

From: Dan Yurman
To: Burnell, Scott
Subject: RE: FYI - even though you're gone
Date: Wednesday, March 16, 2011 7:51:57 PM

Agreed, As you can see below I don't sugar coat the news.

Dan Yurman
Email: (b)(6)
Mobile: (b)(6)
Blog: <http://djysrv.blogspot.com>

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Wednesday, March 16, 2011 7:22 PM
To: dan.yurman@usa.net
Subject: RE: FYI - even though you're gone

I appreciate that. In my sleep-deprived and otherwise cranky state, I have to say I don't want to be in the shoes of some of the list's Pollyannas if things progress according to the agency's best understanding. Pardon my frankness, seriously.

From: Dan Yurman [mailto:(b)(6)]
Sent: Wednesday, March 16, 2011 7:18 PM
To: Burnell, Scott
Subject: FYI - even though you're gone

From: Dan Yurman [mailto:(b)(6)]
Sent: Wednesday, March 16, 2011 7:07 PM
To: 'Social Media'
Subject: Moderator Message

There is no way to sugar coat this one.

While the policy of the list is to preserve the privacy of the list members, there have been several instances since Friday where it has been clear that result cannot be guaranteed in practice.

This means that when someone pops off with a sarcastic remark about something or someone there is a chance it will wind up outside this list.

I want to caution list members that vicious sarcasm and personal attacks are not acceptable as part of the dialog here.

Sardonic remarks, dry humor, and witty sarcasm come with the territory so no one is likely to object.

Ok, now let's get back to it.

Dan Yurman, Moderator

SSSS / 1

From: Burnell, Scott
To: McIntyre, David; Taylor, Robert
Subject: FW: Dave Schechiter - CNN Atlanta
Date: Wednesday, March 16, 2011 7:00:00 PM

Dunno if it's GSI-199

From: Ghneim, Munira
Sent: Wednesday, March 16, 2011 5:18 PM
To: Burnell, Scott
Cc: Harrington, Holly; Akstulewicz, Brenda
Subject: Dave Schechiter - CNN Atlanta

Good Evening,

Dave Schechiter would like some to answer his inquiry regarding the Nuclear Power Station guidelines. Dave may be reached at (b)(6).

Thank You
Munira Ghneim
Contract Secretary
Office of Information Services
301-415-1170

SSSS/2

From: Burnell, Scott
To: McIntyre, David; Taylor, Robert
Subject: FW: Nell Greenfield-Boyce -NPR
Date: Wednesday, March 16, 2011 7:19:00 PM

She might be calling the HOOs – perhaps you could inform them that overnights are ok for putting media calls through to you.

From: Ghneim, Munira
Sent: Wednesday, March 16, 2011 5:31 PM
To: Burnell, Scott
Cc: Harrington, Holly; Akstulewicz, Brenda
Subject: Nell Greenfield-Boyce -NPR

Good Evening,

Nell would like someone to call her back to confirm the latest news that is on AP.
Please call her back at (b)(6)

Thank You
Munira Ghneim
Contract Secretary
Office of Information Services
301-415-1170

SSSS/3

From: Burnell, Scott
To: Vartabedian, Ralph
Bcc: Sheehan, Neil
Subject: RE:
Date: Wednesday, March 16, 2011 6:33:00 PM

Ralph;

I have absolutely no information one way or the other on that site.

The best available information continues to lead to the conclusion that U.S. territory will avoid any harmful radiation levels.

EPA does environmental monitoring – check their site for RadNet (might not have that name exactly right).

Scott

From: Vartabedian, Ralph [mailto:Ralph.Vartabedian@latimes.com]
Sent: Wednesday, March 16, 2011 6:28 PM
To: Burnell, Scott
Cc: 'LaVera, Damien'; 'mary.simms@epa.gov'; 'btb8@cdc.gov'
Subject: RE:

I have found this website projecting radiological plumes reaching the U.S. Have your people seen it? <http://www.myhealthbeijing.com/prevention/wellness/radiation-plume-is-moving-east-over-the-pacific/>

I wonder if NARAC has seen it? It certainly suggests that we are going to get some kind of a radiological response here. Does anybody know whether the Federal Radiological Emergency Response Plan has been activated, and if so, who has been designated as the lead federal agency.

Ralph Vartabedian
National Correspondent
Los Angeles Times
213-237-3393 office

(b)(6)

 cell

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Wednesday, March 16, 2011 2:49 PM
To: Vartabedian, Ralph
Subject: RE:

Sorry for the delay – don't have a timeframe, they're simple projections of total estimated dose.

From: Vartabedian, Ralph [mailto:Ralph.Vartabedian@latimes.com]

SSSS/4

Sent: Wednesday, March 16, 2011 3:17 PM
To: Burnell, Scott
Subject:

Scott,
I forgot to ask...are these projected doses daily or over some other period of time?

Ralph Vartabedian
National Correspondent
Los Angeles Times
213-237-3393 office

(b)(6) cell

From: [Burnell, Scott](#)
To: [Ledford, Joey](#)
Subject: RE: GI-199
Date: Wednesday, March 16, 2011 5:28:00 PM
Attachments: [image001.png](#)

Sorry to be so late, can't recall off the top of my head anyway.

From: Ledford, Joey
Sent: Wednesday, March 16, 2011 3:01 PM
To: Burnell, Scott
Subject: GI-199

Scott:

Is there a single reference document for the GI-199 Safety/Risk Assessment? I've had a reporter ask and I haven't been able to locate anything that fits the bill.

Joey Ledford
Public Affairs Officer
Region II – Atlanta, Ga.
O: 404.997.4416

C: (b)(6)

joey.ledford@nrc.gov



SSSS/5

From: [Zimmerman, Jacob](#)
To: [Burnell, Scott](#)
Subject: RE: FYI: TABS Communication Team Meeting
Date: Wednesday, March 16, 2011 5:43:51 PM

I had already counted you out.

Thanks for all you and the rest of the OPA + others are doing throughout this crisis in Japan.

We'll have to get a beer sometime in the future and you can tell me some war stories.

Jake

Jacob I. Zimmerman

U.S. Nuclear Regulatory Commission

Office - O-13E22

Mail Stop - OWFN O-12G15

Washington, DC 20555

☒ E-mail: Jacob.Zimmerman@nrc.gov | → Office: (301) 415-1220 | ☒ NRC Cell: (b)(6) | ☒ Fax: (301) 415-1032

NRC – One Mission – One Team

From: Burnell, Scott
Sent: Wednesday, March 16, 2011 5:42 PM
To: Zimmerman, Jacob
Subject: RE: FYI: TABS Communication Team Meeting

Not gonna be able to participate, no great surprise.

From: Zimmerman, Jacob
Sent: Wednesday, March 16, 2011 5:42 PM
To: Burnell, Scott; Carpenter, Cynthia; Decker, David; Ellmers, Glenn; Landau, Mindy; Olive, Karen; Pittiglio, Clayton; Powell, Dawn; Solander, Lars; Thompson, Catherine; Zimmerman, Jacob
Subject: FYI: TABS Communication Team Meeting

All

The agenda for tomorrow's TABS Communication Team Meeting is available on the TABS SharePoint site. I requested a Bridge Line and will get that out tomorrow before the meeting.

I know some of you may not be available because you are supporting communication activities associated with the tragic events in Japan. Please send me an email if that is the case or you are otherwise not available for the meeting.

Thanks

SSSS/6

Jake

Jacob I. Zimmerman
U.S. Nuclear Regulatory Commission
Transforming Assets into Business Solutions Task Force
Office - O-13E22
Mail Stop - OWEHO-12615
Washington, DC 20555
E-mail: Jacob.Zimmerman@nrc.gov | Office: (301) 415-1220 | NRC Cell: (b)(6) | Fax: (301) 415-1032



NRC – One Mission – One Team

From: Burnell, Scott
To: Tamar Cerafici
Subject: RE: WTF? JASZKO disaster?
Date: Wednesday, March 16, 2011 5:45:00 PM

Nowhere near enough sleep.

All I can say is that our public comments are based on the best available information.

Hope you & Tom are well.

From: Tamar Cerafici [mailto:(b)(6)]
Sent: Wednesday, March 16, 2011 5:44 PM
To: Burnell, Scott
Subject: WTF? JASZKO disaster?

Have you slept at all? Has your chairman, and why is he saying such things? I would take anything TEPCO said with a whole shaker of salt, but really, spent fuel pools are empty?

--

Tamar Jergensen Cerafici
The Cerafici Law Firm, LLC
Admitted in Idaho and Utah only
9509 Burgee Place
Frederick, MD 21704
Phone: (301) 363-5543
Direct: (603) 496-2575
Fax: (603) 737-5605
gnplegal.com

This e-mail is confidential and is protected by the attorney work product and/or attorney-client privileges. If you are not the addressee, please delete this email and notify the sender.

SSSS/7

From: Burnell, Scott
To: (b)(6)
Subject: RE: Temporary disable?
Date: Wednesday, March 16, 2011 5:47:00 PM

Just kill it, I can't even take the brief flashes of their comments before I delete them.

From: Dan Yurman [mailto:(b)(6)]
Sent: Wednesday, March 16, 2011 5:36 PM
To: Burnell, Scott
Subject: RE: Temporary disable?

Do you want to send list traffic to your Hotmail account?

Dan Yurman
Email: (b)(6)
Mobile: (b)(6)
Blog: <http://djysrv.blogspot.com>

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Wednesday, March 16, 2011 5:36 PM
To: Dan Yurman, (b)(6)
Subject: Temporary disable?
Importance: High

Dan;

Can you "take me off the list" temporarily? A) no time B) can't respond anyway C) I'm going to pop a blood vessel if I glance at any more of Jeff Madison's uninformed crap. If temporary doesn't work, just take me off and I'll sign up sometime later.

Thanks.

Scott

SSSS/8

From: [Burnell, Scott](#)
To: [Dan Yurman](#)
Subject: RE: Temporary disable?
Date: Wednesday, March 16, 2011 5:54:00 PM

THANKS!

From: Dan Yurman [mailto:[\(b\)\(6\)](#)]
Sent: Wednesday, March 16, 2011 5:53 PM
To: Burnell, Scott
Subject: RE: Temporary disable?

OK, I'm going to set you to "no mail" for now. Let me know if you want to turn it back on .

Dan Yurman

Email: [\(b\)\(6\)](#)

Blog: [ANS Nuclear Cafe](#) Twitter: [@djysrv](#)

Google Voice: [\(b\)\(6\)](#)

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Wednesday, March 16, 2011 5:36 PM
To: Dan Yurman; dan.yurman@usa.net
Subject: Temporary disable?
Importance: High

Dan;

Can you "take me off the list" temporarily? A) no time B) can't respond anyway C) I'm going to pop a blood vessel if I glance at any more of Jeff Madison's uninformed crap. If temporary doesn't work, just take me off and I'll sign up sometime later.

Thanks.

Scott

SSSS/9

From: Burnell, Scott
To: Brenner, Eliot
Subject: RE: Laptop
Date: Wednesday, March 16, 2011 6:11:00 PM

In Ops Ctr

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

From: Brenner, Eliot
Sent: Wednesday, March 16, 2011 3:58 PM
To: Burnell, Scott
Subject: Laptop

I will need laptop and accessory bag tonight. Please be sure it is in ops center or office.

Eliot Brenner
Director, Office of Public Affairs
US Nuclear Regulatory Commission
Protecting People and the Environment
301 415 8200

C: (b)(6)

Sent from my Blackberry

SSSS/10

From: Burnell, Scott
To: Sheehan, Neil
Subject: FW:
Date: Wednesday, March 16, 2011 6:34:00 PM

If you have a chance, please alert the protective measures team to that site – I really can't judge the "projections" at all.

From: Vartabedian, Ralph [mailto:Ralph.Vartabedian@latimes.com]
Sent: Wednesday, March 16, 2011 6:28 PM
To: Burnell, Scott
Cc: 'LaVera, Damien'; 'mary.simms@epa.gov'; 'btb8@cdc.gov'
Subject: RE:

I have found this website projecting radiological plumes reaching the U.S. Have your people seen it? <http://www.myhealthbeijing.com/prevention/wellness/radiation-plume-is-moving-east-over-the-pacific/>

I wonder if NARAC has seen it? It certainly suggests that we are going to get some kind of a radiological response here. Does anybody know whether the Federal Radiological Emergency Response Plan has been activated, and if so, who has been designated as the lead federal agency.

Ralph Vartabedian
National Correspondent
Los Angeles Times
213-237-3393 office

(b)(6)

 cell

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Wednesday, March 16, 2011 2:49 PM
To: Vartabedian, Ralph
Subject: RE:

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From: Vartabedian, Ralph [mailto:Ralph.Vartabedian@latimes.com]
Sent: Wednesday, March 16, 2011 3:17 PM
To: Burnell, Scott
Subject:

Scott,

I forgot to ask...are these projected doses daily or over some other period of time?

Ralph Vartabedian
National Correspondent
Los Angeles Times
213-237-3393 office

SSSS/11

(b)(6) cell

From: [Rivera, Alison](#)
To: [Nguyen, Quynh](#); [Nelson, Robert](#); [Couret, Ivonne](#); [Burnell, Scott](#); [Meighan, Sean](#); [Piccone, Josephine](#); [Thomas, Eric](#)
Subject: Fyi: March 17, 2011 OAS|CRCPD Teleconference "Final Agenda"
Date: Thursday, March 17, 2011 8:34:41 AM
Attachments: [March 17, 2011 Call.pdf](#)

Hopefully the attachment comes through. If not, please contact Patricia McGrady-Finneran. Thanks.

Sent from a NRC Blackberry
Alison Rivera

(b)(6)

From: Patricia McGrady-Finneran <Patricia.McGrady-Finneran@nrc.gov>
To: Rivera, Alison
Sent: Wed Mar 16 13:05:20 2011
Subject: March 17, 2011 OAS|CRCPD Teleconference "Final Agenda"

Good Afternoon Everyone!

Tomorrow afternoon, Thursday, March 17th, 2011, we will conduct the March OAS\CRCPD Teleconference. Attached please find the "Final" agenda for your information. The call will be held from 3:00-5:00 p.m. (EDT) in T8C5. The call-in number is (888)989-5163, passcode (b)(6)

REMINDER: For the sake of continuity and cohesiveness, all presenters will need to preface their topics with a brief narrative detailing the history, development, status, etc. of the subject topic.

Thank you all for your patience regarding the dispatch of the "Final" agenda.

SSSS/12

MARCH 17, 2011 NRC/OAS/CRCPD TELECONFERENCE

Lines will be available from 3:00 p.m. - 5:00 p.m. EST, **T8C5**

Participant Phone Number: **(888) 989-5163**

Pass Code: (b)(6)

Possible Participants:

OAS BOARD

K. David Walter, AL
Julia Schmitt, NE
Lee Cox, NC
Patricia Gardner, NJ
Mike Snee, OH
Ann Troxler, LA
Mike Welling, VA
Cheryl Rogers, WI

CRCPD BOARD

Alice Rogers, TX
John Winston, PA
Adela Salame-Alfie, NY

FSME

| | |
|---------------------------|-----------------|
| Josephine Piccone | James Danna |
| Deborah Jackson | Alison Rivera |
| Rob Lewis | Terry Reis |
| Jim Luehman | Richard Turtill |
| Duncan White | James Firth |
| Christian Einberg | Jack Foster |
| Adelaide Giantelli | |
| Patricia McGrady-Finneran | |

NMSS

Peter Habighorst

RSAO

| | |
|----------------|---------------|
| Donna Janda | |
| Randy Erickson | Monica Orendi |
| Rachel Browder | Jim Lynch |

STATES

Clyde Pearce, AK
J. McNees, AL
Jared Thompson, AR
Aubrey Godwin, AZ
Gary Butner, CA
Steve Tarlton, CO
Ed Wilds, CT
Frieda Fisher-Tyler, DE
George Talley, D.C.
Bill Passetti, FL
Cynthia Sanders, GA
Melanie Rasmusson, IA
Mark Dietrich, ID.
Joe Klinger, IL
Rex Bowser, IN.
Tom Conley, KS
Matthew McKinley, KY
Tim Knight, LA
Robert Gallagher, MA

Roland Fletcher, MD
Jay Hyland, ME
Bob Skowronek, MI
Dale Dorschner, MN
John Langston, MO.
B.J. Smith, MS.
Roy Kemp, MT.
Julia Schmitt, NE
Terry O'Claire, ND
Dennis O'Dowd, NH
Paul Baldauf, NJ
Michael Ortiz, NM
Karen Beckley, NV
Steven Gavitt, NYSH
Gene Mishkin, NYCH
Francis Murray, NYSERDA
Sandra Hinkle, NYDEC
Robert E. Dansereau, NYSH

Mike Snee, OH
Mike Broderick, OK
David Howe, OR
David Allard, PA
Raymond Rusin, RI
Aaron Gantt, SC
Robert Stahl, SD
Debra Shults, TN
Susan Jablonski, TX
Richard Ratliff, TX
William Irwin, II, VT
Rusty Lundberg, UT
Leslie Foldesi, VA
Terry Frazee, WA
Paul Schmidt, WI
Scott Ramsay, WY

Please e-mail Patricia McGrady-Finneran at Patricia.McGrady-Finneran@nrc.gov if you have additions/corrections to the agenda.

TELECONFERENCE AGENDA FOR OAS/CRCPD CALL MARCH 17, 2011

1. Status Update on NRC Response to Japanese Nuclear Events – (FSME Management)
2. Update on Safety Culture Policy Statement – J. Firth – FSME\DILR\RB-B
3. Update on the ASTSWMO Tritium Exit Sign Petition – A. McIntosh – FSME\DMSSAILSD

NRC Announcements and Reminders:

1. March 24, 2011, 9:00 A.M. – Commission Briefing on 50.46a Risk-Informed Emergency Core Cooling System (ECCS) Rule (PUBLIC MEETING) Contact: Richard DUDley (301)415-1116 Webcast
2. March 31, 2011, 9:00 A.M. – Commission Briefing on Small Modular Reactors (PUBLIC MEETING)-Contact: Stephanie Coffin (301)415-6877 Webcast
3. April 19, 2011, 9:00 A.M. –Commission Briefing on Source Security – Part 37 Rulemaking- Physical Protection of Byproduct Material (PUBLIC MEETING)-Contact Merri Horn (301)415-8126 Webcast

The next OAS\CRCPD Teleconference will be held on Thursday, April 21, 2011.

Please e-mail Patricia McGrady-Finneran at Patricia.McGrady-Finneran@nrc.gov if you have additions/corrections to the agenda.

From: Burnell, Scott
To: Harrington, Holly
Subject: Re: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!
Date: Thursday, March 17, 2011 11:29:20 AM

Yes and yes

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Harrington, Holly
To: Burnell, Scott
Sent: Thu Mar 17 11:26:43 2011
Subject: RE: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!

Let's split the difference. How about 3 to 1?
Can you come on the conference call at 11:30?

From: Burnell, Scott
Sent: Thursday, March 17, 2011 11:22 AM
To: Harrington, Holly
Subject: Re: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!
Importance: High

Well then -- really, I'm OK now. Shall we make it 2-12? 4p.m. - 2 a.m.?

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Harrington, Holly
To: Burnell, Scott
Sent: Thu Mar 17 11:08:47 2011
Subject: RE: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!

Do not come in until 6 p.m. you'll work to midnight if ok. No need overnight

From: Burnell, Scott
Sent: Thursday, March 17, 2011 10:48 AM
To: Harrington, Holly
Subject: Re: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!

It's subsiding, I'll be functional -- trying to use hotel laundry rt now :-)

Sent from an NRC Blackberry
Scott Burnell

SSSS/13

(b)(6)

From: Harrington, Holly
To: Burnell, Scott
Sent: Thu Mar 17 09:00:41 2011
Subject: RE: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!

Sleep and relax. Call me later

From: Burnell, Scott
Sent: Thursday, March 17, 2011 9:00 AM
To: Brenner, Eliot; Couret, Ivonne; Harrington, Holly; Akstulewicz, Brenda; Shannon, Valerie; Landau, Mindy; Janbergs, Holly; Taylor, Robert; Sheehan, Neil; Hayden, Elizabeth; McIntyre, David
Subject: Re: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!

Really hate to say it -- fighting what feels like migraine, I'll do my best to make it in.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Brenner, Eliot
To: Couret, Ivonne; Harrington, Holly; Akstulewicz, Brenda; Shannon, Valerie; Wittick, Susan; Landau, Mindy; Janbergs, Holly; Taylor, Robert; Sheehan, Neil; Burnell, Scott; Hayden, Elizabeth; McIntyre, David
Cc: michael.widomski@dhs.gov <michael.widomski@dhs.gov>; Tobin, Jennifer; Bonaccorso, Amy; Deavers, Ron
Sent: Thu Mar 17 08:45:42 2011
Subject: RE: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!

Ivonne ... I would like to ask a favor ... could you bundle these messages up about every 15 to 30 minutes or so. That would avoid the horrendous clutter that I have to wade through. If they are local affiliate requests, just refer them to the regional offices which by now should be equipped with sufficient information to at least get started.

Please group network shows together ... then group print calls in a list.

Helps me prioritize where to throw our resources.

Thanks.

Eliot

From: Couret, Ivonne
Sent: Thursday, March 17, 2011 8:35 AM
To: Harrington, Holly; Akstulewicz, Brenda; Shannon, Valerie; Wittick, Susan; Landau, Mindy; Janbergs, Holly; Taylor, Robert; Sheehan, Neil; Brenner, Eliot; Burnell, Scott; Hayden, Elizabeth; McIntyre, David
Cc: michael.widomski@dhs.gov; Tobin, Jennifer; Bonaccorso, Amy; Deavers, Ron
Subject: RE: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!

I'm in please start emailing media messages so I can begin the follow up process. Mindy is in meeting. Ivonne

From: Harrington, Holly

Sent: Wednesday, March 16, 2011 5:33 PM

To: Akstulewicz, Brenda; Shannon, Valerie; Wittick, Susan; Landau, Mindy; Janbergs, Holly; Taylor, Robert; Sheehan, Neil; Brenner, Eliot; Burnell, Scott; Couret, Ivonne; Hayden, Elizabeth; McIntyre, David

Cc: michael.widomski@dhs.gov; Tobin, Jennifer; Bonaccorso, Amy; Deavers, Ron

Subject: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!

Eliot: 7:30/8 -- ?

Holly: ??

Op Center:

Dave: 7:30 a.m.- 6:30 p.m.

Rob: noon to 10 p.m.

Michael Widomski: 8-6 (loan from FEMA/general support in Op Center)

Scott: noon-8/9/10

Phones:

Brenda: 7:30 – 6 p.m.

Val: 6:45 – 4:30 p.m.

Munira: 8-6

Deanna Royer: 8-5

Misc.

Susan Wittick: 8:15 a.m. to 5 p.m. (loan from OCA)

Bethany: 9 a.m. – 6 p.m.

Nancy Stills 9-6 (loan from FEMA; working on project with "fact checking")

Media Desk:

Ivonne: 9-7

Mindy: 8 a.m.- 6 p.m. (backing up Ivonne when necessary)

Public Inquiries (moving to touchdown stations on 17th floor)

Amy Bonaccorso: 8 a.m. - 4:30 p.m.

Ron Deavers/Jenny Tobin – (combined) 8-6:30 (loan)

Overnight Op Center: Neil: 10 p.m. to 8 a.m.

From: Uselding, Lara
To: McIntyre, David; Burnell, Scott; Harrington, Holly; Couret, Ivonne
Subject: This is what I'm talking about - FYI Boxer and Feinstein request for comprehensive investigation at Cali nukes
Date: Thursday, March 17, 2011 11:58:30 AM

Couple of reporters asking for comment- told them we'll let them know

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

From: Mavis Scanlon <mavis@newsdata.com>

To: Uselding, Lara

Sent: Wed Mar 16 17:53:36 2011

Subject: Re: Can you comment on Boxer and Feinstein request for comprehensive investigation at Cali nukes?

Here is Boxer's statement from earlier today:

<http://boxer.senate.gov/en/press/releases/031611.cfm>

Uselding, Lara wrote:

> Have not heard that so I do not have info on that at this time. We will be reviewing japan incident and will look at this and any new info that arises

> Lara Uselding

> NRC Region 4 Public Affairs

> (b)(6)

>

> ----- Original Message -----

> From: Mavis Scanlon <mavis@newsdata.com>

> To: Uselding, Lara

> Sent: Wed Mar 16 17:41:19 2011

> Subject: Can you comment on Boxer and Feinstein request for comprehensive investigation at Cali nukes?

>

> Hi Lara,

> Immediately after I responded, I saw that Sen Boxer, in a hearing this

> afternoon, called on the NRC to conduct a comprehensive investigation

> into safety issues, with a focus on seismically active areas like

> California. Can you comment on that request to the NRC - does the NRC

> plan to conduct such an investigation?

>

> thanks again,

> -Mavis

>

> Uselding, Lara wrote:

>

>> No delays on reviews at this time.

>> Yes.

>>

>> Lara Uselding

>> U.S. Nuclear Regulatory Commission (NRC)

>> Public Affairs - Region IV

>>

>> Lara.Uselding@nrc.gov

>> For more information visit www.nrc.gov

>>

>>

>>

>> -----Original Message-----

>> From: Mavis Scanlon [<mailto:mavis@newsdata.com>]

>> Sent: Wednesday, March 16, 2011 3:49 PM

>> To: Uselding, Lara

SSSS/14

>> Subject: Diablo Canyon question - request for comment
>>
>> Hi Lara,
>> I'm following up an earlier message regarding Diablo Canyon. I wanted to
>> get a comment on whether the NRC is considering suspending or delaying
>> its review of PG&E's application to renew licenses for Diablo Canyon
>> until the utility completes additional seismic reports. I also wanted to
>> confirm whether the schedule for the review that is on the NRC's website
>> is the most current, updated schedule.
>>
>> Best regards,
>> -Mavis
>>
>> _____
>> Mavis Scanlon
>> Associate Editor
>> California Energy Markets
>> 425 Divisadero St. Ste. 303
>> San Francisco CA 94605
>> 415.963.4439 x12
>> mavis@newsdata.com
>>
>>
>>

From: McIntyre, David
To: Burnell, Scott
Subject: RE: BB charger @ your desk?
Date: Thursday, March 17, 2011 11:59:07 AM

You're supposed to get some sleep.

My charger is in the usual drawer; I think you know where it is. I also have my phone charger (which works) here in OPS.

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

From: Burnell, Scott
Sent: Thursday, March 17, 2011 11:55 AM
To: McIntyre, David
Subject: BB charger @ your desk?
Importance: High

My PC cable is in Ops Ctr and my BB's fading.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

SSSS/15

From: Screnci, Diane
To: McIntyre, David; Burnell, Scott
Subject: RE: seismic study
Date: Thursday, March 17, 2011 12:12:35 PM

I think he asked just now when I sent you both the question.

DIANE SCRENCI

SR. PUBLIC AFFAIRS OFFICER

USNRC, RI

610/337-5330

From: McIntyre, David
Sent: Thursday, March 17, 2011 12:12 PM
To: Burnell, Scott; Screnci, Diane
Subject: RE: seismic study

When and who did you ask?

From: Burnell, Scott
Sent: Thursday, March 17, 2011 12:06 PM
To: McIntyre, David; Screnci, Diane
Subject: Re: seismic study

I've asked the seismic staff for a fuller "no."

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: McIntyre, David
To: Screnci, Diane; Burnell, Scott
Sent: Thu Mar 17 12:01:18 2011
Subject: RE: seismic study

Yes. We would disagree. The NRC does not have a list of the most vulnerable plants. That "list" was constructed by the MSNBC reporter using partial data and even more partial understanding of our design criteria.

From: Screnci, Diane
Sent: Thursday, March 17, 2011 11:20 AM
To: McIntyre, David; Burnell, Scott
Subject: FW: seismic study

I think the answer is yes. Correct?

DIANE SCRENCI

SR. PUBLIC AFFAIRS OFFICER

USNRC, RI

SSSS/16

610/337-5330

From: Tumposky, Ellen X. -ND [mailto:Ellen.X.Tumposky.-ND@abc.com]
Sent: Thursday, March 17, 2011 11:12 AM
To: Screnci, Diane
Subject: RE: seismic study

Would you disagree with this statement, from a press release put out by Rep. Eliot Engel:

The NRC has released a report saying that Indian Point's reactor number 3 has the highest risk of core damage from an earthquake among U.S. nuclear plants.

From: Screnci, Diane [mailto:Diane.Screnci@nrc.gov]
Sent: Thursday, March 17, 2011 10:27 AM
To: Tumposky, Ellen X. -ND
Subject: seismic study

I have several comments about the report:

We don't rank plants... and didn't in this case. MSNBC ranked the plants. This wasn't a seismic ranking tool; it was an effort to screen for plants needing a further look.

The report shows us that:

Currently the operating nuclear power plants in the US remain safe, with no need for immediate action. Existing plants are designed with considerable margin to be able to withstand the ground motions that accounted for the largest earthquake expected in the area of the plant.

This results of our recent assessment demonstrate that the probability of exceeding the design basis ground motion might have increased at some sites, but only by a relatively small amount.

Even though the overall seismic risk estimates remain small, we've identified a number of reactors (27 total) where we need to complete additional analysis. That's being done. The Indian Point Units are two of those.

Here are the instructions for retrieving the document. It's very large:

For the document, go to the NRC's electronic database, called "Adams"...

<http://www.nrc.gov/reading-rm/adams.html>

Click on "web-based Adams"

Then Click on "begin web based search"

Click on the "simple search" tab

And use this accession number in the "simple search" box: ML100270582

DIANE SCRENCI

SR. PUBLIC AFFAIRS OFFICER

USNRC, RI

610/337-5330

From: McIntyre, David
To: Burnell, Scott
Subject: RE: seismic study
Date: Thursday, March 17, 2011 12:13:44 PM

Thanks – please cc me on the response. Cliff is working remotely today, I believe.

From: Burnell, Scott
Sent: Thursday, March 17, 2011 12:13 PM
To: McIntyre, David
Subject: Fw: seismic study
Importance: High

These folks, 20 min ago.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Burnell, Scott
To: Kammerer, Annie; Munson, Clifford; Ake, Jon
Cc: Screnci, Diane
Sent: Thu Mar 17 11:46:44 2011
Subject: Fw: seismic study

Folks;

Would it be accurate to say the GSI-199 seismic CDF #s are predicated on a quake that exceeds the SSE, and therefore the overall risk numbers are orders of magnitude lower? I can't imagine that IP is any really different than other plants. Quick response appreciated, of course!

Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Screnci, Diane
To: McIntyre, David; Burnell, Scott
Sent: Thu Mar 17 11:19:56 2011
Subject: FW: seismic study

I think the answer is yes. Correct?

DIANE SCRENCI
SR. PUBLIC AFFAIRS OFFICER
USNRC, RI
610/337-5330

SSSS/17

From: Tumposky, Ellen X. -ND [mailto:Ellen.X.Tumposky.-ND@abc.com]
Sent: Thursday, March 17, 2011 11:12 AM
To: Screnci, Diane
Subject: RE: seismic study

Would you disagree with this statement, from a press release put out by Rep. Eliot Engel:

The NRC has released a report saying that Indian Point's reactor number 3 has the highest risk of core damage from an earthquake among U.S. nuclear plants.

From: Screnci, Diane [mailto:Diane.Screnci@nrc.gov]
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To: Tumposky, Ellen X. -ND
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DIANE SCRENCI
SR. PUBLIC AFFAIRS OFFICER

USNRC, RI
610/337-5330

From: Cusseaux, Susan
To: Burnell, Scott; Brenner, Eliot; Harrington, Holly
Subject: Arrangements for CBS
Date: Thursday, March 17, 2011 2:59:51 PM

Good afternoon

I have made arrangements for the CBS truck to enter the NRC complex. I have received confirmation from the Wackenhut Project Officer that there will be no problems.

Susan

301-415-6545 (ofc)

(b)(6)

SSSS/18

From: Brenner, Eliot
To: Garcia, Gina; Burnell, Scott
Cc: Anyse, Alana
Subject: RE: CBS Early Show interview request in am
Date: Thursday, March 17, 2011 3:02:42 PM

Gina: I talked with the boss on the way back from the white house. We are doing nothing tonight, nothing in the morning, but evening shows tomorrow remain possible. Moreover, the chairman doesn't want to do any of the usual policy-oriented Sunday shows.

Want my job?

Eliot

From: Garcia, Gina [mailto:GarciaG@cbsnews.com]
Sent: Thursday, March 17, 2011 2:56 PM
To: Brenner, Eliot; Burnell, Scott
Cc: Anyse, Alana
Subject: CBS Early Show interview request in am

Mr. Brenner,

It was great chatting with you earlier. So you know I've sent along the details of your Monday NRC event as well as made a couple of phone calls to the CBS News Pool Chair of the month to make sure they understood the request and details. Someone should be following up with you shortly if they haven't already.

In regards to the morning show interviews you and I spoke about on the phone, if the Russell Rotunda, round robin option is the location you're looking to make Chairman Gregory Jaczko available from, when you get a moment I'd love to hear from you or someone that you put in a position to be a point of contact with about this interview for the morning.

For your planning purposes, should you make him available we'd be interested in an interview between 6:30 and 7:05a for five minutes. It would be a one on one interview with either Erika Hill or Chris Wragge and here's the information that we'd need to know from you all:

- Will the Chairman need makeup? (we can provide)
- Who will be the on-site contact for the Chairman in the morning? (name and cell phone)
- What time will he be available?

I'm cc'ing our evening shift producer Alana Anyse so that she's fully aware of your decision about the guest as well so we can get our crews into gear as soon as you give us the go.

Thanks so much for your time and attention to this, I can be reached at (b)(6) or by responding to this e-mail, whatever is most convenient for you.
Gina Garcia

Gina Garcia | CBS News *The Early Show* | direct: 202-457-4408 | cell: (b)(6)

SSSS/19

From: Couret, Ivonne
To: Burnell, Scott
Subject: MEDIA - FW: Josh Bernstein - The Daily
Date: Thursday, March 17, 2011 3:12:06 PM

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

Visit our online photo gallery. Incorporate graphics and photographs to tell your story!
<http://www.nrc.gov/reading-rm/photo-gallery/>

2010-2011 Information Digest - Where you can find NRC Facts at a Glance
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

From: Ghneim, Munira
Sent: Thursday, March 17, 2011 2:28 PM
To: Couret, Ivonne
Subject: Josh Bernstein - The Daily

Organization – The Daily -NY

Contact – Josh Bernstein

Phone – (b)(6)

Email – josh.bernstein@thedaily.com

Request – Would like to know more about the list of at risk nuclear power plants that NRC put out. He would also like to know how we arrived at our calculations.

SSSS/20

From: Couret, Ivonne
To: Burnell, Scott
Subject: MEDIA FW: Question - ARD German TV
Date: Thursday, March 17, 2011 3:12:37 PM

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

Visit our online photo gallery. Incorporate graphics and photographs to tell your story!
<http://www.nrc.gov/reading-rm/photo-gallery/>

2010-2011 Information Digest - Where you can find NRC Facts at a Glance
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

From: Steger (Tucci), Christine
Sent: Thursday, March 17, 2011 2:33 PM
To: Couret, Ivonne
Subject: Question - ARD German TV

Call from: Henning Werle
Organization: ARD German TV
Number: (b)(6)

- Question stems from Chairman Briefing yesterday – Chairman was asked question about how many reactors and how many plants U.S. has.... The answer was unclear.
 - How many reactors in U.S.? What is the difference between plants and reactors

SSSS/21

From: Screnci, Diane
To: Burnell, Scott
Subject: RE: seismic study
Date: Thursday, March 17, 2011 3:15:47 PM

Thanks. Can you explain to me what the 1 in 10,000 number means? We can talk if that would be easier.

Diane Screnci
Sr. Public Affairs Officer
USNRC, RI
610/337-5330

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

From: Burnell, Scott
Sent: Thursday, March 17, 2011 3:15 PM
To: Munson, Clifford; Kammerer, Annie; Ake, Jon
Cc: Screnci, Diane
Subject: RE: seismic study

Working on additional language with Annie -- please stand by.

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

From: Munson, Clifford
Sent: Thursday, March 17, 2011 2:41 PM
To: Burnell, Scott; Kammerer, Annie; Ake, Jon
Cc: Screnci, Diane
Subject: RE: seismic study

Scott,

Jon and I developed a response to your question below. The GI-199 study is very preliminary in nature as we stated in our earlier response.

The numbers are not just predicated on one large earthquake. They are based on an evaluation of all of the potential seismic sources in the CEUS and are used to produce seismic hazard estimates (curves) for each site. The GI-199 effort to-date has been to perform a screening assessment to determine if further, more detailed studies are warranted. This study has utilized fragility information from the Individual Plant Examination of External Events (IPEEE) program which was conducted to identify potential seismic vulnerabilities, not to produce robust risk estimates. Therefore, the GI-199 results should be viewed as preliminary and not definitive. It is important to note that the seismic CDF numbers do not imply total loss of containment etc. but only damage.

Cliff

From: Burnell, Scott
Sent: Thursday, March 17, 2011 11:46 AM
To: Kammerer, Annie; Munson, Clifford; Ake, Jon
Cc: Screnci, Diane
Subject: Fw: seismic study

Folks;

Would it be accurate to say the GSI-199 seismic CDF #s are predicated on a quake that exceeds the SSE, and therefore the overall risk numbers are orders of magnitude lower? I can't imagine that IP is any really different than other plants. Quick response appreciated, of course!

SSSS / 22

Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Screnci, Diane
To: McIntyre, David; Burnell, Scott
Sent: Thu Mar 17 11:19:56 2011
Subject: FW: seismic study

I think the answer is yes. Correct?

Diane Screnci
Sr. Public Affairs Officer
USNRC, RI
610/337-5330

From: Tumposky, Ellen X. -ND [<mailto:Ellen.X.Tumposky.-ND@abc.com>]
Sent: Thursday, March 17, 2011 11:12 AM
To: Screnci, Diane
Subject: RE: seismic study

Would you disagree with this statement, from a press release put out by Rep. Eliot Engel:

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From: Screnci, Diane [<mailto:Diane.Screnci@nrc.gov>]
Sent: Thursday, March 17, 2011 10:27 AM
To: Tumposky, Ellen X. -ND
Subject: seismic study

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Click on the "simple search" tab

And use this accession number in the "simple search" box: ML100270582

Diane Screnci
Sr. Public Affairs Officer
USNRC, RI
610/337-5330

From: Harrington, Holly
To: McIntyre, David; Burnell, Scott; Taylor, Robert
Subject: RE: Seismic Q&As
Date: Thursday, March 17, 2011 3:36:56 PM
Attachments: image001.png

OK. But who in OPA is she working with to be sure we want this posted and know it's going up, etc. etc. (and is this something we should do a release or blog post on?)

From: McIntyre, David
Sent: Thursday, March 17, 2011 3:31 PM
To: Harrington, Holly; Burnell, Scott; Taylor, Robert
Subject: Re: Seismic Q&As

Annie K has the lede on this doc.

David McIntyre
NRC Office of Public Affairs
(b)(6) (mobile)
301-415-8200 (office)
Sent from my BlackBerry, which is wholly responsible for all typos.

From: Harrington, Holly
To: Burnell, Scott; McIntyre, David; Taylor, Robert
Sent: Thu Mar 17 15:29:42 2011
Subject: FW: Seismic Q&As

Can anyone address? I told Nelson not to post anything without our approval

From: Nelson, Robert
Sent: Thursday, March 17, 2011 2:27 PM
To: Harrington, Holly
Subject: FYI: Seismic Q&As
Importance: High

Heads up for possible action tomorrow.

NELSON

From: Nelson, Robert
Sent: Thursday, March 17, 2011 2:18 PM
To: Kammerer, Annie
Cc: Roberts, Darrell; Croteau, Rick; Kennedy, Kriss; Lara, Julio; West, Steven; Shear, Gary; Ruland, William; Boger, Bruce; Meighan, Sean; Nguyen, Quynh; Gitter, Joseph
Subject: Action: Seismic Q&As
Importance: High

Annie:

The regions have a critical need for publicly releasable seismic info (Qs & As) to support public meetings beginning next week. We need a releasable version of your document. Can you assemble the info that you have prepared that you believe is good to go. We can then get that reviewed by OPA. Need your input tomorrow.

Robert A. Nelson

Robert A. Nelson
Deputy Director
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation



E-mail: robert.nelson@nrc.gov | Office: (301) 415-1453 | Cell: (703) 244-7493 | Fax: (301) 415-2102

From: Kammerer, Annie
Sent: Thursday, March 17, 2011 2:36 AM
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Gitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Gitter, Joseph; Howe, Allen; Ruland, William; Dudes, Laura;

SSSS/23

Karas, Rebecca; Ake, Jon; Munson, Clifford; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Usekding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Murphy, Andrew; Pires, Jose; Hogan, Rosemary; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffry; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas
Subject: Seismic Q&As March 17th 2am update

All,

As promised, a sharepoint site has been set up where our friends in NRR will be posting the latest version of the Seismic Q&A document on an ongoing basis. If someone would prefer to use the sharepoint site, instead of being on this distribution list, please let me know...

<http://portal.nrc.gov/edo/nrr/NRR%20TA/FAQ%20Related%20to%20Events%20Occuring%20in%20Japan/Forms/AllItems.aspx>

This latest update has a number of new questions (not many with answers today, but we are working hard). A high priority question we are working on is "how many plants are near a mapped active fault". We're focusing on anything within 50 miles. We're also pulling relevant questions from the congressional inquiries we just received; and will also give these high priority to support any needs by NRR.

Many new figures and some draft fact sheets have added to the "additional information" section. These include the NRO half of a tsunami fact sheet...a description of the tsunami research is still to come from RES.

Some good news: Yesterday's version seems to have been widely forwarded around the agency. So, we are also starting to get some excellent questions from staff looking forward. This is allowing us to feel that we are finally getting out in front of things to a small degree. Also, our team has grown and we now have someone acting as source of seismic expertise for the 11pm to 7 am shift. This means that we now have seismic experts available to the RST and OPA at the Op Center 24 hours, with 2 people during the day. That extra support is allowing us to get this out at least an hour earlier today ☺

We are continuing to compile the questions that come in and update the seismic Q&A document. If you have suggested changes, or want to provide missing answers, please forward them to me for compilation.

This is a living document and will be updated daily in the foreseeable future.

Happy St. Paddy's Day. May the world (especially our friends in Japan) have the luck of the Irish today.

Cheers,
Annie

Dr. Annie Kammerer, PE
Senior Seismologist and Earthquake Engineer
US Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
Washington DC 20555
(b)(6) mobile
1 (301) 873-3923 BB

From: Kammerer, Annie
Sent: Tuesday, March 15, 2011 3:41 AM
To: Hiland, Patrick; Skeen, David
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Giltter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Kammerer, Annie; Chokshi, Nilesh; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Giltter, Joseph; Howe, Allen; Case, Michael; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Munson, Clifford; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Usekding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Murphy, Andrew; Pires, Jose; Hogan, Rosemary; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael
Subject: latest version of Q&As

All,

This is the first draft of the seismic-specific Q&As. It is pretty rough and there are many answers still missing, but people have contributed a lot and we thought it may be useful for many people trying to answer questions coming in.

We are continuing to compile the questions that come in and update the seismic Q&A document. If you have suggested changes, or want to provide missing answers, please forward them to me for compilation.

This is a living document and will be updated daily in the foreseeable future.

Annie

Dr. Annie Kammerer, PE
Senior Seismologist and Earthquake Engineer
US Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
Washington DC 20555

(b)(6) mobile

1 (301) 873-3923 BB

From: Burnell, Scott
To: Vokoun, Patricia
Cc: Whited, Ryan; Chokshi, Niles; Flanders, Scott
Subject: RE: Summer FEIS press release
Date: Thursday, March 17, 2011 3:47:00 PM
Attachments: image001.png

I hope I'm available to write the release at that point!

From: Vokoun, Patricia
Sent: Thursday, March 17, 2011 11:01 AM
To: Burnell, Scott
Cc: Whited, Ryan; Chokshi, Niles; Flanders, Scott
Subject: Summer FEIS press release

Hi, Scott,

It's a little early but wanted to give you a heads up that USACE and DSER would like to consider a joint press release for the publication of the Summer FEIS. We are looking at FEIS publication in April.

I imagine that we will need a little extra time for USACE to look at the release and get comfortable with it. That said, I don't anticipate difficulties.

Thank you,

Patricia Vokoun, P.E.
Project Manager
U.S. NRC, Office of New Reactors
301-415-3470
(b)(6) c
FAX: 301-415-5761
patricia.vokoun@nrc.gov



SSSS / 24

From: [Burnell, Scott](#)
To: [Kammerer, Annie](#)
Subject: FW: seismic study
Date: Thursday, March 17, 2011 3:47:00 PM
Importance: High

As we discussed, edits below

The risk numbers are essentially due to earthquakes stronger than anything indicated in the geologic record used to determine the design requirements at these sites. The numbers are based on an evaluation of all of the potential seismic sources in the CEUS and are used to produce seismic hazard estimates (curves) for each site. The GI-199 effort to date has performed a screening assessment to determine if further, more detailed studies are warranted. This study has utilized information from plant-specific evaluation of external hazards, including earthquakes. That information was gathered to identify potential seismic vulnerabilities, not to produce robust risk estimates. Therefore, the GI-199 results should be viewed as preliminary and not definitive.

From: Burnell, Scott
Sent: Thursday, March 17, 2011 11:46 AM
To: Kammerer, Annie; Munson, Clifford; Ake, Jon
Cc: Screnci, Diane
Subject: Fw: seismic study

Folks;

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Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Screnci, Diane
To: McIntyre, David; Burnell, Scott
Sent: Thu Mar 17 11:19:56 2011
Subject: FW: seismic study

I think the answer is yes. Correct?

Diane Screnci
Sr. Public Affairs Officer
USNRC, RI
610/337-5330

From: Tumposky, Ellen X. -ND [<mailto:Ellen.X.Tumposky.-ND@abc.com>]
Sent: Thursday, March 17, 2011 11:12 AM
To: Screnci, Diane
Subject: RE: seismic study

Would you disagree with this statement, from a press release put out by Rep. Eliot Engel:

SSSS/25

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From: Screnci, Diane [<mailto:Diane.Screnci@nrc.gov>]
Sent: Thursday, March 17, 2011 10:27 AM
To: Tumposky, Ellen X. -ND
Subject: seismic study

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Click on the "simple search" tab

And use this accession number in the "simple search" box: ML100270582

Diane Screnci
Sr. Public Affairs Officer
USNRC, RI
610/337-5330

From: Burnell, Scott
To: Brenner, Eliot
Subject: RE: Yesterday's "protective measures team" report seems to say
Date: Thursday, March 17, 2011 3:50:00 PM

Took care or it...

From: Brenner, Eliot
Sent: Thursday, March 17, 2011 3:50 PM
To: Wald, Matthew
Cc: Burnell, Scott
Subject: RE: Yesterday's "protective measures team" report seems to say

Scott....maybe you can help. Higher math is beyond me.

What I can tell you matt, is that we forecast a particular percentage of core melt (I think 33 percent across the board) along with pool-fed emissions ... to generate our estimates....but I will let the pros help you further.

eliot

From: Wald, Matthew [mailto:mattwald@nytimes.com]
Sent: Thursday, March 17, 2011 3:22 PM
To: Brenner, Eliot
Cc: Burnell, Scott
Subject: Yesterday's "protective measures team" report seems to say

that the hypothetical one-reactor site produces a dose at ten miles of 95 rem
But the hypothetical four reactor site produces a smaller dose, 14 rem.
Why does one meltdown give a smaller dose than four melt-downs? And is the hypothetical event a core meltdown? A spent fuel storage pool fire? Something else?
Many thanks if you can help.

Matthew L. Wald
Washington Bureau
The New York Times
1627 Eye St NW, Suite 700
Washington, DC 20006
202-862-0363
cell: (b)(6)
fax: 202-318-0057

<http://www.nytimes.com/info/nuclear-energy/>
twitter: mattwaldnyt

SSSS/26

From: Burnell, Scott
To: Cappiello, Dina; Brenner, Eliot
Subject: RE: Accuracy check
Date: Thursday, March 17, 2011 3:51:00 PM

That's acceptable, Dina. Thanks for checking.

From: Cappiello, Dina [mailto:DCappiello@ap.org]
Sent: Thursday, March 17, 2011 3:50 PM
To: Brenner, Eliot
Cc: Burnell, Scott
Subject: Accuracy check
Importance: High

Eliot,

AP wants to run this information in a box. Can you please confirm it is accurate? I am doing my own research, and want to make sure it hasn't changed.

The NRC establishes two Emergency Planning Zones (EPZ) around each commercial nuclear power plant. The zone within 10 miles of the plant is designated the plume EPZ for planning evacuation and sheltering and the region within 50 miles from the plant is the ingestion EPZ.

It says that in area beyond 10 miles and out to approximately 50 miles, the primary exposure to radioactive materials is from ingestion – meaning the recommendation is to ban consumption of contaminated food, water, milk.

These EPZs are standard, but can be altered when conditions exceed EPA's Protective Action Guidelines (PAG). EPA's PAG for evacuation states that evacuation of the public should occur when the projected dose to an individual is 1 rem.

Dina Cappiello
Environment/Energy Reporter
The Associated Press
1100 13th Street NW, Suite 700
Washington, DC 20005
(202)-641-9446 (o)
(202)-403-3582 (f)

(b)(6)

 (c)

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SSSS / 27

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[IP_US_DISC]msk dccc60c6d2c3a6438f0cf467d9a4938

From: Burnell, Scott
To: Brenner, Eliot; Wald, Matthew
Subject: RE: a request for help on a major story
Date: Thursday, March 17, 2011 3:57:00 PM

Eliot;

Spoke briefly with Matt on this during the other call. I'm checking.

Scott

From: Brenner, Eliot
Sent: Thursday, March 17, 2011 3:00 PM
To: Wald, Matthew
Cc: Burnell, Scott
Subject: RE: a request for help on a major story

We will try. (background works real good under the circumstances so others don't whine that eliot is playing favorites.)

Scott: can you find one person who fits the bill for all of this?

From: Wald, Matthew [mailto:mattwald@nytimes.com]
Sent: Thursday, March 17, 2011 2:58 PM
To: Brenner, Eliot
Subject: a request for help on a major story

Eliot,

We are planning a major story (covering a whole page or more) on the general concept of "can it happen here." One part of this will be to explain Probabilistic Risk Assessment, risk-informed regulation, and similar reader-friendly concepts.

I would like to explain to readers what the NRC thinks dominates risk. (LOOP, station blackout, fires, dropping a fuel cask into the spent fuel pool, "external events," etc.) plus what you can't quantify, like chance of 9/11-type attack. I'd also like to explore the concept of unknowns and events that exceed expectations (9.0 and a tsunami.) I'd like to make some reference to Katrina and Andrew, and to the earthquake at Perry while it was still under construction, which, as I recall, exceeded its design basis but didn't cause any damage). And the 1983 Salem ATWS, which seemed to cast doubt on the PRA methodology.

Obviously, this is the busy season at your shop. But is there somebody at White Flint whom I could come talk to tomorrow, preferably in the A.M.?

--- Matt

Matthew L. Wald
Washington Bureau

SSSS/28

The New York Times
1627 Eye St NW, Suite 700
Washington, DC 20006
202-862-0363

cell: (b)(6)

fax: 202-318-0057

<http://www.nytimes.com/info/nuclear-energy/>

twitter: mattwaldnyt

From: [Burnell, Scott](#)
To: [Henry, Ray](#)
Cc: [Brenner, Eliot](#)
Subject: RE: NEI voluntary inspections
Date: Thursday, March 17, 2011 4:04:00 PM

Hi Ray;

Any efforts NEI and U.S. nuclear power plants take to ensure the plants meet the NRC's strict requirements for withstanding severe events are appreciated at this time. The NRC continues to conclude U.S. plants are meeting our requirements.

Scott

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

From: Henry, Ray [<mailto:rhenry@ap.org>]
Sent: Thursday, March 17, 2011 2:46 PM
To: Burnell, Scott
Subject: NEI voluntary inspections

Scott:

NEI announced today they are taking the steps listed below. Does the NRC have any reaction? The NEI says these steps go beyond the NRC design-basis requirements for their nuclear plants -- are they correct?

I've pasted the NEI announcement below.

Cheers,
Ray Henry

Ray Henry | The Associated Press | Office: 404-522-8971 | Cell:
(b)(6) | rhenry@ap.org

Senior executives representing all U.S. nuclear power plants are taking the following actions at each of their sites:

1. Verify each company's capability to mitigate conditions that result from severe adverse events, including the loss of significant operational and safety systems due to natural events, fires, aircraft impact and explosions. Specific actions include testing and inspecting equipment required to mitigate these events and verifying that qualifications of operators and support staff required to implement them are current.
2. Verify that the capability to mitigate a total loss of electric power to a nuclear power plant is proper and functional. This will require inspections verifying that all required materials are adequate and properly staged and that procedures are implemented.
3. Verify the capability to mitigate flooding and the impact of floods on systems inside and outside the plant. Specific actions include verifying required materials and equipment are properly located to protect them from flood.
4. Perform walk downs and inspection of important equipment needed to successfully respond to fire and flood events. Identify the potential that the equipment's function could be lost during seismic events appropriate for the site and develop mitigating strategies for potential vulnerabilities.

SSSS/29

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[IP_US_DISC]

msk dccc60c6d2c3a6438f0cf467d9a4938

From: Couret, Ivonne
To: Burnell, Scott; McIntyre, David
Subject: FW: Media - Interview JAPAN COMM>
Date: Thursday, March 17, 2011 4:08:23 PM

Tell me who is taking this...

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

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<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

From: Royer, Deanna
Sent: Thursday, March 17, 2011 3:56 PM
To: Couret, Ivonne
Subject: Media - Interview

Takashi Kozawa
Japan Communications

(b)(6)

(b)(6)

Re: Interview - technical questions

Deanna Royer
Contract Secretary
301-415-8200

SSSS/30

From: Couret, Ivonne
To: Burnell, Scott
Subject: MEDIA - FW: Philadelphia Inquirer - Question re: Seismic Risks
Date: Thursday, March 17, 2011 4:13:37 PM

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

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<http://www.nrc.gov/reading-rm/photo-gallery/>

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<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

From: Steger (Tucci), Christine
Sent: Thursday, March 17, 2011 4:08 PM
To: Couret, Ivonne
Subject: Philadelphia Inquire - Question re: Seismic Risks

Call from: Tom Avril
Organization: Philadelphia Inquire
Number (b)(6)

Question: Seismic Risks – recent reports in the media about ranking of plants who are at risk of an earthquake. Would like to confirm this information, does the NRC rank the plants.

SSSS/31

From: Brenner, Eliot
To: Burnell, Scott
Subject: RE: Presidential directive
Date: Thursday, March 17, 2011 4:17:18 PM
Attachments: image001.png

Ok. Have Josh call me immediately please if he is still there.

From: Burnell, Scott
Sent: Thursday, March 17, 2011 4:06 PM
To: Brenner, Eliot; Harrington, Holly
Subject: FW: Presidential directive
Importance: High

Just corralled Josh in the ET room and he's fine with –

“The NRC has received the President’s request and we will be responding to it.”

No timelines, no further details at this point. OK??

From: Ledford, Joey
Sent: Thursday, March 17, 2011 4:02 PM
To: McIntyre, David; Brenner, Eliot; Harrington, Holly; Burnell, Scott; Couret, Ivonne; Janbergs, Holly; Hannah, Roger; Screnci, Diane; Sheehan, Neil; Chandrathil, Prema; Mitlyng, Viktoria; Widomski, Michael; Landau, Mindy; Uselding, Lara
Subject: Presidential directive

Reuters says the President has directed us to do a systematic review of all plants. True? They want a comment, and I’m not willing to tackle this one blind.

Joey Ledford
Public Affairs Officer
Region II -- Atlanta, Ga.
O: 404.997.4416

C: (b)(6)

joey.ledford@nrc.gov



SSSS/32

From: Uselding, Lara
To: McIntyre, David; Harrington, Holly; Chandrathil, Prema; Burnell, Scott; Widomski, Michael; Taylor, Robert; Brenner, Eliot; Couret, Ivonne
Subject: RE: Indian point/ nark report HuffPo correction
Date: Thursday, March 17, 2011 4:42:02 PM

I did not. I've already ytelled at my reporter from there on the Diablo Story and waiting for a correction!!!

Lara Uselding
U.S. Nuclear Regulatory Commission (NRC)
Public Affairs - Region IV

Lara.Uselding@nrc.gov

BlackBerry: (b)(6)

Office: 817-276-6519

For more information visit www.nrc.gov

From: McIntyre, David
Sent: Thursday, March 17, 2011 3:28 PM
To: Harrington, Holly; Uselding, Lara; Chandrathil, Prema; Burnell, Scott; Widomski, Michael; Taylor, Robert; Brenner, Eliot; Couret, Ivonne
Subject: FW: indian point/ nrc report HuffPo correction

FYI – they do quote us. Anyone remember speaking to them?

From: Jonah Green [mailto:jgreen@huffingtonpost.com]
Sent: Thursday, March 17, 2011 4:12 PM
To: McIntyre, David
Subject: indian point/ nrc report

Hi David,

Thank you for getting in touch with us about that article.

We've updated our post to clarify that the NRC is not the source of this 'most vulnerable' claim:

http://www.huffingtonpost.com/2011/03/17/cuomo-wants-indian-point-_n_836982.html

Best, Jonah

--

Jonah Green
New York Editor
The Huffington Post
<http://www.huffingtonpost.com/new-york/>

SSSS/33

From: Kammerer, Annie
To: Burnell, Scott; Munson, Clifford; Ake, Jon
Cc: Screnci, Diane
Subject: RE: seismic study
Date: Thursday, March 17, 2011 4:42:55 PM

Scott,

Jon and I added some stuff based on our conversation at 3pm today. please let me know if this works for you....

The numbers are not just predicated on one large earthquake, or even on a single seismic source. They are based on an evaluation of all of the potential seismic sources in the central eastern United States and are used to produced seismic hazard estimates (curves) for each site. The evaluation includes all plausible earthquake ground motions beyond the Safe Shutdown Earthquake (SSE) even those that have a very low probability of occurring. The Generic Issue 199 (GI-199) effort to-date has been to perform a screening assessment to determine if further, more detailed studies are warranted. This study has utilized fragility information from the Individual Plant Examination of External Events (IPEEE) program which was conducted to identify potential seismic vulnerabilities, not to produce robust risk estimates. Therefore, the GI-199 results should be viewed as preliminary and not definitive. It is important to also note that the seismic core damage frequency (CDF) numbers do not imply total loss of containment or radiological release, but only the onset of any type of damage to the core.

From: Burnell, Scott
Sent: Thursday, March 17, 2011 3:15 PM
To: Munson, Clifford; Kammerer, Annie; Ake, Jon
Cc: Screnci, Diane
Subject: RE: seismic study

Working on additional language with Annie -- please stand by.

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

From: Munson, Clifford
Sent: Thursday, March 17, 2011 2:41 PM
To: Burnell, Scott; Kammerer, Annie; Ake, Jon
Cc: Screnci, Diane
Subject: RE: seismic study

Scott,

Jon and I developed a response to your question below. The GI-199 study is very preliminary in nature as we stated in our earlier response.

The numbers are not just predicated on one large earthquake. They are based on an evaluation of all of the potential seismic sources in the CEUS and are used to produced seismic hazard estimates (curves) for each site. The GI-199 effort to-date has been to perform a screening assessment to determine if further, more detailed studies are warranted. This study has utilized fragility information from the Individual Plant Examination of External Events (IPEEE) program which was conducted to identify potential seismic vulnerabilities, not to produce robust risk estimates. Therefore, the GI-199 results should be viewed as preliminary and not definitive. It is important to note that the seismic CDF numbers do not imply total loss of containment etc. but only damage.

Cliff

From: Burnell, Scott
Sent: Thursday, March 17, 2011 11:46 AM

SSSS / 34

To: Kammerer, Annie; Munson, Clifford; Ake, Jon
Cc: Screnci, Diane
Subject: Fw: seismic study

Folks;

Would it be accurate to say the GSI-199 seismic CDF #s are predicated on a quake that exceeds the SSE, and therefore the overall risk numbers are orders of magnitude lower? I can't imagine that IP is any really different than other plants. Quick response appreciated, of course!

Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Screnci, Diane
To: McIntyre, David; Burnell, Scott
Sent: Thu Mar 17 11:19:56 2011
Subject: FW: seismic study

I think the answer is yes. Correct?

Diane Screnci
Sr. Public Affairs Officer
USNRC, RI
610/337-5330

From: Tumposky, Ellen X. -ND [<mailto:Ellen.X.Tumposky.-ND@abc.com>]
Sent: Thursday, March 17, 2011 11:12 AM
To: Screnci, Diane
Subject: RE: seismic study

Would you disagree with this statement, from a press release put out by Rep. Eliot Engel:

The NRC has released a report saying that Indian Point's reactor number 3 has the highest risk of core damage from an earthquake among U.S. nuclear plants.

From: Screnci, Diane [<mailto:Diane.Screnci@nrc.gov>]
Sent: Thursday, March 17, 2011 10:27 AM
To: Tumposky, Ellen X. -ND
Subject: seismic study

I have several comments about the report:

We don't rank plants... and didn't in this case. MSNBC ranked the plants. This wasn't a seismic ranking tool; it was an effort to screen for plants needing a further look.

The report shows us that:

Currently the operating nuclear power plants in the US remain safe, with no need for immediate action.

Existing plants are designed with considerable margin to be able to withstand the ground motions that accounted for the largest earthquake expected in the area of the plant.

This results of our recent assessment demonstrate that the probability of exceeding the design basis ground motion might have increased at some sites, but only by a relatively small amount.

Even though the overall seismic risk estimates remain small, we've identified a number of reactors (27 total) where we need to complete additional analysis. That's being done. The Indian Point Units are two of those.

Here are the instructions for retrieving the document. It's very large:

For the document, go to the NRC's electronic database, called "Adams"... <http://www.nrc.gov/reading-rm/adams.html>

Click on "web-based Adams"

Then Click on "begin web based search"

Click on the "simple search" tab

And use this accession number in the "simple search" box: ML100270582

Diane Screnci
Sr. Public Affairs Officer
USNRC, RI
610/337-5330

From: [Burnell, Scott](#)
To: tom.doggett@thomsonreuters.com
Subject: RE: Obama order "comprehensive review" of U.S reactors
Date: Thursday, March 17, 2011 5:23:00 PM

Hi Tom;

In response to the President's request, we will be undertaking a methodical and systematic review of the information to be gleaned from this to inform a decision as to whether any changes need to be made to strengthen an already strong safety regulatory system. As a first step, the commission will be meeting Monday to begin discussing the form of this review.

Scott

From: tom.doggett@thomsonreuters.com [mailto:tom.doggett@thomsonreuters.com]
Sent: Thursday, March 17, 2011 4:04 PM
To: Burnell, Scott
Subject: Obama order "comprehensive review" of U.S reactors

Hey Scott,

You know what I want. What are the details on this "comprehensive review" ordered by Obama on all U.S. reactors. Will NRC inspectors go visit each reactors or will the reactor operators run down a safety checklist. What can you tell me. (Can you at least provide guidance on if we are getting an NRC release on this today. If so, before or after 5 p.m.). Thanks--Tom

Tom Doggett
Energy Correspondent
Reuters News Agency
202-898-8320 (work)

(b)(6)

 (cell)

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SSSS/35

From: Burnell, Scott
To: Couret, Ivonne; McIntyre, David
Subject: RE: Media - Interview - ABC News Good Morning America
Date: Thursday, March 17, 2011 5:45:00 PM

Left a voicemail.

From: Couret, Ivonne
Sent: Thursday, March 17, 2011 2:16 PM
To: Burnell, Scott; McIntyre, David
Subject: FW: Media - Interview - ABC News Good Morning America

This person want to talk to someone who can provide add on information not the chairman.
Ivonne

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

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From: Royer, Deanna
Sent: Thursday, March 17, 2011 1:58 PM
To: Couret, Ivonne
Subject: Media - Interview - ABC News Good Morning America

Jennifer Pereira
ABC News – Good Morning America
Jennifer.M.Pereira@abc.com

(b)(6)

Re: Interview today to air tomorrow – Evacuation plans in place in U.S.

Deanna Royer
Contract Secretary
301-415-8200

SSSS/36

From: Burnell, Scott
To: Brenner, Eliot; mcclaind@nytimes.com
Subject: RE: How much fuel in the reactors?
Date: Thursday, March 17, 2011 6:04:00 PM

Hi Dylan;

There just isn't anything available on that, I'm sorry.

Scott Burnell
Public Affairs Officer
Nuclear Regulatory Commission

From: McClain, Dylan [mailto:mcclaind@nytimes.com]
Sent: Thursday, March 17, 2011 4:08 PM
To: Brenner, Eliot
Subject: Re: How much fuel in the reactors?

(b)(6)

--
Dylan McClain
The New York Times

From: "Brenner, Eliot" <Eliot.Brenner@nrc.gov>
Date: Thu, 17 Mar 2011 16:03:04 -0400
To: Dylan McClain <mcclaind@nytimes.com>
Subject: RE: How much fuel in the reactors?

Send me your number again.

From: McClain, Dylan [mailto:mcclaind@nytimes.com]
Sent: Thursday, March 17, 2011 1:09 PM
To: Brenner, Eliot
Subject: How much fuel in the reactors?

Eliot,
On deep, deep, deep background, we are trying to get specific information on how much fuel was in the reactors and how much was in the spent fuel pools at the plants. Can you help us?

--
Dylan McClain
The New York Times

SSSS/37

From: [Burnell, Scott](#)
To: zunairazaki@abc.com
Bcc: [Courret, Ivonne](#)
Subject: RE: MEDIA QUESTION - FW: Zunaira Zaki - ABC News -NY
Date: Thursday, March 17, 2011 6:45:00 PM

Hello Zunaira;

The last construction permit for a currently operating plant was issued in 1978. Approximately half of today's operating plants, however, were completed and came online after the Three Mile Island accident. Thanks.

Scott Burnell
Public Affairs Officer
Nuclear Regulatory Commission

Subject: Zunaira Zaki - ABC News -NY

Organization – ABC News- NY

Contact – Zunaira Zaki

Phone – (b)(6)

Email – zunairazaki@abc.com

Request – Would like to confirm that the U.S. has not built another nuclear plant since three mile island.

Thank you,
Munira Ghneim
Contract Secretary
Office of Information Services
301-415-1170

SSSS/38

From: Burnell, Scott
To: Harrington, Holly
Subject: Re: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!
Date: Thursday, March 17, 2011 10:47:44 AM

It's subsiding, I'll be functional -- trying to use hotel laundry rt now :-)

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Harrington, Holly
To: Burnell, Scott
Sent: Thu Mar 17 09:00:41 2011
Subject: RE: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!

Sleep and relax. Call me later

From: Burnell, Scott
Sent: Thursday, March 17, 2011 9:00 AM
To: Brenner, Eliot; Couret, Ivonne; Harrington, Holly; Akstulewicz, Brenda; Shannon, Valerie; Landau, Mindy; Janbergs, Holly; Taylor, Robert; Sheehan, Neil; Hayden, Elizabeth; McIntyre, David
Subject: Re: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!

Really hate to say it -- fighting what feels like migraine, I'll do my best to make it in.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Brenner, Eliot
To: Couret, Ivonne; Harrington, Holly; Akstulewicz, Brenda; Shannon, Valerie; Wittick, Susan; Landau, Mindy; Janbergs, Holly; Taylor, Robert; Sheehan, Neil; Burnell, Scott; Hayden, Elizabeth; McIntyre, David
Cc: michael.widomski@dhs.gov <michael.widomski@dhs.gov>; Tobin, Jennifer; Bonaccorso, Amy; Deavers, Ron
Sent: Thu Mar 17 08:45:42 2011
Subject: RE: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!

Ivonne ... I would like to ask a favor ... could you bundle these messages up about every 15 to 30 minutes or so. That would avoid the horrendous clutter that I have to wade through. If they are local affiliate requests, just refer them to the regional offices which by now should be equipped with sufficient information to at least get started.

Please group network shows together ... then group print calls in a list.

Helps me prioritize where to throw our resources.

Thanks.

SSSS/39

Eliot

From: Couret, Ivonne

Sent: Thursday, March 17, 2011 8:35 AM

To: Harrington, Holly; Akstulewicz, Brenda; Shannon, Valerie; Wittick, Susan; Landau, Mindy; Janbergs, Holly; Taylor, Robert; Sheehan, Neil; Brenner, Eliot; Burnell, Scott; Hayden, Elizabeth; McIntyre, David

Cc: michael.widomski@dhs.gov; Tobin, Jennifer; Bonaccorso, Amy; Deavers, Ron

Subject: RE: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!

I'm in please start emailing media messages so I can begin the follow up process. Mindy is in meeting. Ivonne

From: Harrington, Holly

Sent: Wednesday, March 16, 2011 5:33 PM

To: Akstulewicz, Brenda; Shannon, Valerie; Wittick, Susan; Landau, Mindy; Janbergs, Holly; Taylor, Robert; Sheehan, Neil; Brenner, Eliot; Burnell, Scott; Couret, Ivonne; Hayden, Elizabeth; McIntyre, David

Cc: michael.widomski@dhs.gov; Tobin, Jennifer; Bonaccorso, Amy; Deavers, Ron

Subject: Schedule for Thursday -- please let me know if this does not work for you. Thank you to our loanees!

Eliot: 7:30/8 -- ?

Holly: ??

Op Center:

Dave: 7:30 a.m.- 6:30 p.m.

Rob: noon to 10 p.m.

Michael Widomski: 8-6 (loan from FEMA/general support in Op Center)

Scott: noon-8/9/10

Phones:

Brenda: 7:30 – 6 p.m.

Val: 6:45 – 4:30 p.m.

Munira: 8-6

Deanna Royer: 8-5

Misc.

Susan Wittick: 8:15 a.m. to 5 p.m. (loan from OCA)

Bethany: 9 a.m. – 6 p.m.

Nancy Stills 9-6 (loan from FEMA; working on project with "fact checking")

Media Desk:

Ivonne: 9-7

Mindy: 8 a.m.- 6 p.m. (backing up Ivonne when necessary)

Public Inquiries (moving to touchdown stations on 17th floor)

Amy Bonaccorso: 8 a.m. - 4:30 p.m.

Ron Deavers/Jenny Tobin – (combined) 8-6:30 (loan)

Overnight Op Center: Neil: 10 p.m. to 8 a.m.

From: Burnell, Scott
To: Brenner, Eliot; Hayden, Elizabeth; Sheehan, Neil; McIntyre, David
Subject: Media call for first thing Friday morning
Date: Thursday, March 17, 2011 10:30:00 PM

All;

Steve Featherstone, Business Week

Friday deadline

315-473-0612

(b)(6)

(c)

Sounds like he wants Japan speculation, which we won't do, but it'd be good to return the call.

Scott

SSSS/40

From: [Burnell, Scott](#)
To: scott.disavino@thomsonreuters.com
Bcc: [Courret, Ivonne](#)
Subject: RE: ANother question - FW: NRC REPLY - RE: spent fuel pool in no 4 at daiichi
Date: Thursday, March 17, 2011 10:17:00 PM

Scott;

So sorry on the delay in getting back to you – just that slammed. We don't have enough information on where the power would be going to have an answer on that.

Scott

From: scott.disavino@thomsonreuters.com [mailto:scott.disavino@thomsonreuters.com]
Sent: Thursday, March 17, 2011 6:34 PM
To: Courret, Ivonne
Subject: RE: NRC REPLY - RE: spent fuel pool in no 4 at daiichi

Got my response on that one – thanks

Any comment on what benefit having power would be to Tepco?

Thanks

Scott

Scott DiSavino
Correspondent
Thomson Reuters

Phone: 1 646 223 6072

Mobile: (b)(6)

Email - scott.disavino@thomsonreuters.com

Reuters (Instant) Messaging - scott.disavino.thomsonreuters.com@reuters.net

thomsonreuters.com

From: Courret, Ivonne [mailto:Ivonne.Couret@nrc.gov]
Sent: Thursday, March 17, 2011 6:11 PM
To: DiSavino, Scott P. (M Edit Ops)
Subject: NRC REPLY - RE: spent fuel pool in no 4 at daiichi

Did you get your response? I'm just cleaning out OPA mailbox, please advise. Ivonne

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

SSSS/41

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From: scott.disavino@thomsonreuters.com [mailto:scott.disavino@thomsonreuters.com]
Sent: Wednesday, March 16, 2011 2:36 PM
To: Burnell, Scott; OPA Resource
Subject: spent fuel pool in no 4 at daiichi

Hi,

Hate to ask but we have story on wire saying nrc head told congress there is no water in spent fuel pool at no. 4 at daiichi

Is that right or did we misquote him

Problem is as I understand it – if there is no water – those rods should be on fire

Am I right

We need to get this right quickly to avoid worrying people

Scott

Scott DiSavino
Correspondent
Thomson Reuters

Phone: 1 646 223 6072

Mobile: 1 (b)(6)

Email - scott.disavino@thomsonreuters.com
Reuters (Instant) Messaging - scott.disavino.thomsonreuters.com@reuters.net

thomsonreuters.com

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From: [Burnell, Scott](#)
To: egthompson@guampdn.com
Bcc: [Courret, Yvonne](#)
Subject: RE: Media inquiry from Guam
Date: Thursday, March 17, 2011 9:35:00 PM

Hello Erin;

I apologize for the delay in getting back to you, it really has been that busy.

All the available information continues to indicate U.S. territories, including Guam, will avoid harmful levels of radiation. It's possible (but unlikely) that today's sensitive equipment might detect very small amounts of radioactive material, but again, Guam is expected to avoid harmful radiation levels. The only thing residents of Guam need to do at this point is stay informed by listening to their local officials.

We're not in a position to comment on snapshots of conditions at Fukushima since events continue to unfold.

Thanks.

Scott Burnell
Public Affairs Officer
Nuclear Regulatory Commission

From: Erin Thompson [<mailto:egthompson@guampdn.com>]
Sent: Wednesday, March 16, 2011 10:14 PM
To: OPA Resource
Subject: Media inquiry from Guam

Hi,
I am a reporter from the Pacific Daily News in Guam.

I am hoping to get an update on the nuclear situation in Japan. Specifically, I'm hoping to get the info on the prospects of any nuclear material reaching the Pacific — specially Guam and the Mariana Islands.

What is the current situation at the Fukushima nuclear facility?

What are the current levels of radiation being released from the Fukushima plant? What kind of radiation? Is this going to travel?

What should Guam and other Pacific islands do in the event of radiation heading our way?

Please call me at (b)(6)

Erin Thompson
Pacific Daily News

SSSS/42

From: Burnell, Scott
To: Wald, Matthew
Cc: Brenner, Eliot
Subject: RE: a request for help on a major story
Date: Thursday, March 17, 2011 7:10:00 PM

Hi Matt;

Unfortunately I'm doing a "late swing shift" today and will be something resembling unconscious at that point. I haven't had a chance to see which technical staff could possibly be available, either. It's just that crushingly busy, I apologize. I can get you into the visitor database but that's not much use without a planned interview. How would you like to proceed? Thanks.

Scott

From: Wald, Matthew [mailto:mattwald@nytimes.com]
Sent: Thursday, March 17, 2011 7:05 PM
To: Burnell, Scott
Subject: RE: a request for help on a major story

Scott,

My plan is to leave home around 9 AM tomorrow morning. I can drive to the White Flint metro. If you can get me into talk to a PR expert, that's great; if not, I could talk to you, or we could do it by phone. As an inducement, if you invite me in, I'll return at least one of my collection of plastic NRC visitor tags.

--- Matt

Matthew L. Wald
Washington Bureau
The New York Times
1627 Eye St NW, Suite 700
Washington, DC 20006
202-862-0363
cell: (b)(6)
fax: 202-318-0057

<http://www.nytimes.com/info/nuclear-energy/>
twitter: mattwaldnyt

From: Brenner, Eliot [mailto:Eliot.Brenner@nrc.gov]
Sent: Thursday, March 17, 2011 2:00 PM
To: Wald, Matthew
Cc: Burnell, Scott
Subject: RE: a request for help on a major story

We will try. (background works real good under the circumstances so others don't whine that eliot is playing favorites.)

SSSS / 43

Scott: can you find one person who fits the bill for all of this?

From: Wald, Matthew [mailto:mattwald@nytimes.com]
Sent: Thursday, March 17, 2011 2:58 PM
To: Brenner, Eliot
Subject: a request for help on a major story

Eliot,

We are planning a major story (covering a whole page or more) on the general concept of "can it happen here." One part of this will be to explain Probabilistic Risk Assessment, risk-informed regulation, and similar reader-friendly concepts.

I would like to explain to readers what the NRC thinks dominates risk. (LOOP, station blackout, fires, dropping a fuel cask into the spent fuel pool, "external events," etc.) plus what you can't quantify, like chance of 9/11-type attack. I'd also like to explore the concept of unknowns and events that exceed expectations (9.0 and a tsunami.) I'd like to make some reference to Katrina and Andrew, and to the earthquake at Perry while it was still under construction, which, as I recall, exceeded its design basis but didn't cause any damage). And the 1983 Salem ATWS, which seemed to cast doubt on the PRA methodology.

Obviously, this is the busy season at your shop. But is there somebody at White Flint whom I could come talk to tomorrow, preferably in the A.M.?

--- Matt

Matthew L. Wald
Washington Bureau
The New York Times
1627 Eye St NW, Suite 700
Washington, DC 20006
202-862-0363
cell: (b)(6)
fax: 202-318-0057

<http://www.nytimes.com/info/nuclear-energy/>
twitter: mattwaldnyt

From: Burnell, Scott
To: Brenner, Eliot; Wald, Matthew
Subject: RE: a request for help on a major story
Date: Thursday, March 17, 2011 7:19:00 PM

I'll get Matt into the visitor database then.

From: Brenner, Eliot
Sent: Thursday, March 17, 2011 7:17 PM
To: Burnell, Scott; Wald, Matthew
Subject: RE: a request for help on a major story

Scott: I have someone lined up. I am still at work doing something PRA related.

From: Burnell, Scott
Sent: Thursday, March 17, 2011 7:16 PM
To: Wald, Matthew
Cc: Brenner, Eliot
Subject: RE: a request for help on a major story

Matt;

I'll actually be on-shift early tomorrow afternoon, so perhaps I could talk to you before I get started. I seriously doubt any Commissioners will be available before the Monday briefing with the staff.

Scott

From: Wald, Matthew [mailto:mattwald@nytimes.com]
Sent: Thursday, March 17, 2011 7:13 PM
To: Burnell, Scott
Cc: Brenner, Eliot
Subject: RE: a request for help on a major story

If you don't come in til late afternoon tomorrow it seems unlikely you can set me up with a technical expert tomorrow either.

Dale Klein says I should talk to George Apostolakis, who qualifies as an expert on PRA. Should I call him directly? Could you set that up? (I know him and I suspect he'd be happy to talk.) Or is there some other expert at NRC I can get to sit down with?

■ Matt

■

Matthew L. Wald
Washington Bureau
The New York Times
1627 Eye St NW, Suite 700
Washington, DC 20006
202-862-0363
cell: (b)(6)
fax: 202-318-0057

SSSS/44

<http://www.nytimes.com/info/nuclear-energy/>
twitter: mattwaldnyt

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Thursday, March 17, 2011 6:10 PM
To: Wald, Matthew
Cc: Brenner, Eliot
Subject: RE: a request for help on a major story

Hi Matt;

Unfortunately I'm doing a "late swing shift" today and will be something resembling unconscious at that point. I haven't had a chance to see which technical staff could possibly be available, either. It's just that crushingly busy, I apologize. I can get you into the visitor database but that's not much use without a planned interview. How would you like to proceed? Thanks.

Scott

From: Wald, Matthew [mailto:mattwald@nytimes.com]
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To: Burnell, Scott
Subject: RE: a request for help on a major story

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twitter: mattwaldnyt

From: Brenner, Eliot [mailto:Eliot.Brenner@nrc.gov]
Sent: Thursday, March 17, 2011 2:00 PM
To: Wald, Matthew
Cc: Burnell, Scott
Subject: RE: a request for help on a major story

We will try. (background works real good under the circumstances so others don't whine that eliot is playing favorites.)

Scott: can you find one person who fits the bill for all of this?

From: Wald, Matthew [mailto:mattwald@nytimes.com]
Sent: Thursday, March 17, 2011 2:58 PM
To: Brenner, Eliot
Subject: a request for help on a major story

Eliot,

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Obviously, this is the busy season at your shop. But is there somebody at White Flint whom I could come talk to tomorrow, preferably in the A.M.?

