARMIJO: Yes. Do you have any kind
14 of a -- call it speculation for now -- from the
15 Japanese or from internally of why Units 5 and 6 fared
16 better? Are they --

17 MR. THORP: I have a photo --

18 MEMBER ARMIJO: -- at the same elevation?

19 MR. THORP: -- that will come after this
20 that will I hope show you -- well, you won't see
21 Units 5 and 6 on this photo. But Units 5 and 6, oddly
22 enough, are located to the north of Units 1, 2, 3, and
23 4, okay? And they appear to be on somewhat higher
24 ground than those four units.

25 MEMBER SIEBER: Do we know how much higher

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1 that is?

2 MR. THORP: We don't know how much higher
3 that is.

4 MEMBER ARMIJO: Well, John, many of us --
5 as you must realize, we have been working on this
6 thing from various sources of information. And if you
7 go on Google Maps, they have an elevation feature.
8 And I did, in fact, look to see if there was any
9 elevation differences in parking lots next to Units 1
10 through 4, and 5 and 6. And my unverified numbers was
11 about another 10 feet higher up on the Units 5 and 6.

12 I don't know if that's actually fact or --
13 but I'm looking for some reason that tells us why 5
14 and 6 made it past this, didn't get into the same
15 state.

16 MEMBER SIEBER: Yes. I reviewed your
17 numbers. I don't fully agree.

18 MEMBER ARMIJO: I wouldn't be surprised.

19 MEMBER SIEBER: I think it's a figurative
20 distance.

21 MEMBER ARMIJO: Well, that's good.

22 MEMBER SIEBER: But that's probably the
23 reason why that occurred right there.

24 MEMBER ARMIJO: Well, that's sort of the
25 things that are on a list of questions that the ACRS

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1 is probably going to be putting together, a list of
2 kind of key questions that --

3 MEMBER SIEBER: We could all --

4 MR. THORP: One of my colleagues that will
5 speak to the station blackout topic, and will be able
6 to address a slight difference between Units 5 and 6,
7 emergency diesel generators and how they respond to a
8 blackout --

9 MR. RULAND: John?

10 MR. THORP: -- or loss of power versus --

11 MR. RULAND: John?

12 MR. THORP: -- the other units, so I would
13 like to defer to --

14 MR. RULAND: George, why don't you mention
15 that briefly.

16 MR. WILSON: Yes. The --

17 MR. RULAND: This is George Wilson.

18 MR. WILSON: One of the units has a HPCS,
19 and Unit 5 has HPCS diesel -- or it might be Unit 6 --
20 has HPCS diesel, has a HPCS system. So if it has a
21 HPCS diesel, that is the power supply. So the fact
22 that it has a HPCS diesel, that -- and at that
23 elevation, nothing happened to that HPCS diesel.

24 Therefore, power was there, and they were
25 able to -- what we think is that they were able to

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1 cross-connect the Unit 5 and Unit 6 spent fuel pools,
2 because they didn't have the power from the HPCS
3 diesel on the other unit. So there was nothing
4 happening to that.

5 MEMBER ARMIJO: And you mentioned a
6 somewhat higher elevation? Do you have a --

7 MR. WILSON: Well, it --

8 MEMBER ARMIJO: -- for that, or is that a
9 fact, that you know that there is an elevation
10 difference?

11 MR. WILSON: As John said, I don't know if
12 there is an elevation difference. But as you do know,
13 HPCS is a safety-related system. And it's used -- I
14 mean, it should be in an environment that it would be
15 protected from that, because that would be the safety-
16 related diesel. So, and that's all we know.

17 MEMBER ARMIJO: Okay.

18 CHAIRMAN ABDEL-KHALIK: Now, with regard
19 to the spent fuel pools, it is my understanding that
20 the emergency operating procedures used by the
21 Japanese are similar to those used at U.S. plants.
22 And for both BWRs and PWRs, the emergency operating
23 procedures focus on maintaining the critical safety
24 functions of the reactor.

25 Nowhere in the EOPs are the operators

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1 asked to check the status of the spent fuel pools.
2 Given what happened at Fukushima with regard to the
3 spent fuel pools, should the licensees be asked to
4 evaluate the adequacies of their EOP?

5 MR. RULAND: EOPs and the SAMGs are going
6 to be one of the things that the task force is going
7 to look at.

8 CHAIRMAN ABDEL-KHALIK: Okay.

9 MEMBER CORRADINI: Can I get back just to
10 -- so we asked about the schematics, and you said
11 they're busy and you don't have them. What about the
12 capacities and the loadings on the spent fuel pools,
13 including the common ones? Do you know what that is,
14 or --

15 MR. THORP: I don't have specific details
16 with me on that. We have worked to get some
17 information from GE-Hitachi on the fuel assembly
18 loadout in the various spent fuel pools, and the
19 normal core loading number of assemblies, etcetera, in
20 each of the reactor pressure vessels. But I couldn't
21 answer the question for you right now.

22 MEMBER CORRADINI: That's fine. That's
23 fine. I figure a lot of the things we're asking
24 you're going to defer, and that's fine. We'll make a
25 list.

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1 But the reason I'm asking the question is,
2 particularly for Unit 4, since it was offloaded, I was
3 curious about what was in Unit 4 besides the core.
4 And given the fact there is like three or four NUREGs
5 that NRC has done on spent fuel pools relative to
6 accident situations and essentially boildowns, what
7 would be -- has the NRC done a calculation on if -- if
8 unattended, how many days would this pool have been
9 able to -- do you know what I'm asking?

10 MR. THORP: Yes. Yes.

11 MEMBER CORRADINI: And has that been done?

12 MR. THORP: We have been working to obtain
13 information in that regard and to conduct some
14 calculations, but I don't know whether they are
15 finalized or not.

16 MEMBER CORRADINI: That's fine, that's
17 fine. But you have already thought in that regard.

18 MR. THORP: We did.

19 MEMBER CORRADINI: Thank you.

20 MR. RULAND: When we talk about emergency
21 planning, we have -- that's one of the topics.

22 MEMBER CORRADINI: Okay. Thank you.

23 MR. RULAND: We'll bring that up then.

24 MEMBER CORRADINI: Thank you very much.

25 MEMBER SIEBER: One thing I would point

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1 out is the fuel pool content is going to be typical of
2 plants that are regularly in service. On the other
3 hand, I think it makes, from a thermal hydraulic
4 standpoint, a difference to know how they -- where
5 they place fuel assemblies in the pool.

6 You can build a chimney effect by having a
7 whole core discharge in one place in the pool, which,
8 you know, mixing is natural circulation, and fuel
9 damage will occur earlier if it's that way as opposed
10 to spread around to cool it. So that would be
11 something that we need to learn what the pattern was.

12 MR. RULAND: Randy? If you don't --
13 Randy, could you talk about this a little bit, please?

14 MR. SULLIVAN: Yes, Randy Sullivan. I'm
15 not the spent fuel pool expert, but much of what you
16 are asking was known in the Operations Center. And
17 these spent fuel pools very much do not look like your
18 typical American spent fuel pool. They are not re-
19 racked densely.

20 In Unit -- let's see, let me get this
21 straight -- 1, 2, 3, there is like one core offload.
22 There was some calculations -- this was a surprise to
23 us early on. We were unaware of this until later in
24 the event, but we do have some calculations in the Ops
25 Center on time to boil off.

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1 You know, we would assume in a typical
2 U.S. spent fuel pool you've got, I don't know, six
3 days, eight days, something. These are more like 30
4 days. I have even heard 100 days.

5 Now, Unit 4 was the exception. There was
6 a 105-day-old full core offload, and of course Unit 4
7 is where the problem was.

8 I don't have the actual numbers at my
9 fingertips, and I would encourage you to wait.

10 MEMBER CORRADINI: That's fine.

11 MEMBER REMPE: Would you elaborate a
12 little more about the geometry being different? And,
13 in particular, in Unit 4?

14 MR. SULLIVAN: Yes.

15 MEMBER REMPE: Tell me what, you know --

16 MR. SULLIVAN: In a typical U.S. spent
17 fuel pool, you will find several cores, right? And
18 we're -- I'm sorry?

19 MR. RULAND: Just to kind of put this in
20 perspective, the spent fuel pools -- we don't know
21 what the condition of the spent fuel pools were after
22 the seismic event.

23 MEMBER REMPE: I'm talking about just
24 the --

25 MR. RULAND: We don't know --

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1 MEMBER REMPE: -- structure, John.

2 MR. RULAND: We don't know structurally
3 what their condition was. We don't know how much
4 water was in the spent fuel pools after the seismic
5 event. And we don't know how much water was in after
6 the explosion. So there is lots of uncertainty to --
7 you know, trying to -- you know, truly it is a rough
8 estimate. Anything that we could have done was a
9 rough estimate about time to boil.

10 CHAIRMAN ABDEL-KHALIK: But in terms of
11 geometry, there were indications that there is a
12 shallow part of the pool. And if that is the case,
13 was the full core offload for Unit 4 placed in the
14 shallow part of the pool?

15 MR. RULAND: I have no idea. No idea.

16 MR. SULLIVAN: The only thing I wanted to
17 relate that we were sure of is that there was fewer
18 elements in the pool than perhaps you were expecting,
19 given your U.S. experiments.

20 MEMBER CORRADINI: That's fine. Thank
21 you.

22 MR. SULLIVAN: That's what I am sure of.

23 MEMBER CORRADINI: Thank you.

24 MEMBER REMPE: But building geometry,
25 anything different that you know about?

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1 MR. SULLIVAN: No, sorry. Can't help you
2 with building geometry.

3 MEMBER REMPE: Okay.

4 MEMBER BLEY: Bill, quickly, you mentioned
5 the SAMGs. I've heard different things over the
6 years. Up to this point in time, does staff review
7 the SAMGs in any way, or audit them? Or because it's
8 outside the design basis, are they really outside of
9 the normal scope?

10 MR. RULAND: The SAMGs are something that
11 we worked with industry to establish, right, at a high
12 generic level. So that's what we did.

13 MEMBER BLEY: Okay.

14 MR. RULAND: You know, I'll be sure that
15 we're -- the whole issue of SAMGs and what -- what is
16 appropriate there is going to come out. I know the
17 Chairman here has opined that the -- you know, they
18 have similar procedures that we do. We have heard
19 that.

20 CHAIRMAN ABDEL-KHALIK: Not with regard to
21 SAMGs, though.

22 MR. RULAND: With SAMGs or EOPs. You
23 know, we -- that has not been verified. That might be
24 -- you know, that could be a presumption, but we don't
25 know for certain. You know, this will come out in the

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1 weeks and the months ahead.

2 MEMBER SIEBER: One of the things I think
3 would help in an analysis of all of this is to know
4 what happened in that first hour of operation between
5 the earthquake and whatever seismic damage occurred in
6 the tsunami, because it appears to me is the tsunami
7 caused the bulk of the problems, as opposed to the
8 seismic event.

9 And from a regulatory standpoint, that
10 makes a big difference as to how you treat various
11 phenomena, natural phenomena at various sites. So
12 perhaps you can reach into that area and see what you
13 can pull out.

14 MR. RULAND: How much more time, John?

15 MR. THORP: We're just about done.

16 MR. RULAND: Okay.

17 MR. THORP: But I think that's going to be
18 another one of the focuses of the task force's
19 Committee.

20 There are a number of photographs -- you
21 can see one of them here -- of the Fukushima Daiichi
22 site that have been released through the media. This
23 is one such photograph with the units labeled as
24 shown. The degree of destruction of the secondary
25 containment buildings is evident from the photographs

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1 as you look at them.