--- Matt

Matthew L. Wald
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Washington, DC 20006
202-862-0363
cell: (b)(6)
fax: 202-318-0057

<http://www.nytimes.com/info/nuclear-energy/>
twitter: mattwaldnyt

From: Brenner, Eliot
To: Couret, Ivonne; Burnell, Scott
Subject: RE: urgent request from the Financial Times
Date: Thursday, March 17, 2011 7:23:59 PM

I'm fine with scott talking, but he is coming in late I think.

From: Couret, Ivonne
Sent: Thursday, March 17, 2011 7:21 PM
To: Burnell, Scott
Cc: Brenner, Eliot
Subject: FW: urgent request from the Financial Times
Importance: High

Scott if you can handle print – Eliot..thoughts for more?

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

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2010-2011 Information Digest - Where you can find NRC Facts at a Glance
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

From: Stephanie.Kirchgaessner@FT.com [mailto:Stephanie.Kirchgaessner@FT.com]
Sent: Thursday, March 17, 2011 6:30 PM
To: Couret, Ivonne
Subject: RE: urgent request from the Financial Times

Hi,

Just two questions. I'm doing a story on the NRC's record for Monday's paper and would really like to discuss some issues with you tomorrow for comment.

Also, I realize Chairman Jaczko is busy but please consider this a formal request for an interview from our "view from DC" video slot, which is a high profile interview we reserve for leading Washington figures in politics and regulatory affairs. What does his schedule look like?

Thank you, Stephanie

Stephanie Kirchgaessner
Washington Correspondent
202 434 0982 (work)

(b)(6)

 (mobile)

"Couret, Ivonne" ---03/17/2011 06:25:53 PM---The NRC is unable to accommodate interview requests at this time; I will place you on the list for f

From: "Couret, Ivonne" <Ivonne.Couret@nrc.gov>
To: "Stephanie.Kirchgaessner@FT.com" <Stephanie.Kirchgaessner@FT.com>
Date: 03/17/2011 06:25 PM
Subject: RE: urgent request from the Financial Times

SSSS/45

The NRC is unable to accommodate interview requests at this time; I will place you on the list for future opportunities. U.S. Nuclear Regulatory Commission Chairman Gregory B. Jaczko briefed reporters at the White House today we direct attention to the White House's transcript of the Chairman's remarks that will be located at <http://www.whitehouse.gov/briefing-room/press-briefings>.

Please monitor the NRC home page or sign up for the listserv for any press releases. News releases are available through a free subscription at the following Web address: <http://www.nrc.gov/public-involve/listserver.html>. The NRC homepage at www.nrc.gov also offers a SUBSCRIBE link. E-mail notifications are sent to subscribers when news releases are posted to NRC's website.

Ivonne L. Couret
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Media Desk
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<http://www.nrc.gov/reading-rm/photo-gallery/>

2010-2011 Information Digest - Where you can find NRC Facts at a Glance
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

From: Stephanie.Kirchgaessner@FT.com [<mailto:Stephanie.Kirchgaessner@FT.com>]
Sent: Wednesday, March 16, 2011 5:06 PM
To: OPA Resource
Subject: urgent request from the Financial Times

Hi - could someone send me the chairman's remarks before the House energy committee as read (as opposed to the prepared remarks that were submitted)?
Thank you

Stephanie Kirchgaessner
Washington Correspondent
202 434 0982 (work)

(b)(6)

 (mobile)

From: [Vartabedian, Ralph](#)
To: [Burnell, Scott](#)
Subject: RE: spent fuel pool at reactor 4
Date: Thursday, March 17, 2011 7:24:29 PM

Scott,

As I see it, Chairman Jaczko's did not mention it in his prepared statement, but said that the pool is empty. But I don't think he said why it is empty. My information appears to go one step further in explaining why the pool would be empty. If the pool has a hole in it, then it seems questionable whether it could be refilled. If you can offer any guidance on background, I would appreciate it.

Thanks.

Ralph

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Thursday, March 17, 2011 3:59 PM
To: Vartabedian, Ralph
Subject: RE: spent fuel pool at reactor 4

Hi Ralph;

If you look at Chairman's Jaczko's comments on the Hill yesterday concerning the state of pool #4, as well as Ambassador Ross's statement, you'll see we based our assessment based on a variety of sources that represented the best available information. We're responding to Japanese requests as quickly and comprehensively as possible, but I don't have details on specific assistance areas. Speaking generally, yes, unshielded rods present a line-of-sight radiation hazard, although that decreases with distance. Introducing water from a distance is generally considered feasible, but what is done at Fukushima will obviously depend on the information at the site. Thanks.

Scott

From: Vartabedian, Ralph [mailto:Ralph.Vartabedian@latimes.com]
Sent: Thursday, March 17, 2011 6:37 PM
To: Burnell, Scott
Subject: spent fuel pool at reactor 4

Scott,

It's my understanding that some people, including officials at NRC, believe that the spent fuel pool at reactor No. 4 in Japan has lost its coolant due to a leak or rupture in the pool wall, which would account for the fact that there has not been a lot of steam coming out of the plant and yet there clearly was a hydrogen explosion in the secondary containment building. As I understand it, contractor employees were at the plant, including for General Electric, and have provided specific input about the conditions at the time of the accident that has lent credible evidence to the conclusion that a breach has occurred in the pool wall. Can you comment? Here are some specific questions that come to mind: Why did NRC come to this conclusion? If the pool has a fracture or crack in the concrete wall, is the NRC assisting Japanese authorities with a recommended repair or mitigation? If the rods are now uncovered, wouldn't radiation levels be so high that workers could

SSSS/46

not spend any time in direct line of sight of the pool? Is a water spray system a feasible way to prevent fires and is there an installed spray system in the pool?

Ralph

Ralph Vartabedian
National Correspondent
Los Angeles Times
213-237-3393 office

(b)(6)

cell

From: Burnell, Scott
To: Malik, Naureen
Subject: RE: Earthquake report
Date: Thursday, March 17, 2011 7:28:00 PM

Hi Naureen;

Again, sorry for the delay. Information and understanding increases over time, for seismic science as with everything. There was no specific information that led to the effort, which looks at the ENTIRE Central and Eastern U.S. -- it is not focused on any one plant. Indian Point was one of about 25 reactors that the initial screening indicated were worth a closer look.

Scott

From: Malik, Naureen [mailto:Naureen.Malik@dowjones.com]
Sent: Thursday, March 17, 2011 5:28 PM
To: Burnell, Scott
Subject: RE: Earthquake report

Hi Scott, Could you clarify what the last part -- are you saying the NRC is reviewing Indian Point based on new seismic data? What is it about that seismic data that warrants this effort? Sorry I'm just trying to find a simple, accurate way to describe what exactly triggered NRC's attention and what the agency is doing.

Thank you,
Naureen

Naureen S. Malik
Energy Reporter
Dow Jones Newswires
1211 6th Avenue, 5th
New York, NY 10036
(W): (212) 416-4210
(M): (b)(6)

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Thursday, March 17, 2011 5:17 PM
To: Malik, Naureen
Subject: RE: Earthquake report

Hi Naureen;

Yes, I'm very late in responding, I hope you understand. There is no report that says Indian Point is susceptible to earthquakes. We've been involved in a multi-agency examination of updated seismic information in the Central and Eastern U.S. (press release 9/8/10 <http://www.nrc.gov/reading-rm/doc-collections/news/2010/>) We've screened Central and Eastern sites against a very broad set of seismic hazards, and all plants continue to meet NRC requirements to withstand their site's strongest expected earthquake. Indian Point was one of several plants where the screening indicated a more detailed look with more advanced models still under development. This project should have some final results next year.

SSSS/47

Hope that's helpful.

Scott

From: Malik, Naureen [mailto:Naureen.Malik@dowjones.com]

Sent: Thursday, March 17, 2011 1:20 PM

To: Burnell, Scott

Subject: Earthquake report

Hi Scott,

I'm having a tough time finding the report that says Indian Point is susceptible to earthquakes. Could you point me in the right direction?

Thankyou,

Naureen

Naureen S. Malik

Energy Reporter

Dow Jones Newswires

1211 6th Avenue, 5th

New York, NY 10036

(W): (212) 416-4210

(M): (b)(6)

From: [Burnell, Scott](#)
To: [Mike Soraghan](#)
Subject: RE: Station blackout questions
Date: Thursday, March 17, 2011 7:45:00 PM
Attachments: [SSE.xlsx](#)

Hi Mike;

The fact that "a moment ago" is now almost two hours gives you an idea of the crush we're dealing with. What we do have on "safe shutdown earthquake" standards (attached) is expressed in terms of "g," the force of gravity. We don't use magnitude, so I don't have a "translation" available. There wasn't anything attached to your note – does that report have a "NUREG" number or something similar? Thanks.

Scott

From: Mike Soraghan [<mailto:msoraghan@eenews.net>]
Sent: Thursday, March 17, 2011 6:06 PM
To: Burnell, Scott
Subject: Station blackout questions

Mr. Burnell,

Thank you for taking my call a moment ago. I am looking at doing a story on station black out, with a little on seismic, that looks at all u.s. plants.

My simplest question is whether there is a list of the design basis each of the 104 reactors must meet in terms of what magnitude earthquake they must be able to withstand. I've been told that's not likely, so I'm pulling the information from news reports.

I have the 2000 report (attached) "Regulatory Effectiveness of the Station Blackout Rule." I've been looking at this, particularly the plant-by-plant chart, and I'm seeking some guidance.

First, has there been any update to these numbers?

"Coping time in hours" – is that the amount of battery power? And is it the amount the plant has, or is required to have?

"Loss of Power events" – if a combined plant with two reactors lists two events, did each shut down for a total of four?

Also, is there updated figures for the "loss of power events?"

Thank you,

Mike Soraghan

Reporter

msoraghan@eenews.net

202-446-0423 (desk)

(b)(6) (cell)

(b)(6) (Google Voice)

SSSS/48

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SEISMIC INFORMATION: SSE

| Plant | SSE (g's) |
|------------------|----------------------|
| Arkansas 1 | 0.2 |
| Arkansas 2 | 0.2 |
| Beaver Valley 1 | 0.12 |
| Beaver Valley 2 | 0.12 |
| Braidwood 1 | 0.2 |
| Braidwood 2 | 0.2 |
| Browns Ferry 1 | 0.2 |
| Browns Ferry 2 | 0.2 |
| Browns Ferry 3 | 0.2 |
| Brunswick 1 | 0.16 |
| Brunswick 2 | 0.16 |
| Byron 1 | 0.2 |
| Byron 2 | 0.2 |
| Callaway | 0.2 |
| Calvert Cliffs 1 | 0.15 |
| Calvert Cliffs 2 | 0.15 |
| Catawba 1 | 0.15 |
| Catawba 2 | 0.15 |
| Clinton | 0.25 |
| Columbia | 0.25 |
| Comanche Peak 1 | 0.12 |
| Comanche Peak 2 | 0.12 |
| Cooper | 0.2 |
| Crystal River 3 | 0.1 |
| D.C. Cook 1 | 0.2 |
| D.C. Cook 2 | 0.2 |
| Davis Besse | 0.15 |
| Diablo Canyon 1 | 0.75 |
| Diablo Canyon 2 | 0.75 |
| Dresden 2 | 0.2 |
| Dresden 3 | 0.2 |
| Duane Arnold | 0.12 |
| Farley 1 | 0.1 |
| Farley 2 | 0.1 |
| Fermi 2 | 0.15 |
| Fitzpatrick | 0.15 |
| Fort Calhoun 1 | 0.17 |
| Ginna | 0.2 |
| Grand Gulf | 0.15 |
| Hatch 1 | 0.148 |
| Hatch 2 | 0.15 |
| Hope Creek | 0.2 |
| Indian Point 2 | 0.15 |
| Indian Point 3 | 0.15 |
| Kewaunee | 0.12 |
| LaSalle 1 | 0.2 |
| LaSalle 2 | 0.2 |
| Limerick 1 | 0.15 |
| Limerick 2 | 0.15 |
| McGuire 1 | 0.15 |
| McGuire 2 | 0.15 |

| | |
|---------------------|-------|
| Millstone 1 | 0.254 |
| Millstone 2 | 0.17 |
| Millstone 3 | 0.17 |
| Monticello | 0.12 |
| Nine Mile Point 1 | 0.11 |
| Nine Mile Point 2 | 0.15 |
| North Anna 1 | 0.12 |
| North Anna 2 | 0.12 |
| Oconee 1 | 0.1 |
| Oconee 2 | 0.1 |
| Oconee 3 | 0.1 |
| Oyster Creek | 0.17 |
| Palisades | 0.2 |
| Palo Verde 1 | 0.258 |
| Palo Verde 2 | 0.258 |
| Palo Verde 3 | 0.258 |
| Peach Bottom 2 | 0.12 |
| Peach Bottom 3 | 0.12 |
| Perry | 0.15 |
| Pilgrim 1 | 0.15 |
| Point Beach 1 | 0.12 |
| Point Beach 2 | 0.12 |
| Prairie Island 1 | 0.12 |
| Prairie Island 2 | 0.12 |
| Quad Cities 1 | 0.24 |
| Quad Cities 2 | 0.24 |
| River Bend | 0.1 |
| Robinson (HR) | 0.2 |
| Saint Lucie | 0.1 |
| Salem 1 | 0.2 |
| Salem 2 | 0.2 |
| San Onofre 2 | 0.67 |
| San Onofre 3 | 0.67 |
| Seabrook | 0.25 |
| Sequoyah 1 | 0.18 |
| Sequoyah 2 | 0.18 |
| Shearon Harris 1 | 0.15 |
| South Texas 1 | 0.1 |
| South Texas 2 | 0.1 |
| Summer | 0.15 |
| Surry 1 | 0.15 |
| Surry 2 | 0.15 |
| Susquehanna 1 | 0.1 |
| Susquehanna 2 | 0.1 |
| Three Mile Island 1 | 0.12 |
| Turkey Point 3 | 0.15 |
| Turkey Point 4 | 0.15 |
| Vermont Yankee | 0.14 |
| Vogtle 1 | 0.2 |
| Vogtle 2 | 0.2 |
| Waterford 3 | 0.1 |
| Watts Bar | 0.18 |
| Wolf Creek | 0.12 |

25th percentile
min

median
mean
max
75th percentile

From: Burnell, Scott
To: Couret, Ivonne
Subject: RE: MEDIA - WALL STREET JOURNAL EP Questions
Date: Thursday, March 17, 2011 8:11:00 PM

Voicemail @ 8:10

From: Couret, Ivonne
Sent: Thursday, March 17, 2011 6:17 PM
To: Burnell, Scott
Subject: MEDIA - WALL STREET JOURNAL EP Questions
Importance: High

Daniel Gilbert

(b)(6)

Ivonne L. Couret
Public Affairs Officer
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301-415-8200

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2010-2011 Information Digest - Where you can find NRC Facts at a Glance
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

SSSS/49

From: Uselding, Lara
To: Brenner, Eliot
Cc: Akstulewicz, Brenda; Burnell, Scott; Harrington, Holly
Subject: PLZ DISREGARD----Re: David Snead - DC reporter
Date: Thursday, March 17, 2011 8:29:25 PM

I got my NY Huff Post story updated by reporter- no need to bother Snead! I thought u were wanting a POC to pitch a story to.....

Lara Uselding
NRC Region 4 Public Affairs

(b)(6)

From: Uselding, Lara
To: Brenner, Eliot
Cc: Akstulewicz, Brenda; Burnell, Scott; Harrington, Holly
Sent: Thu Mar 17 20:27:25 2011
Subject: David Snead - DC reporter

Lara Uselding
NRC Region 4 Public Affairs

(b)(6)

From: Sneed, David - SLO <dsneed@thetribunenews.com>
To: Uselding, Lara
Sent: Thu Mar 17 17:33:01 2011
Subject: RE: Cross cutting issues

I was in with the PG&E guys. Jim Becker mentioned the end of cycle letter and said the NRC considers the cross-cutting issues to still be of concern. I will weave in some of the info you gave me on what you want them to do.

Thanks for getting back to me.

David Sneed
Environment writer
The Tribune newspaper
San Luis Obispo, CA
<http://www.sanluisobispo.com>
E-mail: dsneed@thetribunenews.com

From: Uselding, Lara [mailto:Lara.Uselding@nrc.gov]
Sent: Thursday, March 17, 2011 1:35 PM
To: Sneed, David - SLO
Subject: RE: Cross cutting issues

Just tried you again.

What did you want to know? Have you seen end of cycle letter?

We want them to;

- 1) Give us a letter then they think they have fixed the PI&R issues, we'll be coming to

SSSS/50

- take a look at their corrective actions. We want to do this soon
- 2) We know they did a safety culture assessment and we'd expect that they will have results from this that would aid in correcting the issue and tie it in to their corrective actions. We will be taking a look at this as well.

Lara Uselding
U.S. Nuclear Regulatory Commission (NRC)
Public Affairs - Region IV

Lara.Uselding@nrc.gov

BlackBerry: (b)(6)

Office: 817-276-6519

For more information visit www.nrc.gov

From: Sneed, David - SLO [mailto:dsneed@thetribunenews.com]

Sent: Thursday, March 17, 2011 3:00 PM

To: Uselding, Lara

Subject: Cross cutting issues

Lara

Emailing you to get the info on the crosscutting issue question I posed. Thanks.

David Sneed
Environment writer
The Tribune newspaper
San Luis Obispo, CA
<http://www.sanluisobispo.com>
E-mail: dsneed@thetribunenews.com

From: Burnell, Scott
To: Brenner, Eliot
Subject: Fw: CBS Early Show hello
Date: Thursday, March 17, 2011 10:12:04 AM

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Garcia, Gina <GarciaG@cbsnews.com>
To: Burnell, Scott
Sent: Thu Mar 17 10:09:39 2011
Subject: CBS Early Show hello

Scott,

Good morning and hope you're well. It's Gina with the CBS Early Show and you and I spoke earlier this week about the potential for Chairman Gregory Jaczko to appear on our morning news program for an interview.

We'd love to have him on and word is he was so close to appearing this morning.

Are you making him available tomorrow morning to morning news programs live or via taped interviews please?

Thank you Scott, feel free to give me a call anytime to discuss, (b)(6)
Gina Garcia

Gina Garcia | CBS News *The Early Show* | direct: 202-457-4408 | cell: (b)(6)

SSSS/51

From: Tom Zeller Jr.
To: Burnell, Scott; Hayden, Elizabeth
Subject: nyt query
Date: Thursday, March 17, 2011 10:18:30 AM

Elizabeth, Scott - I know you all are likely inundated with press queries at the moment, but we'd like to begin taking a look at how all the various risks -- and potential consequences -- of core damage, etc. U.S. nuclear power plants are examined and assessed by NRC. I know it's a complicated topic involving dense probability assessments, but we'd like to parse it all in some way for ordinary readers. Wondering if you could make someone available to help us do that? I'm at the NYC number below. -TZ

Tom Zeller Jr.
Energy & Environment
The New York Times
tom@nytimes.com
1-212-556-1880 (NYC)

(b)(6)

 (mobile)
1-208-460-4394 (efax)

SSSS/52

From: Marshall, Michael
To: Johnson, Michael; Bergman, Thomas
Cc: Sanfilippo, Nathan; Shams, Mohamed; Dixon-Herrity, Jennifer; Holahan, Gary; Burnell, Scott
Subject: RE: Query - "Improved safety" of AP1000 shield building
Date: Thursday, March 17, 2011 10:50:04 AM

Tom,

I agree with Mike Johnson's comments. His comments were intended for the structure itself not the entire plant.

Michael L. Marshall, Jr.
Policy Advisor for Reactors
Office of the Chairman
U.S. Nuclear Regulatory Commission

Phone: 301-415-1750
Email: michael.marshall@nrc.gov

From: Johnson, Michael
Sent: Thursday, March 17, 2011 7:18 AM
To: Bergman, Thomas; Marshall, Michael
Cc: Sanfilippo, Nathan; Shams, Mohamed; Dixon-Herrity, Jennifer; Holahan, Gary; Burnell, Scott
Subject: RE: Query - "Improved safety" of AP1000 shield building

I believe I also heard that the plant would be safer if additional reinforcement were added. I think he was simply trying to make the point that the structure would be more robust (safer) although we found it to be sufficiently robust.

Your clarification is correct, but I think the distinction would be lost on most. . .

From: Bergman, Thomas
Sent: Thursday, March 17, 2011 6:50 AM
To: Marshall, Michael
Cc: Sanfilippo, Nathan; Shams, Mohamed; Dixon-Herrity, Jennifer; Holahan, Gary; Johnson, Michael; Burnell, Scott
Subject: Query - "Improved safety" of AP1000 shield building

Mike – just want to make sure we get messages aligned in case questions come in the future, and Matt Wald's piece during the RIC picked up the distinction. I was told (i.e., I did not personally hear it) that in the hearing yesterday that the Chairman said the plant would be safer if the additional reinforcement were added to the shield building Module 2.

We have been careful to say that the shield building would be more robust, although even using the term safer is ok if referring

SSSS/53

to the shield building. However we haven't extended that to the plant as we don't have a basis to extend it to plant. The reason we haven't generalized the safety improvement claim is that the SSE applies to many SSCs (definition is similar to safety-related). Strengthening the shield building beyond the SSE may not improve safety because these other SSCs may fail, since they are evaluated against the SSE. We may be able to come up with a rationale to justify the more general statement, but we do not have one readily available with a good basis (that I am aware of).

It is a subtlety that most may not pick up on, though Matt did and I clarified that distinction. I would like us to get our message consistent and would appreciate your thoughts.

Thanks

Thomas A. Bergman
Director, Division of Engineering
Office of New Reactors
(O) 301-415-7192
(C) (b)(6)

From: Burnell, Scott
To: Bagchi, Goutam
Subject: Re: Queries from an Indian science writer: Please Advise
Date: Thursday, March 17, 2011 10:54:05 AM

Hi Goutam;

Yes please, let the reporter know you've forwarded the request to public affairs. Thanks.

Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Bagchi, Goutam
To: Burnell, Scott
Sent: Thu Mar 17 09:06:25 2011
Subject: FW: Queries from an Indian science writer: Please Advise

Good morning Scott,

The forwarded message came to my NRC email. I am forwarding it for your action. If you advise me to send a reply to the sender saying "I have sent your request to our Agency's Public Affairs staff for appropriate response," I can do so, otherwise I will not reply. Best regards and

*Thank you,
Goutam*

From: Jayan T.V. [mailto:tvjayan@gmail.com]
Sent: Wednesday, March 16, 2011 2:15 PM
To: Bagchi, Goutam
Subject: Queries from an Indian science writer

Dear Dr. Bagchi,

My name is T V Jayan and I work with an Indian newspaper called The Telegraph (published from Calcutta and many other eastern Indian cities) as science editor. We are currently working on an article on nuclear safety from unforeseen natural/man-made calamities. In this connection, I would like to ask a couple of questions I have related to the subject. I would be grateful if you could kindly answer them. Following are the questions:

1. I am told some of the US reactors located on the West Coast are designed to withstand a 30-feet tsunami. Is that true?
2. Are you familiar with PHWR design that used in Indian nuclear power plants? Do you think they would have behaved differently in a situation like that the Fukushima plant has faced just because of they are of a different design all together? Incidentally, this has been

SSSS / 54

the claim made by Indian atomic energy officials since the Japanese incident.

I look forward to hearing from you asap.

Best regards,

T V Jayan
Science Editor - Features
The Telegraph
New Delhi
www.telegraphindia.com
Mob. (b)(6)

From: [Smith, Rebecca](#)
To: [Burnell, Scott](#)
Subject: Re: Questions from Wall Street Journal for story today
Date: Friday, March 18, 2011 1:04:30 AM

Great. Thanks.

Sent from my BlackBerry Wireless Device

From: Burnell, Scott
To: Smith, Rebecca
Sent: Thu Mar 17 20:44:13 2011
Subject: RE: Questions from Wall Street Journal for story today

Well hey, a steady schedule would be boring, right? Yes, I hope we can talk tomorrow (almost there myself), most likely after 1 p.m. my time. How's that?

From: Smith, Rebecca [<mailto:Rebecca.Smith@wsj.com>]
Sent: Thursday, March 17, 2011 11:43 PM
To: Burnell, Scott
Subject: Re: Questions from Wall Street Journal for story today

No need to apologize -- geez, you don't even get to go home at night! Can we talk Fri?

Sent from my BlackBerry Wireless Device

From: Burnell, Scott
To: Smith, Rebecca
Sent: Thu Mar 17 18:47:47 2011
Subject: RE: Questions from Wall Street Journal for story today

Rebecca;

I humbly apologize for not getting back to you, I truly do. I'm on a late shift tomorrow (as I am tonight), so hopefully we'll do better tomorrow.

Scott

From: Smith, Rebecca [<mailto:Rebecca.Smith@wsj.com>]
Sent: Thursday, March 17, 2011 11:39 AM
To: OPA Resource
Subject: FW: Questions from Wall Street Journal for story today

Hello, Office of Public Affairs folks,

I just got off the phone with Scott Burnell and he suggested I direct my questions to you in written form, to make a response easier.

SSSS/SS

Thanks, in advance, for your help since I know you are working long hours!

I'm working on a story, with a deadline in four hours that looks at "station blackout" situations, particularly for BWRs. I have read several reports on your web site but need help with the Aug. 2003 report prepared by R.S. Roughly, "Regulatory Effectiveness of Station Blackout Rule."

I am trying to understand what the main takeaway points are. I am trying to understand what the NRC felt was the probability of a station blackout actually resulting in core damage or fuel damage, particularly in a BWR.

I also would be helped by an overview of whether the NRC moved more forcefully after 9/11 to make on-site emergency systems more robust, in a station blackout situation.

The 2003 report has me flummoxed by some of the tables and information. Scott suggested I send actual questions, so here goes:

- Table 4 looks at emergency diesel generators. I have no idea how to read these numbers. Can someone help me understand, in plain English what they mean?

- Table B-1 describes outage events and shows causes of LOOP or loss of offsite power events as "plant, weather, grid." I don't find any explanation of what plant failures are. Can someone explain? Does this mean that the 88 events counted were caused by equipment problems at the reactor site, such as from switching gear or substation problems or something like that? Only 16 were weather related, but I need to understand how an event is classified because the number for weather seems really low.

- "Added crosstie" appears a common remedy. Can someone explain?

- Table C-1 compares station blackout characteristics but, again, the table is puzzling. For example, actual loss of offsite power events for Pilgrim is described as "1.48E-01/4" It might as well be in pig Latin. Can someone translate?

- The report talks about "generation trigger values" but I can't find an explanation of a trigger value. Is this trying to analyze whether a generator fires up, when needed?

-- The report quantifies the value of action in terms of radiation exposure avoidance. But if I multiply avoided rems by the estimated value of nearly \$5,000, I get a number that's far in excess of what's shown in the report, so my math must be wrong. Is there a common-sense way to look at the NRC's assessment of the value of not exposing people to radiation as a result of a station blackout?

These are specific questions but I don't want to lose the forest for the trees.

Talking with someone who could explain the thrust of recent efforts would be extremely helpful, if at all possible.

Thank you so much.

Regards,

Rebecca

Rebecca Smith

Staff Reporter

The Wall Street Journal

(415) 765-8212 office

(b)(6)

cell

From: Burnell, Scott
To: "ayesha.rascoe@thomsonreuters.com"
Cc: OPA Resource
Subject: Re: NRC meeting Monday
Date: Friday, March 18, 2011 10:16:17 AM

Hi Ayesha;

Just woke up, actually. Please check w/ OPA Resource or 301-415-8200 on details for Monday. Thx

Scott

Sent from an NRC Blackberry
Scott Burnell
202-441-0471

From: ayesha.rascoe@thomsonreuters.com <ayesha.rascoe@thomsonreuters.com>
To: Burnell, Scott
Sent: Fri Mar 18 10:11:08 2011
Subject: NRC meeting Monday

Hi Scott,

Thanks for getting back to me last night. I know things are crazy and I hope you're getting a little bit of rest. I just wanted to do my daily check with NRC to see if I can expect any more announcements from you guys today or the release of any more information about the findings of NRC's team in Japan.

Also, the meeting on Monday about the comprehensive review requested by Obama, will that be open to the public?

Best,
Ayesha

Ayesha Rascoe
Energy Reporter
Thomson Reuters

Phone: 1-202-310-5683
Mobile: (b)(6)

ayesha.rascoe@thomsonreuters.com
thomsonreuters.com

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SSSS / 56

From: Burnell, Scott
To: Brenner, Eliot; Couret, Ivonne
Subject: FW: Bloomberg question re radiation information
Date: Friday, March 18, 2011 1:03:00 PM

I've got this if Eliot hasn't already responded.

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

From: SIMON LOMAX, BLOOMBERG/ NEWSROOM: [<mailto:slomax@bloomberg.net>]
Sent: Friday, March 18, 2011 12:55 PM
To: Brenner, Eliot
Cc: Burnell, Scott; Couret, Ivonne
Subject: Bloomberg question re radiation information

Hi Eliot (cc Scott & Ivonne):

Hope you're hanging in there.

We're trying to nail down the specific information that U.S. Agencies have collected on radiation from the Fukushima plant. Does the NRC have this information:

- the latest radiation measurements from the affected area in Japan;
- radiation levels in the atmosphere over the Pacific Ocean; and
- an assessment of whether it's safe for passenger aircraft to be flying through airspace with radiation that's coming from the Fukushima reactors.

If you've got this information, can you please provide ASAP? If not, can you tell us which agency of the U.S. government is making that information available? My deadline is ASAP.

Thank you again for your help,

Simon Lomax
Bloomberg News
202-654-4305 (w)

(b)(6)

 (c)
slomax@bloomberg.net

SSSS/57

From: SIMON LOMAX, BLOOMBERG/ NEWSROOM:
To: Brenner, Eliot
Cc: Couret, Ivonne; Burnell, Scott
Subject: RE: Bloomberg question re radiation information
Date: Friday, March 18, 2011 1:54:01 PM

Thanks Eliot. Please understand we're in a full-court press trying to pin down what U.S. agencies know and we're being redirected by just about everybody.

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

From: Eliot Brenner <Eliot.Brenner@nrc.gov>
To: SIMON LOMAX (BLOOMBERG/ NEWSROOM:)
Cc: Ivonne.Couret@nrc.gov, Scott.Burnell@nrc.gov
At: 3/18 13:49:02

We are in contact with the FAA offering them information that might affect flight routes. You would have to check with FAA public affairs 202-267-3883. I do not have immediate details on the rest of your questions. We are not the sole repository for all information, though folks think we are.

eliot

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

From: SIMON LOMAX, BLOOMBERG/ NEWSROOM: [<mailto:slomax@bloomberg.net>]
Sent: Friday, March 18, 2011 12:55 PM
To: Brenner, Eliot
Cc: Burnell, Scott; Couret, Ivonne
Subject: Bloomberg question re radiation information

Hi Eliot (cc Scott & Ivonne):

Hope you're hanging in there.

We're trying to nail down the specific information that U.S. Agencies have collected on radiation from the Fukushima plant. Does the NRC have this information:

- the latest radiation measurements from the affected area in Japan;
- radiation levels in the atmosphere over the Pacific Ocean; and
- an assessment of whether it's safe for passenger aircraft to be flying through airspace with radiation that's coming from the Fukushima reactors.

If you've got this information, can you please provide ASAP? If not, can you tell us which agency of the U.S. government is making that information available? My deadline is ASAP.

Thank you again for your help,

Simon Lomax
Bloomberg News
202-654-4305 (w)
(b)(6) (c)
slomax@bloomberg.net

From: Burnell, Scott
To: SIMON LOMAX, BLOOMBERG/ NEWSROOM:
Subject: RE: Bloomberg question re radiation information
Date: Friday, March 18, 2011 2:08:00 PM

Keep trying 415-8200 and opa.resource@nrc.gov if all else fails. I'll respond if possible.

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

From: SIMON LOMAX, BLOOMBERG/ NEWSROOM: [mailto:slomax@bloomberg.net]
Sent: Friday, March 18, 2011 2:07 PM
To: Burnell, Scott
Subject: Re: Bloomberg question re radiation information

Ha! Thanks Scott.

Housekeeping question: Who's fielding press calls at NRC over the weekend?

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

From: Scott Burnell <Scott.Burnell@nrc.gov>
To: SIMON LOMAX (BLOOMBERG/ NEWSROOM:)
At: 3/18 13:55:24

I will refrain from any "Pinball Wizard" references.

:~)

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

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

From: SIMON LOMAX, BLOOMBERG/ NEWSROOM: <slomax@bloomberg.net>
To: Brenner, Eliot
Cc: Couret, Ivonne; Burnell, Scott
Sent: Fri Mar 18 13:53:57 2011
Subject: RE: Bloomberg question re radiation information

Thanks Eliot. Please understand we're in a full-court press trying to pin down what U.S. agencies know and we're being redirected by just about everybody.

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

From: Eliot Brenner <Eliot.Brenner@nrc.gov>
To: SIMON LOMAX (BLOOMBERG/ NEWSROOM:)
Cc: Ivonne.Couret@nrc.gov, Scott.Burnell@nrc.gov
At: 3/18 13:49:02

We are in contact with the FAA offering them information that might affect flight routes. You would have to check with FAA public affairs 202-267-3883. I do not have immediate details on the rest of your questions. We are not the sole repository for all information, though folks think we are.

eliot

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

From: SIMON LOMAX, BLOOMBERG/ NEWSROOM: [mailto:slomax@bloomberg.net]
Sent: Friday, March 18, 2011 12:55 PM

From: [Burnell, Scott](#)
To: [SIMON LOMAX, BLOOMBERG/ NEWSROOM](#); [Brenner, Eliot](#)
Cc: [Couret, Ivonne](#)
Bcc: laura.j.brown@faa.gov
Subject: RE: Bloomberg question re radiation information
Date: Friday, March 18, 2011 3:29:00 PM

Simon;

I beg your pardon if my sleep-deprived state made me unclear earlier -- FAA handles flight safety and coordinates that topic with its international counterparts. I didn't say they were making any calls regarding plumes. As I said, DOE would be a better source for plume projection information.

Scott

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

From: SIMON LOMAX, BLOOMBERG/ NEWSROOM: [<mailto:slomax@bloomberg.net>]
Sent: Friday, March 18, 2011 2:40 PM
To: Burnell, Scott; Brenner, Eliot
Cc: Couret, Ivonne
Subject: RE: Bloomberg question re radiation information

Okay, thanks. Who makes the call about whether it's safe to fly through those plumes? I'm (reluctantly) bugging you all because NRC's recommendation was what led to the 50-mile evacuation zone for U.S. citizens in Japan.

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

From: Scott Burnell <Scott.Burnell@nrc.gov>
To: Eliot.Brenner@nrc.gov, SIMON LOMAX (BLOOMBERG/ NEWSROOM:)
Cc: Ivonne.Couret@nrc.gov
At: 3/18 14:35:53

Hi Simon;

I would suggest contacting DOE for information on plume projections across the Pacific. I'd check with EPA on information regarding monitoring on U.S. territory. Thanks.

Scott

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

From: SIMON LOMAX, BLOOMBERG/ NEWSROOM: [<mailto:slomax@bloomberg.net>]
Sent: Friday, March 18, 2011 2:34 PM
To: Brenner, Eliot
Cc: Couret, Ivonne; Burnell, Scott
Subject: RE: Bloomberg question re radiation information

Hi Eliot

FYI, just heard from our FAA reporter -- FAA says it has no information on radioactivity over the Pacific.

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

From: Eliot Brenner <Eliot.Brenner@nrc.gov>
To: SIMON LOMAX (BLOOMBERG/ NEWSROOM:)
Cc: Ivonne.Couret@nrc.gov, Scott.Burnell@nrc.gov
At: 3/18 13:49:02

We are in contact with the FAA offering them information that might affect flight routes. You would have to check with FAA public affairs 202-267-3883. I do not have immediate details on the rest of your

From: Brenner, Eliot
To: SIMON LOMAX, BLOOMBERG/ NEWSROOM:
Cc: McIntyre, David; Burnell, Scott; Sheehan, Neil; Taylor, Robert; Harrington, Holly; Brenner, Eliot; Couret, Ivonne
Subject: RE: Bloomberg question re radiation information
Date: Friday, March 18, 2011 5:51:00 PM

Simon, for the moment, would you keep this as either an NRC or a government source? "The radiation is actually at a rather low altitude, less than a kilometer, rather than up high. It is bleeding out, carried on plumes of heat and radiation levels drop off rapidly higher above the plant."

Tell your buddies the altitude is far below long distance flight routes so they probably don't need to pursue that angle.

Scott/david/neil et al...once simon runs this, expect some calls. Feel free to provide the same background material or something close.

Eliot

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

From: SIMON LOMAX, BLOOMBERG/ NEWSROOM: [<mailto:slomax@bloomberg.net>]
Sent: Friday, March 18, 2011 3:53 PM
To: Brenner, Eliot
Subject: RE: Bloomberg question re radiation information

Thanks Eliot -- is your welcome guidance on the way radiation is moving on the record or off? if it's on the record it might be very useful for some of my colleagues who are working directly on the flight routes.

cheers, and thank you again,
Simon.

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

From: Eliot Brenner <Eliot.Brenner@nrc.gov>
To: SIMON LOMAX (BLOOMBERG/ NEWSROOM:)
At: 3/18 15:17:41

Simon: any call on changing flight routes is up to the FAA or Japanese ATC officials. You need to talk with them. However, you need to remember that this radiation is actually at low altitudes rather than up high. It is bleeding out at ground level -- carried upwards on plumes of heat -- rather than, as was the case at Chernobyl, being explosively ejected high into the air currents.

Eliot

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

From: SIMON LOMAX, BLOOMBERG/ NEWSROOM: [<mailto:slomax@bloomberg.net>]
Sent: Friday, March 18, 2011 2:40 PM
To: Burnell, Scott; Brenner, Eliot
Cc: Couret, Ivonne
Subject: RE: Bloomberg question re radiation information

Okay, thanks. Who makes the call about whether it's safe to fly through those plumes? I'm (reluctantly) bugging you all because NRC's recommendation was what led to the 50-mile evacuation zone for U.S. citizens in Japan.

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

From: Scott Burnell <Scott.Burnell@nrc.gov>
To: Eliot.Brenner@nrc.gov, SIMON LOMAX (BLOOMBERG/ NEWSROOM:)
Cc: Ivonne.Couret@nrc.gov
At: 3/18 14:35:53

From: Burnell, Scott
To: Brenner, Eliot; Hayden, Elizabeth
Subject: Re: Extending hotel room
Date: Friday, March 18, 2011 10:33:22 AM

About 60, and I don't want the added stress of traffic or train delays. I really hope things slow down a little by Wed. or so.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

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

From: Brenner, Eliot
To: Burnell, Scott; Hayden, Elizabeth
Sent: Fri Mar 18 10:31:01 2011
Subject: RE: Extending hotel room

I have no objections, but there's got to be a way to keep staff close without bankrupting them. How far is your house from the office in miles?

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

From: Burnell, Scott
Sent: Friday, March 18, 2011 10:30 AM
To: Brenner, Eliot; Hayden, Elizabeth
Subject: Extending hotel room
Importance: High

Eliot, Beth;

Even if I get Sunday off, I'm inclined to keep the room at least through Tuesday, due to the Comm meeting. I know we haven't resolved compensating me yet, I'm not concerned. Any objections?

Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

5555/58

From: Burnell, Scott
To: Harrington, Holly
Subject: Re: 11:30am Meeting Today
Date: Friday, March 18, 2011 10:51:55 AM

Should be there in person, trying to extend hotel room.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Harrington, Holly
To: Burnell, Scott
Sent: Fri Mar 18 10:49:57 2011
Subject: FW: 11:30am Meeting Today

Call in?

From: Widomski, Michael [mailto:michael.widomski@dhs.gov]
Sent: Friday, March 18, 2011 10:33 AM
To: Akstulewicz, Brenda; Hayden, Elizabeth; Harrington, Holly; Couret, Ivonne; Wittick, Susan; Widomski, Michael
Cc: Brenner, Eliot
Subject: RE: 11:30am Meeting Today

I'll be there.

From: prvs=051e3bf65=Brenda.Akstulewicz@nrc.gov on behalf of Akstulewicz, Brenda
Sent: Fri 3/18/2011 10:31 AM
To: Hayden, Elizabeth; Harrington, Holly; Couret, Ivonne; Wittick, Susan; Widomski, Michael
Cc: Brenner, Eliot
Subject: 11:30am Meeting Today

All,

Eliot would like to meet regarding Monday's briefing at 11:30am in his office. Please let me know ASAP if you are able to meet at this time.

Thanks,
B

Brenda Akstulewicz
Administrative Assistant
Office of Public Affairs
301-415-8209
brenda.akstulewicz@nrc.gov

SSSS/59

From: [Burnell, Scott](#)
To: ["WBarber@snl.com"; OPA Resource](#)
Subject: Re: Trade press question: NRC "review of US plants"
Date: Friday, March 18, 2011 10:56:38 AM

Stay tuned, Wayne. Check our Commission sked, too. Thx

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Wayne Barber (SNL: 703-373-0160) <WBarber@snl.com>
To: Burnell, Scott; OPA Resource
Sent: Fri Mar 18 10:55:29 2011
Subject: Trade press question: NRC 'review of US plants'

I am hoping that NRC will today add some flesh onto the bones of President Obama's announcement of this US nuclear plant 'review.'

What exactly are we talking about? Will it gauge US reactors ability to withstand major natural disasters and terror attacks?

Will it focus on 'station blackout' events?

How long will this review take?

What happens if certain US plants are found lacking?

What part of NRC will conduct this review?

Will it force other NRC work to be delayed/backburnered?

Many thanks.

Wayne B.

Wayne Barber

Generation Markets Week Editor

SNL Energy

703-373-0160 p

703-373-0159 f

wbarber@snl.com

SSSS/60

From: Burnell, Scott
To: Hatchett, Gregory
Cc: Hayden, Elizabeth
Subject: RE: What FEIS???
Date: Friday, March 18, 2011 11:32:00 AM
Attachments: Vogtle COL FEIS.docx
Importance: High

Greg;

Obviously "normal" concurrence is impossible, so we'll do it this way. Please have your mgmt chain make any suggested edits using "Track Changes" in Word and e-mail it back to me. I'll mark whoever's involved as concurring via e-mail, then run it past the EDO & Chairman's office. Thanks.

Scott

From: Hatchett, Gregory
Sent: Friday, March 18, 2011 9:49 AM
To: Burnell, Scott
Subject: RE: What FEIS???

yes

From: Burnell, Scott
Sent: Friday, March 18, 2011 9:48 AM
To: Hatchett, Gregory; Chokshi, Niles; Brenner, Eliot; Flanders, Scott
Subject: Re: What FEIS???

OK, if EPA publishes next Friday, I'd like to aim for perhaps Wed for our release. Sound reasonable?

Sent from an NRC Blackberry

Scott Burnell

(b)(6)

From: Hatchett, Gregory
To: Burnell, Scott
Sent: Fri Mar 18 09:41:49 2011
Subject: RE: What FEIS???

I spoke with Mike and Gary yesterday, Frank A-Z, Scott Flanders, and Niles Chokshi and the word was do what you do. Thus, I am signing out letters and sending Mallecia down to EPA today with the document so they can publish it in the *Federal Register* next Friday.

Greg

From: Burnell, Scott
Sent: Friday, March 18, 2011 9:13 AM
To: Hatchett, Gregory
Subject: Re: What FEIS???

SSSS/61

OK, just woke up. Should be to the office before noon and a draft shouldn't take long. Is mgmt CERTAIN they want to do this now?

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Hatchett, Gregory
To: Burnell, Scott
Sent: Fri Mar 18 07:50:51 2011
Subject: Re: What FEIS???

Vogtle plant

From: Burnell, Scott
To: Hatchett, Gregory
Sent: Thu Mar 17 21:19:15 2011
Subject: What FEIS???

Greg;

Which plant? I'm really wrapped up in Ops Ctr activity and general response to the media crush (you have no idea), so I'm at a loss to remember what review's at what point. I'll try and get something done tomorrow before I start my Ops Ctr shift, just need the plant.

Scott

Attachment Vogtle_COL_FEIS.docx (15612 Bytes) cannot be converted to PDF format.

From: Bonaccorso, Amy
To: Burnell, Scott; McIntyre, David
Cc: Deavers, Ron; Janbergs, Holly
Subject: FW: Question from Public - Emergency Info in Libraries
Date: Friday, March 18, 2011 11:40:43 AM

Folks:

Our library folks did a lot of research on this...but can anyone in the Ops Center tell me if emergency response plans are accessible anywhere? If they aren't at the library, are they anywhere else?

Thanks,

Amy

From: McGowan, Anna
Sent: Friday, March 18, 2011 11:12 AM
To: Bonaccorso, Amy
Cc: Smith(OIS), Thomas; Glazer, Adam
Subject: FW: Question from Public - Emergency Info in Libraries

Hello, Amy,

Adam Glazer from the Section staff searched for the document type "Emergency Plans in the current ADAMS as well as the Legacy Library and he found the following information. There was only one record in ADAMS and it is non-publicly available. The results from the Legacy Library search were more mixes, both publicly available and non-publicly available. That supports the information from Tom Smith. Formerly, emergency plans were available from the Local Public Document Rooms but after the events of September 11, 2001, changes in emergency plan availability were put in place. By that point, the NRC also was no longer supplying microfiche to the Local Public Document Rooms since we were making documents available through ADAMS.

I hope that this information is useful, Amy; have a good weekend!

Anna

From: Glazer, Adam
Sent: Thursday, March 17, 2011 4:17 PM
To: McGowan, Anna
Subject: RE: Question from Public - Emergency Info in Libraries

According to ADAMS Legacy, there are 6586 publicly-available and non-publicly available citations with the "Emergency Plans" document type.

There's only one document in ADAMS Main:

| | |
|------------------|-----------------|
| Accession Number | ML082321470 |
| Document Date | 10/30/1984 |
| Document Type | EMERGENCY PLANS |

SSSS/62

| | |
|--------------------|--|
| | Emergency Preparedness-Emergency Plan Implementing Procedures TECHNICAL SPECIFICATIONS & TEST REPORTS TEST/INSPECTION/OPERATING PROCEDURES TEXT-SAFETY REPORT |
| Title | Revised Central Emergency Control Ctr Implementing Procedures IP-1 re transportation accident involving shipment of radwaste & IP-6 re alert,site area,emergency & general emergency.W/841030 ltr. |
| Author Affiliation | TENNESSEE VALLEY AUTHORITY |
| Author Name | Mills L M |
| Pages | 15 |
| Official Record? | Yes |
| Availability | Non-Publicly Available |
| Sensitivity | Non-Sensitive |

Adam

From: McGowan, Anna
Sent: Thursday, March 17, 2011 1:10 PM
To: Glazer, Adam
Subject: FW: Question from Public - Emergency Info in Libraries

Hi, Adam,

Would you be able to search document type "Emergency Plans" and see what there is in ADAMS?

Thank you.

Anna

From: Smith(OIS), Thomas
Sent: Thursday, March 17, 2011 12:38 PM
To: McGowan, Anna
Cc: Rathje, M. Jean; Coplin, Seth
Subject: RE: Question from Public - Emergency Info in Libraries

The former LPDRs were supposed to make available for viewing copies of NRC publicly-available documents. Emergency plans would have been such documents. They would have been filed in Category F of each docket. The rule was if it was public, it was available. The NRC ceased supporting the former LPDRs in 1999 when ADAMS came online. After 9/11, depending on the information, parts of the emergency plans were restricted. You can have your staff do an ADAMS search on the document type "Emergency Plans".

From: McGowan, Anna
Sent: Thursday, March 17, 2011 12:27 PM
To: Smith(OIS), Thomas

Subject: FW: Question from Public - Emergency Info in Libraries

Hello, Tom,

Please see Amy's note below mine; was there ever a requirement for public libraries to hold onto emergency plans for nuclear power plants? So far, the PDR staff has not found any such requirement.

Thank you.

Anna

From: McGowan, Anna

Sent: Thursday, March 17, 2011 12:26 PM

To: Bonaccorso, Amy

Subject: RE: Question from Public - Emergency Info in Libraries

Hello, Amy,

I am going to also check with Tom Smith about this. The NRC used to support Local Public Document Rooms (LPDRs) which were usually located near a nuclear power plant. Those Document Rooms had copies of the Legacy microfiche collection since they were publicly available documents. I am not sure if plant emergency response plans would be considered as publicly available. Many of the LPDRs were Government Depository libraries but there were also a few that were supported by the power plants or the local community. We are still checking to see if there was ever any requirement for public libraries to have emergency plans for power plants in their collections and I will let you know what we learn.

Thank you.

Anna

From: Bonaccorso, Amy

Sent: Thursday, March 17, 2011 8:55 AM

To: McGowan, Anna

Subject: Question from Public - Emergency Info in Libraries

Anna:

Have a call about libraries – can anyone in your area provide an answer to this?

Dave Schecter

(b)(6)

Heard public libraries near plants need to have on file the emergency response plan for that plant is this true?

From: [Burnell, Scott](#)
To: eileen.ogrady@thomsonreuters.com
Subject: RE: Obama nuclear review
Date: Friday, March 18, 2011 12:02:00 PM

Hi Eileen;

Sorry to be short – incredible crush – watch for media advisory on upcoming Commission briefing. Thx

From: eileen.ogrady@thomsonreuters.com [mailto:eileen.ogrady@thomsonreuters.com]
Sent: Friday, March 18, 2011 11:50 AM
To: Burnell, Scott; OPA Resource
Subject: Obama nuclear review

Hi, Scott. Are there any details about the nuclear review Obama talked about yesterday? Such as specific areas to be reviewed and timing? Or anything known about the timing of when we might know the specifics and timing?

Eileen

Eileen O'Grady
Houston Correspondent

Thomson Reuters

Office: 713 210 8522

Mobile: (b)(6)

eileen.ogrady@thomsonreuters.com
thomsonreuters.com

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SSSS/63

From: Burnell, Scott
To: McIntyre, David
Subject: RE: Edward Klump - Bloomberg News
Date: Friday, March 18, 2011 12:39:00 PM

He should stop hogging it all!!!

From: McIntyre, David
Sent: Friday, March 18, 2011 12:39 PM
To: Burnell, Scott
Subject: RE: Edward Klump - Bloomberg News

He's waaaay too caffeinated.

From: Burnell, Scott
Sent: Friday, March 18, 2011 12:20 PM
To: McIntyre, David
Subject: RE: Edward Klump - Bloomberg News

THANKS!

From: McIntyre, David
Sent: Friday, March 18, 2011 12:17 PM
To: EDWARD KLUMP, BLOOMBERG/ NEWSROOM;; Burnell, Scott
Subject: RE: Edward Klump - Bloomberg News

I'll call.

From: EDWARD KLUMP, BLOOMBERG/ NEWSROOM: [mailto:eklump@bloomberg.net]
Sent: Friday, March 18, 2011 12:11 PM
To: Burnell, Scott
Cc: McIntyre, David
Subject: RE: Edward Klump - Bloomberg News

Scott, David -- I know you all are swamped, but I am on a tight deadline. Could either of you call me soon just to go over a few stats I'm seeing in the 2010 Information Digest? I want to be clear on a couple points so I'm quoting this properly. I am at (b)(6). Thanks. --
Edward Klump, Bloomberg News

From: Scott Burnell<Scott.Burnell@nrc.gov>
To: EDWARD KLUMP, BLOOMBERG/ NEWSROOM:
Cc: <David.McIntyre@nrc.gov>
Subject: RE: Edward Klump - Bloomberg News
Date: 3/18/2011 12:06:22

Hi Edward;

My colleague David McIntyre does the most work in this area, so he's a better first option to discuss. Let me know if I need to fill in. Thx

SSSS/64

From: EDWARD KLUMP, BLOOMBERG/ NEWSROOM: [mailto:eklump@bloomberg.net]
Sent: Friday, March 18, 2011 11:33 AM
To: Burnell, Scott
Subject: RE: Edward Klump - Bloomberg News

Scott -- I have a few follow-up questions on some of the fuel storage stats in the document you sent me yesterday. Would you have a couple moments to discuss sometime soon? I want to be clear I'm looking at the numbers properly. Thanks. --Edward Klump, Bloomberg News,

(b)(6)

From: Scott Burnell<Scott.Burnell@nrc.gov>
To: EDWARD KLUMP, BLOOMBERG/ NEWSROOM:
Subject: RE: Edward Klump - Bloomberg News
Date: 3/17/2011 19:02:03

That should be attributed to the NRC's 2010 Information Digest. Thanks.

From: EDWARD KLUMP, BLOOMBERG/ NEWSROOM: [mailto:eklump@bloomberg.net]
Sent: Thursday, March 17, 2011 7:01 PM
To: Burnell, Scott
Subject: RE: Edward Klump - Bloomberg News

Thanks for passing that along. If I use some of the information in this report, do I attribute it to the NRC? What is the year or date of this report? Thanks....

From: Scott Burnell<Scott.Burnell@nrc.gov>
To: EDWARD KLUMP, BLOOMBERG/ NEWSROOM:
Subject: RE: Edward Klump - Bloomberg News
Date: 3/17/2011 18:22:28

Hi Edward;

Thanks for clarifying. We don't have a plant-by-plant breakdown, but our Information Digest includes a brief discussion of spent fuel:

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/v22/sr1350v22-sec-5.pdf>
starting on PDF page 4 of 14

Hope that's helpful.

Scott

From: EDWARD KLUMP, BLOOMBERG/ NEWSROOM: [mailto:eklump@bloomberg.net]

Sent: Thursday, March 17, 2011 6:20 PM
To: Burnell, Scott
Subject: RE: Edward Klump - Bloomberg News

Thanks for the note. I'm wondering if the NRC has data on how much spent fuel is kept at each reactor in the U.S. Is this something you can help with? Thanks. --Edward Klump, Bloomberg News, (b)(6)

From: Scott Burnell<Scott.Burnell@nrc.gov>
To: EDWARD KLUMP, BLOOMBERG/ NEWSROOM:
Subject: RE: Edward Klump - Bloomberg News
Date: 3/17/2011 18:11:59

Hello Edward;

Sorry for the delay in responding. If you're asking about the Fukushima reactors the NRC has no statistical information available. Thanks.

Scott Burnell
Public Affairs Officer
Nuclear Regulatory Commission

Subject: Edward Klump - Bloomberg News

Organization – Bloomberg News
Contact – Edward Klump
Phone – (b)(6)
Email – eklump@bloomberg.net
Request – Would like statistical information on the spent fuel.

From: Hannah, Roger
To: Burnell, Scott
Subject: RE: Ap 1000 story for Miami Herald
Date: Friday, March 18, 2011 12:44:29 PM
Attachments: image001.png

Perfect – See you next week...

Roger Hannah, APR

Senior Public Affairs Officer

Region II -- Atlanta, Ga.

Office - 404-997-4417

Cell - (b)(6)

roger.hannah@nrc.gov



From: Burnell, Scott
Sent: Friday, March 18, 2011 12:42 PM
To: Hannah, Roger
Subject: RE: Ap 1000 story for Miami Herald

Yes, the article's accurate, I helped get Matt in touch with Bergman. And if he asks about the Chairman's Hill testimony, the agency continues to believe the overall AP1000 design meets all NRC safety requirements. No word on any changes to NRO processes at this point.

Non-concurrences are an expected part of the process, since there's no requirement for unanimous staff approval on any given review. There have been several non-concurrences over the past few years. In each case, the overall staff opinion has always provided sufficient technical detail for management to move forward despite the non-concurrence, as was the case with Ma.

How's that?

From: Hannah, Roger
Sent: Friday, March 18, 2011 12:32 PM
To: Burnell, Scott
Subject: FW: Ap 1000 story for Miami Herald

Scott, When you get a chance, can you send me a quick confirmation of story accuracy and answer to the first question? – I think I can handle everything else...

Thanks,

SSSS/65

Roger Hannah, APR

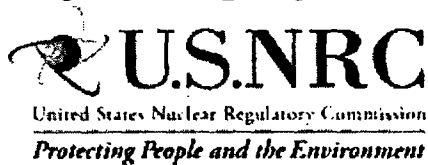
Senior Public Affairs Officer

Region II -- Atlanta, Ga.

Office - 404-997-4417

Cell - (b)(6)

roger.hannah@nrc.gov



From: Morgan, Curtis - Miami [mailto:CMorgan@miamiherald.com]

Sent: Friday, March 18, 2011 10:30 AM

To: Hannah, Roger

Subject: Ap 1000 story for Miami Herald

Roger,

Hey. This is an NY Times story from March 8 regarding the Markey letter and Dr. Ma's "non-concurrence" issue with design that we talked about Wednesday. Can I at confirm its accuracy, particularly regarding NRC discussions about the issue and comments from Mr. Bergman. I want to properly characterize Dr. Ma's dissent .. Is this unusual or a regular part of approval process?

In addition, just to ask again, is there any thought of reopening consideration of this design in the wake of the crisis in Japan.

Curtis Morgan

Environmental Reporter

The Miami Herald

W: 305-376-3610

Fax: 305-376-5287

Email: Cmorgan@miamiherald.com

From: Couret, Ivonne
To: Burnell, Scott
Subject: MEDIA - FW: Ian Crowdord - KUT Radio -Austin Texas -3PM DEADLINE
Date: Friday, March 18, 2011 1:06:48 PM
Importance: High

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

Visit our online photo gallery. Incorporate graphics and photographs to tell your story!
<http://www.nrc.gov/reading-rm/photo-gallery/>

2010-2011 Information Digest - Where you can find NRC Facts at a Glance
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

From: Ghneim, Munira
Sent: Friday, March 18, 2011 12:29 PM
To: Couret, Ivonne
Subject: Ian Crowdord - KUT Radio -Austin Texas -3PM DEADLINE

Organization – KUT Radio –Austin Texas

Contact – Ian Crawford

Phone – (b)(6)

Email – icrawford@kut.org

Request – Would like some information regarding the AP story that came out about the screening for radiation.

SSSS / 66

From: [Burnell, Scott](#)
To: [Karen Yourish](#)
Bcc: [Cullingford, Michael](#); [Ramsey, Jack](#)
Subject: RE: Washington Post question
Date: Friday, March 18, 2011 1:12:00 PM

Ow, that's a quick deadline. I'll keep trying.

From: Karen Yourish [mailto:[\(b\)\(6\)](#)]
Sent: Friday, March 18, 2011 1:05 PM
To: Burnell, Scott
Subject: Re: Washington Post question

2?

Sent from my iPhone. Please excuse brevity and typos.

On Mar 18, 2011, at 12:54 PM, "Burnell, Scott" <Scott.Burnell@nrc.gov> wrote:

Hello Karen;

I'm checking with some staff who I hope aren't totally engaged in our response. What's your overall deadline? Thanks.

Scott

From: Karen Yourish [mailto:YourishK@washpost.com]
Sent: Friday, March 18, 2011 12:35 PM
To: Burnell, Scott
Subject: Washington Post question

Is it possible to filter licensee event reports by those that were given an INES rating?

Karen Yourish
Deputy Graphics Director
The Washington Post
202-334-6396

SSSS/67

From: Burnell, Scott
To: Cullingford, Michael; Ramsey, Jack
Subject: FW: Washington Post question
Date: Friday, March 18, 2011 1:13:00 PM
Importance: High

Gentlemen;

Anything we can provide immediately to the Washington Post on NRC submittals for INES rated events? Thanks!!

Scott

From: Karen Yourish [mailto:(b)(6)]
Sent: Friday, March 18, 2011 1:05 PM
To: Burnell, Scott
Subject: Re: Washington Post question

2?

Sent from my iPhone. Please excuse brevity and typos.

On Mar 18, 2011, at 12:54 PM, "Burnell, Scott" <Scott.Burnell@nrc.gov> wrote:

Hello Karen;

I'm checking with some staff who I hope aren't totally engaged in our response. What's your overall deadline? Thanks.

Scott

From: Karen Yourish [mailto:YourishK@washpost.com]
Sent: Friday, March 18, 2011 12:35 PM
To: Burnell, Scott
Subject: Washington Post question

Is it possible to filter licensee event reports by those that were given an INES rating?

Karen Yourish
Deputy Graphics Director
The Washington Post
202-334-6396

SSSS/68

From: Burnell, Scott
To: Tamar Cerafici
Subject: RE: Checking in
Date: Friday, March 18, 2011 1:14:00 PM

Ah, such sweet naivete... :-) Thanks, Tamar, really appreciate it. Been holed up at the Mariott across the street all week. I'm still vertical somehow.

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

From: Tamar Cerafici [mailto:(b)(6)]
Sent: Friday, March 18, 2011 1:14 PM
To: Burnell, Scott
Subject: Checking in

Holding up? Every time something happens I send positive energy your way. Hopefully something will happen in Libya or Bahrain to take some of the focus away.

--

Sent from my mobile device

Tamar Jergensen Cerafici
The Cerafici Law Firm, LLC
Admitted in Idaho and Utah only
9509 Burgee Place
Frederick, MD 21704
Phone: (301) 363-5543
Direct: (b)(6)
Fax: (603) 737-5605
gnlegal.com

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SSSS/69

From: Pham, Bo
To: Screnci, Diane; Sheehan, Neil; McNamara, Nancy; Tifft, Doug; Jackson, Donald; Conte, Richard; Burnell, Scott; Kim, James; Dacus, Eugene; Spencer, Mary; Subin, Lloyd; Wittick, Brian
Cc: Spindler, David; Rich, Sarah; Holian, Brian; Galloway, Melanie; Wrona, David; Kuntz, Robert; Nelson, Robert; Salgado, Nancy
Subject: RE: Final Comm Plan for VYNPS license renewal
Date: Friday, March 18, 2011 1:31:54 PM

All,

A quick clarification regarding the attached Q&A Incident Response document. It has NOT be cleared by OPA for sharing with the public yet, so I emphasize that it's really for background info & not to be relayed to the public.

Thank you!

Bo Pham

Chief, Projects Branch 1

Division of License Renewal

Office of Nuclear Reactor Regulation

U.S. Nuclear Regulatory Commission

301-415-8450

From: Pham, Bo
Sent: Friday, March 18, 2011 1:24 PM
To: Screnci, Diane; Sheehan, Neil; McNamara, Nancy; Tifft, Doug; Jackson, Donald; Conte, Richard; Burnell, Scott; Kim, James; Dacus, Eugene; Spencer, Mary; Subin, Lloyd; Wittick, Brian
Cc: Spindler, David; Rich, Sarah; Holian, Brian; Galloway, Melanie; Wrona, David; Kuntz, Robert; Nelson, Robert; Salgado, Nancy
Subject: Final Comm Plan for VYNPS license renewal

All,

Attached is the final comm plan with all the input that I've received today. I left it in redline view so that you can get a better idea where the changes are.

In addition, for background info, I'm attaching a Q&A doc that'd being developed for the incident response center's use.

NOTE: this is an INTERNAL ONLY document for your use only & the messages in there are clearly marked for public vs. non public use.

Please let me know if you need additional information. Since this is going to happen at 8am on Monday, you can also get a hold of me over the weekend, if needed, on my blackberry at (b)(6)

SSSS/70

Thanks.

<< File: VY license Issuance Comm Plan Final 3-18-11.docx >> << File: Seismic Questions for Incident Response 3-18-11 5am.pdf >>

Bo Pham

Chief, Projects Branch 1

Division of License Renewal

Office of Nuclear Reactor Regulation

U.S. Nuclear Regulatory Commission

301-415-8450

From: Harrington, Holly
To: Burnell, Scott; McIntyre, David
Subject: FW: No tv tonight
Date: Friday, March 18, 2011 2:50:40 PM

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

From: Brenner, Eliot
Sent: Friday, March 18, 2011 2:21 PM
To: Couret, Ivonne; Akstulewicz, Brenda; Hayden, Elizabeth; Harrington, Holly
Subject: No tv tonight

You can tell all callers the chairman will NOT do television tonight and we do not anticipate any tomorrow. If asked, confirm he will do a c-span show Sunday at 10am. Location is 400 North Capitol Street.

Eliot
Eliot Brenner
Director, Office of Public Affairs
US Nuclear Regulatory Commission
Protecting People and the Environment
301 415 8200
C: (b)(6)
Sent from my Blackberry

SSSS/71

From: [Burnell, Scott](#)
To: ayesha.rascoe@thomsonreuters.com; [Courret, Ivonne](#)
Bcc: [Akstulewicz, Brenda](#)
Subject: RE: NRC Proposes to Amend Licensing, Inspection and Annual Fees Rule
Date: Friday, March 18, 2011 2:55:00 PM

Ah, the wonders of modern technology. Let me check.

From: ayesha.rascoe@thomsonreuters.com [mailto:ayesha.rascoe@thomsonreuters.com]
Sent: Friday, March 18, 2011 2:55 PM
To: Burnell, Scott; Courret, Ivonne
Subject: FW: NRC Proposes to Amend Licensing, Inspection and Annual Fees Rule

Do either of you guys have the actual release for this? The email I just got does not have any attachment.

Thanks,
Ayesha

Ayesha Rascoe
Energy Reporter
Thomson Reuters

Phone: 1-202-310-5683

Mobile: (b)(6)

ayesha.rascoe@thomsonreuters.com
thomsonreuters.com

From: opa administrators [mailto:opa@nrc.gov]
Sent: Friday, March 18, 2011 3:50 PM
To: Rascoe, Ayesha r. (M Edit Ops)
Subject: NRC Proposes to Amend Licensing, Inspection and Annual Fees Rule

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SSSS/72

From: McIntyre, David
To: Burnell, Scott
Subject: RE: Separate issue -- Q&A?
Date: Friday, March 18, 2011 8:27:45 AM

Ummmmmm no you hadn't

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

From: Burnell, Scott
Sent: Thursday, March 17, 2011 10:38 PM
To: McIntyre, David
Subject: FW: Separate issue -- Q&A?

Can't remember if I closed the loop or not...

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

From: Bentz, Julie A. [mailto: (b)(6)]
Sent: Wednesday, March 16, 2011 9:58 PM
To: Burnell, Scott
Subject: RE: Separate issue -- Q&A?

Scott,
You're very understanding. Could you also reach out to Dave McIntyre and close the loop with him as well?
Thanks!
Julie

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

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Wednesday, March 16, 2011 12:04 PM
To: Bentz, Julie A.
Subject: RE: Separate issue -- Q&A?

Julie
That would let the staff check a "done" box, and it's possible you have a Q we've not thought of. I'd appreciate it. Thanks.

Scott

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

From: Bentz, Julie A. [mailto: (b)(6)]
Sent: Wednesday, March 16, 2011 12:02 PM
To: Burnell, Scott
Subject: RE: Separate issue -- Q&A?

Scott,
I can send you some draft Q&As, but they haven't been updated since Monday, and the effort has significantly changed (and we've not kept up on those QAs). Do you still feel they would be useful?
Julie

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

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Wednesday, March 16, 2011 11:54 AM
To: Shapiro, Nicholas S.; Bentz, Julie A.
Subject: RE: Separate issue -- Q&A?

Julie, I'd heard your name in relation to this but wasn't sure how to reach you. Anything you can provide is much appreciated, thanks!

SSSS/73

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

From: Shapiro, Nicholas S. [mailto:(b)(6)]

Sent: Wednesday, March 16, 2011 11:52 AM

To: Burnell, Scott; Bentz, Julie A.

Subject: Re: Separate issue -- Q&A?

Adding julie. Q/A is only draft form

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

From: Burnell, Scott <Scott.Burnell@nrc.gov>

To: Shapiro, Nicholas S.

Sent: Wed Mar 16 11:50:53 2011

Subject: Separate issue -- Q&A?

Nick;

The technical staff here are trying to respond to a management directive and get ahold of the latest White House Q&A on events in Japan. Who can help me track those down? Thanks very much!

Scott

From: Burnell, Scott
To: "ian.sample@guardian.co.uk"
Subject: Re: Guardian query / Fukushima 50 mile exclusion zone.
Date: Friday, March 18, 2011 9:07:56 AM

Hello Ian;

Just waking up, so forgive simple grammar. I can only refer you back to US Ambassador's remarks on the 16th -- I beleieve his wording was "a variety of sources." Thx.

Scott

Sent from an NRC Blackberry
Scott Burnell
(b)(6)

From: Ian Sample <ian.sample@guardian.co.uk>
To: Burnell, Scott
Sent: Fri Mar 18 06:26:22 2011
Subject: Re: Guardian query / Fukushima 50 mile exclusion zone.

Dear Scott,

Thanks so much for getting back to me, and I do apologise for adding my queries to your in-tray, which must be creaking under the strain these days. One more thing would be a huge help - can you clarify how the NRC / US know that the storage pool at reactor four is empty? Keen to know if this is from some kind of aerial/sat instrumentation, which would presumably be possible.

I really appreciate your help with this,

With best regards, Ian

On 18 March 2011 00:29, Burnell, Scott <Scott.Burnell@nrc.gov> wrote:

Hello Ian;

I sincerely apologize for the delay in responding, we're really just that swamped. The document we provided in support of our press release represents projections based on the best available data we had at the time regarding conditions at the site. They do not represent actual measurements on the ground. As Chairman Jaczko said in his congressional testimony, the NRC does believe there are high radiation levels in some sections of the Fukushima site. Please let me know if you need anything else, and I'll do my best to respond promptly this time.

Scott Burnell

Public Affairs Officer

SSSS / 74

Nuclear Regulatory Commission

From: Ian Sample [mailto:ian.sample@guardian.co.uk]
Sent: Wednesday, March 16, 2011 4:13 PM
To: OPA Resource
Subject: Guardian query / Fukushima 50 mile exclusion zone.

Dear NRC folks,

I'm the science correspondent at the Guardian newspaper in London.
Might you help me out with a query?
I am looking at your data via the document here (<http://www.nrc.gov/>) for working out the 50 mile exclusion zone the US has adopted around Fukushima.
Am I right that your calculations show that today, the max total EDE at 0.5 miles from the plant, was 5400 rems, or 54 sieverts?
Wouldn't a dose that high would be lethal to anyone on the site?
It would be great to have some clarification.
With best regards,

--

Ian Sample
Science correspondent
The Guardian
Kings Place
90 York Way
London N1 9GU
Direct: +44(0)203 353 4752

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Ian Sample
Science correspondent
The Guardian
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From: Burnell, Scott
To: Brenner, Eliot; Hayden, Elizabeth
Subject: Fw: For your review: SSA session on nuclear power plants
Date: Friday, March 18, 2011 9:23:23 AM

More fun -- cliff munson's been working on the seismic QA and becky Karas is on Ops Ctr staffing, so they should know the drill. Still, the timing here does not fill me with great joy.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Chokshi, Niles
To: Burnell, Scott; Bauer, Laurel
Cc: Karas, Rebecca; Li, Yong; Munson, Clifford; Flanders, Scott; NRO DSER Branch Chiefs; Holahan, Gary
Sent: Fri Mar 18 09:20:08 2011
Subject: RE: For your review: SSA session on nuclear power plants

Scott,

Thanks for your response. I understand your concerns. We had an internal discussion with the NRO management to discuss the issue, and we have concluded that we should go ahead and participate as planned. This is a part of our normal business practice, and wholesale pull out may create more negative impressions. Of course, we are instructing our staff to stick to how we conduct the reviews, our processes, and regulations. Your concerns are very valid – we need your help in developing few Qs and As related to and stemming from the Japanese events which are most likely to be asked of any NRC staff.

Thanks,

Niles

From: Burnell, Scott
Sent: Thursday, March 17, 2011 5:43 PM
To: Bauer, Laurel; Chokshi, Niles
Cc: Karas, Rebecca; Li, Yong; Munson, Clifford
Subject: RE: For your review: SSA session on nuclear power plants
Importance: High

Hi Laurel;

Sorry for the delay. At this point I would strongly suggest, after conferring with your management, that all of you politely back out of any commitments as soon as possible. Most importantly, I would think all of our seismic-related staff could be involved in the President-requested "comprehensive safety review" by that point. Also, it's inevitable you'll be asked policy-related questions that simply can't be addressed right now.

Scott

SSSS / 75

From: Bauer, Laurel
Sent: Thursday, March 17, 2011 2:12 PM
To: Chokshi, Niles; Burnell, Scott
Cc: Karas, Rebecca; Li, Yong; Munson, Clifford
Subject: FW: For your review: SSA session on nuclear power plants

Scott / Niles,

I am forwarding you this request from SSA. Yong and I are scheduled to lead an oral session at the annual Seismological Society of America Meeting next month, April 13-16. The title of the session is: Seismic Siting for Nuclear Power Plants. The session is scheduled for Friday, April 15 in the afternoon. Hosung and Cliff will also be presenting in this session. We received the following request from their press officer who is putting together a tip sheet. How should this be handled? I have attached the SSA Meeting Program as the talks listed are only a few that are scheduled. I would not exactly call what she has provided a tip sheet.

Scott, the OPA staff that I spoke with directed me by phone to forward to you.

Thanks,

Laurel Bauer
(301) 415-3210 (HQ)

From: Nan BROADBENT [mailto:(b)(6)]
Sent: Thursday, March 17, 2011 1:47 PM
To: Li, Yong; Bauer, Laurel
Subject: For your review: SSA session on nuclear power plants

Dr. Li and Dr. Bauer:

I am preparing a media tip sheet that highlights selected talks and posters at the upcoming SSA annual meeting. I don't know if there have been additional talks added to your session since the earthquake in Japan. Based on the submitted abstracts I have drafted the following text and would appreciate feedback from either of you. Please let me know how to improve it.

Thank you,

Nan Broadbent
SSA, press officer
(b)(6)

Seismic Siting for Nuclear Power Plants
Ballroom D, 1:30 – 3 p.m.

Developing and implementing a real-time earthquake notification system for nuclear power plant site using ShakeCast (Poster)

The IAEA International Seismic Safety Centre (ISSC) and the U. S. Nuclear Regulatory

Commission (NRC), in collaboration with the U. S. Geological Survey (USGS), are developing and implementing a custom ShakeCast system for discovery, processing, and notification of real-time ground shaking information at nuclear power plant (NPP) sites. ShakeCast takes freely available, post-earthquake data and compares intensity measures against nuclear power plants, sends notifications of potential damage to responsible parties, and generates facility damage maps. [K. Lin, U.S. Geological Survey, klin@usgs.gov]

Geomorphic assessment of past extreme ground motion on Yucca Mountain, Southern Nevada (poster)

Analysis of rock fall along the cliffs near Yucca Mountain, Nevada, a long-proposed nuclear waste storage site, helps to date past extreme ground motions in the area. The researchers say that the rock fall data show no evidence that Yucca Mountain cliffs have been shattered in response to extreme ground motions for at least 250,000 years. [J.W. Whitney, U.S. Geological Survey, jwhitney@usgs.gov]

Unanticipated Exceptional Ground Motions at a Nuclear Power Plant during the 2007 Chuetsu-Oki, Japan, Earthquake

The 2007 Chuetsu-oki, Japan, earthquake occurred on July 16 with a moment magnitude (M_w) of 6.6. This event is significant as the world's first major earthquake upon a source fault that extends beneath a nuclear power plant (until the March 2011 earthquake/tsunami). The researchers looked at several models to find out why their previous models of ground shaking for the area underpredicted how severe the actual shaking was in 2007. [K. Koketsu, University of Tokyo, koketsu@eri.u-tokyo.ac.jp]

From: Harrington, Holly
To: Burnell, Scott
Subject: FW: ACTION: NGA Center in DC Requests NRC Expert Speaker for 3/22 or 3/23 and 4/4
Date: Friday, March 18, 2011 10:18:21 AM

I think you're aware of this and I've lost track on this. Can you provide some guidance or info for us on this NRR initiative . . .

From: Virgilio, Rosetta
Sent: Friday, March 18, 2011 12:19 AM
To: Harrington, Holly
Cc: Ellmers, Glenn; Landau, Mindy
Subject: ACTION: NGA Center in DC Requests NRC Expert Speaker for 3/22 or 3/23 and 4/4

Holly - Since sending out my initial request, I've been informed by Marty that Bob Nelson is heading up a NRC communications effort and also that Brian Sheron, Mike Johnson, Eric Leeds, and Cathy Haney have been appointed NRC Communicators. Can I approach them directly?

Sent from an NRC Blackberry
Rosetta O. Virgilio

(b)(6)

From: Landau, Mindy
To: Harrington, Holly
Cc: Ellmers, Glenn; Virgilio, Rosetta
Sent: Thu Mar 17 18:01:37 2011
Subject: Fw: NGA Center NRC expert speaker requests

Holly - what's our posture? Does Eliot have an opinion on whether we should agree to this request?

Sent from my NRC Blackberry
Mindy Landau

(b)(6)

Mindy.Landau@nrc.gov

From: Virgilio, Rosetta
To: Landau, Mindy; Ellmers, Glenn
Cc: Piccone, Josephine; Jackson, Deborah; Ryan, Michelle; Turtill, Richard
Sent: Thu Mar 17 17:17:28 2011
Subject: Fw: NGA Center NRC expert speaker requests

Mindy/Glenn - Please see below. I understand Mike Weber has suggested that "NRC ambassadors" could go out and do this sort of thing. Can you help identify who these folks are so I can move this request forward? NGA indicated they could set up a bridge line in the event NRC was unable to physically travel downtown. I did indicate staff is pretty stretched and is looking to hold a public Commission meeting next week, which might satisfy their needs; perhaps we could instead entertain the April 4 meeting.

Anything you can do to help me move this request forward would be appreciated.

Sent from an NRC Blackberry
Rosetta O. Virgilio

ssss/ 76

(b)(6)

From: Virgilio, Rosetta
To: 'gdierkers@NGA.ORG' <gdierkers@NGA.ORG>
Sent: Thu Mar 17 17:03:28 2011
Subject: Re: NGA Center NRC expert speaker requests

Thank you, Greg; I will followup and get back to you.

Sent from an NRC Blackberry
Rosetta O. Virgilio

(b)(6)

From: Dierkers, Gregory <gdierkers@NGA.ORG>
To: Virgilio, Rosetta
Cc: Gander, Sue <sgander@NGA.ORG>; MacLellan, Thomas <TMacLellan@NGA.ORG>; Ferro, Carmen <CFerro@NGA.ORG>
Sent: Thu Mar 17 16:36:04 2011
Subject: NGA Center NRC expert speaker requests

Hi Rosetta,

Thanks for your time today. We appreciate you identifying someone from the NRC to support the NGA Center's outreach to states during this busy time.

As we discussed we would like to invite the NRC to join us for **two upcoming events -- a webinar next week and a conference in early April -- to brief governors' advisors on the Japanese situation and the implications for US plants.** The events are:

1) **A webinar with governors' security and energy advisors.** NGA Center staff is planning to host a conference call next week (Tuesday 3/21 or Wednesday 3/22) to provide senior state officials with an update on the Japan situation and to answer questions as to the operations of US plants, including regulations, plant security/safety, and the emergency preparedness efforts at the US nuclear fleet. We would ask that an NRC expert join the webinar remotely; the webinar would last for 1 hour.

2) **An in-person speaker at a governors' energy advisors meeting.** NGA Center's *Governors' Energy Advisors Policy Institute* on April 4th in Arlington, Virginia. The focus of the April 4th Institute is to provide a 'Technology 101' briefing for governors senior energy advisors. We would invite the NRC to attend in-person on April 4th from 1:45pm to 4:15pm. We would ask for a 10-15 minute presentation on the situation in Japan, the state of nuclear technology and regulations in the US, and the implications for states from the Japanese crisis. Attached is a draft agenda.

Thanks for considering both of these requests.

Sincerely,

Greg Dierkers

Program Director – Energy and Transportation

NGA Center for Best Practices

Environment, Energy and Transportation Division

202-624-7789

gdierkers@nga.org

From: [Burnell, Scott](mailto:Burnell.Scott)
To: Jeanine.Prezioso@thomsonreuters.com
Subject: RE: Looking for comment...
Date: Friday, March 18, 2011 3:00:00 PM

Yes indeed.

From: Jeanine.Prezioso@thomsonreuters.com [mailto:Jeanine.Prezioso@thomsonreuters.com]
Sent: Friday, March 18, 2011 3:00 PM
To: Burnell, Scott
Subject: RE: Looking for comment...

Your title is "spokesman" right?

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 18, 2011 3:00 PM
To: Prezioso, Jeanine (M Edit Ops)
Subject: RE: Looking for comment...

Hi Jeanine;

I hate to say it's self-serve on the e-mail -- we have instructions on signing up for our press release listserv at the bottom of every release. Thanks.

Scott

From: Jeanine.Prezioso@thomsonreuters.com [mailto:Jeanine.Prezioso@thomsonreuters.com]
Sent: Friday, March 18, 2011 2:58 PM
To: Burnell, Scott
Subject: RE: Looking for comment...

Hi Scott,

I guess it sort of does but I guess you won't have any answers until after this commission meeting then.

Would you please add me to your press list so I receive all these media releases?