2 Units 5 and 6 are not --

3 MEMBER RAY: You are now calling these
4 "secondary containments" consistently.

5 MR. THORP: That's what I am calling them.
6 You know, I'm a PWR guy, so here I am trying to
7 relate BWR stuff.

8 MEMBER SIEBER: Call them reactor
9 buildings.

10 MR. THORP: Reactor building, yes.

11 MEMBER RAY: Reactor building is what I
12 have been calling them.

13 MR. THORP: Yes. I'm good with reactor
14 building.

15 MEMBER RAY: All right.

16 MR. THORP: Units 5 and 6 are not show in
17 this picture, but they are located, as you're looking
18 at this picture, to the left or to the north end of
19 the site.

20 And that concludes the slides that I
21 intended to present.

22 MEMBER ARMIJO: Where is the common fuel
23 pool for the discharge?

24 MR. THORP: The common fuel pool -- I
25 can't point it out exactly, but it's kind of south of

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1 Unit 4.

2 MEMBER ARMIJO: Okay.

3 MR. THORP: In one of the structures
4 there, but I don't know specifically.

5 MEMBER ARMIJO: All right.

6 MEMBER SIEBER: Those tower-like
7 structures are the vent towers, right?

8 MR. THORP: That would have been my guess,
9 but I don't know for sure.

10 MEMBER SIEBER: That's what I assume from
11 the photographs that I saw.

12 MR. RULAND: Eric?

13 MR. BOWMAN: Good morning. On March 18th,
14 we issued the first generic communication on the
15 subject. It is the only generic communication we have
16 issued so far, Information Notice 2011-05.

17 The purpose of that Information Notice was
18 to provide a summary, a high-level summary of the
19 events as they happened, as we knew them at the time,
20 to the industry and to allow the recipients to review
21 the information and consider what actions would be
22 appropriate on their parts to avoid having similar
23 problems at their sites.

24 In addition to the description of the
25 circumstances as we knew it to have occurred, we

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1 provided a discussion of the regulatory background
2 that we felt was pertinent to the events that took
3 place.

4 In particular, we discussed General Design
5 Criteria 2, or whatever the similar design criteria
6 requirements were for appropriate licensees, the B.5.b
7 requirements for mitigating strategies for beyond
8 design basis events that came out after the terrorist
9 events of September 11, 2001, and the station blackout
10 rule.

11 We also provided a look ahead to what was
12 -- what we knew of the industry initiatives following
13 on to the event to verify their capabilities. Tim
14 Kobetz will be covering that. And we provided a
15 discussion of the upcoming Temporary Instruction to
16 conduct inspections, and Barry Westreich will be
17 discussing the task force action that came out after
18 the follow-on Commission meeting.

19 CHAIRMAN ABDEL-KHALIK: It's my
20 understanding that the equipment staged by the
21 licensees in response to Section B.5.b are based on an
22 event at a specific unit, at a single unit. So for
23 licensees of multiple-unit sites, are they being asked
24 to also evaluate the adequacy of the staged equipment,
25 if more than one unit is involved?

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1 MR. THORP: This was an information --

2 MR. RULAND: Barry, could you -- hold on a
3 second. Barry was associated with -- you know, he is
4 on rotation from NSIR. Can you answer that question,
5 Barry?

6 MR. WESTREICH: Yes, the B.5.b equipment
7 was there for an event. It wasn't for a single unit.

8 So the licensees evaluated an event -- large
9 explosion -- to see the location of the various units.

10 They may be designed for multiple units. We don't
11 really know. I mean, I can't give you an answer
12 specifically for the fleet. So some sites have
13 capabilities for multiple units; some may not.

14 MEMBER ARMIJO: This was a mind-boggling
15 event, you know, which may be much different than what
16 we have traditionally thought of as an event.

17 MR. THORP: Barry, if I could address the
18 question, this was an Information Notice. We did not
19 ask them to evaluate anything. We provided the
20 information so they could do their own evaluations.
21 The Temporary Instruction inspection will follow-on to
22 take a look at those things.

23 And also, the details of the mitigating
24 strategies requirements are typically Official Use
25 Only security-related information that we have not

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1 released to the public, and we aren't really prepared
2 at this point to --

3 CHAIRMAN ABDEL-KHALIK: But the industry,
4 on its own, is asking licensees to do these
5 evaluations, and the question is whether the staged
6 equipment would be adequate if you have an event that
7 involves more than one unit on a multi-unit site.

8 MR. RULAND: I'm certain that that is one
9 of the questions the task force will address.

10 CHAIRMAN ABDEL-KHALIK: That what --

11 MR. RULAND: The task force will address
12 that question.

13 CHAIRMAN ABDEL-KHALIK: The task force,
14 right? Is that a question that has already been
15 asked?

16 MR. RULAND: The task force has not only
17 long term, which is -- has the short-term actions,
18 which is within 90 days, and those are the issues that
19 are adequate protection issues. So that's what the
20 task force has on their plate near term. And then,
21 after the three months, it turns out the three-month
22 to nine-month timeframe is the longer term actions.

23 So the task force is asking the adequate
24 protection issue virtually as we speak. Is there
25 anything that needs to be done, as an adequate

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1 protection issue, that needs to be addressed now? And
2 that's the question that is on the task force's plate.

3 CHAIRMAN ABDEL-KHALIK: Thank you.

4 MEMBER CORRADINI: Just a clarification.
5 So I don't understand the sequence. So the
6 Information Notice went out within the first week?

7 MR. BOWMAN: Yes.

8 MEMBER CORRADINI: Okay. And then, this
9 in some sense -- I don't want to say call it an
10 inventory, but this is a -- shall I say, an inventory
11 of what from various rules historically are onsite for
12 the various units. And then, you said something after
13 that that I wanted to connect to it. You said that
14 there will now be a temporary order or a temporary --
15 I don't remember what you called it, but an
16 inspection, an onsite inspection, by the NRC staff.

17 MR. BOWMAN: Tim will be addressing that.

18 MEMBER CORRADINI: Oh, I'm sorry. Okay,
19 okay. Thank you.

20 MR. BOWMAN: Any other questions for me?

21 (No response.)

22 MR. KOBETZ: All right. I'm Tim Kobetz.
23 I'm the Chief of the Reactor Inspection Branch, and,
24 as we have just discussed, I am going to be talking
25 about -- at a high level about some industry

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1 initiatives, because we only know about them at a high
2 level.

3 But I am going to be talking about our
4 Temporary Instruction and what that is, and how that
5 is going to be looking at some of what they're doing,
6 and then also performing somewhat of an independent
7 assessment. But it's a quick high-level look, and
8 I'll talk about that.

9 So within a few days of the event, the
10 industry -- an industry-wide initiative was launched
11 to assess the plant's readiness to manage some of
12 these extreme events. The assessments are scheduled
13 to be completed within 30 days, so that would be mid
14 -- probably late April.

15 There is really four areas that they were
16 looking at, and, again, I'm going to talk about them
17 at a high level, because we don't know specifics as
18 to, you know, the question that you just brought up
19 about, are they looking at the 50.54(hh)(2) for
20 multiple sites. We don't know that yet, but that's
21 part of what our Temporary Instruction would be doing.

22 So the first area that they would be
23 looking at is verifying each plant's capability to
24 manage major challenges, such as aircraft impacts, as
25 we just talked, and other losses of large areas of the

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1 plant due to natural events and fires. You know, this
2 is somewhat from the 50.54(hh)(2).

3 Specific actions would include testing and
4 inspecting equipment required to mitigate these
5 events, and verifying that qualifications of the
6 operators and support staff are in place, and, you
7 know, up to date to deal with what they have put in
8 place.

9 The second one would be verifying the
10 plant's capability to manage a total loss of offsite
11 power. You know, you're at station blackout, which,
12 as we said, George Wilson will go into a little bit
13 more on our requirements for a station blackout. But
14 this is going to require verification that all of the
15 required materials are adequately -- are adequate and
16 properly staged, and that the procedures are in place,
17 and that operator training is, again, up to date.

18 The third one is verifying capability to
19 mitigate flooding and impact of floods on systems
20 inside and outside the plant. Specific actions
21 include verifying required materials and equipment are
22 properly located again.

23 One of the things I would like to point
24 out is these are things that we do look at during, you
25 know, the inspections. But they are going to be

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1 looking at them here from a slightly different angle
2 now as to what could go beyond.

3 And then, the last one, they are
4 performing walkdowns and inspections of important
5 equipment needed to respond successfully to extreme
6 events like fires and floods. This will include an
7 analysis identifying any potential equipment functions
8 that could be lost during a seismic event, and then
9 developing strategies to mitigate any potential
10 vulnerabilities.

11 Walkdowns and inspections will include
12 important equipment, permanent and temporary, such as
13 storage tanks, plant water to intake structures, and
14 fire and flood response equipment.

15 So the NRC obviously wants to -- may have
16 a good understanding of what the licensees are looking
17 at, and then perform somewhat of an independent look
18 as to what else we think should be addressed going
19 into the future.

20 So that takes us --

21 MEMBER CORRADINI: I'm sorry. I just
22 wanted to make sure -- this is everything onsite, and
23 particularly in your fourth bullet relative to natural
24 disasters. So spent fuel, other things that are not
25 necessarily independent, is that what I understood

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1 that to mean?

2 So, for example, what I was looking for is
3 some sort of discussion about natural events that may
4 affect spent fuel cooling.

5 MR. KOBETZ: Would they be looking at
6 this?

7 MEMBER CORRADINI: Yes.

8 MR. KOBETZ: That's our understanding.

9 MEMBER CORRADINI: Okay.

10 MR. KOBETZ: Again, we're going to have to
11 follow up during the TI, but --

12 MEMBER CORRADINI: Thank you.

13 MR. KOBETZ: So we decided to perform a
14 Temporary -- issue a Temporary Instruction to perform
15 an inspection. Just to give you an understanding of
16 what a Temporary Instruction is, you know, we have our
17 normal baseline inspection program and other special
18 inspections. But when things come up, a Temporary
19 Instruction is used for a one-time inspection to focus
20 on a current safety issue.

21 Now, where we usually use Temporary
22 Instructions are going to be maybe to follow up on
23 licensee actions in response to a Generic Letter or
24 something like that, something that we are going to do
25 one time, or when an event like this happens and we

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1 want to gather some information and see what else
2 maybe we should be doing, or the industry should be
3 doing. And then, this -- the information that we
4 would gather from this would feed into the teamwork
5 that Barry is going to be talking about.

6 So on March 23rd, the NRC issued a
7 Temporary Instruction, which was very quick for doing
8 one of these, to focus on these things. The objective
9 of the TI is to independently assess the adequacy of
10 the actions taken by the licensee in response to the
11 Fukushima event. The inspection results from this TI
12 will be used to evaluate the industry's readiness for
13 a similar event, and aid in determining whether
14 additional regulatory actions by the NRC are
15 warranted.

16 The intent of this TI is to be a high-
17 level look at the industry's preparedness for events
18 that in some aspects could exceed a design basis for
19 the plant -- in some instances. If necessary, more
20 specific followup inspection will be performed.

21 The inspection assessment area is similar
22 to the industry initiative. However, to maintain our
23 independence, as I was noting, from the industry
24 inspection, we are going to use a combination of
25 looking at what the industry is doing, what they are

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1 finding, and then doing some independent looks at
2 those areas.

3 Our inspections are scheduled to be
4 completed by April 29th, and then the report
5 documented by May 13th.

6 MEMBER POWERS: I'm a little unclear.
7 What is it that you are looking for? Their ability to
8 respond to beyond design basis events?

9 MR. KOBETZ: Well, it's to look to make
10 sure that the things that they've put into place for
11 some of these other things, such as 50.54(hh)(2),
12 station blackout, they are still -- they are
13 maintaining them and that.

14 But the fourth one is to look at, okay,
15 let's say we do have the fire and the flood and the
16 earthquake at the same time. What are the
17 vulnerabilities? Are there things that they need to
18 put in place? Are they putting things in place into
19 their corrective action program?

20 But, again, it's a high-level look to see,
21 are there some vulnerabilities that we haven't noted
22 before? And what is the industry doing about it? And
23 what should we maybe do about it down the road?

24 MEMBER CORRADINI: I'm kind of with Dana.
25 I want to understand the logic. So the first logic

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1 was the -- what's called the Information Notice, to
2 kind of list the stuff. I'll call it an inventory.
3 That's the wrong word.

4 Now, you are going out with staff to look
5 at the list and say, "Okay. What is the current
6 status of these items relative to their originally
7 intended function?" And then, you are going to ask --
8 or you are going to look at the same things and their
9 maintenance and upkeep for what exactly?

10 I understand Step 1, which is you were
11 supposed to do this, what's the list, now I am going
12 to go out and make sure that the list is there and
13 it's being maintained per the original objective.
14 Now, the second part of that I'm still --

15 MR. KOBETZ: Well, actually, it's the
16 fourth part --

17 MEMBER CORRADINI: Okay.

18 MR. KOBETZ: -- is the licensee would be
19 going out and performing walkdowns of other equipment
20 -- tanks, things that could be lost that maybe weren't
21 considered in the original design basis of the plant
22 but need to be looked -- or they think could cause a
23 vulnerability, maybe not. But it's to look, you know,
24 at those types of things.

25 MEMBER CORRADINI: All right. I mean, I'm

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1 sorry I can't get a hold on this one. So do they know
2 what they are looking for? That's what I'm -- I'm
3 struggling here. I understand their original
4 objectives and what they have installed it for, and I
5 understand that you want to make sure that what is
6 installed is there and being properly maintained.

7 But the fourth thing I'm -- it seems a bit
8 fuzzy, so I'm trying to understand what -- what is an
9 applicant going to do there, and what is the staff
10 going to do versus the applicant's stuff onsite?

11 MR. RULAND: Right now, what the staff --
12 the regional staff and the inspectors have been
13 assigned to do is not only to kind of look at what
14 licensees are doing, but to independently examine the
15 site, think about potential flooding, dam failures,
16 whatever external events that site could affect, write
17 that down and provide it to us.

18 And what that is going to do is inform the
19 task force, oh, here is what so-and-so inspector at
20 such-and-such a plant identified as a potential
21 vulnerability, and that will -- that information --
22 because we're not going to do anything about it at
23 this stage, that information then would go to the task
24 force, be examined by not only the task force but NRR
25 management, and, okay, what do we need to do about

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1 this? It's basically going to feed into our overall
2 picture of, what do we need to do to respond to this
3 event?

4 MEMBER CORRADINI: But let me just push
5 back a little bit. So I understand the objective, but
6 the staff -- your staff, I mean, inspection staff
7 that's going out, to put it crudely, do they have a
8 menu or a thinking process they are going to use as
9 they go doing this looking? If the answer is no, you
10 could get soup to nuts.

11 MR. RULAND: And that's --

12 MEMBER CORRADINI: That's what I'm worried
13 about.

14 MR. RULAND: That's -- well, I would argue
15 that that's not a worry; that's an advantage. We've
16 got 104 sites out there. Inspectors know the plants.
17 They know what their FSAR says, and they have a
18 decent idea of what are those potential events. This
19 is something that the staff got out very quickly. It
20 is just our initial look at what is going on out
21 there. It is not the -- in any shape or form the
22 final statement about what licensees need to do or do
23 not need to do.

24 MEMBER CORRADINI: That part I get. I
25 understand.

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1 MR. KOBETZ: And to help focus, one of the
2 things that we are doing -- because, you know,
3 obviously we do have 104 sites, 65 reports. We have
4 weekly calls. We start having weekly calls with the
5 different regions to talk about things that they are
6 finding, so they can exchange information. Maybe
7 there is something at a plant that one inspector
8 identified that another inspector didn't think to look
9 at, and so we are trying to do that. But, as Bill
10 said, this is the first of -- just to feed in.

11 MEMBER CORRADINI: Okay.

12 MEMBER SIEBER: You're actually inspecting
13 for the current requirements of the plant as opposed
14 to tasking inspectors to figure out what happened at
15 Fukushima, and how should you change the plant. To
16 me, that's two different things. I think that you are
17 treating it as two different things, which is the
18 appropriate way to do it.

19 Until your task force is done analyzing
20 what happened in Japan, that's the only way you can
21 decide what new requirements you need to put on plants
22 here to protect against that same thing.

23 So you are determining existing
24 conditions, deciding what needs to be changed,
25 changing the rules to make that happen, and sometime

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1 in the future there will be an inspection to make sure
2 everybody did it. And that's what -- how I
3 understand, in simplistic terms, what it is you're
4 doing now. Is that correct?

5 MR. RULAND: Yes.

6 MR. KOBETZ: That was all of the -- my
7 presentation, if there's no other questions.

8 CHAIRMAN ABDEL-KHALIK: Thank you.

9 MR. WESTREICH: My name is Barry
10 Westreich. I'm going to talk about the task force.
11 We have talked about it quite a bit already, so that
12 there is a lot of the details we have already gone
13 over. And just to clarify, I am not on the task
14 force, so -- I have spoken to them. I know they have
15 started their efforts, and we are providing input to
16 them as they begin to understand what their efforts
17 are going to be.

18 But on March 23rd, the Commission directed
19 the staff to establish this task force. It is a
20 methodical review and will recommend near-term actions
21 to improve our regulatory system. It is independent
22 from the industry efforts, so it is our own
23 independent review. And they will be discussing with
24 staff and others a variety of our current status and
25 the areas where we need to go in the future.

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1 As on the slide, they have a number of
2 milestones. The first milestone is a 30-day
3 Commission meeting, which the date is May 12th. And
4 then, the 60-day meeting on April 16th, and the 90-day
5 meeting corresponds with the issuance of their final
6 near-term report, which is on July 19th.

7 And then, they are also looking at a
8 longer term. And as Bill indicated, that effort is to
9 start no later than the issuance of the 90-day report,
10 and it will extend for six months.

11 They are looking at specific information
12 on sequence of events. A lot of this stuff we have
13 talked about today they will be looking at in greater
14 detail -- potential interagency issues and policy
15 issues, as well as lessons learned for non-operating
16 reactors, non-power reactors.

17 They intend to have extensive interaction
18 with the key stakeholders, and they will issue a
19 report at the end of that six-month period for the
20 longer term effort. And then, as you indicated, the
21 ACRS has been asked to review that and report back to
22 the Commission on their findings.

23 MEMBER CORRADINI: Is there -- I'm sure
24 there is. Is there a -- for want of a better word --
25 a to-do list and a schedule that goes along with three

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1 months, and then the further meeting, that is out
2 there?

3 MR. WESTREICH: Well, my understanding,
4 they do have a charter that has been developed, but I
5 think they are still reviewing kind of the world, the
6 universe of issues they might want to consider in --

7 MEMBER CORRADINI: But they are still
8 developing this.

9 MR. WESTREICH: They are.

10 MEMBER CORRADINI: Okay.

11 MR. WESTREICH: As far as I know.

12 CHAIRMAN ABDEL-KHALIK: Now, most of our
13 plants are located on multi-unit sites. And yet many
14 of our safety-significant decisions are made on an
15 individual unit basis. There are many examples of
16 that. The estimated risks are done on an individual
17 unit basis rather than site-wide basis.

18 Our operator training programs, simulator
19 training scenarios, design of full-scale simulators,
20 the role in training of shift technical advisors,
21 given what happened, should we change our paradigm and
22 address issues based on site-specific evaluations,
23 general site evaluations rather than unit-specific
24 evaluations?

25 MR. WESTREICH: Well, I think those are

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1 all good issues that the task force I'm sure will be
2 wrestling with.

3 CHAIRMAN ABDEL-KHALIK: Okay.

4 MR. RULAND: That's it, right, Barry?

5 MR. WESTREICH: Yes, that's it. So now we
6 tag-team to the next group.

7 MR. RULAND: Yes, right. Next group?

8 (Pause.)

9 MR. RULAND: I've just advised the NRC
10 staff that we have like 51 minutes left, so kind of
11 march -- you know, let's try to -- because I know the
12 ACRS members want to address each one of these issues.

13 MR. ALI: Yes. I'm Syed Ali from the
14 Office of Research SL, Structural Issues, and I'm
15 going to give you a brief overview of the seismic
16 environment or seismic background.

17 So this earthquake was magnitude 9 on the
18 Richter scale. The epicenter was about 109 miles from
19 the Fukushima site. The peak ground acceleration at
20 about 80 miles from the epicenter was in the range of
21 1 to 2.75 g.

22 A couple of slides down I will give you a
23 little bit more on the Fukushima site itself. The
24 question that came up in the beginning about the
25 hazard, we don't have probabilistic data, but we do

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1 have some comparisons of the design versus the
2 observed.

3 MEMBER SHACK: How about their procedure
4 for developing a design earthquake? Does it sort of
5 go through a seismic hazard analysis somewhat akin to
6 what we do, or do they go strictly on historical
7 record?

8 MR. ALI: Well, I think they are in the
9 same kind of a phase that we are. You know,
10 previously, they were more deterministic, and now they
11 are trying to do more of hazard assessments. But for
12 this particular plant, from what we know it was, you
13 know, deterministic basis.

14 MR. RULAND: But we have been working very
15 closely with the Japanese in this particular seismic
16 area. As a matter of fact, the event, if you recall,
17 happened on Friday, the 11th of March. Their seismic
18 experts were here in country for the RIC, and our
19 seismic experts were meeting with them during that
20 time.

21 MR. ALI: That's right. I was actually in
22 that meeting all day long with them and their Director
23 of the Seismic Division. That was JNES was going back
24 and forth to the Ops Center to, you know, find out the
25 status of what is happening and kind of updating us.

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1 So, yes, we do have a cooperative research program
2 with JNES.

3 The tsunami data -- we say peak amplitude
4 reports vary, because looking at different reports we
5 get different numbers. Now, that could be because
6 they were observed at different locations or
7 interpreted differently, but we have numbers anywhere
8 varying from 14 meters to 23 meters from the wave
9 height.

10 The design basis number -- again, we don't
11 have the exact numbers right now, but that also varies
12 anywhere from five to 10 meters. And we have seen
13 some reports stating that the reactors and the backup
14 power sources were located 10 to 13 meters above the
15 sea level. But, you know, this is something that we
16 will be getting more details on and firm up the
17 numbers as we move along.

18 MEMBER STETKAR: Syed?

19 MR. ALI: Yes.

20 MEMBER STETKAR: That's the diesels.
21 Where are -- the switchgear was located relatively low
22 in the plant, though, wasn't it?

23 MR. ALI: That I don't know.

24 MEMBER STETKAR: Okay. But, I mean, you
25 can have survivable diesels but no -- they seem to be

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1 having problems connecting electric power to things.