Thanks,
Jeanine

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 18, 2011 2:54 PM
To: Prezioso, Jeanine (M Edit Ops)
Subject: RE: Looking for comment...

Hi Jeanine;

You may have seen that the Commission is holding a meeting Monday morning to examine the staff's ongoing response to events in Japan, and many of your questions

SSSS/77

could be answered then. I would expect we'll have a media advisory out on that soon.
Thanks.

Scott

From: Jeanine.Prezioso@thomsonreuters.com [mailto:Jeanine.Prezioso@thomsonreuters.com]
Sent: Friday, March 18, 2011 2:50 PM
To: Burnell, Scott
Subject: Looking for comment...
Importance: High

Dear Mr. Burnell,

I know you've been in touch with others at Reuters but I had a specific question I'd like answered and wanted to touch base.

I am working on a story about whether the NRC will tighten regulations on U.S. nuclear plants anytime soon (and thus lean on natural gas to replace lost power generation).

I know the president has requested a comprehensive review of U.S. nuclear facilities. What I'd like to know is whether or not the NRC will take action to prolong maintenance closures?

I need a response on this before 5 p.m. today.

Thanks and best regards,
Jeanine

Jeanine Prezioso
Editor, North American Power & Gas Forum
Reuters News
Thomson Reuters

3 Times Square
19th Floor
New York, NY 10036

Phone: 646-223-6241

Mobile: (b)(6)

jeanine.prezioso@thomsonreuters.com

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From: laura.j.brown@faa.gov
To: [Brenner, Eliot](#)
Cc: [Burnell, Scott](#)
Subject: RE: Bloomberg
Date: Friday, March 18, 2011 3:25:56 PM

Thanks. I know we've been talking to you and DOE and the EPA, but the point is, we would not be responsible for "making the call" about what it's safe to fly through and what it's not safe to fly through. We rely on all you radiation experts at other agencies to tell us that.

Laura J. Brown
Deputy Assistant Administrator
for Public Affairs
202-267-3455 W

(b)(6)

 C

From: "Brenner, Eliot" <Eliot.Brenner@nrc.gov>
To: Laura J Brown/AWA/FAA@FAA
Cc: "Burnell, Scott" <Scott.Burnell@nrc.gov>
Date: 03/18/2011 03:21 PM
Subject: RE: Bloomberg

Ok. Will do. Will make an effort to figure out who is driving that bus.

Scott: please call simon and tell him neither you nor I know what the hell we are talking about and he should try elsewhere, maybe at the Japanese government.

(laura...we did have NRC-FAA consultation overnight a couple nights ago with your folks calling our folks asking for radiation information to help them chose routes. I had the fortune/misfortune of standing there while the conversation went on)

From: laura.j.brown@faa.gov [<mailto:laura.j.brown@faa.gov>]
Sent: Friday, March 18, 2011 3:18 PM
To: Brenner, Eliot
Subject: Bloomberg

Eliot,
Someone on your PA staff -- I hope it's not you! -- is telling Simon Lomax of Bloomberg that the FAA is responsible for making the call on whether it's safe to fly through radioactive plumes.

WE ARE NOT DOING THIS!!!

Can you please tell your staff to tell Simon we are not the ones who make this call? I don't know whether it's the EPA or some other agency,

SSSS / 78

Laura J. Brown
Deputy Assistant Administrator
for Public Affairs
202-267-3455 W

(b)(6) C

----- Forwarded by Laura J Brown/AWA/FAA on 03/18/2011 03:09 PM -----

From: "JOHN HUGHES, BLOOMBERG/ NEWSROOM:" <jhughes5@bloomberg.net>
To: Laura J Brown/AWA/FAA@FAA
Date: 03/18/2011 02:47 PM
Subject: Fwd:Re:Fwd:Fw: FYI -- Nuclear Regulatory Commission says

--- Original Sender: SIMON LOMAX, BLOOMBERG/ NEWSROOM: ---

Response from NRC reporter....

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

From: SIMON LOMAX (BLOOMBERG/ NEWSROOM:)
To: JOHN HUGHES (BLOOMBERG/ NEWSROOM:), BERNIE KOHN (BLOOMBERG/ NEWSROOM:)
At: 3/18 14:46:05

hi john -- nrc says at one point there was some consultation with faa, but
it may have dropped off. I asked them who makes the call on whether its safe
to fly through the radioactive plumes, and they say it's faa.

From: Burnell, Scott
To: Karen Yourish
Subject: RE: Washington Post question
Date: Friday, March 18, 2011 4:16:00 PM

Certainly. Better to try Tuesday or later. Thanks.

From: Karen Yourish [mailto:YourishK@washpost.com]
Sent: Friday, March 18, 2011 4:15 PM
To: Burnell, Scott
Subject: Re: Washington Post question

Can I touch base with you next week about this data?

Karen Yourish
Deputy Graphics Director
The Washington Post

(b)(6)

"Burnell, Scott" <Scott.Burnell@nrc.gov>

03/18/11 04:10 PM

To "YourishK@washpost.com" <YourishK@washpost.com>
cc
Subject Re: Washington Post question

I'm sorry, no. I do hope you understand how many of the staff are working on our response.

Sent from an NRC Blackberry
Scott Burnell
202-441-0471

From: Karen Yourish <YourishK@washpost.com>
To: Burnell, Scott
Sent: Fri Mar 18 15:59:57 2011
Subject: RE: Washington Post question

Any luck?

Karen Yourish
Deputy Graphics Director
The Washington Post
202-334-6396

"Burnell, Scott" <Scott.Burnell@nrc.gov>

03/18/11 02:00 PM

To Karen Yourish <YourishK@washpost.com>
cc

SSSS/79

Subject RE: Washington Post question

Yes, I'm checking to see what we've got, please bear with us.

From: Karen Yourish [mailto:YourishK@washpost.com]
Sent: Friday, March 18, 2011 1:26 PM
To: Burnell, Scott
Subject: RE: Washington Post question

Just to be clear: I don't necessarily need them to do it for me. Just need guidance on how to do it using the LERs database.

Thanks,

Karen

Karen Yourish
Deputy Graphics Director
The Washington Post
202-334-6396
"Burnell, Scott" <Scott.Burnell@nrc.gov>

03/18/11 12:54 PM

To Karen Yourish <YourishK@washpost.com>

cc

Subject RE: Washington Post question

Hello Karen;

I'm checking with some staff who I hope aren't totally engaged in our response. What's your overall deadline? Thanks.

Scott

From: Karen Yourish [mailto:YourishK@washpost.com]
Sent: Friday, March 18, 2011 12:35 PM
To: Burnell, Scott
Subject: Washington Post question

Is it possible to filter licensee event reports by those that were given an INES rating?

Karen Yourish
Deputy Graphics Director
The Washington Post
202-334-6396

From: [Burnell, Scott](#)
To: Moconley@yahoo.com
Cc: [Courret, Ivonne](#)
Subject: FW: Media - Questions PLATTS
Date: Friday, March 18, 2011 4:30:00 PM

Hi Maureen;

I think Dave talked to you – all set? Thanks.

Scott

From: Royer, Deanna
Sent: Friday, March 18, 2011 3:14 PM
To: Courret, Ivonne
Subject: Media - Questions

Maureen Conley

Platts

Moconley@yahoo.com

(b)(6)

Re: Info on a past document

Deanna Royer

SSSS/80

From: Couret, Ivonne
To: Burnell, Scott
Subject: FW: Media - question Seismic_IP
Date: Friday, March 18, 2011 5:02:50 PM

Thanks,

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

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<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

From: Royer, Deanna
Sent: Friday, March 18, 2011 4:56 PM
To: Couret, Ivonne
Subject: Media - question

Gregg Orrill
Barclays Capital
Gregg.orrill@barclayscapital.com

(b)(6)

Re: Document on reviewing seismic data at Indian Point

Deanna Royer

SSSS/81

From: [Burnell, Scott](#)
To: [Peter Behr](#)
Cc: [Courret, Ivonne](#)
Subject: RE: Monday NRC meeting
Date: Friday, March 18, 2011 5:23:00 PM

Hi Pete;

Please contact 301-415-8200 for the details. Thanks!

Scott

From: Peter Behr [mailto:pbehr@eenews.net]
Sent: Friday, March 18, 2011 5:18 PM
To: Burnell, Scott
Subject: Monday NRC meeting

Hello Scott – Are any special arrangements required for attending the Monday NRC meeting?

Thanks
Pete

Peter Behr
Reporter, *ClimateWire*
pbehr@eenews.net
202-446-0420 (p)

(b)(6)

 (c)
202-737-5299 (f)

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SSSS/82

From: Burnell, Scott
To: Brenner, Eliot; Couret, Ivonne
Subject: RE: URGENT - FW: request from Washington Post - Deadline
Date: Friday, March 18, 2011 5:46:00 PM
Importance: High

Point them at DOE, yes??

From: Autumn Brewington [mailto:BrewingtonA@washpost.com]
Sent: Friday, March 18, 2011 5:31 PM
To: Janbergs, Holly
Subject: Fw: request from Washington Post

Is it possible to find out whether anyone was working on this?

Autumn Brewington
Assistant Editorial Page Editor
BrewingtonA@washpost.com
202.334.5120

----- Forwarded by Autumn Brewington/news/TWP on 03/18/2011 05:30 PM -----

From: "Stephen Stromberg" <Stephen.Stromberg@washingtonpost.com>
To: "Brenner, Eliot" <Eliot.Brenner@nrc.gov>
Cc: "Autumn A Brewington" <BrewingtonA@washpost.com>
Date: 03/17/2011 02:32 PM
Subject: Another request

Hi Eliot,

Sorry we couldn't connect yesterday. I have another request for you, though, from our op-ed page editor (cced here). She's looking for a few short (roughly 200-word) pieces on the following question: Following events in Japan, will there still be enough political support for a "nuclear renaissance" in America? Would the chairman be interested in sending a brief comment in by tomorrow, around noon, on this?

Thanks.

Best,
Steve

Steve Stromberg
Deputy Opinions Editor
Editorial Writer
The Washington Post
Office: 202.334.6370
Cell: (b)(6)

SSSS/83

From: [Burnell, Scott](#)
To: [BrewingtonA@washpost.com](#); [Stephen.Stromberg@washingtonpost.com](#)
Cc: [Courret, Ivonne](#)
Bcc: [Brenner, Eliot](#); [Smith-Kevern, Rebecca](#)
Subject: RE: URGENT - FW: request from Washington Post - Deadline
Date: Friday, March 18, 2011 6:00:00 PM

Hello Autumn, Stephen;

That's not an area the NRC gets into, as we're the impartial regulator focused on safety. The "promotional" aspects of nuclear energy policy are handled by the Department of Energy. I'd say the DOE's Office of Nuclear Energy, if anyone, is the best place for you to start on that sort of discussion.

Thanks for checking with us, we do appreciate it.

Scott Burnell
Public Affairs Officer
Nuclear Regulatory Commission

From: Autumn Brewington [<mailto:BrewingtonA@washpost.com>]
Sent: Friday, March 18, 2011 5:31 PM
To: Janbergs, Holly
Subject: Fw: request from Washington Post

Is it possible to find out whether anyone was working on this?

Autumn Brewington
Assistant Editorial Page Editor
BrewingtonA@washpost.com
202.334.5120

----- Forwarded by Autumn Brewington/news/TWP on 03/18/2011 05:30 PM -----

From: "Stephen Stromberg" <Stephen.Stromberg@washingtonpost.com>
To: "Brenner, Eliot" <Eliot.Brenner@nrc.gov>
Cc: "Autumn A Brewington" <BrewingtonA@washpost.com>
Date: 03/17/2011 02:32 PM
Subject: Another request

Hi Eliot,

Sorry we couldn't connect yesterday. I have another request for you, though, from our op-ed page editor (cced here). She's looking for a few short (roughly 200-word) pieces on the following question: Following events in Japan, will there still be enough political support for a "nuclear renaissance" in America? Would the chairman be interested in sending a brief comment in by tomorrow, around noon, on this?

Thanks.

SSSS/84.

Best,
Steve

Steve Stromberg
Deputy Opinions Editor
Editorial Writer
The Washington Post
Office: 202.334.6370
Cell: (b)(6)

From: Burnell, Scott
To: Couret, Ivonne
Subject: RE: MEDIA - FW: # Spent Fuel Rods Nationwide
Date: Friday, March 18, 2011 6:02:00 PM

Info Digest's HLW stuff is the only real answer to provide.

From: Couret, Ivonne
Sent: Friday, March 18, 2011 6:02 PM
To: Burnell, Scott
Subject: MEDIA - FW: # Spent Fuel Rods Nationwide

Do we have this answer doesn't that vary by reactor and design? Let me know. Ivonne

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

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From: Janbergs, Holly **On Behalf Of** OPA Resource
Sent: Friday, March 18, 2011 5:45 PM
To: Couret, Ivonne
Subject: FW: # Spent Fuel Rods Nationwide

From: Strickler, Laura [mailto:StricklerL@cbsnews.com]
Sent: Friday, March 18, 2011 5:38 PM
To: OPA Resource
Cc: Strickler, Laura
Subject: # Spent Fuel Rods Nationwide

Hello –

Question from CBS News – is the **total number of spent fuel rods in the 104 nuclear facilities nationwide a PUBLIC figure?** If so, can we get the most current figure? Thank you very much.

Laura Strickler
CBS News
Cell (b)(6)
Office 202-457-1597

SSSS/85

From: Burnell, Scott
To: Couret, Ivonne
Subject: RE: Media - question CNN Seismic
Date: Friday, March 18, 2011 6:11:00 PM

Answered

From: Couret, Ivonne
Sent: Friday, March 18, 2011 6:03 PM
To: Burnell, Scott
Subject: FW: Media - question CNN Seismic

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

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<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

From: Royer, Deanna
Sent: Friday, March 18, 2011 5:41 PM
To: Couret, Ivonne
Subject: Media - question

Deborah Brunswick
CNN

(b)(6)

Re: When NRC renews Indian Point are we going to consider seismic activity

Deanna Royer

SSSS/86

From: [Burnell, Scott](#)
To: tom.doggett@thomsonreuters.com
Subject: RE: Press signup for NRC meeting on Monday
Date: Friday, March 18, 2011 7:11:00 PM

Lucky her! Or lucky you, depending on your perspective...

From: tom.doggett@thomsonreuters.com [mailto:tom.doggett@thomsonreuters.com]
Sent: Friday, March 18, 2011 6:51 PM
To: Burnell, Scott
Subject: RE: Press signup for NRC meeting on Monday

Hey Scott,

It's been decided that Reuters reporter Ayesha Rascoe is covering the meeting by herself. So, I'm not coming to the meeting. Cheers--Tom

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 18, 2011 6:50 PM
To: Doggett, Thomas W. (M Edit Ops); OPA Resource
Subject: RE: Press signup for NRC meeting on Monday

Hi Tom;

The OPA Resource folks will get you the details. I think at least one other Reuters reporter has asked – you all may have to draw straws or something.

Scott

From: tom.doggett@thomsonreuters.com [mailto:tom.doggett@thomsonreuters.com]
Sent: Friday, March 18, 2011 6:48 PM
To: OPA Resource
Cc: Burnell, Scott
Subject: Press signup for NRC meeting on Monday

Hi,

Could you please me on the press list for registering to cover Monday's NRC meeting at 9 at am.
Thanks—Tom Doggett, Reuters.

Tom Doggett
Energy Correspondent
Reuters News Agency
202-898-8320 (work)

(b)(6)

 (cell)

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This email was sent to you by Thomson Reuters, the global news and information company.

SSSS / 87

Any views expressed in this message are those of the individual sender, except where the sender specifically states them to be the views of Thomson Reuters.

From: Burnell, Scott
To: Brenner, Eliot
Subject: RE: WSJ
Date: Friday, March 18, 2011 7:31:00 PM

We actually do put out yearly reports on exposure data, I'll see if I can get it to her.

From: Brenner, Eliot
Sent: Friday, March 18, 2011 7:27 PM
To: Burnell, Scott
Subject: WSJ

Scott: I talked earlier with Rebecca Smith. She had some detailed question re BWR automatic scram rates and also was looking for some exposure data on the u.s. workforce for BWRs. The journal has some rather ugly operation data for TEPCO and wants to compare it. Not sure we can fill the request, but thought I would ask.

Eliot

Eliot Brenner
Director, Office of Public Affairs
Nuclear Regulatory Commission
Rockville, Md.
O: 301-415-8200
C: (b)(6)

5555/88

From: Burnell, Scott
To: Brenner, Eliot; Smith, Rebecca
Bcc: Lewis, Doris; Holahan, Vincent; Garry, Steven
Subject: RE: WSJ
Date: Friday, March 18, 2011 8:02:00 PM

Rebecca;

I think I can finally prove useful to you this week...

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0713/>

The report trails by a couple of years, but the last one was issued Jan. 10. Not sure when the next issue will make it on to the Web, I'll check with the staff.

Scott

From: Brenner, Eliot
Sent: Friday, March 18, 2011 7:27 PM
To: Burnell, Scott
Subject: WSJ

Scott: I talked earlier with Rebecca Smith. She had some detailed question re BWR automatic scram rates and also was looking for some exposure data on the u.s. workforce for BWRs. The journal has some rather ugly operation data for TEPCO and wants to compare it. Not sure we can fill the request, but thought I would ask.

Eliot

Eliot Brenner
Director, Office of Public Affairs
Nuclear Regulatory Commission
Rockville, Md.
O: 301-415-8200
C: (b)(6)

From: Burnell, Scott
To: Lewis, Doris; Holahan, Vincent; Garry, Steven
Subject: FW: WSJ
Date: Friday, March 18, 2011 8:03:00 PM

Folks;

If we have an idea of when the next edition of the NUREG will be out, that'll be helpful.
Thanks very much.

Scott

From: Brenner, Eliot
Sent: Friday, March 18, 2011 7:27 PM
To: Burnell, Scott
Subject: WSJ

Scott: I talked earlier with Rebecca Smith. She had some detailed question re BWR automatic scram rates and also was looking for some exposure data on the u.s. workforce for BWRs. The journal has some rather ugly operation data for TEPCO and wants to compare it. Not sure we can fill the request, but thought I would ask.

Eliot

Eliot Brenner
Director, Office of Public Affairs
Nuclear Regulatory Commission
Rockville, Md.
O: 301-415-8200
C: (b)(6)

From: Burnell, Scott
To: Hayden, Elizabeth
Subject: RE: Are you at the Ops Center?
Date: Friday, March 18, 2011 8:24:00 PM

No calls, just wrapping up e-mail stuff. See you tomorrow, hopefully no sooner.

From: Hayden, Elizabeth
Sent: Friday, March 18, 2011 8:24 PM
To: Burnell, Scott
Subject: RE: Are you at the Ops Center?

Please give them my cell phone number (b)(6) I'm about to bug out of here and will be in the Ops Center at 12 noon tomorrow.

Have you gotten any calls in the last hour?

Beth

From: Burnell, Scott
Sent: Friday, March 18, 2011 8:21 PM
To: Hayden, Elizabeth; Brenner, Eliot
Subject: RE: Are you at the Ops Center?

Beth, Eliot;

I plan to be here until about 9, is that OK?

Last night the procedure was to give the HOOs phone numbers to cover the overnight period. As I understand it, Diane's coming in at 8? I plan to give the HOOs my BB # and Beth's home #, is that OK?

Scott

From: Hayden, Elizabeth
Sent: Friday, March 18, 2011 8:17 PM
To: Burnell, Scott
Subject: Are you at the Ops Center?

We've put the voicemail on and I heard about 3 to 4 calls. There's a Mr. Miklja (from Portland, WA) who keeps calling and e-mailing about a solution to the Japan situation. You may hear from him.

Beth Hayden
Senior Advisor
Office of Public Affairs
U.S. Nuclear Regulatory Commission
--- Protecting People and the Environment
301-415-8202
elizabeth.hayden@nrc.gov

SSSS/89

From: [Burnell, Scott](#)
To: [Kammerer, Annie](#)
Subject: Re: Journalist request from Nature
Date: Friday, March 18, 2011 9:59:24 PM

Thanks, Annie. :-)

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Kammerer, Annie
To: Burnell, Scott; Chokshi, Niles; Jones, Henry
Cc: Flanders, Scott; Raione, Richard; Flanders, Scott
Sent: Fri Mar 18 21:57:37 2011
Subject: RE: Journalist request from Nature

This makes me nervous. He specifically says "I am interested in speaking with scientists -- tsunami experts, seismological experts, hydrology experts, engineers - who have themselves looked closely at this issue, to see what research questions they have been asking and what research in this area remains to be done." That is not Rajiv. He doesn't know anything about the research being done now. As soon as I started the tsunami program and could take over the development tasks, he was happy to give it up because it is not his area of expertise.

Either Henry or I are much better choices; preferably Henry as he is really fantastic and I am really overloaded and he is my point of contact in NRO. Of course, Rajiv will probably just say that they should call the NRC.

They can also call

Eric Geist at the USGS Menlo park: egeist@usgs.gov

Uri ten Brink at the USGS Woods Hole: utenbrink@usgs.gov

Vasily Titov or Chris Moore at PMEL NOAA: Vasily.Titov@noaa.gov,

Christopher.Moore@noaa.gov

I don't believe that EPRI has a tsunami expert. The closest they have is Bob Kassawara, who does seismic work. RKASSAWA@epri.com

Not sure about NSF and NIST. I can ask the NEHRP team at NIST to see who NIST has if they really want a contact.

Annie

From: Burnell, Scott
Sent: Friday, March 18, 2011 5:46 PM
To: Chokshi, Niles; Jones, Henry
Cc: Flanders, Scott; Raione, Richard; Kammerer, Annie; Flanders, Scott
Subject: RE: Journalist request from Nature

Please reach out Rajiv so I can let the reporter know it's OK to talk to him. Thanks.

From: Chokshi, Niles

5555/90

Sent: Friday, March 18, 2011 5:42 PM
To: Burnell, Scott; Jones, Henry
Cc: Flanders, Scott; Raione, Richard; Kammerer, Annie; Flanders, Scott
Subject: RE: Journalist request from Nature

Scott,

My misunderstanding – I thought the request had come to us, Since the request was directed to the PNL, unless Richard has some good reason, we should not be stopping PNL. Of course, we will have to talk to Rajiv to make sure that he does speak for or implicate NRC.

Nilesh

From: Burnell, Scott
Sent: Friday, March 18, 2011 5:34 PM
To: Chokshi, Nilesh; Jones, Henry
Cc: Flanders, Scott; Raione, Richard; Kammerer, Annie
Subject: RE: Journalist request from Nature

Folks;

I'm sure Henry has something to say about it. Do any of you have any problems with PNNL talking to the reporter? Thanks.

Scott

From: Chokshi, Nilesh
Sent: Friday, March 18, 2011 5:10 PM
To: Burnell, Scott
Cc: Flanders, Scott; Raione, Richard; Kammerer, Annie
Subject: FW: Journalist request from Nature
Importance: High

Scott,

We would like to suggest Dr. Henry Jones of NRO. He is the staff expert on tsunamis.

Nilesh

From: Munson, Clifford
Sent: Friday, March 18, 2011 2:47 PM
To: Chokshi, Nilesh; Raione, Richard
Subject: FW: Journalist request from Nature
Importance: High

Comments?

From: Burnell, Scott
Sent: Friday, March 18, 2011 2:42 PM
To: Munson, Clifford; Kammerer, Annie
Subject: FW: Journalist request from Nature
Importance: High

Folks;

Any objection to having Rajiv speak about the tsunami report? Any NIST/USGS/EPRI/NSF folks you can think to recommend? Thanks!

Scott

From: Nicola Jones [mailto:(b)(6)]
Sent: Friday, March 18, 2011 1:15 PM
To: Burnell, Scott
Subject: Journalist request from Nature

Dear Scott,

Many thanks for looking at this query while in your sleep deprived state!

I am investigating the topic of tsunami risks to nuclear facilities (current or future) in the United States for a possible story in the science journal Nature. We are poking around at the moment to see if there's something of value we could add to this conversation. I am interested in speaking with scientists -- tsunami experts, seismological experts, hydrology experts, engineers - who have themselves looked closely at this issue, to see what research questions they have been asking and what research in this area remains to be done. Perhaps, for example, Nature might be able to highlight research projects that the community thinks is important to get a better handle on the risks of tsunamis to nuclear facilities.

I found this document: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6966/> and feel that its author, Rajiv Prasad, might be an interesting person to speak to about this.

PNL is happy for me to speak with Rajiv if you are happy; they say all media requests must route through you first.

My deadline is end-of-day PST Monday.

Many thanks for your help in this matter.
Nicola.

--

Ms. Nicola Jones

(b)(6)
Science Journalist in Residence, UBC School of Journalism
Freelance Commissioning Editor, Opinion section, Nature (Tues / Wed / Thurs, 8am-5pm PST)
Freelance Reporter, Vancouver (Mon-Fri, 8am-5pm PST)
home office (b)(6)
cell (b)(6)

Follow Nature at www.nature.com, and <http://twitter.com/naturenews>

From: Burnell, Scott
To: Brenner, Eliot; Hayden, Elizabeth
Subject: Re: What FEIS???
Date: Friday, March 18, 2011 9:19:27 AM

OK, I'll whip up the boilerplate when I get in. Still very dubious.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Brenner, Eliot
To: Burnell, Scott; Hayden, Elizabeth
Sent: Fri Mar 18 09:17:24 2011
Subject: RE: What FEIS???

Never under estimate the tendency of a ship to be unable to turn sharply. However, the agency does need to continue its business.

From: Burnell, Scott
Sent: Friday, March 18, 2011 9:16 AM
To: Brenner, Eliot; Hayden, Elizabeth
Subject: Fw: What FEIS???
Importance: High

Hatchett's in NRO, and I believe his voicemail said they're sending the FEIS to EPA today -- I'm inclined to very strongly suggest NRO hold off on that until the op plant review's well underway. Your guidance, please.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Hatchett, Gregory
To: Burnell, Scott
Sent: Fri Mar 18 07:50:51 2011
Subject: Re: What FEIS???

Vogtle plant

From: Burnell, Scott
To: Hatchett, Gregory
Sent: Thu Mar 17 21:19:15 2011
Subject: What FEIS???

Greg;

Which plant? I'm really wrapped up in Ops Ctr activity and general response to the media crush (you have no idea), so I'm at a loss to remember what review's at what point. I'll try and get something done tomorrow before I start my Ops Ctr shift, just need the plant.

SSSS/91

Scott

From: Burnell, Scott
To: Screnci, Diane
Subject: Re: easy question of the day
Date: Friday, March 18, 2011 9:35:56 AM

Flashing back to "Blazing Saddles" -- "I hope you brought enough for EVERYONE???" :-). (Can you tell my coffee hasn't kicked in yet?)

Of course, self-supply is the most reliable.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Screnci, Diane
To: McIntyre, David; Burnell, Scott
Sent: Fri Mar 18 08:49:34 2011
Subject: easy question of the day

Do I need to bring lunch with me on Sunday?

DIANE SCRENCI
SR. PUBLIC AFFAIRS OFFICER
USNRC, RI
610/337-5330

SSSS/92

From: Uselding, Lara
To: Burnell, Scott
Subject: RE: NRC comment on msnbc.com article
Date: Friday, March 18, 2011 9:40:51 AM

Hang in there! You are doing great

Lara Uselding
U.S. Nuclear Regulatory Commission (NRC)
Public Affairs - Region IV

Lara.Uselding@nrc.gov

BlackBerry: (b)(6)

Office: 817-276-6519

For more information visit www.nrc.gov

From: Burnell, Scott
Sent: Friday, March 18, 2011 3:44 AM
To: Sheehan, Neil; Brenner, Eliot; Hayden, Elizabeth; Harrington, Holly; Screnci, Diane; Hannah, Roger; Ledford, Joey; Chandrathil, Prema; Mitlyng, Viktoria; Uselding, Lara; Dricks, Victor; Couret, Ivonne
Subject: Fw: NRC comment on msnbc.com article

All;

Please ignore any further comments along these lines from him. I see absolutely no benefit in engaging him any further - he reminds me of Witherspoon. He's proven he's not interested in a reasonable discussion of the situation and will only accept his version of events. I'm glad I briefly woke up in time to see this. Thanks.

Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Bill Dedman <Bill.Dedman@msnbc.com>
To: OPA1 RESOURCE
Cc: Burnell, Scott; OPA Resource; OPA2 Resource; Resource, OPA3; OPA4 Resource
Sent: Fri Mar 18 01:29:31 2011
Subject: NRC comment on msnbc.com article

Neil,

I see you're quoted on Patch.com:

Quoting:

The MSNBC [msnbc.com] story has to do with a seismic risk ranking it created. It is not the result of an NRC review. The NRC does not rank plants by seismic risk.

SSSS/93

The objective of the NRC study was to perform a conservative, screening-level assessment of earthquake risk. The NRC results to date should not be interpreted as definitive estimates of seismic risk. The nature of the information used to make these estimates are useful only as a screening tool.

Currently operating nuclear power plants in the U.S. remain safe, with no need for immediate action. This determination is based on NRC staff reviews of updated seismic hazard information and the conclusions of the screening panel. Existing plans ([sic] were designed with considerable margin to be able to withstand the ground motions from the largest earthquake expected in the area around the plant.

Neil Sheehan, NRC Public Affairs

End quote

I posted this information on the Patch.com article:

Our story made clear that the NRC does not rank the nuclear plants. But it does publish its estimates for each plant, by which we ranked the plants.

If the newspaper starts publishing the American League East standings in alphabetical order, it's entirely appropriate for the reader to put the teams in order by winning percentage.

Don't be misled. NRC hasn't said our numbers are wrong. I checked my interpretation with Scott Burnell in Public Affairs, who checked with the NRC technical staff before publication. No challenge from NRC has arrived after publication.

After all, they're NRC's numbers.

What NRC is saying is that it doesn't do rankings. That's right. We did, from NRC's data. Just as the story says.

You can see for yourself in the NRC report that:

- NRC says the risk of quakes in the central and eastern states is higher than previously thought.

- It still thinks plants are safe.

- but their margin of safety is reduced.

- and some plants are now near the point where they should be re-examined, and perhaps retrofitted.

- and the staff says this should now move from being a research issue to a regulatory issue.

- and it has made its best estimates of the frequency (chance, odds) of an earthquake that would cause core damage to a plant.

A link to the NRC report is on our report:

http://www.msnbc.msn.com/id/42103936/ns/world_news-asiapacific/.

Regards,

Bill

P.S. We're not MSNBC. That's a TV company, in New York. We're msnbc.com, a Web company, in Redmond, Wash. The companies have always been separate. Half-sisters, we are. Don't worry about getting this wrong -- hardly anybody understands it!

Bill Dedman

 **msnbc.com**

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msnbc.com, the news site, a joint venture of NBC and Microsoft

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From: [Burnell, Scott](#)
To: [McIntyre, David](#); [Brenner, Eliot](#); "[sck@nei.org](#)"; "[jps@nei.org](#)"
Subject: Fw: Earthquake statement
Date: Friday, March 18, 2011 9:42:54 AM

Gentlemen;

Jim's the PR guy for NY Power Auth (if memory serves) -- I spoke to him Wed. and he's been clamoring for an official response to the MSNBC crap. What is he looking at? Thx
Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: james_denn@dps.state.ny.us <james_denn@dps.state.ny.us>
To: james_denn@dps.state.ny.us <james_denn@dps.state.ny.us>
Cc: Burnell, Scott
Sent: Fri Mar 18 09:36:22 2011
Subject: Re: Earthquake statement

Scott: We saw this notice from NEI, but I can't find anything on your website. Has NRC issued a statement regarding MSNBC?



NRC response to MSNBC Seismic Article:

The objective of the GI-199 Safety/Risk Assessment was to perform a conservative, screening-level assessment to evaluate if further investigations of seismic safety for operating reactors in the central and eastern U.S. (CEUS) are warranted consistent with NRC directives. The results of the GI-199 SRA should not be interpreted as definitive estimates of plant-specific seismic risk. The nature of the information used (both seismic hazard data and plant-level fragility information) make these estimates useful only as a screening tool. The NRC does not rank plants by seismic risk.

Operating nuclear plants in the United States remain safe, with no need for immediate action. This determination is based on NRC staff reviews of updated seismic hazard information and the conclusions of the Generic Issue 199 Screening Panel. Existing plants were designed with considerable margin to be able to withstand the ground motions from the "deterministic" or "scenario earthquake" that accounted for the largest earthquake expected in the area around the plant.

SSSS/94

During the mid-to late-1990s, the NRC staff reassessed the margin beyond the design basis as part of the Individual Plant Examination of External Events (IPEEE) program. The results of the GI-199 assessment demonstrate that the probability of exceeding the design basis ground motion may have increased at some sites, but only by a relatively small amount. In addition, the Safety/Risk Assessment stage results indicate that the probabilities of seismic core damage are lower than the guidelines for taking immediate action.

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**James
Denn/Exec/NYSDPS**

03/17/2011 10:57 AM

To scott.burnell@nrc.gov
cc
Subject Earthquake statement

Scott: let me know if NRC issues corrections to the MSNBC story. Thanks. Jim Denn, NY PSC

From: Gilbert, Daniel
To: Burnell, Scott
Subject: Wall Street Journal, re: evacuation plans
Date: Friday, March 18, 2011 9:49:43 AM

Scott:

I'm trying to locate evacuation plans by U.S. nuclear plants. Does each plant operator file such a plan with NRC? If so, can I find that on your website and what should I search for? If not, where do such plans reside? Regards,

Daniel Gilbert

Daniel Gilbert
The Wall Street Journal
Desk: (713) 547-9229
Mobile: (b)(6)
daniel.gilbert@wsj.com

SSSS/95

From: Bonaccorso, Amy
To: Harrington, Holly; Burnell, Scott; McIntyre, David
Cc: Deavers, Ron
Subject: RE: K1 Pills
Date: Friday, March 18, 2011 10:00:02 AM

Okay – I will continue to use that.

From: Harrington, Holly
Sent: Friday, March 18, 2011 9:53 AM
To: Burnell, Scott; Bonaccorso, Amy; McIntyre, David
Cc: Deavers, Ron
Subject: RE: K1 Pills

Yes, that is the language. Coupled with we do not expect unsafe levels etc etc

From: Burnell, Scott
Sent: Friday, March 18, 2011 9:33 AM
To: Bonaccorso, Amy; McIntyre, David; Harrington, Holly
Cc: Deavers, Ron
Subject: Re: K1 Pills

Amy;

Please double-check w/Dave and Holly, since my coffee hasn't kicked in, but here goes -- isn't there some QA language to the effect of "listen to your state and local authorities, they'll be the best source of information on actions appropriate to your area" we can use?

Scott

Sent from an NRC Blackberry

Scott Burnell

(b)(6)

From: Bonaccorso, Amy
To: Burnell, Scott; McIntyre, David; Harrington, Holly
Cc: Deavers, Ron
Sent: Fri Mar 18 09:01:57 2011
Subject: K1 Pills

What are we telling people who want to know where to get K1? If I say there is no danger, it's still a potentially weak answer because FEMA always tells people to "be prepared."

SSSS/96

From: Burnell, Scott
To: "james_denn@dps.state.ny.us"
Subject: Re: Earthquake statement
Date: Friday, March 18, 2011 10:13:34 AM

Care to offer the moon? :-O

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: james_denn@dps.state.ny.us <james_denn@dps.state.ny.us>
To: Burnell, Scott
Sent: Fri Mar 18 10:05:40 2011
Subject: Re: Earthquake statement

You wouldn't trade it for the world...

"Burnell, Scott"
<Scott.Burnell@nrc.gov>

To "james_denn@dps.state.ny.us" <james_denn@dps.state.ny.us>
cc

03/18/2011 09:59 AM

Subject Re: Earthquake statement

I've got the electronic equivalent now, a hundred-fold over. Love my job, right?

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: james_denn@dps.state.ny.us <james_denn@dps.state.ny.us>
To: Burnell, Scott
Sent: Fri Mar 18 09:58:51 2011
Subject: Re: Earthquake statement

Once or twice...my favorite was when I got to my office and there were more than a dozen TV cameras and print reporters waiting; why they were there I had not a clue until they started shouting out questions.

"Burnell, Scott" <Scott.Burnell@nrc.gov>

To "james_denn@dps.state.ny.us" <james_denn@dps.state.ny.us>

SSSS/97

03/18/2011 09:55 AM

cc
Subject Re: Earthquake statement

The hotel one-cup mud maker just ain't cutting it today. I'm sure you've been there.

Sent from an NRC Blackberry

Scott Burnell

(b)(6)

From: james_denn@dps.state.ny.us <james_denn@dps.state.ny.us>
To: Burnell, Scott
Sent: Fri Mar 18 09:49:43 2011
Subject: Re: Earthquake statement

Cold ice water on the face sometimes helps if Starbucks is not around...

"Burnell, Scott" <Scott.Burnell@nrc.gov>

03/18/2011 09:45 AM

To "james_denn@dps.state.ny.us" <james_denn@dps.state.ny.us>
cc
Subject Re: Earthquake statement

I'm checking as best I can via BB + running @ about 35 percent power -- where's that damn coffee??

Sent from an NRC Blackberry

Scott Burnell

(b)(6)

From: james_denn@dps.state.ny.us <james_denn@dps.state.ny.us>
To: Burnell, Scott
Sent: Fri Mar 18 09:42:31 2011
Subject: Re: Earthquake statement

Scott: That's the weird thing. It seems that they are "reprinting" what NRC's response is (or should be).

"Burnell, Scott" <Scott.Burnell@nrc.gov>

03/18/2011 09:40 AM

To "james_denn@dps.state.ny.us" <james_denn@dps.state.ny.us>
cc
Subject Re: Earthquake statement

Hi Jim;

Just waking up after pulling a late-night shift, and coffee's not yet kicked in, so bear with me. Are you saying NEI's issued their own statement, or are they "reprinting" what they feel is the NRC's response?
Thx

Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: james_denn@dps.state.ny.us <james_denn@dps.state.ny.us>
To: james_denn@dps.state.ny.us <james_denn@dps.state.ny.us>
Cc: Burnell, Scott
Sent: Fri Mar 18 09:36:22 2011
Subject: Re: Earthquake statement

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James Denn/Exec/NYSDPS

03/17/2011 10:57 AM

To scott.burnell@nrc.gov

cc

Subject Earthquake statement

Scott: let me know if NRC issues corrections to the MSNBC story. Thanks. Jim Denn, NY PSC

From: Burnell, Scott
To: Harrington, Holly; Uselding, Lara; McIntyre, David
Cc: Brenner, Eliot; Couret, Ivonne
Subject: RE: washpost query on nrc v. japanese gov't data
Date: Friday, March 18, 2011 1:02:00 PM

Already responding on the phone.

From: Harrington, Holly
Sent: Friday, March 18, 2011 1:00 PM
To: Uselding, Lara; Burnell, Scott; McIntyre, David
Cc: Brenner, Eliot; Couret, Ivonne
Subject: RE: washpost query on nrc v. japanese gov't data

Ivonne, please log.

Eliot – who (b) you want to respond to this?

From: Uselding, Lara
Sent: Friday, March 18, 2011 12:54 PM
To: Burnell, Scott; McIntyre, David; Harrington, Holly
Cc: Brenner, Eliot
Subject: HQ- can u respond to her plz? Fw: washpost query on nrc v. japanese gov't data

Lara Uselding
NRC Region 4 Public Affairs
(b)(6)

From: Annys Shin <ShinA@washpost.com>
To: Uselding, Lara; Geoffrey.Miller@nrc.go <Geoffrey.Miller@nrc.go>
Sent: Fri Mar 18 12:41:00 2011
Subject: washpost query on nrc v. japanese gov't data

Hi Lara and Geoffrey
i'm working on a story for tomorrow's paper looking at difference discrepancies between what the
japanese gov't has been saying about the situation at the FD plant and other sources, including NRC

i am included a ref to the testimony by the chairman the other day about there being no water in the
fuel pool at unit 4.

was wondering how i explain where NRC gets its info from?

any help is appreciated. thanks.

Annys Shin
Staff Writer
Washington Post
1150 15th St. NW
Washington, DC 20071
o. (202) 334-5465

5555/98

From: Burnell, Scott
To: "slomax@bloomberg.net"
Subject: Re: Bloomberg question re radiation information
Date: Friday, March 18, 2011 1:55:25 PM

I will refrain from any "Pinball Wizard" references.

:-)

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

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

From: SIMON LOMAX, BLOOMBERG/ NEWSROOM: <slomax@bloomberg.net>
To: Brenner, Eliot
Cc: Couret, Ivonne; Burnell, Scott
Sent: Fri Mar 18 13:53:57 2011
Subject: RE: Bloomberg question re radiation information

Thanks Eliot. Please understand we're in a full-court press trying to pin down what U.S. agencies know and we're being redirected by just about everybody.

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

From: Eliot Brenner <Eliot.Brenner@nrc.gov>
To: SIMON LOMAX (BLOOMBERG/ NEWSROOM:)
Cc: Ivonne.Couret@nrc.gov, Scott.Burnell@nrc.gov
At: 3/18 13:49:02

We are in contact with the FAA offering them information that might affect flight routes. You would have to check with FAA public affairs 202-267-3883. I do not have immediate details on the rest of your questions. We are not the sole repository for all information, though folks think we are.

eliot

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

From: SIMON LOMAX, BLOOMBERG/ NEWSROOM: [<mailto:slomax@bloomberg.net>]
Sent: Friday, March 18, 2011 12:55 PM
To: Brenner, Eliot
Cc: Burnell, Scott; Couret, Ivonne
Subject: Bloomberg question re radiation information

Hi Eliot (cc Scott & Ivonne):

Hope you're hanging in there.

We're trying to nail down the specific information that U.S. Agencies have collected on radiation from the Fukushima plant. Does the NRC have this information:

- the latest radiation measurements from the affected area in Japan;
- radiation levels in the atmosphere over the Pacific Ocean; and
- an assessment of whether it's safe for passenger aircraft to be flying through airspace with radiation that's coming from the Fukushima reactors.

If you've got this information, can you please provide ASAP? If not, can you tell us which agency of the

SSSS/99

U.S. government is making that information available? My deadline is ASAP.

Thank you again for your help,

Simon Lomax
Bloomberg News
202-654-4305 (w)

(b)(6)

slomax@bloomberg.net

From: McIntyre, David
To: Burnell, Scott; Brenner, Eliot; Harrington, Holly
Subject: RE: MSNBC blog post -- ok to go
Date: Friday, March 18, 2011 1:59:32 PM

Tweak away. This was the sentence in Annie's talking points that I inartfully based that on:

The results of the GI-199 assessment demonstrate that the probability of exceeding the design basis ground motion may have increased at some sites, but only by a relatively small amount.

From: Burnell, Scott
Sent: Friday, March 18, 2011 1:57 PM
To: Brenner, Eliot; Harrington, Holly
Cc: McIntyre, David
Subject: Re: MSNBC blog post -- ok to go

Let me tweak that when I get back to my desk.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Brenner, Eliot
To: Harrington, Holly
Cc: McIntyre, David; Burnell, Scott
Sent: Fri Mar 18 13:55:30 2011
Subject: MSNBC blog post -- ok to go

Check the last sentence in the next to last paragraph with Scott. Otherwise ready to go

Many news reports during this chaotic week have questioned the safety of U.S. nuclear power plants in the wake of the terrible events in Japan. These reports raise questions about the design of reactor containments and spent fuel pools, and of course whether our plants would be able to withstand an earthquake and tsunami like the ones that devastated Japan.

Nuclear power is a complicated, technical subject, and we naturally try to simplify it to make it understandable to the general public. Sometimes, however, simplification leads to misunderstanding, and misunderstanding causes fear.

One example was a so-called "investigative report" on MSNBC.com that ranked nuclear power plants according to their "vulnerability" to major earthquakes. The reporter concluded that the Indian Point plant, 24 miles north of New York City, was "the most vulnerable" in the nation. Instant headlines. You may have heard a local news report that your neighborhood nuclear plant

SSSS/100

ranked "on the NRC's Top Ten List" of the plants most likely to tumble in a temblor.

Let's be clear: The NRC does not rank nuclear power plants according to their vulnerability to earthquakes. This "ranking" was developed by the MSNBC.com reporter using partial information and we believe an even more partial understanding of how we evaluate plants for seismic risk. Each plant is evaluated individually according to the geology of its site, not by a "one-size-fits-all" model – therefore such rankings or comparisons are highly misleading.

We are also frequently asked whether Plant A can withstand a quake of magnitude X. The reporters always want a yes-or-no answer, but again, it's not that simple. Nuclear plants are designed to withstand a certain level of "ground shaking," to use a technical term. But the way the ground shakes in an earthquake is a factor of the magnitude and the distance from the epicenter, among other things. So we can't give a simple answer to such a simple question.

Each plant is built to the circumstances that exist at its location – including earthquakes, floods and tsunamis. For example, at nuclear plants along the Atlantic and Gulf Coasts, the greatest water threat is hurricane storm surge, not a tsunami. Moreover, there is only one fault, near the northwest U.S. coast, that is similar to the fault in Japan, and there are no nuclear plants nearby. The closest coastal plant to that fault is well-protected against tsunami.

Over the last few years, the NRC has reassessed nuclear plants in the central and eastern United States for their vulnerability to earthquakes, using new seismic data developed by geologists. This study has shown that quakes may slightly exceed those the plants were designed to withstand, but not by much and not to the point there is any immediate concern on the part of nuclear regulators.

This is a complex issue that does not always lend itself to simple yes and no answers. Bottom line: the NRC does not rank plants on seismic risk. Plants in this country continue to operate safely and securely.

From: [McIntyre, David](#)
To: [Brenner, Eliot](#); [Harrington, Holly](#)
Cc: [Burnell, Scott](#)
Subject: RE: MSNBC blog post -- ok to go
Date: Friday, March 18, 2011 1:56:37 PM

Which "nuclear regulators" are you referring to?

From: Brenner, Eliot
Sent: Friday, March 18, 2011 1:56 PM
To: Harrington, Holly
Cc: McIntyre, David; Burnell, Scott
Subject: MSNBC blog post -- ok to go

Check the last sentence in the next to last paragraph with Scott. Otherwise ready to go

Many news reports during this chaotic week have questioned the safety of U.S. nuclear power plants in the wake of the terrible events in Japan. These reports raise questions about the design of reactor containments and spent fuel pools, and of course whether our plants would be able to withstand an earthquake and tsunami like the ones that devastated Japan.

Nuclear power is a complicated, technical subject, and we naturally try to simplify it to make it understandable to the general public. Sometimes, however, simplification leads to misunderstanding, and misunderstanding causes fear.

One example was a so-called "investigative report" on MSNBC.com that ranked nuclear power plants according to their "vulnerability" to major earthquakes. The reporter concluded that the Indian Point plant, 24 miles north of New York City, was "the most vulnerable" in the nation. Instant headlines. You may have heard a local news report that your neighborhood nuclear plant ranked "on the NRC's Top Ten List" of the plants most likely to tumble in a temblor.

Let's be clear: The NRC does not rank nuclear power plants according to their vulnerability to earthquakes. This "ranking" was developed by the MSNBC.com reporter using partial information and we believe an even more partial understanding of how we evaluate plants for seismic risk. Each plant is evaluated individually according to the geology of its site, not by a "one-size-fits-all" model – therefore such rankings or comparisons are highly misleading.

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Each plant is built to the circumstances that exist at its location – including earthquakes, floods and

tsunamis. For example, at nuclear plants along the Atlantic and Gulf Coasts, the greatest water threat is hurricane storm surge, not a tsunami. Moreover, there is only one fault, near the northwest U.S. coast, that is similar to the fault in Japan, and there are no nuclear plants nearby. The closest coastal plant to that fault is well-protected against tsunami.

Over the last few years, the NRC has reassessed nuclear plants in the central and eastern United States for their vulnerability to earthquakes, using new seismic data developed by geologists. This study has shown that quakes may slightly exceed those the plants were designed to withstand, but not by much and not to the point there is any immediate concern on the part of nuclear regulators.

This is a complex issue that does not always lend itself to simple yes and no answers. Bottom line: the NRC does not rank plants on seismic risk. Plants in this country continue to operate safely and securely.

From: Burnell, Scott
To: Munson, Clifford; Kammerer, Annie
Subject: FW: Journalist request from Nature
Date: Friday, March 18, 2011 2:41:00 PM
Importance: High

Folks;

Any objection to having Rajiv speak about the tsunami report? Any NIST/USGS/EPRI/NSF folks you can think to recommend? Thanks!

Scott

From: Nicola Jones [mailto:(b)(6)]
Sent: Friday, March 18, 2011 1:15 PM
To: Burnell, Scott
Subject: Journalist request from Nature

Dear Scott,

Many thanks for looking at this query while in your sleep deprived state!
I am investigating the topic of tsunami risks to nuclear facilities (current or future) in the United States for a possible story in the science journal Nature. We are poking around at the moment to see if there's something of value we could add to this conversation. I am interested in speaking with scientists -- tsunami experts, seismological experts, hydrology experts, engineers - who have themselves looked closely at this issue, to see what research questions they have been asking and what research in this area remains to be done. Perhaps, for example, Nature might be able to highlight research projects that the community thinks is important to get a better handle on the risks of tsunamis to nuclear facilities.

I found this document: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6966/> and feel that its author, Rajiv Prasad, might be an interesting person to speak to about this.

PNL is happy for me to speak with Rajiv if you are happy; they say all media requests must route through you first.

My deadline is end-of-day PST Monday.

Many thanks for your help in this matter.
Nicola.

--

Ms. Nicola Jones

(b)(6)

Science Journalist in Residence, UBC School of Journalism
Freelance Commissioning Editor, Opinion section, Nature (Tues / Wed / Thurs, 8am-5pm PST)
Freelance Reporter, Vancouver (Mon-Fri, 8am-5pm PST)

SSSS/101

home office +1 (604) 894 5590

cell (b)(6)

Follow Nature at www.nature.com, and <http://twitter.com/naturenews>

From: [Burnell, Scott](#)
To: Jeanine.Prezioso@thomsonreuters.com
Subject: RE: Looking for comment...
Date: Friday, March 18, 2011 2:59:00 PM

Hi Jeanine;

I hate to say it's self-serve on the e-mail -- we have instructions on signing up for our press release listserv at the bottom of every release. Thanks.

Scott

From: Jeanine.Prezioso@thomsonreuters.com [mailto:Jeanine.Prezioso@thomsonreuters.com]
Sent: Friday, March 18, 2011 2:58 PM
To: Burnell, Scott
Subject: RE: Looking for comment...

Hi Scott,

I guess it sort of does but I guess you won't have any answers until after this commission meeting then.

Would you please add me to your press list so I receive all these media releases?

Thanks,
Jeanine

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 18, 2011 2:54 PM
To: Prezioso, Jeanine (M Edit Ops)
Subject: RE: Looking for comment...

Hi Jeanine;

You may have seen that the Commission is holding a meeting Monday morning to examine the staff's ongoing response to events in Japan, and many of your questions could be answered then. I would expect we'll have a media advisory out on that soon.
Thanks.

Scott

From: Jeanine.Prezioso@thomsonreuters.com [mailto:Jeanine.Prezioso@thomsonreuters.com]
Sent: Friday, March 18, 2011 2:50 PM
To: Burnell, Scott
Subject: Looking for comment...
Importance: High

Dear Mr. Burnell,

SSSS/102

I know you've been in touch with others at Reuters but I had a specific question I'd like answered and wanted to touch base.

I am working on a story about whether the NRC will tighten regulations on U.S. nuclear plants anytime soon (and thus lean on natural gas to replace lost power generation).

I know the president has requested a comprehensive review of U.S. nuclear facilities. What I'd like to know is whether or not the NRC will take action to prolong maintenance closures?

I need a response on this before 5 p.m. today.

Thanks and best regards,
Jeanine

Jeanine Prezioso

Editor, North American Power & Gas Forum
Reuters News
Thomson Reuters

3 Times Square
19th Floor
New York, NY 10036

Phone: 646-223-6241

Mobile: (b)(6)

jeanine.prezioso@thomsonreuters.com

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From: Brenner, Eliot
To: laura.j.brown@faa.gov
Cc: Burnell, Scott
Subject: RE: Bloomberg
Date: Friday, March 18, 2011 3:21:57 PM

Ok. Will do. Will make an effort to figure out who is driving that bus.

Scott: please call simon and tell him neither you nor I know what the hell we are talking about and he should try elsewhere, maybe at the Japanese government.

(laura...we did have NRC-FAA consultation overnight a couple nights ago with your folks calling our folks asking for radiation information to help them chose routes. I had the fortune/misfortune of standing there while the conversation went on)

From: laura.j.brown@faa.gov [mailto:laura.j.brown@faa.gov]
Sent: Friday, March 18, 2011 3:18 PM
To: Brenner, Eliot
Subject: Bloomberg

Eliot,
Someone on your PA staff -- I hope it's not you! -- is telling Simon Lomax of Bloomberg that the FAA is responsible for making the call on whether it's safe to fly through radioactive plumes.

WE ARE NOT DOING THIS!!!

Can you please tell your staff to tell Simon we are not the ones who make this call? I don't know whether it's the EPA or some other agency,

Laura J. Brown
Deputy Assistant Administrator
for Public Affairs
202-267-3455 W

(b)(6) C

----- Forwarded by Laura J Brown/AWA/FAA on 03/18/2011 03:09 PM -----

From: "JOHN HUGHES, BLOOMBERG/ NEWSROOM:" <jhughes5@bloomberg.net>
To: Laura J Brown/AWA/FAA@FAA
Date: 03/18/2011 02:47 PM
Subject: Fwd:Re:Fwd:Fw: FYI -- Nuclear Regulatory Commission says

--- Original Sender: SIMON LOMAX, BLOOMBERG/ NEWSROOM: ---

Response from NRC reporter....

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

From: SIMON LOMAX (BLOOMBERG/ NEWSROOM:)
To: JOHN HUGHES (BLOOMBERG/ NEWSROOM:), BERNIE KOHN (BLOOMBERG/ NEWSROOM:)
At: 3/18 14:46:05

SSSS/103

hi john -- nrc says at one point there was some consultation with faa, but
it may have dropped off. I asked them who makes the call on whether its safe
to fly through the radioactive plumes, and they say it's faa.

From: Burnell, Scott
To: Couret, Ivonne
Subject: RE: MEDIA - FW: Request for Comment - WSJ
Date: Friday, March 18, 2011 5:13:00 PM

First time I saw it. I'll respond.

From: Couret, Ivonne
Sent: Friday, March 18, 2011 5:12 PM
To: Burnell, Scott
Subject: MEDIA - FW: Request for Comment - WSJ
Importance: High

Did you respond to WSJ???

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

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<http://www.nrc.gov/reading-rm/photo-gallery/>

2010-2011 Information Digest - Where you can find NRC Facts at a Glance
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

From: Janbergs, Holly **On Behalf Of** OPA Resource
Sent: Friday, March 18, 2011 5:07 PM
To: Couret, Ivonne
Subject: FW: Request for Comment - WSJ

From: Power, Stephen [<mailto:Stephen.Power@wsj.com>]
Sent: Friday, March 18, 2011 5:02 PM
To: OPA Resource
Cc: Brenner, Eliot
Subject: Request for Comment - WSJ

Hi-

I'm told that at a congressional briefing this afternoon, NRC staff declined to say what the radiation levels are around the Fukushima plant. One person who listened in on the conversation quoted NRC staff as saying the data the U.S. is getting is "not reliable enough" to share.

SSSS/104

Would the NRC like to comment on this characterization of what the agency told congressional staff?

With kind regards,

Stephen Power

Staff Reporter

The Wall Street Journal

Office: (202) 862-9269

Cell: (b)(6)

Email: Stephen.Power@wsj.com

Follow me on Twitter at <http://twitter.com/stephenpower>

From: Burnell, Scott
To: valerie.insinna@tokyoshimbun.us
Cc: Couret, Ivonne
Subject: RE: Media request question for Tokyo Newspaper-- deadline: 1/17 at midnight
Date: Friday, March 18, 2011 5:22:00 PM

Hello Valerie;

We simply don't have enough information on an unfolding situation to comment on how NRC analyses would or would not apply to Fukushima Daiichi.

Seismic activity has always been considered an important contributor to accident risk at U.S. nuclear power plants. All U.S. plants are designed to withstand their site's strongest earthquake, determined after examination of thousands of years of the site's geologic history. All U.S. plants meet requirements to be prepared for loss of offsite power.

NUREG-1150 is no longer considered the latest NRC research on the subject of severe accidents and we therefore can't comment. The NRC has been working for the past several years on the State-of-the-Art Reactor Consequence Analysis project. Information about SOARCA is available on the NRC website:

<http://www.nrc.gov/about-nrc/regulatory/research/soar.html>

Please let me know if you have other questions. Thanks.

Scott Burnell
Public Affairs Officer
Nuclear Regulatory Commission

From: Valerie Insinna [mailto:valerie.insinna@tokyoshimbun.us]
Sent: Friday, March 18, 2011 4:42 PM
To: OPA Resource
Subject: Media request question for Tokyo Newspaper-- deadline: 1/17 at midnight

Hello,

I had a couple questions about a 1990 NRC report, NUREG-1150 and its connection to what's going on in Japan. Bloomberg recently released a story about how this report predicted some of the problems that happened at Fukushima Dai-ichi.

The NRC report stated that seismic activity could cause an accident at a nuclear power plant by causing diesel generator failure and power outages that result in a cooling system failure.

1. Does the NRC still support that specific part of the report? Is that part of the report still accurate?
2. Is what was described in the report similar to what happened at Fukushima? Why or why not?
3. Since the report was published, has there been any changes in US regulations that specifically address this issue? For example, has there been any additional sources of power backup that is now mandated for nuclear plants.

SSSS/105

Thank you so much for your help. Please email me or give me a call if you have any questions.

Best,
Valerie Insinna

--

Staff Reporter/ Researcher
Tokyo-Chunichi Shimbun
National Press Building 1012
529 14th Street, NW
Washington, DC 20045
valerie.insinna@tokyoshimbun.us
office: 202-783-9479
cell: (b)(6)

From: [Burnell, Scott](#)
To: jleake@sunday-times.co.uk
Cc: [Courret, Yvonne](#)
Subject: RE: The Sunday Times, London
Date: Friday, March 18, 2011 5:44:00 PM

Hello Jonathan;

The NRC's view of the situation remains essentially unchanged; we continue to monitor all the best available information coming from a variety of sources, including U.S. staff in Japan.

We've sent 11 NRC staff to Japan to assist the USAID team. The team includes specialists in boiling-water reactors, international affairs and general management expertise. Other U.S. agencies have also sent staff, but I have no details.

I'm afraid our "press list" is self-serve; if you open any of the press releases on our home page, you'll see instructions for signing up for our listserv.

Please let me know if you have additional questions. Thanks.

Scott Burnell
Public Affairs Officer
U.S. Nuclear Regulatory Commission

From: Leake, Jonathan [<mailto:jleake@sunday-times.co.uk>]
Sent: Friday, March 18, 2011 2:37 PM
To: OPA Resource
Subject: The Sunday Times, London

Dear NRC

This inquiry relates to the American and NRC response to the problems being experienced at the Fukushima nuclear reactor in Japan.

I wondered if you could update me on your view of this event in terms of its seriousness?

I also wondered if you could tell me what assistance and expertise you might be providing to Japan? Is the NRC the key agency overseeing any response or are others involved?

I see from the releases on your website that you have sent a dozen or so people to Japan to help the teams at Fukushima. Are you sending any further help? One report suggested the US was sending a very large number of people to the site. Is this correct? Perhaps you could call me as soon as possible. Could you also add me to any press lists you may have to ensure I get future updates.

Regards

Jonathan Leake

Science & Environment Editor
The Sunday Times (Readership 3.5m)
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SSSS/106

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From: Burnell, Scott
To: Maureen Conley
Subject: RE: Media - Questions PLATTS
Date: Friday, March 18, 2011 8:51:00 PM

Yes, I saw, thanks for that... So funny for all the wrong reasons, at least at the start.
SIGH

From: Maureen Conley [mailto:(b)(6)]
Sent: Friday, March 18, 2011 5:13 PM
To: Burnell, Scott
Subject: Re: Media - Questions PLATTS

Yes indeed, thanks Scott!

And I shared with him this video, to add some levity to a terrible week. If you have workplace restrictions on viewing youtube videos, you ought to forward this link to your home email. Apparently it was put together to explain the Fukushima situation to Japanese children...

<http://www.youtube.com/watch?v=5sakN2hSVxA>

Maureen Conley
10220 Carroll Pl.
Kensington, MD 20895
(b)(6)

From: "Burnell, Scott" <Scott.Burnell@nrc.gov>
To: (b)(6) <(b)(6)>
Cc: "Couret, Ivonne" <Ivonne.Couret@nrc.gov>
Sent: Fri, March 18, 2011 4:30:19 PM
Subject: FW: Media - Questions PLATTS

Hi Maureen;

I think Dave talked to you – all set? Thanks.

Scott

From: Royer, Deanna
Sent: Friday, March 18, 2011 3:14 PM
To: Couret, Ivonne
Subject: Media - Questions

Maureen Conley
Platts
(b)(6)
(b)(6)

Re: Info on a past document

SSSS/107

Deanna Royer

From: Burnell, Scott
To: Brenner, Eliot
Subject: RE: Monday's meeting
Date: Saturday, March 19, 2011 7:50:00 AM

OK, in Ops Ctr. Ldrshp discussing what I e-mailed about last night.

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 7:50 AM
To: Burnell, Scott
Subject: RE: Monday's meeting

Yes, and on subsequent leadership bridge

From: Burnell, Scott
Sent: Saturday, March 19, 2011 7:30 AM
To: Brenner, Eliot
Subject: RE: Monday's meeting
Importance: High

You calling in to the 7:30 Comm Asst bridge?

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 7:26 AM
To: Burnell, Scott; ayesha.rascoe@thomsonreuters.com; tom.doggett@thomsonreuters.com
Cc: OPA Resource; Couret, Ivonne
Subject: RE: Monday's meeting

Ivonne, please put Ayesha's name down as the Reuters representative. thanks

From: Burnell, Scott
Sent: Saturday, March 19, 2011 7:25 AM
To: ayesha.rascoe@thomsonreuters.com; tom.doggett@thomsonreuters.com
Cc: OPA Resource
Subject: RE: Monday's meeting

Ayesha, Tom;

My inbox is a shambles, but if memory serves, Tom informed me that Ayesha is the designated Reuters rep for the Monday meeting. If one of you could confirm that today or tomorrow, we'd really appreciate it. Thanks.

Scott

From: ayesha.rascoe@thomsonreuters.com [mailto:ayesha.rascoe@thomsonreuters.com]
Sent: Friday, March 18, 2011 3:31 PM
To: OPA Resource
Cc: Burnell, Scott; Couret, Ivonne
Subject: Monday's meeting

Hi,

SSSS/108

I plan to attend the meeting on Monday regarding the NRC response to the Japan nuclear crisis.
Could a space please be reserved for me?

Thanks,
Ayesha

Ayesha Rascoe
Energy Reporter
Thomson Reuters

Phone: 1-202-310-5683

Mobile: (b)(6)

ayesha.rascoe@thomsonreuters.com
thomsonreuters.com

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From: Burnell, Scott
To: Brenner, Eliot
Subject: RE: Monday's meeting
Date: Saturday, March 19, 2011 7:32:00 AM

(b)(6) PIN (b)(6) for the bridge I'll be in Ops as soon as call's done.

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 7:26 AM
To: Burnell, Scott; ayesha.rascoe@thomsonreuters.com; tom.doggett@thomsonreuters.com
Cc: OPA Resource; Couret, Ivonne
Subject: RE: Monday's meeting

Ivonne, please put Ayesha's name down as the Reuters representative. thanks

From: Burnell, Scott
Sent: Saturday, March 19, 2011 7:25 AM
To: ayesha.rascoe@thomsonreuters.com; tom.doggett@thomsonreuters.com
Cc: OPA Resource
Subject: RE: Monday's meeting

Ayesha, Tom;

My inbox is a shambles, but if memory serves, Tom informed me that Ayesha is the designated Reuters rep for the Monday meeting. If one of you could confirm that today or tomorrow, we'd really appreciate it. Thanks.

Scott

From: ayesha.rascoe@thomsonreuters.com [mailto:ayesha.rascoe@thomsonreuters.com]
Sent: Friday, March 18, 2011 3:31 PM
To: OPA Resource
Cc: Burnell, Scott; Couret, Ivonne
Subject: Monday's meeting

Hi,

I plan to attend the meeting on Monday regarding the NRC response to the Japan nuclear crisis. Could a space please be reserved for me?

Thanks,
Ayesha

Ayesha Rascoe
Energy Reporter
Thomson Reuters

Phone: 1-202-310-5683
Mobile: (b)(6)

ayesha.rascoe@thomsonreuters.com
thomsonreuters.com

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Any views expressed in this message are those of the individual sender, except where the sender specifically states them to be the views of Thomson Reuters.

From: [Burnell, Scott](#)
To: tom.doggett@thomsonreuters.com
Subject: RE: Monday's meeting
Date: Saturday, March 19, 2011 7:30:00 AM

Thanks, Tom.

From: tom.doggett@thomsonreuters.com [mailto:tom.doggett@thomsonreuters.com]
Sent: Saturday, March 19, 2011 7:28 AM
To: Brenner, Eliot; Burnell, Scott; ayesha.rascoe@thomsonreuters.com
Cc: OPA Resource; Couret, Ivonne
Subject: RE: Monday's meeting

Yes, Ayesha will be representing Reuters at Monday's hearing, not me. Thanks—Tom D.

From: Brenner, Eliot [mailto:Eliot.Brenner@nrc.gov]
Sent: Saturday, March 19, 2011 7:26 AM
To: Burnell, Scott; Rascoe, Ayesha r. (M Edit Ops); Doggett, Thomas W. (M Edit Ops)
Cc: OPA Resource; Couret, Ivonne
Subject: RE: Monday's meeting

Ivonne, please put Ayesha's name down as the Reuters representative. thanks

From: Burnell, Scott
Sent: Saturday, March 19, 2011 7:25 AM
To: ayesha.rascoe@thomsonreuters.com; tom.doggett@thomsonreuters.com
Cc: OPA Resource
Subject: RE: Monday's meeting

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Sent: Friday, March 18, 2011 3:31 PM
To: OPA Resource
Cc: Burnell, Scott; Couret, Ivonne
Subject: Monday's meeting

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Thanks,
Ayesha

Ayesha Rascoe
Energy Reporter
Thomson Reuters

Phone: 1-202-310-5683

Mobile: (b)(6)

ayesha.rascoe@thomsonreuters.com
thomsonreuters.com

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This email was sent to you by Thomson Reuters, the global news and information company. Any views expressed in this message are those of the individual sender, except where the sender specifically states them to be the views of Thomson Reuters.

From: Burnell, Scott
To: Brenner, Eliot
Subject: RE: i expect to arrive by noon
Date: Saturday, March 19, 2011 8:24:00 AM
Importance: High

- The Nuclear Regulatory Commission is in discussions with the Department of Energy, the U.S. Navy, the Institute for Nuclear Power Operations (a U.S. nuclear industry body), individual nuclear utilities and other sources of technical expertise, regarding potential additional U.S. assistance to Japan.
- Any decision on providing additional assistance will be closely coordinated with the U.S. and Japanese governments, as well as TEPCO.

How's that sound?

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 8:13 AM
To: Burnell, Scott
Subject: Re: i expect to arrive by noon

... Anyone just yet. Just have handy. This will be big.

Eliot Brenner
Director, Office of Public Affairs
US Nuclear Regulatory Commission
Protecting People and the Environment
301 415 8200

C (b)(6)

Sent from my Blackberry

From: Burnell, Scott
To: Brenner, Eliot
Sent: Sat Mar 19 08:10:03 2011
Subject: RE: i expect to arrive by noon

Most all of it – talking point will be “we’re just talking,” essentially

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 8:09 AM
To: Burnell, Scott
Subject: Re: i expect to arrive by noon

Did you listen to discussion?
Eliot Brenner
Director, Office of Public Affairs
US Nuclear Regulatory Commission
Protecting People and the Environment
301 415 8200

C (b)(6)

SSSS/109

Sent from my Blackberry

From: Burnell, Scott
To: Brenner, Eliot; Hayden, Elizabeth
Cc: Screnci, Diane
Sent: Sat Mar 19 08:02:31 2011
Subject: RE: i expect to arrive by noon

I'm going to draft a tentative talking point in case the meeting garners any attention (and I'm almost certain it will).

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 7:59 AM
To: Burnell, Scott; Hayden, Elizabeth
Subject: i expect to arrive by noon

From: Burnell, Scott
To: Couret, Ivonne; OPA Resource
Subject: FW: Response from "Contact the NRC Web Site Staff"
Date: Saturday, March 19, 2011 9:54:00 AM

Refer him to EPA, which handles U.S. monitoring. Thanks.

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

From: OPA Resource
Sent: Saturday, March 19, 2011 9:53 AM
To: Burnell, Scott
Subject: FW: Response from "Contact the NRC Web Site Staff"

Give to folks that Rob was handing into similar to in Ops. Ivonne

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

Visit our online photo gallery. Incorporate graphics and photographs to tell your story!
<http://www.nrc.gov/reading-rm/photo-gallery/>

2010-2011 Information Digest - Where you can find NRC Facts at a Glance
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

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

From: NRCWEB Resource
Sent: Friday, March 18, 2011 6:58 PM
To: OPA Resource
Subject: FW: Response from "Contact the NRC Web Site Staff"

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

From: Pat Davi [mailto:(b)(6)]
Sent: Friday, March 18, 2011 5:42 PM
To: NRCWEB Resource
Subject: Response from "Contact the NRC Web Site Staff"

Below is the result of your feedback form. It was submitted by

Pat Davi ((b)(6)) on Friday, March 18, 2011 at 17:42:29

comments: Dear Client

Due to the nuclear accident in Japan, many people are concerned with radioactive contamination there, and here in America.

The isotopes of interest, so far, are Iodine-125 and Cesium-137.

Here at Davi Laboratories, in Hercules, CA, we have the capability to analyze those and many other

SSSS/110

isotopes that may be needed later.

We are fully certified by CA DHS. We have combined experience of 50 years in radiological analysis. Davi Laboratories was founded in 1992.

If you are concerned about contamination we can analyze water, urine, air filters, soil and other materials at very reasonable cost and fast turn around time.

Please feel free to contact us at: (b)(6)

Or by phone at: (b)(6) for questions or comments.

Our Website is <http://davidlabsenvAssoc.com>

Thank you.

Angela Davi, Laboratory Director
Patricia Davi; QA/QC and Operations Manager

organization: Davi Laboratories

address1: 730 Alfred Nobel Dr

address2:

city: Hercules

state: CA

zip: 94547

country: USA

phone: (b)(6)

From: Burnell, Scott
To: OPA Resource
Subject: RE: emergency in Japan
Date: Saturday, March 19, 2011 9:59:00 AM

It's another "helpful suggestion" so file accordingly.

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

From: OPA Resource
Sent: Saturday, March 19, 2011 9:55 AM
To: Harrington, Holly; Burnell, Scott
Subject: FW: emergency in Japan

Don't know if this is contact or not?

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

Visit our online photo gallery. Incorporate graphics and photographs to tell your story!
<http://www.nrc.gov/reading-rm/photo-gallery/>

2010-2011 Information Digest - Where you can find NRC Facts at a Glance
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

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

From: Abas Sultan [mailto:(b)(6)]
Sent: Friday, March 18, 2011 6:39 PM
To: OPA Resource
Subject: emergency in Japan

Below is the result of your feedback form. It was submitted by

Abas Sultan ((b)(6)) on Friday, March 18, 2011 at 18:38:44

comments: Dear US NRC,

Thank you for your email. I am passing on your email to our technical team for their consideration. Thank you again for taking the time to contact us. We appreciate your concern for the emergency in Japan. Best regards, Greg GreIAEA Press and Public Information Officer Ph: 43-1-2600-22047 www.iaea.org Press@IAEA.org

From: (b)(6) (b)(6)
Sent: Thursday, 17 March 2011 13:05
To: iaeany@un.org; Official Mail - IAEA Mail address; VIDRICAIRE, Marc; IAEA - Press Office; VERLINI, Giovanni; UNOG - IAEA Contact Geneva; Marine Environment Laboratory; japan-info@mw.mofa.go.jp; (b)(6); shinichiro.kanoya@mofa.go.jp

SSSS/111

Subject: Dear Yukiya Amano, Director General , Japanese Ambassador Masaharu Kono, John SCOTT!

Dear

Yukiya Amano, Director General,
Japanese Ambassador Masaharu Kono,

John Scott,

Today Tokhtsbiev Sergei PhD Chief Ubykh Circassian Tribe gave his drawings relating to cessation of radiation contamination on the ruined nuclear power plants in Japan to SAKNOUE YOKO from Japan Foundation Moscow office.

Tohtabiev Sergei suggested the use of Airships for Cooling destroyed nuclear reactor.

Water through the pipes should be supplied to the nuclear station, then pump fed up to the airship.

The second method proposed Tohtabiev- if from the destroyed reactor released the radioactive clouds-then to the airship will be attached the sprinkler 100 meters.They are widely used in reclamation in Russia.Water is supplied to the airship, then through the sprinklers in creating the songs rain, which destroys the radioactive cloud. Will be saved from infection Tokyo, the Japanese people and people of other countries

We ask you urgently to discuss Tohtabiev,s proposals with specialists. And apply for the salvation of nations.

And the most important.Sergeyy Tokhtabiev on behalf of the Indigenous Peoples of Russia offered to save the children, women, old teenagers-

placing them in Resorts
in the Caucasus and Siberia.

Reference

: Tohtabiev graduated in 1971 professional- technical school.
He has several inventions-

Chief Indigenous Circassian Ubykh Tribe Tokhtabiev Sergey PhD , Imir , with Zalina20 YEARS created a new technology of food corn,which is cheaper world analogues five times.They can feed the starving population of Africa, Bangladesh, Ethiopia. EU documents attached.

Also they created a new technology soil remediation in the desert for save forests.

Tokhtabiev Sergey was in Washington DS at CSCE Comission of the USA Congress and at United States Institute of Peace with his project " Hayma of Peace"- fo r Environment protection.

Indigenous Tokhtabiev together with Zalina Tokhtabieva 20 years Ubykh girl engineer and Imir suggested how to eliminate BP oil Spill accident and to save million Birds,they offer a secure oil and gas exploration at great depths in the ocean.They suggested how eliminate traffic jam in Moscow and London.

They was able to decrypt the purpose of the Pyramids.
They were built to optimize the coordinates of the
Earth's rotation around its axis. Also they created a new
technology soil remediation in the desert.
Sergey and Zalina are ready to publish their offer in your newspaper
or magazine ..
Tokhtabiev's new
Project Peace Rally Tokyo- Moscow- London-Washington. For
protecting Indigenous ,Global Climat and Wild Nature,

organization: International Fund for Indigenous

address1: MechnikovA 130/8

address2:

city: Nalchik, Russia

state: WA

zip: 360022

country: Russia

phone: (b)(6)

From: Burnell, Scott
To: Akstulewicz, Brenda
Subject: RE: i expect to arrive by noon
Date: Saturday, March 19, 2011 10:03:00 AM

We'll have a press release linking to it, so Webworks will need to add it to the Japan Quake page. As a PDF, I don't think webworks needs anything else done to it – same principle as the charts we added to the press release on Wed. Please check with Sally or whoever's on call to see if I've missed anything. Thanks.

From: Akstulewicz, Brenda
Sent: Saturday, March 19, 2011 10:00 AM
To: Burnell, Scott
Subject: RE: i expect to arrive by noon

Scott,

I've never done anything to be posted to the website except press releases and speeches so I'm not exactly sure what to do with this. Can you give me a few more details? Am I supposed to get it in final format, if so I'd really like it in docx format. Sorry I can't make it happen without questions.

B

From: Burnell, Scott
Sent: Saturday, March 19, 2011 9:50 AM
To: Brenner, Eliot; Akstulewicz, Brenda
Cc: Couret, Ivonne; Screnci, Diane
Subject: RE: i expect to arrive by noon

Brenda;

Please make sure this PDF is ready to be posted to the Quake Web page – I'm working on a blog post to go up at the same time. (unless Eliot wants the PDF up post-haste). Thanks.

Scott

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 9:26 AM
To: Burnell, Scott
Subject: RE: i expect to arrive by noon

correct

From: Burnell, Scott
Sent: Saturday, March 19, 2011 9:24 AM
To: Brenner, Eliot
Cc: Screnci, Diane

SSSS/112

Subject: RE: i expect to arrive by noon
Importance: High

Going over the Q&A now. To review:

If they're acceptable, post on the quake-specific Web page
Do a blog post on them
Provide to DOE

(not in that order, necessarily)

Correct?

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 8:44 AM
To: Burnell, Scott
Subject: Re: i expect to arrive by noon

Just hold them to yourself at the moment. Josh and I are talking on the side.

Also, I managed to delete anne kemmerer's seismic Q/A which she sent around "for publication next week." Can you pass message that today for publication is best (DOE needs something for Chu) we can coordinate this stuff internally until it becomes useless because of the delays and we look worse than slow.

Eliot Brenner
Director, Office of Public Affairs
US Nuclear Regulatory Commission
Protecting People and the Environment
301 415 8200
C: (b)(6)
Sent from my Blackberry

From: Burnell, Scott
To: Brenner, Eliot
Sent: Sat Mar 19 08:14:05 2011
Subject: RE: i expect to arrive by noon

O really? Ya think? :-)

I'm going to vet them with you and ET and then close-hold, reply-to-query only.

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 8:13 AM
To: Burnell, Scott
Subject: Re: i expect to arrive by noon

... Anyone just yet. Just have handy. This will be big.

Eliot Brenner
Director, Office of Public Affairs
US Nuclear Regulatory Commission
Protecting People and the Environment
301 415 8200
C: (b)(6)

Sent from my Blackberry

From: Burnell, Scott
To: Brenner, Eliot
Sent: Sat Mar 19 08:10:03 2011
Subject: RE: i expect to arrive by noon

Most all of it – talking point will be “we’re just talking,” essentially

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 8:09 AM
To: Burnell, Scott
Subject: Re: i expect to arrive by noon

Did you listen to discussion?
Eliot Brenner
Director, Office of Public Affairs
US Nuclear Regulatory Commission
Protecting People and the Environment
301 415 8200
C: (b)(6)
Sent from my Blackberry

From: Burnell, Scott
To: Brenner, Eliot; Hayden, Elizabeth
Cc: Screnci, Diane
Sent: Sat Mar 19 08:02:31 2011
Subject: RE: i expect to arrive by noon

I'm going to draft a tentative talking point in case the meeting garners any attention (and I'm almost certain it will).

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 7:59 AM
To: Burnell, Scott; Hayden, Elizabeth
Subject: i expect to arrive by noon

From: Burnell, Scott
To: Akstulewicz, Brenda
Subject: RE: Action: Seismic Q&As
Date: Saturday, March 19, 2011 10:46:00 AM
Attachments: image001.png
image002.png

Buzzing beehive... Enjoy the quiet.

From: Akstulewicz, Brenda
Sent: Saturday, March 19, 2011 10:46 AM
To: Burnell, Scott
Subject: RE: Action: Seismic Q&As

Done! Waiting for PR. Don't know what it's like over there – very, very quiet here!

From: Burnell, Scott
Sent: Saturday, March 19, 2011 10:37 AM
To: Akstulewicz, Brenda
Subject: RE: Action: Seismic Q&As

Q17 – please remove the partial underlining in the question. Apart from that it's good.

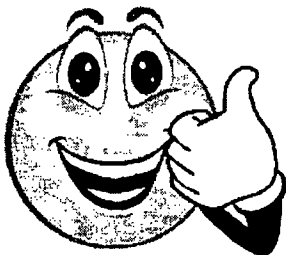
From: Akstulewicz, Brenda
Sent: Saturday, March 19, 2011 10:29 AM
To: Burnell, Scott
Subject: RE: Action: Seismic Q&As

☺ sending your way for one last look-see!

From: Burnell, Scott
Sent: Saturday, March 19, 2011 10:26 AM
To: Akstulewicz, Brenda
Subject: RE: Action: Seismic Q&As

You got a laugh out of both Diane and I with that. ☺

From: Akstulewicz, Brenda
Sent: Saturday, March 19, 2011 10:24 AM
To: Burnell, Scott
Subject: RE: Action: Seismic Q&As



From: Burnell, Scott
Sent: Saturday, March 19, 2011 10:21 AM
To: Akstulewicz, Brenda
Subject: RE: Action: Seismic Q&As

Remove – thanks for the sharp eye.

From: Akstulewicz, Brenda
Sent: Saturday, March 19, 2011 10:20 AM
To: Burnell, Scott
Subject: RE: Action: Seismic Q&As

Scott,

the below is on the title page, keep or remove?