2 MR. RULAND: Right.

3 MEMBER STETKAR: Because of flooded
4 switchgear.

5 MR. RULAND: Right. It's the whole suite
6 of what, you know, you need the diesel for -- the
7 tanks, the diesels, and the switchgear, all of them,
8 right, is what could have been affected.

9 MR. ALI: Actually, I was in Japan. I
10 went there as a part of the second team and just came
11 back a couple of days ago. And, you know, their
12 emphasis right now is to deal with the current crisis
13 and not -- not deal so much with the -- you know, how
14 it happened, but, you know, deal with the crisis as it
15 unfolds.

16 The next -- this slide gives a little bit
17 of a flavor of the design basis peak ground
18 acceleration versus the observed. And what you see
19 here for -- you know, this is kind of a representative
20 number for Unit 2. The design was less than the
21 observed. The observed was more.

22 We do have numbers for the other units
23 also, so from the records that we have seen, or from
24 the reports we have seen, for Daiichi, three of the
25 six units had observed accelerations greater than the

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1 design. And the other three were either close to the
2 design or a little bit less than the design.

3 MEMBER ARMIJO: What was Unit 4? Was
4 it --

5 MR. ALI: Unit 4 was -- actually, the
6 maximum was less than the design.

7 MEMBER ARMIJO: So it was --

8 MR. ALI: Yes, 2, 3, and 5 -- 2, 3, and 5
9 observed as more than the design, Units 2, 3, and 5.

10 MEMBER ARMIJO: Okay.

11 MR. ALI: And the other three units were
12 less than the design.

13 MEMBER SIEBER: Now, your observed numbers
14 come from seismic instrumentation?

15 MR. ALI: Right.

16 MEMBER SIEBER: Okay. It's unusual to see
17 such a variation over a short distance, unless there
18 is soil --

19 MR. ALI: Right. It could be part --

20 MEMBER SIEBER: -- or something like --

21 MR. ALI: -- partly because of the soil,
22 partly, you know, as was discussed here, that the
23 level of the different buildings is different also.

24 MEMBER SIEBER: I can picture how it would
25 happen, but it's sort of unusual anyway.

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1 MR. ALI: Yes. So from the numbers that I
2 have here, the observed varies from 319 gal to 550
3 gal, like 300 -- .3 g to about .55 or .56 g.

4 MEMBER STETKAR: One centimeter per second
5 squared.

6 MEMBER REMPE: Dennis has the answer.

7 MR. ALI: You have to divide by 90 D1 to
8 get gs. So g would be a little bit more. So if it's
9 .55 -- or 500 gal, that might be .56 or .57 g's.

10 MEMBER STETKAR: Okay. Thank you. Thank
11 you.

12 MR. ALI: But that's all I have, you know,
13 as far as the overall background.

14 MEMBER SIEBER: Thank you.

15 MR. WILSON: My name is George Wilson.
16 I'm the Electrical I&C Branch Chief right now in NRR.
17 I'm going to be basically going over how we
18 implemented a station blackout rule here for the
19 plants in the United States.

20 In 1988, we -- NRC issued a station
21 blackout rule that required every plant in the United
22 States to be able to take a station blackout and
23 recover from it for that -- for a specified duration.

24 We issued Regulatory Guide 1.155, which endorsed the
25 NUMARC 87-00 standard, that is the standard the

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1 industry used to implement the station blackout rule.

2 We also performed evaluations and issued
3 safety evaluations for all 104 plants, and performed
4 eight pilot inspections, two in each region, to get a
5 feel for what we -- make sure they had implemented the
6 rule correctly, and no major issues were identified
7 during those inspections.

8 First, I want to go over what we classify
9 to be the --

10 MEMBER BROWN: What was the specified
11 duration that you listed in the second -- I just don't
12 remember --

13 MR. WILSON: Four hours.

14 MEMBER BROWN: Four hours?

15 MR. WILSON: Right.

16 MEMBER BROWN: Thank you.

17 MR. WILSON: It will be for batteries, and
18 I'll explain that in a little bit.

19 MEMBER BROWN: Okay.

20 MR. WILSON: First, I want to explain what
21 coping is. The coping duration is actually the time
22 that you get a station blackout event until you either
23 restore offsite power or you restore a diesel
24 generator, so you get the power back. And the coping
25 durations were evaluated on the design of the plant

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1 for both onsite and offsite power systems.

2 The offsite power systems would be the
3 redundancy of the different lines coming into the
4 switchyard, and also the chances that they would have
5 a loss of offsite power. That could be where they
6 were located by the severe weather. the factors
7 onsite would be the redundancy of the diesel
8 generators and the reliability of the diesel
9 generators.

10 We allowed two different types of coping
11 mechanisms. One was AC-independent, and that means a
12 battery only. We only allowed each nuclear powerplant
13 -- they could only cope with a station blackout for
14 four hours on the batteries. If it was longer than
15 four hours, they had to make modifications to the
16 plant or they had to have an alternate AC source.

17 So, and the alternate -- and on the
18 alternate AC source, they analyzed how long it would
19 take them to get back the power, and they use that for
20 two to 16 hours. There is one three-unit site that
21 has a 16-hour coping, and that means they have to have
22 all of the fuel oil and everything to run that plant
23 for -- those diesel, that other supply, for 16 hours.

24 Forty-plants are battery coping plants; 60 plants are
25 alternate AC plants.

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1 The big key on the station blackout is
2 that it required every plant to have procedures to be
3 able to recover from the station blackout, and those
4 procedures specifically recovered the restoration of
5 AC power. That means that they enhanced the diesel
6 generator troubleshooting plans that were made. They
7 also addressed to be able to hook up temporary power.

8 And they also have -- during Generic
9 Letter 2006-02 that we issued with the grid interface,
10 we ensured that every nuclear powerplant have an
11 interface agreement with their local grid operator to
12 ensure that they would be the primary source to
13 restore power first, if offsite power was lost.

14 They also evaluated non-essential DC loads
15 for stripping to increase the capacity of the
16 batteries. And some examples of that would be
17 lighting in the control room, they could break that
18 down, or if the diesel generator start circuits
19 actually come from the battery, they could open that
20 up, so that at least it wouldn't continue to try to
21 start. So they would strip some of the loads down.

22 They also took actions for a loss of
23 ventilation to ensure that the rooms were being
24 cooled, or looked at potentially bypassing some of the
25 isolation circuits that would cause an isolation for

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1 HPSI and RCIC. And, like I said, you know, they had
2 grid interfaces.

3 MEMBER STETKAR: George, I suspect I know
4 the answer to this -- or at least your answer -- do we
5 know whether the Japanese had similar station blackout
6 coping procedures?

7 MR. WILSON: I do not know.

8 MEMBER SIEBER: I think the more important
9 question is -- Fukushima had the event. At the time
10 of the flooding, that was the start of the station
11 blackout. How long did they last until they got core
12 damage? Was it four hours? Eight hours? Two hours?
13 Ten minutes? If you could answer that, that will
14 tell you the validity of the four-hour, eight-hour,
15 what have you, stipulation in our rules. Does anybody
16 know the answer to that timing question?

17 MR. RULAND: We don't know specifically
18 what the answer is. But, you know, of course you know
19 that the NRC has done some analysis as part of the
20 SOARCA program to estimate -- if you remember, the
21 Peach Bottom sequence in there is very similar to what
22 was done, right? It's basically loss of offsite
23 power, no recovery, right? And that was the analysis
24 we did.

25 So that could help inform us about

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1 approximately, you know, when core damage could have
2 started.

3 MEMBER SIEBER: But I think it would be
4 important to look at this event to see -- as another
5 way to validate what we believe station blackout or
6 duration time really is.

7 MR. RULAND: Yes, correct.

8 MEMBER SIEBER: And I would like to know
9 the answer, if I could find out somehow.

10 MR. RULAND: Yes, sir.

11 MEMBER SIEBER: Okay. Thank you.

12 MR. RULAND: That will be on our plate.

13 MR. McDERMOTT: Good morning. My name is
14 Brian McDermott. I'm the Director for the Division of
15 Preparedness and Response in NSIR, and I'm going to be
16 speaking about NRC's incident response relative to
17 this incident.

18 Shortly after 4:40 a.m. on Friday,
19 March 11, the NRC headquarters operations officers
20 made the first calls to inform NRC management of the
21 earthquake in Japan. Although there was no
22 significant threat to NRC licensed facilities, it
23 quickly became evident that the Fukushima Daiichi site
24 had multiple units in a station blackout condition,
25 and that we would need to engage our stakeholders.

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1 In order to coordinate interactions with
2 federal partners, NRC elected to staff the NRC
3 Operations Center with a liaison team. However, as
4 requests for technical and radiological assessment
5 began coming in, staffing was expanded to include a
6 reactor safety team and a protective measures team.

7 Later that day, in response to a request
8 from the U.S. Ambassador in Japan, the NRC discharged
9 two senior staff to provide technical assistance at
10 the U.S. Embassy in Tokyo under the umbrella of the
11 USAID disaster assistance response team. Within a few
12 days, seven additional staff were dispatched to assist
13 the Embassy and serve as technical liaisons with
14 Japanese counterparts.

15 Since March 11, we have continued around-
16 the-clock staffing in the Operations Center, and
17 maintained the multi-discipline team in Japan.

18 Actions to stabilize the situation at
19 Fukushima are ongoing, and so is NRC's response.
20 NRC's role in the events at Fukushima has really been
21 primarily to provide technical assessment and
22 coordination assistance. We are supporting the U.S.
23 Embassy in Japan in its efforts to assess the
24 situation and make recommendations relative to the
25 protection of U.S. citizens.

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1 In addition, we are supporting the
2 Japanese government by responding to their technical
3 questions and coordinating efforts in the U.S. to
4 address other requests for assistance. The NRC has
5 also been working domestically with federal partners
6 on the issue of trace radionuclides detected here in
7 the United States.

8 Under the national response framework, the
9 Environmental Protection Agency has the lead role for
10 such events. However, in a support role, the NRC has
11 provided peer reviews for technical papers and worked
12 with licensees on the sharing of radiological
13 monitoring data.

14 In terms of our coordination, support, and
15 outreach, we utilized our knowledge regarding the
16 basic boiling water reactor designs at Fukushima. NRC
17 has been able to provide significant support to other
18 agencies as they assess the event and evaluate
19 potential impacts on their missions and personnel.

20 In order to develop the best possible
21 technical responses to questions received from Japan,
22 the NRC's reactor safety team has been working closely
23 with nuclear experts from other civilian agencies, the
24 Department of Defense, General Electric, and the
25 Institute for Nuclear Power Operations.

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1 Relative to our dose assessments and plume
2 modeling, the protective measures team has worked
3 closely with the Department of Energy counterparts,
4 and the National Atmospheric Release Advisory Center,
5 also known as NARAC. Throughout the event, the NRC's
6 liaison team has been working to ensure a timely
7 exchange of information with the White House,
8 congressional stakeholders, federal and state
9 partners, and international organizations such as
10 IAEA.

11 Regarding our continued support for the
12 response, as I noted earlier, the Operations Center
13 remains staffed, and we continue to have the team in
14 Japan. And while there are many of us very interested
15 in learning lessons from the events at Fukushima, this
16 remains an ongoing event. The information available
17 today is often incomplete and difficult to
18 corroborate.

19 As the situation on the ground improves,
20 and our Japanese counterparts are able to share
21 additional details, I fully expect and support a
22 thorough examination of the facts by the NRC's newly
23 formed task force, as the lessons learned will help
24 strengthen our domestic preparedness.

25 I am prepared to answer any questions you

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1 might have.

2 MEMBER POWERS: Question on the dispersal.

3 You said you were working on the dispersal of
4 radiation.

5 MR. McDERMOTT: Yes, sir.

6 MEMBER POWERS: What computational tool
7 are you using to estimate the amount of dispersal that
8 you get?

9 MR. McDERMOTT: We are going to have a
10 presentation by Randy Sullivan next, and we are going
11 to talk about our dose assessment in particular.

12 MEMBER POWERS: Well, I was more
13 interested in the -- it's a substantial distance from
14 Japan to our --

15 MR. McDERMOTT: Yes. The short answer is
16 that NRC has the RASCAL code, which we use to generate
17 source terms. However, dose projections in terms of
18 plume for RASCAL only go out 50 miles. That is our
19 quick-look tool in the Operations Center. For the
20 official U.S. Government position on plume modeling,
21 we coordinate with NARAC, and we do that -- practice
22 that during our exercises. And they have the
23 capability to model over a greater distance.

24 MEMBER CORRADINI: So was -- is this the
25 appropriate to ask a question on that? So I saw a

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1 release on the 16th of March and an appendix, which
2 looked like it was from the RASCAL code.

3 MR. McDERMOTT: We're going to speak to
4 that.

5 MEMBER CORRADINI: You're going to speak
6 to that.

7 MR. McDERMOTT: I guess, yes.

8 MEMBER CORRADINI: So can I ask the -- I
9 will save that part of the question. My second part
10 of the question is: are NARAC calculations being done
11 simultaneously so there is more refined analysis that
12 is available to you?

13 MR. SULLIVAN: Simultaneously? I --

14 MEMBER CORRADINI: Well, I mean, you are
15 doing the RASCAL calculations very quick. But the
16 NARAC calculations I thought were also being -- I
17 thought were available.

18 MR. SULLIVAN: They are not simultaneous.
19 They take many hours to do, and it's not
20 simultaneous, as you're saying. We are working on
21 some comparisons, but that's more for follow-on than
22 happened on the 16th.

23 MEMBER CORRADINI: There were NARAC
24 calculations by the 16th?

25 MR. SULLIVAN: On the 15th, that's right.

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1 MEMBER POWERS: Let me ask you one other
2 question. We have this team that has been set up to
3 learn sorts of things about licensees and accidents
4 and what not. Will you be looking at the tools that
5 you have within the Operations Center to see if there
6 are tools that could be refined, improved, created,
7 gotten rid of, whatever it is that should be done with
8 that, to -- I mean, this is a wonderful exercise for
9 you in the sense that you can have a certain
10 detachment from it, but it gives you some hint, if you
11 weren't so detached. And will you be coming forth
12 with a set of -- maybe it's in the longer term, but --

13 MR. McDERMOTT: It will be. We are going
14 to do the lessons learned relative to the functions
15 within the Operations Center. This was a very
16 valuable learning experience for us on how we work as
17 a team in response to emergencies. You know, you
18 learn a lot of things just from the fact that we were
19 running around-the-clock operations now for the last
20 several weeks.

21 So there is a lot of logistical and
22 integration type things we can learn, but the tools
23 are certainly on the list of things we need to take a
24 hard look at.

25 MEMBER POWERS: I think the -- I mean, I

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1 think the chore of managing around the clock
2 operations, I don't want to underestimate the
3 difficulty there. The Committee here has very little
4 expertise in that, but the tools we might be very
5 interested in. Sometimes our Committee may seem to go
6 around the clock, but it doesn't involve managing lots
7 of people.

8 MR. SULLIVAN: I had the privilege of
9 staffing several shifts around the clock, and I don't
10 know that detached would be the right word. We are
11 heartsick over the events in Japan, and we did
12 everything we could to support them with our technical
13 expertise.

14 MEMBER BANERJEE: Are you going to talk in
15 -- about these RASCAL --

16 MR. SULLIVAN: I'll talk about them, yes.
17 Let's go to the next slide.

18 MR. RULAND: Before we move on, just -- I
19 want to emphasize for the support for the Ambassador
20 and the U.S. Government as a whole, there was -- you
21 know, the NRC is just one part of the overall federal
22 family, right? There's the Department of State,
23 Defense, Energy, right? And I think we have
24 integrated well with all of those organizations.

25 Go ahead, Randy.

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1 MR. SULLIVAN: Well, I was going to start
2 by talking about EPZs, but I think you all already
3 know this.

4 MEMBER SIEBER: Yes, we know that.

5 MR. SULLIVAN: So go to the next slide.

6 If you want to talk about the
7 recommendation, I'm prepared to do that.

8 MEMBER BANERJEE: This is of great
9 interest.

10 MR. SULLIVAN: So I thought. I wasn't
11 sure we would have time for it, but apparently we do,
12 so --

13 MEMBER SIEBER: It's a yellow
14 announcement. I think we all read it.

15 MR. SULLIVAN: Okay. Do you want a
16 presentation, or do you want to ask questions?

17 MEMBER CORRADINI: Yes. Well, I guess my
18 first question -- I just wanted to know that the
19 release -- I don't know if it was on the 16th or 17th
20 -- there a click point on the PDF that had an output.

21 MR. SULLIVAN: Yes.

22 MEMBER CORRADINI: But there was no input.
23 So I'm asking a simple engineering question --

24 MR. SULLIVAN: Sure.

25 MEMBER CORRADINI: -- where is the

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1 complete calculation?

2 MR. SULLIVAN: I'm sorry. Ask that again?

3 MEMBER CORRADINI: Where is the complete
4 calculation, so I can see the source, the assumed
5 source, and the assumptions?

6 MR. SULLIVAN: Well, that's available. We
7 have a book of RASCAL stuff.

8 MEMBER CORRADINI: Okay. But it wasn't
9 released?

10 MR. SULLIVAN: No, it was not.

11 MEMBER CORRADINI: Okay.

12 MR. SULLIVAN: But I can rattle it off for
13 you, if that's what you want. I mean, I can rattle
14 off our assumptions.

15 MEMBER CORRADINI: That's what I guess I
16 was --

17 MEMBER BANERJEE: Do we have this written
18 down somewhere?

19 MR. SULLIVAN: I think so, yes.

20 MEMBER SIEBER: That would be a better way
21 to give it to us.

22 MR. SULLIVAN: Okay.

23 MEMBER BANERJEE: But weather conditions,
24 wind velocity, everything.

25 MR. SULLIVAN: Sure.

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1 MEMBER SIEBER: Well, and the other factor
2 that I think is important is, do you have more than
3 one reactor?

4 MR. SULLIVAN: Yes.

5 MEMBER SIEBER: So you had a bunch of
6 different source terms.

7 MR. SULLIVAN: Unfortunately, RASCAL
8 doesn't handle a bunch of different source terms.

9 MEMBER SIEBER: I understand how RASCAL
10 works. That's -- so there has to be a compromise in
11 there someplace.

12 MR. SULLIVAN: Exactly.

13 MEMBER SIEBER: Source term -- you can't
14 really tell what it is because it's multiple sources
15 that came at different times?

16 MR. SULLIVAN: That's right.

17 MEMBER SIEBER: And as far as I could
18 tell, neither the licensee nor the officials in Japan
19 knew exactly what the source term strength was and
20 what its composition was. So it becomes very
21 difficult to make an evacuation recommendation under
22 those circumstances.

23 CHAIRMAN ABDEL-KHALIK: I understand that
24 a request has been made to provide that information in
25 written form.

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1 MEMBER SIEBER: Yes.

2 CHAIRMAN ABDEL-KHALIK: But I think it
3 would be very informative to us if you just go ahead
4 and talk about the assumptions on which this
5 calculation was based.

6 MR. SULLIVAN: I'm assuming that the task
7 force will be looking at this in some depth. I'll
8 provide what I know from a response person's point of
9 view. I wasn't there for the calculation.

10 But I have to set the stage for you a
11 little bit. I'm not sure about these times, but --
12 and of course this record is known. There was an
13 explosion at Unit 1 on the 12th. There was an
14 explosion at Unit 2 -- I'm sorry, Unit 3 on the 14th,
15 and an explosion at Unit 2 on the 15th.

16 Before that time, the NRC's position was
17 that we were advising the Ambassador to advise
18 citizens to obey the Japanese Protective Action
19 Recommendation. We performed a calculation that --
20 well, the morning of the 16th, we were very much
21 worried about the status of the spent fuel pools, in
22 addition to the reactors.

23 Our vision was what you might have
24 expected in a spent fuel pool in America, and that
25 would be a lot more fuel in them than turns out to be

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1 the case, which we learned several days later. So we
2 were very worried about the spent fuel pools.

3 We were not getting succinct information,
4 as you might imagine. We did talk to a NISA
5 representative on the morning of the 16th, and we
6 didn't get much information that would tell us things
7 were going in the right direction. The gentleman did
8 his best to inform us of what he knew, but that wasn't
9 at all what we would have expected in a nuclear event
10 in the U.S.

11 That being the case, my staff -- I'm the
12 protective measure team's director, developed a source
13 term that they thought would represent the potential
14 situation using the tools we had -- that's RASCAL.
15 NARAC takes a couple of days to perform -- well,
16 several hours, and perhaps longer, to perform a
17 calculation. So we needed to use the tool that we had
18 -- that was RASCAL.

19 We did a calculation that would give you
20 -- the details do exist, and whether the task force
21 looks into that deeper or they can be provided, we
22 will have to get back to you on that. But the first
23 source term was 100 percent fuel damage in Unit 2, and
24 literally no -- it was assumed to be ex-vessel and an
25 unfiltered, totally failed containment. By "totally

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1 failed," that is typically 100 percent a day.

2 MEMBER CORRADINI: So it was 100 percent
3 release bypass. As you use RASCAL, it asks you
4 whether or not you have containment bypass. You
5 assume containment bypass.

6 MR. SULLIVAN: I think we did not. I
7 think we assumed failed containment. But I could be
8 wrong on that, so we'll have to get back to you on
9 that. The difference is some plate-out factors that
10 are embedded in RASCAL, and I just don't know which --

11 MEMBER CORRADINI: That's fine. Okay.
12 But approximately what you're saying is --

13 MR. SULLIVAN: Yes, it's a big release is
14 what I'm approximately saying.

15 MEMBER SIEBER: You have scrubbing and
16 plate-out, but otherwise it looks like a Chernobyl
17 source term.

18 MR. RULAND: Randy?

19 MR. SULLIVAN: I wouldn't say that. Yes?

20 MR. RULAND: I understand you are trying
21 to be responsive to the Committee here, but I'm
22 getting the sense that we need to have some more
23 refined numbers and answers to the Committee. So I
24 would ask some forbearance on the Committee, and let's
25 get something in writing and provide that to the

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1 Committee.

2 MEMBER ARMIJO: Well, Bill, I want to make
3 sure that we get the analysis and the numbers that
4 were actually used in coming up with this decision,
5 because, clearly, there were -- a number of
6 conservatisms were made, and as time goes on we will
7 find out how conservative they were, and we can look
8 back and -- on this decision. But I would like to see
9 the actual analysis as it was done at the time.