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

SSSS/113

thx
b

From: Burnell, Scott
Sent: Saturday, March 19, 2011 10:09 AM
To: Akstulewicz, Brenda
Subject: FW: Action: Seismic Q&As

Brenda;

I beg your pardon – THESE are the public Q&A. THANK YOU for catching that. Please remove the OUO header/footer and put it in a PDF format for posting to the Web site.

Scott

From: Kammerer, Annie
Sent: Saturday, March 19, 2011 8:33 AM
To: Nelson, Robert
Cc: Roberts, Darrell; Croteau, Rick; Kennedy, Kriss; Lara, Julio; West, Steven; Shear, Gary; Ruland, William; Boger, Bruce; Meighan, Sean; Nguyen, Quynh; Glitter, Joseph; Burnell, Scott; Brenner, Eliot; Case, Michael; Munson, Clifford; Ake, Jon; Hogan, Rosemary
Subject: RE: Action: Seismic Q&As

OK. Here is the proposed set of public Q&As for publication next week. I think it's pretty good, at least it's the best I can do. Jennifer Uhle did a pretty thorough review for me.

I didn't end up including the plant specific questions because it was too awkward. We could theoretically do a separate add on.

Annie

From: Nelson, Robert
Sent: Thursday, March 17, 2011 2:18 PM
To: Kammerer, Annie
Cc: Roberts, Darrell; Croteau, Rick; Kennedy, Kriss; Lara, Julio; West, Steven; Shear, Gary; Ruland, William; Boger, Bruce; Meighan, Sean; Nguyen, Quynh; Glitter, Joseph
Subject: Action: Seismic Q&As
Importance: High

Annie:

The regions have a critical need for publicly releasable seismic info (Qs & As) to support public meetings beginning next week. We need a releasable version of your document. Can you assemble the info that you have prepared that you believe is good to go. We can then get that reviewed by OPA. Need your input tomorrow.

Robert Nelson

Robert A. Nelson
Deputy Director
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation



E-mail: robert.nelson@nrc.gov | Office: (301) 415-1453 | Cell: (703) 244-7493 | Fax: (301) 415-2102

From: Kammerer, Annie
Sent: Thursday, March 17, 2011 2:36 AM
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Glitter, Joseph; Howe, Allen; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Munson, Clifford; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Murphy, Andrew; Pires, Jose; Hogan, Rosemary; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffry; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas
Subject: Seismic Q&As March 17th 2am update

All,

As promised, a sharepoint site has been set up where our friends in NRR will be posting the latest version of the Seismic Q&A document on an ongoing basis. If someone would prefer to use the sharepoint site, instead of being on this distribution list, please let me know...

<http://portal.nrc.gov/edo/nrr/NRR%20TA/FAQ%20Related%20to%20Events%20Occuring%20in%20Japan/Forms/AllItems.aspx>

This latest update has a number of new questions (not many with answers today, but we are working hard). A high priority question we are working on is "how many plants are near a mapped active fault". We're focusing on anything within 50 miles. We're also pulling relevant questions from the congressional inquiries we just received; and will also give these high priority to support any needs by NRR.

Many new figures and some draft fact sheets have added to the "additional information" section. These include the NRO half of a tsunami fact sheet...a description of the tsunami research is still to come from RES.

Some good news: Yesterday's version seems to have been widely forwarded around the agency. So, we are also starting to get some excellent questions from staff looking forward. This is allowing us to feel that we are finally getting out in front of things to a small degree. Also, our team has grown and we now have someone acting as source of seismic expertise for the 11pm to 7 am shift. This means that we now have seismic experts available to the RST and OPA at the Op Center 24 hours, with 2 people during the day. That extra support is allowing us to get this out at least an hour earlier today ☺

We are continuing to compile the questions that come in and update the seismic Q&A document. If you have suggested changes, or want to provide missing answers, please forward them to me for compilation.

This is a living document and will be updated daily in the foreseeable future.

Happy St. Paddy's Day. May the world (especially our friends in Japan) have the luck of the Irish today.

Cheers,
Annie

Dr. Annie Kammerer, PE
Senior Seismologist and Earthquake Engineer
US Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
Washington DC 20555

(b)(6) mobile

(b)(6) BB

From: Kammerer, Annie
Sent: Tuesday, March 15, 2011 3:41 AM
To: Hiland, Patrick; Skeen, David
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Kammerer, Annie; Chokshi, Nitesh; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Glitter, Joseph; Howe, Allen; Case, Michael; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Munson, Clifford; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Murphy, Andrew; Pires, Jose; Hogan, Rosemary; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael
Subject: latest version of Q&As

All,

This is the first draft of the seismic-specific Q&As. It is pretty rough and there are many answers still missing, but people have contributed a lot and we thought it may be useful for many people trying to answer questions coming in.

We are continuing to compile the questions that come in and update the seismic Q&A document. If you have suggested changes, or want to provide missing answers, please forward them to me for compilation.

This is a living document and will be updated daily in the foreseeable future.

Annie

Dr. Annie Kammerer, PE
Senior Seismologist and Earthquake Engineer
US Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
Washington DC 20555

(b)(6) mobile

(b)(6) BB

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

List of Questions

| | |
|---|---------------|
| 1) Can an earthquake and tsunami as large as happened in Japan also happen here? | 1 |
| 2) Did the Japanese underestimate the size of the maximum credible earthquake and tsunami that could affect the plants?..... | 1 |
| 3) How high was the tsunami at the Fukushima nuclear plants? | 1 |
| 4) Was the damage to the Japanese nuclear plants mostly from the earthquake or the tsunami? | 1 |
| 5) Have any lessons for US nuclear plants been identified? | 1 |
| 6) Was there any damage to US reactors from either the earthquake or the resulting tsunami? | 2 |
| 7) How many US reactors are located in active earthquake zones? | 2 |
| 8) What level of earthquake hazard are the US reactors designed for? | 2 |
| 9) What magnitude earthquake are currently operating US nuclear plants designed to? | 2 |
| 10) Have events in Japan changed our perception of earthquake risk to the nuclear plants in the US? | 2 |
| 11) Can significant damage to a nuclear plant like we see in Japan happen in the US due to an earthquake? Are the Japanese nuclear plants similar to US nuclear plants? | 3 |
| 12) What is the likelihood of the design basis or “SSE” ground motions being exceeded over the life of a nuclear plant? | 3 |
| 13) Which reactors are along coastal areas that could be affected by a tsunami? | 3 |
| 14) What is magnitude anyway? What is the Richter Scale? What is intensity?..... | 4 |
| 15) How do magnitude and ground motion relate to each other? | 4 |
| 16) What is Generic Issue 199 about? | 4 |
| 17) Does GI-199 provide rankings of US nuclear plants in terms of safety?..... | 4 |
| 18) What are the current findings of GI-199? | 5 |
| 19) What do you mean by “increased estimates of seismic hazards” at nuclear plant sites? | 5 |
| 20) Does the Seismic Core Damage represent a measurement of the risk of radiation release or only the risk of core damage (not accounting for additional containment)? | 5 |
| 21) Where can I get current information about Generic Issue 199?..... | 5 |
| 22) Could an accident sequence like the one at Japan’s Fukushima Daiichi nuclear plants happen in the US?..... | 6 |
| 23) Are US plants susceptible to the same kind of loss of power as happened in Japan?..... | Error! |

Bookmark not defined.

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

This earthquake occurred on a “subduction zone”, which is the type of tectonic region that produces earthquakes of the largest magnitude. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. Subduction zone earthquakes are also required to produce the kind of massive tsunami seen in Japan. In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of northern California, Oregon and Washington. So, a continental earthquake and tsunami as large as in Japan could only happen there. The only nuclear plant near the Cascadia subduction zone is the Columbia Generating Station. This plant is located a large distance from the coast (approximately 225 miles) and the subduction zone (approximately 300 miles), so the ground motions estimated at the plant are far lower than those seen at the Fukushima plants. This distance also precludes the possibility of a tsunami affecting the plant. Outside of the Cascadia subduction zone, earthquakes are not expected to exceed a magnitude of approximately 8. Magnitude is measured on a log scale and so a magnitude 9 earthquake is ten times larger than a magnitude 8 earthquake.

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

The magnitude of the earthquake was somewhat greater than was expected for that part of the subduction zone. However, the Japanese nuclear plants were recently reassessed using ground motion levels similar to those that are believed to have occurred at the sites. The ground motions against which the Japanese nuclear plants were reviewed were expected to result from earthquakes that were smaller, but were much closer to the sites. The NRC does not currently have information on the maximum tsunami height that was expected at the sites.

3) How high was the tsunami at the Fukushima nuclear plants?

The tsunami modeling team at the National Oceanic and Atmospheric Administration’s Pacific Marine Environmental Lab have estimated the wave height just offshore to be approximately 8 meters in height at Fukushima Daiichi and approximately 7 meters in Fukushima Daini. This is based on recordings from NOAA’s Deep-ocean Assessment and Reporting of Tsunamis (DART) buoys and a high resolution numerical model developed for the tsunami warning system. If plant recordings exist they were not yet provided to the NRC.

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

Because this event happened in Japan, it is hard for NRC staff to make the assessment necessary to understand exactly what happened at this time. In the nuclear plants there may have been some damage from the shaking, and the earthquake caused the loss of offsite power. However, the tsunami appears to have played a key role in the loss of other power sources at the site producing station blackout, which is a critical factor in the ongoing problems.

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

The NRC is in the process of following and reviewing the event in real time. This will undoubtedly lead to the identification of issues that warrant further study. However, a complete

understanding of lessons learned will require more information than is currently available to NRC staff.

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

No.

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

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

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

Each reactor is designed for a different ground motion that is determined on a site-specific basis. The existing nuclear plants were designed on a “deterministic” or “scenario earthquake” basis that accounted for the largest earthquakes expected in the area around the plant, without consideration of the likelihood of the earthquakes considered. New reactors are designed using probabilistic techniques that characterize both the ground motion levels and uncertainty at the proposed site. These probabilistic techniques account for the ground motions that may result from all potential seismic sources in the region around the site. Technically speaking, this is the ground motion with an annual frequency of occurrence of 1×10^{-4} /year, but this can be thought of as the ground motion that occurs every 10,000 years on average. One important aspect is that probabilistic hazard and risk-assessment techniques account for beyond-design basis events. NRC’s Generic Issue 199 (GI-199) project is using the latest probabilistic techniques used for new nuclear plants to review the safety of the existing plants. [see questions 16 to 21 for more information about GI-199]

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

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

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

The NRC continues to determine that US nuclear plants are safe. This does not change the NRC’s perception of earthquake hazard (i.e., ground motion levels) at US nuclear plants. It is too early to tell what the lessons from this earthquake are. The NRC will look closely at all aspects of response of the plants to the earthquake and tsunami to determine if any actions need to be taken in US nuclear plants and if any changes are necessary to NRC regulations.

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

All US nuclear plants are built to withstand environmental hazards, including earthquakes and tsunamis. Even those nuclear plants that are located within areas with low and moderate seismic activity are designed for safety in the event of such a natural disaster. The NRC requires that safety-significant structures, systems, and components be designed to take into account even rare and extreme seismic and tsunami events. In addition to the design of the plants, significant effort goes into emergency response planning and accident management. This approach is called defense-in-depth.

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

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

The ground motions that are used as seismic design bases at US nuclear plants are called the Safe Shutdown Earthquake ground motion (SSE). In the mid to late 1990s, the NRC staff reviewed the potential for ground motions beyond the design basis as part of the Individual Plant Examination of External Events (IPEEE). From this review, the staff determined that seismic designs of operating nuclear plants in the US have adequate safety margins for withstanding earthquakes. Currently, the NRC is in the process of conducting GI-199 to again assess the resistance of US nuclear plants to earthquakes. Based on NRC's analyses to date, the probability of ground motions exceeding the SSE for the plants in the Central and Eastern United States is less than 2%, with values ranging from a low of 0.1% to a high of 6%.

It is important to remember that structures, systems and components are required to have "adequate margin," meaning that they must continue be able withstand shaking levels that are above the plant's design basis.

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

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

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

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

represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

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

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

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

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

16) What is Generic Issue 199 about?

GI-199 investigates the safety and risk implications of updated earthquake-related data and models. These data and models suggest that the probability for earthquake ground motion above the seismic design basis for some nuclear plants in the Central and Eastern United States, although is still low, is larger than previous estimates.

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

The NRC does not rank nuclear plants by seismic risk. The objective of the GI-199 Safety/Risk Assessment was to perform a conservative, screening-level assessment to evaluate if further investigations of seismic safety for operating reactors in the central and eastern US (CEUS) are warranted, consistent with NRC directives. The results of the GI-199 safety risk assessment

should not be interpreted as definitive estimates of plant-specific seismic risk because some analyses were very conservative making the calculated risk higher than in reality. The nature of the information used (both seismic hazard data and plant-level fragility information) make these estimates useful only as a screening tool.

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

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

19) What do you mean by “increased estimates of seismic hazards” at nuclear plant sites?

Seismic hazard (earthquake hazard) represents the chance (or probability) that a specific level of ground motion could be observed or exceeded at a given location. Our estimates of seismic hazard at some Central and Eastern United States locations have changed based on results from recent research, indicating that earthquakes occurred more often in some locations than previously estimated. Our estimates of seismic hazard have also changed because the models used to predict the level of ground motion, as caused by a specific magnitude earthquake at a certain distance from a site, changed. The increased estimates of seismic hazard at some locations in the Central and Eastern United States were discussed in a memorandum to the Commission, dated July 26, 2006. (The memorandum is available in the NRC Agencywide Documents Access and Management System [ADAMS] under Accession No. ML052360044).

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

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

21) Where can I get current information about Generic Issue 199?

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

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

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

In addition, US nuclear plant designs and operating practices since the terrorist events of September 11, 2001, are designed to mitigate severe accident scenarios such as aircraft impact, which include the complete loss of offsite power and all on-site emergency power sources.

US nuclear plant designs include consideration of seismic events and tsunamis'. It is important not to extrapolate earthquake and tsunami data from one location of the world to another when evaluating these natural hazards. These catastrophic natural events are very region- and location-specific, based on tectonic and geological fault line locations.

From: Burnell, Scott
To: Akstulewicz, Brenda; Hardy, Sally
Cc: Couret, Ivonne
Bcc: Screnci, Diane
Subject: RE: draft press release
Date: Saturday, March 19, 2011 11:37:00 AM

Brenda, Sally;

I do apologize for being unclear. The PDF with the seismic Q&A needs to have its own link on the Japan quake page. I don't know what else is involved in putting the PDF into ADAMS or whatever is needed to add it to the website.

Once we have that URL for the PDF on the quake page, that link will be inserted into both the press release and the blog post.

Thank you.

Scott

From: Akstulewicz, Brenda
Sent: Saturday, March 19, 2011 11:33 AM
To: Burnell, Scott
Subject: RE: draft press release

no press release attached – is it ready?

From: Burnell, Scott
Sent: Saturday, March 19, 2011 11:17 AM
To: Couret, Ivonne; Akstulewicz, Brenda
Subject: RE: draft press release

Webworks needs to give us the URL to use in both the press release and blog post.

From: Couret, Ivonne
Sent: Saturday, March 19, 2011 11:15 AM
To: Burnell, Scott
Subject: RE: draft press release

What URL do we want to insert?

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

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<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

SSSS/114

From: Burnell, Scott
Sent: Saturday, March 19, 2011 11:07 AM
To: Couret, Ivonne
Subject: FW: draft press release

Ivonne;

Are you in a position to get this ready for posting, or do we call Holly @ home? Thanks.

Scott

From: Burnell, Scott
Sent: Saturday, March 19, 2011 10:51 AM
To: Brenner, Eliot
Cc: Screnci, Diane
Subject: RE: draft press release

Still trying to get a moment with the ET on the press release – here's the proposed blog post.

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 10:29 AM
To: Burnell, Scott
Subject: Re: draft press release

I would use "series of updated" XXX

And show it to them as a courtesy, if anyone has comments incorporate. Play nice.

Eliot Brenner
Director, Office of Public Affairs
US Nuclear Regulatory Commission
Protecting People and the Environment
301 415 8200
C: (b)(6)
Sent from my Blackberry

From: Burnell, Scott
To: Brenner, Eliot
Cc: Screnci, Diane
Sent: Sat Mar 19 10:21:21 2011
Subject: FW: draft press release

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From: Screnci, Diane
Sent: Saturday, March 19, 2011 10:19 AM
To: Burnell, Scott
Subject: draft press release

From: Burnell, Scott
To: Screnci, Diane
Subject: FW: draft press release
Date: Saturday, March 19, 2011 11:42:00 AM

struggling to maintain composure

From: Couret, Ivonne
Sent: Saturday, March 19, 2011 11:41 AM
To: Burnell, Scott; Hardy, Sally; Akstulewicz, Brenda
Subject: RE: draft press release

Got it...Sally is prepping it will provide final document momentarily...SMILE

Ivonne L. Couret
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From: Burnell, Scott
Sent: Saturday, March 19, 2011 11:40 AM
To: Hardy, Sally; Akstulewicz, Brenda
Cc: Couret, Ivonne
Subject: RE: draft press release

Ivonne has the language for the link.

From: Hardy, Sally
Sent: Saturday, March 19, 2011 11:39 AM
To: Akstulewicz, Brenda; Burnell, Scott
Cc: Couret, Ivonne
Subject: RE: draft press release

Email me what you want the link to say on the Japan page

Sally

From: Akstulewicz, Brenda
Sent: Saturday, March 19, 2011 11:38 AM
To: Burnell, Scott; Hardy, Sally
Cc: Couret, Ivonne
Subject: RE: draft press release

Ooookaaaaaaa, I get it now!

SSSS/115

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Sent from my Blackberry

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Cc: Screnci, Diane
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Subject: FW: draft press release

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To: Burnell, Scott
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From: Hardy, Sally
To: Couret, Ivonne
Cc: Burnell, Scott; Akstulewicz, Brenda
Subject: RE: draft press release
Date: Saturday, March 19, 2011 11:48:05 AM
Importance: High

The link for the new faq will be:

<http://www.nrc.gov/japan/faqs-related-to-japan.pdf>

You can review the draft page at:

<http://webwork.nrc.gov:300/japan/faqs-related-to-japan.pdf> let me know when you want me to post live

Sally

From: Couret, Ivonne
Sent: Saturday, March 19, 2011 11:41 AM
To: Burnell, Scott; Hardy, Sally; Akstulewicz, Brenda
Subject: RE: draft press release

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To: Akstulewicz, Brenda; Burnell, Scott
Cc: Couret, Ivonne
Subject: RE: draft press release

Email me what you want the link to say on the Japan page

From: Burnell, Scott
To: Kammerer, Annie; Chokshi, Niles; Jones, Henry
Cc: Flanders, Scott; Raione, Richard; Flanders, Scott
Subject: RE: Journalist request from Nature
Date: Saturday, March 19, 2011 1:13:00 PM

I'll point the reporter at the outside experts, thanks.

From: Kammerer, Annie
Sent: Friday, March 18, 2011 9:58 PM
To: Burnell, Scott; Chokshi, Niles; Jones, Henry
Cc: Flanders, Scott; Raione, Richard; Flanders, Scott
Subject: RE: Journalist request from Nature

This makes me nervous. He specifically says "I am interested in speaking with scientists -- tsunami experts, seismological experts, hydrology experts, engineers - who have themselves looked closely at this issue, to see what research questions they have been asking and what research in this area remains to be done." That is not Rajiv. He doesn't know anything about the research being done now. As soon as I started the tsunami program and could take over the development tasks, he was happy to give it up because it is not his area of expertise.

Either Henry or I are much better choices; preferably Henry as he is really fantastic and I am really overloaded and he is my point of contact in NRO. Of course, Rajiv will probably just say that they should call the NRC.

They can also call

Eric Geist at the USGS Menlo park: egeist@usgs.gov
Uri ten Brink at the USGS Woods Hole: utenbrink@usgs.gov
Vasily Titov or Chris Moore at PMEL NOAA: Vasily.Titov@noaa.gov,
Christopher.Moore@noaa.gov

I don't believe that EPRI has a tsunami expert. The closest they have is Bob Kassawara, who does seismic work. RKASSAWA@epri.com

Not sure about NSF and NIST. I can ask the NEHRP team at NIST to see who NIST has if they really want a contact.

Annie

From: Burnell, Scott
Sent: Friday, March 18, 2011 5:46 PM
To: Chokshi, Niles; Jones, Henry
Cc: Flanders, Scott; Raione, Richard; Kammerer, Annie; Flanders, Scott
Subject: RE: Journalist request from Nature

Please reach out Rajiv so I can let the reporter know it's OK to talk to him. Thanks.

From: Chokshi, Niles
Sent: Friday, March 18, 2011 5:42 PM
To: Burnell, Scott; Jones, Henry
Cc: Flanders, Scott; Raione, Richard; Kammerer, Annie; Flanders, Scott
Subject: RE: Journalist request from Nature

5555/116

Scott,

My misunderstanding – I thought the request had come to us, Since the request was directed to the PNL, unless Richard has some good reason, we should not be stopping PNL. Of course, we will have to talk to Rajiv to make sure that he does speak for or implicate NRC.

Nilesh

From: Burnell, Scott
Sent: Friday, March 18, 2011 5:34 PM
To: Chokshi, Nilesh; Jones, Henry
Cc: Flanders, Scott; Raione, Richard; Kammerer, Annie
Subject: RE: Journalist request from Nature

Folks;

I'm sure Henry has something to say about it. Do any of you have any problems with PNNL talking to the reporter? Thanks.

Scott

From: Chokshi, Nilesh
Sent: Friday, March 18, 2011 5:10 PM
To: Burnell, Scott
Cc: Flanders, Scott; Raione, Richard; Kammerer, Annie
Subject: FW: Journalist request from Nature
Importance: High

Scott,

We would like to suggest Dr. Henry Jones of NRO. He is the staff expert on tsunami.

Nilesh

From: Munson, Clifford
Sent: Friday, March 18, 2011 2:47 PM
To: Chokshi, Nilesh; Raione, Richard
Subject: FW: Journalist request from Nature
Importance: High

Comments?

From: Burnell, Scott
Sent: Friday, March 18, 2011 2:42 PM
To: Munson, Clifford; Kammerer, Annie
Subject: FW: Journalist request from Nature
Importance: High

Folks;

Any objection to having Rajiv speak about the tsunami report? Any NIST/USGS/EPRI/NSF folks you can think to recommend? Thanks!

Scott

From: Nicola Jones [mailto:(b)(6)]
Sent: Friday, March 18, 2011 1:15 PM
To: Burnell, Scott
Subject: Journalist request from Nature

Dear Scott,

Many thanks for looking at this query while in your sleep deprived state!
I am investigating the topic of tsunami risks to nuclear facilities (current or future) in the United States for a possible story in the science journal Nature. We are poking around at the moment to see if there's something of value we could add to this conversation. I am interested in speaking with scientists -- tsunami experts, seismological experts, hydrology experts, engineers - who have themselves looked closely at this issue, to see what research questions they have been asking and what research in this area remains to be done. Perhaps, for example, Nature might be able to highlight research projects that the community thinks is important to get a better handle on the risks of tsunamis to nuclear facilities.

I found this document: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6966/> and feel that its author, Rajiv Prasad, might be an interesting person to speak to about this.

PNL is happy for me to speak with Rajiv if you are happy; they say all media requests must route through you first.

My deadline is end-of-day PST Monday.

Many thanks for your help in this matter.
Nicola.

--

Ms. Nicola Jones

(b)(6)

Science Journalist in Residence, UBC School of Journalism
Freelance Commissioning Editor, Opinion section, Nature (Tues / Wed / Thurs, 8am-5pm PST)
Freelance Reporter, Vancouver (Mon-Fri, 8am-5pm PST)
home office (b)(6)
cell (b)(6)

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From: Burnell, Scott
To: Nicola Jones
Bcc: Koller, Greg L; Kammerer, Annie
Subject: RE: Journalist request from Nature
Date: Saturday, March 19, 2011 1:24:00 PM

Hi Nicola;

As I'd mentioned on the phone, our folks are really focused on responding, and they feel Rajiv's time is also best spent on his work. They did suggest the following people:

Eric Geist at USGS Menlo park: egeist@usgs.gov
Uri ten Brink at USGS Woods Hole: utenbrink@usgs.gov
Vasily Titov or Chris Moore at PMEL NOAA: Vasily.Titov@noaa.gov,
Christopher.Moore@noaa.gov
The Electric Power Research Institute's best option is a seismic person, Bob Kassawara,
at RKASSAWA@epri.com

Please pardon the delay in getting all this to you. Thanks for your understanding.

Scott Burnell
Public Affairs Officer
Nuclear Regulatory Commission

From: Nicola Jones [mailto:(b)(6)]
Sent: Friday, March 18, 2011 1:15 PM
To: Burnell, Scott
Subject: Journalist request from Nature

Dear Scott,

Many thanks for looking at this query while in your sleep deprived state!
I am investigating the topic of tsunami risks to nuclear facilities (current or future) in the United States for a possible story in the science journal Nature. We are poking around at the moment to see if there's something of value we could add to this conversation. I am interested in speaking with scientists -- tsunami experts, seismological experts, hydrology experts, engineers - who have themselves looked closely at this issue, to see what research questions they have been asking and what research in this area remains to be done. Perhaps, for example, Nature might be able to highlight research projects that the community thinks is important to get a better handle on the risks of tsunamis to nuclear facilities.

I found this document: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6966/> and feel that its author, Rajiv Prasad, might be an interesting person to speak to about this.

PNL is happy for me to speak with Rajiv if you are happy; they say all media requests must route through you first.

My deadline is end-of-day PST Monday.

Many thanks for your help in this matter.
Nicola.

From: [Burnell, Scott](#)
To: [Nicola Jones](#); [Uselding, Lara](#); [Dricks, Victor](#)
Bcc: [Couret, Yvonne](#)
Subject: RE: Journalist request from Nature
Date: Monday, March 21, 2011 11:23:00 AM

Hi Nicola;

For your last, broadest question, the NRC is beginning the process of determining if any short-term actions are called for; possible permanent changes to our regulations (we call the process "rulemaking") will be considered over a much longer timescale.

Victor and Lara, my counterparts in our Arlington, TX, office deal most directly with San Onofre and Diablo Canyon and are in the best position to help you with site-specific questions. Thanks!

Scott

From: Nicola Jones [mailto:[\(b\)\(6\)](#)]
Sent: Monday, March 21, 2011 11:19 AM
To: Burnell, Scott
Subject: Re: Journalist request from Nature

Thanks Scott.

I'm also hoping for some official statements about the preparedness of the two nuclear plants currently in California to possible quakes and tsunamis. Is this best to get from you or from the plants themselves? Ideally I'd like to know:

- what is it regulated that these 2 plants must be able to withstand (a quake of what magnitude, for each? Is it mandated that they must be able to withstand a tsunami of a certain size?)
- what are the 2 plants currently designed to withstand (ie does this exceed the regulatory requirements?)
- are there any mandated upgrades or evaluations in terms of quake or tsunami preparedness ongoing at either plant?
- will the NRC reconsider its regulations regarding quake or tsunami preparedness for nuclear plants in the wake of the Japan disaster?

Again, my deadline is end of day today (Monday)
Many thanks,
Nicola.

On Sat, Mar 19, 2011 at 10:24 AM, Burnell, Scott <Scott.Burnell@nrc.gov> wrote:
Hi Nicola;

As I'd mentioned on the phone, our folks are really focused on responding, and they feel Rajiv's time is also best spent on his work. They did suggest the following people:

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Uri ten Brink at USGS Woods Hole: utenbrink@usgs.gov
Vasily Titov or Chris Moore at PMEL NOAA: Vasily.Titov@noaa.gov,

Christopher.Moore@noaa.gov

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Public Affairs Officer
Nuclear Regulatory Commission

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PNL is happy for me to speak with Rajiv if you are happy; they say all media requests must route through you first.

My deadline is end-of-day PST Monday.

Many thanks for your help in this matter.
Nicola.

--

Ms. Nicola Jones

(b)(6)

Science Journalist in Residence, UBC School of Journalism

Freelance Commissioning Editor, Opinion section, Nature (Tues / Wed / Thurs, 8am-5pm PST)

Freelance Reporter, Vancouver (Mon-Fri, 8am-5pm PST)

home office (b)(6)

cell (b)(6)

From: Screnci, Diane
To: Burnell, Scott
Subject: FW: STATEMENT FROM GOVERNOR ANDREW M. CUOMO
Date: Saturday, March 19, 2011 1:14:40 PM

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 1:09 PM
To: Screnci, Diane
Cc: Sheehan, Neil
Subject: Re: STATEMENT FROM GOVERNOR ANDREW M. CUOMO

Confirm meeting with sr staffer and 1:08:55 PM. Gov but no details yet on time and place.

Eliot Brenner

Director, Office of Public Affairs

US Nuclear Regulatory Commission

Protecting People and the Environment

301 415 8200

C: (b)(6)

Sent from my Blackberry

From: Screnci, Diane
To: Brenner, Eliot
Cc: Sheehan, Neil
Sent: Sat Mar 19 13:03:19 2011
Subject: FW: STATEMENT FROM GOVERNOR ANDREW M. CUOMO

Eliot,

Do we have a comment on this? Or anything details to provide? I'm being asked.

Thanks,
Diane

From: Robert Hennelly [mailto:(b)(6)]
Sent: Saturday, March 19, 2011 9:45 AM
To: Screnci, Diane
Subject: Fw: STATEMENT FROM GOVERNOR ANDREW M. CUOMO

From: Robert Hennelly
To: edit@wnyc.org; *Dept Newsroom; *Dept BL Show; *Dept Thetakeaway
Sent: Sat Mar 19 09:42:59 2011
Subject: Fw: STATEMENT FROM GOVERNOR ANDREW M. CUOMO

From: Press Office <Press.Office@exec.ny.gov>
To: Robert Hennelly
Sent: Sat Mar 19 09:36:10 2011
Subject: STATEMENT FROM GOVERNOR ANDREW M. CUOMO

SSSS/117



STATE OF NEW YORK | EXECUTIVE CHAMBER

ANDREW M. CUOMO | GOVERNOR

For Immediate Release: March 19, 2011

STATEMENT FROM GOVERNOR ANDREW M. CUOMO

"In light of the catastrophe in Japan, New Yorkers must know the facts regarding Indian Point and its latest risk assessment.

"After watching the events in Japan and having previously opposed the Indian Point plant, this past Tuesday, I requested the White House schedule a meeting between my staff and senior members of the Nuclear Regulatory Commission. That meeting has now been scheduled for Tuesday, March 22 with, among others, Lieutenant Governor Robert Duffy and Director of State Operations Howard Glaser.

"The purpose of the meeting will be to discuss the risks facing Indian Point in the event of an earthquake, how prepared Indian Point is to handle an earthquake, as well as what risk assessments have been completed regarding Indian Point.

"We are looking forward to a productive dialogue with the NRC."

###

Additional news available at www.governor.ny.gov

New York State | Executive Chamber | press.office@exec.ny.gov | 518.474.8418

From: Burnell, Scott
To: McIntyre, David
Subject: RE: did Annie K ever forward the slimmed down PUBLIC seismic talking points?
Date: Saturday, March 19, 2011 2:04:00 PM

He was on distro

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

From: McIntyre, David
Sent: Saturday, March 19, 2011 2:04 PM
To: Burnell, Scott
Subject: Re: did Annie K ever forward the slimmed down PUBLIC seismic talking points?

Do send to eliot tho

David McIntyre
NRC Office of Public Affairs
(b)(6) (mobile)
301-415-8200 (office)
Sent from my BlackBerry, which is wholly respnsble for all typos.

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

From: Burnell, Scott
To: McIntyre, David
Sent: Sat Mar 19 12:28:02 2011
Subject: RE: did Annie K ever forward the slimmed down PUBLIC seismic talking points?

Done and done. I've forwarded more thing to DOE contacts than you've had hot dinners!!! :-)

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

From: McIntyre, David
Sent: Saturday, March 19, 2011 12:26 PM
To: Burnell, Scott
Cc: Brenner, Eliot
Subject: RE: did Annie K ever forward the slimmed down PUBLIC seismic talking points?

Excellent. Eliot will want to forward to his DOE contact.

From: Burnell, Scott
Sent: Saturday, March 19, 2011 12:24 PM
To: McIntyre, David
Subject: RE: did Annie K ever forward the slimmed down PUBLIC seismic talking points?

Q&A yes, we're posting it to the Japan page soon.

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

From: McIntyre, David
Sent: Saturday, March 19, 2011 12:21 PM
To: Burnell, Scott
Subject: did Annie K ever forward the slimmed down PUBLIC seismic talking points?

SSSS/118

From: Burnell, Scott
To: Brenner, Eliot; Hayden, Elizabeth
Subject: RE: Updated Seismic Q&A from NRC
Date: Saturday, March 19, 2011 3:28:00 PM

First of all, I'm going to THROW MY BLACKBERRY INTO THE POTOMAC!!!!

I'm sorry, did I say that?

Seriously, the BB goes off before I leave here and I won't turn it on again before tomorrow night. My personal cell will be the only way to reach me tomorrow, is that cool?

April's coming to Rockville after work and we'll go have a nice dinner (I hear this Matchbox place is pretty good) and get reacquainted. Tomorrow will be haircuts and terribly boring stuff like that – gotta look nice for Monday, right?

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 3:16 PM
To: Burnell, Scott; Hayden, Elizabeth
Subject: Re: Updated Seismic Q&A from NRC

Ok by me. What are your plans for RandR? Believe you need some.

Eliot Brenner
Director, Office of Public Affairs
US Nuclear Regulatory Commission
Protecting People and the Environment
301 415 8200

C: (b)(6)

Sent from my Blackberry

From: Burnell, Scott
To: Brenner, Eliot; Hayden, Elizabeth
Sent: Sat Mar 19 15:12:43 2011
Subject: RE: Updated Seismic Q&A from NRC

Took care of Dan and I'm fried. Seems fairly quiet – may I go collapse in peace?

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 3:00 PM
To: Burnell, Scott
Subject: Re: Updated Seismic Q&A from NRC

Lochbaum yesterday or day before posted a list of 2010 near misses. Look at website. Many were NRC catches. Timing is very suspect.

Eliot Brenner
Director, Office of Public Affairs
US Nuclear Regulatory Commission
Protecting People and the Environment
301 415.8200

C: (b)(6)

Sent from my Blackberry

SSSS/119

From: Burnell, Scott
To: Leistikow, Dan <Dan.Lestikow@hq.doe.gov>; Brenner, Eliot
Sent: Sat Mar 19 14:54:36 2011
Subject: RE: Updated Seismic Q&A from NRC

Hi Dan;

Not sure which UCS blather you're referring to – is that their “2010 safety report?”

As for our 50-mile recommendation in Japan, we've said the NRC continues to believe existing U.S. emergency preparedness plans for immediate actions such as evacuation or sheltering/KI would not be necessary beyond 10 miles of a plant, and that those plans are sufficient to protect the population within 10 miles should anything occur at a plant. The agency also believes those 10-mile plans provide a solid basis for expanding actions beyond 10 miles if necessary.

On IP seismic issues – All U.S. reactors, including Indian Point, are meeting their requirements to safely ride out the strongest expected earthquakes at their sites, based on scientific review of at least 10,000 years of the geologic record at every site. The NRC does not rank nuclear power plants according to seismic risk. This “ranking” was developed by an MSNBC.com reporter using partial information (and an even more partial understanding, in the agency's view) of how the NRC evaluates plants for seismic risk. The numbers MSNBC.com used came from NRC research that reassessed nuclear plants in the central and eastern United States for their vulnerability to earthquakes, using new seismic data developed by geologists. The study's preliminary work has shown that some plants might have stronger ground motions than originally thought, although still within the plants' safety margins. These plants will do more research once more detailed analytical models are available later this year.

Scott

From: Leistikow, Dan [mailto:Dan.Lestikow@hq.doe.gov]
Sent: Saturday, March 19, 2011 2:31 PM
To: Burnell, Scott; Brenner, Eliot
Subject: Re: Updated Seismic Q&A from NRC

One last thing - do you have a bullet on the UCS report about 14 “near misses”

I don't think that was covered in the briefing you sent - apologies if I missed it

From: Leistikow, Dan
To: 'Scott.Burnell@nrc.gov' <Scott.Burnell@nrc.gov>; 'eliot.brenner@nrc.gov' <eliot.brenner@nrc.gov>
Sent: Sat Mar 19 14:29:09 2011
Subject: Re: Updated Seismic Q&A from NRC

First of all, I really appreciate the help you and your team have given us. This is a great document.

Just one more query from Secretary Chu: what is the situation with Indian Point, and the criticism about it being within 50 miles of NYC? How do you respond to concerns about that distance as well as specific safety concerns about that plant (and the report that it was the most unsafe)

From: Burnell, Scott <Scott.Burnell@nrc.gov>
To: Leistikow, Dan; Brenner, Eliot <Eliot.Brenner@nrc.gov>
Sent: Sat Mar 19 10:15:23 2011
Subject: Updated Seismic Q&A from NRC

Good Morning, Dan;

These are the NRC's latest seismic-related Q&A; we'll be posting to our website later this morning. Eliot wanted to make sure Secretary Chu had them for his prep materials. Please let me know if you have any questions.

Scott Burnell
NRC Public Affairs

From: Burnell, Scott
To: Brenner, Eliot
Subject: RE: Updated Seismic Q&A from NRC
Date: Saturday, March 19, 2011 3:00:00 PM

UCS website? Bleah!!!

From: Brenner, Eliot
Sent: Saturday, March 19, 2011 3:00 PM
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301 415 8200

C (b)(6)

Sent from my Blackberry

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Sent: Saturday, March 19, 2011 2:31 PM
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Sent: Sat Mar 19 10:15:23 2011
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Scott Burnell
NRC Public Affairs

From: Burnell, Scott
To: Leistikow, Dan; Brenner, Eliot
Subject: RE: Updated Seismic Q&A from NRC
Date: Saturday, March 19, 2011 3:04:00 PM

Ah, Eliot pointed me at the UCS... document. Here's what we've said about it.

The NRC is aware that UCS issued a report regarding U.S. nuclear power plant safety in 2010. The NRC remains focused on responding promptly and effectively to events in Japan. Once we have completed that important task, we'll review the UCS report in depth. At first blush it doesn't seem to break any new ground, since all U.S. plants met strict NRC requirements for operating safely over the past year. The NRC remains confident that our Reactor Oversight Program, which includes both on-site and region-based inspectors, is effectively ensuring U.S. nuclear power plants are meeting the NRC's requirements. Apart from that, President Obama has asked the NRC to do a comprehensive safety review of U.S. nuclear power plants, and we're responding to that request.

From: Leistikow, Dan [mailto:Dan.Leistikow@hq.doe.gov]
Sent: Saturday, March 19, 2011 2:31 PM
To: Burnell, Scott; Brenner, Eliot
Subject: Re: Updated Seismic Q&A from NRC

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Scott Burnell
NRC Public Affairs

From: Chip Cameron
To: Ann Bisconti; Tappert, John; Carl Paperiello; J Stewart Bland; Chris Grimes; Cool, Donald; Burnell, Scott; Hugh Thompson
Subject: Fwd: Japanese Children's animation to explain meltdown
Date: Sunday, March 20, 2011 9:29:50 PM

Friends. Thank you for all of your advice on my interview with the Japan Society.
The attached FYI!

----- Forwarded message -----

From: **David Weisman** <(b)(6)>
Date: Sun, Mar 20, 2011 at 12:25 AM
Subject: Japanese Children's animation to explain meltdown
To: (b)(6)
(b)(6)

Unreal. And yet real.

<http://www.youtube.com/watch?v=gXPN4dfBAGU>

DAVID

--

David Weisman

(b)(6)

SSSS/120

From: Burnell, Scott
To: Lewis, Doris
Cc: Brenner, Eliot; Bush-Goddard, Stephanie; Garry, Steven
Subject: RE: WSJ
Date: Monday, March 21, 2011 8:10:00 AM

The reporter seemed satisfied with the '08 version, I'll let you know if she asks for the latest. Thanks very much!

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

From: Lewis, Doris
Sent: Monday, March 21, 2011 8:09 AM
To: Burnell, Scott
Cc: Brenner, Eliot; Bush-Goddard, Stephanie; Garry, Steven
Subject: RE: WSJ

Hi All,

The 2008 publication of NUREG-0713 is on the website, www.reirs.com, and can be found under the section "Available Annual Reports." The document can be downloaded in pdf.

The 2009 publication has not yet been published or posted to the web. However, if there is specific information that is needed from the 2009 document, please contact me.

Thanks,
Doris
301-251-7559 *del*

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

From: Burnell, Scott
Sent: Saturday, March 19, 2011 7:56 AM
To: Garry, Steven; Lewis, Doris
Cc: Brenner, Eliot
Subject: RE: WSJ

Stever;

Thanks for responding on vacation. Doris, if we have a link or PDF or something for the latest document that'd be very helpful.

Scott

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

From: Garry, Steven
Sent: Saturday, March 19, 2011 7:51 AM
To: Burnell, Scott
Subject: RE: WSJ

Scott,

I am on vacation, and Doris handles this. However, I think the 2009 report has been published, and possibly the web site not updated.

The 2009 "data" was submitted by power plants in April, 2010. Then Derek analyzes it, and normally publishes the draft report in December 2010, and NRC HP staff reviewed the 2009 draft report in December and it should have been published it in January, 2011.

Steve

SSSS/121

From: Burnell, Scott
Sent: Friday, March 18, 2011 8:02 PM
To: Brenner, Eliot; Smith, Rebecca
Subject: RE: WSJ

Rebecca;

I think I can finally prove useful to you this week...

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0713/>

The report trails by a couple of years, but the last one was issued Jan. 10. Not sure when the next issue will make it on to the Web, I'll check with the staff.

Scott

From: Brenner, Eliot
Sent: Friday, March 18, 2011 7:27 PM
To: Burnell, Scott
Subject: WSJ

Scott: I talked earlier with Rebecca Smith. She had some detailed question re BWR automatic scram rates and also was looking for some exposure data on the u.s. workforce for BWRs. The journal has some rather ugly operation data for TEPCO and wants to compare it. Not sure we can fill the request, but thought I would ask.

Eliot

Eliot Brenner
Director, Office of Public Affairs
Nuclear Regulatory Commission
Rockville, Md.
O: 301-415-8200
C: (b)(6)

From: [Harrington, Holly](#)
To: [Burnell, Scott](#)
Subject: FW: Near final Interagency PAG on KI announcements
Date: Monday, March 21, 2011 10:11:33 AM
Attachments: [20110321 - Interagency PAG on KI.docx](#)

Apparently this document did not receive NRC review. Can you run by the PMT for high-level heartburn?

From: CDC IMS JIC Lead -2 [<mailto:eocjiclead2@cdc.gov>]
Sent: Monday, March 21, 2011 10:01 AM
To: Harrington, Holly
Cc: CDC IMS JIC Lead -2
Subject: FW: Near final Interagency PAG on KI announcements

Holly,

I didn't see you in this chain. Forwarding FYI. I will send the document Guidance for American Citizens in Japan when I can.

Regards,
Lisa
JIC Co-Lead/Japan EQ Response
(Email) eocjiclead2@cdc.gov

From: 2011 Japan Earthquake (CDC)
Sent: Monday, March 21, 2011 9:38 AM
To: CDC IMS JIC Lead -2; CDC IMS JIC Triage -2; CDC IMS Scientific Response Section Chief -2; CDC IMS Incident Manager Senior Advisor
Cc: 2011 Japan Earthquake (CDC)
Subject: FW: Near final Interagency PAG on KI announcements

FYI

Matthew Nunn
CDC 2011 Japan Earthquake Response Coordinator
eocevent49@cdc.gov
404-553-7746

From: EOC Report (CDC)
Sent: Monday, March 21, 2011 9:25 AM
To: 2011 Japan Earthquake (CDC)
Subject: FW: Near final Interagency PAG on KI announcements

FYI

From: Frieden, Thomas (Tom) (CDC/OD)
Sent: Monday, March 21, 2011 9:22 AM
To: EOC Report (CDC)
Subject: FW: Near final Interagency PAG on KI announcements

SSSS/122

From: Hayden, Caitlin [mailto:(b)(6)]
Sent: Monday, March 21, 2011 8:32 AM
To: #PRESS; 'HammerMA@state.gov'; 'changbe@state.gov'; (b)(6);
(b)(6); Shapiro, Nicholas S.; Russel, Daniel R.; Rhodes, Benjamin J.; Petrou, Laura
(HHS/OS); Frieden, Thomas (Tom) (CDC/OD); Bader, Jeffrey A.; Reed, Richard A.;
'BronkeHM@state.gov'; 'tonerm@state.gov'
Subject: RE: Near final Interagency PAG on KI announcements

All: Attached is an updated version of the interagency press guidance. I've highlighted new additions in yellow, as well as highlighted those points that I think need to be checked closely by State. Would appreciate having final comments by 9:30 or so, if possible. Thanks! --Caitlin

From: Hayden, Caitlin
Sent: Monday, March 21, 2011 2:12 AM
To: #PRESS; 'HammerMA@state.gov'; 'changbe@state.gov'; (b)(6);
(b)(6); Shapiro, Nicholas S.; Russel, Daniel R.; Rhodes, Benjamin J.;
'Laura.Petrou@hhs.gov'; 'bxf2@cdc.gov'; Bader, Jeffrey A.; Reed, Richard A.
Subject: Fw: Near final Interagency PAG on KI announcements

All: Attached is almost final guidance that can be used by any of our agencies if asked about the forthcoming announcements that KI will be made available to USG personnel and dependents in specified areas of Japan. If you have improvements or edits, please send along. If Embassy Tokyo needs to use this while we sleep, you should be on safe footing given how many experts have read this here tonight. Thanks! --CH

Ps--Thanks to everyone who helped get this done!

From: Caitlin Hayden <(b)(6)>
To: Hayden, Caitlin
Sent: Mon Mar 21 02:04:15 2011
Subject: Near final Interagency PAG on KI announcements

Attachment 20110321 - Interagency PAG on KI.docx (21340 Bytes) cannot be converted to PDF format.

From: Burnell, Scott
To: Brenner, Eliot
Subject: Fw: ANALYSIS-US gas market, unable to export, eyes nuclear outages
Date: Monday, March 21, 2011 10:40:50 AM

Any pushback needed on "uninformed speculation?" Just asking -- Idiots will make guesses regardless.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Jeanine.Prezioso@thomsonreuters.com <Jeanine.Prezioso@thomsonreuters.com>
To: Jeanine.Prezioso@thomsonreuters.com <Jeanine.Prezioso@thomsonreuters.com>
Cc: Jeanine.Prezioso@thomsonreuters.com <Jeanine.Prezioso@thomsonreuters.com>
Sent: Mon Mar 21 10:38:27 2011
Subject: ANALYSIS-US gas market, unable to export, eyes nuclear outages

Passing on.

07:00 21Mar11 -ANALYSIS-US gas market, unable to export, eyes nuclear outages

- * 3.6 bcfd would replace 20 pct of lost US nukes
- * Gas likely to fill a void left if nukes go offline
- * Gas prices up 7 percent last week

By Jeanine Prezioso

NEW YORK, March 21 (Reuters) - The U.S. natural gas market's rally last week, its biggest this year, may have less to do with an anticipated Japanese import boom than with fears about short-term safety measures in the U.S. nuclear sector.

The U.S. government has so far refrained from the kind of knee-jerk reaction to Japan's nuclear crisis that prompted Germany to shut down a quarter of its oldest plants, but U.S. traders are increasingly anxious that more rigorous inspections or other measures could yet crimp nuclear power use.

Slicing into nuclear power would create a vacuum for other fuels to replace the lost generation -- likely natural gas as the nation has potentially more than a hundred years of supply trapped in between layers of underground rock.

If operators were to shut all the General Electric Co <GE.N> Mark 1 boiling water reactors -- the type damaged in the Japanese quake and tsunami -- operating in the United States for for one month it would reduce overall nuclear power generation by 20 percent and potentially boost gas demand by 3.6 billion cubic feet per day -- more than 5 percent of current demand.

A worst-case scenario involving the Nuclear Regulatory Commission ordering all U.S. reactors to shut is not expected, but some market watchers are already starting to factor in longer stretches of outages for bolt-specific checks of plants that provide about a fifth of the country's electricity.

(GRAPHIC: <http://link.reuters.com/ryz58r>)

"We could imagine the NRC requesting a timeout over coming months for each plant to come offline and take a full assessment of safety equipment performance," said analysts at Credit Suisse

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in a report issued last week.

Prices for U.S. natural gas spiked sharply between the day the earthquake occurred on March 11 and Thursday, with June and July contracts gaining around 7 percent each and benchmark futures climbing over the \$4-per-million-British-thermal-units level for the first time in two weeks, as public concern began to mount on how U.S. nuclear capacity might be affected.

Even so, there is little cause for a direct impact on the U.S. market as a result of the likely surge in liquefied natural gas (LNG) imports by Japan, which needs the fuel to compensate for its shut nuclear plants.

U.S. LNG imports have already shrunk to near zero as a result of the domestic shale gas boom that's depressed prices. Proposed terminals to export LNG from the United States are years away.

"Bullish punts are...mostly based on market position and technical landscape, but also emerging concerns on whispers of upcoming "spot checks"/inspections of domestic nukes nationwide," Michael Guido, director of energy hedge fund sales for Macquarie Bank in New York, told the Reuters North American Power & Gas Forum, an online forum for power and gas traders.

GERMANY JUMPS, U.S. SUPPORTS

Amid a predictable knee-jerk reaction to talk tough on tightening regulations for the nuclear industry around the world, only German Chancellor Angela Merkel took the additional step of shutting seven of Germany's older nuclear power plants following the disaster in Japan.

[ID:nLDE72E176]

President Barack Obama said on Thursday he had requested a comprehensive review of U.S. nuclear facilities, maintaining his support for atomic energy. [ID:nN17190337]

U.S. regulators still have an ear toward Japan and international nuclear regulatory groups, to discern exactly what went wrong before they slap a set of new instructions onto local plant operators.

The NRC will hold a meeting on Monday "to examine the staff's ongoing response to events in Japan," said NRC spokesman Scott Burnell, declining any further comment on possible additional safety measures the NRC could take.

Following the Three Mile Island disaster more than 30 years ago, U.S. officials tightened physical plant design standards and required plants to build their own training simulator, but they did not order any existing plants to close.

There seems even less reason to do so this time around: The root cause of the accident in Japan was a tsunami that caused power outages and back-up generators to fail; as a result, Tepco was unable to cool down fuel in the reactors, which shut as planned when the massive earthquake struck.

WORST CASE SCENARIO

The NRC governs the specifics of refueling and maintaining a nuclear power plant but does not impose time requirements on when an outage needs to occur.

Generally plants are taken offline to refuel every 12, 18 or 24 months in spring and fall when demand is slack for several weeks at a time.

The wild card would be whether findings from any inspections would lead the U.S. to scrap that type of GE reactor entirely and spur a redo.

"It's reasonable to assume there's going to be inspections which may involve some downtime and it's economic to combine them with refueling outages if it's not urgent," said Jone-Lin Wang,

managing director of global power in Washington, D.C., for consultancy IHS-CERA. "If you're in imminent danger you're not going to wait until your next refueling."

The GE reactor that suffered damages in Japan operates in 23 power plants in the U.S. representing some 20 percent of U.S. nuclear power. Right now, of that total, about 4,000 MW are offline for seasonal maintenance.

If the balance were to go offline and were replaced only with gas-fired combined cycle generation, gas demand would increase by 2.9 bcfd.

If all that capacity were to go offline, it would mean a 3.6 bcfd increase in natural gas demand, or 5.6 percent increase over current U.S. gas demand over the long term, according to calculations by Bentek Energy, an arm of Platts.

Still, with the amount of natural gas producers are churning out, it will likely take more than a full-scale nuclear plant panic to keep prices elevated for long.

"I think you'd have this unknown around the duration and that would support gas prices," said Dave Pursell, a natural gas analyst with Tudor Pickering Holt & Co. in Houston. "That would be enough to take gas to the mid-\$4s to high \$4s. It would clearly be bullish for gas." (Additional reporting by Scott DiSavino; Editing by Alden Bentley) ((jeanine.prezioso@thomsonreuters.com; +1 646 223 6241 Reuters Messaging: jeanine.prezioso.reuters.com@reuters.net))

Keywords: US NATGAS/JAPAN

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From: Burnell, Scott
To: [Bowman, Eric](#); [Courret, Ivonne](#)
Subject: FW: Technical assumptions for 50 miles exclusion zone Fukushima
Date: Monday, March 21, 2011 12:39:00 PM
Attachments: [Follow up on previous e-mail.msg](#)
[Questions on the NRC Bulletin NRC INFORMATION NOTICE 2011-05 March 18 2011.msg](#)

My read is that they also fall under the public inquiry category – if it's not from an existing utility, industry group or government agency, default to forwarding it to OPA.

From: Bowman, Eric
Sent: Monday, March 21, 2011 12:34 PM
To: Burnell, Scott
Subject: RE: Technical assumptions for 50 miles exclusion zone Fukushima

Thanks Scott. I also received the two attached that more closely address the IN, but are not really on topic. Should I reply, or will you address his inquiries?

Eric

From: Burnell, Scott
Sent: Monday, March 21, 2011 12:32 PM
To: Courret, Ivonne
Cc: Bowman, Eric
Subject: FW: Technical assumptions for 50 miles exclusion zone Fukushima

Thanks Eric, that'll go into our public inquiry file.

From: Bowman, Eric
Sent: Monday, March 21, 2011 12:28 PM
To: Burnell, Scott
Subject: FW: Technical assumptions for 50 miles exclusion zone Fukushima

Scott,

I received this inquiry over the weekend regarding press release 11-050. Would you be the appropriate point of contact to address this? I believe she chose to send it to me since I am the technical POC for the recent IN 2011-05.

Thanks!

Eric

Eric E. Bowman
Sr. Project Manager
Generic Communications & Power Uprate Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
301-415-2963
Eric.Bowman@nrc.gov

5555/124

From: (b)(6) [mailto:(b)(6)]
Sent: Saturday, March 19, 2011 10:49 AM
To: Bowman, Eric
Subject: Technical assumptions for 50 miles exclusion zone Fukushima

I would like to understand the basis for the "50 miles sheltering zone" recommendation of the NRC around Fukushima.

Is it the nuclear explosion of the 9 source terms on site?

Is it the nuclear explosion of one 850 MW reactor?

Something else?

To my knowledge, the attachment 11-050 gives NO scientific/technical basic assumptions for its computerized calculations.

Thanks for your response.

Catherine GAUJACQ

(b)(6)

Attachment Follow up on previous e-mail_1.msg (2560 Bytes) cannot be converted to PDF format.

attachment Questions on the NRC Bulletin NRC INFORMATION _1.msg (2560 Bytes) cannot be converted to PDF format

From: SIMON LOMAX, BLOOMBERG/ NEWSROOM;
To: Brenner, Eliot
Cc: Burnell, Scott
Subject: (BN) Nuclear Board's Jaczko Grabs Investor Attention on
Date: Monday, March 21, 2011 1:28:19 PM

Hi Eliot and Scott,
FYI, here's the profile that my eds put on the wire a little earlier. Thanks both for your help today and hope you feel better soon, Eliot.
Cheers,

Simon Lomax
Bloomberg News
202-654-4305 (w)
(b)(6) (c)
slomax@bloomberg.net

+-----+
Nuclear Board's Jaczko Grabs Investor Attention on Japan Crisis
2011-03-21 16:35:39.392 GMT

(See EXT2 <GO> for special report on nuclear crisis.)

By Jim Efstathiou Jr. and Simon Lomax

March 21 (Bloomberg) -- Investors seeking some direction on the potential severity of Japan's nuclear crisis got it from a person most probably hadn't heard of until last week.

"We believe that the secondary containment has been destroyed and there is no water in the spent-fuel pool," Gregory Jaczko, chairman of the U.S. Nuclear Regulatory Commission, said at a congressional hearing on March 16. "We believe that radiation levels are extremely high."

Stocks fell from the U.S. to Russia, with the Standard & Poor's 500 Index ending the day down 2 percent. Currencies including the Australian dollar and Indonesian rupiah also fell, along with crude oil and copper. Market commentaries for an array of investments cited Jaczko's remarks.

Japan's nuclear crisis has thrust the agency that regulates U.S. atomic power plants into the spotlight. Policy makers and financial markets alike are listening to its chairman, a 40-year-old native of upstate New York who associates say has been one of the most aggressive advocates of nuclear safety on the five-member commission.

Some lawmakers "probably might have had trouble telling you what NRC stood for" before the crisis in Japan, said Kevin Cook, a former senior Republican aide on the House Appropriations Committee. "Now it's taken a much higher profile," Cook, now a Prescott, Arizona-based energy consultant, said in an interview.

Fifty Miles

On the same day he testified to Congress, Jaczko briefed President Barack Obama on conditions at the Fukushima Dai-Ichi nuclear plant. Based on his assessments, the U.S. Embassy in

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Japan ordered that American citizens stay 50 miles (80 kilometers) from the reactor complex. Japanese officials had ordered an evacuation to about 12 miles away.

While the Associated Press said Japanese officials denied that the cooling pond at one of the reactors had dried up, a condition that could cause spent fuel rods to ignite and release radiation, Jaczko stood by his comments then, and again yesterday on C-Span.

"I really can't say that I have views on nuclear power or the nuclear industry," he said. "I have views on nuclear safety." His conclusion was based on reports from NRC experts on the scene, he said.

Attention on Jaczko and his commission will continue this week, starting with a public briefing on Japan today at the agency's headquarters in Rockville, Maryland, north of downtown Washington. Hearings are scheduled on reactor safeguards on March 24.

No 'Stern Taskmaster'

The crisis at the Japan plant may be "on the verge of stabilizing," Bill Borchardt, the NRC's executive director of operations, said at today's briefing.

The NRC, created by Congress to regulate nuclear safety in 1974, hasn't been as vigilant as its chairman might wish, said Representative Dennis Kucinich, an Ohio Democrat.

"He impresses me as someone who wants to do the right thing and of course the NRC has a tradition of not so much being a stern taskmaster of the industry," Kucinich said.

Jaczko, who declined through a spokesman to be interviewed, was nominated to the NRC in 2005 by President George W. Bush and named chairman by President Barack Obama in 2009. He earned a bachelor's degree in physics and philosophy at Cornell University in Ithaca, New York, before completing a doctorate in physics at the University of Wisconsin at Madison, according to the NRC.

Before joining the NRC, Jaczko was science adviser to current Senate Majority Leader Harry Reid, a Nevada Democrat, and worked for Representative Edward Markey, a Massachusetts Democrat and critic of nuclear power.

Losing Side

Jaczko has been on the losing side of NRC votes to strengthen safety measures, said Edwin Lyman, a physicist and expert on nuclear plant design at the Cambridge, Massachusetts-based Union of Concerned Scientists.

Greater exposure as a result of the crisis in Japan may translate into more pressure from Congress as the NRC prepares to rule on new nuclear reactor designs this year, Lyman said.

Last year, Jaczko ordered the NRC's staff to stop considering a proposed nuclear waste repository at Yucca Mountain, Nevada, a move that angered Republican lawmakers who say he overstepped his authority. Reid, Jaczko's former boss, was a vocal critic of the Yucca Mountain plan.

The NRC is "under tremendous pressure on the Hill as well as from industry to accelerate licensing actions," Lyman said yesterday on a conference call with reporters.

Quake, Tsunami

Jaczko said on C-Span yesterday that the NRC should be able to complete its review of failures at the crippled Fukushima plant before reaching a decision on new reactor licenses in the U.S. He compared the commission's work to its review of security measures at nuclear plants after the Sept. 11 terrorist attacks, which led to a requirement that operators add backup equipment to cool reactors and spent fuel pools.

"We think we have programs in place that would deal with the kinds of situations that we're seeing in Japan," he said on C-Span.

The crisis at the Fukushima plant began after it was struck March 11 by an earthquake and tsunami. The natural disasters knocked out backup generators needed to power systems to keep cool reactor fuel and spent nuclear fuel stored on site.

There are about 100 similar storage pools at about 60 sites in the U.S., said Robert Alvarez, a senior scholar at the Institute for Policy Studies and a former policy adviser to the U.S. Energy Department.

Major Test

A major test of the NRC will be how the agency addresses the issue of spent fuel storage, Alvarez said. Jaczko, who Alvarez characterized as "a straight shooter," may end up in the minority, he said.

"Even though he's chairman, there are other commissioners and he's just one vote," Alvarez said in an interview. "In order to fill seats on that commission, you have to get the OK from the nuclear industry."

Nuclear plant operators had misgivings about Jaczko when he joined the NRC and then became chairman, Kai Anderson, who served with Jaczko on Reid's staff, said in an interview. Jaczko was considered an "aggressive regulator," said Anderson, now a lobbyist at Cassidy & Associates in Washington.

"He's going to be the best thing that's happened to them in the last couple of decades because he's actually a real regulator," Anderson said. "If Greg Jaczko tells me something's safe, I believe him."

For Related News and Information:

Japan Catastrophe Portal: JCAT <GO>

BMAP of Disasters: BMAP 80438 <GO>

Japan Markets Monitor: OTC JPY <GO>

News Trends TREND <GO>

--With assistance from Kim Chipman in Washington. Editors: Joe Winski, Steve Geimann

To contact the reporters on this story:

Jim Efstathiou Jr. in New York at +1-212-617-1647 or jefstathiou@bloomberg.net and Simon Lomax in Washington at +1-202-654-4305 or slomax@bloomberg.net

To contact the editor responsible for this story:

Larry Liebert at +1-202-624-1936 or lliebert@bloomberg.net.

From: McIntyre, David
To: Kammerer, Annie; Harrington, Holly
Cc: Brenner, Eliot; Hayden, Elizabeth; Munson, Clifford; Ake, Jon; Burnell, Scott
Subject: RE: FAQ questions posted
Date: Monday, March 21, 2011 2:27:14 PM

This answer has been changed; the corrected version will be posted shortly. Or eventually.

From: Kammerer, Annie
Sent: Sunday, March 20, 2011 10:11 PM
To: Harrington, Holly
Cc: McIntyre, David; Brenner, Eliot; Hayden, Elizabeth; Munson, Clifford; Ake, Jon; Burnell, Scott
Subject: RE: FAQ questions posted

I just saw a second document entitled, "**Frequently Asked Questions About the Japan Nuclear Crisis: 'Can It Happen Here?'**"

There is an error in the question:

Are nuclear power plants along the coasts vulnerable to tsunami?

Large tsunami such as the one that hit Japan typically are caused by "subduction" faults, where one tectonic plate slides under another. There is only one such fault near the U.S. coastline – off the northern part of the West Coast, from northern California up past Oregon and Washington. There are no coastal nuclear power plants in this region. The closest plant, in southern California, is well protected against tsunami. Along the Gulf Coast and the Atlantic Coast, storm surge from hurricanes poses a greater threat than tsunami to nuclear power plants. The plants in these regions are well protected against hurricane storm surge.

The closest plant is Diablo canyon. Most people from California (myself included) would not call the region that Diablo is in "southern California", but rather the central California coast. SONGS is in So. Cal. We can't really say that SONGS is "well protected against tsunami"...it's adequately protected. Also, this makes it seem like hurricanes are always a greater threat than tsunami. The NRC's tsunami research program is showing that this is not true on the north Atlantic coast. As you get toward the moderate seismic zone in coastal Canada, the tsunami exceeds the storm surge due to the potential for large local tsunami from seismically-induced landslides.

A better answer is:

Large tsunami such as the one that hit Japan typically are caused by faults located in "subduction" zones, where one tectonic plate slides under another. There is only one such fault near the U.S. coastline – off the northern part of the West Coast, from northern California up past Oregon and Washington. There are no coastal nuclear power plants in this region. The closest coastal plant, located along the central California coastline is the Diablo Canyon nuclear plant. This nuclear plant is well protected against tsunami. Along the Gulf Coast and the Atlantic Coast, storm surge from hurricanes generally poses a greater threat to nuclear plants than tsunami. The plants in these regions are well protected against hurricane storm surge.

From: Harrington, Holly
Sent: Sunday, March 20, 2011 11:34 AM
To: Kammerer, Annie
Cc: McIntyre, David; Brenner, Eliot; Hayden, Elizabeth; Munson, Clifford; Ake, Jon; Burnell, Scott
Subject: RE: FAQ questions posted

Thanks Annie.

Eliot/Beth: Do we think this can wait until Monday to be updated on the Web?

Holly

From: Kammerer, Annie
Sent: Sunday, March 20, 2011 11:31 AM
To: Harrington, Holly
Cc: McIntyre, David; Brenner, Eliot; Hayden, Elizabeth; Munson, Clifford; Ake, Jon
Subject: RE: FAQ questions posted

Change it to this....

"Magnitude is measured on a log scale and so a magnitude 9 earthquake produces about ten times stronger shaking and releases about 31 times more energy than a magnitude 8 earthquake."

I was trying to keep things simple to be more user friendly. I thought that people would find this confusing a little. People feel wave amplitude, not energy...so I chose the thing that people could relate to. But engineers, like Christine, think about energy absorption in structures.

Anyway, just so you know, Christine is a good friend of mine and she is supported as full time staff (the project manager) on

SSSS/126

a major research project funded by NRC, DOE, EPRI and the USGS (called NGA-East). So, she's very protective of the NRC and is on the lookout for anything that may related to us and is inaccurate, or can be misinterpreted. She's one of the many people out there who have our backs when it comes to what is going out in the press.

Annie

P.S. This is straight from a USGS fact sheet. "Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value."

From: Harrington, Holly
Sent: Sunday, March 20, 2011 10:50 AM
To: Kammerer, Annie
Cc: McIntyre, David; Brenner, Eliot; Hayden, Elizabeth
Subject: RE: FAQ questions posted

Please see comment below. Please let me know if this document needs to be changed.

From: Christine Goulet [<mailto:goulet@berkeley.edu>]
Sent: Saturday, March 19, 2011 5:54 PM
To: OPA Resource
Subject: ERROR in your answers to faqs related to Japan document

Good afternoon,

I just opened your pdf at <http://www.nrc.gov/japan/faqs-related-to-japan.pdf> and found a **major error** in the answer to question 1. At the bottom of the answer, "ten times" should be replaced by "approximately 32 times":
"Magnitude is measured on a log scale and so a magnitude 9 earthquake is ten times larger than a magnitude 8 earthquake."

I hope this can be corrected soon!

Sincerely,

Christine Goulet, PhD
Assistant Researcher
NGA East TI team co-chair
Pacific Earthquake Engineering Research Center (PEER),
University of California, Berkeley

Tel (510) 374-4620
goulet@berkeley.edu

From: Kammerer, Annie
Sent: Saturday, March 19, 2011 5:25 PM
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffrey; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas; Webb, Michael; Manoly, Kamal; Khanna, Meena; Scrend, Diane; Thomas, Eric; Nguyen, Quynh; Meighan, Sean; FOIAResource.hoc@nrc.gov
Subject: FAQ questions posted

All,

For your reading enjoyment, and in anticipation of the end of cycle meetings in the regions next week, the NRC has issued a press release announcing a publically available set of FAQs on the earthquake and tsunami.

I hope people find it helpful!

Cheers,
Annie

PS special thanks to Jennifer Uhle who stayed after her overnight shift in the Ops Center to review and provide outstanding comments that really improved the document.

From: Kammerer, Annie
Sent: Saturday, March 19, 2011 9:00 AM
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson,

Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffery; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas; Webb, Michael; Manoly, Kamal; Khanna, Meena; Screnci, Diane; Thomas, Eric; Nguyen, Quynh; Meighan, Sean; FOIAResource.hoc@nrc.gov
Subject: Seismic Q&As March 19th 8am update

All,

Here is today's updated version. Lot of new fact sheets have been prepared for various briefings and for Monday's public meeting!

However, the big news of the day is that we just sent off a 6 page, 22 question, much better edited version for a public Q&A set. It's all in OPA's capable hands now. I think it's pretty good...but then I'm biased.

Cheers,
Annie

From: Kammerer, Annie
Sent: Friday, March 18, 2011 6:51 AM
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffery; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas; Webb, Michael; Manoly, Kamal; Khanna, Meena; Screnci, Diane; Thomas, Eric; Nguyen, Quynh; Meighan, Sean
Subject: RE: Seismic Q&As March 18th 5am update

All,

Please see the updated version of the Seismic Q&As.

Among today's highlights:

- *We added a Terms and Definitions section at the end of the document. (We know that an acronyms list would be helpful too, but it will have to wait a little)
- *The "additional information" section has been split into tables, plots, and fact sheets
- *A high-level draft fact sheet on NRC's seismic regulations has been added
- *We added a section to track outstanding questions that have come in from congress. This will support those who get the tickets in the short terms (most likely NRR). The questions will be moved to the appropriate sections long term (as long as they are not duplicates.)

I'm sure we all agree this has been a crazy week! We're hoping that the weekend workload is lighter (if only because we won't get as many email from in house) and we can clean up this document and fill in some of the missing answers in preparation for the news story changing. We're trying hard to get out in front of the next wave.

Cheers,
Annie

From: Kammerer, Annie
Sent: Thursday, March 17, 2011 2:36 AM
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Glitter, Joseph; Howe, Allen; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Munson, Clifford; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Murphy, Andrew; Pires, Jose; Hogan, Rosemary; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffery; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas
Subject: Seismic Q&As March 17th 2am update

All,

As promised, a sharepoint site has been set up where our friends in NRR will be posting the latest version of the Seismic Q&A document on an ongoing basis. If someone would prefer to use the sharepoint site, instead of being on this distribution list, please let me know...

<http://portal.nrc.gov/edo/nrr/NRR%20TA/FAQ%20Related%20to%20Events%20Occuring%20in%20Japan/Forms/AllItems.aspx>

This latest update has a number of new questions (not many with answers today, but we are working hard). A high priority question we are working on is "how many plants are near a mapped active fault". We're focusing on anything within 50 miles. We're also pulling relevant questions from the congressional inquiries we just received; and will also give these high priority to support any needs by NRR.

Many new figures and some draft fact sheets have added to the "additional information" section. These include the NRO half of a tsunami fact sheet...a description of the tsunami research is still to come from RES.

Some good news: Yesterday's version seems to have been widely forwarded around the agency. So, we are also starting to get some excellent questions from staff looking forward. This is allowing us to feel that we are finally getting out in front of things to a small degree. Also, our team has grown and we now have someone acting as source of seismic expertise for the 11pm to 7 am shift. This means that we now have seismic experts available to the RST and OPA at the Op Center 24 hours, with 2 people during the day. That extra support is allowing us to get this out at least an hour earlier today ☺

We are continuing to compile the questions that come in and update the seismic Q&A document. If you have suggested changes, or want to provide missing answers, please forward them to me for compilation.

This is a living document and will be updated daily in the foreseeable future.

Happy St. Paddy's Day. May the world (especially our friends in Japan) have the luck of the Irish today.

Cheers,
Annie

Dr. Annie Kammerer, PE
Senior Seismologist and Earthquake Engineer
US Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
Washington DC 20555

(b)(6) mobile

(b)(6) BB

From: Kammerer, Annie
Sent: Tuesday, March 15, 2011 3:41 AM
To: Hiland, Patrick; Skeen, David
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Giltter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Kammerer, Annie; Chokshi, Nilesh; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Giltter, Joseph; Howe, Allen; Case, Michael; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Munson, Clifford; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Murphy, Andrew; Pires, Jose; Hogan, Rosemary; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael
Subject: latest version of Q&As

All,

This is the first draft of the seismic-specific Q&As. It is pretty rough and there are many answers still missing, but people have contributed a lot and we thought it may be useful for many people trying to answer questions coming in.

We are continuing to compile the questions that come in and update the seismic Q&A document. If you have suggested changes, or want to provide missing answers, please forward them to me for compilation.

This is a living document and will be updated daily in the foreseeable future.

Annie

Dr. Annie Kammerer, PE
Senior Seismologist and Earthquake Engineer
US Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
Washington DC 20555

(b)(6) mobile

(b)(6) BB

From: [Burnell, Scott](#)
To: [Lobsenz, George](#)
Subject: RE: Jaczko remarks at meeting today
Date: Monday, March 21, 2011 2:54:00 PM

Stay tuned, that's all I know.

FWIW, I hate Starbucks coffee, and I've been forced to have it twice in the past three days. That's how insane things are.

From: Lobsenz, George [mailto:[\(b\)\(6\)](#)]
Sent: Monday, March 21, 2011 2:54 PM
To: Burnell, Scott
Subject: RE: Jaczko remarks at meeting today

thanks for quick response Scott--will something develop today?

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Monday, March 21, 2011 2:51 PM
To: Lobsenz, George
Subject: RE: Jaczko remarks at meeting today

Hi George, long time no hear...

Short answer is stay tuned to the home page and see what develops. Thanks.

Scott

From: Lobsenz, George [mailto:[\(b\)\(6\)](#)]
Sent: Monday, March 21, 2011 2:49 PM
To: Burnell, Scott
Subject: Jaczko remarks at meeting today

Hi Scott--I listened to the NRC webcast today and heard the chairman refer at the end to a "proposal" that was circulating, presumably among commissioners. Was this a proposal for regulatory response to the Japan accident from NRC staff?

I heard no previous reference in the webcast to such a proposal?

anything you can tell me about this?

thanks

George Lobsenz

SSSS/127

From: Harrington, Holly
To: Burnell, Scott
Subject: FW: Bad Choice of Words in NRC's FAQ's Regarding Japan's Disaster
Date: Monday, March 21, 2011 4:19:46 PM

fyi

From: Dricks, Victor
Sent: Monday, March 21, 2011 4:01 PM
To: Haire, Mark; Harrington, Holly
Subject: RE: Bad Choice of Words in NRC's FAQ's Regarding Japan's Disaster

Yes. It should refer to "ground acceleration." I will pass your suggestion along.

From: Haire, Mark
Sent: Monday, March 21, 2011 1:14 PM
To: Dricks, Victor
Subject: Bad Choice of Words in NRC's FAQ's Regarding Japan's Disaster

Victor,

I was looking over some of the publicly available material the NRC has put out regarding the Japan emergency and came across the following (from the "Can it Happen Here?" FAQ sheet at: <http://www.nrc.gov/japan/japan-info.html>):

11. I saw a news report that said my local nuclear power plant ranked high on your list of plants most vulnerable to earthquakes. Is that true?

The NRC does not rank plants according to seismic risk or vulnerability. This "ranking" was developed by a reporter using partial information and we believe an even more partial understanding of how we evaluate plants for seismic risk. Each plant is evaluated individually according to the geology of its site, not by a "one-size-fits-all" model – therefore such rankings or comparisons are highly misleading.

We are also frequently asked whether Plant A can withstand a quake of magnitude X. This sounds like a yes-or-no question, but again, it's not that simple. Nuclear plants are designed to withstand a certain level of ground shaking," to use a technical term. But the way the ground shakes in an earthquake is a factor of the magnitude and the distance from the epicenter, among other things. So we can't give a simple answer to such a simple question.

Don't you think the phrase, "Nuclear plants are designed to withstand a certain level of "ground shaking," to use a technical term." is a little patronizing? "Ground shaking" is a "technical term"? I'm just thinking that a member of the public reading that sentence is either going to think that the NRC is a bunch of buffoons or they're going to think that the NRC thinks that the public is a bunch of buffoons – either way it doesn't help our message and our credibility.

MARK S. HAIRE
CHIEF, OPERATIONS BRANCH RIV

SSSS/128

817-860-8159 OFFICE

(b)(6)

CELL

From: Kammerer, Annie
To: McIntyre, David; Burnell, Scott
Subject: RE: earthquakes ...
Date: Monday, March 21, 2011 9:31:33 PM

I do. It relates to a type of seismic equipment called seismic isolators or base isolators (they are the same thing). I am actually writing a NUREG on them. There are a few Q&As on them....

The answer is as follows:

"The NRC would not require isolators for the next generation of plants. However, it is recognized that a properly designed isolation system can be very effective in mitigating the effect of earthquake. As a result, currently the NRC is preparing guidance for plant designers considering the use of seismic isolation devices. It is the understanding of the NRC that several vendors are considering seismic isolation in their designs. The use of seismic isolation systems in any plant design is a decision of the plant vendor."

Cheers,
Annie

P.S. a website with pictures showing what they look like is at

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

They basically use the building's own inertia to hold it in place, while the isolators allow the soils to move underneath.

Here's a video in action...

<http://www.youtube.com/watch?v=Fw7aQwMmBNM&feature=related>

From: McIntyre, David
Sent: Monday, March 21, 2011 9:21 PM
To: Kammerer, Annie; Burnell, Scott
Subject: Fw: earthquakes ...

I don't even understand this question.

David McIntyre
NRC Office of Public Affairs

(b)(6) (mobile)

301-415-8200 (office)

Sent from my BlackBerry, which is wholly responsible for all typos.

From: Gordon, Greg <ggordon@mcclatchydc.com>
To: McIntyre, David
Sent: Mon Mar 21 19:43:40 2011
Subject: RE: earthquakes ...

We've got the 2006 memo – 7/26/06; I think it's referenced in the FAQs.

Here's a question:

Is it likely that any newly licensed plants will be "seismically isolated" – on shock absorbers? (OEM, of

SSSS/129

course; no after market stuff here!).
Thanks,
Greg

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See McClatchy news at <http://news.mcclatchy.com>. Our 30 daily newspapers include the Miami Herald, Sacramento Bee, Ft. Worth Star-Telegram, Kansas City Star, Charlotte Observer, Raleigh News & Observer and others.

From: McIntyre, David [<mailto:David.McIntyre@nrc.gov>]
Sent: Monday, March 21, 2011 5:07 PM
To: Gordon, Greg
Subject: RE: earthquakes ...

Didn't mean to ignore the wastewater question, just can't really predict what the Japanese will do. At Three Mile Island, as I am told, the water was filtered several times to get as much material out of it as possible, leaving essentially tritium. That water was allowed to evaporate.

What "2006 earthquake memo" were you referring to?

From: Gordon, Greg [<mailto:ggordon@mcclatchydc.com>]
Sent: Monday, March 21, 2011 4:45 PM
To: McIntyre, David
Subject: RE: earthquakes ...

Okay, thanks. So obviously, I didn't read the FAQ's carefully enough, since I missed or forgot that line.

I do much appreciate your replies today, little digs aside. And in fairness, I've been involved in two other complicated projects, and then have had to try to get my head around this stuff as a sort of troubleshooter.

Rene and I will look this over and we'll get back to you. Yes, I saw Dedman's headline.

Can you respond to my questions about the wastewater at Fukushima and what would happen in a similar situation here? This question came from a nuclear safety expert who has served on government panels, so I think it's legit and warrants a reply.

Thank you,
Greg.

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Telegram, Kansas City Star, Charlotte Observer, Raleigh News & Observer and others.

From: McIntyre, David [mailto:David.McIntyre@nrc.gov]
Sent: Monday, March 21, 2011 4:34 PM
To: Gordon, Greg
Cc: Schoof, Renee
Subject: RE: earthquakes ...

Greg – If you had read the FAQs carefully, you would know that we do not rate the plants by earthquake magnitude. We use ground speed and acceleration. The attached table gives the “g” rating for the various plants to describe their “safe shutdown earthquakes”. This cannot be translated to magnitude, and should not be used to rank the plants in any spurious way (like MSNBC.com did).

From: Gordon, Greg [mailto:ggordon@mcclatchydc.com]
Sent: Monday, March 21, 2011 4:10 PM
To: McIntyre, David
Cc: Schoof, Renee
Subject: earthquakes ...

Dave,

I had read through the FAQs and just skimmed 'em again. I see no reference to the 1850s; just general comments about being built to withstand “extreme” events, etc. If I missed it, I'm sorry, but I've just read through 22 responses for a 2nd time in my search for an answer to a specific question.

Let me try a different tack:

Specifically, what magnitude earthquake are U.S. plants in the most worrisome earthquake zones built to withstand? Could we see a chart showing exactly what level earthquakes various plants are built to withstand; or what level SSEs they must withstand? And what level can plants that aren't in the most vulnerable zones required to withstand?

Surely there are specific NRC data/figures on the degree of earthquake engineering in these various plants.

Thanks,
Greg

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From: McIntyre, David [mailto:David.McIntyre@nrc.gov]
Sent: Monday, March 21, 2011 3:39 PM
To: Gordon, Greg
Subject: RE: Still no answers to any of my questions ...

Again, I believe the Qs&As we posted over the weekend address the 1800s quakes.

From: Gordon, Greg [mailto:ggordon@mcclatchydc.com]
Sent: Monday, March 21, 2011 3:09 PM
To: McIntyre, David
Subject: RE: Still no answers to any of my questions ...