10 MR. RULAND: We understand, and we will --
11 you know, we will be responsive to the Committee. But
12 as you can imagine, as Randy has already alluded to,
13 right, this -- typically in an emergency event, right,
14 we are going with the best available information that
15 we have at the time, which was based on essentially
16 press reports and our inferences that we were drawing
17 based on what we knew.

18 While the individual that Randy had talked
19 to about, you know, the individual we had talked to,
20 it's not clear to us that that was the right person.
21 We suspect that the Japanese in fact had that
22 information internally for them. They clearly had
23 their hands full, and, you know, so they were not, you
24 know, providing us detailed source term information
25 they were using.

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1 MEMBER CORRADINI: Can I just follow up
2 with what you just said? I'm sorry, I don't
3 completely understand. So you're saying that there
4 was a lack of data, or you're saying that there was
5 data and you weren't getting it?

6 MR. RULAND: We -- what we -- the data --
7 the only thing that we were doing is trying to make a
8 recommendation -- trying to help the United States
9 Government provide whatever information the Ambassador
10 needed relative to a recommendation for U.S. citizens.

11 MEMBER CORRADINI: How many U.S. citizens
12 are we talking about?

13 MR. RULAND: We're talking probably in --
14 where, in the --

15 MEMBER CORRADINI: In that zone.

16 MR. RULAND: I don't know the answer to
17 that question. You know, approximately 320,000
18 Americans in Japan total, but I don't know in that
19 particular area. Don't know. Don't know the answer
20 to that question.

21 MEMBER ARMIJO: There's a military base
22 in --

23 MEMBER CORRADINI: I guess I'm -- this is
24 out of the realm of technical, but in some sense it's
25 in the realm of --

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1 MEMBER ARMIJO: Public confidence, really.

2 MEMBER CORRADINI: Public confidence would
3 be one way of putting it, but in the realm of
4 reasonableness. I guess I'm trying to understand
5 whether it was a lack of data or there was data there
6 and you were concerned that it was not being shared.
7 And if it was a lack of data, then I can understand
8 that, because you'd have to go in in a station
9 blackout condition and go poking around in areas that
10 would be a bit hazardous. So that's what I'm trying
11 to understand.

12 The other part of this technically is is
13 that if you look at the two calculations, the four-
14 unit calculation in our smaller doses -- are smaller
15 doses than the one unit calculation, which confused
16 me.

17 MR. SULLIVAN: Okay.

18 MEMBER CORRADINI: As a function of
19 distance, they are different, which means you're
20 assuming something on some refinement on four units
21 that you're not assuming on the one unit calculation.
22 So that also confuses me.

23 MR. SULLIVAN: Okay.

24 MEMBER CORRADINI: So I was left confused
25 on the 17th.

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1 MR. SULLIVAN: Okay.

2 MEMBER CORRADINI: Not informed.

3 MEMBER BANERJEE: Mike, maybe -- you were
4 just starting to tell us what your assumptions were.
5 Let's get through this, and then we will get back to
6 you.

7 MEMBER SIEBER: I would like to write them
8 down first.

9 MR. SULLIVAN: I thought we agreed that
10 some sort of written summary --

11 MR. RULAND: Yes.

12 MEMBER BANERJEE: Yes, that's great, but
13 if you would just do it qualitatively right now.

14 MR. SULLIVAN: Sure.

15 MEMBER SIEBER: Unit 2, 100 percent.

16 MR. SULLIVAN: First off, I think we are
17 leaving you with the wrong impression about data and
18 RASCAL. We did not have any effluent monitoring data.
19 We did not have any spectral analysis from a plume.
20 All this is is an assumption given what we knew was
21 potentially the status of the reactors in the spent
22 fuel pool. There is no data from the site that's
23 involved in this, "data" as in measurements.

24 MEMBER CORRADINI: Well, I guess what --
25 I'm sorry that I'm picking on you, but you just happen

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1 to be there. It's just if you have a calculation that
2 is very quick to do, I would think I would have the
3 monitoring data that -- the airborne monitors that a
4 lot of us were looking at every day --

5 MEMBER SIEBER: Right.

6 MEMBER CORRADINI: -- every hour of every
7 day and asking, "How can I get a calculation that maps
8 up with what I see there to at least benchmark what
9 I'm calculating?"

10 MEMBER SIEBER: You can't do it.

11 MEMBER BANERJEE: You can do that in
12 RASCAL.

13 MR. SULLIVAN: The wind was not blowing in
14 the direction of those monitors for the most part. I
15 mean, if we're going to do an assessment of a
16 potential future dose rate, we are not looking at the
17 way the wind blew yesterday or the deposition on the
18 ground. We're using what we know to frame a potential
19 accident at the site, and then going forward with what
20 that hypothetically could result in.

21 MEMBER CORRADINI: So to better understand
22 what you're saying is is that you were doing a what-if
23 calculation.

24 MR. SULLIVAN: That's right.

25 MEMBER CORRADINI: Not a benchmarking of

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1 what you saw.

2 MR. SULLIVAN: That's right. I think we
3 got through the first calculation. It's 100 percent
4 fuel damage. I'm sorry, I don't know whether it's
5 containment bypass or failed containment. That's a
6 piece of information that we can know from the
7 calculation record. And relatively low wind speed,
8 stable air, light precipitation, and a 16-hour release
9 duration.

10 The second calculation assumed --

11 MR. RULAND: Randy?

12 MR. SULLIVAN: Yes.

13 MR. RULAND: I think I had previously
14 stated that we were going to provide them -- the
15 Committee something --

16 MR. SULLIVAN: I'm happy to do that.

17 MR. RULAND: -- in writing. And my -- I'm
18 reluctant for you to provide this, so I'd ask the
19 Committee's forbearance, that we are going to -- we
20 will provide something to the Committee on this
21 matter.

22 CHAIRMAN ABDEL-KHALIK: That's fine.

23 MEMBER ARMIJO: Well, can you tell us
24 something at least qualitatively on statements that we
25 read in the media that we knew that the spent fuel

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1 pool in Unit 4 was dry? That was the Chairman's
2 testimony on this.

3 And so, you know, was that in your
4 assumption, that the spent fuel pools were empty? I'd
5 like to know as much as -- whatever you can tell us
6 about that.

7 MR. SULLIVAN: Well, Unit 4 had -- reactor
8 building had experienced an explosion event.

9 MEMBER ARMIJO: I know that. I know that.
10 I'm not disputing that, but --

11 MR. SULLIVAN: -- or not, I don't know,
12 but certainly in bad shape you could know.

13 MEMBER ARMIJO: So your assessment was
14 that the Unit 4 fuel was the source of that explosion?

15 MR. SULLIVAN: There was limited and
16 uncertain data, and although our assumptions here
17 don't necessarily track, we, the staff, were worried
18 about all the spent fuel pools. You know, we were
19 unaware of the low heat loading in Units 1, 2, and 3,
20 and we were aware that mitigative actions were not
21 being taken.

22 Well, we thought -- we didn't know that
23 mitigative actions were being taken. So that gave us
24 great pause. Although we didn't model four spent fuel
25 pools in trouble, it was part of the limited and

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1 uncertain data that forced this conservative and
2 prudent recommendation.

3 MEMBER ARMIJO: The reason I'm pressing on
4 this is this was a very, very important decision. And
5 I would have expected there would have been high-level
6 conversations between our regulatory bodies and our
7 government with equivalent people in the Japanese
8 government on the worst-case analysis that we were
9 doing. Was there anything like that going on?

10 MR. SULLIVAN: You know, I'm not aware of
11 what took place at a high level. I'm more of a staff
12 guy.

13 MEMBER BANERJEE: So these calculations
14 were done, and they went where after that?

15 MR. SULLIVAN: To the Chairman, right?

16 MR. McDERMOTT: They were assessed by the
17 executive team and discussed with the Chairman.

18 MEMBER BANERJEE: So it went to who in the
19 executive team?

20 MR. RULAND: Typically, the executive team
21 is deputy office directors and office directors. I d
22 not recall who specifically was the executive -- the
23 ET director at the time that this recommendation was
24 made.

25 MEMBER CORRADINI: But I guess Sanjoy

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1 asked the question I think you wanted to get an answer
2 to.

3 MEMBER BANERJEE: Yes, I want an answer on
4 this.

5 MEMBER CORRADINI: Who reviewed it?

6 MEMBER BANERJEE: Who reviewed it?

7 MEMBER CORRADINI: Because at least from
8 my standpoint, I think Sam kind of expressed it for a
9 number of us. We're a bit concerned about the fact
10 clearly you did a what-if calculation, but I'm
11 assuming the Japanese did a what-if calculation.
12 Before you started publicizing our what-if, I'd like
13 to have done some sort of comparison, because it
14 creates a -- it potentially can create a
15 misimpression.

16 MR. RULAND: As everybody here I know is
17 well aware, under normal circumstances in the United
18 States -- in the United States, there is no such thing
19 as conservative or non-conservative in EP, in
20 emergency planning. It's you try to get it right,
21 what the recommendation is, right? I mean, that's
22 kind of our operating -- that's kind of the operating
23 presumption.

24 MEMBER CORRADINI: But let me reverse
25 this. Thirty-two years ago, if Japan would have done

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1 a what-if calculation about Three Mile Island, and
2 said all the Japanese within 50 miles of Harrisburg
3 should get out, what would be our response to that,
4 from a policy standpoint?

5 MR. RULAND: I can't answer that question.

6 MEMBER CORRADINI: Well, that's the sort
7 of thing that I think Sam --

8 MEMBER ARMIJO: Well, it's just as we talk
9 to many people, they come up to us and ask us,
10 friends, associates, they say, you know, what was your
11 assumption, and how did you coordinate with the
12 Japanese regulators?

13 And this is a very high-level decision, I
14 would think, and it would have -- you know, the
15 Chairman of the NRC called up his counterpart or the
16 Embassy and they say, "Hey, look, we're getting some
17 very, very different numbers, and what do you think?
18 And we're thinking of getting our people out, and what
19 do you guys think?"

20 MR. RULAND: As Brian McDermott said, one
21 of the things that we have to do for the incident
22 response program is do a hotwash. Basically, examine
23 our incident response to this event. And this will be
24 included, as well as all of the actions we have taken.

25 So we are going to examine how this

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1 recommendation was made and/or whatever. You know,
2 this will be part of our overall review of our agency
3 response to this matter.

4 CHAIRMAN ABDEL-KHALIK: I think the point
5 has been made, and you promised to give us the
6 detailed --

7 MR. RULAND: Yes, sir.

8 CHAIRMAN ABDEL-KHALIK: -- information to
9 support that calculation.

10 MEMBER SIEBER: I don't want to prolong
11 the questioning in this area, and I would like to
12 leave aside whatever diplomatic issues are there.

13 But had the accident occurred in the
14 United States, would your calculation and your
15 recommendation, which would differ from state, local,
16 and utility recommendations be similar, or would you
17 have -- would you say, "This is the -- I think the
18 whole reactor went, and I got all of these spent fuel
19 pools, and this reactor went, and that reactor went,
20 so we'll take 100 percent of all of it."

21 And I didn't have -- I didn't model the
22 topography, and I think the wind is going to blow it
23 over the mountain.

24 MR. SULLIVAN: Could we back up one slide?

25 Because that goes to --

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1 MEMBER SIEBER: That to me is the most
2 important thing right now.

3 MR. SULLIVAN: I mean, our expectation is
4 that if it were our licensee --

5 MEMBER SIEBER: Right.

6 MR. SULLIVAN: -- and our response in the
7 U.S. we would have better data, a very different
8 response, and we would have much better plume
9 measurements. And maybe the Japanese had some of
10 that, but we didn't.

11 MEMBER SIEBER: Yes.

12 MR. SULLIVAN: All right? I want to point
13 out that the 10-mile EPZ is designed, tested, and
14 inspected to be able to perform response actions,
15 protective actions, within hours. Our longest ETEs --
16 evacuation time estimates -- in the U.S. are 10 to 14
17 hours. So that is the initial phase.

18 We have always said that should it be
19 necessary, the EPZ -- the 10-mile EPZ provides a
20 substantial basis for expansion should that ever be
21 necessary. We have studied evacuations in the U.S.
22 We have studied some 250, some 50 or 60 in detail.
23 They are ad hoc evacuations for the most part. They
24 are all successful. They all saved lives. so local
25 authorities know how to evacuate people should there

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1 be a threat.

2 So getting back to your question, we would
3 have expected different data, more data, plume
4 measurements, better effluent monitoring, on and on.

5 MEMBER SIEBER: Provided the licensee
6 provided that, because you don't have access --

7 MR. SULLIVAN: We have people onsite.

8 MEMBER SIEBER: You don't have NRC people
9 or any federal people out there with monitoring.

10 MR. SULLIVAN: We have state people out
11 there with monitoring.

12 MR. RULAND: In addition, if I could add,
13 the NRC does not make protective action
14 recommendations. Our role in a U.S. event is to
15 understand, to do our own independent calculations, so
16 when the state or when the licensee makes protective
17 action recommendations to the local, county, or state
18 officials, who actually make the decision, we can
19 verify whether those recommendations -- you know, we
20 can do an independent check. That is our role during
21 a U.S. event.

22 And so it is -- in this case, it was a
23 different role that the NRC was playing, it was
24 fulfilling.

25 MEMBER SIEBER: It's exactly how that role

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1 is portrayed in the United States that I would be
2 concerned about, you know. And I think this area
3 needs more examination. I'll leave it at that, and
4 thank you.

5 MR. SULLIVAN: Thank you.

6 CHAIRMAN ABDEL-KHALIK: Please proceed.

7 MR. SULLIVAN: Well, I'm pretty much done.
8 I'm the last speaker.

9 CHAIRMAN ABDEL-KHALIK: Let me just ask a
10 question about a topic that didn't come up in the
11 discussions, and that pertains to dry cask storage.
12 My understanding is that Fukushima had many dry casks,
13 and assisted with a lot of dry storage casks, is that
14 correct?

15 MR. SULLIVAN: Sorry. Don't know. Does
16 somebody? I heard not so many dry cask storage, but
17 I'm not --

18 MEMBER ARMIJO: Nine.

19 CHAIRMAN ABDEL-KHALIK: Nine. Okay. And
20 that none of them was damaged, is that correct?

21 MR. McDERMOTT: According to the TEPCO
22 reports, they performed walkdowns and did not identify
23 anything on their initial inspections. They indicated
24 they would be doing subsequent detailed examinations,
25 and they never reported out on that.

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1 CHAIRMAN ABDEL-KHALIK: Was that due to
2 their inherent robustness, or was it because the pad
3 was located at a much higher elevator?

4 MR. McDERMOTT: I don't think we have that
5 information at this time.

6 CHAIRMAN ABDEL-KHALIK: Okay. Are there
7 any additional questions to the staff? Mike?

8 MEMBER CORRADINI: Just I wanted to
9 compliment the staff. This is kind of a tough area.
10 So I appreciate them coming on such short notice to
11 inform us. I guess I don't want to -- them to take
12 away our aggressive questioning to imply anything
13 different. I really do appreciate the staff coming to
14 talk to us.

15 MEMBER ARMIJO: I would like to provide
16 some feedback, if it's okay. The thing that I think
17 I'm missing -- it's probably there -- is in the 30-day
18 review, and then the 90-day review, I think it's very
19 important to get down to the root cause of the things
20 that failed, because before we start saying, "This is
21 what we've got to do to improve our plants here in the
22 United States," and not limit ourselves to a tsunami,
23 because most of our plants aren't subject to a
24 tsunami, but we may be subject to other things that
25 are worse than what we thought we had to deal with.

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1 But I think it's very important to get to
2 the root cause of why some units survived well, and
3 why others didn't. And until we know that fairly
4 well, even at a working level, working hypothesis, I
5 think it's kind of premature to be making
6 recommendations on what to do about something that we
7 haven't really sorted out. So --

8 MR. McDERMOTT: I would agree with you 100
9 percent. I think understanding this event will be
10 very important for NRC, but, as I mentioned earlier,
11 this is an ongoing event. You know, they have taken
12 some actions at this point in time that appear to have
13 brought some stability to the situation. However, we
14 don't have enough information to verify that at this
15 time. So --

16 CHAIRMAN ABDEL-KHALIK: As I indicated
17 earlier, this briefing serves as the initiation of
18 significant ACRS engagement on the followup activities
19 and lessons learned from the Fukushima event in order
20 to maintain public health and safety in the United
21 States.

22 While the Commission tasking for ACRS on
23 the subject of Fukushima is thus far specific to the
24 evaluation of the staff's longer term review, however,
25 the ACRS, consistent with its charter, will self-

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1 initiate activities to be appropriately informed and
2 properly prepared to provide the best possible advice
3 to the Commission on an ongoing basis.

4 At this point, again, let me express my
5 thanks and appreciation to the staff.

6 MR. RULAND: Thank you.

7 CHAIRMAN ABDEL-KHALIK: Mr. Ruland?

8 MR. RULAND: Mr. Chairman, I have some
9 closing remarks that I --

10 CHAIRMAN ABDEL-KHALIK: Yes, please.

11 MR. RULAND: Thank you. I just wanted to
12 say thank you to the Committee for their forbearance
13 in our frequent saying, "The task force is going to
14 handle that." But, you know, it is -- as you know,
15 you know, we probably started working on this
16 presentation early this week. So, you know, normally
17 we get to do lots of dry runs, because we take
18 Committee meetings extremely seriously.

19 But two areas I would like to address is,
20 first, the actions of our Japanese colleagues. You
21 know, what we are -- what you heard here, you might
22 have assumed that the Japanese, you know, were not --
23 may or may not have been doing what was appropriate.
24 We don't know that, right? As far as we can tell,
25 right, the Japanese took the actions that they needed

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1 to to protect their citizens, and attempting to try to
2 recover the plant.

3 We have -- you know, we were trying to, in
4 the United States, to protect our citizens or to make
5 recommendations, as appropriate, based on the limited
6 information we had. And sometimes during emergencies
7 you have to basically make a decision on the spot that
8 -- you know, based on limited data. And sometimes you
9 have to make a decision, and sometimes that's better
10 than no decision. So I just kind of wanted to say
11 that.

12 And the other thing has to do with the
13 timing of root cause evaluations and the timing of our
14 recommendations. This is a balance that we are trying
15 to -- you know, how long do you wait before you start
16 acting on making recommendations to change our
17 regulatory framework? It's -- you know, do we
18 continue to wait for root cause evaluations, or do we
19 start the process now of examining what we should do?

20 And so similar to what I have just said
21 about, you know, making decisions with limited data,
22 you know, the staff -- we need to make some decisions
23 and make some recommendations to the Commission with
24 the data we have today, and the data we might have in
25 the next 60 to 90 days.

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1 So I would just ask, basically, a
2 collective understanding from everybody of, you know,
3 the situation we're in, and we're trying to do our
4 best. So --

5 CHAIRMAN ABDEL-KHALIK: Thank you very
6 much.

7 MR. RULAND: And thank you for allowing me
8 to say that.

9 CHAIRMAN ABDEL-KHALIK: Thanks.

10 At this time, we are scheduled for a one-
11 hour lunch break, and we will reconvene at quarter to
12 two.

13 (Whereupon, at 12:44 p.m., the proceedings in the
14 foregoing matter went off the record.)

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**Advisory Committee
on Reactor Safeguards
Fukushima Event and Issues**

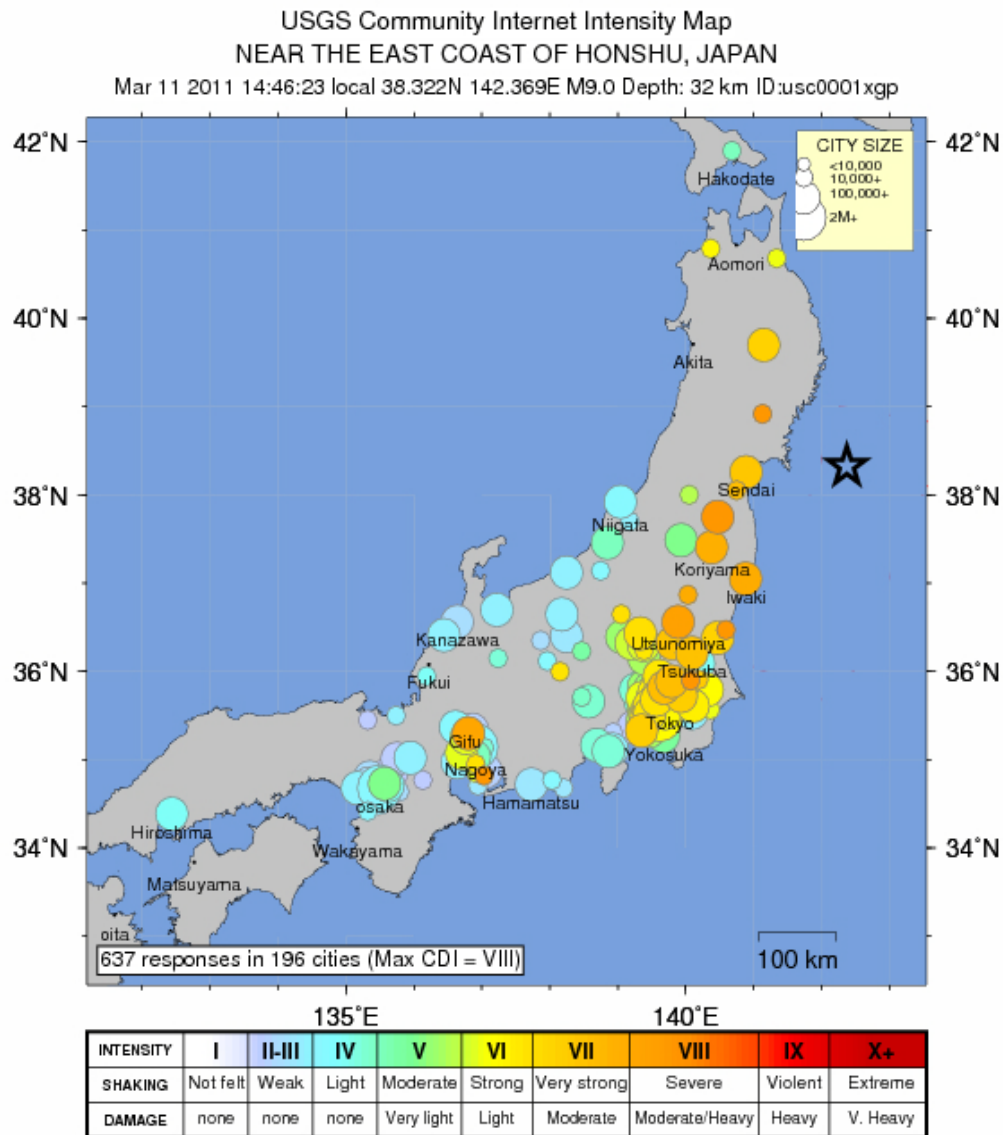
April 7, 2011

Agenda

- Introduction – Bill Ruland (5 min)
- Sequence of Events – John Thorp (10 min)
- Information Notice – Eric Bowman (5 min)
- Industry Actions and Temporary Instruction – Tim Kobetz (5 min)
- Near Term Task Force – Barry Westreich (10 min)
- Seismic Attributes – Syed Ali (5 min)
- Station Blackout – George Wilson (10 min)
- NRC Incident Response – Brian McDermott (10 min)
- Emergency Preparedness – Randy Sullivan (10 min)