This helps a lot. Rene was on the call, but she read her notes to me quoting Lyman as saying something to that effect, but I suspect it was more nuanced. Just rushed to get the question to you. We've got an editor pointing us to a massive earthquake in Ohio circa 1854 (I may have the date wrong) and saying it was the biggest on record – in other words, the question is whether the regulations cover the big Enchilada, one like Japan's, even if interior U.S. plants are not in "subduction zones."

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From: McIntyre, David [mailto:David.McIntyre@nrc.gov]
Sent: Monday, March 21, 2011 3:04 PM
To: Gordon, Greg
Subject: RE: Still no answers to any of my questions ...

Check the list below. 27 units at 17 sites.

The "seismic scrutiny" new plant applications are undergoing is different from the scrutiny existing plants faced decades ago. That's because risk assessment and seismology have evolved into different disciplines in the meantime. We are using state of the art techniques to analyze new plant applications. If Dr. Lyman is somehow intimating that we are ignoring seismic issues for new plants, as your question inferred, then he is being totally irresponsible.

From: Gordon, Greg [mailto:ggordon@mcclatchydc.com]

Sent: Monday, March 21, 2011 2:58 PM
To: McIntyre, David
Subject: RE: Still no answers to any of my questions ...

Thanks. We've seen your Japan earthquake FAQs. I'm trying to download the 2006 earthquake memo from ADAMS and having problems. Any advice?

The follow-on question relates to a comment by Ed Lyman of UCS this a.m., when he said at their daily briefing that new plants somehow don't undergo the same seismic scrutiny as the original plants. Is there a grain of truth to that?

The question about the 17 plants relates to a line in a NY Times story last week stating that NRC asked 17 plants to review their ability to withstand earthquakes. The relevant paragraph:

Officials with the Nuclear Regulatory Commission say the site is safe and that its earthquake threat is on the lower end nationally and in the Northeast. But it is one of 17 nuclear sites being asked to review and reassess seismic issues. Still, said Scott Burnell, a commission spokesman, "The N.R.C. continues to believe that all U.S. plants are capable of withstanding the strongest earthquakes that can be expected at any given site."

May we know the identities of the other 16 plants?

Could Rene and I speak to someone at NRC about this whole issue of preparedness for earthquakes?

Also, as to the sea water being pumped into Fukushima, after it gets hot and is drained off, replaced by cooler water ... where does the now-radioactive waste sea water go? Back into the ocean? If so, where would cooling waste water go in the event of a U.S. accident? Into a river or lake? Or how is this covered?

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From: McIntyre, David [mailto:David.McIntyre@nrc.gov]
Sent: Monday, March 21, 2011 2:44 PM
To: Gordon, Greg
Subject: RE: Still no answers to any of my questions ...

Hi Greg – I apologize for you not getting replies from us. Please realize we have responded to hundreds of media requests daily since the earthquake, and quite honestly, long laundry lists of questions like these are more difficult for us to respond to.

I'll take a stab at some of these below.

From: Gordon, Greg [mailto:ggordon@mcclatchydc.com]
Sent: Monday, March 21, 2011 12:16 PM
To: McIntyre, David
Subject: Still no answers to any of my questions ...

Hi Dave,

Hope you got at least some of your weekend. I suspect I'm not alone, but I've yet to get a single answer from NRC since I started work on the Japan nuclear power crisis. Today, we're turning toward earthquakes and sure would like someone to assist us.

In addition to the questions below:

--Could someone send us the list of Mark I plants in the U.S.?

All the plants and their types are listed in Appendix A of our Information Digest.

--Again, which are the 17 plants that are currently under review?

Not sure I understand this question. All US plants will be reviewed as part of the process being worked out by the Commission today. (See below)

--Does the NRC know whether any spent fuel pools at Japan's Tokyo Electric Daiichi plant are leaking? Are any domestic nuclear plants' spent fuel pools leaking? If so, which ones?

We do not know for certain the status of those pools. I'm checking on ours.

--What specific events in Japan's Tokyo Electric Daiichi plant, if any, are most likely to prompt retrofitting of U.S. plants or what is being considered along those lines?

Probably too early to say, as we begin our review.

--Regardless of the events in Japan, has improved knowledge about global seismic activity over the last 40 years prompted your agency to recommend specific design changes

to lessen the threat that a major earthquake could knock out power, breach a reactor containment vessel, cause a leak in a spent fuel pool or cause other damage?

We have reviewed recent seismological data for the central and eastern US for how it might affect plants in those areas. We posted a lot of info on seismic questions on our [website](#) Saturday. On our Japan Information page linked from our website, there are two other documents on seismic issues linked under "Related Information."

Thanks.

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Our 30 daily newspapers include the Miami Herald, Sacramento Bee, Ft. Worth Star-Telegram, Kansas City Star, Charlotte Observer, Raleigh News & Observer and others.

From: Gordon, Greg
Sent: Friday, March 18, 2011 1:21 PM
To: David.mcintyre@nrc.gov
Subject: questions

Hi Dave,

First, please say hello to Eliot, with whom I worked at UPI many years ago.

I had to huddle with my colleague and an editor to see where we're headed before messaging you.

Here are some questions on behalf of myself and Rene Schoof:

--After the 9/11 attacks, didn't NRC take action to move backup generators away from the power plants? If this is true, could someone provide details? Were the diesel generators situated in a vulnerable position at Fukushima?

Several "mitigating measures" were prescribed, including staging some emergency equipment near, but not at the plant site.

--Aren't the controls for the Fukushima Mark I plants' water pumps in the basements of the plants, and didn't they get flooded by the tsunami? What are the chances they'll work? Is this another design lesson?

This is something we will be looking at in our review of US plants.

--Could someone walk me through all the steps that can be taken to contain the Fukushima radiation leaks? Can they pour sand on the reactors, or would that worsen prospects for an explosion if a meltdown hit the water table and triggered a hydrogen explosion? I think we've seen a number of attempts over the past few days; we are not in a position to critique or otherwise comment on what the Japanese are trying.

What is the worst-case scenario? When projections on potential worst-case radiation are made, do they include more than one reactor melting down, or just a single reactor?

Over the past week, we've been confronted with a number of possible scenarios, including multiple reactor core damage and multiple spent fuel pool loss of cooling.

----Can you please identify or point me to a list of the 17 plants being asked to reassess seismic issues?

The plants currently under review for Generic Issue

199 are:

Region I

Indian Point 2

Indian Point 3

Limerick 1

Limerick 2

Peach Bottom 2

Peach Bottom 3

Seabrook 1

Region II

Crystal River 3

Farley 1

Farley 2

North Anna 1

North Anna 2

Oconee 1

Oconee 2

Oconee 3

Saint Lucie 1

Saint Lucie 2

Sequoyah 1

Sequoyah 2

Summer
Watts Bar 1
Region III
Dresden 2
Dresden 3
Duane Arnold
Perry 1
Region IV
River Bend 1
Wolf Creek 1

How many and which of those plants are boiling water plants?

--Have there ever been instances in which the understanding of earthquake risks changed and a U.S. plant was reinforced? Can you provide details?

--Is the strength of the reactor core containment vessels an issue in the review of Mark I plants? Can it withstand the pressure of a partial meltdown like Three-Mile Island?

Again, I'd love to have a background briefing on the worst-case scenario and the backup systems.

Many thanks for your assistance, Dave.

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From: Taylor, Robert
To: Harrington, Holly; Burnell, Scott
Subject: Fw: Japanese Event Response and Available Resources
Date: Tuesday, March 22, 2011 8:37:51 AM

Fyi. See paragraph below on Nelson's activities.

Sent from an NRC BlackBerry
Robert Taylor

(b)(6)

From: Schwarz, Sherry
To: NRR Distribution
Sent: Mon Mar 21 18:03:11 2011
Subject: Japanese Event Response and Available Resources

I want to echo the Commission and Bill Borchardt's words of appreciation and admiration spoken of the staff during the Commission Meeting this morning. NRR has provided tremendous support over the last week, and we will continue our efforts in the weeks, months, and years to come.

In our continued efforts to assist with responding and centralizing information related to events in Japan, we've added a new feature to the homepage of the NRR internal SharePoint site, "[Japan Event Information](#)." All of the information under this title has been publicly released or has been approved to be used publicly in our responses to related questions that might arise. Included in the list is a link to the NRC public web site, "[NRC Actions on Japan's Emergency](#)," where you may find information related to NRC actions, including news releases, NRC Blog posts, Frequently Asked Questions (FAQs), and other related information and sources. Please be sure to check these resources frequently, as information is being updated daily.

In addition, I've assigned Bob Nelson, Deputy Director, Division of Operating Reactor Licensing (DORL), as the NRR Coordinator for External Communications related to NRR's response to the recent events in Japan. Assisting Nelson will be Sean Meighan and Quynh Nguyen from the NRR front office, Eric Thomas from Division of Inspection and Regional Support, Eric Oesterle from the Office of New Reactors and a communications "tiger team" formulated in DORL headed by Mike Markley. Harold Chernoff will also provide assistance as needed. Nelson and his team will be responsible for coordinating the development and review of related Qs & As and coordinating the response to related controlled correspondence tasked to NRR, including related 2.206 petitions.

Please forward all of your requests for support in this area, to [Nelson](#), 301-415-1453.

Thank you all for your continued support!

Eric

- NRR SharePoint Site: <http://portal.nrc.gov/edo/nrr/default.aspx>
- NRC Public Website: NRC Actions on Japan's Emergency:
<http://www.nrc.gov/japan/japan-info.html>

5555/130

From: [Burnell, Scott](#)
To: [Annette Heist](#)
Cc: [Brenner, Eliot](#)
Bcc: [Courret, Ivonne](#)
Subject: RE: Science Friday, March 2011 edition
Date: Tuesday, March 22, 2011 11:59:00 AM

Hi Annette;

Oh, later in April is practically New Year's at this point. OK, knowing the basic topic we'll see what's possible. Thanks once again for including us at this point in the conversation.

Scott

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

From: Annette Heist [<mailto:AHeist@npr.org>]
Sent: Tuesday, March 22, 2011 11:57 AM
To: Burnell, Scott
Cc: Brenner, Eliot
Subject: RE: Science Friday, March 2011 edition

Hi there--

Thanks for your reply. (I had an underscore in your email address, that's why it bounced.) For the show, we'd like to talk about reactor design here in the US--how reactors are/ aren't different from the reactors in Japan, what the newest designs are, whether older designs need to be changed or retrofitted. We would also like to talk about the recent UCS report on power plant safety. We'd likely have someone from the UCS join the conversation as well.

We aren't looking for this Friday, but perhaps a Friday in April? Right now, any Friday in April except for the 8th would work for us.

If someone from the NRC can join us, I would schedule a preinterview with that person, to go over more specifically what we would like to talk about and to answer any questions that person might have about the show.

Thanks very much for your help Scott. Let me know if I can provide any more information.
Annette

Annette Heist
Senior Producer, NPR's Science Friday
M-Th 610.381.5653
Friday 1-4 PM Eastern (studio) 212.880.3520
cell (b)(6)
sciencefriday.com

From: Burnell, Scott [Scott.Burnell@nrc.gov]
Sent: Tuesday, March 22, 2011 11:44 AM
To: Annette Heist
Cc: Brenner, Eliot
Subject: Science Friday, March 2011 edition

Hi Annette;

I'm not sure why the e-mail bounced, and I greatly appreciate the invitation. Please let me know with as much specificity as possible what you're planning to discuss, as well as the time requirements, and we'll see what can be done. No promises, of course, given the level of effort in directly responding to events in Japan.

Scott

SSSS/131

From: Burnell, Scott
To: "scott.disavino@thomsonreuters.com"; OPA Resource
Subject: Re: list of US reactors most prone to earthquake
Date: Tuesday, March 22, 2011 1:29:18 PM

Scott;

Please check our blog -- link on lower right of home page -- for our detailed response to the MSNBC.com report.

The NRC DOES NOT rank plants according to seismic risk, as all plants deal with different levels of seismic activity. ALL U.S. Plants meet NRC requirements for withstanding the strongest quakes at their sites.

Scott

Sent from an NRC Blackberry
Scott Burnell
202-441-0471

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

From: scott.disavino@thomsonreuters.com <scott.disavino@thomsonreuters.com>
To: OPA Resource; Burnell, Scott
Sent: Tue Mar 22 13:23:07 2011
Subject: list of US reactors most prone to earthquake

Hi Scott or whoever is on call,

Did the NRC issue a release on a list of reactors most prone to earthquakes

Or can you point me to where I may find such a list on your website

The highlighted line does not instill confidence in worried New Yorkers

Thanks,

Scott

See story,

Related News

SSSS/132

Boone grad working on new nuclear power method

<<http://www.energycentral.com/generationstorage/nuclear/news/en/19273323/Boone-grad-working-on-new-nuclear-power-method?>>

Safety No. 1 priority at Comanche

<<http://www.energycentral.com/generationstorage/nuclear/news/en/19273891/Safety-No-1-priority-at-Comanche?>>

Banner: No lawsuit if county says no to nuclear plant

<<http://www.energycentral.com/generationstorage/nuclear/news/en/19276613/Banner-No-lawsuit-if-county-says-no-to-nuclear-plant?>>

Ohio's 2 nuclear plants face critics of safety

<<http://www.energycentral.com/generationstorage/nuclear/news/en/19277684/Ohio-s-2-nuclear-plants-face-critics-of-safety?>>

South Texas Project Development Slowed to Await Guidance on Nuclear Generation Regulatory Requirements <<http://www.energycentral.com/generationstorage/nuclear/news/en/19287744/South-Texas-Project-Development-Slowed-to-Await-Guidance-on-Nuclear-Generation-Regulatory-Requirements?>>

NRC: Shippingport reactor 5th of 10 riskiest U.S. plants

Mar 17 - The Pittsburgh Tribune-Review

Pennsylvania is home to three of the 10 U.S. nuclear power plants most vulnerable to an earthquake, including the Beaver Valley plant in Shippingport, according to Nuclear Regulatory Commission data.

The federal agency that oversees nuclear energy evaluates the nation's 104 nuclear power reactors for the chance of an earthquake causing a catastrophic failure each year, based on 2008 and 1989 geological data.

The Beaver Valley 1 reactor in Shippingport ranks fifth-most at risk, with a 1 in 20,833 chance of it suffering reactor core damage during an earthquake, according to data reported Tuesday by msnbc.com.

The power plant is operated by FirstEnergy Corp. in Akron, Ohio. The Beaver Valley 1 nuclear reactor was designed by Westinghouse Electric Co. and came on line in 1976.

Article Continues Below ↓

<<http://www.energycentral.com/generationstorage/nuclear/news/en/19232024/NRC-Shippingport-reactor-5th-of-10-riskiest-U-S-plants#nextpart>>

"Beaver Valley remains safe and is capable of withstanding at least a 5.8 scale earthquake, which is highly unlikely for this area," said FirstEnergy spokesman Todd Schneider.

"Safety is our top priority. So residents shouldn't be concerned," Schneider said. "If an event did occur, we have an emergency plan to protect the public."

Westinghouse designed the Beaver Valley reactor, as well as five others in the top 10 list of vulnerable reactors. The ratio is not surprising, given that the Cranberry company designed 62 of the 104 nuclear reactors in the United States and roughly 45 percent of the world's 440 nuclear reactors.

Westinghouse spokesmen could not be reached for comment.

The earthquake that struck Japan was initially recorded as magnitude 8.9 but was upgraded Tuesday by the U.S. Geological Survey to a 9.0 event.

The commission assessed earthquake risk to nuclear reactors to "screen for plants needing a further look," said Diane Screnci, spokeswoman for the NRC's regional office in King of Prussia.

"Currently, the operating nuclear power plants in the United States remain safe, with no need for immediate action," Screnci said. The NRC evaluated reactors based on "ground motions" associated with the largest earthquake that could hit a plant's vicinity.

However, handicapping the odds of an earthquake is a difficult science, experts said.

"The longer the period I look at, the more confidence I have in my predictions," said Kent Harries, associate professor of structural engineering mechanics at the University of Pittsburgh, who has studied seismic events and effects on buildings.

"If you want to predict whether an earthquake will occur this year, your estimate is probably pretty poor," Harries said. "But if you want to predict whether there would be one in the next 30 years, your prediction is probably pretty darn good."

The NRC data show the nuclear reactor most at risk of failure from an earthquake is the Indian Point 3 reactor in Buchanan, N.Y., along the Hudson River, 24 miles north of New York City. Also designed by Westinghouse, the plant stands a 1 in 10,000 chance of failure from an earthquake.

Harries said that a 1 in 10,000 chance in a given year is about the same as a 1 percent chance of an event in the next 100 years.

"There is risk in any human activity. U.S. power plants pose extremely low risk when compared to other activities including dying from heart disease, smoking cigarettes and driving a car," said Tom Kauffman, spokesman for the Nuclear Energy Institute, an industry trade organization in Washington.

America's nuclear reactors operate "with an additional margin of safety" above the standards set in NRC regulations, Kauffman said. The commission used "conservative" analytics to drive risk levels, which are not indicative of a "Fukushima-level accident," he said, referring to the power plant in Japan affected by the country's devastating earthquake and tsunami.

The report stated the third-highest risk was found at the Limerick 1 and 2 reactors at a power plant 21 miles northwest of Philadelphia. They stand a 1 in 18,868 chance of core damage in a quake and were designed by General Electric Co., according to NRC data.

Three Mile Island, the Middletown plant, remembered for a radiation leak and partial core meltdown in 1979, ranks 10th-most at risk. The reactor there was designed by Babcock & Wilcox and stands a 1 in 25,000 chance of suffering core damage in an earthquake.

Each year, the odds are 1 in 74,176 that the typical nuclear power reactor in the United States will experience a catastrophic failure and radioactive leak from an earthquake, according to the msnbc.com report, citing NRC calculations.

Those odds are 10 times better than a person winning \$10,000 with a ticket in the Powerball multistate lottery -- which is a 1 in 723,145 chance.

"We, as a society, have to determine what is an acceptable risk," Harries said.

S

Scott DiSavino
Correspondent

Thomson Reuters

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From: Davide Castelvechi
To: Burnell, Scott
Subject: Time-sensitive: Request from Scientific American
Date: Tuesday, March 22, 2011 1:56:07 PM

Dear Mr. Burnell,

I am an editor at Scientific American and covering the meeting of the American Physical Society here in Dallas. I am writing an article a session that took place on nuclear power, and in particular about Ray Orbach's talk. He listed some recommendations for retrofitting existing nuclear power plants in the U.S. to make them safer in light of the Fukushima disaster. The retrofits he proposed are the following:

- 1) passive cooling or spent fuel storage pools (air-cooled heat exchangers)
- 2) Primary containment venting system that minimizes hydrogen combustion risk (design issues-distributive outlet, hardened vents; hydrogen mitigation in the secondary containment building)
- 3) in-vessel retention of corium (lava-like molten mixture of portions of a nuclear reactor, formed during meltdown)
- 4) Core catcher to mitigate ex-vessel core relocation, preventing corium-concrete interactions (heat-absorbing, non gas emitting sacrificial materials, external natural circulation-cooled)

I was wondering if you would be available to comment on these proposals and on whether other experts have proposed any similar set of recommendations either recently or in the past.

It would be ideal if we could talk on the phone some time this afternoon/evening. My cell phone is (b)(6). Alternatively, any comments you may want to make by email would also be very helpful.

Thank you very much, and best regards,

Davide

Davide Castelvechi
Board of Editors
Scientific American
75 Varick Street
New York, NY 10013

SSSS/133

From: Couret, Ivonne
To: Hayden, Elizabeth; Harrington, Holly; McIntyre, David; Burnell, Scott; Brenner, Eliot; Janbergs, Holly
Subject: Japan info provided by Richard Barkley Region 1
Date: Tuesday, March 22, 2011 2:00:38 PM

FYI – Link to Japan Nuclear folks and how they are illustrating information. Ivonne

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

Visit our online photo gallery. Incorporate graphics and photographs to tell your story!
<http://www.nrc.gov/reading-rm/photo-gallery/>

2010-2011 Information Digest - Where you can find NRC Facts at a Glance
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

From: Barkley, Richard
Sent: Tuesday, March 22, 2011 1:49 PM
To: Couret, Ivonne; Mitlyng, Viktoria; Rakovan, Lance; Ryan, Michelle; Salter, Susan; Screnci, Diane; Steger (Tucci), Christine; Virgilio, Rosetta
Subject: FW: Good Discussion Today - Thanks for Such a Group Effort!!

http://www.mext.go.jp/component/english/_icsFiles/afieldfile/2011/03/22/1303997_2219.pdf

Take a look at the cute Japanese radiological pictorial graph on Page 5 – We should use something like this going forward.

This information was forwarded from someone in Research, and has radiological data from Japan post-Fukushima.

At least the Japanese have been lucky in one big way – The wind at Fukushima Daiichi has been almost always out to sea.

Most of the readings outside of the 20 km radius around the plant (~12 miles) are less than 10 microsieverts per hour (= to 1 millirem/hour).

From: Carpenter, Gene
Sent: Tuesday, March 22, 2011 1:27 PM
To: Barkley, Richard; Adelstein, Patricia; Anderson, Brian; Bafundo Crimm, Nina; Bailey, Kenneth; BowdenBerry, Elva; Burton, William; Daniel, Richard; Fehst, Geraldine; Fuller, Michael; Glenn, Nichole; Heck, Jared; Kotra, Janet; Krsek, Robert; Leslie, Bret; Maier, Bill; Meeting_Facilitation Resource; Mroz (Sahm), Sara; Rakovan, Lance; Rivera, Alison; Rodriguez, Michael; Salter, Susan; Smith, George; Stuyvenberg, Andrew; Wright, Lisa (Gibney)
Subject: RE: Good Discussion Today - Thanks for Such a Group Effort!!

SSSS/134

FYI:

This is what our Japanese equivalent (NISA) is saying:

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

Gene

From: Barkley, Richard

Sent: Tuesday, March 22, 2011 13:26

To: Adelstein, Patricia; Anderson, Brian; Bafundo Crimm, Nina; Bailey, Kenneth; Barkley, Richard; BowdenBerry, Elva; Burton, William; Carpenter, Gene; Daniel, Richard; Fehst, Geraldine; Fuller, Michael; Glenn, Nichole; Heck, Jared; Kotra, Janet; Krsek, Robert; Leslie, Bret; Maier, Bill; Meeting_Facilitation Resource; Mroz (Sahm), Sara; Rakovan, Lance; Rivera, Alison; Rodriguez, Michael; Salter, Susan; Smith, George; Stuyvenberg, Andrew; Wright, Lisa (Gibney)

Subject: Good Discusssion Today - Thanks for Such a Group Effort!!

<http://www.nrc.gov/japan/japan-info.html>

The above link takes you to the NRC's external website location for the events related to Japan. The agency has gone from having almost nothing on our website on Fukushima to a very healthy list of Frequently Asked Questions. I suspect the materials provided to the Regions in advance of their Annual Assessment Meetings will rely heavily on this material.

Richard S. Barkley, PE

Nuclear & Environmental Engineer

(610) 337-5065 Work

(b)(6)

Cell

From: Lee, Richard
To: Wilson, George
Cc: Katie Wagner; Burnell, Scott; Gibson, Kathy
Subject: FW: Station blackout questions
Date: Tuesday, March 22, 2011 2:24:54 PM
Importance: High

Hi, George:

We were asked by PA to respond to an inquiry from a reporter. Please review the answers provided by Kevin Coyne and advised us on the final responses. Appreciate it.

We are asking Scott to clarify one of the questions, and will get back to you.

Thanks, Richard

From: Coyne, Kevin
Sent: Tuesday, March 22, 2011 1:40 PM
To: Lee, Richard
Cc: Wagner, Katie; Wilson, George; Demoss, Gary; Beasley, Benjamin; Coe, Doug
Subject: RE: Station blackout questions
Importance: High

Richard –

We've taken a first cut at responding to the questions, but George Wilson from the NRR electrical engineering branch has been very active in this area and should review the question and answers before a response goes back to OPA (particularly for the first question...). I've cc'ed George, but Katie should coordinate the response with him before providing a final answer back to Scott Burnell.

-Kevin

-

-

First, has there been any update to these numbers?

- Unknown. However, our understanding is that NUREG-1776 (<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1776/>) is the most recent study specific to the station blackout rule that has been prepared by RES.

“Coping time in hours” – is that the amount of battery power? And is it the amount the plant has, or is required to have?

- 10 CFR 50.63, “Loss of all alternating current power,” requires that the station blackout duration shall be based on (i) redundancy of the onsite emergency power ac power sources; (2) the reliability of the onsite emergency ac power sources; (3) the expected frequency of loss of offsite power; and (4) the probably time needed to restore offsite power. RG 1.155, “Station Blackout,” (August 1988), provides guidance for determining a plant specific coping time based on these factors. In general, coping times range from 2 to 16 hours, though licensees may propose alternate durations based on plant specific factors relating to the reliability of their ac power systems.

SSSS/135

- Licensees must demonstrate that systems have sufficient capacity and capability to ensure core cooling and containment integrity are maintained for the duration of the specified coping time. Although station batteries are one of the necessary systems, other systems that provide water inventory and containment functions must also be available

“Loss of Power events” – if a combined plant with two reactors lists two events, did each shut down for a total of four?

- Do not understand question – can a reference to a specific table or graph be provided by the questioner?

Also, is there updated figures for the “loss of power events?”

- NUREG/CR-6890, “Reevaluation of Station Blackout Risk at Nuclear Power Plants,” (<http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6890/>) examined data from 1986-2004 for four categories of loss of offsite power events: plant-centered, switchyard centered, grid-related, and weather-related.
- The NRC also maintains an active data collection program on operating experience. The most recent data for loss of offsite power events can be found at the following website: <http://nrcoe.inel.gov/results/index.cfm?fuseaction=LOSP.showMenu>

From: Lee, Richard
Sent: Tuesday, March 22, 2011 12:49 PM
To: Coyne, Kevin
Cc: Wagner, Katie
Subject: FW: Station blackout questions

Kevin:

We need to respond to inquiry on this. Could you please have someone in your Branch or Division to take a look at this. There is also another report, NUREG/CR-6890 on station blackout too.

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6890/>

If you know other staff in NRO or NRR knows the answers, please let me know.

Thanks, Richard

From: Wagner, Katie
Sent: Tuesday, March 22, 2011 12:13 PM
To: Santiago, Patricia; Hoxie, Chris; Elkins, Scott; Bush-Goddard, Stephanie; Zaki, Tarek
Cc: Lee, Richard
Subject: Station blackout questions
Importance: High

All,

Do any of you know who the lead should be to answer these questions about station blackout (the questions are from a reporter see the highlighted section at the bottom of this email)? It may be another RES division or one in NRR?

Thank you,

Katie Wagner
DSA POC for Japan-Related Requests

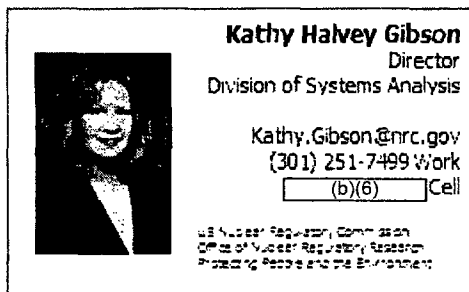
From: Gibson, Kathy
Sent: Tuesday, March 22, 2011 11:59 AM
To: Wagner, Katie
Cc: Lee, Richard
Subject: FW: Station blackout questions
Importance: High

See if you can find this report in ADAMS and who was the cognizant office, branch, and staff.

If that doesn't work or in parallel, send an email request to our BCs and see if any of them know who the lead should be to answer these questions.

It may be another RES division or NRR, I am not sure.

If you need help processing this, see me or Richard Lee.



From: Burnell, Scott
Sent: Tuesday, March 22, 2011 9:49 AM
To: Gibson, Kathy; Scott, Michael
Cc: Elkins, Scott
Subject: FW: Station blackout questions
Importance: High

Kathy, Mike;

I'm thinking NUREG-1776 (Regulatory Effectiveness of the Station Blackout Rule) was done by the predecessor to your division, probably under Scott's branch. I need help answering the reporter's four questions below. Thanks very much.

Scott

From: Mike Soraghan [mailto:msoraghan@eenews.net]
Sent: Thursday, March 17, 2011 6:06 PM
To: Burnell, Scott
Subject: Station blackout questions

Mr. Burnell,

Thank you for taking my call a moment ago. I am looking at doing a story on station black out, with a little on seismic, that looks at all u.s. plants.

My simplest question is whether there is a list of the design basis each of the 104 reactors must meet in terms of what magnitude earthquake they must be able to withstand. I've been told that's not likely, so I'm pulling the information from news reports.

I have the 2000 report (attached) "Regulatory Effectiveness of the Station Blackout Rule." I've been looking at this, particularly the plant-by-plant chart, and I'm seeking some guidance.

First, has there been any update to these numbers?

"Coping time in hours" - is that the amount of battery power? And is it the amount the plant has, or is required to have?

"Loss of Power events" - if a combined plant with two reactors lists two events, did each shut down for a total of four?

Also, is there updated figures for the "loss of power events?"

Thank you,

Mike Soraghan

Reporter

msoraghan@eenews.net

202-446-0423 (desk)

(b)(6) (cell)

(b)(6) (Google Voice)

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ClimateWire, E&E Daily, Greenwire, E&ENews PM, E&ETV, Land Letter

From: Burnell, Scott
To: Gibson, Kathy; Wagner, Katie
Cc: Lee, Richard
Subject: RE: Station blackout questions
Date: Tuesday, March 22, 2011 2:17:00 PM

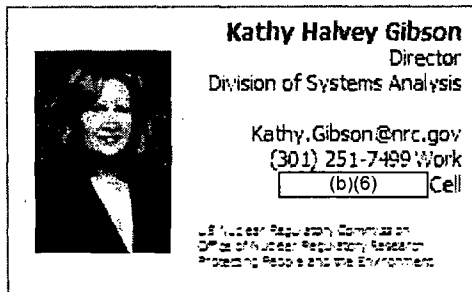
I'm checking with NRR, no worries.

Katie, FYI – Robert Nelson in NRR is heading their quake-related external communications, so please CC him when coordinating with NRR folks. Thanks.

From: Gibson, Kathy
Sent: Tuesday, March 22, 2011 2:16 PM
To: Wagner, Katie; Burnell, Scott
Cc: Lee, Richard
Subject: RE: Station blackout questions

Katie,
Kevin wanted you to have NRR to review this BEFORE it went to OPA.

Thanks



From: Wagner, Katie
Sent: Tuesday, March 22, 2011 1:53 PM
To: Burnell, Scott
Cc: Lee, Richard; Gibson, Kathy
Subject: Station blackout questions
Importance: High

Good Afternoon Scott,

Kevin Coyne of RES/DRA has provided a preliminary response to Mr. Soraghan's questions (see below), however he did not understand the third question and recommends that George Wilson of NRR/DE/EEEB review the preliminary response.

Thanks,

Katie Wagner
DSA POC for Japan-Related Requests

From: Coyne, Kevin

5555/136

Sent: Tuesday, March 22, 2011 1:40 PM

To: Lee, Richard

Cc: Wagner, Katie; Wilson, George; Demoss, Gary; Beasley, Benjamin; Coe, Doug

Subject: RE: Station blackout questions

Importance: High

Richard –

We've taken a first cut at responding to the questions, but George Wilson from the NRR electrical engineering branch has been very active in this area and should review the question and answers before a response goes back to OPA (particularly for the first question...). I've cc'ed George, but Katie should coordinate the response with him before providing a final answer back to Scott Burnell.

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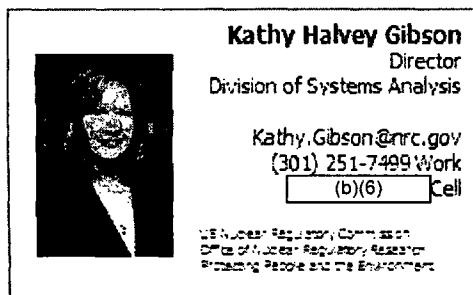
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Reporter

msoraghan@eenews.net

202-446-0423 (desk)

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(b)(6) (Google Voice)

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From: Burnell, Scott
To: Xie, Yanmei
Subject: RE: Could you help me find answers?
Date: Tuesday, March 22, 2011 11:12:00 AM

We'll see what we can find, thanks.

From: Xie, Yanmei [mailto:yanmei_xie@platts.com]
Sent: Tuesday, March 22, 2011 11:12 AM
To: Burnell, Scott; Brenner, Eliot
Subject: RE: Could you help me find answers?

Yikes! I didn't realize it would take so much research for you guys. Sorry...I can extend the deadline to noon tomorrow, which is the time my editor finalizes all copies before sending them to production.

Yanmei Xie
Associate Editor
Platts Nuclear Publications
Office: (202) 383-2161
Mobile: (b)(6)
www.platts.com

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Tuesday, March 22, 2011 11:10 AM
To: Xie, Yanmei; Brenner, Eliot
Subject: RE: Could you help me find answers?

Hi Yanmei;

Going back 40 years into the archives will be interesting. I'll see what the staff can find by 5.

Scott

From: Xie, Yanmei [mailto:yanmei_xie@platts.com]
Sent: Tuesday, March 22, 2011 10:57 AM
To: Burnell, Scott; Brenner, Eliot
Subject: FW: Could you help me find answers?

And my deadline is 5pm today.

Yanmei Xie
Associate Editor
Platts Nuclear Publications
Office: (202) 383-2161
Mobile: (b)(6)
www.platts.com

From: Xie, Yanmei
Sent: Tuesday, March 22, 2011 10:56 AM
To: 'Brenner, Eliot'; 'Burnell, Scott'
Subject: Could you help me find answers?

Hi, Eliot and Scott,

I hope you guys were able to catch some much needed rest during the weekend. I feel a little

SSSS / 137

ashamed to say that my weekend was actually quite relaxing, while two of my colleagues were on duty.

The Union of Concerned Scientists said "A little-known test performed decades ago at the Brunswick" could explain the hydrogen explosions at Japan's Fukushima Daiichi plant. See the UCS analysis below. Could you help me get answers to the following questions?

1. Did the test actually happen? If so,
2. Why was the test performed and when was it performed?
3. Did the UCS analysis below accurately reflect the test and the test result?
4. Did Brunswick report the test results to NRC or the industry? If so,
5. Did either the NRC or industry require or suggest any modifications to mitigate the risk?
6. Did Brunswick take measures to mitigate the risk?

Your help is greatly appreciated!

Possible Cause of Reactor Building Explosions

| by [Dave Lochbaum](#) | [nuclear power](#) | [nuclear power safety](#) | [Japan nuclear](#) |

Dramatic videos show the explosions that severely damaged the reactor buildings at first Unit 1 and then Unit 3 at the stricken Fukushima Dai-Ichi nuclear plant in Japan. The explosions are attributed to the ignition of hydrogen gas that collected within the reactor buildings. This was early in the crisis, and before the spent fuel pools are thought to have lost water and started producing hydrogen. The hydrogen was likely produced by damaged fuel rods in the reactor core. To reduce pressure in the reactor vessel, some of that hydrogen was released from the vessel into the primary containment structure of the reactor.

A key, unsolved riddle is how a significant amount of hydrogen escaped from the primary containment into the reactor building, and how this low-probability event would have happened in multiple reactors.

How Hydrogen Got into Primary Containment

Figure 1 shows a cross-sectional view of a boiling water reactor with a Mark I containment like that at Fukushima Dai-Ichi. The reactor core is housed within a metal reactor vessel. The reactor vessel is enclosed within the primary containment structure. The reactor building completely surrounds the containment structure. The reactor building walls are made of 18 to 30 inch-thick concrete up to the elevation of the refueling platform. The walls are made of metal from that elevation to the roof.

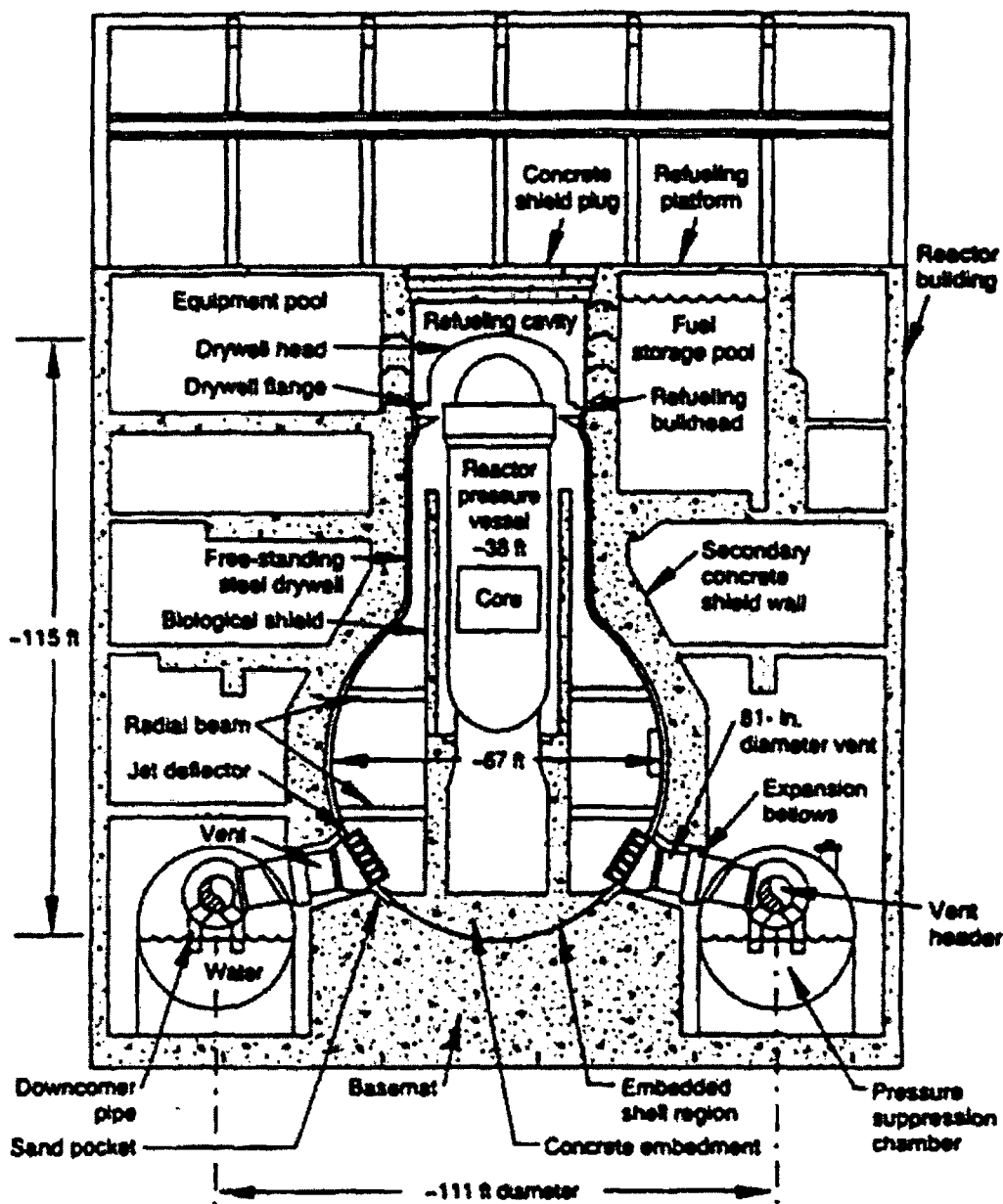


Figure 1

The hydrogen gas most likely came from a chemical reaction between water and the metal cladding of fuel rods in the reactor cores when the water level inside the reactor vessels dropped low enough to expose at least the upper core regions. The hydrogen gas initially collected in the reactor vessel. To cool the fuel in the reactor, workers attempted to pump seawater into the reactor vessel. As pressure inside the reactor vessel increased, it kept water from flowing into the reactor. Periodically, workers opened valves to vent steam and gas from the reactor vessel to into the pressure suppression chamber (also called the torus). The gas, including hydrogen, collected in the torus and periodically equalized with the air space in the drywell. When pressure in the primary containment (the combination of the drywell and the torus) rose too high, workers vented the containment to the atmosphere. This vent piping passed through the reactor building, but discharged well outside of it, and should not have led to a hydrogen buildup inside the building.

How Hydrogen May Have Gotten from Primary Containment into the Reactor Building

The destruction of the Unit 1 and 3 reactor buildings appears to have been caused by hydrogen explosions. As noted above, an unanswered question is how the hydrogen got into the reactor buildings. A little-known test performed decades ago at the Brunswick nuclear plant in North Carolina may hold the key to answering that question.

To satisfy a requirement in the American Society of Mechanical Engineers (ASME) code for prototype containment designs, workers performed a structural integrity test on the reactor at Brunswick in the 1970s.

The primary containment structure at Brunswick was designed to withstand an internal pressure of 62 pounds per square inch (psi). The ASME code required it to be tested at 71 psi. This test involved pumping air into the containment structure until the pressure rose to 71 psi. The pumps would then be turned off and the pressure would be monitored for several hours to verify that it remained fairly constant, indicating that the primary containment was intact and not leaking. During this time, workers would record data from strain gauges and other instrumentation to verify that structural loads were properly distributed.

But as workers increased the containment pressure they encountered a problem. The pressure stopped increasing and remained constant at 70 psi. The pumps continued to push air into the containment, but its pressure just stopped increasing. This unexpected plateau started a hunt for air leaking from the containment somewhere.

A hissing sound attracted workers to the top of the containment structure. They identified air leaking through the drywell flange area (see Figure 1). The metal drywell head (see Figure 2) is bolted to the metal drywell with a rubber O-ring between the surfaces to provide a good seal fit.

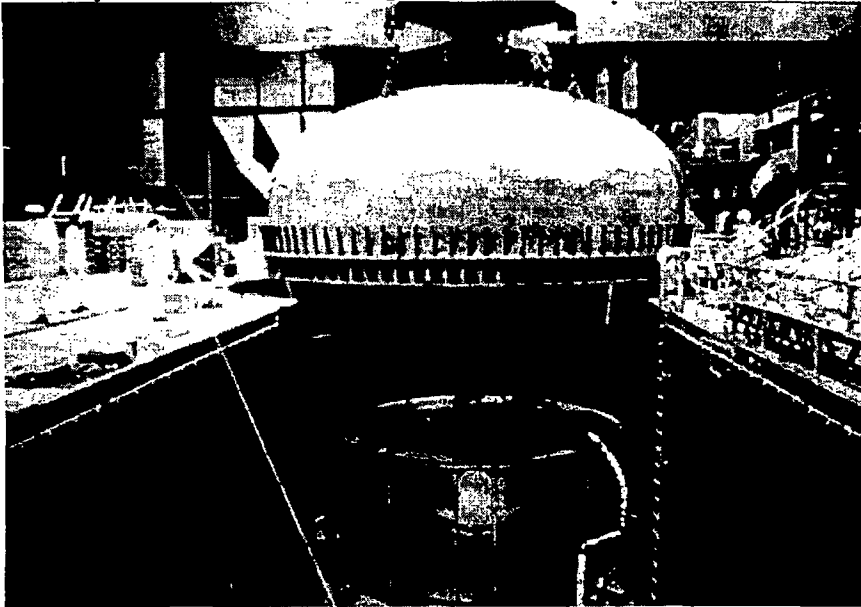


Figure 2

Workers found that the containment pressure of 70 psi pushing upward against the inner dome of the drywell head lifted it off the drywell flange enough to provide a pathway for air to leak from the containment. That air leaked into the area labeled refueling cavity in Figure 1. The refueling cavity is located outside the primary containment but inside the reactor building.

At Brunswick, workers tightened the drywell head bolts beyond the amount specified in the reactor plans in order to reduce the leak rate and continue the test. While workers conducted pressure tests at all nuclear reactors prior to initial startup and periodically thereafter, these tests were performed at or below the containment design-pressure of 62 psi. So none of them reached the pressure that caused the leak around the drywell head.

In other words, had Brunswick not featured a prototype containment design, its initial and recurring pressure tests would have been conducted at 62 psi, not 71 psi. Leaking from the drywell head was not observed until the containment pressure rose to 70 psi.

How does this Brunswick containment testing experience relate to the reactor building explosions experienced at Fukushima Dai-Ichi Units 1 and 3?

Like Brunswick, the containment design at those reactors features a drywell head bolted onto the lower portion of the drywell. Workers at these reactors faced significant problems cooling the reactor cores. The combined effects of the earthquake and tsunami left the reactors without an electrical power. The only dc-powered (i.e., battery-powered) backup system was lost when the batteries were exhausted. Workers turned to their only remaining option: injecting sea water into the reactor vessels to cool the reactor cores.

The pumps used to pump seawater into the vessel operated at low pressure. When seawater entered the reactor vessel, it was heated by the hot reactor core to the point of boiling. Steam produced by the boiling increased the pressure inside the reactor vessel. To prevent this rising pressure from hindering seawater from being pumped into reactor, workers periodically vented the reactor vessel. This carried steam and gas, including hydrogen, into the primary containment. This flow in turn increased the pressure inside containment. When containment pressure rose too high, workers vented the containment to the atmosphere.

The workers properly sought to minimize the amount of gas they vented from containment to the atmosphere to lessen the amount of radiation released. They did this by allowing the containment pressure to rise as high as tolerable between ventings.

It is possible that the containment pressures rose high enough to replicate the Brunswick experience by lifting the drywell head enough to allow hydrogen and other gases to leak into the refueling cavity and reactor building. If so, hydrogen could build up to an explosive mixture.

This tragedy will be closely examined for its causes. That scrutiny must determine how hydrogen got into the reactor building early in the crisis. The drywell head pathway may be that answer.

Answering this question is critical to prevent hydrogen explosions at the other reactors at Fukushima. If this mechanism is the cause of the leak, it could be averted easily and effectively simply by changing the venting procedures so that workers vent the containment pressure to the atmosphere more frequently and do not let it build up to such high level. Taking such action might moderately increase the amount of radioactive gases vented into the atmosphere, but could eliminate a source of hydrogen inside the reactor buildings that could cause another explosion.

Authorities should launch an investigation to pinpoint the source of the hydrogen leak to eliminate this risk in the future. But in the meantime, since the Brunswick test showed that this containment is vulnerable to high-pressure leaking, Tokyo Electric Power Co. can and should take immediate steps to avoid creating such a leak by changing its procedures to vent the containment before it builds up to such high pressure (70 psi).

Yanmei Xie

Associate Editor

Platts Nuclear Publications

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From: Markley, Michael
To: Broaddus, Doug; Saba, Farideh
Cc: Mozafari, Brenda; Burnell, Scott; Nelson, Robert; Oesterle, Eric; Nelson, Robert
Subject: RE: Could you help me find answers?
Date: Wednesday, March 23, 2011 7:56:11 AM

Farideh,

We need the licensee's information on the docket. Otherwise, we are out of process in being able to respond. How are you going to handle a FOIA if it is not docketed? This could turn ugly if we get out of process.

In inspection space, we can look at documents but not take possession. In licensing space, we need docketed information and a proprietary review, if needed.

Mike

From: Broaddus, Doug
Sent: Tuesday, March 22, 2011 6:54 PM
To: Saba, Farideh
Cc: Mozafari, Brenda; Burnell, Scott; Markley, Michael; Nelson, Robert
Subject: RE: Could you help me find answers?

I reviewed the report, as well, and it appears to only address the successful conduct of the test to 71.5 psi, and does not indicate that an earlier attempt was unsuccessful due to leakage that prevented achieving the full test pressure. The report does indicate that the Structural Integrity Test (SIT) was performed in conjunction with an Integrated Leak Rate Test (ILRT) (see page 5.1). However, this report only provides the results of the SIT, and indicates that the results of the ILRT are provided in a separate report. A discussion of leakage during the test would more likely be in the report prepared for the ILRT results. Do you know if the ILRT report was ever submitted on the docket?

Doug

From: Saba, Farideh
Sent: Tuesday, March 22, 2011 6:26 PM
To: Burnell, Scott; Markley, Michael; Nelson, Robert
Cc: Broaddus, Doug; Mozafari, Brenda
Subject: RE: Could you help me find answers?

I understand. I have sent this document FYI. I have glanced through the document, but I could not find any information related to leakage from the containment to the reactor building.

Farideh E. Saba, P.E.
Senior Project Manager
NRC/ADRO/NRR/DORL
301-415-1447
Mail Stop O-8G9A
Farideh.Saba@NRC.GOV

From: Burnell, Scott
Sent: Tuesday, March 22, 2011 6:02 PM
To: Saba, Farideh; Markley, Michael; Nelson, Robert
Cc: Broaddus, Doug; Mozafari, Brenda
Subject: Re: Could you help me find answers?
Importance: High

SSSS/138

Licensee documents should come directly from them in a case like this, not through us. We could use the documents to inform our answers, of course.

Sent from an NRC Blackberry

Scott Burnell

(b)(6)

From: Saba, Farideh
To: Markley, Michael; Nelson, Robert; Burnell, Scott
Cc: Broaddus, Doug; Mozafari, Brenda
Sent: Tue Mar 22 17:57:59 2011
Subject: RE: Could you help me find answers?

FYI, the media has asked the licensee the same question. The licensee has found an old document that may have the information related to the containment testing. The licensee has scanned the document and sent me in two emails (big files). I will forward this document in the separate emails. It does not appear that this document is not a publicly available document. However, the licensee itself may provide this document to the media.

Farideh E. Saba, P.E.
Senior Project Manager
NRC/ADRO/NRR/DORL
301-415-1447
Mail Stop O-8G9A
Farideh.Saba@NRC.GOV

From: Markley, Michael
Sent: Tuesday, March 22, 2011 3:50 PM
To: Saba, Farideh; Mozafari, Brenda
Cc: Broaddus, Doug
Subject: FW: Could you help me find answers?

Quick Turnaround: Please see the note below. Any insights on the Brunswick aspect?

From: Nelson, Robert
Sent: Tuesday, March 22, 2011 2:08 PM
To: Burnell, Scott
Cc: Markley, Michael
Subject: RE: Could you help me find answers?

NELSON

From: Burnell, Scott
Sent: Tuesday, March 22, 2011 11:18 AM
To: Nelson, Robert; Meighan, Sean; Thomas, Eric
Subject: FW: Could you help me find answers?
Importance: High

Bob et al;

Deadline's actually noon tomorrow, but with a research project like this that's not much help. I

would think we could focus on the end result – improved drywell seals, if my quick read of the UCS item is worth anything. Thanks!

Scott

From: Xie, Yanmei [mailto:yanmei_xie@platts.com]
Sent: Tuesday, March 22, 2011 10:57 AM
To: Burnell, Scott; Brenner, Eliot
Subject: FW: Could you help me find answers?

And my deadline is 5pm today.

Yanmei Xie

Associate Editor
Platts Nuclear Publications
Office: (202) 383-2161
Mobile: (b)(6)
www.platts.com

From: Xie, Yanmei
Sent: Tuesday, March 22, 2011 10:56 AM
To: 'Brenner, Eliot'; 'Burnell, Scott'
Subject: Could you help me find answers?

Hi, Eliot and Scott,

I hope you guys were able to catch some much needed rest during the weekend. I feel a little ashamed to say that my weekend was actually quite relaxing, while two of my colleagues were on duty.

The Union of Concerned Scientists said "A little-known test performed decades ago at the Brunswick" could explain the hydrogen explosions at Japan's Fukushima Daiichi plant. See the UCS analysis below. Could you help me get answers to the following questions?

1. Did the test actually happen? If so,
2. Why was the test performed and when was it performed?
3. Did the UCS analysis below accurately reflect the test and the test result?
4. Did Brunswick report the test results to NRC or the industry? If so,
5. Did either the NRC or industry require or suggest any modifications to mitigate the risk?
6. Did Brunswick take measures to mitigate the risk?

Your help is greatly appreciated!

Possible Cause of Reactor Building Explosions

| by [Dave Lochbaum](#) | [nuclear power](#) | [nuclear power safety](#) | [Japan nuclear](#) |

Dramatic videos show the explosions that severely damaged the reactor buildings at first Unit 1 and then Unit 3 at the stricken Fukushima Dai-Ichi nuclear plant in Japan. The explosions are attributed to the ignition of hydrogen gas that collected within the reactor buildings. This was early in the crisis, and before the spent fuel pools are thought to have lost water and started producing hydrogen.

The hydrogen was likely produced by damaged fuel rods in the reactor core. To reduce pressure in the reactor vessel, some of that hydrogen was released from the vessel into the primary containment structure of the reactor.

A key, unsolved riddle is how a significant amount of hydrogen escaped from the primary containment into the reactor building, and how this low-probability event would have happened in

From: Chernoff, Harold
To: Burnell, Scott
Cc: Nelson, Robert; Markley, Michael; Howe, Allen; Gitter, Joseph
Subject: Response to FW: Action: Could you help me find answers?
Date: Wednesday, March 23, 2011 4:29:02 PM
Importance: High

For your use Scott in response to the Platts reporter's query.

The scenario described by Mr. Lochbaum presents one plausible mechanism for the accumulation of hydrogen into the secondary containment under the circumstances of the events at the Fukushima site. However, since the potential mechanisms for the hydrogen accumulation have not been investigated, no conclusions can be reached.

At this time, the NRC does not have the details of the Brunswick test scenario immediately available.

For U.S. plants with Mark I containments, strengthened or "hardened" vents were installed as a result of Generic Letter 89-16, "Installation of a Hardened Wetwell Vent." These modifications provided a vent pathway from the primary containment wetwell airspace to a location outside the secondary containment building.

From: Nelson, Robert
Sent: Wednesday, March 23, 2011 4:19 PM
To: Chernoff, Harold
Subject: RE: Action: Could you help me find answers?

I don't want to imply a commitment on our part to conduct such an investigation. If you agree with these changes, you can send it to OPA

NELSON

From: Chernoff, Harold
Sent: Wednesday, March 23, 2011 4:04 PM
To: Nelson, Robert; Markley, Michael
Cc: Bamford, Peter
Subject: FW: Action: Could you help me find answers?

Nelson – for agreement to forward to Scott in response to Platts reporter inquiry on Lochbaum posting (thanks to Pete for this draft):

The scenario described by Mr. Lochbaum presents one plausible mechanism for the accumulation of hydrogen into the secondary containment under the circumstances of the events at the Fukushima site. However, ~~any event investigations should explore~~ because all potential mechanisms for the hydrogen accumulation have not been investigated, no conclusions can be reached ~~so that a cause can be established, and appropriate corrective actions can be taken.~~

At this time, the NRC does not have the details of the Brunswick test scenario immediately available.

For U.S. plants with Mark I containments, strengthened or "hardened" vents were installed as a

result of Generic Letter 89-16, "Installation of a Hardened Wetwell Vent." These modifications provided a vent pathway from the primary containment wetwell airspace to a location outside the secondary containment building.

From: Chernoff, Harold
Sent: Wednesday, March 23, 2011 3:23 PM
To: Burnell, Scott
Cc: Saba, Farideh; Broaddus, Doug; Mozafari, Brenda; Markley, Michael; Oesterle, Eric; Bamford, Peter
Subject: RE: Action: Could you help me find answers?

All:

Pete Bamford, from my group, is going to try to put together some words related to this request. At first glance I would opine that there might be some relevance.

hkc

From: Burnell, Scott
Sent: Wednesday, March 23, 2011 10:16 AM
To: Oesterle, Eric; Markley, Michael
Cc: Chernoff, Harold; Saba, Farideh; Broaddus, Doug; Mozafari, Brenda
Subject: RE: Action: Could you help me find answers?

I can certainly repeat the "preliminary review" language in the second sentence, whatever you're most comfortable with. I just don't want to leave the impression UCS has found something "new" from 35 years ago.

From: Oesterle, Eric
Sent: Wednesday, March 23, 2011 10:15 AM
To: Markley, Michael
Cc: Chernoff, Harold; Burnell, Scott; Saba, Farideh; Broaddus, Doug; Mozafari, Brenda
Subject: RE: Action: Could you help me find answers?

Hey Folks,

Shouldn't we convey the notion that our *initial look* into this appears to result in low relevance to US plants but we are continuing research, examination of the records, etc. It just seems to me like we are brushing this off too quickly without having done due diligence. Just my opinion.

Eric

From: Nelson, Robert
Sent: Wednesday, March 23, 2011 9:54 AM
To: Markley, Michael; Oesterle, Eric
Cc: Chernoff, Harold
Subject: Action: Could you help me find answers?
Importance: High

Please coordinate review with Harold.

NELSON

From: Burnell, Scott
Sent: Wednesday, March 23, 2011 9:49 AM

To: Broaddus, Doug; Saba, Farideh
Cc: Mozafari, Brenda; Markley, Michael; Nelson, Robert
Subject: RE: Could you help me find answers?
Importance: High

Folks;

Based on this thread and existing Mark I Q&A, our basic answer seems to be this:

The NRC's preliminary review of available information indicates a test similar to the one UCS describes took place at Brunswick. Given the passage of more than 30 years, including the efforts of the NRC's Containment Performance Improvement program in the late 1980s and early 1990s, that test's relevance to U.S. plants and current events is considered low. As part of the CPI effort, all U.S. BWRs with Mark I containments installed hardened vents to ensure containment integrity would be maintained under accident conditions.

Please let me know if that's acceptable. Thanks.

Scott

From: Broaddus, Doug
Sent: Tuesday, March 22, 2011 6:54 PM
To: Saba, Farideh
Cc: Mozafari, Brenda; Burnell, Scott; Markley, Michael; Nelson, Robert
Subject: RE: Could you help me find answers?

I reviewed the report, as well, and it appears to only address the successful conduct of the test to 71.5 psi, and does not indicate that an earlier attempt was unsuccessful due to leakage that prevented achieving the full test pressure. The report does indicate that the Structural Integrity Test (SIT) was performed in conjunction with an Integrated Leak Rate Test (ILRT) (see page 5.1). However, this report only provides the results of the SIT, and indicates that the results of the ILRT are provided in a separate report. A discussion of leakage during the test would more likely be in the report prepared for the ILRT results. Do you know if the ILRT report was ever submitted on the docket?

Doug

From: Saba, Farideh
Sent: Tuesday, March 22, 2011 6:26 PM
To: Burnell, Scott; Markley, Michael; Nelson, Robert
Cc: Broaddus, Doug; Mozafari, Brenda
Subject: RE: Could you help me find answers?

I understand. I have sent this document FYI. I have glanced through the document, but I could not find any information related to leakage from the containment to the reactor building.

Farideh E. Saba, P.E.
Senior Project Manager
NRC/ADRO/NRR/DORL
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Mail Stop O-8G9A
Farideh.Saba@NRC.GOV

From: OPA Resource
To: Burnell, Scott
Subject: MEDIA - Short & Long Term reviews?- FOX NEW Mike Emanuel
Date: Wednesday, March 23, 2011 6:04:45 PM
Importance: High

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

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<http://www.nrc.gov/reading-rm/photo-gallery/>

2010-2011 Information Digest - Where you can find NRC Facts at a Glance
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

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

From: Emanuel, Mike [<mailto:Mike.Emanuel@FOXNEWS.COM>]
Sent: Wednesday, March 23, 2011 5:54 PM
To: OPA Resource
Subject: Short & Long Term reviews?

Do you folks have anything on this one? Thanks.-Mike

U.S. NUCLEAR REGULATORY COMMISSION VOTES TO APPROVE SHORT AND LONG TERM REVIEWS OF
SAFETY STATUS OF U.S. REACTORS IN RESPONSE TO JAPAN CRISIS

Mike Emanuel
White House Correspondent
Fox News

(b)(6)

-cell
-bureau
-WH

SSSS/138

From: [Burnell, Scott](#)
To: [McDowell, Robin](#)
Cc: [OPA Resource](#)
Bcc: [Bagchi, Goutam](#)
Subject: RE: Tsunami/Nuclear Plants
Date: Thursday, March 24, 2011 8:02:00 AM

Hello Robin;

As Goutam said, he's forwarded your request to me in the Office of Public Affairs. I'm the agency spokesperson who deals with reactor issues, so I'll be happy to see what additional information we can provide you. I'll check on which agency sponsored the workshop you mentioned and see what documents were produced afterwards.

The NRC can only speak to U.S. nuclear power plants, and the agency continues to conclude all U.S. reactors are appropriately designed and operated to withstand the strongest earthquake expected at their sites, and that coastal plants are appropriately designed to withstand possible tsunami, storm surge or similar flooding. In the wake of the 2004 tsunami, the NRC took part in multiagency U.S. research, which led to up-to-date guidance on tsunami hazards for new plant applicants to follow. That guidance is available on the NRC website here:

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6966/>

The NRC has also posted several information resources regarding the March 11 earthquake and tsunami:

<http://www.nrc.gov/japan/japan-info.html>

The agency has also announced a two-pronged review of U.S. nuclear power plant safety:

<http://www.nrc.gov/reading-rm/doc-collections/news/2011/11-055.pdf>

Please let me know what additional questions you have. Thanks.

Scott Burnell
Public Affairs Officer
Nuclear Regulatory Commission

From: McDowell, Robin [mailto:rmcdowell@ap.org]
Sent: Thursday, March 24, 2011 5:44 AM
To: Bagchi, Goutam
Subject: Tsunami/Nuclear Plants

Mr. Bagchi,

I'm a reporter from The Associated Press based in Asia and am working on a story about the risk nuclear power plants positioned along coasts face from tsunamis.

Since this was also the topic of the 2005 workshop in

SSSS/140

Kalpakkam, in which you took part, do you think you might be able to discuss this by telephone or email?

Were specific recommendations made at the workshop, for instance? In the case of Japan (off-the-record is fine) do you think they were followed?

Also:

_ Given historical records on tsunamis, what nuclear power plants across the globe are most vulnerable?

_ Is there a need for more risk analysis and planning for tsunamis by plants in general?

_ What lessons can we learn from Fukushima Dai-ichi disaster?

Thanks in advance for any help you can offer.

Cheers

Robin

Robin McDowell

AP Bureau Chief

Jakarta, Indonesia

(b)(6)

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[IP_UK_DISC]msk dccc60c6d2c3a6438f0cf467d9a4938

From: Nelson, Robert
To: Burnell, Scott
Cc: Cullingford, Michael; Astwood, Heather; McGinty, Tim; Blount, Tom; Quay, Theodore
Subject: RE: seeking NRC comment on IEA report raising concerns about safety upgrades at US nuclear plants.
Date: Tuesday, March 22, 2011 3:34:41 PM

DORL has no one available who is familiar with the IAEA IRRS Report. Our international team in DPR is probably the best source for support.

NELSON

From: Burnell, Scott
Sent: Tuesday, March 22, 2011 3:22 PM
To: Cullingford, Michael; Astwood, Heather; Nelson, Robert
Subject: FW: seeking NRC comment on IEA report raising concerns about safety upgrades at US nuclear plants.
Importance: High

Bob;

Jon Hopkins is out and he's the go-to on the IRRS report. As you saw, I tried to wave the reporter off but I need our response ASAP!! Thanks.

Scott

From: tom.doggett@thomsonreuters.com [mailto:tom.doggett@thomsonreuters.com]
Sent: Tuesday, March 22, 2011 3:17 PM
To: Burnell, Scott
Subject: seeking NRC comment on IEA report raising concerns about safety upgrades at US nuclear plants.

Hey Scott,

I writing a story on the IAEA report released two days before the Japan earthquake comparing U.S. nuclear power regulation to other countries. The NRC's overall regulatory structure got the IAEA's blessing. However, the agency raised concerns about the safety upgrades at some older U.S. reactors. The group said some plant operator make the upgrades on their own, while others waited to be told or do the minimum to meet NRC regulations. The IAEA said the NRC should direct plant operators that they have to take their own initiatives to improve safety and the NRC should take measures to ensure licensees are more proactive in upgrading their systems.. That's what my story is about. What is the NRC's comment on this part of the report, which can be found on page 69. Thanks--Tom

Tom Doggett

SSSS/141

Energy Correspondent

Reuters News Agency

202-898-8320 (work)

(b)(6)

(cell)

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From: [Burnell, Scott](#)
To: tom.doggett@thomsonreuters.com
Bcc: [Nelson, Robert](#); [Hopkins, Jon](#)
Subject: RE: seeking NRC comment on IEA report raising concerns about safety upgrades at US nuclear plants.
Date: Tuesday, March 22, 2011 3:20:00 PM

Hi Tom;

That's the IRRS mission report, yes? I'll check with the staff on specifics, but that report was very broad in nature and I'd really suggest caution in trying to apply it to specific technical areas.

Scott

From: tom.doggett@thomsonreuters.com [mailto:tom.doggett@thomsonreuters.com]
Sent: Tuesday, March 22, 2011 3:17 PM
To: Burnell, Scott
Subject: seeking NRC comment on IEA report raising concerns about safety upgrades at US nuclear plants.

Hey Scott,

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Tom Doggett
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(b)(6)

 (cell)

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From: Burnell, Scott
To: Brian Palmer
Subject: RE: Slate Article Inquiry
Date: Tuesday, March 22, 2011 4:02:00 PM

Gimme just a sec.

From: Brian Palmer [mailto:(b)(6)]
Sent: Tuesday, March 22, 2011 4:01 PM
To: Burnell, Scott
Subject: Re: Slate Article Inquiry

I do really need to file this. Have a free second?

On Tue, Mar 22, 2011 at 3:33 PM, Brian Palmer <(b)(6)> wrote:
(b)(6)

On Tue, Mar 22, 2011 at 3:33 PM, Burnell, Scott <Scott.Burnell@nrc.gov> wrote:
Pardon the red ink, but you understand. You really need 5,000 words for this, but I understand that... I'll try and call ASAP – phone #?

From: Brian Palmer [mailto:(b)(6)]
Sent: Tuesday, March 22, 2011 3:21 PM

To: Burnell, Scott
Subject: Re: Slate Article Inquiry

Great. If you can get back to me by 4, I would appreciate it. Here goes...

Japanese regulators granted a 10-year extension to a reactor the Fukushima Daiichi nuclear plant despite observing damaged components, according to a report in *The New York Times*. Inspectors spent just three days looking at the reactor, which is apparently a very brief inspection. What are inspectors looking for when examining an aging reactor?

Rust, cracks, and pits, among other things. Nuclear reactors have thousands of parts to examine—valves, pumps, pipes, turbines, etc. Inspectors monitor all these bits and pieces, but the greatest concerns in older plants are the reactor vessel, which houses the core, and the containment structure, which is the last line of defense between the fissioning uranium and the public. Radiation and ordinary weathering processes can undermine these components, so inspectors have to routinely measure the thickness of their walls and check for signs of corrosion or fissures in order to ensure that the barriers remain leak-proof.

~~The 1954 Atomic Energy Act initially limited nuclear plant licenses to 40 years, because scientists weren't sure that the reactor vessels could last much longer than that. Their six-~~ to

SSSS/143

eight-inch-thick steel walls are bombarded with radiation, and go through extreme heating and cooling cycles when the reactor is shut down and restarted during the refueling process every 18 or 24 months. If one of those walls is undermined, the reactor must be shut down permanently, since replacing a reactor vessel would require dismantling half of the plant. Researchers are experimenting with technologies to repair thinned parts of the wall, but none of the methods have yet been deployed in a commercial reactor. This requires a phone call.

Nuclear engineers monitor the condition of the vessel by periodically removing tiny samples of metal, of the same type and size as the reactor wall itself, and examining them for wear. The assumption is that the samples are suffering the same effects as the reactor vessel.

Back in the 1950s, few engineers were as concerned about the containment structure as the reactor vessel. After all, the thick metal and concrete structures outside the reactor were, in theory, insulated from the harsh conditions of a nuclear reactor. They were designed to withstand earthquakes and other acts of nature, and weren't exposed to a regular barrage of radiation. By the late 1980s, however, inspectors began to notice flaws. More than one-quarter of the containment systems at the 104 nuclear reactors operating in the U.S. have now shown some form of degradation, which can be caused by freeze-thaw cycles, erosion, and even plant matter growing through the concrete.

There are several ways to monitor a containment structure. Inspectors conduct visual examinations, either with the naked eye or a magnifying glass, in search of rust or pitting. They can apply a liquid to the wall, wipe off surface fluid, and see if any managed to penetrate. Some engineers create a magnetic field in the wall, then spread a thin layer of iron particles. If the characteristic magnetic field pattern is disrupted, it suggests the presence of cracks. Sound waves, radiography, electrical resistance, and compression tests can also indicate flaws. Unlike reactor vessels, it's economically feasible to repair damaged containment structures.

~~Recognizing the political resistance to new nuclear plants,~~ Since the Atomic Energy Act allows for license renewals, the Nuclear Regulator Commission published procedures in 1995 to extend the license of many plants. Today, most nuclear plants have seen their expiration dates put off by two decades, and there's talk of extending the limits up to 80 total years of operation. The possibility has split the scientific community, largely because of potentially undetectable effects of aging.

On Tue, Mar 22, 2011 at 3:19 PM, Burnell, Scott <Scott.Burnell@nrc.gov> wrote:
That'll work -- I appreciate your patience, persistence and professionalism!!!

From: Brian Palmer [mailto:[\(b\)\(6\)](mailto:(b)(6))]

Sent: Tuesday, March 22, 2011 3:19 PM

To: Burnell, Scott

Subject: Re: Slate Article Inquiry

Hey Scott,

I take it your caught under a pile of inquiries, so I'd like to make a request. I've spoken to a few people and drafted up a 500-word explainer column. I was thinking that reviewing it for factual errors might be easier for you than talking to me on the phone. Interested?

On Tue, Mar 22, 2011 at 12:21 PM, Brian Palmer <[\(b\)\(6\)](mailto:(b)(6))> wrote:
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The problem is your query straddles the line between a few things: our "maintenance rule," ongoing inspections and the "aging management" aspect of license renewal. Handing you off can lead to multiple interviews. If I'm still slammed at 3 I'll see if someone else can help.

From: Brian Palmer [mailto:[\(b\)\(6\)](mailto:(b)(6))]

Sent: Tuesday, March 22, 2011 12:17 PM

To: Burnell, Scott

Subject: Re: Slate Article Inquiry

What a two-week period this must be at NRC media. If we could talk before 3:30, that would be great. I'm happy to be handed off to someone else, if you can't spare the time, like a resident inspector at a plant.

I can call you at a convenient time, or you can call me at [\(b\)\(6\)](tel:(b)(6)).

Thanks.

Brian

On Tue, Mar 22, 2011 at 12:15 PM, Burnell, Scott <Scott.Burnell@nrc.gov> wrote:
Hi Brian;

Haven't forgotten you, but of course I'm juggling about a dozen chainsaws. Deadline today?
Thanks.

Scott

From: Brian Palmer [mailto:[\(b\)\(6\)](mailto:(b)(6))]

Sent: Tuesday, March 22, 2011 11:34 AM

To: Burnell, Scott

Subject: Re: Slate Article Inquiry

Hi Scott,

Just checking in to see if you have time talk about reactor inspections today.

Thanks again.

Brian

On Tue, Mar 22, 2011 at 9:47 AM, Brian Palmer <[REDACTED]> wrote:
Hi Scott,

This is Brian Palmer, from Slate magazine, again. There have been reports today that Japanese inspectors did a rather brief inspection of the Daichi plant before extending its lifespan by 10 years past the statutory limit. I'm writing a piece on how you inspect an aging reactor. What parts wear down? Why do you have to mothball an old reactor rather than fix it? The articles say the inspection lasted "only" three hours... how long should an inspection last?

Do you have a few minutes today?

Thanks again.

Brian

From: Brian Palmer
To: Burnell, Scott
Subject: Re: Slate Article Inquiry
Date: Tuesday, March 22, 2011 3:34:18 PM

(b)(6)

On Tue, Mar 22, 2011 at 3:33 PM, Burnell, Scott <Scott.Burnell@nrc.gov> wrote:

Pardon the red ink, but you understand. You really need 5,000 words for this, but I understand that... I'll try and call ASAP – phone #?

From: Brian Palmer [mailto:[\(b\)\(6\)](mailto:(b)(6))]
Sent: Tuesday, March 22, 2011 3:21 PM

To: Burnell, Scott
Subject: Re: Slate Article Inquiry

Great. If you can get back to me by 4, I would appreciate it. Here goes...

Japanese regulators granted a 10-year extension to a reactor the Fukushima Daiichi nuclear plant despite observing damaged components, according to a report in *The New York Times*. Inspectors spent just three days looking at the reactor, which is apparently a very brief inspection. What are inspectors looking for when examining an aging reactor?

Rust, cracks, and pits, among other things. Nuclear reactors have thousands of parts to examine—valves, pumps, pipes, turbines, etc. Inspectors monitor all these bits and pieces, but the greatest concerns in older plants are the reactor vessel, which houses the core, and the containment structure, which is the last line of defense between the fissioning uranium and the public. Radiation and ordinary weathering processes can undermine these components, so inspectors have to routinely measure the thickness of their walls and check for signs of corrosion or fissures in order to ensure that the barriers remain leak-proof.

~~The 1954 Atomic Energy Act initially limited nuclear plant licenses to 40 years, because scientists weren't sure that the reactor vessels could last much longer than that. Their six to eight inch thick steel walls are bombarded with radiation, and go through extreme heating and cooling cycles when the reactor is shut down and restarted during the refueling process every 18 or 24 months. If one of those~~

~~walls is undermined, the reactor must be shut down permanently, since replacing a reactor vessel would require dismantling half of the plant. Researchers are experimenting with technologies to repair thinned parts of the wall, but none of the methods have yet been deployed in a commercial reactor. This requires a phone call.~~

Nuclear engineers monitor the condition of the vessel by periodically removing tiny samples of metal, of the same type and size as the reactor wall itself, and examining them for wear. The assumption is that the samples are suffering the same effects as the reactor vessel.

Back in the 1950s, few engineers were as concerned about the containment structure as the reactor vessel. After all, the thick metal and concrete structures outside the reactor were, in theory, insulated from the harsh conditions of a nuclear reactor. They were designed to withstand earthquakes and other acts of nature, and weren't exposed to a regular barrage of radiation. By the late 1980s, however, inspectors began to notice flaws. More than one-quarter of the containment systems at the 104 nuclear reactors operating in the U.S. have now shown some form of degradation, which can be caused by freeze-thaw cycles, erosion, and even plant matter growing through the concrete.

There are several ways to monitor a containment structure. Inspectors conduct visual examinations, either with the naked eye or a magnifying glass, in search of rust or pitting. They can apply a liquid to the wall, wipe off surface fluid, and see if any managed to penetrate. Some engineers create a magnetic field in the wall, then spread a thin layer of iron particles. If the characteristic magnetic field pattern is disrupted, it suggests the presence of cracks. Sound waves, radiography, electrical resistance, and compression tests can also indicate flaws. Unlike reactor vessels, it's economically feasible to repair damaged containment structures.

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To: Burnell, Scott

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Do you have a few minutes today?

Thanks again.

Brian

From: Burnell, Scott
To: Harrington, Holly; McIntyre, David
Cc: Anderson, Brian
Subject: RE: Media Inquiry From USAID
Date: Tuesday, March 22, 2011 4:30:00 PM

Brian took a look at this and correctly noted the Ops Ctr would be the most likely source. I suggest pinging the Liason Team.

From: RMTPACTSU_ELNRC [mailto:RMTPACTSU_ELNRC@ofda.gov]
Sent: Tuesday, March 22, 2011 4:27 PM
To: Harrington, Holly; McIntyre, David; Burnell, Scott
Cc: RMTPACTSU_PRO
Subject: Media Inquiry From USAID

Holly, David, Scott:

Below, I have enclosed a media inquiry that was sent to USAID by Jessica Jung of the Japanese Daily News. Can you help answer her questions? Thanks! ☺

From: Mainichi LA [mailto:mainichila@mainichi.com] *rel*
Sent: Tuesday, March 22, 2011 3:28 PM

I spoke with your colleague Brett and received your email from him. My name is Jessica Jung with Japanese Daily News (Mainichi), working out of our Los Angeles bureau.

I have a couple questions regarding the nuclear crisis in Japan - Did the U.S. Agency for International Development assist with communicating information between the NRC and NISA? If so, can you give us information on the initial communication, so we document the first contact between U.S. and Japan's counterparts. Or refer us to someone who may know this information.

We hope that you can get back to us in a timely manner, as our time is limited. I appreciate any help you can provide us with.

With regards,

--
Jessica Jung
The Mainichi Newspapers
Los Angeles Bureau
o: 310-396-7547
c: (b)(6)

SSSS/1418

From: Burnell, Scott
To: Kammerer, Annie; McIntyre, David; Harrington, Holly
Cc: Ake, Jon; Munson, Clifford
Subject: Re: EERI national reconnaissance reports - request to produce some information
Date: Wednesday, March 23, 2011 5:55:01 AM

Annie;

My two cents -- you're quite right that EERI's focus lies outside our expertise and they should therefore avoid attempting to interpret or even summarize quake/tsunami effects on Fukushima, etc. I'm not sure we'd be the proper source, however, since we're dealing with a lot of second- and third-hand info. Properly attributing "public" sources could resolve that concern. If you have any spare time left, it'd be worthwhile from my point of view.

Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Kammerer, Annie
To: Burnell, Scott; McIntyre, David
Cc: Ake, Jon; Munson, Clifford
Sent: Tue Mar 22 21:17:28 2011
Subject: EERI national reconnaissance reports - request to produce some information

Not sure who to send this to...

The Earthquake Engineering Research Institute is funded by NSF to coordinate and lead US efforts in earthquake reconnaissance and the documentation of lessons learned. It's done through the EERI Learning from earthquakes (LFE) program. They do an excellent job at it and are exceptionally well respected globally. The participants are earthquake experts who are also pmembers of the US earthquake reconnaissance team (like myself) who pitch in on a rotating pro-bono basis.

Of course, rarely does the earthquake impact (and therefore the reconnaissance effort) involve damage to a nuclear plant.

I was called by the EERI Board earlier today, because they were arguing over whether or not to report on the NPP. I strongly encouraged them not to because I don't think there's any chance they will get all the info right and (given their standing) that would be bad. But, it is the biggest story of the quake and so not adding something is nearly impossible for them. I said I'd ask if we could instead submit a section of our own so that they could be more complete and we could get our preferred message out to the earthquake engineers out there.

I want to stress that the EERI LFE program is the clearing house for the entire earthquake engineering community globally; not just another publication

Do you think this is possible to given them a factual write up of public information? I'm happy to write it, but I feel that I should get permission from someone if it's actually written

SSSS /145

by the NRC.

Advice?

Annie

See info at <http://www.eeri.org/site/projects/learning-from-earthquakes>

Dr. Annie Kammerer, PE
Senior Seismologist and Earthquake Engineer
US Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
Washington DC 20555

(b)(6) mobile

(b)(6) BB

From: Deavers, Ron
To: Harrington, Holly; McIntyre, David; Bonaccorso, Amy; Burnell, Scott; Janbergs, Holly; Tobin, Jennifer
Cc: Couret, Ivonne
Subject: RE: Radiation Question - Any Answers?
Date: Wednesday, March 23, 2011 9:59:53 AM

I talked to this guy yesterday and provided him the information. He did not leave the conversation with any open questions. I think we can consider this case closed.

Ron Deavers

From: Harrington, Holly
Sent: Wednesday, March 23, 2011 9:58 AM
To: McIntyre, David; Bonaccorso, Amy; Burnell, Scott; Janbergs, Holly; Tobin, Jennifer
Cc: Deavers, Ron; Couret, Ivonne
Subject: RE: Radiation Question - Any Answers?

I don't feel a compelling need to help this individual beyond sending him to EPA and/or DOE.

Amy/Ron – you can provide him with the information below, if that helps. You can also direct him here: <http://www.usa.gov/japan2011.shtml>

From: McIntyre, David
Sent: Tuesday, March 22, 2011 4:58 PM
To: Bonaccorso, Amy; Burnell, Scott; Janbergs, Holly; Tobin, Jennifer
Cc: Deavers, Ron; Harrington, Holly; Couret, Ivonne
Subject: RE: Radiation Question - Any Answers?

Did anyone respond to this? The guy is probably so annoying that they'll tell him anything to get him off the phone.

For future reference:

Here are the media contacts from both EPA and DOE. Feel free to give these to members of the public as well, since everyone and his uncle has been calling us.

NEWS MEDIA CONTACT FOR EPA:
press@epa.gov
202-564-6794

NEWS MEDIA CONTACT FOR DEPARTMENT OF ENERGY:
(202) 586-4940

EPA's RadNet data is online, though not particularly readable. This page explains that EPA does indeed monitor for radiation and gives a link to RadNet:
<http://www.epa.gov/radiation/rert/monitoring.html>

SSSS/148

From: Bonaccorso, Amy
Sent: Tuesday, March 22, 2011 1:54 PM
To: Burnell, Scott; McIntyre, David; Janbergs, Holly; Tobin, Jennifer
Cc: Deavers, Ron
Subject: Radiation Question - Any Answers?

I just had a person call me and insist that we monitor background radiation and have numbers....he said we stopped releasing them after Chernobyl.

I have his name and number and he wants a call back.

He says other agencies are sending him here....saying we have numbers. An EPA person, he told me, said they do not monitor radiation (?)

I gave him the EPA's email address for radiation questions.

Can anyone help me here? Am I missing anything?

Gordon Anderson

| |
|--------|
| (b)(6) |
|--------|

Thanks,

Amy

From: Burnell, Scott
To: McIntyre, David; Brenner, Eliot; Couret, Ivonne; Harrington, Holly; Clark, Theresa
Subject: RE: Paper from 2003 calling for NRC to stop allowing reracking, calling for 5 years from pool to cask
Date: Wednesday, March 23, 2011 11:26:00 AM

Could have sworn I'd sent that NRR request around. My apologies.

From: McIntyre, David
Sent: Wednesday, March 23, 2011 11:22 AM
To: Brenner, Eliot; Burnell, Scott; Couret, Ivonne; Harrington, Holly; Clark, Theresa
Subject: FW: Paper from 2003 calling for NRC to stop allowing reracking, calling for 5 years from pool to cask

All – note the request that we cc Bob Nelson on any queries to NRR staff stemming from the Japan events.

From: Nelson, Robert
Sent: Wednesday, March 23, 2011 11:19 AM
To: McIntyre, David
Subject: RE: Paper from 2003 calling for NRC to stop allowing reracking, calling for 5 years from pool to cask

Dave:

See the second paragraph of the attached e-mail from Eric Leeds regarding my role. I don't know how this role will evolve.

I would appreciate that you either route thru me or cc me on any queries to NRR staff in response to the Japan events.

NELSON

From: McIntyre, David
Sent: Wednesday, March 23, 2011 10:59 AM
To: Jones, Steve
Cc: Nelson, Robert
Subject: RE: Paper from 2003 calling for NRC to stop allowing reracking, calling for 5 years from pool to cask

Steve – by the way, as part of what we here in OPA are calling “the new normal,” we are expecting this pool issue to bedevil us for awhile. At some point I'd like to stop by your office, shake your hand and thank you for your help, and then ask you to teach me everything you know. (Well, maybe not everything.)

Bob – does your designation as Communications Lead for Japan extend into the lessons-learned stage and responses to public/media inquiries? If so, we'll get to know each other even better than during your stint in NMSS.

Dave

SSSS/147

From: Jones, Steve
Sent: Wednesday, March 23, 2011 10:36 AM
To: McIntyre, David
Cc: Nelson, Robert
Subject: RE: Paper from 2003 calling for NRC to stop allowing reracking, calling for 5 years from pool to cask

Dave,

The attached files are the only 2.206 petition and director's decisions I know of related to the 2003 Alvarez paper. They are publically available at the accession number included in the file name. Basically, the staff was looking at SFP issues already, and the staff determined the actions the NRC had taken by 2005 reasonably addressed the petition. The director's decision references other publically available documents, such as letters to Congress and the National Academy of Sciences report on spent fuel pool safety (public summary attached).

By the way, please keep Bob Nelson, the NRR Communications Lead for Japan, in the loop.

Thanks!

Steve

Steven R. Jones
Sr. Reactor Systems Engineer
NRR/DSS/SBPB
301-415-2712

From: McIntyre, David
Sent: Wednesday, March 23, 2011 9:17 AM
To: Jones, Steve
Subject: FW: Paper from 2003 calling for NRC to stop allowing reracking, calling for 5 years from pool to cask

Steve – are you familiar with the attached paper and whatever became of it?

Thanks,
Dave

From: Mitlyng, Viktoria
Sent: Tuesday, March 22, 2011 6:53 PM
To: McIntyre, David
Subject: FW: Paper from 2003 calling for NRC to stop allowing reracking, calling for 5 years from pool to cask

Dave,

Can you give me a contact for finding out if the attached report on spent fuel pool safety was submitted to the NRC as a 2.206 petition in 2003? Or, at least, tell me where to start. It's for the same Minneapolis Star Tribune Inquiry. The reporter is digging pretty deep on spent fuel pools and getting an ear full from the authors of this report. Now, he wants to understand the NRC's perspective and position relative to their statements. His deadline is Wednesday and I am hoping to get on this early AM. Thank you. Can't promise a good bottle of wine since you have them all... You'll have to do with a hug next time I see you.

Vika

From: Shaffer, David [mailto:David.Shaffer@startribune.com]
Sent: Tuesday, March 22, 2011 4:13 PM
To: Mitlyng, Viktoria
Subject: Paper from 2003 calling for NRC to stop allowing reracking, calling for 5 years from pool to cask

Victoria,

Here is the 2003 paper. The authors said NRC never formally responded.

David Shaffer
Reporter/Editor, Business news
Minneapolis Star Tribune
612-673-7090 (desk) (b)(6) (cell)

From: Kammerer, Annie
To: Burnell, Scott
Subject: Re: Seismic Q&As March 22th 10pm update
Date: Wednesday, March 23, 2011 12:09:22 PM

It seems like not as many are coming to me. I hope that means the Q&As are a useful resource.....however, the things I'm being asked to do is, as you say, more in-depth and complex.

We're focused on cleaning up the big Q&As and will go through for the public stuff tomorrow.

Cheers,
Annie

Sent from an NRC blackberry
Annie Kammerer
mobile (b)(6)
bb (b)(6)
annie.kammerer@nrc.gov

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

From: Burnell, Scott
To: Kammerer, Annie
Sent: Wed Mar 23 12:01:35 2011
Subject: RE: Seismic Q&As March 22th 10pm update

Slower??? Nooooooooooooo... Still a significant numbers of Qs, and many asking for more detail than earlier.

If there's anything in the latest batch you feel warrant updating the public Q&A, feel free to send us an updated total document. Thanks. :-)

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

From: Kammerer, Annie
Sent: Wednesday, March 23, 2011 12:00 PM
To: Burnell, Scott
Subject: Re: Seismic Q&As March 22th 10pm update

Thanks!

Do we need an update to the public Q&A? If so, what is the content? Our steps forward would be good, I suppose.

I see you were in early. Is it slowing down at all?

Cheers,
Annie

Sent from an NRC blackberry
Annie Kammerer
mobile (b)(6)
bb (b)(6)
annie.kammerer@nrc.gov

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

From: Burnell, Scott
To: Kammerer, Annie
Sent: Wed Mar 23 11:53:33 2011
Subject: RE: Seismic Q&As March 22th 10pm update

I'm brain-fried, you're confused, a wonderful combination!! :-)

I meant to ask if there'd be an update to the public Q&A, and the DC/SONGS specific comments were for the staff-only documents.

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

From: Kammerer, Annie
Sent: Wednesday, March 23, 2011 11:51 AM
To: Burnell, Scott
Subject: Re: Seismic Q&As March 22th 10pm update

I'm confused. This is the internal one. Or do you mean DC and SONGS?

SSSS/148

Cheers,
Annie

Sent from an NRC blackberry
Annie Kammerer
mobile (b)(6)
bb (b)(6)
annie.kammerer@nrc.gov

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

From: Burnell, Scott
To: Kammerer, Annie
Sent: Wed Mar 23 07:49:08 2011
Subject: RE: Seismic Q&As March 22th 10pm update

Just checking -- will you be sending a Word version of the update so we can post to the Web?

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

From: Kammerer, Annie
Sent: Wednesday, March 23, 2011 3:15 AM
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Giitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffry; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas; Webb, Michael; Manoly, Kamal; Khanna, Meena; Screnci, Diane; Thomas, Eric; Nguyen, Quynh; Meighan, Sean; FOIA Response.hoc Resource; Bensi, Michelle
Subject: Seismic Q&As March 22th 10pm update

All,

Attached please find an updated set of Q&As. I also included some new Q&As for SONGS and Diablo Canyon, just in case anyone is interested.

This version has an expanded set of definitions and new sections on station blackout, spent fuel, flooding and some other topics. It also has fewer duplicate questions.

Let me also pass on a tidbit of info. According to TEPCO (via an NEI press release), the tsunami at Fukushima was 14 meters and the design tsunami level was 5.7 meters. The reactors and backup power sources were at 10 meters and at 13 meters. Ouch.

Cheers,
Annie

From: Kammerer, Annie
Sent: Sunday, March 20, 2011 11:00 PM
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Giitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffry; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas; Webb, Michael; Manoly, Kamal; Khanna, Meena; Screnci, Diane; Thomas, Eric; Nguyen, Quynh; Meighan, Sean; FOIA Response.hoc Resource; Bensi, Michelle
Subject: Seismic Q&As March 20th 8pm update

All,

Here's today's version. It includes updates on related topics for tomorrow's briefing. Also, some of the sections have been streamlined and some (though not all) of the answers have been updated.

The biggest news from the seismic team's perspective is that starting tomorrow a very bright young risk analyst (Michelle Bensi) who recently joined us from UC Berkeley (my beloved alma mater) will be helping with the compilation of this document. That will allow our team to spend more time cleaning and streamlining it; which inevitably will make it more user friendly...and shorter! Starting with tomorrow's version her name will start to show up on the front.

Best of luck to everyone with the briefing tomorrow!

Annie

From: Kammerer, Annie
Sent: Saturday, March 19, 2011 9:00 AM
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffrey; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas; Webb, Michael; Manoly, Kamal; Khanna, Meena; Screnci, Diane; Thomas, Eric; Nguyen, Quynh; Meighan, Sean; FOIAResource.hoc@nrc.gov
Subject: Seismic Q&As March 19th 8am update

All,

Here is today's updated version. Lot of new fact sheets have been prepared for various briefings and for Monday's public meeting!

However, the big news of the day is that we just sent off a 6 page, 22 question, much better edited version for a public Q&A set. It's all in OPA's capable hands now. I think it's pretty good...but then I'm biased.

Cheers,
Annie

From: Kammerer, Annie
Sent: Friday, March 18, 2011 6:51 AM
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffrey; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas; Webb, Michael; Manoly, Kamal; Khanna, Meena; Screnci, Diane; Thomas, Eric; Nguyen, Quynh; Meighan, Sean
Subject: RE: Seismic Q&As March 18th 5am update

All,

Please see the updated version of the Seismic Q&As.

Among today's highlights:

*We added a Terms and Definitions section at the end of the document. (We know that an acronyms list would be helpful too, but it will have to wait a little) *The "additional information" section has been split into tables, plots, and fact sheets *A high-level draft fact sheet on NRC's seismic regulations has been added *We added a section to track outstanding questions that have come in from congress. This will support those who get the tickets in the short terms (most likely NRR). The questions will be moved to the appropriate sections long term (as long as they are not duplicates.)

I'm sure we all agree this has been a crazy week!. We're hoping that the weekend workload is lighter (if only because we won't get as many email from in house) and we can clean up this document and fill in some of the missing answers in preparation for the news story changing. We're trying hard to get out in front of the next wave.

Cheers,
Annie

From: Kammerer, Annie
Sent: Thursday, March 17, 2011 2:36 AM
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Glitter, Joseph; Howe, Allen; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Munson, Clifford; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Murphy, Andrew; Pires, Jose; Hogan, Rosemary; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffrey; Boska, John; Ma, John; Tegeler,

Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas
Subject: Seismic Q&As March 17th 2am update All,

As promised, a sharepoint site has been set up where our friends in NRR will be posting the latest version of the Seismic Q&A document on an ongoing basis. If someone would prefer to use the sharepoint site, instead of being on this distribution list, please let me know...

<http://portal.nrc.gov/edo/nrr/NRR%20TA/FAQ%20Related%20to%20Events%20Occurring%20in%20Japan/Forms/AllItems.aspx>

This latest update has a number of new questions (not many with answers today, but we are working hard). A high priority question we are working on is "how many plants are near a mapped active fault". We're focusing on anything within 50 miles. We're also pulling relevant questions from the congressional inquiries we just received; and will also give these high priority to support any needs by NRR.

Many new figures and some draft fact sheets have added to the "additional information" section. These include the NRO half of a tsunami fact sheet...a description of the tsunami research is still to come from RES.

Some good news: Yesterday's version seems to have been widely forwarded around the agency. So, we are also starting to get some excellent questions from staff looking forward. This is allowing us to feel that we are finally getting out in front of things to a small degree. Also, our team has grown and we now have someone acting as source of seismic expertise for the 11pm to 7 am shift. This means that we now have seismic experts available to the RST and OPA at the Op Center 24 hours, with 2 people during the day. That extra support is allowing us to get this out at least an hour earlier today ☺

We are continuing to compile the questions that come in and update the seismic Q&A document. If you have suggested changes, or want to provide missing answers, please forward them to me for compilation.

This is a living document and will be updated daily in the foreseeable future.

Happy St. Paddy's Day. May the world (especially our friends in Japan) have the luck of the Irish today.

Cheers,
Annie

Dr. Annie Kammerer, PE
Senior Seismologist and Earthquake Engineer US Nuclear Regulatory Commission Office of Nuclear Regulatory Research
Washington DC 20555

(b)(6) mobile
BB

From: Kammerer, Annie
Sent: Tuesday, March 15, 2011 3:41 AM
To: Hiland, Patrick; Skeen, David
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Giltter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Kammerer, Annie; Chokshi, Nilesh; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Giltter, Joseph; Howe, Allen; Case, Michael; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Munson, Clifford; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Murphy, Andrew; Pires, Jose; Hogan, Rosemary; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael
Subject: latest version of Q&As

All,

This is the first draft of the seismic-specific Q&As. It is pretty rough and there are many answers still missing, but people have contributed a lot and we thought it may be useful for many people trying to answer questions coming in.

We are continuing to compile the questions that come in and update the seismic Q&A document. If you have suggested changes, or want to provide missing answers, please forward them to me for compilation.

This is a living document and will be updated daily in the foreseeable future.

Annie

Dr. Annie Kammerer, PE
Senior Seismologist and Earthquake Engineer US Nuclear Regulatory Commission Office of Nuclear Regulatory Research
Washington DC 20555

(b)(6) mobile
BB

From: Kammerer, Annie
To: Burnell, Scott; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Chokshi, Niles; Munson, Clifford; Karas, Rebecca; Ake, Jon; Uhle, Jennifer; Uselding, Lara; Hayden, Elizabeth; Dricks, Victor; Warnick, Greg
Subject: Re: Seismic Q&As March 22th 10pm update
Date: Wednesday, March 23, 2011 11:55:52 AM

Yes. But, It's consistent with both the NOAA estimates with the 5m bathymetric line and presentations on the tsunami assessments that I've seen TECPO make, and also their plant elevations.

Cheers,
Annie

Sent from an NRC blackberry
Annie Kammerer
mobile (b)(6)
bb (b)(6)
annie.kammerer@nrc.gov

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

From: Burnell, Scott
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Chokshi, Niles; Munson, Clifford; Karas, Rebecca; Ake, Jon; Uhle, Jennifer; Uselding, Lara; Hayden, Elizabeth; Dricks, Victor; Warnick, Greg
Sent: Wed Mar 23 05:45:06 2011
Subject: Re: Seismic Q&As March 22th 10pm update

Thanks Annie!

We'll give these a once-over and get them posted today.

It probably goes without saying, but NEI quoting TEPCO isn't the sort of "definitive" info we should be repeating outside the agency. They could well be right, but it's always better to be able to refer to the direct source instead of going through intermediaries. Thanks.

Scott

Sent from an NRC Blackberry
Scott Burnell
(b)(6)

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

From: Kammerer, Annie
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffrey; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas; Webb, Michael; Manoly, Kamal; Khanna, Meena; Screnci, Diane; Thomas, Eric; Nguyen, Quynh; Meighan, Sean; FOIA Response.hoc Resource; Bensi, Michelle
Sent: Wed Mar 23 03:14:31 2011
Subject: Seismic Q&As March 22th 10pm update

All,

Attached please find an updated set of Q&As. I also included some new Q&As for SONGS and Diablo Canyon, just in case anyone is interested.

This version has an expanded set of definitions and new sections on station blackout, spent fuel, flooding and some other topics. It also has fewer duplicate questions.

Let me also pass on a tidbit of info. According to TEPCO (via an NEI press release), the tsunami at Fukushima was 14 meters and the design tsunami level was 5.7 meters. The reactors and backup power sources were at 10 meters and at 13 meters. Ouch.

Cheers,

From: Kammerer, Annie
To: Burnell, Scott
Subject: Re: Seismic Q&As March 22th 10pm update
Date: Wednesday, March 23, 2011 11:48:22 AM

Thanks will address when it get in.

Cheers,
Annie

Sent from an NRC blackberry
Annie Kammerer
mobile (b)(6)
bb (b)(6)
annie.kammerer@nrc.gov

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

From: Burnell, Scott
To: Kammerer, Annie
Sent: Wed Mar 23 08:30:20 2011
Subject: RE: Seismic Q&As March 22th 10pm update

On the San Onofre Q&A, #3 and #6 need some tweaks --

For #3 we need to include a caveat along the lines of "based on currently available information," since as you point out we don't have direct measurements from the site.

For #6 there seems to be a garble in explaining the station blackout rule.

For the Diablo Canyon Q&A, #4 needs the same caveat language and there's the same garble in #6.

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

From: Kammerer, Annie
Sent: Wednesday, March 23, 2011 3:15 AM
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffrey; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas; Webb, Michael; Manoly, Kamal; Khanna, Meena; Screnci, Diane; Thomas, Eric; Nguyen, Quynh; Meighan, Sean; FOIA Response.hoc Resource; Bensi, Michelle
Subject: Seismic Q&As March 22th 10pm update

All,

Attached please find an updated set of Q&As. I also included some new Q&As for SONGS and Diablo Canyon, just in case anyone is interested.

This version has an expanded set of definitions and new sections on station blackout, spent fuel, flooding and some other topics. It also has fewer duplicate questions.

Let me also pass on a tidbit of info. According to TEPCO (via an NEI press release), the tsunami at Fukushima was 14 meters and the design tsunami level was 5.7 meters. The reactors and backup power sources were at 10 meters and at 13 meters. Ouch.

Cheers,
Annie

From: Kammerer, Annie
Sent: Sunday, March 20, 2011 11:00 PM
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi,

What does the Japanese Earthquake Mean to Diablo Canyon?

1) Could an earthquake and tsunami the size of the one in Japan happen at Diablo Canyon?

No. This earthquake occurred on a "subduction zone", which is the type of tectonic region that produces the largest magnitudes earthquake. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. Subduction zone earthquakes are also required to produce the kind of massive tsunami seen in Japan. In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of far northern California, Oregon and Washington. So, a continental earthquake and tsunami as large as in Japan could only happen there. Outside of the Cascadia subduction zone, earthquakes are not expected to exceed a magnitude of approximately 8.25; and that would only occur on the largest fault lines, such as the San Andreas fault, which is 50 miles away onshore.

2) What magnitude earthquake are currently operating US nuclear plants such as Diablo Canyon designed to?

Each reactor is designed for a different ground motion that is determined on a site-specific basis. Ground motion is a function of both the magnitude of an earthquake and the distance from the fault to the site; and it is ground motion that causes damage. So, Nuclear plants, and in fact all engineered structures, are actually designed based on ground motion levels, not earthquake magnitudes. The existing nuclear plants were designed based on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquakes expected in the area around the plant. The scenario earthquake at Diablo is a magnitude 7.5 on the Hosgri Fault 3 miles from the main plant. This earthquake results in a ground motion that has a peak ground acceleration of 0.75g, that is 75% of the acceleration of gravity.

3) Could the newly discovered Shoreline Fault produce a larger "Scenario Earthquake"?

The NRC's preliminary analyses indicate that the ground motions from the largest earthquakes expected on the smaller Shoreline Fault do not exceed the ground motions from the Hosgri Fault, for which the plant has already been analyzed and been found to be safe. NRC is currently reviewing the Final Report on the Shoreline Fault that was submitted to the NRC earlier this year. The NRC is performing an independent analysis of potential ground motions based the data contained in the report and other information. Much of the data on the Shoreline Fault comes from the USGS in Menlo Park.

4) Could Diablo Canyon withstand an earthquake of the magnitude of the Japanese earthquake?

It could withstand the ground shaking experienced by the Japanese nuclear plants. As discussed above, it is actually ground motions that structures, systems, and components "feel". We do not have direct recordings of ground motion at the Japanese reactors. However, we do have estimates of shaking that come from a ShakeMap produced by the the K-NET system. The ground motion at the Japanese nuclear reactors is believed to be somewhat smaller than the 0.75g peak ground acceleration that Diablo Canyon has been analyzed to. Do, Diablo Canyon could withstand the ground shaking experienced by the Fukushima plant.

In fact, the Fukushima plant also withstood the earthquake. In the hour or so after the earthquake the Fukushima plant's safety systems, including the diesel generators, performed as expected and effectively shut down the reactor. The cause of the problems at the plant stemmed from the loss of emergency power that appears to be the direct result of the subsequent tsunami, which far exceeded the design basis tsunami for the Fukushima plant.

5) Is Diablo Canyon's equipment vulnerable to tsunami?

Nuclear plants are designed to withstand protection against natural phenomena such as tsunami, earthquakes. Diablo Canyon's main plant is located above the flood level associated with tsunami. The intake structures and Auxiliary Sea Water System at Diablo canyon are designed for combination of tsunami and storm wave activity.

6) How do we know that the emergency diesel generators in Diablo Canyon and SONGS will not fail to operate like in Japan?

Emergency Diesel Generators (EDGs) are installed in a seismically qualified structure. Even if these EDGs did fail, plants can safely shutdown using station blackout power source law 10 CFR 50.63. In 1988 the NRC concluded that additional regulatory requirements were justified in order to provide further assurance that a loss of both offsite and on-site emergency ac power systems would not adversely affect public health and safety and the station blackout rule was enacted. Studies conducted by the NRC since this rule has been in effect confirms that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in significant risk reduction and have further enhanced defense-in-depth. However, we plan to carefully evaluate the lessons learned from the events in Japan to determine if enhancements to the station blackout rule are warranted.

7) Was there any damage to Diablo Canyon from either the earthquake or the resulting tsunami?

A small tsunami did hit the region around Diablo Canyon. There was no damage at the nuclear plant.

8) How do we know the evacuation routes in the region around Diablo Canyon are realistic?

FEMA reviews off-site evacuation plans formally every 2 years during a biennial emergency preparedness exercise. NRC evaluates on-site evacuation plans during the same exercise. Population studies are formally done every 10 years, and evacuation time estimates are re-evaluated at that time. FEMA reviews these evacuation plans, and will conclude their acceptability through a finding of "reasonable assurance" that the off-site facilities and infrastructure is capable of protecting public health and safety in the event of an emergency at DCNPP.

What does the Japanese Earthquake Mean to San Onofre?

1) Could an earthquake and tsunami the size of the one in Japan happen at San Onofre?

No. This earthquake occurred on a "subduction zone", which is the type of tectonic region that produces the largest magnitudes earthquake. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. Subduction zone earthquakes are also required to produce the kind of massive tsunami seen in Japan. In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of far northern California, Oregon and Washington. So, a continental earthquake and tsunami as large as in Japan could only happen there. Outside of the Cascadia subduction zone, earthquakes are not expected to exceed a magnitude of approximately 8.25; and that would only occur on the largest fault lines, such as the San Andreas fault, which is 50 miles away onshore.

2) What magnitude earthquake are currently operating US nuclear plants such as SONGS designed to?

Each reactor is designed for a different ground motion that is determined on a site-specific basis. Ground motion is a function of both the magnitude of an earthquake and the distance from the fault to the site; and it is ground motion that causes damage. So, Nuclear plants, and in fact all engineered structures, are actually designed based on ground motion levels, not earthquake magnitudes. The existing nuclear plants were designed based on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquakes expected in the area around the plant. The scenario earthquake at SONGS is a magnitude 7 approximately 5 miles from the main plant. This earthquake results in a ground motion that has a peak ground acceleration of 0.67g, that is 67% of the acceleration of gravity.

3) Could San Onofre withstand an earthquake of the magnitude of the Japanese earthquake?

It could withstand the ground shaking experienced by the Japanese nuclear plants. As discussed above, it is actually ground motions that structures, systems, and components "feel". We do not have direct recordings of ground motion at the Japanese reactors. However, we do have estimates of shaking that come from a ShakeMap produced by the K-NET system. The ground motion at the Japanese nuclear reactors is believed to be somewhat on the order of the 0.67g, or possibly slightly higher, that San Onofre peak ground acceleration has been analyzed to. However, US nuclear plants have additional seismic margin, as demonstrated by the result of the Individual Plant Examination of External Events program carried out by the NRC in the mid-90s.

It should be noted that, the Fukushima plant also withstood the earthquake. In the hour or so after the earthquake the Fukushima plant's safety systems, including the diesel generators, performed as expected and effectively shut down the reactor. The cause of the problems at the plant stemmed from the loss of emergency power that appears to be the direct result of the subsequent tsunami, which far exceeded the design basis tsunami for the Fukushima plant.

4) Is possible to have a tsunami at San Onofre that is capable of damaging the plant?

The San Onofre Units 2 and 3 plant grade is elevation +30.0 feet MLLW. San Onofre has reinforced concrete cantilevered retaining seawall and screen well perimeter wall designed to withstand the design basis earthquake, followed by the maximum predicted tsunami with coincident storm wave action. The controlling tsunami for San Onofre occurring during simultaneous high tide and storm surge produces a maximum runup to elevation +15.6 feet MLLW at the Unit 2 and 3 seawall. When storm waves are superimposed, the predicted maximum runup is to elevation +27 MLLW. Tsunami protection for the

SONGS site is provided by a reinforced concrete seawall constructed to elevation +30.0 MLLW. A tsunami larger than this is extremely unlikely.

5) Has the earthquake hazard at San Onofre been reviewed like Diablo Canyon nuclear power plant is doing? Are they planning on doing an update before relicensing?

Relicensing does not evaluate seismic hazard or other siting issues. Seismic safety is part of NRC's ongoing licensing activities. If an immediate safety concern emerged, the issue would be addressed as part of NRC's response, regardless of relicensing status.

The closest active fault is approximately five miles offshore from San Onofre, a system of folds and faults exist called the offshore zone of deformation (OZD). The OZD includes the Newport-Inglewood-Rose Canyon fault system. The Cristianitos fault is ½ mile southeast, but is an inactive fault. Other faults such as the San Andreas and San Jacinto, which can generate a larger magnitude earthquake, are far enough away that they would produce ground motions much less severe than earthquakes in the OZD for San Onofre.

Notwithstanding the above, the NRC is considering extending the Generic Issue 199 program to all operating reactors. This would require a reassessment of hazard for San Onofre using the latest probabilistic seismic hazard assessment approaches. Based on a preliminary assessment using the source model developed by the USGS for the national seismic hazard maps, the annual probability of occurrence of a 0.67g ground motion at the San Onofre site is only slightly higher than is than the annual probability of occurrence that is recommended for new nuclear plants.

6) How do we know that the emergency diesel generators in San Onofre will not fail to operate like in Japan?

Emergency Diesel Generators (EDGs) are installed in a seismically qualified structure and are seismic Category I equipment. Even if these EDGs did fail, plants can safely shutdown using station blackout power source law 10 CFR 50.63. In 1988 the NRC concluded that additional regulatory requirements were justified in order to provide further assurance that a loss of both offsite and onsite emergency ac power systems would not adversely affect public health and safety and the station blackout rule was enacted. Studies conducted by the NRC since this rule has been in effect confirms that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in significant risk reduction and have further enhanced defense-in-depth. However, we plan to carefully evaluate the lessons learned from the events in Japan to determine if enhancements to the station blackout rule are warranted.

7) Was there any damage to San Onofre from either the earthquake or the resulting tsunami?

There was no damage at the San Onofre nuclear plant from either the earthquake or tsunami.

8) What about emergency planning for San Onofre. Does it consider tsunami?

FEMA reviews off-site evacuation plans formally every 2 years during a biennial emergency preparedness exercise. NRC evaluates on-site evacuation plans during the same exercise. Population studies are formally done every 10 years, and evacuation time estimates are re-evaluated at that time. FEMA reviews these evacuation plans, and will conclude their acceptability through a finding of "reasonable assurance" that the off-site facilities and infrastructure is capable of protecting public health and safety in the event of an emergency at San Onofre. The next such exercise is planned for April 12, 2011.

The San Onofre emergency plan initiates the emergency response organization and results in declaration of emergency conditions via their Emergency Action Levels. The facility would then make protective action recommendations to the Governor, who would then decide on what protective actions would be ordered for the residents around San Onofre. The consideration of tsunami would be contained in the State and local (City, County) emergency plans, which are reviewed by FEMA.

Compiled Seismic Questions for NRC Response to the March 11, 2011 Japanese Earthquake and Tsunami

This is current as of 3-22-11 at 10 pm.

The keeper of this file is Annie Kammerer. Please provide comments, additions and updates to Annie with CC to Clifford Munson, Jon Ake and Michelle Bensi.

A SharePoint site has been set up so that anyone can download the latest Q&As. The site is found at NRC>NRR>NRR TA or at

<http://portal.nrc.gov/edo/nrr/NRR%20TA/FAQ%20Related%20to%20Events%20Occuring%20in%20Japan/Forms/AllItems.aspx>

A list of topics is shown in the Table of Contents at the front of this document.

A list of all questions is provided at the end of the document.

A list of terms and definitions is included at the end of the document.

We greatly appreciate the assistance of the many people who have contributed to this document. Please do not distribute beyond the NRC.

CONTENTS

| | |
|--|-----------|
| Natural Hazards and Ground Shaking Design Levels | 1 |
| Design Against Natural Hazards & Plant Safety in the US..... | 7 |
| Seismically Induced Fire..... | 12 |
| Seismically Induced Internal Flooding | 14 |
| About Japanese Hazard, Design and Earthquake Impact..... | 16 |
| Impact at US Nuclear Power Plants During the March 11, 2011 Earthquake and Tsunami? ... | 20 |
| NRC Response and Future Licensing Actions | 21 |
| Reassessment of US Plants and Generic Issue 199 (GI-199)..... | 23 |
| Seismic Probabilistic Risk Assessment (SPRA)..... | 31 |
| State-of-the-art Reactor Consequence Analysis (SOARCA)..... | 32 |
| Defense-in-Depth and Severe Accident Management..... | 34 |
| Spent Fuel Pools and Independent Spent Fuel Storage Installations | 36 |
| Station Blackout | 39 |
| Emergency Preparedness (Emphasis on B.5.b) | 41 |
| Other External Hazards..... | 43 |
| Plant-Specific Questions | 44 |
| San Onofre Nuclear Generating Station (SONGS) Questions | 44 |
| Diablo Canyon Nuclear Power Plant (DCNPP) Questions | 49 |
| Indian Point Questions..... | 53 |
| Pending and Unanswered Questions from Members of Congress..... | 55 |
| Additional Information: Useful Tables..... | 59 |
| Table of Design Basis Ground Motions for US Plants | 59 |
| Table of SSE, OBE and Tsunami Water Levels..... | 61 |
| Table of Plants Near Known Active Faults or in High or Moderate Seismicity Zones..... | 66 |
| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE), and Seismic Core Damage Frequencies | 67 |
| Table: Design Basis Ground Motions and New Review Level Ground Motions Used for Review of Japanese Plants..... | 72 |
| Table: Status of Review of Japanese NPPs to New Earthquake Levels Based on 2006 Guidance | 74 |
| Additional Information: Useful Plots..... | 75 |
| Plot of Mapped Active Quaternary Faults and Nuclear Plants in the US..... | 75 |
| Nuclear Plants in the US Compared to the USGS National Seismic Hazard Maps..... | 76 |

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|--|------------|
| USGS US National Seismic Hazard Maps..... | 76 |
| Plot of Nuclear Plants in the US Compared to Recent Earthquakes..... | 77 |
| UCERF Map of California Earthquake Probabilities for Northern versus Southern California | 77 |
| Plot of ground motion acceleration (PGA) from Japanese earthquake | 78 |
| Plot of Tsunami Wave Heights at 5 Meter-Bathymetry Offshore at the Japanese Plants (NOAA)..... | 80 |
| Plot of Tsunami Wave Heights in the Pacific (NOAA) | 81 |
| Fact Sheets | 82 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (High level overview) | 82 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (The policy work version) | 83 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (The cliff notes)... | 85 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Tsunami | 86 |
| Fact Sheet: Tsunami Assessment Method for Nuclear Power Plants in Japan..... | 87 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Flooding | 88 |
| Fact Sheet: Summarization of Seismological Information from Regional Instrumentation | 90 |
| Fact Sheet: Regulatory Framework for Protection of Nuclear Power Plants against Tsunami Flooding | 91 |
| Fact Sheet: Seismic Zones and US Plants | 94 |
| Fact Sheet: Seismicity of the Central and Eastern US (In-depth technical information) | 98 |
| Fact Sheet: US Portable Array Information..... | 100 |
| Fact Sheet: The B.5.b Rule (10 CFR 50.54hh/B.5.b) | 102 |
| Fact Sheet: Generic Issue GI-199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants" | 104 |
| Fact Sheet: Station Blackout Rule | 106 |
| Terms and Definitions | 107 |
| List of Questions..... | 120 |

Natural Hazards and Ground Shaking Design Levels

1) Does the NRC consider earthquakes of magnitude 9?

Public response: This earthquake was caused by a “subduction zone” event, which is the type of earthquake that can produce the largest magnitudes. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of northern California, Oregon and Washington. As a result, magnitude 9 events would only be considered for this particular seismic source. The NRC requires all credible earthquakes that may impact a site to be considered.

Additional, technical, non-public information: None.

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

Public response: The magnitude of the earthquake was somewhat greater than was expected for that part of the subduction zone. However, the Japanese nuclear plants were recently reassessed using ground motion levels similar to those that are believed to have occurred at the sites. The ground motions against which the Japanese nuclear plants were reviewed were expected to result from earthquakes that were smaller, but were much closer to the sites. The NRC does not currently have information on the maximum tsunami height that was expected at the sites.

Additional, technical, non-public information: Jon Ake is doing some review of the data to determine the likely return period of this motion.

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

Public response: See below.

4) What if an earthquake like the Sendai earthquake occurred near a US plant?

Public response: This earthquake occurred on a “subduction zone”, which is the type of tectonic region that produces earthquakes of the largest magnitude. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. Subduction zone earthquakes are also required to produce the kind of massive tsunami seen in Japan. In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of northern California, Oregon and Washington. So, a continental earthquake and tsunami as large as in Japan could only happen there. The only nuclear plant near the Cascadia subduction zone is the Columbia Generating Station. This plant is located a large distance from the coast (approximately 225 miles) and the subduction zone (approximately 300 miles), so the ground motions estimated at the plant are far lower than those seen at the Fukushima plants. This distance also precludes the possibility of a tsunami affecting the plant. Outside of the Cascadia subduction zone, earthquakes are not expected to exceed a magnitude of approximately 8. Magnitude is measured on a log scale and so a magnitude 9 earthquake produces about ten times stronger shaking and releases about 31 times more energy than a magnitude 8 earthquake.

Additional, technical, non-public information: None.

5) What magnitude earthquake are US nuclear plants designed to?

Public Answer: Ground motion is a function of both the magnitude of an earthquake and the distance from the fault to the site. Nuclear plants, and in fact all engineered structures, are actually designed

based on ground motion levels, not earthquake magnitudes. The existing nuclear plants were designed based on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquakes expected in the area around the plant. A margin is further added to the predicted ground motions to provide added robustness.

Additional, technical non-public information: In the past, "deterministic" or "scenario based" or "maximum credible earthquake" analyses were used to determine ground shaking (seismic hazard) levels. Seismic hazard for the new plants is determined using a probabilistic seismic hazard assessment approach that explicitly addresses uncertainty and the potential for beyond-design-basis earthquakes, as described in Regulatory Guide 1.208. Probabilistic methods account for possible earthquakes of various magnitudes that come from potential sources (including background seismicity) and the likelihood that each particular hypothetical earthquake occurs. The ground motions that are used as seismic design bases at US nuclear power plants are called the Safe Shutdown Earthquake ground motion (SSE) and are described mathematically through use of a response spectrum. On the west coast of the US, the two nuclear power plants are designed to specific ground motions that are determined from earthquakes of about magnitude 7 (SONGS) and 7.5 (Diablo) on faults located just offshore of the plants. Because the faults are well characterized, the magnitude and distances are known. However the design and licensing bases are still the ground motions...not the earthquakes. The earthquakes on these faults are mainly strike-slip (horizontal motion) type earthquakes, not subduction zone earthquakes. Therefore, the likelihood of a tsunami from these faults is remote.

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

6) How many US reactors are located in active earthquake zones?

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

Additional, technical non-public information: The preliminary consensus opinion by NRC staff is that there are approximately 9 plants in the moderate seismicity zones in the CEUS: 4 or 5 in the Charleston SZ (depending on whose interpretation you use, it varies widely), 1 in the Wabash valley SZ, 2 in the East Tennessee SZ, 1 in the Central Virginia SZ. But some of these are open to interpretation and debate. This does not have a simple answer and NRC seismic staff are developing a fact sheet to respond to this question. There are also two plants that are in highly seismicity areas of California. Unfortunately, the extent of the moderate seismicity zones in the US are open to interpretation and are a matter of scientific debate.

Please note that although the earthquakes in the CEUS are rare, they can be big. The most widely felt earthquakes within the continental US were the 1811-12 New Madrid sequence and the 1886 Charleston, SC, which were estimated to be between about magnitude 7.0 to 7.75.

7) Has this changed our perception of earthquake risk to the plants in the US?

Public Answer: The NRC continues to determine that US nuclear plants are safe. This does not change the NRC's perception of earthquake hazard (i.e., ground motion levels) at US nuclear plants. It is too early to tell what the lessons from this earthquake are. The NRC will look closely at all aspects of response of the plants to the earthquake and tsunami to determine if any actions need to be taken in US nuclear plants and if any changes are necessary to NRC regulations.

Additional, technical, non-public information: We expect that there would be lessons learned and we may need to seriously relook at common cause failures, including dam failure and tsunami.

8) Why do we have confidence that US nuclear power plants are adequately designed for earthquakes and tsunamis?

Public Answer: [use the first paragraph of the response below]

Additional, technical, non-public information: None.

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

Public Answer: All US nuclear plants are built to withstand environmental hazards, including earthquakes and tsunamis. Even those nuclear plants that are located within areas with low and moderate seismic activity are designed for safety in the event of such a natural disaster. The NRC requires that safety-significant structures, systems, and components be designed to take into account even rare and extreme seismic and tsunami events. In addition to the design of the plants, significant effort goes into emergency response planning and accident management. This approach is called defense-in-depth.

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

Additional technical, non-public information: See notes under question "What magnitude earthquake are US nuclear plants designed to?"

10) If the earthquake in Japan was a larger magnitude than considered by plant design, why can't the same thing happen in the US?

Public response: *Discuss in terms of, IPEEE, Seismic PRA to be provided by Nilesh*

Additional, technical, non-public information: ADD

11) What level of earthquake hazard are the US reactors designed for?

Public Answer: Each reactor is designed for a different ground motion that is determined on a site-specific basis. The existing nuclear plants were designed on a "deterministic" or "scenario earthquake" basis that accounts for the largest earthquakes expected in the area around the plant, without consideration of the likelihood of the earthquakes considered, and with an additional factor applied for conservatism. New reactors are designed using probabilistic techniques that characterize both the ground motion levels and uncertainty at the proposed site. These probabilistic techniques account for the ground motions that may result from all potential seismic sources in the region around the site.

Technically speaking, this is the ground motion with an annual frequency of occurrence of 1×10^{-4} /year, but this can be thought of as the ground motion that occurs every 10,000 years on average. One important aspect is that probabilistic hazard and risk-assessment techniques account for beyond-design basis events. NRC's Generic Issue 199 (GI-199) project is using the latest probabilistic techniques used for new nuclear plants to review the safety of the existing plants. [see questions in the section about GI-199 for more information]

Additional technical, non-public information: Note to OPA: This may perhaps seem like an oddly worded general question because the word "hazard" has several meanings, but in fact it is a specific technical question. If you see "earthquake hazard levels" or similar language, check with the seismic staff.

12) How was the seismic design basis for existing nuclear plants established?

Public Answer: The seismic ground motions used for the design basis of existing nuclear plants were determined from the evaluation of the maximum historic earthquake within 200 miles of the site, without explicitly considering the time spans between such earthquakes; safety margin was then added beyond this maximum historic earthquake to form a hypothetical *design basis earthquake*. The relevant regulation for currently operating plants is 10 CFR Part 100, Appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants" (<http://www.nrc.gov/reading-rm/doc-collections/cfr/part100/part100-appa.html>).

Additional, technical, non-public information: None.

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

Public response: The ground motions that are used as seismic design bases at US nuclear plants are called the Safe Shutdown Earthquake ground motion (SSE). In the mid to late 1990s, the NRC staff reviewed the potential for ground motions beyond the design basis as part of the Individual Plant Examination of External Events (IPEEE). From this review, the staff determined that seismic designs of operating nuclear plants in the US have adequate safety margins for withstanding earthquakes. Currently, the NRC is in the process of conducting GI-199 to again assess the resistance of US nuclear plants to earthquakes. Based on NRC's preliminary analyses to date, the mean probability of ground motions exceeding the SSE over the life of the plant for the plants in the Central and Eastern United States is less than about 1%.

It is important to remember that structures, systems and components are required to have "adequate margin," meaning that they must continue be able withstand shaking levels that are above the plant's design basis.

Additional technical, non-public information: There is a section of this document focused on questions related to GI-199.

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

Public Answer: An earthquake's magnitude is a measure of the strength of the earthquake as determined from seismographic observations. Magnitude is essentially an objective, quantitative measure of the size of an earthquake. The magnitude can be expressed in various ways based on seismographic records (e.g., Richter Local Magnitude, Surface Wave Magnitude, Body Wave Magnitude, and Moment Magnitude). Currently, the most commonly used magnitude measurement is the Moment Magnitude, M_w , which is based on the strength of the rock that ruptured, the area of the fault that

ruptured, and the average amount of slip. Moment magnitude is, therefore, a direct measure of the energy released during an earthquake. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

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

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

Additional, technical non-public information: None.

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

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

Additional, technical non-public information: None.

16) Which reactors are along coastal areas that could be affected by a tsunami?

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

Additional, technical non-public information: A table with information on tsunami design levels is provided in the "Additional Information" section of this document.

17) How are combined seismic and tsunami events treated in risk space? Are they considered together?

The PRA Standard (ASME/ANS-Ra-Sa2009) does address the technical requirements for both seismic events and tsunamis (tsunami hazard under the technical requirements for external flooding analysis). But together? The standard does note that uncertainties associated with probabilistic analysis

of tsunami hazard frequency are large and that an engineering analysis can usually be used to screen out tsunamis.

18) How are aftershocks treated in terms of risk assessment?

Seismic PRAs do not consider the affect of aftershocks since there are not methods to predict equipment fragility after the first main shock.

19) Could a "mega-tsunami" strike the U.S. East Coast as indicated in a recent Washington Post Weather Gang article?

Public Answer: Please verify information before public release.

Additional, technical, non-public information: The Washington Post Weather Gang article is based on a scenario involving a mega-tsunami caused by a massive landslide in the Canary Islands. This scenario has been debunked by the scientific community (including the NRC's tsunami research program). Volcanic flank failures on the Canary Islands will produce a mega-tsunami in the very near area, but won't be noticeable in the United States. Refer to the 2008 USGS report on tsunamis for additional information: [insert citation].

Design Against Natural Hazards & Plant Safety in the US

20) Are US nuclear plants designed for tsunamis? If so, what level of tsunami are they designed for?

Public Answer: Yes. Plants are built to withstand a variety of environmental hazards and those plants that might face a threat from tsunami are required to withstand large waves and the maximum wave height at the intake structure (which varies by plant.) Like seismic hazard, the level of tsunami that each plant is designed for is site-specific and is appropriate for what may occur at each location. [See table with tsunami design heights in Tables section of document]

Additional, technical, non-public information: Tsunami are considered in the design of US nuclear plants. Nuclear plants are designed to withstand flooding from not only tsunami, but also hurricane and storm surge; therefore there is often significant margin against tsunami flooding. However, it should be noted that Japanese experience (prior to the March 2011 earthquake) has shown that drawdown can be a significant problem.

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

21) Is there a minimum earthquake shaking that nuclear plants designed for?

Public Answer: Yes. According to Appendix S to 10 CFR Part 50, the foundation level ground motion must be represented by an appropriate response spectrum with a peak ground acceleration of at least 0.1g.

Additional, technical, non-public information: NOTE TO OPA: this comes straight from RG1.208 and it, therefore, approved for public release. If you get this question, we can help make it more user friendly.

22) Which plants are close to known active faults? What are the faults and how far away are they from the plants?

Public Answer: Jon to develop answer with Dogan's help. I created a placeholder table for your use "Table of Plants Near Known Active Faults" to be populated in the additional information section. The plots that Dogan made are in the additional information section under "Plot of Mapped Active Quaternary Faults and Nuclear Plants in the US".

Additional, technical, non-public information: ADD

23) Is there margin above the design basis?

Public Answer: Yes, there is margin beyond the design basis. In the mid to late 1990s, NRC staff reviewed the plants' assessments of potential consequences of severe earthquakes (earthquakes beyond the safety margin included in each plant's design basis), which licensees performed as part of the Individual Plant Examination of External Events (or IPEEE) program. From this review, the staff determined that seismic designs of operating plants in the United States have adequate safety margins, for withstanding earthquakes, built into the designs.

General Design Criterion (GDC) 2, "Design Bases for Protection Against Natural Phenomena," in Appendix A requires that the design bases include sufficient margin to account for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

Additional, technical, non-public information: None.

24) Are US plants safe? Would a plant in the U.S. be able to withstand a large earthquake?

Public Answer: US plants are designed for appropriate earthquake shaking levels that are based on historical data for the site plus additional margin to account for uncertainties. Currently, the NRC is conducting a program called Generic Issue 199, which is reviewing the adequacy of the earthquake design of US NPPs in central and eastern North America based on the latest data and analysis techniques. The NRC will look closely at all aspects of the response of the plants in Japan to the earthquake and tsunami to determine if any actions need to be taken in US plants and if any changes are necessary to NRC regulations.

Additional, technical, non-public information: None.

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

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

In addition, US nuclear plant designs and operating practices since the terrorist events of September 11, 2001, are designed to mitigate severe accident scenarios such as aircraft impact, which include the complete loss of offsite power and all on-site emergency power sources.

US nuclear plant designs include consideration of seismic events and tsunamis'. It is important not to extrapolate earthquake and tsunami data from one location of the world to another when evaluating these natural hazards. These catastrophic natural events are very region- and location-specific, based on tectonic and geological fault line locations.

Additional technical, non-public information: None

26) Should US nuclear facilities be required to withstand earthquakes and tsunamis of the kind just experienced in Japan? If not, why not?

Public response: US nuclear reactors are designed to withstand an earthquake equal to the most significant historical event or the maximum projected seismic event and associated tsunami without any breach of safety systems.

The lessons learned from this experience must be reviewed carefully to see whether they apply to US nuclear power plants. It is important not to extrapolate earthquake and tsunami data from one location of the world to another when evaluating these natural hazards, however. These catastrophic natural events are very region- and location-specific, based on tectonic and geological fault line locations.

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The United States Geological Survey (USGS) conducts continuous research of earthquake history and geology, and publishes updated seismic hazard curves for various regions in the continental US. These curves are updated approximately every six years. NRC identified a generic issue (GI-199) that is currently undergoing an evaluation to assess implications of this new information to nuclear plant sites located in the central and eastern United States. The industry is working with the NRC to address this issue.

Additional technical, non-public information: None

27) Do any plants have special design considerations associated with seismic design?

Public response: Many plants have unique features. However, the most notable design element is the automatic reactor trip systems in Diablo Canyon and San Onofre.

Additional, technical, non-public information: None

28) How do we know equipment will work if the magnitude is bigger than expected, like in Japan?

Public response: [see below]

29) How do we know that the equipment in plants is safe in earthquakes?

Public response: All equipment important to safety (required to safely shutdown a nuclear power plant) has significant seismic margin and is qualified to withstand earthquakes in accordance with plants' licensing basis and NRC regulations.

Additional, technical, non-public information: 10 CFR 50, Appendix A, General Design Criterion 2 and 4, 10 Part 100, and Appendix S. Guidance: Regulatory Guides 1.100, IEEE 344 and ASME QME-1. See also part 100 Reactor Site Criteria

30) Are US plants susceptible to the same kind of loss of power as happened in Japan?

Public response: NRC previously recognized that there is the possibility of a total loss of AC power at a site, called a 'Station Blackout', or SBO. Existing Regulations require the sites to be prepared for the possibility of an SBO. In addition to battery powered back-up system to immediately provide power for emergency systems, NRC regulations require the sites to have a detailed plan of action to address the loss of AC power while maintaining control of the reactor.

There has also been an understanding that sites can lose offsite power as well. Of course, this can be caused by earthquake. However, hurricane- or tornado-related high winds may potentially damage the transmission network in the vicinity of a nuclear plant as well. Flood waters can also affect transformers used to power station auxiliary system. These types of weather related events have the potential to degrade the offsite power source to a plant.

The onsite Emergency Diesel Generators need fuel oil stored in tanks that are normally buried underground. These tanks and associated pumps and piping require protection from the elements. Above ground tanks have tornado and missile protection.

In case both offsite and onsite power supplies fail, NRC has required all licensee to evaluate for a loss of all AC power (station blackout) scenario and implement coping measures to safely shutdown the plant law 10 CFR 50.63.

Additional, technical, non-public information: Additional SBO information is found in a fact sheet on the subject at the back of the document. Some plants have safeguards equipment below sea level and

rely on watertight doors or Bilge pumps to remove water from equipment required to support safe shutdown. Overflowing rivers can result in insurmountable volume of water flooding the vulnerable areas. SBO definition in 10CFR50.2, SBO plan requirements in 10CFR50.63.

31) How do we know that the emergency diesel generators will not fail to operate like in Japan?

Public response: Emergency Diesel Generators (EDGs) are installed in a seismically qualified structure and are seismic Category I equipment. Even if these EDGs did fail, plants can safely shutdown using station blackout power source law 10 CFR 50.63. In 1988 the NRC concluded that additional regulatory requirements were justified in order to provide further assurance that a loss of both offsite and onsite emergency ac power systems would not adversely affect public health and safety and the station blackout rule was enacted. Studies conducted by the NRC since this rule has been in effect confirms that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in significant risk reduction and have further enhanced defense-in-depth. However, we plan to carefully evaluate the lessons learned from the events in Japan to determine if enhancements to the station blackout rule are warranted.

Additional, technical, non-public information: None.

32) Is there a risk of loss of water during tsunami drawdown? Is it considered in design?

Public response: Yes. Section 2.4.6 (Tsunami Hazards) of NUREG 0800 Standard Review Plan) specifically addresses tsunami drawdown in the safety review of new reactor applications.

Additional, technical, non-public information: None.

33) Are aftershocks considered in the design of equipment at the plants? Are aftershocks considered in design of the structure?

Public response: ADD

Additional, technical, non-public information: ADD

34) Are there any special issues associated with seismic design at the plants? For example, Diablo Canyon has special requirements. Are there any others?

Public response: Both SONGS and Diablo canyon are licensed with an automatic trip for seismic events.

Additional, technical, non-public information: ADD

35) Is the NRC planning to require seismic isolators for the next generation of nuclear power plants? How does that differ from current requirements and/or precautions at existing US nuclear power plants?

Public response: The NRC would not require isolators for the next generation of plants. However, it is recognized that a properly designed isolation system can be very effective in mitigating the effect of earthquake. Currently the NRC is preparing guidance for plant designers considering the use of seismic isolation devices.

Additional, technical, non-public information: A NUREG is in the works in the office of research. It is expected to be available for comment in 2011.

36) Are there any US nuclear power plants that incorporate seismic isolators? What precautions are taken in earthquake-prone areas?

Public response: No currently constructed nuclear power plants in the US use seismic isolators. However seismic isolation is being considered for a number of reactor designs under development. Currently seismic design of plants is focused on assuring that design of structures, systems, and components are designed and qualified to assure that there is sufficient margin beyond the design basis ground motion.

Additional, technical, non-public information: None.

37) Do you think that the recent Japan disaster will cause any rethinking of the planned seismic isolation guidelines, particularly as it regards earthquakes and secondary effects such as tsunamis?

Public response: Whenever an event like this happens, the NRC thoroughly reviews the experience and tries to identify any lessons learned. The NRC further considers the need to change guidance or regulations. In this case, the event will be studied and any necessary changes will be made to the guidance under development. However, it should be noted that Japan does not have seismically isolated nuclear plants.

Additional, technical, non-public information: None.

Seismically Induced Fire

38) How does the NRC address seismic-induced fire?

Public Response: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: The NRC's rules for fire protection are independent of the event that caused the fire. The power plant operators are required to evaluate all the fire hazards in the plant and make sure a fire will not prevent a safe plant shutdown. The NRC's guidance says that power plant operators should assume that a fire can happen at any time. The rules do not require specific consideration of a fire that starts as a result of an earthquake. In addition, we do not require analysis of more than one fire at a time at one reactor.

39) Does the NRC require the fire protection water supply system be designed to withstand an earthquake?

Public Response: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: The NRC recommends the licensee follow the applicable National Fire Protection Association (NFPA) codes and standards for the fire protection systems or provide an acceptable alternative. This would include local building code earthquake requirements. Since 1976, the NRC has recommended that, "At a minimum, the fire suppression system should be capable of delivering water to manual hose stations located within hose reach of areas containing equipment required for safe plant shutdown following the safe shutdown earthquake (SSE)." For plants located, "in areas of high seismic activity, the staff will consider on a case-by-case basis the need to design the fire detection and suppression system to be functional following the SSE." This is the guidance provided to plants that were licensed to operate, or had construction permits prior to July 1, 1976. For plants with applications docketed but construction permit not received as of July 1, 1976, they were required, "in the event of the most severe earthquake, i.e., the SSE, the fire suppression system should be capable of delivering water to manual hose stations located within hose reach of areas containing equipment required for safe plant shutdown."

The NRC's guidance since 1976 also recommends that fire detection, alarm, and suppression systems function as designed after less severe earthquakes that are expected to occur once every 10 years. The guidance further recommends plant operators in areas of high seismic activity consider the need to design those fire protection systems to function after a severe earthquake.

40) How are safe shutdown equipment protected from an oil spill which can cause potential fire?

Public Response: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: In general, the NRC recommends that curbing and dikes be located around all equipment that presents an oil fire hazard. In one special case, the Reactor Cooling Pumps (RCPs) located inside the containment of Pressurized Water Reactors (PWRs) the NRC requires that plants have a seismically qualified oil collection system. The purpose of this requirement is that in the event of a severe earthquake the lubrication oil is not spread out inside containment.

41) How are safe shutdown equipment protected from a hydrogen fire?

Public Response: The below is from an internal document. This needs to be cleared before it can be used.

Additional, technical, non-public information: Hydrogen can be normally found in a couple areas of the plant. For example, most all large electric generating stations (Nuclear, Coal, Oil, Gas and Hydro) use hydrogen as a blanket in the electric generator. This hydrogen storage is typically well separated from safe shutdown equipment. Hydrogen may also be generated in Battery Rooms during charging and discharging of the stations emergency batteries. The battery rooms are typically equipped with hydrogen detectors set to alarm at about 2% (Hydrogen's lower flammable limit is 4.1%). The ventilation system is typically run to prevent any hydrogen build up. In PWR's hydrogen is used as a cover gas in the Volume Control Tank (VCT). This gas is kept at a normally lower pressure (15-20 psig) to allow oxygen scavenging in the tank. Systems like this typically have devices such as excess flow check valves that automatically isolate the system if excess flow occurs. The NRC recommends that pipes that contain hydrogen are designed to withstand a severe earthquake. This design includes a separate pipe wrapped around the hydrogen pipe that vents any leaked hydrogen to the outside.

[Also please note that this is general information. Mark Salley noted that if the question relates to H2 generated as a part of fuel failure there is a whole other conversation that needs to happen. Please contact him with questions.]

Seismically Induced Internal Flooding

42) How does the NRC consider seismically induced equipment failures leading to internal flooding?

Public Response: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: 10 CFR Part 50 Appendix A General Design Criterion (GDC) 2 requires, in part, that structures, systems, and components (SSCs) important to safety be designed to withstand the effects of earthquakes without loss of capability to perform their safety functions. 10 CFR Part 50 Appendix A, GDC 4 requires the SSCs important to safety being designed to accommodate the effects of the flooding associated with seismic events. NUREG-0800, Standard Review Plan, Section 3.4.1, "Internal Flood Protection for Onsite Equipment Failures," provide guidance for the NRC staff to consider seismically induced equipment failures (pipe breaks, tank failures) that could affect safety-related SSCs to perform their safety functions.

The specific areas of review include the following :

- Identify all safety-related SSCs that must be protected against flooding;
- The location of the safety-related SSCs relative to the **internal flood level** (from internal flood analysis) in various buildings, rooms, and enclosures that house safety-related SSCs;
- Possible flow paths from interconnected non-safety-related areas to rooms that house safety-related SSCs;
- The adequacy of the isolation, if applicable, from sources causing the flood (e.g., tank of water)
- Provisions for protection against possible in-leakage sources (from outside to inside of the structures)
- All SSCs that could be a potential source of internal flooding (e.g. pipe breaks and cracks, tank and vessel failures, backflow through drains), **which includes seismically induced equipment failures**, are included for the internal flood analysis – see Q&A (2);
- Design features that will be used to mitigate the effects of internal flooding (e.g., adequate drainage, sump pumps, etc.);
- Safety-related structures that are protected from below-grade groundwater seepage by means of a permanent dewatering system.

43) How is the potential source of internal flooding from the seismically induced equipment failures postulated in the internal flood analysis?

Public Response: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: All of the non-safety-related systems in the room are assumed to fail. However, the analysis systematically considers the flooding condition/level caused by only one system at a time. By considering the pipe size, volume of the source tank, and the isolation valves, the limiting case, which is the one that releases the largest volume of water, is used to determine the internal flood level. All of the safety-related SSCs are designed to be located above the calculated flood level caused by the limiting case.

44) Are the non-safety-related equipment failures assumed to occur at the same time?

Public Response: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: No. As stated earlier, for design basis flood analysis, it is assumed that a system (containing water source) fails one at a time. Then, the most limiting case, a system breach that causes highest level of flooding, is applied in the design of the location of the safety-related systems.

About Japanese Hazard, Design and Earthquake Impact

- 45) Was the damage to the Japanese nuclear plants mostly from the earthquake or the tsunami?

Public response: Because this event happened in Japan, it is hard for NRC staff to make the assessment necessary to understand exactly what happened at this time. In the nuclear plants there may have been some damage from the shaking, and the earthquake caused the loss of offsite power. However, the tsunami appears to have played a key role in the loss of other power sources at the site producing station blackout, which is a critical factor in the ongoing problems.

Additional, technical, non-public information: None

- 46) What was the disposition of the plant during the time after the earthquake struck and before the tsunami arrived? Was there indication of damage to the plant solely from the earthquake (if so, what systems) and did emergency procedures function during this time.

Public response: Given that the Fukushima plant is not in the US, the NRC does not yet have enough information to answer this question.

Additional, technical, non-public information: Typically there would be the opportunity to get this data, but given the situation it is not clear.

- 47) What magnitude earthquake was the plant designed to withstand? For example, what magnitude earthquake was the plant expected to sustain with damage but continued operation? And with an expected shutdown but no release of radioactive material?

Public response: There are two shaking levels relevant to the Fukushima plant, the original design level ground motion and a newer review level ground motion. As a result of a significant change in seismic regulations in 2006, NISA, the Japanese regulator initiated a program to reassess seismic hazard and seismic risk for all nuclear plants in Japan. This resulted in new assessments of higher ground shaking levels (i.e. seismic hazard) and a review of seismic safety for all Japanese plants. The program is still ongoing, but has already resulted in retrofit in some plants. Therefore, it is useful to discuss both the design level and a review level ground motion for the plants. A relevant table is found a few questions down, and also in the "Additional Information: Useful Tables" section.

| Plant sites | Contributing earthquakes used for determination of hazard | New DBGM S_e | Original DBGM S_1 |
|-------------|---|-----------------|---------------------|
| Fukushima | Magnitude 7.1 Earthquake near the site | 600 gal (0.62g) | 370 gal (0.37g) |

Additional, technical, non-public information: Add

- 48) Did this reactor sustain damage in the July 16, 2007 earthquake, as the Kashiwazaki power plant did? What damage and how serious was it?

Public response: Neither Fukushima power plant was affected by the 2007 earthquake.

Additional, technical, non-public information: None.

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49) Was the Fukushima power plant designed to withstand a tsunami of any size? What specific design criteria were applied?

Public response: Japanese plants are designed to withstand both earthquake and tsunami. An English explanation of how Tsunami hazard assessments are undertaken for Japanese plants is found in Annex II to IAEA Guidance on Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations Assessment of Tsunami Hazard: Current Practice in Some States in Japan. The design ground motions are as shown above. We do not have information on the design basis tsunami.

Additional, technical, non-public information: Annie has a copy of the draft annex and will put them into ADAMS

50) What is the design level of the Japanese plants? Was it exceeded?

Public response: As a result of a significant change in seismic regulations in 2006, the Japanese regulator initiated a program to reassess seismic hazard and seismic risk for all nuclear plants in Japan. This resulted in new assessments of higher ground shaking levels (i.e. seismic hazard) and a review of seismic safety for all Japanese plants. The program is still on-going, but has already resulted in retrofit in some plants. Therefore, it is useful to discuss both the design level and a review level ground motion for the plants, as shown below.

Currently we do not have official information. However, it appears that the ground motions (in terms of peak ground acceleration) are similar to the S_s shaking levels, although the causative earthquakes are different. Thus the design basis was exceeded, but the review level may not have been.

Table: Original Design Basis Ground Motions (S_2) and New Review Level Ground Motions (S_s) Used for Review of Japanese Plants

| Plant sites | Contributing earthquakes used for determination of hazard | New DBGM S_s | Original DBGM S_1 |
|-------------|---|-----------------|---------------------|
| Onagawa | Soutei Miyagiken-oki (M8.2) | 580 gal (0.59g) | 375 gal (0.38g) |
| Fukushima | Earthquake near the site (M7.1) | 600 gal (0.62g) | 370 gal (0.37g) |
| Tokai | Earthquakes specifically undefined | 600 gal (0.62g) | 380 gal (0.39g) |
| Hamaoka | Assumed Tokai (M8.0), etc. | 800 gal (0.82g) | 600 gal (0.62g) |

Additional, technical, non-public information: A PDF file provided by John Anderson (prepared by Japanese colleagues) indicates that the majority of the recorded ground motions during the main shock were below the attenuation curve by Si & Midorikawa (1999). Most of the recorded motions fit well to median minus 1 sigma of their GMPE. There are also about a dozen stations with the recorded ground motions above 1g. The highest recorded PGA (~3g) is at the K-Net station MYG004. We can use this information to try to estimate motions at the plants as soon as someone catches a breath.

51) What are the Japanese S_1 and S_s ground motions and how are they determined?

Public response: Japanese nuclear power plants are designed to withstand specified earthquake ground motions, previously specified as S_1 and S_2 , but now simply S_s . The design basis earthquake ground

motion S_1 was defined as the largest earthquake that can reasonably be expected to occur at the site of a nuclear power plant, based on the known seismicity of the area and local faults that have shown activity during the past 10,000 years. A power reactor could continue to operate safely during an S_1 level earthquake, though in practice they are set to trip at lower levels. The S_2 level ground motion was based on a larger earthquake from faults that have shown activity during the past 50,000 years and assumed to be closer to the site. The revised seismic regulations in May 2007 replaced S_1 and S_2 with S_5 . The S_5 design basis earthquake is based on evaluating potential earthquakes from faults that have shown activity during the past 130,000 years. The ground motion from these potential earthquakes are simulated for each of the sites and used to determine the revised S_5 design basis ground motion level. Along with the change in definition, came a requirement to consider "residual risk", which is a consideration of the beyond-design-basis event.

Additional, technical, non-public information: None

52) Did this earthquake affect the Kashiwazaki-Kariwa nuclear power plant?

Public response: No, this earthquake did not affect Kashiwazaki-Kariwa nuclear power plant and all reactors remained in the state of operation prior to the March 11, 2011, Japan earthquake. It also did not trip during an earthquake of magnitude XX that occurred on the western side subsequent to the 8.9 earthquake. This is very important for the stability of Japan's energy supply due to the loss of production at TEPCO's Fukushima nuclear power plants.

Additional, technical, non-public information: None

53) How high was the tsunami at the Fukushima nuclear power plants?

Public response: The tsunami modeling team at the National Oceanic and Atmospheric Administration's Pacific Marine Environmental Lab have estimated the wave height offshore (at the 5 meter bathymetric line) to be approximately 8 meters in height at Fukushima Daiichi and approximately 7 meters in Fukushima Daini. This is based on recordings from NOAA's Deep-ocean Assessment and Reporting of Tsunamis (DART) buoys and a high resolution numerical model developed for the tsunami warning system. NEI subsequently reported that TEPCO believes that TEPCO believes the tsunami that inundated the Fukushima Daiichi site was 14 meters high at the plant location. This is not inconsistent as wave heights increase as they come ashore. NEI also noted that design basis tsunami for the site was 5.7 meters, and the reactors and backup power sources were located 10 to 13 meters above sea level, according to TEPCO.

Additional, technical, non-public information: NOAA's PMEL center has provided us their best numbers for all the plants on the NW coast of Japan. These can be found in the Additional Information section in the back of this document.

54) Wikileaks has a story that quotes US embassy correspondence and some un-named IAEA expert stating that the Japanese were warned about this ... Does the NRC want to comment?

<http://www.dailymail.co.uk/news/article-1366721/Japan-tsunami-Government-warned-nuclear-plants-withstand-earthquake.html>

Public response: TBD Annie to explain the history of their recent retrofit program!

Additional, technical, non-public information: The article talks about that the plants and that they were checked for a magnitude 7, but the earthquake was a 9. The reality is that they assumed the magnitude 7 close in had similar ground motions to a 9 farther away. They did check (and retrofit) the plant to the

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ground motions that they probably saw (or nearly). The problem was the tsunami. We probably need a small write up so that staff understands, even if we keep it internal.

Impact at US Nuclear Power Plants During the March 11, 2011 Earthquake and Tsunami?

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

Public Answer: No

Additional, technical non-public information: Two US plants on the Pacific Ocean (Diablo Canyon and San Onofre) experienced higher than normal sea level due to tsunami. However, the wave heights were consistent with previously predicted levels and this had no negative impact to the plants. In response, Diablo Canyon Units 1 and 2 declared an "unusual event" based on tsunami warning following the Japanese earthquake. They have since exited the "unusual event" declaration, based on a downgrade to a tsunami advisory.

56) Have any lessons for US plants been identified?

Public Answer: The NRC is in the process of following and reviewing the event in real time. This will undoubtedly lead to the identification of issues that warrant further study. However, a complete understanding of lessons learned will require more information than is currently available to NRC staff.

Additional, technical non-public information: We need to take a closer look at common cause failures, such as earthquake and tsunami, and earthquake and dam failure.

NRC Response and Future Licensing Actions

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

Public Answer: We are closely following events in Japan, working with other agencies of the federal government and with our counterparts in that country. In addition, we currently have a team of experts in boiling water reactors working in Japan.

Additional technical, non-public information: NOTE TO OPA: please check the current staffing in Japan to provide more accurate information. This is changing on an ongoing basis. We are taking the knowledge that the staff has about the design of the US nuclear plants and we are applying this knowledge to the Japan situation. For example, this includes calculations of severe accident mitigation that have been performed.

58) With NRC moving to design certification, at what point is seismic capability tested – during design or modified to be site-specific? If in design, what strength seismic event must these be built to withstand?

Public Answer: During design certification, vendors propose a seismic design in terms of a ground motion spectrum for their nuclear facility. This spectrum is called a standard design response spectrum and is developed so that the proposed nuclear facility can be sited at most locations in the central and eastern United States. The vendors show that this design ground motion is suitable for a variety of different subsurface conditions such as hard rock, deep soil, or shallow soil over rock. Combined License and Early Site Permits applicants are required to develop a site specific ground motion response spectrum that takes into account all of the earthquakes in the region surrounding their site as well as the local site geologic conditions. Applicants estimate the ground motion from these postulated earthquakes to develop seismic hazard curves. These seismic hazard curves are then used to determine a site specific ground motion response spectrum that has a maximum annual likelihood of 1×10^{-4} of being exceeded. This can be thought of as a ground motion with a 10,000 year return period. This site specific ground motion response spectrum is then compared to the standard design response spectrum for the proposed design. If the standard design ground motion spectrum envelopes the site specific ground motion spectrum then the site is considered to be suitable for the proposed design. If the standard design spectrum does not completely envelope the site specific ground motion spectrum, then the COL applicant must do further detailed structural analysis to show that the design capacity is adequate. Margin beyond the standard design and site specific ground motions must also be demonstrated before fuel loading can begin.

Additional technical, non-public information: None.

59) What are the near term actions that U.S. plants are taking in consideration of the events in Japan?

Public Answer: The U.S. nuclear energy industry has already started an assessment of the events in Japan and is taking steps to ensure that U.S. reactors could respond to events that may challenge safe operation of the facilities. These actions include:

- Verify each plant's capability to manage major challenges, such as aircraft impacts and losses of large areas of the plant due to natural events, fires or explosions.
Verify each plant's capability to manage a total loss of off-site power.

- Verify the capability to mitigate flooding and the impact of floods on systems inside and outside the plant.
- Perform walk-downs and inspection of important equipment needed to respond successfully to extreme events like fires and floods.

Additional technical, non-public information: Note to OPA: This was a Q&A from the 3/21 briefing. please check that this is OK to provide to the public before doing so.

60) What are the immediate steps NRC is taking?

Public Answer: To date (march 20, 2011) the NRC has taken the following steps:

- The Nuclear Regulatory Commission has issued an Information Notice to all currently operating U.S. nuclear power plants, describing the effects of the March 11 earthquake and tsunami on Japanese nuclear power plants.
- The notice provides a brief overview of how the earthquake and tsunami are understood to have disabled several key cooling systems at the Fukushima Daiichi nuclear power station, and also hampered efforts to return those systems to service. The notice is based on the NRC's current understanding of the damage to the reactors and associated spent fuel pools as of Friday, March 18.
- The notice reflects the current belief that the combined effects of the March 11 earthquake and tsunami exceeded the Fukushima Daiichi plant's design limits. The notice also recounts the NRC's efforts, post-9/11, to enhance U.S. plants' abilities to cope with severe events, such as the loss of large areas of a site, including safety systems and power supplies.

The NRC expects U.S. nuclear power plants will review the entire notice to determine how it applies to their facilities and consider actions, as appropriate.

Additional technical, non-public information: Note to OPA: This was a Q&A from the 3/21 briefing. please check that this is OK to provide to the public before doing so.

61) Should U.S. residents be using Potassium iodide?

Public Response: It is the responsibility of the individual States to decide on the use of KI. It is EPA's responsibility to inform states of projected doses. Due to the extremely low levels of radioactivity expected on the U.S. West coast and Pacific States/territories, the NRC staff does not recommend use of KI.

Additional technical, non-public information: None.

Reassessment of US Plants and Generic Issue 199 (GI-199)

62) What is Generic Issue 199 about?

Public Answer: Generic Issue 199 investigates the safety and risk implications of updated earthquake-related data and models. These data and models suggest that the probability for earthquake ground motion above the seismic design basis for some nuclear plants in the Central and Eastern United States, although is still low, is larger than previous estimates.

Additional, technical, non-public information: See additional summary/discussion of GI-199 and terms below.

63) Does the NRC have a position on the MSNBC article that ranked the safety of US plants?

Public Response: [see below]

64) A recent Can we get the rankings of the plants in terms of safety? (Actually this answer should be considered any time GI-199 data is used to "rank" plants)

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

Additional, technical, non-public information: NOTE TO OPA: Add the answer to "What are the current findings of GI-199", to create a longer answer if it is appropriate.

65) What are the current findings of GI-199?

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

Additional, technical, non-public information: None.

66) If the plants are designed to withstand the ground shaking why is there so much risk from the design level earthquake

Much of the risk in the total risk levels provided in the report comes from earthquakes stronger than the safe shutdown ground motion. The anything indicated in the geologic record used to determine the

design requirements at these sites. The numbers are based on an evaluation of all of the potential seismic sources in the CEUS and are used to produce seismic hazard estimates (curves) for each site. The GI-199 effort to date has performed a screening assessment to determine if further, more detailed studies are warranted. This study has utilized information from plant-specific evaluation of external hazards, including earthquakes. That information was gathered to identify potential seismic vulnerabilities, not to produce robust risk estimates. Therefore, the GI-199 results should be viewed as preliminary and not definitive.

67) Overall, how would the NRC characterize the CDF numbers? A quirk of numbers? A serious concern?

Public Response: The objective of the GI-199 Safety/Risk Assessment was to perform a conservative, screening-level assessment to evaluate if further investigations of seismic safety for operating reactors in the central and eastern US (CEUS) are warranted consistent with NRC directives. The results of the GI-199 SRA should not be interpreted as definitive estimates of plant-specific seismic risk. The nature of the information used (both seismic hazard data and plant-level fragility information) make these estimates useful only as a screening tool. The use of the absolute value of the seismic hazard-related risk, as done in the MSNBC article, is not the intended use, and the NRC considers it an inappropriate use of the results.

The study is still underway and it is too early to predict the final outcome. However, staff has determined that there is no immediate safety concern and that overall seismic risk estimates remain small. If at any time the NRC determines that an immediate safety concern exists, action to address the issue will be taken. However, the NRC is focused on assuring safety during even very rare and extreme events. Therefore, the NRC has determined that assessment of updated seismic hazards and plant performance should continue.

Additional, technical, non-public information: None.

68) Describe the study and what it factored in – plant design, soils, previous quakes, etc.

Public Response: The study considers the factors that impact estimates of both the seismic hazard (i.e. ground shaking levels) at the site and the plants resistance to earthquakes (mathematically represented by the plant level fragility curve). Previous quakes, the tectonic environment, and the soils that underlie the site are all used in the development of the ground shaking estimates used in the analyses. Plant design and the seismic resistance of the important structures, systems, and components are all used in the development of plant level fragility curves.

Additional, technical, non-public information: None.

69) Explain “seismic curve” and “plant level fragility curve”.

Public Response: A seismic curve is a graphical representation of seismic hazard. Seismic hazard in this context is the highest level of ground motion expected to occur (on average) at a site over different periods of time. Plant level fragility is the probability of damage to plant structures, systems and components as a function of ground shaking levels.

Additional, technical, non-public information: None.

70) Explain the “weakest link model”.

Public Response: The weakest link model is a method for evaluating the importance of different frequencies of ground vibration to the overall plant performance. The model and its details are not integral to understanding the fundamental conclusions of the study.

Additional, technical, non-public information: None.

71) What would constitute fragility at a plant?

Public Response: Fragility is a term that relates the probability of failure of an individual structure, system or component to the level of seismic shaking it experiences. Plant level fragility is the probability of damage to sets of plant structures, systems and components as a function of ground shaking levels.

Additional, technical, non-public information: None.

72) Can someone put that risk factor into perspective, using something other than MSNBC’s chances of winning the lottery?

Public Response: As noted above, the risk factors determined in GI-199 were conservative estimates of risk intended for use as a screening tool. Use of these factors beyond this intended purpose is inappropriate.

Additional, technical, non-public information: None.

73) What, if anything, can be done at a site experiencing such a risk? (Or at Limerick in particular.)

Public Response: The probabilistic seismic risk analyses (SPRA) that are performed to determine the core damage frequency (CDF) numbers also provides a significant amount of information on what the plant vulnerabilities are. This allows the analyst to determine what can be done to the plant to address the risk.

Additional, technical, non-public information: None.

74) Has anyone determined that anything SHOULD be done at Limerick or any of the other PA plants?

Public Response: The fundamental conclusion of the report is that “work to date supports a decision to continue ...; the methodology, input assumptions, and data are not sufficiently developed to support other regulatory actions or decisions.” The NRC is planning to issue a Generic Communication to operating reactor licensees in the CEUS requesting additional information. This includes the plants in PA.

Additional, technical, non-public information: None.

75) Page 20 of the report: This result confirms NRR’s conclusion that currently operating plants are adequately protected against the change in seismic hazard estimates because the guidelines in NRR Office Instruction LIC-504 “Integrated Risk-Informed Decision Making Process for Emergent Issues” are not exceeded. Can someone please explain?

Public response: Can someone help with this?

Additional, technical, non-public information: None.

76) Is the earthquake safety of US plants reviewed once the plants are constructed?

Public response: Yes, earthquake safety is reviewed during focused design inspections, under the Generic Issues Program (GI-199) and as part of the Individual Plant Evaluation of External Events program (IPEEE) that was conducted in response to Generic Letter 88-20 Supplement 4.

Additional, technical, non-public information: None.

77) Does the NRC ever review tsunami risk for existing plants?

Public Answer: The NRC has not conducted a generic issue program on tsunami risk to date. However, some plants have been reviewed as a result of the application for a license for a new reactor. In the ASME/ANS 2009 seismic probabilistic risk assessment standard, all external hazards are included.

Additional, technical, non-public information: None.

78) Does GI-199 consider tsunami?

Public response: GI-199 stems from the increased in perceived seismic hazard focused on understanding the impact of increased ground motion on the risk at a plant. GI-199 does not consider tsunami

Additional, technical, non-public information: In the past there has been discussion about a GI program on tsunami, but the NRC's research and guidance was not yet at the point it would be effective. We are just getting to this stage and the topic should be revisited.

79) Where can I get current information about Generic Issue 199?

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

Additional, technical, non-public information: The GI-199 section of the NRC internal GIP website (<http://www.internal.nrc.gov/RES/projects/GIP/Individual%20GIs/GI-0199.html>) contains additional information about Generic Issue 199 (GI-199) and is available to NRC staff.

80) Are all US plants being evaluated as a part of Generic Issue 199?

Public Answer: Currently the scope of the Generic Issue 199 (GI-199) Safety/Risk Assessment is limited to all plants in the Central and Eastern United States. Although plants at the Columbia, Diablo Canyon, Palo Verde, and San Onofre sites are not included in the GI-199 Safety/Risk Assessment, the Information Notice on GI-199 is addressed to all operating power plants in the US (as well as all independent spent fuel storage installation licensees). The staff will also consider inclusion of operating reactors in the Western US in its future generic communication information requests.

Additional, technical, non-public information: The staff is currently developing specific information needs to be included in a Generic Letter to licensees in the CEUS.

81) Are the plants safe? If you are not sure they are safe, why are they not being shut down? If you are sure they are safe, why are you continuing evaluations related to this generic issue?

Public Answer: Yes, currently operating nuclear plants in the United States remain safe, with no need for immediate action. This determination is based on NRC staff reviews associated with Early Site Permits (ESP) and updated seismic hazard information, the conclusions of the Generic Issue 199 Screening Panel (comprised of technical experts), and the conclusions of the Safety/Risk Assessment Panel (also comprised of technical experts).

No immediate action is needed because: (1) existing plants were designed to withstand anticipated earthquakes with substantial design margins, as confirmed by the results of the Individual Plant Examination of External Events program; (2) the probability of exceeding the *safe shutdown earthquake* ground motion may have increased at some sites, but only by a relatively small amount; and (3) the Safety/Risk Assessment Stage results indicate that the probabilities of seismic core damage are lower than the guidelines for taking immediate action.

Even though the staff has determined that existing plants remain safe, the Generic Issues Program criteria (Management Directive 6.4) direct staff to continue their analysis to determine whether any cost-justified plant improvements can be identified to make plants enhance plant safety.

Additional, technical, non-public information : The Safety/Risk Assessment results confirm that plants are safe. The relevant risk criterion for GI-199 is total *core damage frequency* (CDF). The threshold for taking immediate regulatory action (found in NRR Office Instruction LIC-504, see below) is a total CDF greater than or on the order of 10^{-3} (0.001) per year. For GI-199, the staff calculated seismic CDFs of 10^{-4} (0.0001) per year and below for nuclear power plants operating in the Central and Eastern US (CEUS) (based on the new US Geological Survey seismic hazard curves). The CDF from internal events (estimated using the staff-developed Standardized Plant Analysis of Risk models) and fires (as reported by licensees during the IPEEE process and documented in NUREG-1742), when added to the seismic CDF estimates results in the total risk for each plant to be, at most, 4×10^{-4} (0.0004) per year or below. This is well below the threshold (a CDF of 10^{-3} [0.001] per year) for taking immediate action. Based on the determination that there is no need for immediate action, and that this issue has not changed the licensing basis for any operating plant, the CEUS operating nuclear power plants are considered safe. In addition, as detailed in the GI-199 Safety/Risk Assessment there are additional, qualitative considerations that provide further support to the conclusion that plants are safe.