Tohoku Pacific Earthquake

- 14:46 (Local) March 11, 2011
- Magnitude 9.0 Earthquake
 - 4th largest in the world since 1900 (USGS)
 - Largest in Japan since modern instrument recordings began 130 years ago (USGS)
- Resulted in a Tsunami that is estimated to have exceeded 32 feet in height (NISA)



Processed: Thu Mar 31 06:47:13 2011

Affected Nuclear Power Stations

– **Onagawa NPS**

- All 3 units scrambled

– **Fukushima Dai-ichi (I) NPS**

- Units 1, 2, 3 scrambled
- Units 4, 5, 6 already shutdown

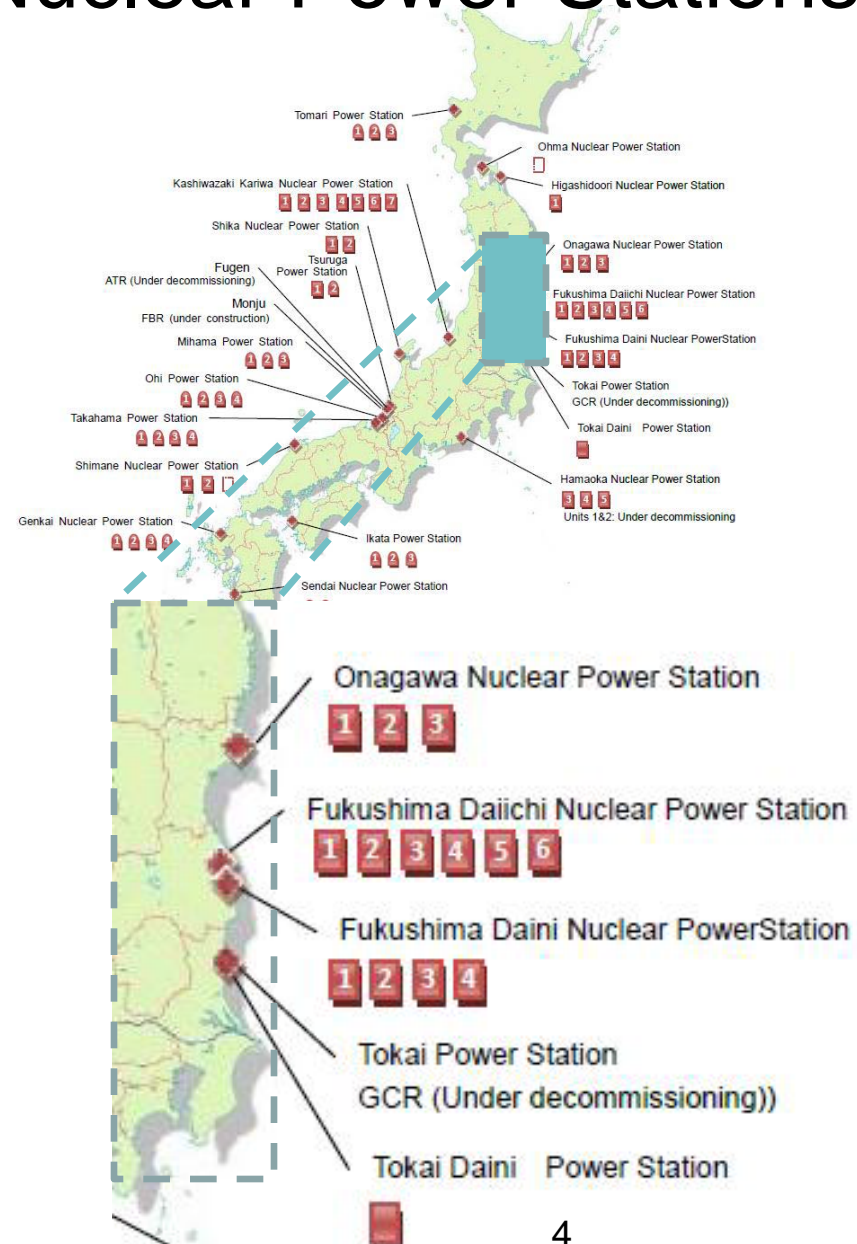
– **Fukushima Dai-ni (II) NPS**

- All 4 units scrambled

– **Tokai**

- Scrammed (single unit site)

Source: NISA



Extended SBO at Fukushima Dai-ichi

- **Earthquake**
 - Reactor Units 1, 2, and 3 scram
 - Loss of offsite power to all 6 units
- **Tsunami**
 - Loss of emergency AC power
- **Extended Station Blackout**



Accident Sequence

- **Reactor coolant flow after SBO**
 - Reactor isolation makeup water system
- **Loss of coolant flow**
 - Utility established seawater injection
- **Elevated primary containment pressure**
- **Explosions**
 - Damaged reactor buildings for Units 1, 3 and 4
 - Unit 2 explosion in primary Containment- reactor building not damaged, possible torus damage

5 April Status: Units 1,2 and 3

- Cores reported to be damaged
 - Extent unknown
 - Salt buildup from seawater injection
- All units have offsite AC power available
 - Equipment verification in progress
- Freshwater injection via:
 - Feedwater line
 - Low pressure coolant injection
- High radiation levels in containment and site

Status: Units 4, 5, and 6

- Unit 4
 - Core offloaded to spent fuel pool (SFP)
 - An explosion caused significant damage to Unit 4 reactor building
 - SFP cooling system not functional
 - SFP being cooled periodically by injection of fresh water from a concrete truck pump
- Units 5 and 6
 - On external AC power with core cooling functional
 - SFP cooling is functional on both units



Fukushima Dai'ichi Nuclear Power Station

Information Notice 2011-05

- Purpose: to provide high level discussion of earthquake effects at Fukushima Daiichi and allow licensee review and consideration of actions to avoid similar problems.
- Background discussion of pertinent regulatory requirements
 - General Design Criteria 2 (or similar)
 - “B.5.b Requirements” for beyond design basis events
 - Interim Compensatory Measures Order EA-02-026, Section B.5.b
 - License Conditions
 - 10 CFR 50.54(hh)(2)
 - Station Blackout Rule, 10 CFR 50.63

Industry Initiatives

- An industry-wide assessment to verify and validate each plant site's readiness to manage extreme events
- Initiatives include licensee verification of:
 - Each plant's capability to manage major challenges, and losses of large areas of the plant due to natural events, fires or explosions
 - Each plant's capability to manage a total loss of off-site power
 - Verifying the capability to mitigate flooding and the impact of floods
 - Performing walk-downs and inspection of important equipment needed to respond successfully to extreme events like fires and flood including identification of any potential that equipment functions could be lost during seismic events appropriate for the site, and development of strategies to mitigate any potential vulnerabilities.

NRC Inspection Activities

- Temporary Instruction 2515/183, “Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event
- Inspection uses a combination of assessment of licensee actions and independent inspections
- The inspection is for fact/data gathering to help evaluate whether future regulatory actions may be necessary.

Near-Term Task Force

- Commission Direction for Near-Term Review
 - Conduct a methodical and systematic review of relevant NRC regulatory requirements, programs, and processes, and their implementation, to recommend whether the agency should make near-term improvements to our regulatory system
 - Recommendations for the content, structure, and estimated resource impact for the longer-term review
 - Independent from industry efforts
 - Milestones
 - 30-day Commission meeting (5/12/11)
 - 60-day Commission meeting (6/16/11)
 - 90-day final report, SECY, and Commission meeting (7/19/11)

Longer-Term Review

- Commission Direction for Longer-Term Review
 - Specific information on sequence of events and equipment status
 - Evaluate policy issues
 - Potential interagency issues
 - Lessons learned for facilities other than operating reactors
 - Receive input and interact with all key stakeholders
 - Report within six months after beginning of long-term effort
 - ACRS to review final long-term report (as issued in its final form), and provide letter report to the Commission

Tōhoku Earthquake and Tsunami

- Earthquake Data*
 - Magnitude 9.0
 - Epicenter: ~109 miles from Fukushima site
 - Peak Ground Acceleration
 - 1.0g up to 2.75g at 80 miles from epicenter
 - ~0.30g to 0.58g in Fukushima Prefecture

*California Coastal Commission. "The Tōhoku Earthquake of March 11, 2011: A preliminary Report on Implications for Coastal California "

Tōhoku Earthquake and Tsunami

- Tsunami Data*
 - Peak amplitude reports vary
 - Reached shore within ~ one hour after the earthquake
 - Up to six miles of run-up in flat regions

*California Coastal Commission. "The Tōhoku Earthquake of March 11, 2011: A preliminary Report on Implications for Coastal California "

Tōhoku Earthquake and Tsunami

- NPP Foundation Accelerations*

Location	Design Japanese Regulatory Guide g	Observed g
Daiichi Unit 2	.45	.56
Daiichi Unit 6	.46	.45
Daini Unit 1	.44	.23
Daini Unit 2	.44	.20

*TEPCO Press Release April 01, 2011: The record of the earthquake intensity observed at Fukushima Daiichi Nuclear Power Station and the Fukushima Daini Nuclear Power Station (Interim Report).

Station Blackout– Background

- **NRC issued SBO Rule (10 CFR 50.63) in 1988**
- **Each plant must be able to withstand for a specified duration and recover from a SBO**
- **Regulatory Guide (RG) 1.155, “Station Blackout,” - endorsed NUMARC 87-00 industry guidance for SBO rule**
- **All 104 plants met the SBO rule requirements at the time of the staff’s review**
 - Safety Evaluations
 - Pilot Inspections

Station Blackout - Implementation

- **Coping Duration**
 - Factors affecting Offsite power design
 - Factors affecting Onsite power system
- **Coping Methods**
 - AC independent
 - Alternate AC
- **Procedures**
 - Restoration of AC power
 - Non essential DC loads for stripping
 - Actions for loss of ventilation
 - Grid Interface

NRC Incident Response

- **Response Decisions**
- **NRC Roles**
- **Areas of Focus**
- **Coordination, Support and Outreach**
- **Current Status of Response**

Emergency Planning Zones

- Two emergency planning zones (EPZ) around each nuclear power plant
 - 10 mile EPZ – plume exposure planning zone
 - Response within hours
 - 50 mile EPZ – ingestion exposure planning zone
 - Response within days
- EPZ size established:
 - Encompasses most accident sequences
 - WASH 1400 Reactor Safety Study
 - Conservative Assumptions
 - Provides a substantial basis for expansion of response beyond the EPZ should it be needed

PAR for U.S. Citizens in Japan

- Recommendation for 50 mile evacuation
 - Limited and uncertain data available
 - Significant challenges to 3 units and 4 spent fuel pools
 - Potential for large offsite release existed
 - Rapidly modeled aggregate cores to simulate potential release
 - Decision to expand evacuation was prudent given the uncertain conditions

Questions?