Note: The NRC has an integrated, risk-informed decision-making process for emergent reactor issues (NRR Office Instruction LIC-504, ADAMS Accession No. ML100541776 [not publically available]). In addition to deterministic criteria, LIC-504 contains risk criteria for determining when an emergent issue requires regulatory action to place or maintain a plant in a safe condition.

82) What do you mean by "increased estimates of seismic hazards" at nuclear power plant sites?

Public Answer: *Seismic hazard* (earthquake hazard) represents the chance (or probability) that a specific level of ground motion could be observed or exceeded at a given location. Our estimates of seismic hazard at some Central and Eastern United States locations have changed based on results from recent research, indicating that earthquakes occurred more often in some locations than previously estimated. Our estimates of seismic hazard have also changed because the models used to predict the level of ground motion, as caused by a specific magnitude earthquake at a certain distance from a site, changed. The increased estimates of seismic hazard at some locations in the Central and Eastern United States were discussed in a memorandum to the Commission, dated July 26, 2006. (The memorandum is

available in the NRC Agencywide Documents Access and Management System [ADAMS] under Accession No. ML052360044).

Additional, technical, non-public information: See additional discussion of terms at the end of the document.

- 83) Does the SCDF represent a measurement of the risk of radiation RELEASE or only the risk of core damage (not accounting for secondary containment, etc.)?**

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

- 84) Did an NRC spokesperson tell MSNBC's Bill Dedman that the weighted risk average was invalid and useless? He contends to us that this is the case.**

Public Response: No. See Answers below.

- 85) 3. If it was "invalid" as he claims, why would the USGS include that metric?**

Public Response: The weighted average is not invalid (see Answer 5 below). All of the values in Appendix D were developed by NRC staff. Table D-1 in Appendix D uses the (2008) US Geological Survey (USGS) seismic source model, but the Seismic Core Damage Frequency results were developed by US NRC staff. The USGS seismic source model is the same one used to develop the USGS National Seismic Hazard Maps.

- 86) Can you explain the weighted average and how it compares to the weakest link average?**

Public Response: Tables D-1 through D-3 in Appendix D of the US NRC study show the "simple" average of the four spectral frequencies (1, Hz, 5 Hz, 10 Hz, peak ground acceleration (PGA)), the "IPEEE weighted" average and the "weakest link" model. These different averaging approaches are explained in Appendix A.3 (simple average and IPEEE weighted average) and Appendix A.4 (weakest link model). The weighted average uses a combination of the three spectral frequencies (1, 5, and 10 Hz) at which most important structures, systems, and components of nuclear power plants will resonate. The weakest link is the largest SCDF value from among the four spectral frequencies noted above.

- 87) Ultimately would you suggest using one of the models (average, weighted, weakest link) or to combine the information from all three?**

Public Response: Most nuclear power plant structures, systems, and components resonate at frequencies between 1 and 10 Hz, so there are different approaches to averaging the Seismic Core Damage Frequency (SCDF) values. By using multiple approaches, the NRC staff gains a better understanding of the uncertainties involved in the assessments.

- 88) Were there any other factual inaccuracies or flaws in Mr. Dedman's piece you would like clarify/point out.**

Public Response: The US Nuclear Regulatory Commission study, released in September, 2010, was prepared as a screening assessment to evaluate if further investigations of seismic safety for operating reactors in the central and eastern US (CEUS) are warranted, consistent with NRC directives. The report clearly states that "work to date supports a decision to continue ...; the methodology, input assumptions, and data are not sufficiently developed to support other regulatory actions or

decisions." Accordingly, the results were not used to rank or compare plants. The study produced plant-specific results of the estimated change in risk from seismic hazards. The study did not rely on the absolute value of the seismic risk except to assure that all operating plants are safe. The plant-specific results were used in aggregate to determine the need for continued evaluation and were included in the report for openness and transparency. The use of the absolute value of the seismic hazard-related risk, as done in the MSNBC article, is not the intended use, and the NRC considers it an inappropriate use of the results.

- 89) Mr. Dedman infers that the plant quake risk has grown (between the 1989 and 2008 estimates) to the threshold of danger and may cross it in the next study. Is this the NRC's position?**

Public Response: The US NRC evaluation is still underway and it is too early to predict the final outcome. However, staff has determined that there is no immediate safety concern and that overall seismic risk estimates remain small. If at any time the NRC determines that an immediate safety concern exists, action to address the issue will be taken. However, the NRC is focused on assuring safety during even very rare and extreme events. Therefore, the NRC has determined that assessment of updated seismic hazards and plant performance should continue

- 90) What document has the latest seismic hazard estimates (probabilistic or not) for existing nuclear power plants in the western US?**

Public Response: At this time the staff has not formally developed updated probabilistic seismic hazard estimates for the existing nuclear power plants in the Western US. However, NRC staff during the mid- to late-1990's reviewed the plants' assessments of potential consequences of severe ground motion from earthquakes beyond the plant design basis as part of the Individual Plant Examination of External Events (IPEEE) program. From this review, the NRC staff determined that the seismic designs of operating plants in the US have adequate safety margin. NRC staff has continued to stay abreast of the latest research on seismic hazards in the Western US and interface with colleagues at the US Geological Survey. The focus of Generic Issue 199 has been on the CEUS. However, the Information Notice that summarized the results of the Safety/Risk Assessment was sent to all existing power reactor licensees. The documents that summarize existing hazard estimates are contained in the Final Safety Analysis Reports (FSARS) and in the IPEEE submittals. It must be noted that following 9/11 the IPEEE documents are no longer publicly available.

Additional, technical, non-public information: None

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

Public Response: The new consensus hazard curves are being developed in a cooperative project that has NRC, US Department of Energy, US Geological Survey (USGS) and Electric Power Research Institute (EPRI) participation. The title is: The Central and Eastern US Seismic Source Characterization (CEUS-SSC) project. The project is being conducted following comprehensive standards to ensure quality and regulatory defensibility. It is in its final phase and is expected to be publicly released in the fall of 2011. The project manager is Larry Salamone (Lawrence.salamone@srs.gov, 803-645-9195) and the technical

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lead on the project is Dr. Kevin Coppersmith (925-974-3335, kcoppersmith@earthlink.net). Additional information on this project can be found at: <http://mydocs.epri.com/docs/ANT/2008-04.pdf>, and http://my.epri.com/portal/server.pt?open=512&objID=319&PageID=218833&mode=2&in_hi_us_erid=2&cached=true.

Additional, technical, non-public information: None

92) What is the timetable now for consideration of any regulatory changes from the GI-199 research?

Public Response: The NRC is working on developing a Generic Letter (GL) to request information from affected licensees. The GL will likely be issued in a draft form within the next 2 months to stimulate discussions with industry in a public meeting. After that it has to be approved by the Committee to Review Generic Requirements, presented to the Advisory Committee on Reactor Safeguards and issued as a draft for formal public comments (60 days). After evaluation of the public comments it can then be finalized for issuance. We expect to issue the GL by the end of this calendar year, as the new consensus seismic hazard estimates become available. The information from licensees will likely require 3 to 6 months to complete. Staff's review will commence after receiving licensees' responses. Based on staff's review, a determination can be made regarding cost beneficial backfits where it can be justified.

Additional, technical, non-public information: None

1. Please explain in plain language how the NRC determined plants are safe with regard to the results of our GI199 assessment report..
2. The GI199 Safety/Risk Assessment states 24 plants "lie in the continue zone" (pg 23) These plants "need more assessment." What are these 24 plants? Why are these plants that require further evaluation safe? (pg 23 and Figure 8)
3. Why is the list of plants identified by the NRC for further evaluation under GI199 different than those identified by MSNBC as the "top 10" likely to fail due to seismic event?
4. Why are plants safe when MSNBC calculations indicate several hundred percent increases in the risk of a seismic event that damages the core?
5. Why do Indian Point 2 and Indian Point 3 plants have different probabilities of failing due to a seismic event when the plants are located next to each other? Is IP3 calculated to be the most likely to fail due to a seismic event? Why? Why is IP2 different? Aren't these plant at the same location and very similar design?
6. Why is Pilgrim not in the NRC "continue to evaluate zone" but second on the MSNBC list as moist likely to fail due to a seismic event?

Seismic Probabilistic Risk Assessment (SPRA)

93) The NRC increasingly uses risk-information in regulatory decisions. Are risk-informed PRAs useful in assessing an event such as this?

Public response: Nilesch Chokshi to provide Q&As on SPRA

Additional, technical, non-public information: None

State-of-the-art Reactor Consequence Analysis (SOARCA)

94) What severe accident research is the U.S. Nuclear Regulatory Commission (NRC) doing?

Public Answer: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: The NRC and its contractor presently are completing a research project entitled "State-of-the-Art Reactor Consequence Analysis" (SOARCA). This research project develops best estimates of the potential public health effects from a nuclear power plant accident where low-likelihood scenarios could release radioactive material into the environment and potentially cause offsite consequences. The project also evaluates and improves, as appropriate, methods and models for evaluating outcomes of such severe accidents. In addition, research is being conducted to develop advanced risk assessment modeling techniques (e.g., dynamic probabilistic risk assessment (PRA) using simulation based methods) to improve the state-of-the practice in PRA severe accident modeling. Key goals of this research include increased analysis realism, reduced reliance on modeling simplification, and improved the treatment of human interactions with the reactor plant system.

95) Why is the NRC performing the SOARCA study?

Public Answer: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: NRC is doing this study to develop the most realistic evaluations for the potential consequences of severe nuclear accidents. Over the years, NRC, industry, and international nuclear safety organizations have completed substantial research on plant response to hypothetical accidents that could damage the core and containment. The results have significantly improved NRC's ability to analyze and predict how nuclear plant systems and operators would respond to severe accidents. Also, plant owners have improved the plant design, emergency procedures, maintenance programs, and operator training, all of which have improved plant safety. Emergency preparedness measures also have been refined and improved to further protect the public in the highly unlikely event of a severe accident. Combining all of this new information and analysis will improve the realism of accident consequence evaluations.

96) Does the NRC intend to revisit previous risk studies?

Public Answer: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: The last NRC-sponsored Level 3 probabilistic risk assessment (PRA) studies to estimate the integrated risk to the public from severe nuclear reactor accidents were conducted in the late 1980s with the results published in a collection of reports and a corresponding summary document, NUREG-1150, "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants." Based on advances in both nuclear power plant safety and PRA technology since NUREG-1150 was published, the NRC staff is considering conducting new Level 3 PRA studies to update its understanding of the integrated risk to the public from accidents involving nuclear power plant sites. The NRC staff is currently conducting a scoping study to develop various options for proceeding with Level 3 PRA activities, and plans to provide the Commission with these potential options and a specific recommendation for proceeding by July 2011.

97) How will the SOARCA study be different from earlier studies?

Public Answer: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: The SOARCA project will:

- Use an improved understanding of source terms and severe accident phenomenology.
- Credit the use of severe accident mitigation strategies and procedures.
- Use updated emergency preparedness modeling.
- Account for plant improvements.
- Use modern computer resources and advanced software to yield more accurate results.

In addition, the SOARCA project is designed to be a more realistic estimate. Some of the earlier studies also were designed to be best estimates; however, because they were limited by the available knowledge of accident phenomenology, these older studies were conservative (particularly the very improbable severe accidents) in their estimates of off-site releases and early fatalities. The SOARCA project will provide the latest basis from which the public and decision makers can assess the consequences of severe reactor accidents.

Defense-in-Depth and Severe Accident Management

This is not exactly related to seismic questions. I read these with great interest. I believe there are many staff who would like to be more informed about this topic. So, I have included it.

99) Although there undoubtedly will be many lessons learned about severe accidents from the tragic events at Fukushima, have you identified any early lessons?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: There will undoubtedly be many lessons learned in the months and years to come as we learn more about the tragic events at the Fukushima Daiichi plant in Japan. However, one of the early lessons is this: You can't anticipate — either in the deterministic design basis of the plant or through probabilistic risk assessment models — everything that could happen. That is why the NRC's defense-in-depth philosophy is fundamental to ensuring that safety is achieved, even under extreme circumstances, such as those experienced at the Fukushima Daiichi plant. This NRC focus on defense-in-depth has led to a number of improvements in the design and operation of U.S. Nuclear Power Plants:

- Studies of severe accident prevention and mitigation in the 1980s led to a number of improvements at plants, such as installation of hardened vents at BWRs with Mark I containments. (See "fact sheet" for more detail.)
- Also, in the 1980s (specifically in 1988) the NRC concluded that additional regulatory requirements were justified in order to provide further assurance that a loss of both offsite and onsite emergency ac power systems would not adversely affect public health and safety and the station blackout rule was enacted. Studies conducted by the NRC since this rule has been in effect confirms that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in significant risk reduction and have further enhanced defense-in-depth. However, we plan to carefully evaluate the lessons learned from the events in Japan to determine if enhancements to the station blackout rule are warranted. (See "fact sheet" on station black-out.)
- Operator procedures that are symptom-based and ensure that operators primary focus is maintaining the critical safety functions such as ensuring the core is cooled and covered.
- Addition procedures for operators to use in the event of a severe accident (Severe Accident Mitigation Guidelines (SAMG)).
- Provisions in 10 CFR 50.54hh that require licensees to develop and implement guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities in situations involving loss of large areas of the plant due to explosions or fire.

100) What procedures do U.S. plants have for responding to an unexpected event like the events in Japan.

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: One of the most significant lessons learned from the Three Mile Island Accident in 1979 was that operating procedures need to be symptom based and less prescriptive. Procedures that previously directed operators to take a series of actions based on a preestablished accident were replaced with procedures that directed operators to maintain the critical

safety functions, such as keeping the core covered and cooled. Operators routinely practice these procedures on a plant specific simulator to ensure that they can be implemented for a wide range of accident scenarios, including a station blackout scenario, or other events caused by an earthquake or a flood.

101) What are Severe Accident Management Guidelines

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: SAMGs are the set of guidelines employed to manage the in-plant response following a severe accident (i.e., Beyond design basis events that are expected to have resulted in significant core damage).

The *ultimate objective* of SAMGs is to protect the health and safety of the public from the hazards associated with the uncontrolled release of radioactive materials

The *operational objective* of SAMGs is to protect or restore, if possible, the integrity of the three physical barriers (fuel, reactor coolant system, and containment) to contain fission products.

Some important aspects of the guidelines are as follows:

- SAMGs go beyond the Emergency Operating Procedures (EOPs)
- SAMGs identify all possible means of achieving the operational objective, including the use of non-safety-related equipment and capabilities on site (including capabilities from other units)
- plant-specific SAMGs identify the various safety functions and list the capabilities to achieve that function, with some high-level procedure-like guidance.

Spent Fuel Pools and Independent Spent Fuel Storage Installations

102) Are Independent Spent Fuel Storage Installations (ISFSIs) required to withstand the same ground shaking as the reactor?

Public Response: Nuclear plant licensees use the same Safe Shutdown Earthquake (SSE) ground motion developed for the nuclear plant site for the design basis ground motion for the spent fuel dry cask storage facilities (also known as independent spent fuel storage installations, or ISFSIs) located at that site. Some reactor licensees have ISFSIs under a site-specific 10 CFR Part 72 license, and these licensees are required to use the same Part 50 reactor SSE for their design basis earthquake, in accordance with 10 CFR 72.102(f)(1). Other reactor licensees have onsite ISFSIs under the general license provisions of 10 CFR 72.210; they are similarly required to apply the same seismic design bases for the Part 50 license to the ISFSI design, in accordance with 10 CFR 72.212(b)(3).

Additional, technical, non-public information: none.

103) What do we know about the potential for and consequences of a zirconium fire in the spent fuel pool?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Spent fuel pools contain large amounts of water to keep the fuel cooled, and no fire can result as long as the water covers the fuel. Should the pool not be cooled for a substantial amount of time (on the order of days), the water in the pool may boil off. Should that continue and the fuel be exposed, the fuel could overheat. In the worst case, the zirconium cladding could oxidize and burn. The result of such a fire would be significant damage to the fuel, also the fire has the potential to propagate to the other assemblies, as well as release of hydrogen gas and volatile radioactive materials.

104) Can a zirconium fuel fire be prevented by wide spacing of spent fuel assemblies in the spent fuel pool?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Wider spacing would help in preventing a fire. Preventing a fire requires coolability in absence of water submersion. This depends on the heat and the assembly arrangement in the pool. A checkerboard arrangement (no two assemblies in adjacent locations) is coolable in about one third the time needed for a fully loaded (no open locations) pool. Other arrangements can also mitigate the potential of the onset of zirconium fires.

105) Are the implications of new seismic hazard estimates being considered for the storage of spent fuel?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Yes, while the GI-199 Safety/Risk Assessment focused solely on operating power reactors in the Central and Eastern U.S., spent fuel storage has been considered by NRC.

The NRC Office of Nuclear Materials Safety and Safeguards (NMSS) was informed of GI-199 and a preliminary screening review was performed in November, 2008 by the NMSS Division of Spent Fuel Storage and Transportation. There is a total of 40 operating independent spent fuel storage installations (ISFSIs) in the Central and Eastern U.S. (CEUS). Except for a wet storage facility at G. E. Morris located in Illinois, the ISFSIs are co-located at the operating and permanently shutdown reactor sites. A review of design earthquakes (DE) used at the existing ISFSI locations in CEUS indicated that the safety margin (defined for ISFSIs as the ratio of DE/SSE, where SSE is the safe shutdown earthquake discussed in answer A8) for the cask designs were in the range of 1.20 ~ 3.90.

Therefore, NMSS considers that there is significant margin built into the existing designs and has confidence that the ISFSIs can continue to operate safely while the licensees' investigate this issue using their site specific information. Even so, holders of operating license for ISFSIs are included among addressees in the Information Notice on GI-199. Spent fuel pools (SFPs) were not specifically evaluated as part of GI-199. However, based on their design attributes (as follows), SFPs remain safe. SFPs are constructed of reinforced concrete, several feet thick, with a stainless steel liner to prevent leakage and maintain water quality. Due to their configuration, SFPs are inherently structurally-rugged and are designed to the same seismic requirements as the nuclear plant.

Note: Typically, SFPs are about 40 feet deep and vary in width and length. The fuel is stored in stainless steel racks and submerged with approximately 23 feet of water above the top of the stored fuel. Each plant has a preferred SFP make-up water source (the refueling water storage tank for pressurized water reactors and the condensate storage tank for boiling water reactors). SFPs have alternate means of make-up such as service water systems and the fire water system. SFPs are also typically designed (e.g. with anti-siphon check valves) and instrumented such that leakage is minimized and promptly detected.

106) What are the design acceptance criteria for cooling systems for the spent fuel pools?

Public Response: The Standard Review Plan (NUREG0-800) acceptance Criteria for SP Cooling includes the following aspects:

General Design Criterion (GDC) 2 contained in Appendix A to 10 CFR Part 50, as related to structures housing the system and the system itself being capable of withstanding the effects of natural phenomena such as earthquakes, tornadoes, and hurricanes. Acceptance for meeting this criterion is based on conformance to positions C.1, C.2, C.6, and C.8 of RG 1.13 and position C.1 of RG 1.29 for safety-related and position C.2 of RG 1.29 for nonsafety-related portions of the system.

This criterion does not apply to the cleanup portion of the system and need not apply to the cooling system if the fuel pool makeup water system and its source meet this criterion, the fuel pool building and its ventilation and filtration system meet this criterion, and the ventilation and filtration system meets the guidelines of RG 1.52.

The cooling and makeup system should be designed to Quality Group C requirements in accordance with RG 1.26. However, when the cooling system is not designated Category I it need not meet the requirements of ASME Section XI for in-service inspection of nuclear plant components.

107) How does B.5.b apply to spent fuel pools?

Public Response: The answer below is a compilation of two questions contained in the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Section B.5.b of the ICM Order required licensees to "Develop specific guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities using existing or readily available resources (equipment and personnel) that can be effectively implemented under the circumstances associated with loss of large areas of the plant due to explosions or fire." Phase 1 was part of a larger NRC effort to enhance the safety and security of the nation's nuclear power plants. In Phase 2, the NRC independently looked at additional ways to protect the spent fuel pools at nuclear power plants. The NRC's plant-specific assessments identified both "readily available" and other resources that could be used to mitigate damage to spent fuel pools and the surrounding areas. The assessments considered damage that could have been caused by land, water, or air attacks.

Station Blackout

This is not exactly related to seismic questions. But, similar to the above topics, I read these with great interest. I believe there are many staff who would like to be more informed about this topic and this is an excellent summary. So, I have included it here.

A Factsheet related to station blackout has been added (see pg XX).

108) What is the definition of station blackout?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Station blackout (SBO) means the complete loss of alternating current (ac) electric power to the essential and nonessential switchgear buses in a nuclear power plant (i.e., loss of offsite electric power system concurrent with turbine trip and unavailability of the onsite emergency ac power system). Station blackout does not include the loss of available ac power to buses fed by station batteries through inverters or by alternate ac sources as defined in this section, nor does it assume a concurrent single failure or design basis accident. At single unit sites, any emergency ac power source(s) in excess of the number required to meet minimum redundancy requirements (i.e., single failure) for safe shutdown (non-DBA) is assumed to be available and may be designated as an alternate power source(s) provided the applicable requirements are met. At multi-unit sites, where the combination of emergency ac power sources exceeds the minimum redundancy requirements for safe shutdown (non-DBA) of all units, the remaining emergency ac power sources may be used as alternate ac power sources provided they meet the applicable requirements. If these criteria are not met, station blackout must be assumed on all the units.

109) What is the existing regulatory requirement regarding SBO?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Each light-water-cooled nuclear power plant licensed to operate must be able to withstand for a specified duration and recover from a station blackout as defined in Sec. 50.2.

110) How many plants have an alternate ac (AAC) source with the existing EDGs

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: 60 plants

111) How many plants cope with existing class 1E batteries?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: 44 plants

112) What are the coping duration determined for the plants based on the SBO Rule ?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: 4-16 hours (4 hours only with batteries; 4-16 with AAC)

113) How is coping duration determined?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: The specified station blackout duration shall be based on the following factors:

- (i) The redundancy of the onsite emergency ac power sources;
- (ii) The reliability of the onsite emergency ac power sources;
- (iii) The expected frequency of loss of offsite power; and
- (iv) The probable time needed to restore offsite power.

114) When does the SBO event start?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: The onset of a loss of offsite power and onsite power as verified by the control room indications

115) When does the SBO event end?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Either onsite or offsite power is recovered.

116) Did the NRC review the licensee's actions to meet the SBO rule?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Yes. The NRC staff reviewed the responses from each licensee and issued a SER accepting the proposed coping methods. All plants have (1) established SBO coping and recovery procedures; (2) completed training for these procedures; (3) implemented modifications as necessary to cope with an SBO; and (4) ensured a 4-16 hour coping capability. In addition, the staff performed pilot inspections at 8 sites to verify the implementation of the SBO rule implementation. No issues were identified during initial implementation.

117) Are all plants designed to mitigate a station blackout event?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Yes. All plants have the capability to withstand and recover from a SBO event. In 1988, the NRC concluded that additional regulatory requirements were justified in order to provide further assurance that a loss of both offsite and onsite emergency ac power systems—a station blackout condition—would not adversely affect public health and safety. Studies conducted by the NRC have shown that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in significant risk reduction and have further enhanced defense in depth.

Emergency Preparedness (Emphasis on B.5.b)

Although this is not strictly seismic, it is often the case that design for mitigation actions taken for one issue have impact on others. It seems apparent that the actions taken for B.5.b are going to have an impact on the assessment of seismic risk at the plants.

118) Is the emergency preparedness planning basis for nuclear power plants is valid?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Yes- NRC continues to conduct studies to determine the vulnerability of nuclear power plants and the adequacy of licensee programs to protect public health and safety. Whether the initiating event is a severe earthquake, a terrorist based event, or a nuclear accident, the EP planning basis provides reasonable assurance that the public health and safety will be protected. EP plans have always been based on a range of postulated events that would result in a radiological release, including the most severe.

119) What is B.5.b?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: After the terrorist attacks of 9/11, the NRC issued an Interim Compensatory Measures (ICM) Order on February 25, 2002, requiring power reactor licensees to take certain actions to prevent or mitigate terrorist attacks. Section B.5.b of the ICM Order required licensees to "Develop specific guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities using existing or readily available resources (equipment and personnel) that can be effectively implemented under the circumstances associated with loss of large areas of the plant due to explosions or fire."

120) What were Phases 1, 2, and 3 of the B.5.b?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information:

Phase 1: Phase 1 was part of a larger NRC effort to enhance the safety and security of the nation's nuclear power plants. The Phase 1 effort was initiated as part of the February 2002 ICM Order. The Order, among other things, required licensees to look at what might happen if a nuclear power plant lost large areas due to explosions or fire. The licensees then were required to identify – and later implement – strategies that would maintain or restore cooling for the reactor core, containment building, and spent fuel pool. The requirements listed in Section B.5.b of the ICM Order directed licensees to identify "mitigative strategies" (meaning the measures licensees could take to reduce the potential consequences of a large fire or explosion) that could be implemented with resources already existing or "readily available."

Phase 2: In Phase 2, the NRC independently looked at additional ways to protect the spent fuel pools at nuclear power plants. The NRC's plant-specific assessments identified both "readily available" and other resources that could be used to mitigate damage to spent fuel pools and the surrounding areas. The assessments considered damage that could have been caused by land, water, or air attacks.

Phase 3: In Phase 3, each nuclear power plant licensee identified ways to improve its ability to protect the reactor core and containment from a terrorist attack. This was done by identifying both "readily available" and other resources that could be used to mitigate loss of large areas of the plant due to fires and explosions. In addition, the NRC independently assessed the plant and audited the licensee's effort to identify additional mitigation strategies.

121) Has the NRC inspected full implementation of the mitigating strategies?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: All phases of the B.5.b mitigating strategies were complete and inspected by December 2008.

122) What additional action has been taken?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: On March 27, 2009, the NRC amended 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," which added 10 CFR 50.54(hh)(2) in order to impose the same mitigating strategies requirements on new reactor applicants and licensees as those imposed by the ICM Order and associated license conditions. The Statement of Considerations for this rulemaking specifically noted that the requirements described in Section 50.54(hh) are for addressing certain events that are the cause of large fires and explosions and in addition, the rule contemplates that the initiating event for such large fires and explosions could be any number of beyond-design basis events, including natural phenomena such as earthquakes, tornadoes, floods, and tsunamis.

123) Is more information available about the mitigating strategies and inspections and reviews conducted?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: In general, the B.5.b mitigating strategies are plans, procedures, and pre-staged equipment whose intent is to minimize the effects of adverse events or accidents due to terrorist attacks. The NRC does not publicly release information that could assist terrorists to make nuclear power plants less safe. Since the NRC cannot share the details of the mitigating strategies with the public, we have given briefings to elected officials such as state governors and members of Congress to share sensitive unclassified or classified information, as appropriate. In addition, the NRC

Other External Hazards

124) How many plants are in hurricane zones?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: The plants near Gulf of Mexico and East coast as far north as Pilgrim have experienced Hurricane force winds in the past. Approximately 30 plants fall in this category.

125) How many plants are susceptible to flooding?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Most nuclear plants are close to large bodies of water and are situated on flat lands. Approximately 80% of the plants fall in this category. There are a few plants that may NOT be vulnerable to flooding such as Palo Verde.

126) How many plants are susceptible to blizzard?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: The plants in California, Arizona, South Texas, Louisiana and Florida are not expected to fall in this category. Approximately 80% of the plants are likely to experience blizzard conditions or adverse wintry weather conditions.

127) How many plants are susceptible to tornadoes?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Majority of the plants in the Midwest and the South have had tornado activity in the area. Approximately 50% of the operating plants

Plant-Specific Questions

San Onofre Nuclear Generating Station (SONGS) Questions

128) Could an earthquake and tsunami the size of the one in Japan happen at San Onofre?

No. [insert response to "Does the NRC consider earthquakes of magnitude 9"] Outside of the Cascadia subduction zone, earthquakes are not expected to exceed a magnitude of approximately 8.25; and that would only occur on the largest fault lines, such as the San Andreas fault, which is 50 miles away onshore.

129) What magnitude earthquake are currently operating US nuclear plants such as SONGS designed to?

Each reactor is designed for a different ground motion that is determined on a site-specific basis. Ground motion is a function of both the magnitude of an earthquake and the distance from the fault to the site; and it is ground motion that causes damage. So, Nuclear plants, and in fact all engineered structures, are actually designed based on ground motion levels, not earthquake magnitudes. The existing nuclear plants were designed based on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquakes expected in the area around the plant. The scenario earthquake at SONGS is a magnitude 7 approximately 5 miles from the main plant. This earthquake results in a ground motion that has a peak ground acceleration of 0.67g, that is 67% of the acceleration of gravity.

130) Could San Onofre withstand an earthquake of the magnitude of the Japanese earthquake?

It could withstand the ground shaking experienced by the Japanese nuclear plants. As discussed above, it is actually ground motions that structures, systems, and components "feel". We do not have direct recordings of ground motion at the Japanese reactors. However, we do have estimates of shaking that come from a ShakeMap produced by the K-NET system. The ground motion at the Japanese nuclear reactors is believed to be somewhat on the order of the 0.67g, or possibly slightly higher, that San Onofre peak ground acceleration has been analyzed to. However, US nuclear plants have additional seismic margin, as demonstrated by the result of the Individual Plant Examination of External Events program carried out by the NRC in the mid-90s.

It should be noted that, the Fukushima plant also withstood the earthquake. In the hour or so after the earthquake the Fukushima plant's safety systems, including the diesel generators, performed as expected and effectively shut down the reactor. The cause of the problems at the plant stemmed from the loss of emergency power that appears to be the direct result of the subsequent tsunami, which far exceeded the design basis tsunami for the Fukushima plant.

131) Is possible to have a tsunami at San Onofre that is capable of damaging the plant?

Public Information: The San Onofre Units 2 and 3 plant grade is elevation +30.0 feet MLLW. San Onofre has reinforced concrete cantilevered retaining seawall and screen well perimeter wall designed to withstand the design basis earthquake, followed by the maximum predicted tsunami with coincident storm wave action. The controlling tsunami for San Onofre occurring during simultaneous high tide and storm surge produces a maximum runup to elevation +15.6 feet MLLW at the Unit 2 and 3 seawall. When storm waves are superimposed, the predicted maximum runup is to elevation +27 MLLW. Tsunami protection for the SONGS site is provided by a reinforced concrete seawall constructed to elevation +30.0 MLLW. A tsunami larger than this is extremely unlikely.

Additional, technical, non-public information: None

132) Has the earthquake hazard at San Onofre been reviewed like Diablo Canyon nuclear power plant is doing? Are they planning on doing an update before relicensing?

Relicensing does not evaluate seismic hazard or other siting issues. Seismic safety is part of NRC's ongoing licensing activities. If an immediate safety concern emerged, the issue would be addressed as part of NRC's response, regardless of relicensing status.

The closest active fault is approximately five miles offshore from San Onofre, a system of folds and faults exist called the offshore zone of deformation (OZD). The OZD includes the Newport-Inglewood-Rose Canyon fault system. The Cristianitos fault is ½ mile southeast, but is an inactive fault. Other faults such as the San Andreas and San Jacinto, which can generate a larger magnitude earthquake, are far enough away that they would produce ground motions much less severe than earthquakes in the OZD for San Onofre.

Notwithstanding the above, the NRC is considering extending the Generic Issue 199 program to all operating reactors. This would require a reassessment of hazard for San Onofre using the latest probabilistic seismic hazard assessment approaches. Based on a preliminary assessment using the source model developed by the USGS for the national seismic hazard maps, the annual probability of occurrence of a 0.67g ground motion at the San Onofre site is only slightly higher than is than the annual probability of occurrence that is recommended for new nuclear plants.

Additional, technical, non-public information: Past history relative to nearby major quakes have been of no consequences to San Onofre. In fact, three major earthquakes from 1992 to 1994 (Big Bear, Landers and Northridge), ranging in distance from 70-90 miles away and registering approximately 6.5 to 7.3 magnitude, did not disrupt power production at San Onofre. The plant is expected to safely shutdown if a major earthquake occurs nearby. Safety related structures, systems and components have been designed and qualified to remain functional and not fail during and after an earthquake.

133) How do we know that the emergency diesel generators in San Onofre will not fail to operate like in Japan?

[See response to same question in earlier section]

134) Was there any damage to San Onofre from either the earthquake or the resulting tsunami?

There was no damage at the San Onofre nuclear plant from either the earthquake or tsunami.

135) What about emergency planning for San Onofre. Does it consider tsunami?

Public Response: FEMA reviews off-site evacuation plans formally every 2 years during a biennial emergency preparedness exercise. NRC evaluates on-site evacuation plans during the same exercise. Population studies are formally done every 10 years, and evacuation time estimates are re-evaluated at that time. FEMA reviews these evacuation plans, and will conclude their acceptability through a finding of "reasonable assurance" that the off-site facilities and infrastructure is capable of protecting public health and safety in the event of an emergency at San Onofre. The next such exercise is planned for April 12, 2011.

The San Onofre emergency plan initiates the emergency response organization and results in declaration of emergency conditions via their Emergency Action Levels. The facility would then make protective action recommendations to the Governor, who would then decide on what protective actions

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would be ordered for the residents around San Onofre. The consideration of tsunami would be contained in the State and local (City, County) emergency plans, which are reviewed by FEMA.

Additional, technical, non-public information: None

- 136) SONGS received a white finding in 2008 for 125VDC battery issue related to the EDGs that went undetected for 4 years. NRC issued the white finding as there was increased risk that one EDG may not have started due to a low voltage condition on the battery on one Unit (Unit 2). Aren't all plants susceptible to the unknown? Is there any assurance the emergency cooling systems will function as desired in a Japan-like emergency?**

Public response: The low voltage condition was caused by a failure to properly tighten bolts on a electrical breaker that connected the battery to the electrical bus that would be relied on to start the EDG in case of a loss of off-site power. This was corrected immediately on identification and actions taken to prevent its reoccurrence. The 3 other EDGs at SONGS were not affected.

Additional, technical, non-public information: None

- 137) What is the height of water that SONGS is designed to withstand?**

Public Response: 30 feet (9.1 meters). Information for all plants can be found in the "Additional Information" section of this document.

Additional, technical, non-public information: None

- 138) What about drawdown and debris?**

Public Response: *Good question...can HQ answer? Goutam, Henry, or Rich...can you help with this one?*

Additional, technical, non-public information: None

- 139) Will this be reviewed in light of the Japan earthquake.**

Public Response: The NRC will do a thorough assessment of the lessons learned from this event and will review all potential issues at US nuclear plants as a result.

Additional, technical, non-public information: None

- 140) Could all onsite and offsite power be disrupted from SONGS in the event of a tsunami, and if that happened, could the plant be safely cooled down if power wasn't restored for days after?**

Public Response: Seismic Category I equipment is equipment that is essential to the safe shutdown and isolation of the reactor or whose failure or damage could result in significant release of radioactive material. All Seismic Category I equipment at SONGS is designed to function following a DBE with ground acceleration of 0.67g.

The operating basis earthquake (1/2 of the DBE) is characterized by maximum ground shaking of 0.33g. Historically, even this level of ground shaking has not been observed at the site. Based on expert analysis, the average recurrence interval for 0.33g ground shaking at the San Onofre site would be in excess of 1000 years and, thus, the probability of occurrence in the 40-year design life of the plant would be less than 1 in 25. The frequency of the DBE would be much more infrequent, and very unlikely to occur during the life of the plant. Even if an earthquake resulted in greater than the DBE movement/acceleration at SONGS, the containment structure would ultimately protect the public from harmful radiation release, in the event significant damage occurred to Seismic category 1 equipment.

Additional, technical, non-public information: None

141) Are there any faults nearby SONGS that could generate a significant tsunami?

Public Response: Current expert evaluations estimate a magnitude 7 earthquake about 4 miles (6.4 km) from SONGS. This is significantly less than the Japan earthquake, and SONGS has been designed to withstand this size earthquake without incident. ~~Should discuss the different tectonic nature (not a subduction zone like Japan)?~~

Additional, technical, non-public information: None

142) What magnitude or shaking level is SONGS designed to withstand? How likely is an earthquake of that magnitude for the SONGS site?

Public Response: The design basis earthquake (DBE) is defined as that earthquake producing the maximum vibratory ground motion that the nuclear power generating station is designed to withstand without functional impairment of those features necessary to shut down the reactor, maintain the station in a safe condition, and prevent undue risk to the health and safety of the public. The DBE for SONGS was assessed during the construction permit phase of the project. The DBE is postulated to occur near the site (5 miles (8km)), and the ground accelerations are postulated to be quite high (0.67g), when compared to other nuclear plant sites in the U.S (0.25g or less is typical for plants in the eastern US). Based on the unique seismic characteristics of the SONGS site, the site tends to amplify long-period motions, and to attenuate short-period motions. These site-specific characteristics were accounted for in the SONGS site-specific seismic analyses.

Additional, technical, non-public information: None

143) Could SONGS withstand an earthquake of the magnitude of the Japanese earthquake?

Public Response: We do not have current information on the ground motion at the Japanese reactors. SONGS was designed for approximately a 7.0 magnitude earthquake 4 miles (6.4 km) away. The Japanese earthquake was much larger (8.9), but was also almost 9 miles (14.5 km) away. The local ground motion at a particular plant is significantly affected by the local soil and bedrock conditions. SONGS was designed (0.67g) to withstand more than 2 times the design motion at average US plants.

Additional, technical, non-public information: None

144) What about the evacuation routes at SONGS? How do we know they are reasonable?

Public Response: FEMA reviews off-site evacuation plans formally every 2 years during a biennial emergency preparedness exercise. NRC evaluates on-site evacuation plans during the same exercise. Population studies are formally done every 10 years, and evacuation time estimates are re-evaluated at that time. FEMA reviews these evacuation plans, and will conclude their acceptability through a finding of "reasonable assurance" that the off-site facilities and infrastructure is capable of protecting public health and safety in the event of an emergency at SONGS. The next such exercise is planned for April 12, 2011.

Additional, technical, non-public information: None

145) Regarding tsunami at DCNPP and SONGS, is the tsunami considered separately from flooding in licensing? And from the design perspective, is the flood still the controlling event for those plants rather than the tsunami?

Public response: See below

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146) What is the design level flooding for San Onofre? Can a tsunami be larger?

Public response: San Onofre is located above the flood level associated with tsunami. San Onofre has reinforced concrete cantilevered retaining seawall and screen well perimeter wall designed to withstand the design basis earthquake, followed by the maximum predicted tsunami with coincident storm wave action

Additional, technical, non-public information: None

147) Is there potential linkage between the South Coast Offshore fault near SONGS and the Newport-Inglewood Fault system and/or the Rose Canyon fault? Does this potential linkage impact the maximum magnitude that would be assigned to the South Coast Offshore fault and ultimately to the design basis ground motions for this facility?

Public response: Stephanie and Jon to answer (you may want to change the question) based on the discussions in the articles sent by Lara U.

Additional, technical, non-public information: Proposed action is to check the FSAR for San Onofre and read the discussion on characterization of the offshore fault. A quick look at discussion of the Newport Inglewood from other sources suggest this is part of the "system". It would be helpful to check the basis for segmenting the fault in the FSAR. Probably have to dig on this a bit, may need to look at the USGS/SCEC/ model for this area.

Diablo Canyon Nuclear Power Plant (DCNPP) Questions

148) Could an earthquake and tsunami the size of the one in Japan happen at Diablo Canyon?

[use same response as "Could an earthquake and tsunami the size of the one in Japan happen at San Onofre?"]

149) What magnitude earthquake are currently operating US nuclear plants such as Diablo Canyon designed to?

[use response to same question for SONG, but substitute the following: "The scenario earthquake at Diablo is a magnitude 7.5 on the Hosgri Fault 3 miles from the main plant. This earthquake results in a ground motion that has a peak ground acceleration of 0.75g, that is 75% of the acceleration of gravity.]

150) Could the newly discovered Shoreline Fault produce a larger "Scenario Earthquake"?

The NRC's preliminary analyses indicate that the ground motions from the largest earthquakes expected on the smaller Shoreline Fault do not exceed the ground motions from the Hosgri Fault, for which the plant has already been analyzed and been found to be safe. NRC is currently reviewing the Final Report on the Shoreline Fault that was submitted to the NRC earlier this year. The NRC is performing an independent analysis of potential ground motions based the data contained in the report and other information. Much of the data on the Shoreline Fault comes from the USGS in Menlo Park.

151) Could Diablo Canyon withstand an earthquake of the magnitude of the Japanese earthquake?

It could withstand the ground shaking experienced by the Japanese nuclear plants. As discussed above, it is actually ground motions that structures, systems, and components "feel". We do not have direct recordings of ground motion at the Japanese reactors. However, we do have estimates of shaking that come from a ShakeMap produced by the the K-NET system. The ground motion at the Japanese nuclear reactors is believed to be somewhat smaller than the 0.75g peak ground acceleration that Diablo Canyon has been analyzed to. Do, Diablo Canyon could withstand the ground shaking experienced by the Fukushima plant.

In fact, the Fukushima plant also withstood the earthquake. In the hour or so after the earthquake the Fukushima plant's safety systems, including the diesel generators, performed as expected and effectively shut down the reactor. The cause of the problems at the plant stemmed from the loss of emergency power that appears to be the direct result of the subsequent tsunami, which far exceeded the design basis tsunami for the Fukushima plant.

152) Is Diablo Canyon's equipment vulnerable to tsunami?

Nuclear plants are designed to withstand protection against natural phenomena such as tsunami, earthquakes. Diablo Canyon's main plant is located above the flood level associated with tsunami. The intake structures and Auxiliary Sea Water System at Diablo canyon are designed for combination of tsunami and storm wave activity.

153) How do we know that the emergency diesel generators in Diablo Canyon will not fail to operate like in Japan?

[see same question in earlier section]

154) Was there any damage to Diablo Canyon from either the earthquake or the resulting tsunami?

A small tsunami did hit the region around Diablo Canyon. There was no damage at the nuclear plant.

155) How do we know the evacuation routes in the region around Diablo Canyon are realistic?

FEMA reviews off-site evacuation plans formally every 2 years during a biennial emergency preparedness exercise. NRC evaluates on-site evacuation plans during the same exercise. Population studies are formally done every 10 years, and evacuation time estimates are re-evaluated at that time. FEMA reviews these evacuation plans, and will conclude their acceptability through a finding of "reasonable assurance" that the off-site facilities and infrastructure is capable of protecting public health and safety in the event of an emergency at DCNPP.

156) Now after the Japan tragedy, will the NRC finally hear us (A4NR) and postpone DC license renewal until seismic studies are complete? How can you be sure that what happened there is not going to happen at Diablo with a worse east earthquake and tsunami?

Public response: ADD

Additional, technical, non-public information: ADD

157) The evacuation routes at DCNPP are not realistic. Highway 101 is small...and can you imagine what it will be like with 40K people on it? Has the evacuation plan been updated w/ all the population growth?

Public Response: FEMA reviews off-site evacuation plans formally every 2 years during a biennial emergency preparedness exercise. NRC evaluates on-site evacuation plans during the same exercise. Population studies are formally done every 10 years, and evacuation time estimates are re-evaluated at that time. FEMA reviews these evacuation plans, and will conclude their acceptability through a finding of "reasonable assurance" that the off-site facilities and infrastructure is capable of protecting public health and safety in the event of an emergency at DCNPP.

Additional, technical, non-public information: None

158) Are there local offshore fault sources capable of producing a tsunami with very short warning times?

Public Response: ADD- question forwarded to region

Additional, technical, non-public information: ADD

159) Are there other seismically induced failure modes (other than tsunami) that would yield LTSBO? Flooding due to dam failure or widespread liquefaction are examples.

Public Response: ADD question forwarded to region

Additional, technical, non-public information: ADD

160) Ramifications of beyond design basis events (seismic and tsunami) and potential LTSBO on spent fuel storage facilities?

Public Response: ADD question forwarded to region

Additional, technical, non-public information: ADD

- 161) Why did the Emergency Warning go out for a 'tsunami' that was only 6 ft (1.8 m) high? Do these guys really know what they're doing? Would they know it if a big one was really coming? Crying wolf all the time doesn't instill a lot of confidence.**

Public Response: The warning system performed well. The 6 foot (1.8 meters) wave was predicted many hours before and arrived at the time it was predicted. Federal officials accurately predicted the tsunami arrival time and size; allowing local official to take appropriate measures as they saw necessary to warn and protect the public. It should be understood that even a 6 foot tsunami is very dangerous. Tsunamis have far more energy and power than wind-driven waves.

Additional, technical, non-public information: ADD

The Japanese were supposed to have one of the best tsunami warning systems around. What went wrong last week?

Public Response: ADD can HQ answer?

Additional, technical, non-public information: ADD

NOTE: need to add to SONGS and DCNPP... Canyon and San Onofre IPEEEs - based on the Technical Evaluation Reports, Diablo did consider a locally induced tsunami in a limited way (the aux service water pumps were assumed to become flooded following a seismic event) while SONGS did not consider a coupled seismic/tsunami event.

- 162) Shouldn't the NRC make licensees consider a Tsunami coincident with a seismic event that triggers the Tsunami?**

ADD

- 163) Given that SSCs get fatigued over time, shouldn't the NRC consider after-shocks in seismic hazard analyses?**

ADD

- 164) Did the Japanese also consider an 8.9 magnitude earthquake and resulting tsunami "way too low a probability for consideration"?**

ADD

- 165) GI-199 shows that the scientific community doesn't know everything about the seismicity of CEUS. And isn't there a prediction that the West coast is likely to get hit with some huge earthquake in the next 30 years or so? Why does the NRC continue to license plants on the west coast?**

Work the following into Q&As as time permits.

After an earthquake, in order to restart, In practice a licensee needs to determine from engineering analysis that the stresses on the plant did not exceed their licensed limits. That would be a very tall order for a plant that experienced a beyond design basis earthquake, and probably is why it had taken Japan so long to restore the KK plants following the earlier earthquake.

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- 166) Has anyone done work to look at the effect of many cycles of low amplitude acceleration following a larger event. How do we know a plant would be fit to start back up after an event? We cannot possibly do NDE on everything to determine if flaws have propagated to the point where they need to be replaced.

167) Aren't the California plants right on the San Andreas fault?

No. Both plants are approximately 50 miles from the San Andreas Fault. However, both are closer to other active fault zones. Diablo Canyon is closer to the Hosgri fault zone and has been retrofitted to be safe in ground motions from a magnitude 7.5 earthquake on the Hosgri, which is 3 miles away. Recently there was a new fault, called the Shoreline fault discovered, about a 1/2 mile from the plant. But it is smaller and only capable of about a 6.5 earthquake at the most. The ground motions from the Hosgri's 7.5 earthquake would be larger than an 6.5 on the Shoreline fault. San Onofre is closer to the Newport-Inglewood fault which is about 5 miles away and capable of a magnitude 7. San Onofre was built to withstand the ground motions from that earthquake.

Indian Point Questions

168) Why is Indian Point safe if there is a fault line so close to it?

Public Response: The Ramapo fault system, located near the Indian Point Nuclear Power Plant, is an example of an old fault system that, based on geologic field evidence, has not been active in the last 65.5 million years. The Ramapo fault system extends primarily from southeastern New York to northern New Jersey and is made up of a series of northeast-oriented faults. Even though there is minor earthquake activity in the vicinity of the Ramapo faults, this earthquake activity cannot be directly correlated with any individual fault within the Ramapo fault system.

US nuclear power plants are designed and built to withstand the largest expected earthquake in the site region, based on observed historical seismicity and field evidence for prehistoric earthquakes, and are also designed to incorporate seismic safety margins. A potential earthquake in and around the vicinity of the Ramapo fault system was taken into account during the NRC licensing process for the Indian Point plants, and the plant design incorporated the largest expected earthquake in the site region. In summary, the Ramapo fault system exhibits no definitive evidence for recent fault displacement (i.e., no evidence for fault activity in the last 65.5 million years) and the Indian Point nuclear power plant was designed and built to safely shutdown in the event of an earthquake having the highest magnitude observed in the site region. Therefore, the NRC concluded that the risk of significant damage to the Indian Point reactors due to a potential earthquake is acceptable.

Additional, technical, non-public information: The information above and following is consistent with the literature and the UFSAR for IP related to the Ramapo fault. The Ramapo fault system, which passes through the Indian Point area, is a group of Mesozoic age faults, extending from southeastern New York to northern New Jersey, as well as further southwest. The fault system is composed of a series of southeast-dipping, northeast-striking faults. Various faults of the system contain evidence of repeated slip in various directions since Proterozoic time, including Mesozoic extensional reactivation. However, the USGS staff, who reviewed 31 geologic features in the Appalachian Mountains and Coastal Plain and compiled a National Database on Quaternary Faulting (Crone and Wheeler, 2000), listed the Ramapo fault system as low risk because the fault system lacks evidence for Quaternary slip. They further pointed out that the Ramapo fault system, and 17 other geologic features, "have little or no published geologic evidence of Quaternary tectonic faulting that could indicate the likely occurrence of earthquakes larger than those observed historically" (Wheeler and Crone, 2004). Among these faults, the Ramapo fault system is one of the three that underwent a paleoseismological study. In two trenches excavated across the Ramapo fault, no evidence of Quaternary tectonic faulting was found (Wheeler and Crone, 2000). Because the Ramapo fault system is relatively inactive, and because the plants are designed to safely shutdown in the event of an earthquake of the highest intensity ever recorded in that

area, the NRC has concluded that the risk of significant damage to the reactors due to a probable earthquake in the area is extremely small.

The letter that was sent to the NRC from Rep Lowey refers to the Ramapo seismic zone (RSZ) and the Dobbs Ferry fault. The letter incorrectly states that the Dobbs Ferry fault is located within the Ramapo seismic zone. Based on the literature, it is not. It is close, but it is considered to be in the Manhattan Prong more to the east (more like 10-15 miles away) while the Ramapo fault system is considered to be in the Reading Prong (a couple of miles away from IP). Also for clarification, the seismicity is considered to be within the Precambrian/Paleozoic basement at depths greater than the Mesozoic Newark Basin where the RSZ is situated.

Pending and Unanswered Questions from Members of Congress

The below questions are gleaned from the congressional letters coming into the NRC. Because they generally cover different topics, they are being kept together as sets to assist the office assigned with response. Once a formal response is developed and sent, the questions will be moved to the appropriate sections.

169) Received 3/16/11 from Congresswoman Lowey

The key elements of the congresswoman's letter are as follows:

The Ramapo Seismic Zone is a particular threat because the zone passes within two miles of Indian Point. The Ramapo Seismic zone includes the Dobbs Ferry fault in Westchester, which generated a 4.1 magnitude earthquake in 1955. The Columbia University study suggests that this pattern of subtle but active faults increases the risk to the New York City area and that an earthquake with a magnitude of 7.0 on the Richter scale is within reach. Disturbingly, Entergy measures the risk of an earthquake near Indian Point to be between 1.0 and 3.0 on the Richter scale, despite evidence to the contrary.

The NRC should study Indian Point's risk of, and ability to sustain a disaster, including the impact of earthquakes and hurricanes, as well as collateral impacts such as loss of power, inability to cool reactors and emergency evacuation routes. The NRC should evaluate how a similar incident in the New York metropolitan area could be further complicated due to a dramatically higher population and the effectiveness of the proposed evacuation routes.

Public Response: Please see response in the Indian Point section.

Additional, technical, non-public information: None.

170) From 3/16/11 Press Release from Senators Boxer and Feinstein

Plant Design and Operations

1. What changes to the design or operation of the Diablo Canyon and SONGS facilities have improved safety at the plants since they began operating in the mid-1980s?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

2. What emergency notification systems have been installed at California nuclear power plants? Has there ever been a lapse of these systems during previous earthquakes or emergencies?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

3. What safety measures are in place to ensure continued power to California reactors in the event of an extended power failure?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

Type of Reactor

4. What are the differences and similarities between the reactors being used in California (pressurized water reactors) and those in Japan (boiling water reactors), as well as the

facilities used to house the reactors, including the standards to which they were built and their ability to withstand natural and manmade disasters?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

Earthquakes and Tsunamis

5. We have been told that both Diablo Canyon and San Onofre Nuclear Generating Station are designed to withstand the maximum credible threat at both plants, which we understand to be much less than the 9.0 earthquake that hit Japan. What assumptions have you made about the ability of both plants to withstand an earthquake or tsunami? Given the disaster in Japan, what are our options to provide these plants with a greater margin for safety?

Public Response: Annie and Kamal developing response

Additional, technical, non-public information: ADD

6. Have new faults been discovered near Diablo Canyon or San Onofre Nuclear Generating Station since those plants began operations? If so, how have the plants been modified to account for the increased risk of an earthquake? How will the NRC consider information on ways to address risks posed by faults near these plants that is produced pursuant to state law or recommendations by state agencies during the NRC relicensing process?

Public Response: Annie and Kamal developing response

Additional, technical, non-public information: ADD

7. What are the evacuation plans for both plants in the event of an emergency? We understand that Highway 1 is the main route out of San Luis Obispo, what is the plan for evacuation of the nearby population if an earthquake takes out portions of the highway and a nuclear emergency occurs simultaneously?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

8. What is the NRC's role in monitoring radiation in the event of a nuclear accident both here and abroad? What is the role of EPA and other federal agencies?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

9. What monitoring systems currently are in place to track potential impacts on the US, including California, associated with the events in Japan?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

10. 6. Which federal agency is leading the monitoring effort and which agencies have responsibility for assessing human health impacts? What impacts have occurred to date on the health or environment of the US or are currently projected or modeled in connection with the events in Japan?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

11. What contingency plans are in place to ensure that the American public is notified in the event that hazardous materials associated with the events in Japan pose an imminent threat to the US?

Public Response: NRR/DQRL developing response

Additional, technical, non-public information: ADD

171) From 3/15/11 Press Release from Congresspeople Markey and Capps

Note that these are only the seismic questions. There are other questions that are structural

1. Provide the Richter or moment magnitude scale rating for each operating nuclear reactor in the United States. If no such information exists, on what basis can such an assertion be made regarding the design of any single nuclear power plant?

Public Response: US nuclear power plants are designed for different ground motions determined on a site-specific basis, which are called the Safe Shutdown Earthquake ground motions (SSE). Each nuclear power plant is designed to a ground motion level that is appropriate for the geology and tectonics in the region surrounding the plant location. Ground motion, or shaking, is a function of both earthquake magnitude and distance from the fault to the site. The magnitude alone cannot be used to predict ground motions. Currently operating nuclear power plants developed their SSEs based on a "deterministic" or "scenario earthquake" basis that account for the largest earthquake expected in the area around the plant.

Please see the available table of Design Basis Ground Motions for US Plants in the Additional Information: Useful Tables.

Additional, technical, non-public information: ADD

2. The San Onofre reactor is reportedly designed to withstand a 7.0 earthquake, and the Diablo Canyon reactor is designed to withstand a 7.5 magnitude. According to the Southern California Earthquake Center (SCEC), there is an 82% probability of an earthquake 7.0 magnitude in the next 30 years, and a 37 percent probability that an earthquake of 7.5 magnitude will occur. Shouldn't these reactors be retrofitted to ensure that they can withstand a stronger earthquake than a 7.5? If not, why not?

Public Response: ~~This needs to be edited and enhanced.~~ The noted SCEC magnitudes and probabilities are sourced from Uniform California Earthquake Rupture Forecast (UCERF) Figure 2 (<http://www.scec.org/core/public/scecontext.php/3935/13662>). The value quoted describes the probability that an earthquake of that magnitude will occur somewhere in Southern California. The probability that earthquakes of those magnitudes occur near the plants is far smaller. Each nuclear power plant is designed to a ground motion level that is appropriate for the geology and tectonics in the region surrounding the plant location.

Additional, technical, non-public information: The colors in UCERF Figure 2 represent the probabilities of having a nearby earthquake rupture (within 3 or 4 miles) of magnitude 6.7 or larger in the next 30 years. Therefore, reading the colors off of Figure 2, the San Onofre and Diablo Canyon NPPs have a ≤10% probability of having a ≥M6.7 earthquake rupture within 3 to 4 miles in the next 30 years. Therefore, retrofitting these reactors to withstand earthquakes of M7.5 or stronger based on the UCERF study would put an unnecessary burden on the licensees.

3. Provide specific information regarding the differences in safety-significant structures between a nuclear power plant that is located in a seismically active area and one that is not. Provide, for each operating nuclear reactor in a seismically active area, a full list and description of the safety-

significant design features that are included that are not included in similar models that are not located in seismically active areas.

Public Response: This is a rough draft. We need to get some reviews of this. Assumed NRR will have ultimate responsibility for the response!

There are no differences in safety requirements for nuclear power plants located in seismically active areas and ones that are not. Regardless of site seismicity, Appendix S to 10 CFR Part 50 requires for site-specific SSE ground motions, structures, systems, and components will remain functional and within applicable stress, strain, and deformation limits. The required safety functions of SSCs must be assured during and after the vibratory ground motion through design, testing, or qualification methods. The evaluation must take into account soil-structure interaction effects and the expected duration of the vibratory motions. Appendix S also requires that the horizontal component of the SSE ground motion in the free field at the foundation elevation of structures must be an appropriate response spectrum with peak ground acceleration (PGA) of at least 0.10g. Design basis loads for nuclear power plant structures, important to safety, include combined loads for seismic, wind, tornado, normal operating conditions (pressure and thermal), and accident conditions. Codes and standards, such as the American Institute of Concrete (ACI-349) and the American Institute of Steel Construction (AISC N690), are used in the design of nuclear power plant structures to ensure a conservative, safe design under design basis loads. In addition to the nominal seismic design, all new generation reactors have to demonstrate a seismic margin of 1.67 relative to the site-specific seismic demands.

For the current operating fleet of nuclear power reactors, site-to-site differences in structural design can result from differences in external site hazards such as seismic, wind, tornado, and tsunami. For a low-seismicity region, wind or tornado loads may control the design. Conversely, for a high-seismicity region, seismic loads will likely control. Structures in high-seismicity regions have robust designs with typically higher capacity shear walls, as an example. Systems and components will also be more robust and are designed and tested to higher levels of acceleration.

Additional, technical, non-public information: ADD

4. In your opinion, can any operating nuclear reactors in the United States withstand an earthquake of the magnitude experience in Japan?

Public Response: The March 11, 2011, magnitude 9 earthquake that recently affected Japan is different than earthquakes that could affect US nuclear plants. Each US nuclear plant is designed to a ground-shaking level that is appropriate for its location, given the possible earthquake sources that may affect the site and its tectonic environment. The Japan earthquake was caused by a "subduction zone" event, which is the type of mechanism that produces the largest possible magnitude earthquakes. In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of northern California, Oregon and Washington, so an earthquake this large could only happen in that region. The only plant in that area is Columbia Generating Station, which is approximately 225 miles (363 km) from the coast and the subduction zone. Outside of the Cascadia subduction zone, earthquakes are not expected to exceed a magnitude of approximate 8, which has 31 times less energy than a magnitude 9.

Additional, technical, non-public information: ADD

Additional Information: Useful Tables

Table of Design Basis Ground Motions for US Plants

| Design Basis Earthquake Information | | | | | |
|-------------------------------------|--|-------------------------------------|--|---------------------------------|----------------|
| Nuclear Plant By State/Location | Maximum Observed Or Inferred Intensity (MMI Scale) | Relative Distance Of Seismic Source | Design SSE Peak Acceleration, <i>g</i> | OBE Peak Acceleration, <i>g</i> | Soil Condition |
| New York | | | | | |
| Fitzpatrick | VI | Near | 0.15 | 0.08 | Soil |
| GINNA 1 | VIII/IX | >60 miles | 0.2 | 0.08 | Rock |
| Indian Point 2, 3 | VII | Near | 0.15 | 0.1 | Rock |
| Nine Mile Point 1 | IX-X | >60 miles | 0.11 | 0.06 | Rock |
| Nine Mile Point 2 | VI | Near | 0.15 | 0.075 | Rock |
| New Jersey | | | | | |
| Salem 1,2 | VII-VIII | Near | 0.2 | 0.1 | Deep Soil |
| Connecticut | | | | | |
| Millstone 1, 2, 3 | VII | Near | 0.17 | 0.07 | Rock |
| Vermont | | | | | |
| Vermont Yankee | VI | Near | 0.14 | 0.07 | Rock |
| Ohio | | | | | |
| Davis Besse 1 | VII | Near | 0.15 | 0.08 | Rock |
| Perry 1 | VII | Near | 0.15 | 0.08 | Rock |
| Georgia | | | | | |
| Hatch 1, 2 | VII | Near | 0.15 | 0.08 | Deep Soil |
| Vogtle 1, 2 | VII-VIII | Near | 0.2 | 0.12 | Deep Soil |
| Tennessee | | | | | |
| Sequoyah 1, 2 | VIII | Near | 0.18 | 0.09 | Rock |
| Watts Bar 1 | VIII | Near | 0.18 | 0.09 | Rock |
| California | | | | | |
| San Onofre 2, 3 | IX-X | Near | 0.67 | 0.34 | Soil |
| Diablo Canyon 1, 2 | X-XI | Near | 0.75 | 0.20 | Rock |
| Florida | | | | | |

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| | | | | | |
|-------------------|-----|------|------|------|------|
| Crystal River 3 | V | Near | 0.10 | 0.05 | Rock |
| St. Lucie 1, 2 | VI | Near | 0.10 | 0.05 | Soil |
| Turkey Point 3, 4 | VII | Near | 0.15 | 0.05 | Rock |

NOTES:

MMI=Modified Mercalli Intensity, a measure of observed/reported damage and severity of shaking.

Relative distance measure used in FSAR to develop SSE acceleration, "Near" indicates distance less than 10 miles.

SSE=Safe Shutdown Earthquake ground motion, for horizontal acceleration, in units of earth's gravity, *g*.

OBE=Operating Basis Earthquake ground motion, level of horizontal acceleration, which if exceeded requires plant shutdown.

Table of SSE, OBE and Tsunami Water Levels

| Nuclear Plant Name By State/ Location | Safe Shutdown Earthquake (SSE) Peak Acceleration (g) | Operating Basis Earthquake (OBE) Peak Acceleration (g) | Probable Maximum Tsunami OR Maximum Tsunami Water Level |
|---|--|--|---|
| Alabama | | | |
| Browns Ferry | 0.200 | 0.100 | N/A (Non-Coastal) |
| Farley | 0.100 | 0.050 | N/A (Non-Coastal) |
| Arkansas | | | |
| Arkansas Nuclear | 0.200 | | N/A (Non-Coastal) |
| Arizona | | | |
| Palo Verde | 0.200 | 0.100 | N/A (Non-Coastal) |
| California | | | |
| Diablo Canyon | 0.400 | 0.200 | The design basis maximum combined wave runup is the greater of that determined for near-shore or distantly-generated tsunamis, and results from near-shore tsunamis. For distantly-generated tsunamis, the combined runup is 30 feet. For near-shore tsunamis, the combined wave runup is 34.6 feet, as determined by hydraulic model testing. The safety-related equipment is installed in watertight compartments to protect it from adverse sea wave events to elevation +48 feet above mean lower low water line (MLLWL). |
| San Onofre | 0.670 | 0.340 | The controlling tsunami occurs during simultaneous high tide and storm surge produces a maximum runup to elevation +15.6 feet mean lower low water line (MLLWL) at the Unit 2 and 3 seawall. When storm waves are superimposed, the predicted maximum runup is to elevation +27 MLLWL. Tsunami protection for the SONGS site is provided by a reinforced concrete seawall constructed to elevation +30.0 MLLWL. |
| Connecticut | | | |
| Millstone | 0.170 | 0.090 | 18 ft SWL |
| Florida | | | |
| Crystal River | 0.050 | 0.025 | N/A (Non-Coastal) |

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| Nuclear Plant Name By State/ Location | Safe Shutdown Earthquake (SSE) Peak Acceleration (g) | Operating Basis Earthquake (OBE) Peak Acceleration (g) | Probable Maximum Tsunami OR Maximum Tsunami Water Level |
|---|---|---|--|
| St. Lucie | 0.100 | 0.050 | No maximum tsunami level, bounded by PMH surge of +18 MLW wave runup, with plant openings at +19.5 MLW |
| Turkey Point | 0.150 | 0.050 | No maximum tsunami level, bounded by PMH surge of +18.3 MLW water level, site protected to +20 MLW with vital equipment protected to +22 MLW |
| Georgia | | | |
| Hatch | 0.150 | 0.080 | N/A (Non-Coastal) |
| Vogtle | 0.200 | 0.120 | N/A (Non-Coastal) |
| Illinois | | | |
| Braidwood | 0.200 | 0.090 | N/A (Non-Coastal) |
| Byron | 0.200 | 0.090 | N/A (Non-Coastal) |
| Clinton | 0.250 | 0.100 | N/A (Non-Coastal) |
| Dresden | 0.200 | 0.100 | N/A (Non-Coastal) |
| LaSalle | 0.200 | 0.100 | N/A (Non-Coastal) |
| Quad Cities | 0.240 | 0.120 | N/A (Non-Coastal) |
| Iowa | | | |
| Duane Arnold | 0.120 | 0.060 | N/A (Non-Coastal) |
| Kansas | | | |
| Wolf Creek | 0.120 | 0.060 | N/A (Non-Coastal) |
| Louisiana | | | |
| River Bend | 0.100 | 0.050 | |
| Waterford | 0.100 | | Floods – 30 feet MSL |
| Maryland | | | |
| Calvert Cliffs | 0.150 | 0.080 | 14 ft design wave |
| Massachusetts | | | |
| Pilgrim | 0.150 | 0.080 | *Storm flooding design basis - 18.3ft |
| Michigan | | | |
| D.C. Cook | 0.200 | 0.100 | N/A |
| Fermi | 0.150 | 0.080 | N/A |
| Palisades | 0.200 | 0.100 | N/A |

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| Nuclear Plant Name By State/ Location | Safe Shutdown Earthquake (SSE) Peak Acceleration (g) | Operating Basis Earthquake (OBE) Peak Acceleration, (g) | Probable Maximum Tsunami OR Maximum Tsunami Water Level |
|---|--|---|--|
| Missouri | | | |
| Callaway | 0.200 | | N/A (Non-Coastal) |
| Mississippi | | | |
| Grand Gulf | 0.150 | 0.075 | N/A |
| Minnesota | | | |
| Monticello | 0.120 | 0.060 | N/A (Non-Coastal) |
| Prarie Island | 0.120 | 0.060 | N/A (Non-Coastal) |
| Nebraska | | | |
| Cooper | 0.200 | 0.100 | N/A (Non-Coastal) |
| Fort Calhoun | 0.170 | 0.080 | N/A (Non-Coastal) |
| New York | | | |
| Fitzpatrick | 0.150 | 0.080 | N/A (Non-Coastal) |
| Ginna | 0.200 | 0.080 | N/A |
| Indian Point | 0.150 | 0.100 | 15 ft msl |
| Nine Mile Point, Unit 1 | 0.110 | 0.060 | N/A |
| Nine Mile Point, Unit 2 | 0.150 | 0.075 | N/A |
| New Hampshire | | | |
| Seabrook | 0.250 | 0.125 | (+) 15.6' MSL Still Water Level (Tsunami Flooding -Such activity is extremely rare on the US Atlantic coast and would result in only minor wave action inside the harbor.) |
| New Jersey | | | |
| Hope Creek | 0.200 | 0.100 | 35.4 MSL The maximum probable tsunami produces relatively minor water level changes at the site. The maximum runup height reaches an elevation of 18.1 feet MSL with coincident 10 percent exceedance high tide) |
| Oyster Creek | 0.184 | 0.092 | (+) 23.5' MSL Still Water Level (Probable Maximum Tsunami - Tsunami events are not typical of the eastern coast of the United States and have not, therefore, been addressed.) |

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| Nuclear Plant Name By State/ Location | Safe Shutdown Earthquake (SSE) Peak Acceleration (g) | Operating Basis Earthquake (OBE) Peak Acceleration, (g) | Probable Maximum Tsunami OR Maximum Tsunami Water Level |
|---|--|---|---|
| Salem | 0.200 | 0.100 | 21.9 MSL (There is no evidence of surface rupture in East Coast earthquakes and no history of significant tsunami activity in the region) |
| North Carolina | | | |
| Brunswick | 0.160 | 0.030 | N/A |
| McGuire | 0.150 | 0.080 | N/A (Non-Coastal) |
| Shearon Harris | 0.150 | | N/A (Non-Coastal) |
| Ohio | | | |
| Davis-Besse | 0.150 | 0.080 | N/A |
| Perry | 0.150 | 0.080 | N/A |
| Pennsylvania | | | |
| Beaver Valley | 0.130 | 0.060 | N/A (Non-Coastal) |
| Limerick | 0.150 | 0.075 | N/A (Non-Coastal) |
| Peach Bottom | 0.120 | 0.050 | N/A (Non-Coastal) |
| Three Mile Island | 0.120 | 0.060 | N/A (Non-Coastal) |
| Susquehanna | 0.150 | 0.080 | N/A (Non-Coastal) |
| South Carolina | | | |
| Catawba | 0.150 | 0.080 | N/A (Non-Coastal) |
| Oconee | 0.150 | 0.050 | N/A (Non-Coastal) |
| Robinson | 0.200 | 0.100 | N/A (Non-Coastal) |
| V.C. Summer | 0.250 | 0.150 | N/A (Non-Coastal) |
| Tennessee | | | |
| Sequoyah | 0.180 | 0.090 | N/A (Non-Coastal) |
| Watts Bar, Unit 1 | 0.180 | 0.090 | N/A (Non-Coastal) |
| Texas | | | |
| Comanche Peak | 0.120 | 0.060 | N/A |
| South Texas Project | 0.100 | 0.050 | N/A |
| Vermont | | | |

| Nuclear Plant Name By State/ Location | Safe Shutdown Earthquake (SSE) Peak Acceleration (g) | Operating Basis Earthquake (OBE) Peak Acceleration (g) | Probable Maximum Tsunami OR Maximum Tsunami Water Level |
|--|--|--|--|
| Vermont Yankee | 0.140 | 0.070 | N/A |
| Virginia | | | |
| North Anna | 0.180 | | N/A |
| Surry | 0.150 | 0.080 | N/A |
| Washington | | | |
| Columbia | 0.250 | | N/A (Non-Coastal) |
| Wisconsin | | | |
| Kewaunee | 0.120 | 0.060 | N/A |
| Point Beach | 0.120 | | N/A |
| Definition of Safe Shutdown Earthquake | The safe-shutdown earthquake (SSE) for the site is the ground motion response spectra (GMRS), which also satisfies the minimum requirement of paragraph IV(a)(1)(i) of Appendix S, "Earthquake Engineering Criteria for Nuclear Power Plants," to Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," of the Code of Federal Regulations (10 CFR Part 50). | | |
| Definition of Operating Basis Earthquake: | <p>To satisfy the requirements of paragraph IV(a)(2)(A) of Appendix S to 10 CFR Part 50, the operating-basis earthquake (OBE) ground motion is defined as follows:</p> <ul style="list-style-type: none"> (i) For the certified design portion of the plant, the OBE ground motion is one-third of the CSDRS. (ii) For the safety-related noncertified design portion of the plant, the OBE ground motion is one-third of the design motion response spectra, as stipulated in the design certification conditions specified in design control document (DCD). (iii) The spectrum ordinate criterion to be used in conjunction with Regulatory Guide 1.166, "Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Post-earthquake Actions," issued March 1997, is the lowest of (i) and (ii). | | |

Table of Plants Near Known Active Faults or in High or Moderate Seismicity Zones

It should be noted that in much of the Central and Eastern US, the seismicity comes from "background" seismicity. Background seismicity is earthquake activity, where the earthquakes cannot be tied to known faults.

| Plant (state) | Nearest Active Fault or Seismic Zone | Distance to Fault or Range of Distances to Zones | Type of Faulting Mechanism | Range of Maximum Magnitude (M _w) | OBE (g) | SSE (g) |
|--------------------|--------------------------------------|--|----------------------------|---|---------|---------|
| Diablo Canyon (CA) | Hosgri Fault | 5 miles | Predominantly Strike Slip | 7.5 | | |
| | Shoreline Fault | 0.5 miles | Strike Slip | 6.25 to 6.75 best estimate by NRC staff in RIL 09-001. Final report on the fault in review by NRC staff | | |
| San Onofre (CA) | | | | | | |
| Comanche Peak | | | | | | |

| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE), and Seismic Core Damage Frequencies | | | | | | | |
|---|----------|-----------|---|-------------------|--|-------------------------------------|--------|
| Plant | Docket | SSE (g's) | Frequency of Exceeding the SSE (per year) | RLE (HCLPF) (g's) | Seismic Core Damage Frequency (per year) | IPEEE Method | Source |
| Arkansas 1 | 05000313 | 0.2 | 2.8E-04 | 0.3 | 4.1E-06 | 0.3g full-scope EPRI SMA | GI-199 |
| Arkansas 2 | 05000368 | 0.2 | 9.7E-05 | 0.3 | 4.1E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Beaver Valley 1 | 05000334 | 0.12 | 3.3E-04 | n/a | 4.8E-05 | seismic PRA | GI-199 |
| Beaver Valley 2 | 05000412 | 0.12 | 2.7E-04 | n/a | 2.2E-05 | seismic PRA | GI-199 |
| Braidwood 1 | 05000456 | 0.2 | 6.7E-05 | 0.3 | 7.3E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Braidwood 2 | 05000457 | 0.2 | 6.7E-05 | 0.3 | 7.3E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Browns Ferry 1 | 05000259 | 0.2 | 2.5E-04 | 0.3 | 3.7E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Browns Ferry 2 | 05000260 | 0.2 | 2.5E-04 | 0.26 | 5.4E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Browns Ferry 3 | 05000296 | 0.2 | 2.5E-04 | 0.26 | 5.4E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Brunswick 1 | 05000325 | 0.16 | 7.3E-04 | 0.3 | 1.5E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Brunswick 2 | 05000324 | 0.16 | 7.3E-04 | 0.3 | 1.5E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Byron 1 | 05000454 | 0.2 | 5.2E-05 | 0.3 | 5.8E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Byron 2 | 05000455 | 0.2 | 5.2E-05 | 0.3 | 5.8E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Callaway | 05000483 | 0.2 | 3.8E-05 | 0.3 | 2.0E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Calvert Cliffs 1 | 05000317 | 0.15 | 1.9E-04 | n/a | 1.0E-05 | seismic PRA | GI-199 |
| Calvert Cliffs 2 | 05000318 | 0.15 | 1.9E-04 | n/a | 1.2E-05 | seismic PRA | GI-199 |
| Catawba 1 | 05000413 | 0.15 | 1.4E-04 | n/a | 3.7E-05 | seismic PRA | GI-199 |
| Catawba 2 | 05000414 | 0.15 | 1.4E-04 | n/a | 3.7E-05 | seismic PRA | GI-199 |
| Clinton | 05000461 | 0.25 | 5.8E-05 | 0.3 | 2.5E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Columbia | 05000397 | 0.25 | 1.7E-04 | n/a | 2.1E-05 | seismic PRA | IPEEE |
| Comanche Peak 1 | 05000445 | 0.12 | 1.6E-05 | 0.12 | 4.0E-06 | reduced-scope EPRI SMA; SSE = 0.12g | GI-199 |

| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE), and Seismic Core Damage Frequencies | | | | | | | |
|---|----------|-----------|---|-------------------|--|-------------------------------------|--------|
| Plant | Docket | SSE (g's) | Frequency of Exceeding the SSE (per year) | RLE (HCLPF) (g's) | Seismic Core Damage Frequency (per year) | IPEEE Method | Source |
| Comanche Peak 2 | 05000446 | 0.12 | 1.6E-05 | 0.12 | 4.0E-06 | reduced-scope EPRI SMA; SSE = 0.12g | GI-199 |
| Cooper | 05000298 | 0.2 | 1.5E-04 | 0.3 | 7.0E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Crystal River 3 | 05000302 | 0.1 | 8.9E-05 | 0.1 | 2.2E-05 | reduced-scope EPRI SMA; SSE = 0.1g | GI-199 |
| D.C. Cook 1 | 05000315 | 0.2 | 2.1E-04 | n/a | 2.2E-05 | seismic PRA | GI-199 |
| D.C. Cook 2 | 05000316 | 0.2 | 2.1E-04 | n/a | 2.2E-05 | seismic PRA | GI-199 |
| Davis Besse | 05000346 | 0.15 | 6.3E-05 | 0.26 | 6.7E-06 | reduced-scope EPRI SMA | GI-199 |
| Diablo Canyon 1 | 05000275 | 0.75 | 2.0E-04 | n/a | 4.1E-05 | seismic PRA | IPEEE |
| Diablo Canyon 2 | 05000323 | 0.75 | 2.0E-04 | n/a | 4.1E-05 | seismic PRA | IPEEE |
| Dresden 2 | 05000237 | 0.2 | 9.7E-05 | 0.26 | 1.9E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Dresden 3 | 05000249 | 0.2 | 9.7E-05 | 0.26 | 1.9E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Duane Arnold | 05000331 | 0.12 | 2.3E-04 | 0.12 | 3.2E-05 | reduced-scope EPRI SMA; SSE = 0.12g | GI-199 |
| Farley 1 | 05000348 | 0.1 | 1.0E-04 | 0.1 | 2.8E-05 | reduced-scope EPRI SMA; SSE = 0.1g | GI-199 |
| Farley 2 | 05000364 | 0.1 | 1.0E-04 | 0.1 | 2.8E-05 | reduced-scope EPRI SMA; SSE = 0.1g | GI-199 |
| Fermi 2 | 05000341 | 0.15 | 1.0E-04 | 0.3 | 4.2E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Fitzpatrick | 05000333 | 0.15 | 3.2E-04 | 0.22 | 6.1E-06 | 0.3g focused-scope NRC SMA | GI-199 |
| Fort Calhoun 1 | 05000285 | 0.17 | 3.7E-04 | 0.25 | 5.4E-06 | 0.3g focused-scope NRC SMA | GI-199 |
| Ginna | 05000244 | 0.2 | 1.0E-04 | 0.2 | 1.3E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Grand Gulf | 05000416 | 0.15 | 1.0E-04 | 0.15 | 1.2E-05 | reduced-scope EPRI SMA; SSE = | GI-199 |

| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE) and Seismic Core Damage Frequencies | | | | | | | |
|--|----------|-----------|---|-------------------|--|--|--------|
| Plant | Docket | SSE (g's) | Frequency of Exceeding the SSE (per year) | RLE (HCLPF) (g's) | Seismic Core Damage Frequency (per year) | IPEEE Method | Source |
| | | | | | | 0.15g | |
| Hatch 1 | 05000400 | 0.148 | 3.9E-04 | 0.29 | 2.3E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Hatch 2 | 05000321 | 0.15 | 2.7E-04 | 0.3 | 2.5E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Hope Creek | 05000366 | 0.2 | 9.7E-05 | 0.3 | 2.5E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Indian Point 2 | 05000354 | 0.15 | 4.9E-04 | n/a | 2.8E-06 | seismic PRA | GI-199 |
| Indian Point 3 | 05000247 | 0.15 | 4.9E-04 | n/a | 3.3E-05 | seismic PRA | GI-199 |
| Kewaunee | 05000286 | 0.12 | 2.8E-04 | n/a | 1.0E-04 | seismic PRA | GI-199 |
| LaSalle 1 | 05000305 | 0.2 | 1.7E-04 | n/a | 5.1E-06 | seismic PRA | GI-199 |
| LaSalle 2 | 05000373 | 0.2 | 1.7E-04 | n/a | 2.8E-06 | seismic PRA | GI-199 |
| Limerick 1 | 05000374 | 0.15 | 1.8E-04 | n/a | 2.8E-06 | seismic PRA | GI-199 |
| Limerick 2 | 05000352 | 0.15 | 1.8E-04 | 0.15 | 5.3E-05 | reduced-scope EPRI SMA | GI-199 |
| McGuire 1 | 05000353 | 0.15 | 9.5E-05 | 0.15 | 5.3E-05 | reduced-scope EPRI SMA | GI-199 |
| McGuire 2 | 05000369 | 0.15 | 9.5E-05 | n/a | 3.1E-05 | seismic PRA | GI-199 |
| Millstone 1 | 05000370 | 0.254 | 9.3E-05 | n/a | 3.1E-05 | seismic PRA | GI-199 |
| Millstone 2 | 05000336 | 0.17 | 8.3E-05 | 0.25 | 1.1E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Millstone 3 | 05000423 | 0.17 | 8.3E-05 | n/a | 1.5E-05 | seismic PRA | GI-199 |
| Monticello | 05000263 | 0.12 | 9.3E-05 | 0.12 | 1.9E-05 | modified focused/expended reduced-scope EPRI SMA | GI-199 |
| Nine Mile Point 1 | 05000220 | 0.11 | 1.5E-04 | 0.27 | 4.2E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Nine Mile Point 2 | 05000410 | 0.15 | 4.8E-05 | 0.23 | 5.6E-06 | SPRA and focused-scope EPRI SMA | GI-199 |
| North Anna 1 | 05000338 | 0.12 | 2.1E-04 | 0.16 | 4.4E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| North Anna 2 | 05000339 | 0.12 | 2.1E-04 | 0.16 | 4.4E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Oconee 1 | 05000269 | 0.1 | 9.7E-04 | n/a | 4.3E-05 | seismic PRA | GI-199 |

| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE), and Seismic Core Damage Frequencies | | | | | | | |
|---|----------|-----------|---|-------------------|--|------------------------------------|--------|
| Plant | Docket | SSE (g's) | Frequency of Exceeding the SSE (per year) | RLE (HCLPF) (g's) | Seismic Core Damage Frequency (per year) | IPEEE Method | Source |
| Oconee 2 | 05000270 | 0.1 | 9.7E-04 | n/a | 4.3E-05 | seismic PRA | GI-199 |
| Oconee 3 | 05000287 | 0.1 | 9.7E-04 | n/a | 4.3E-05 | seismic PRA | GI-199 |
| Oyster Creek | 05000219 | 0.17 | 1.5E-04 | n/a | 1.4E-05 | seismic PRA | GI-199 |
| Palisades | 05000255 | 0.2 | 1.4E-04 | n/a | 6.4E-06 | seismic PRA | GI-199 |
| Palo Verde 1 | 05000528 | 0.258 | 3.5E-05 | 0.3 | 3.8E-05 | 0.3g full-scope EPRI SMA | IPEEE |
| Palo Verde 2 | 05000529 | 0.258 | 3.5E-05 | 0.3 | 3.8E-05 | 0.3g full-scope EPRI SMA | IPEEE |
| Palo Verde 3 | 05000530 | 0.258 | 3.5E-05 | 0.3 | 3.8E-05 | 0.3g full-scope EPRI SMA | IPEEE |
| Peach Bottom 2 | 05000277 | 0.12 | 2.0E-04 | 0.2 | 2.4E-05 | modified focused-scope EPRI SMA | GI-199 |
| Peach Bottom 3 | 05000278 | 0.12 | 2.0E-04 | 0.2 | 2.4E-05 | modified focused-scope EPRI SMA | GI-199 |
| Perry | 05000440 | 0.15 | 2.2E-04 | 0.3 | 2.1E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Pilgrim 1 | 05000293 | 0.15 | 8.1E-04 | n/a | 6.9E-05 | seismic PRA | GI-199 |
| Point Beach 1 | 05000266 | 0.12 | 2.0E-04 | n/a | 1.1E-05 | seismic PRA | GI-199 |
| Point Beach 2 | 05000301 | 0.12 | 2.0E-04 | n/a | 1.1E-05 | seismic PRA | GI-199 |
| Prairie Island 1 | 05000282 | 0.12 | 2.0E-04 | 0.28 | 3.0E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Prairie Island 2 | 05000306 | 0.12 | 2.0E-04 | 0.28 | 3.0E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Quad Cities 1 | 05000254 | 0.24 | 8.2E-04 | 0.09 | 2.7E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Quad Cities 2 | 05000265 | 0.24 | 8.2E-04 | 0.09 | 2.7E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| River Bend | 05000458 | 0.1 | 2.4E-04 | 0.1 | 2.5E-05 | reduced-scope EPRI SMA; SSE = 0.1g | GI-199 |
| Robinson (HR) | 05000261 | 0.2 | 1.1E-03 | 0.28 | 1.5E-05 | 0.3g full-scope EPRI SMA | GI-199 |
| Saint Lucie | 05000335 | 0.1 | 1.4E-04 | 0.1 | 4.6E-05 | reduced-scope EPRI SMA; SSE = 0.1g | GI-199 |
| Salem 1 | 05000389 | 0.2 | 2.6E-04 | 0.1 | 4.6E-05 | reduced-scope EPRI SMA; SSE = | GI-199 |

| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE), and Seismic Core Damage Frequencies | | | | | | | |
|---|----------|-----------|---|-------------------|--|-----------------------------------|--------|
| Plant | Docket | SSE (g's) | Frequency of Exceeding the SSE (per year) | RLE (HCLPF) (g's) | Seismic Core Damage Frequency (per year) | IPEEE Method | Source |
| | | | | | | 0.1g | |
| Salem 2 | 05000272 | 0.2 | 2.6E-04 | n/a | 9.3E-06 | seismic PRA | GI-199 |
| San Onofre 2 | 05000361 | 0.67 | 1.2E-04 | n/a | 1.7E-05 | seismic PRA | IPEEE |
| San Onofre 3 | 05000362 | 0.67 | 1.2E-04 | n/a | 1.7E-05 | seismic PRA | IPEEE |
| Seabrook | 05000311 | 0.25 | 1.3E-04 | n/a | 9.3E-06 | seismic PRA | GI-199 |
| Sequoyah 1 | 05000443 | 0.18 | 7.1E-04 | n/a | 2.2E-05 | seismic PRA | GI-199 |
| Sequoyah 2 | 05000327 | 0.18 | 7.1E-04 | 0.27 | 5.1E-05 | 0.3g full-scope EPRI SMA | GI-199 |
| Shearon Harris 1 | 05000328 | 0.15 | 4.6E-05 | 0.27 | 5.1E-05 | 0.3g full-scope EPRI SMA | GI-199 |
| South Texas 1 | 05000498 | 0.1 | 3.0E-05 | n/a | 6.2E-06 | seismic PRA | GI-199 |
| South Texas 2 | 05000499 | 0.1 | 3.0E-05 | n/a | 6.2E-06 | seismic PRA | GI-199 |
| Summer | 05000395 | 0.15 | 3.9E-04 | 0.22 | 3.8E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Surry 1 | 05000280 | 0.15 | 2.2E-04 | n/a | 5.7E-06 | seismic PRA | GI-199 |
| Surry 2 | 05000281 | 0.15 | 2.2E-04 | n/a | 5.7E-06 | seismic PRA | GI-199 |
| Susquehanna 1 | 05000387 | 0.1 | 1.9E-04 | 0.21 | 1.3E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Susquehanna 2 | 05000388 | 0.1 | 1.9E-04 | 0.21 | 1.3E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Three Mile Island 1 | 05000289 | 0.12 | 1.0E-04 | n/a | 4.0E-05 | seismic PRA | GI-199 |
| Turkey Point 3 | 05000250 | 0.15 | 3.8E-05 | 0.15 | 1.0E-05 | site-specific approach; SSE=0.15g | GI-199 |
| Turkey Point 4 | 05000251 | 0.15 | 3.8E-05 | 0.15 | 1.0E-05 | site-specific approach; SSE=0.15g | GI-199 |
| Vermont Yankee | 05000271 | 0.14 | 1.2E-04 | 0.25 | 8.1E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Vogtle 1 | 05000424 | 0.2 | 1.5E-04 | 0.3 | 1.8E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Vogtle 2 | 05000425 | 0.2 | 1.5E-04 | 0.3 | 1.8E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Waterford 3 | 05000382 | 0.1 | 1.1E-04 | 0.1 | 2.0E-05 | reduced-scope EPRI SMA; SSE = | GI-199 |

| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE), and Seismic Core Damage Frequencies | | | | | | | |
|---|----------|-----------|---|-------------------|--|-----------------------------|--------|
| Plant | Docket | SSE (g's) | Frequency of Exceeding the SSE (per year) | RLE (HCLPF) (g's) | Seismic Core Damage Frequency (per year) | IPEEC Method | Source |
| | | | | | | 0.1g | |
| Watts Bar | 05000390 | 0.18 | 2.9E-04 | 0.3 | 3.6E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Wolf Creek | 05000482 | 0.12 | 3.7E-05 | 0.2 | 1.8E-05 | reduced-scope EPRI SMA | GI-199 |
| 25th percentile | | | 9.6E-05 | | 6.0E-06 | | |
| min | | | 1.6E-05 | | 2.0E-06 | | |
| median | | | 1.7E-04 | | 1.5E-05 | | |
| mean | | | 3.1E-04 | | 2.1E-05 | | |
| max | | | 3.9E-03 | | 1.0E-04 | | |
| 75th percentile | | | 2.6E-04 | | 3.2E-05 | | |

Table: Design Basis Ground Motions and New Review Level Ground Motions Used for Review of Japanese Plants

| Plant sites | Contributing earthquakes | New DBGM S_1 | Original DBGM S_2 |
|--------------|---|----------------|---------------------|
| Tomari | Earthquakes undefined specifically | 550 Gal | 370 Gal |
| Onagawa | Soutei Miyagiken-oki (M8.2) | 580 | 375 |
| Higashidoori | Earthquakes undefined specifically | 450 | 375 |
| Fukushima | Earthquake near the site (M7.1) | 600 | 370 |
| Tokai | Earthquakes undefined specifically | 600 | 380 |
| Hamaoka | Assumed Tokai (M8.0), etc. | 800 | 600 |
| Shika | Sasanami-oki Fault (M7.6) | 600 | 490 |
| Tsuruga | Urazoko-Uchiikemi Fault (M6.9), etc. → Mera-Kareizaki - Kaburagi (M7.8), Shelf edge+B+Nosaka (M7.7) | 800 | 532 |
| Mihama | C, Fo-A Fault (M6.9) → Shelf edge+B+Nosaka (M7.7) | 750 | 405 |

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| | | | |
|---------------------------|--|----------------------------------|-----|
| Ohi | C, Fo-A Fault (M6.9)→Fo-A+Fo-B (M7.4) | 700 | 405 |
| Takahama | Fo-A Fault (M6.9) →Fo-A+Fo-B(M7.4) | 550 | 370 |
| Shimane | Shinji Fault (M7.1) | 600 | 456 |
| Ikata | Central Tectonic Structure (M7.6) | 570 | 473 |
| Genkai | Takekoba F. (M6.9) → Enhanced uncertainty consideration | 540 | 370 |
| Sendai | Gotandagawa F.(M6.9), F-A(M6.9) | 540 | 372 |
| Kashiwazaki-Kariwa | F-B Fault (M7.0), Nagaoka-plain-west Fault (M8.1) | 2300 (R1 side) 1209 (R5 side) | 450 |
| Monjyu (Proto Type FBR) | Shiraki-Niu F.(M6.9) , C F.(M6.9)→Shelf edge+B+Nosaka(M7.7), Small Damping | 760 | 408 |
| Shimokita Reprocessing F. | Deto-Seiho F.(M6.8), Yokohama F.(M6.8) | 450 | 320 |

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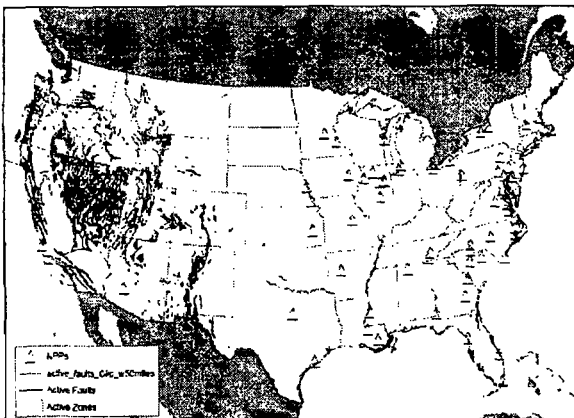
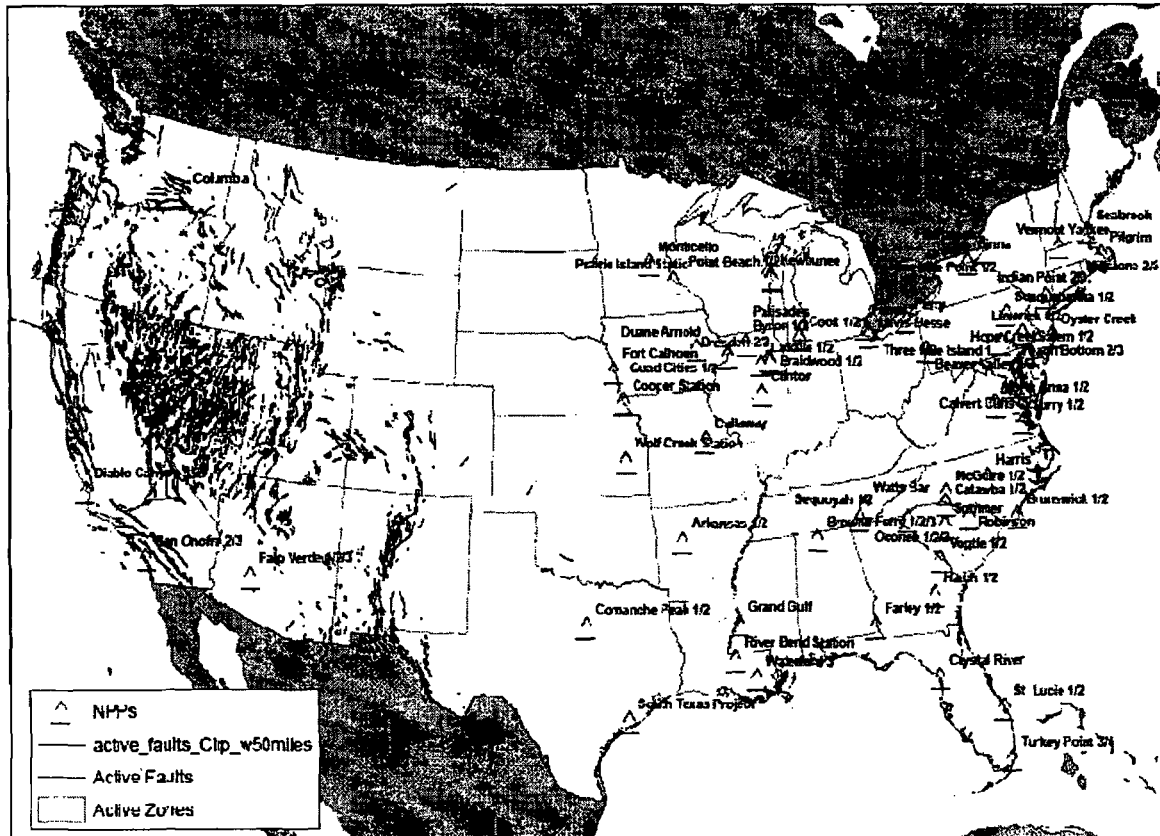
Table: Status of Review of Japanese NPPs to New Earthquake Levels Based on 2006 Guidance

| Utility | Site (Unit) | Type | Dec.2010 |
|--|---------------------|----------------|----------------|
| Hokkaido | Tomari | PWR | △ |
| Tohoku | Onagawa (Unit1) | BWR | ◎ |
| | Higashi-dori | BWR | △ |
| Tokyo | Kashiwazaki-Kariwa | BWR | Unit 1,5,6,7 ◎ |
| | Fukushima-No1 | BWR | Unit 3 ◇, 5 ◎ |
| | Fukushima-No2 | BWR | Unit 4,5 ◎ |
| Chubu | Hamaoka | BWR | △ |
| Hokuriku | Shika (Unit 2) | BWR | ◎ |
| Kansai | Mihama(Unit 1) | PWR | ◎ |
| | Ohi(Unit 3,4) | PWR | ◎ |
| | Takahama (Unit 3,4) | PWR | ◎ |
| Chugoku | Shimane (Unit 1, 2) | BWR | ◎ |
| Shikoku | Ikata (Unit 3) | PWR | ◎ |
| Kyushu | Genkai (Unit 3) | PWR | ◎ |
| | Sendai (Unit 1) | PWR | ◎ |
| Japan Atomic Power | Tokai-Daini | BWR | ○ |
| | Tsuruga | BWR/PWR | △ |
| JAEA | Monju | Proto Type FBR | ◎ |
| Japan Nuc. Fuel | Rokkasyo | Reprocessing | ◎ |
| ◎: NSC review finished, ○: NISA review finished and in NSC review, △: Under review by NISA | | | |

Additional Information: Useful Plots

Plot of Mapped Active Quaternary Faults and Nuclear Plants in the US

It is important to note that this plot somewhat misleading as faults in the central and eastern US are not well characterized. For example, the faults responsible for very large historic events, such as the 1811 and 1812 New Madrid Earthquakes, and the 1886 Charleston Earthquakes have not been conclusively located.



Nuclear Plants in the US Compared to the USGS National Seismic Hazard Maps

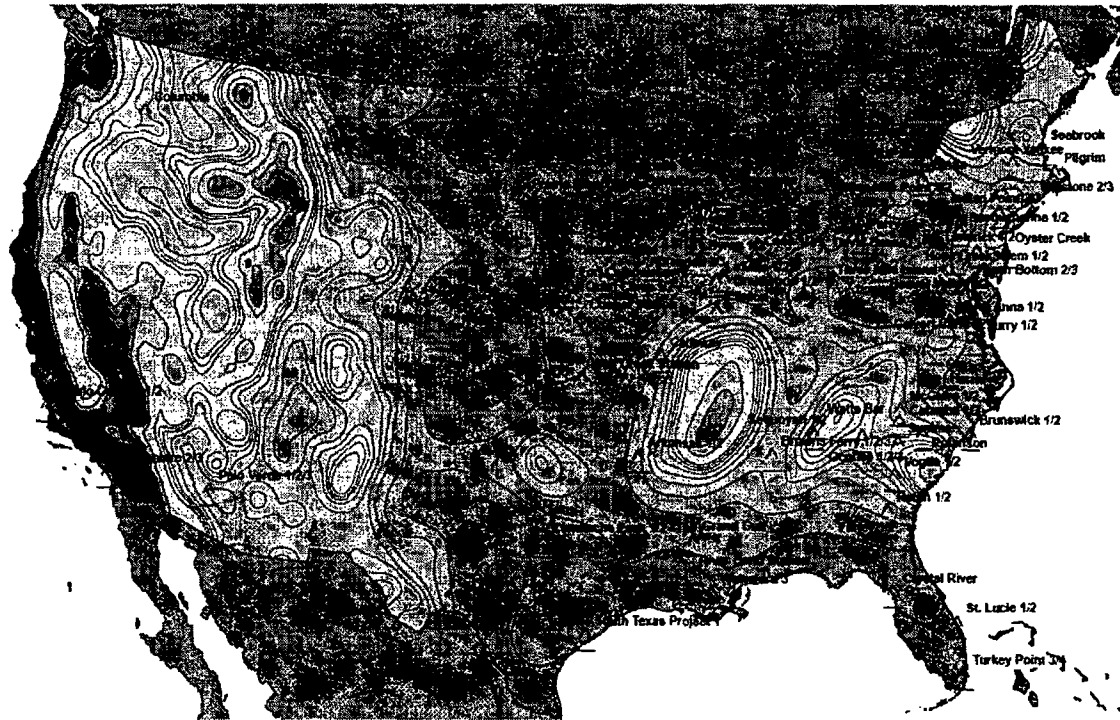
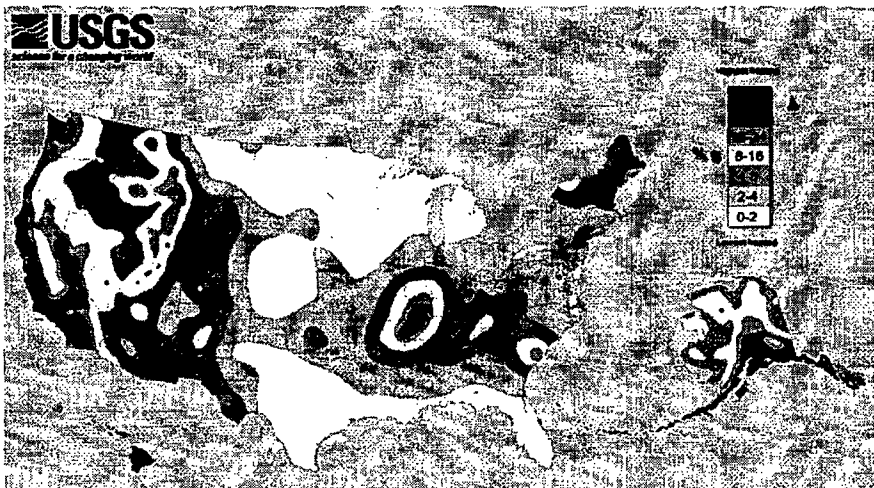


Figure 1: US Nuclear Plants overlain on the USGS National Seismic Hazard Map

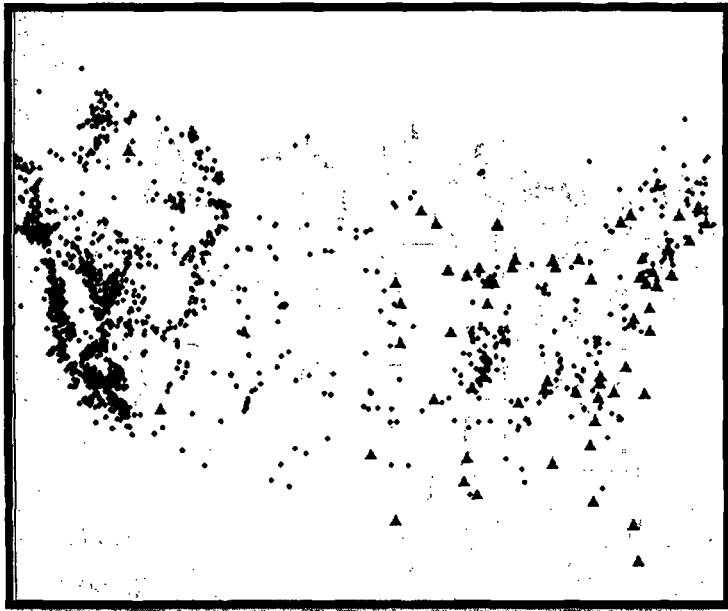
As you can see the seismic source regions in the central and eastern east are not well defined. So to state a specific number of plants that are in the moderate seismicity zones is challenging and open to interpretation. This is just one interpretation, which is provided by the USGS.

USGS US National Seismic Hazard Maps

Many version of this map are available at the USGS website at <http://earthquake.usgs.gov/hazards/>

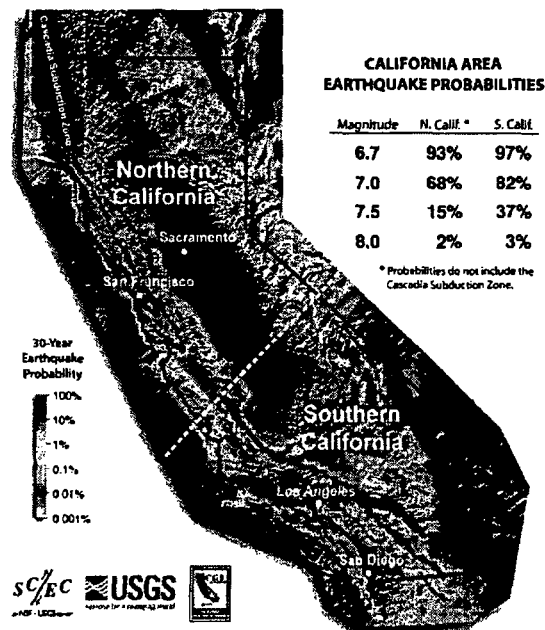


Plot of Nuclear Plants in the US Compared to Recent Earthquakes

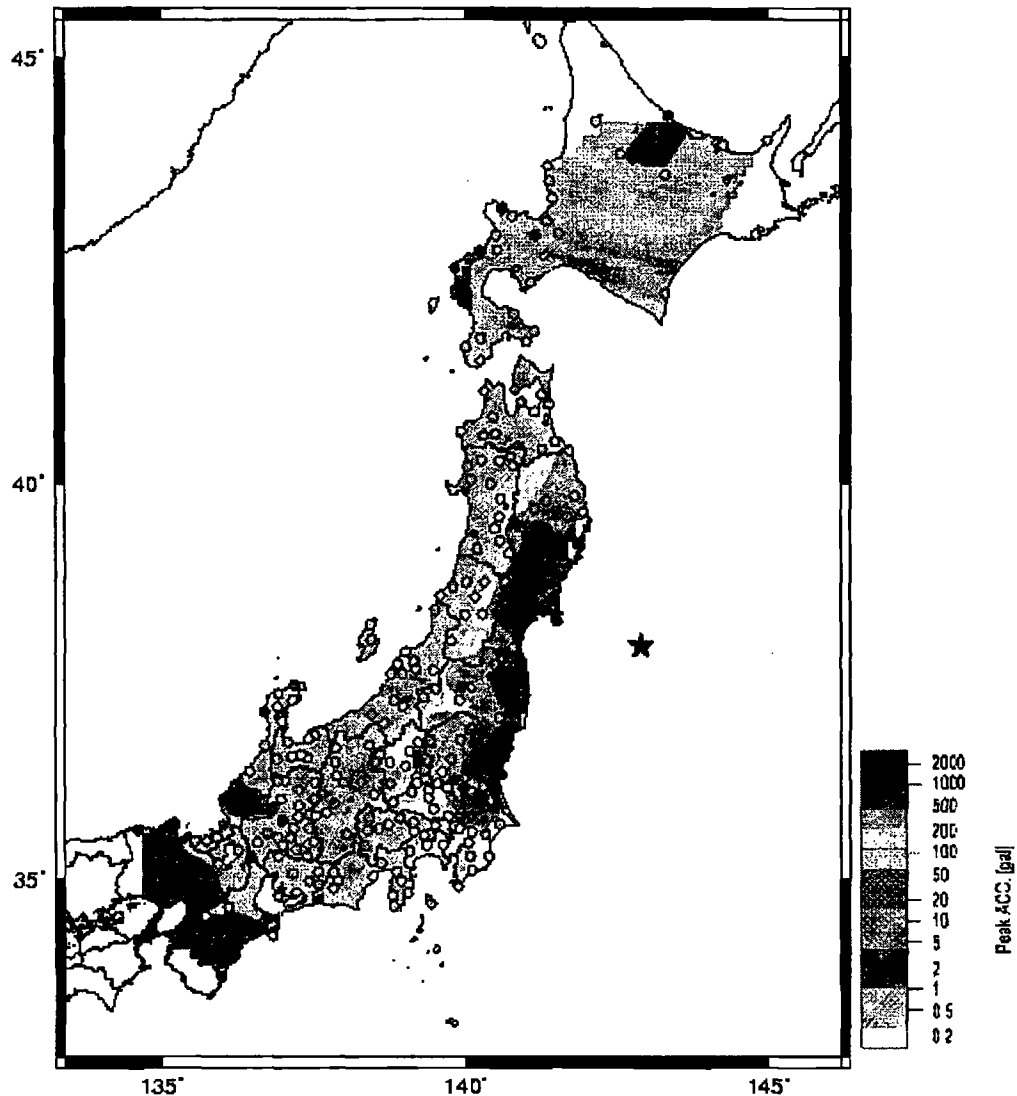


UCERF Map of California Earthquake Probabilities for Northern versus Southern California

This is included in this document as Markey (inaccurately) used the below statistics to say that the probability of a magnitude 7 at SONGS was 82%. The dashed line of this California map is the boundary between northern and southern California used in the UCERF study. As shown in the table, the 30-year probability of an earthquake of magnitude 7.5 or larger is higher in the southern half of the state (37%) than in the northern half (15%).



Plot of ground motion acceleration (PGA) from Japanese earthquake



2011/03/11-14:46 38.0N 142.9E 24km M9.0

Peak Acceleration Map from K-NET NEID

Table of Nuclear Plant Design and Review Ground Motions for the Plants that Automatically Tripped (JNES)

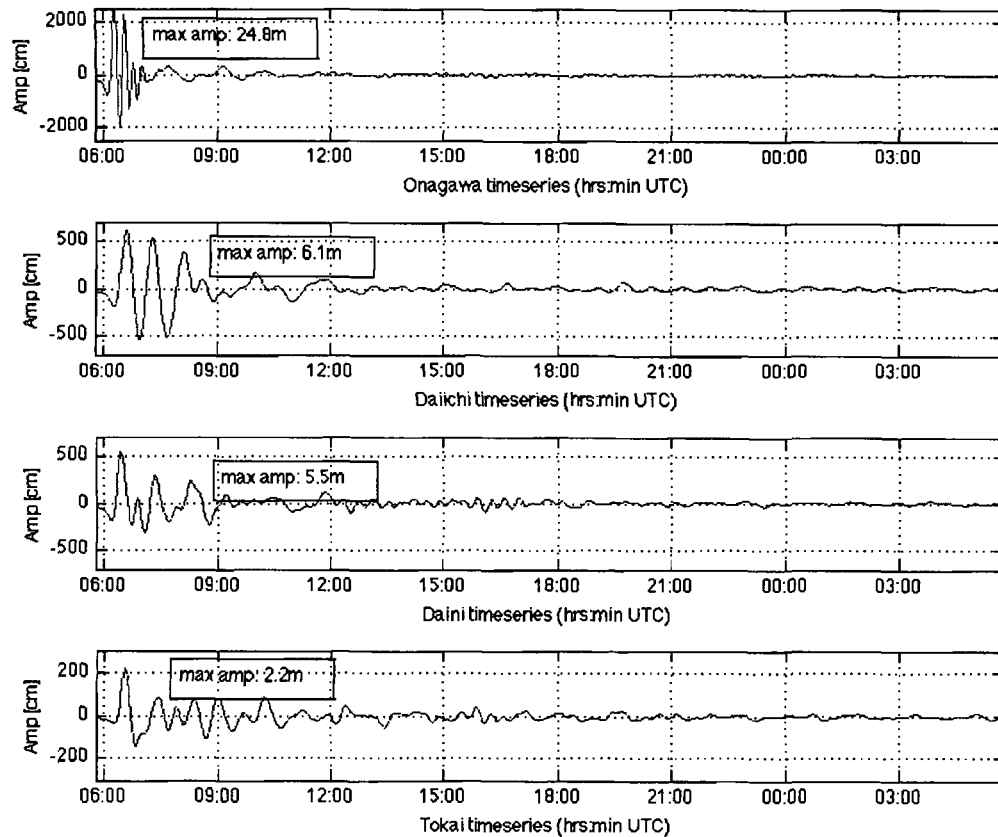
| Plant sites | Contributing earthquakes used for determination of hazard | New DBGM S_h | Original DBGM S_1 |
|------------------|---|-----------------|---------------------|
| Onagawa | Soutei Miyagiken-oki (M8.2) | 580 gal (0.59g) | 375 gal (0.38g) |
| Fukushima (both) | Earthquake near the site (M7.1) | 600 gal (0.62g) | 370 gal (0.37g) |
| Tokai | Earthquakes specifically undefined | 600 gal (0.62g) | 380 gal (0.39g) |

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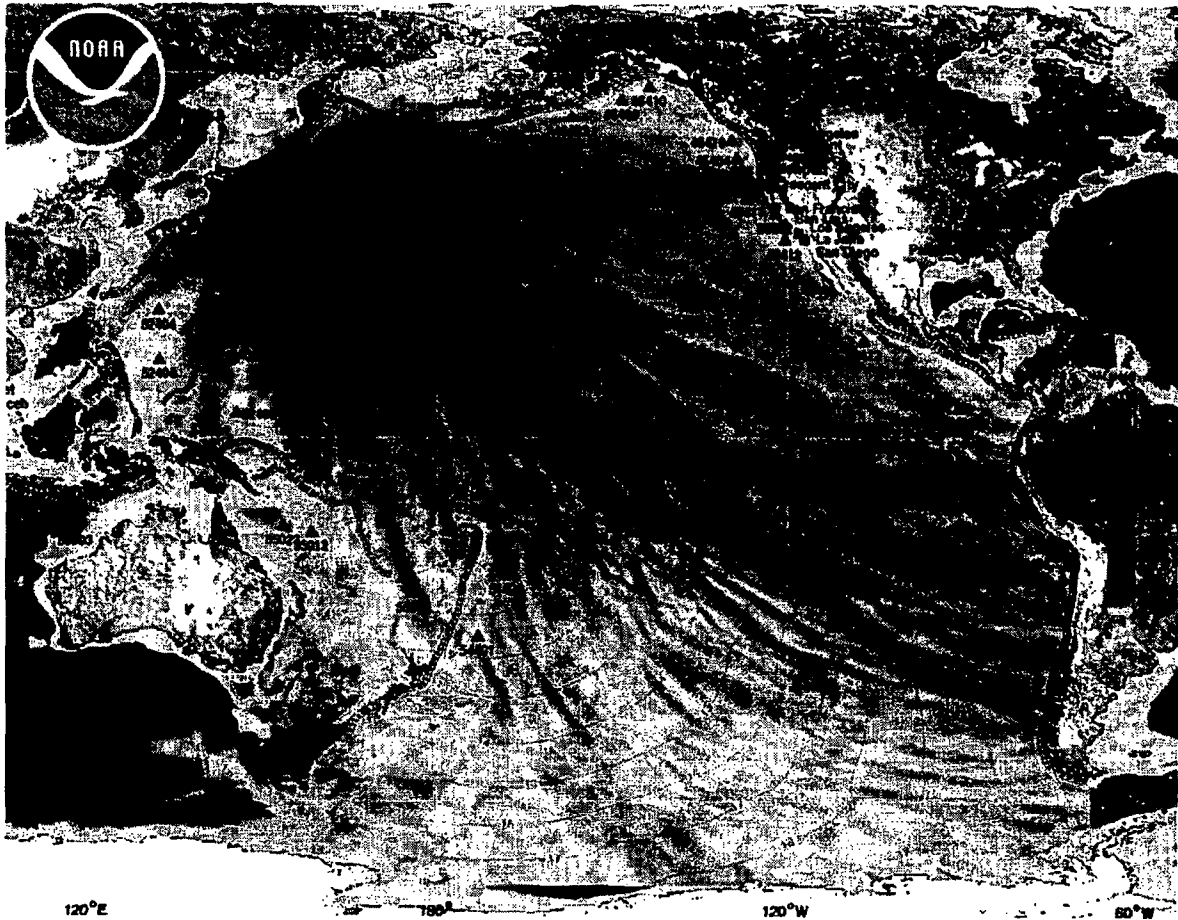
Plot of Tsunami Wave Heights at 5 Meter Bathymetry Offshore at the Japanese Plants (NOAA)

These are results from high-resolution models run by PMEL NOAA staff, who do modeling for the tsunami warning system. While the available bathymetry and topography data used in the model are not of the highest quality at that location, NOAA has confidence in the results, which show good comparisons between model flooding estimates and inundation observations inferred from satellite images. DART measurements are used in the modeling. The images show model time series very close to a shoreline, at about 5m depth. The runup heights (maximum elevation of flooded area) may be different from these amplitudes at shoreline (can be higher or lower, depending on the topographic profile). According to TEPCO, the wave height onshore at the Fukushima plant was 14 meters high.

Offshore wave amplitudes, scaled to the coastline



Plot of Tsunami Wave Heights in the Pacific (NOAA)



This shows the effect on the US coastline.



I found the numbers at the Onagawa plant unimaginable, so I found a side view picture. It's hard to tell the elevation of the plant.

Fact Sheets

Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (High level overview)

The seismic regulatory basis for licensing of the currently operating nuclear power reactors is contained in the following regulations: 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," including the "General Design Criteria for Nuclear Power Plants," and 10 CFR Part 100 ("Seismic and Geologic Siting Criteria For Nuclear Power Plants") and Appendix A to that Part, which describes the general criteria that guide the evaluation of the suitability of proposed sites for nuclear power plants.

General Design Criterion (GDC) 2, "Design Bases for Protection Against Natural Phenomena," in Appendix A requires that the structures and components in nuclear power plants be designed to withstand the effects of natural phenomena, including earthquakes and tsunamis, without loss of capability to perform their intended safety functions. GDC 2 also requires that the design bases include sufficient margin to account for the limited accuracy, quantity, and period of time in which the historical data have been accumulated. The earthquake which could cause the maximum vibratory ground motion at the site is designated as the **Safe Shutdown Earthquake (SSE)**. Under SSE ground motions, nuclear power plant structures and components must remain functional and within applicable stress, strain, and deformation limits. Each plant must also have seismic instrumentation to determine if the **Operating Basis Earthquake (OBE)**, typically one-half or one-third the level of the SSE, has been exceeded. If the OBE is exceeded or significant plant damage has occurred, then the nuclear power plant must be shutdown.

Each plant is designed to a ground-shaking level (the SSE) that is appropriate for its location, given the possible earthquake sources that may affect the site and its tectonic environment. Ground shaking is a function of both the magnitude of the earthquake, the distance of the earthquake to the site, and the local geology. The magnitude alone cannot be used to predict ground motions. The existing plants were designed on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquake expected in the area around the plant. This required an assessment of earthquakes that had occurred in the region around each plant site.

Design basis loads for nuclear power plant structures include combined loads for seismic, wind, tornado, normal operating conditions (pressure and thermal), and accident conditions. Codes and standards, such as the American Society of Mechanical Engineers, the American Concrete Institute, and the American Institute of Steel Construction, are used in the design of nuclear power plant structures to ensure a conservative, safe design under design basis loads.

In the mid to late 1990s, NRC staff reviewed the potential consequences of severe earthquakes (earthquakes beyond the safety margin included in each plant's design basis), as part of the Individual Plant Examination of External Events (or IPEEE) program. From this review, the staff determined that seismic designs of operating plants in the United States have adequate safety margins, for withstanding earthquakes, built into the designs. Currently, the NRC staff is reassessing the seismic designs of operating plants through our Generic Issues program. The initial results of this assessment found that: 1) seismic hazard estimates have increased at some operating plants in the central and eastern US; 2) there is no immediate safety concern, plants have significant safety margin and overall seismic risk estimates remain small; and 3) assessment of updated seismic hazards and plant performance should continue.

Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (The policy wonk version)

~~(Jon to clean up upon his return from vaca)~~ NRC's regulatory framework for seismic safety of nuclear reactors and facilities is based on: reactor site suitability with respect to geological, seismological, hydrological and other site specific hazards; classification of structures, systems and components (SSCs) as Seismic Category I, seismic design of Seismic Category I SSCs, seismic and environmental qualification of Category I SSCs; and maintenance and in-service inspection of equipment and structures, including the containment structure. The NRC's regulatory framework with respect to seismic issues has evolved through time.

Currently Operating Reactors (licensed prior to 1997):

The seismic regulatory basis for licensing of the currently operating nuclear power reactors is contained in the following regulations: 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," including the "General Design Criteria for Nuclear Power Plants," and 10 CFR Part 100 ("Seismic and Geologic Siting Criteria For Nuclear Power Plants") and Appendix A to that Part which describes general criteria that guide the evaluation of the suitability of proposed sites for nuclear power plants.

General Design Criterion (GDC) 2, "Design Bases for Protection Against Natural Phenomena," in Appendix A requires that the SSCs important to safety be designed to withstand the effects of natural phenomena, including earthquakes, tsunamis, and seiches without loss of capability to perform their intended safety functions. GDC 2 requires that the design bases shall include sufficient margin to account for the limited accuracy, quantity, and period of time in which the historical data have been accumulated, and shall consider appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena. The earthquake which could cause the maximum vibratory ground motion at the site is designated the **Safe Shutdown Earthquake (SSE)**.

Each plant is designed to a ground-shaking level (the SSE) that is appropriate for its location, given the possible earthquake sources that may affect the site and its tectonic environment. Ground shaking is a function of both the magnitude of an earthquake and the distance from the fault to the site. The magnitude alone cannot be used to predict ground motions. The existing plants were designed on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquake expected in the area around the plant based on an assessment of earthquakes that had occurred in the region historically. There is no specification of frequency of occurrence in the deterministic approach. There is no requirement for a periodic reassessment of the seismic design basis.

Paragraph VI(a)(3) of Appendix A requires that suitable seismic instrumentation must be provided so that the seismic response of nuclear power plant features important to safety can be determined promptly after an earthquake to permit comparison of such response to that used as the design basis. Such a comparison is needed to decide whether the plant can continue to be operated safely and to permit appropriate action in a timely manner. Appendix A requires that in addition to seismic loads, including aftershocks, applicable concurrent functional and accident induced loads shall be taken into account in the design of safety-related SSCs. Paragraph VI(c) requires that seismically induced flood, water waves from either locally or distantly generated seismic activity and other design conditions shall be taken into account in nuclear power plant design.

Proposed New Reactors (submitted after 1997):

In 1997 new rules governing reactor siting were established. 10 CFR Part 50 Appendix A (GDC 2), 100.23 and Appendix S establish the seismic design basis for plants licensed after January 10, 1997. Similar to

pre-1997, Appendix S defines the SSE as *"the Safe-shutdown earthquake ground motion is the vibratory ground motion for which certain structures, systems, and components must be designed to remain functional."* 10 CFR Part 100.23 "Geologic and Seismic Siting Criteria" requires that the applicant determine the SSE **and its uncertainty**, the potential for surface tectonic and nontectonic deformations. Regulatory Guide 1.165 (and subsequently Regulatory Guide 1.208) provides guidance on satisfying 10 CFR Part 100.23, one of which is performing a probabilistic seismic hazard assessment (PSHA).

Appendix S to 10 CFR Part 50 requires for SSE ground motions, SSCs will remain functional and within applicable stress, strain, and deformation limits. The required safety functions of SSCs must be assured during and after the vibratory ground motion through design, testing, or qualification methods. The evaluation must take into account soil-structure interaction effects and the expected duration of the vibratory motions. Appendix S also requires that the horizontal component of the SSE ground motion in the free field at the foundation elevation of structures must be an appropriate response spectrum with a peak ground acceleration (PGA) of at least 0.10g. Design basis loads for nuclear power plant structures, important to safety, include combined loads for seismic, wind, tornado, normal operating conditions (pressure and thermal), and accident conditions. Codes and standards, such as the ASME B&PV Code, the American Institute of Concrete Institute (ACI-359/ASME Section III Division 2, ACI-349) and the American Institute of Steel Construction (AISC N690), are used in the design of nuclear power plant structures to ensure a conservative, safe design under design basis loads.

In contrast to the deterministic approach used prior to 1997, the probabilistic method is used and explicitly accounts for possible earthquakes of various magnitudes that come from all plausible potential sources (including background seismicity) and the likelihood that each particular hypothetical earthquake occurs. The PSHA process provides a complete characterization of the ground motion and comprehensively addresses uncertainties in nuclear power plant seismic demands. The PSHA results are major input to seismic risk evaluation using either SPRA or SMA approaches. As for plants licensed prior to 1997, there is no requirement for a periodic reassessment of the seismic design basis.

In addition to the nominal seismic design, all new generation reactors have to demonstrate a **Seismic margin of 1.67** relative to the site-specific seismic demands. These designs are required to perform a Probabilistic Risk Assessment (PRA) based seismic margins analysis (SMA) to identify the vulnerabilities of their design to seismic events. The minimum high confidence, low probability of failure (HCLPF) for the plant should be at least 1.67 times the ground motion acceleration of the design basis safe-shutdown earthquake (SSE).

The Standard Review Plan (NUREG-0800), Regulatory Guides and Interim Staff Guidance provide the basis for staff reviews of existing reactors and new license applications. Appendix S, "Earthquake Engineering Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," requires that suitable instrumentation must be provided so that the seismic response of nuclear power plant features important to safety can be evaluated promptly after an earthquake. Paragraph 10 CFR 50.54(ff) and Paragraph IV(a)(3) of Appendix S to 10 CFR Part 50 requires shutdown of the nuclear power plant if vibratory ground motion exceeding that of the operating basis earthquake ground motion (OBE) occurs. The OBE is typically one-half or one-third the level of the SSE. If systems, structures, or components necessary for the safe shutdown of the nuclear power plant are not available after occurrence of the OBE, the licensee must consult with the NRC and must propose a plan for the timely, safe shutdown of the nuclear power plant. Paragraph IV(c) requires that seismically induced flood, water waves from either locally or distantly generated seismic activity and other design conditions shall be taken into account in nuclear power plant design so as to prevent undue risk to health and safety of the public.

Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (The cliff notes)

NRC Regulations and Guidelines for Seismic Safety:

- The seismic regulatory basis for licensing of the currently operating nuclear power reactors is contained in the following regulations:
 - 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," including the "General Design Criteria for Nuclear Power Plants," and
 - 10 CFR Part 100 ("Seismic and Geologic Siting Criteria For Nuclear Power Plants") and Appendix A to that Part, which describes the general criteria that guide the evaluation of the suitability of proposed sites for nuclear power plants.
- In addition, General Design Criterion (GDC) 2, "Design Bases for Protection Against Natural Phenomena," in Appendix A requires that:
 - The structures and components in nuclear power plants be designed to withstand the effects of natural phenomena, including earthquakes and tsunamis, without loss of capability to perform their intended safety functions.
 - GDC 2 also requires that the design bases include sufficient margin to account for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.
 - The earthquake which could cause the maximum vibratory ground motion at the site is designated as the **Safe Shutdown Earthquake (SSE)**. Under SSE ground motions, nuclear power plant structures and components must remain functional and within applicable stress, strain, and deformation limits.
 - Each plant must also have seismic instrumentation to determine if the **Operating Basis Earthquake (OBE)**, typically one-half or one-third the level of the SSE, has been exceeded. If the OBE is exceeded or significant plant damage has occurred, then the nuclear power plant must be shutdown.

Plant Design /Design Basis (Seismic):

- Each plant is designed to a ground-shaking level (the SSE) that is appropriate for its location, given the possible earthquake sources that may affect the site and its tectonic environment. Ground shaking is a function of both the magnitude of the earthquake, the distance of the earthquake to the site, and the local geology. The magnitude alone cannot be used to predict ground motions. The existing plants were designed on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquake expected in the area around the plant. This required an assessment of earthquakes that had occurred in the region around each plant site.
- Design basis loads for nuclear power plant structures include combined loads for seismic, wind, tornado, normal operating conditions (pressure and thermal), and accident conditions. Codes and standards, such as the American Society of Mechanical Engineers, the American Concrete Institute, and the American Institute of Steel Construction, are used in the design of nuclear power plant structures to ensure a conservative, safe design under design basis loads.

Fact Sheet: Summarization of the NRC's Regulatory Framework for Tsunami

Review Guidance and Guidelines Related to Tsunami:

1. General Design Criterion 2 (GDC 2), 10CFR50, requires, in part, that structures, systems, and components important to safety be designed to withstand the effects of natural phenomena such as floods, tsunami, and seiches without loss of capability to perform their safety functions. Design bases for these SSCs are also required to reflect:
2. 10 CFR 100.23, requires, in part, that the size of seismically induced floods and water waves that could affect a site from either locally or distantly generated seismic activity must be determined.
3. RG 1.102 – Flood Protection for Nuclear Power Plants, describes types of flood protection acceptable to the NRC staff
 - a. Exterior Barriers (e.g.)
 - i. Levee – embankment to protect land from inundation
 - ii. Seawall or floodwall - a structure separating land and water areas, primarily to prevent erosion and other damages due to wave action
 - iii. Bulkhead – similar to seawall, purpose is to restrain the land area
 - b. Incorporated Barriers
 - i. Protection provided by specially designed walls and penetration closures. Walls are usually reinforced concrete designed to resist static and dynamic forces of a Design Basis Flood Level of a Probable Maximum Flood.
4. RG 1.59 – Design Basis Floods for Nuclear Power Plants
 - a. The most severe seismically induced floods reasonably possible should be considered for each site.
 - b. Tsunami requires consideration of seismic events of the severity of the Safe Shutdown Earthquake occurring at the location that would produce the worst such flood at the nuclear power plant site.
5. US NRC, Standard Review Plan, "Probable Maximum Tsunami Flooding," Section 2.4.6, Rev. 2
 - a. Areas of Review
 - i. Probable maximum tsunami postulated for a site should include wave runup and drawdown
 - ii. Hydrologic characteristics of maximum locally and distantly generated tsunami (e.g., volcanoes, landslides)
 - iii. Geological and seismic characteristics of potential tsunami faults (e.g., magnitude, focal depth, source dimensions, fault orientation, and vertical displacement)

Fact Sheet: Tsunami Assessment Method for Nuclear Power Plants in Japan

[This section is a placeholder and needs to be expanded]

- An overview of the tsunami assessment method for NPP in Japan is available in ADAMS:
ML110770010
- Information is also available at:
http://www.jsce.or.jp/committee/ceofnp/Tsunami/eng/tsunami_eng.html
- The Japan Society of Civil Engineers is currently finalizing guidance PTHA = probabilistic tsunami hazard analysis

Fact Sheet: Summarization of the NRC's Regulatory Framework for Flooding

Flooding Issues:

1. General Design Criterion 2 (GDC 2), 10CFR50, requires, in part, that structures, systems, and components important to safety be designed to withstand the effects of natural phenomena such as floods, tsunami, and seiches without loss of capability to perform their safety functions. Design bases for these SSCs are also required to reflect:
 - b. Appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding region, with sufficient margin for the limited accuracy and quantity of the historical data and the period of time in which the data have been accumulated.
 - c. Appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena.
 - d. The importance of the safety functions to be performed.
6. Design basis floods for most of the present fleet of operating reactors were calculated using deterministic methods to determine the maximum credible flood levels at the site. These deterministic methods include the site specific calculation of parameters such as the probable maximum precipitation, which is defined as the theoretically greatest depth of precipitation for a given duration that is physically possible over a particular drainage basin. Other potential flooding hazards such as flooding due to storm surge, river flooding, coastal flooding including tsunamis, are evaluated at each site using maximum credible levels from each hazard. Over the life of the operating reactor, if new information becomes available that could affect the design basis, licensees are required to evaluate the new information. Based on this review, if needed, licensees are required to take appropriate mitigation measures, update their final safety analysis report and submit it to the NRC for review and approval.
7. In order to impose new requirements on existing plants, the NRC must be able to justify the new requirements in accordance with the "Backfit Rule" (10 CFR 50.109).

Questions and Answers for Flooding Issues

172) Does the NRC consider severe floods in the design of nuclear power plants?

Yes. NRC regulations require that nuclear power plants are, at all times, capable of safely shutting down and maintaining a safe shutdown condition under severe flooding situations. Safety-related Structures, Systems and Components (SSCs) of Nuclear reactors in the U.S. are required to withstand the design basis flood (DBF). The design basis flood may be caused by the following natural Phenomena:

- 1) Intense rainfall occurring at the site (known as local intense precipitation).
- 2) Intense rainfall (known as the Probable Maximum Precipitation) occurring on other areas of the watershed leading to riverine or coastal flooding (known as Probable Maximum Flood" or "PMF".
- 3) Floods from upstream dam failure or a combination of upstream dam failures.
- 4) Failure of On-site Water Control or Storage Structures (i.e. tanks).
- 5) Storm Surge, Seiche and Tsunami including wave effects.(See Tsunami Q&A Sheet)
- 6) Flooding caused by ice effects (i.e. ice dams both upstream and downstream).
- 7) Floods caused by diversions of stream channels toward the site.

8) Other potential site specific flood hazard(s).

173) What about droughts and conditions which lead to low water? Are these considered?

Yes. Impacts to the plant from low water conditions brought about by ice effects, downstream dam breach, tsunamis, hurricanes and channel diversions away from the site are reviewed to ensure the plant remains safe under these scenerios.

174) Periods of long rainfall can cause the groundwater elevation to rise which can cause structures such as deeply embedded tanks to fail due to buoyancy. Are nuclear power plants designed to withstand this effect?

Yes. Worst-case groundwater levels are estimated for each site and the impacts of these levels are considered in the design of the plant to ensure the plant remains safe under these conditions. During the safety review, impacts due to groundwater levels and other hydrodynamic effects on the design bases of plant foundations and other safety-related structures systems and components (SSCs) are evaluated. Impacts to a safety-related structure such as a deeply embedded tank or a structure containing a deeply embedded tank are considered in the safety review.

175) Some of the Reports from the National Weather Service used to estimate the design precipitation are 30-40 years old. Are these estimates still valid?

The NRC has funded research by the U.S. Bureau of Reclamation to review the information and methods developed by the National Weather Service and the U.S. Army Corps of Engineers (HMR 51), focusing on South and North Carolina. To date, reviews of precipitation records from extreme storm events (e.g., tropical storms, hurricanes) since the publication of HMR 51 does not indicate any exceedance or potential for exceedance of those precipitation (PMP) estimates in this region. We have not seen any information or data that would indicate that HMR precipitation (PMP) estimates for the U.S. have been exceeded. As expected, individual point rainfall gauges have recorded rainfall amounts that have exceeded these areal estimates.

~~Official Use Only~~

Fact Sheet: Summarization of Seismological Information from Regional Instrumentation

Placeholder: to be developed.

Fact Sheet: Regulatory Framework for Protection of Nuclear Power Plants against Tsunami Flooding

Nuclear power plants are designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions. The word tsunami literally means harbor wave. Tsunamis can be generated by large offshore earthquakes (usually greater than magnitude 6.5), submarine or on shore land slides or volcanoes. Some large onshore earthquakes close to the shoreline can generate tsunami. The Nuclear Regulatory Commission (NRC) requires all nuclear power plants to be protected against earthquakes, tsunamis and other natural hazards.

Background

Protection against tsunami effects was required for all operating plants and is required for all new reactors. Following the Indian Ocean tsunami on December 26, 2004, the President moved to protect lives and property by launching an initiative to improve domestic tsunami warning capabilities. This plan was placed under the auspices of the National Science and Technology Council through the President's initiative in July 2005 in the context of a broad national effort of tsunami risk reduction, and United States participated in international efforts to reduce tsunami risk worldwide. In response to the president's initiative, the NRC reviewed its licensing criteria and conducted independent studies and participated in international forums under the auspices of the International Atomic Energy Agency with many participating countries including India and Japan. The final report of the study was published in April 2009 as NUREG/CR 6966, "Tsunami Hazard Assessment at Nuclear Power Plant Sites in the United States of America," ADAMS Accession # ML0915901933. NRC revised its Standard Review Plan for conducting safety reviews of nuclear power plants in 2007. Section 2.4.6 specifically addresses tsunamis. The Office of Nuclear Regulatory Research is conducting tsunami studies in collaboration with the United States Geological Survey and has published a report on tsunami hazard in the Atlantic, Gulf and Pacific coastal areas. Selected nuclear power plants now get tsunami warning notification. The agency requires plant designs to withstand the effects of natural phenomena including effects of tsunamis. The agency's requirements, including General Design Criteria for licensing a plant, are described in Title 10 of the *Code of Federal Regulations* (10 CFR). These license requirements consist of incorporating margins in the initiating hazard and additional margins are due to traditional engineering practices such as "safety factors." Practices such as these add an extra element of safety into design, construction, and operations.

The NRC has always required licensees to design, operate, and maintain safety-significant structures, systems, and components to withstand the effects of natural hazards and to maintain the capability to perform their intended safety functions. The agency ensures these requirements are satisfied through the licensing, reactor oversight, and enforcement processes.

Tsunami Hazard Evaluation

Tsunami hazard evaluation is one component of the complete hydrological review requirements provided in the Standard Review Plan under Chapter 2.4. The safety determination of reactor sites requires consideration of major flood causing events, including consideration of combined flood causing conditions. These conditions include Probable Maximum Flood (PMF) on Streams and Rivers, Potential Dam Failures, Probable Maximum Surge and Seiche Flooding and Probable Maximum Tsunami Hazards, among others. The most significant flooding event is called the design basis flood and flooding protection requirements are correlated to this flood level in 2.4.10.

The Probable Maximum Tsunami (PMT) is defined as that tsunami for which the impact at the site is derived from the use of best available scientific information to arrive at a set of scenarios reasonably expected to affect the nuclear power plant site taking into account (a) appropriate consideration of the most severe of the natural phenomena that have been historically reported or determine from geological and physical data for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated, (b) appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena, and (c) the importance of the safety functions to be performed.

Site-specific tsunami data are collected from historical tsunami records, paleotsunami evidence, regional tsunami assessments, site-specific tsunami mechanisms, site-specific data, such as submarine survey of sea bed and approach channel geometry. Effects of tsunami on a nuclear power plant can be flooding due to water run up, hydro-dynamic pressure on exterior walls of structures, impact of floating debris, and foundation scouring. In addition, tsunami can draw down water from the intake source of plant cooling water.

The tsunami database is available for interactive search and downloads on the internet at <http://www.ngdc.noaa.gov/hazard/tsu.shtml>.

Tsunami Safety Assessment

The licensing bases for existing nuclear power plants are based on historical data at each site. This data is used to determine probable maximum tsunami and the tsunami effects are evaluated for each site with potential for tsunami flooding. The potential for tsunami hazard is determined on a hierarchical analysis process that can identify tsunami potential based primarily on distance from tsunami source and site elevation. The NRC also required existing plants to assess their potential vulnerability to external events, as part of the Individual Plant Examination of External Events Program. This process ensured that existing plants are not vulnerable to tsunami hazard, and they continue to provide adequate public health and safety.

Today, the NRC utilizes a risk-informed regulatory approach, including insights from probabilistic assessments and traditional deterministic engineering methods to make regulatory decisions about existing plants (e.g., licensing amendment decisions). Any new nuclear plant the NRC licenses will use a probabilistic, performance-based approach to establish the plant's seismic hazard and the seismic loads for the plant's design basis.

Operating Plants

The NRC is fully engaged in national international tsunami hazard mitigation programs, and is conducting active research to refine the tsunami sources in the Atlantic, Gulf Coast and Pacific Coast areas. Diablo Canyon (DC) and San Onofre (SONGS) are two nuclear plant sites that have potential for tsunami hazard. Both the DC (main plant) and SONGS are located above the flood level associated with tsunami. However, the intake structures and Auxiliary Sea Water System at DC are designed for combination of tsunami-storm wave activity to 45 ft msl. SONGS has a reinforced concrete cantilevered retaining seawall and screen well perimeter wall designed to withstand the design basis earthquake, followed by the maximum predicted tsunami with coincident storm wave action, designed to protect at approximately 27 ft msl. These reactors are adequately protected against tsunami effects. Distant tsunami sources for DC include the Aleutian area, Kuril-Kamchatka region, and the South American coast (for SONGS the Aleutian area). Distant sources for SONGS is limited by the presence of a broad continental shelf. Local or near sources for DC include the Santa Lucia Bank and Santa Maria Basin Faults (for SONGS the Santa Ana wind).

Additional Information

To read more about risk-related NRC policy, see the fact sheets on Probabilistic Risk Assessment (<http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/probabilistic-risk-asses.html>) and Nuclear Reactor Risk (<http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/reactor-risk.html>). Each provides more information on the use of probability in evaluating hazards (including earthquakes) and their potential impact on plant safety margins. Other regulatory framework includes General Design Criterion 2, 10 CFR Part 100.23, Regulatory Guide 1.102 "Flood Protection for Nuclear Power Plants", Rev. 1 1976, Regulatory Guide 1.59 "Design Basis for Nuclear Power Plants" Rev. 2 1977 (update in progress), and USNRC Standard Review Plan "Probable Maximum Tsunami Flooding" Section 2.4.6, Rev. 2.

March 2011

Fact Sheet: Seismic Zones and US Plants

Note: This is some basic information...staff is developing this into a fact sheet

Some Key Points:

- Although we often think of the US as having “active” and “non-active” earthquake zones, earthquakes can actually happen almost anywhere. Seismologists typically separate the US into low, moderate, and high seismicity zones; not into “active” and “inactive”.
- The boundaries of the low, medium and high zones are not hard, are not well constrained, and are open to interpretation. Below we’ve pulled together a list based on our judgment and based on multiple interpretations in the technical community. But this is just for guidance; it is subjective.
- Faults are often well mapped and characterized in active zones, such as the west. But there are very few mapped faults in the east, which doesn’t mean that there aren’t earthquakes. For example, the most widely felt historical earthquakes in the US occurred in the New Madrid seismic zone in 1811 and 1812. The zones is (clearly shown on figure 1, the hazard map. However, the fault has never been identified and so is only shown as an area source on figure 2. In fact, most CEUS earthquakes are not tied to a known fault.
- The NRC has a seismic research program which has—with DOE and EPRI—sponsored and undertaken a ground breaking project to create a new state of the art seismic source model for the central and eastern US. This project, the Central and Eastern US Seismic Source Characterization for Nuclear Facilities project, is expected to finish at the end of this year.
- The NRC is also undertaking the Generic Issue 199 program to reassess seismic risk in light of the potential for higher seismic hazard (ground shaking) in the CEUS. This shows an ongoing dedication to seismic safety.
- The NRC requires that every nuclear plant be designed for site-specific ground motions that are appropriate for their locations. In addition, the NRC has specified a minimum ground motion level to which nuclear plants must be designed.

This is a preliminary (and subjective) list from seismic staff: Please consider this sensitive information

High Seismicity:

- Diablo Canyon
- SONGS

Moderate Seismicity:

Charleston Seismic Zone

- Brunswick
- Robinson
- Summer
- Vogtle
- Hatch (maybe depends on interpretation)

Wabash Valley Seismic Zone

- Clinton

East Tennessee Seismic Zone (a real point of contention)

- Watts Bar

- Sequoia
- Central Virginia Seismic Zone
- North Anna

Notes:

Also minimum standard on shaking

Note that new Madrid has several subzones.



Figure 1: US Nuclear Plants overlain on the USGS National Seismic Hazard Map

As you can see the seismic source regions in the central and eastern east are not well defined. So to state a specific number of plants that are in the moderate seismicity zones is challenging and open to interpretation. This is just one interpretation, which is provided by the USGS.

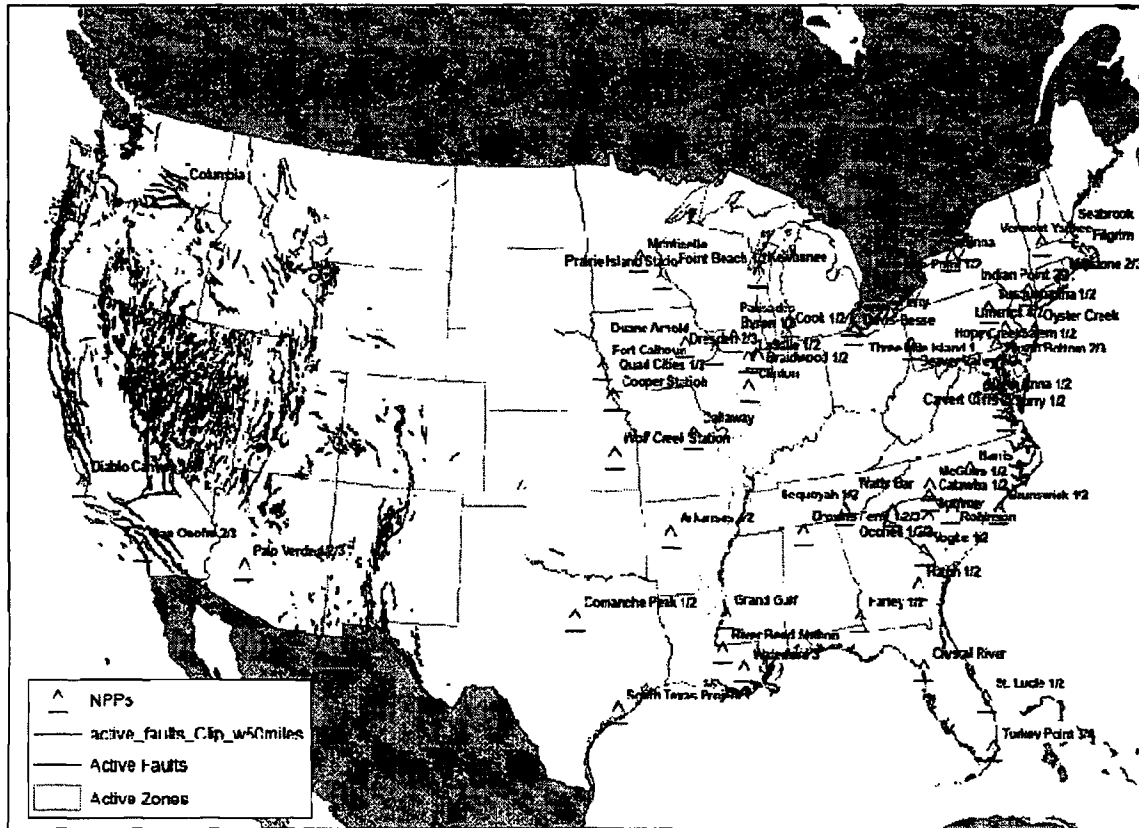


Figure 2: This figure shows mapped active faults and US Nuclear plants

As you can see, there are very few mapped active faults in the east, which doesn't mean that there aren't earthquakes. The most widely felt historical earthquakes in the US happened in the New Madrid seismic zone (clearly shown on figure 1, the hazard map). However, the fault is not shown here because we can't find it under all that Mississippi sand! You can (faintly) see the source one interpretation of a source zone on the figure. However, this is just the interpretation that was in the GIS map we were working with. We will likely put nested "blobs" onto this figure to the widest and narrowest zone interpretations.

If someone asks about plants being very near mapped active faults, there are two...but that doesn't mean that there isn't hazard elsewhere because in the central and eastern US the seismicity comes from "seismic zones" not faults. It's a hard balance between saying things that make it seem that we have a lot of problems and saying things that make it seem we are underestimate the hazard or not taking it seriously.

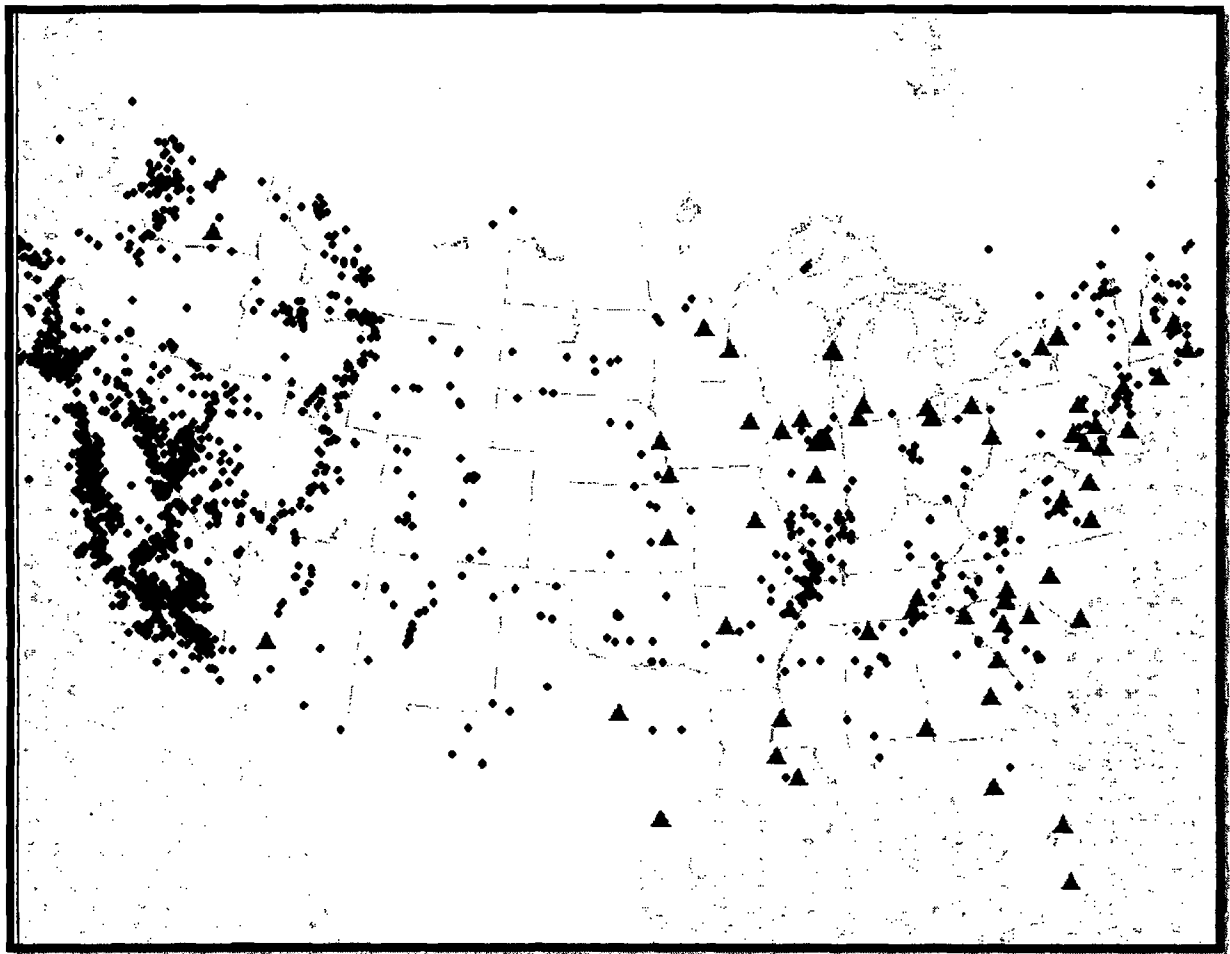


Figure 3: Earthquakes Plotted with US Nuclear Plants

We are remaking a plot like this with a more complete set of earthquake (we're not sure that the time frame of the quakes is), this speaks to the fact that earthquakes occur everywhere, even where we don't have mapped faults.

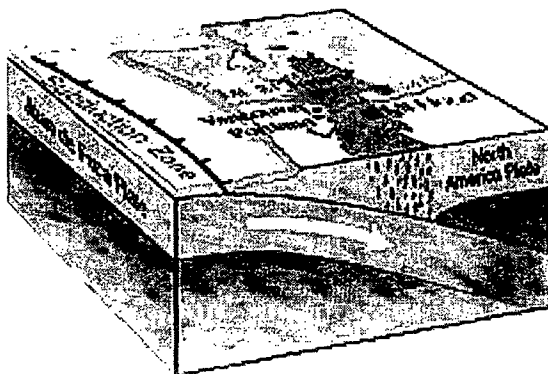
Fact Sheet: Seismicity of the Central and Eastern US (In-depth technical information)

Key Points:

- To date, very large earthquakes (Magnitudes greater than 8.25) have only occurred in specific geological settings, in particular the interfaces between tectonic plates in major **subduction zones**. The only subduction zone that potentially impacts the continental US is the Cascadia zone off the coast of northern California, Oregon and Washington.
- Recent analyses of the magnitudes of the largest earthquakes **not associated** with subduction zones indicates magnitudes are less than ~8.25.
- The size (magnitude) of earthquakes is proportional to the fault area that slips in a given earthquake. The prediction of earthquake magnitudes for a specific fault considers the dimensions of the fault. Extremely large earthquakes do not occur on small faults.
- Nuclear power plants are licensed based on vibratory ground shaking, not earthquake magnitude. The ground shaking (accelerations) are used to estimate forces which are used in the seismic design process. In many cases smaller magnitude earthquakes closer to a site produce more severe ground shaking than larger, more distant earthquakes. Hence it is important to consider all potential earthquake sources regardless of magnitude.

Discussion: Earthquakes with very large magnitudes such as the March 2011 earthquake off the northeast coast of the Japanese island of Honshu occur within subduction zones, which are locations where one of the earth's tectonic plates is subducting beneath (being thrust under) another. The fault that defines the Japan Trench plate boundary dips to the west, i.e., becomes deeper towards the coast of Honshu. Large offshore earthquakes have historically occurred in the same subduction zone (in 1611, 1896, and 1933) all of which produced significant tsunami waves. The magnitudes of these previous large earthquakes have been estimated to be between 7.6 and 8.6. Prior to March 2011, the Japan Trench subduction zone has produced nine earthquakes with magnitudes greater than 7 just since 1973.

The only subduction zone that is capable of directly impacting the continental US is the Cascadia subduction zone, which lies off of the coast of northern California, Oregon, and Washington. The fault surface defined by this interface dips to the east (becomes deeper) beneath the coast. The Cascadia subduction zone is capable of producing very large earthquakes if all or a large portion of the fault area ruptures in a single event. However, the rate of earthquake occurrence along the Cascadia subduction zone is much less than has been observed along the Japan Trench subduction zone. The only operating nuclear power plant in that area is Columbia, which is far from the coast (~220 miles/350 km) and the Cascadia subduction zone. The occurrence of earthquakes on the Cascadia subduction zone has been considered in the evaluation of the Columbia NPP.



Schematic Illustration of the Cascadia Subduction Zone

The size (magnitude) of earthquakes is proportional to the surface area of a fault that slips in a given earthquake. Large earthquakes are associated with large (long) faults. Hence, the prediction of earthquake magnitudes for a specific fault considers the dimensions of the fault. Identification of fault size is usually based on geologic mapping or the evaluation of spatial patterns of small earthquakes. To provide **a point of comparison**, the length of the fault that slipped during the March 11, 2011 magnitude 9 Japanese earthquake was >620 km, the length of the fault(s) that slipped during the magnitude 7.3 1992 Landers, CA earthquake was ~90 km and the estimated length of the Hosgi fault near Diablo Canyon NPP is 140 km and a magnitude of 7.5 is assigned to that fault. A number of major crustal faults or fault zones (not associated with the Cascadia subduction zone) have been identified that have produced earthquakes of magnitude 7.5 to 8 in the continental US (including California). ***These fault sources have been identified and characterized in seismic hazard assessments.***

Seismic designs at US nuclear power plants are developed in terms of seismic ground motion spectra, which are called the Safe Shutdown Earthquake ground motion response spectra (SSE). Each nuclear power plant is designed to a ground motion level that is appropriate for the geology and tectonics in the region surrounding the plant location. Currently operating nuclear power plants developed their SSEs based on a "deterministic" or "scenario earthquake" basis that account for the largest earthquake expected in the area around the plant. Seismic activity in the regions surrounding US plants is much lower than that for Japan since **most US plants are located in the interior of the stable continental US**. The largest earthquakes within the continental US are the 1811-12 New Madrid sequence and the 1886 Charleston, SC, which were estimated to be between about magnitude 6.8 to 7.5. On the west coast of the US, the two nuclear power plants are designed to specific ground motions from earthquakes of about magnitude 7+ on faults located just offshore of the plants. The earthquakes on these faults are mainly strike-slip (horizontal motion on near vertical planes) type earthquakes, not subduction zone earthquakes. This fault geometry does not produce large tsunamigenic waves. Therefore, the likelihood of a significant tsunami from these faults is very remote.

Fact Sheet: US Portable Array Information

NOTE: This is provided because IRIS participants let us know that here was a discussion about the NRC's involvement in this program during a meeting with congressional staffers. We have been involved in this for the last couple years.



The Incorporated Research Institutions for Seismology is the Consortium of United States Universities with Major Research Programs in Seismology and Related Fields.

The Transportable Array: A Science Investment that Can Be Leveraged

IRIS is installing the Transportable Array – a set of 400 broadband seismic instruments – in each of more than 1600 sites across the contiguous United States. The instruments operate at each site for two years and then are removed and redeployed further east. Roughly 1100 stations have been installed since 2003, and instruments have been removed from more than 600 of those sites in the western United States.

The National Science Foundation is funding the full cost to “roll” the Transportable Array across the US, more than \$90,000,000 over ten years. Comparatively small incremental investments could add significant data that are relevant to the safety of nuclear power plants. These efforts would be uniquely cost effective, since NSF is already funding installation, and they would feed data into an existing, standardized and widely used data management system that already incorporates the vast majority of seismic data from US networks. But these opportunities are time constrained: the array will be fully installed in the contiguous 48 states by late 2013.

More Value from Longer Term Regional Observations

A dense, uniform seismic network is necessary for long-term, broad-area seismic monitoring of the central and eastern United States due to low event recurrence rates and the risk of significant earthquakes ($M > 5$) anywhere in the region. Monitoring seismicity in the central and eastern US can be improved by turning selected sites into permanent seismic stations. A total of more than 35 Transportable Array stations have already been “adopted” by several organizations, creating a permanent legacy, but only in the western United States.

A strategic “1-in-4” plan would involve “adoption” of systematically selected stations in the central and eastern United States – every other station in both the east-west and north-south directions, creating a uniform grid of some 250 stations. Long-term regional operation could be combined with two optional enhancements to create a unique observatory for the study of seismicity, source characteristics, attenuation, and local ground acceleration.

Enhancement 1: Acquire Higher Frequency Data

Crustal rigidity in the central and eastern US makes it desirable to record high frequency characteristics of local and regional earthquakes. The existing instruments could be reconfigured to record high frequencies but doing so would nearly triple the data flow, necessitating improvements to the communications infrastructure.

Enhancement 2: Add Strong Motion Sensors

Acquiring strong motion sensors and reconfiguring field computers that record and telemeter the data would help to measure unique effects of severe shaking. The design anticipated this augmentation, and several stations in California and Washington were operated that way. Upgrade would be more efficient at sites that have not yet been installed.

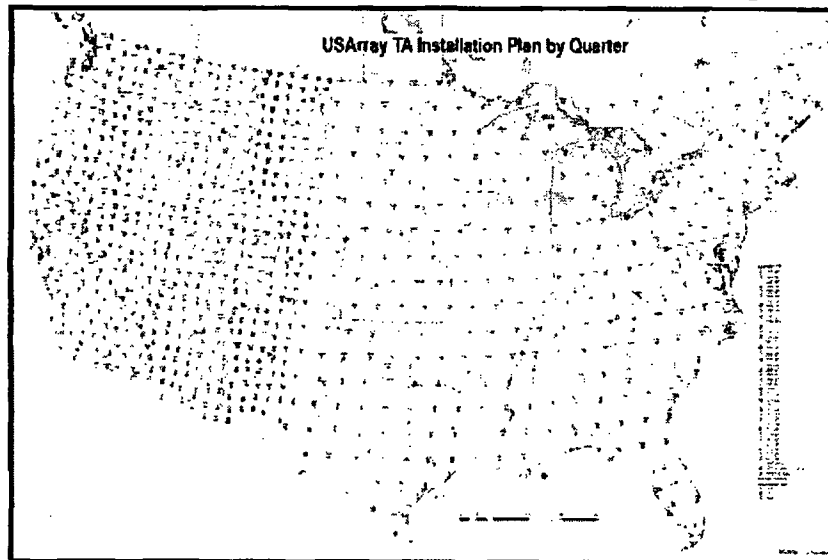
Estimate of annual acquisition and O&M costs for the 1-in-4, 250-station network in central and eastern US.

| Year | Stations | Acquisition ¹ | O&M ² | Total |
|------|----------|--------------------------|------------------|-------------|
| 2011 | 50 | \$1,800,000 | \$ 400,000 | \$2,200,000 |
| 2012 | 50 | \$1,800,000 | \$ 800,000 | \$2,600,000 |
| 2013 | 50 | \$1,800,000 | \$1,200,000 | \$3,000,000 |
| 2014 | 50 | \$1,800,000 | \$1,600,000 | \$3,400,000 |
| 2015 | 50 | \$1,800,000 | \$2,000,000 | \$3,800,000 |
| 2016 | — | — | \$2,000,000 | \$2,000,000 |

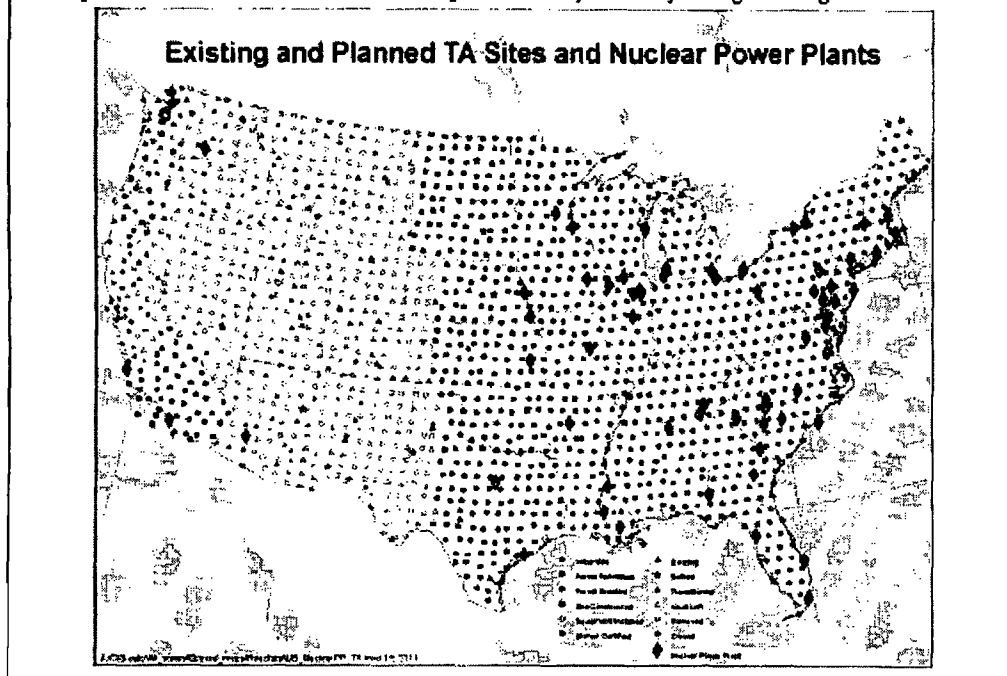
¹ Assumes upgrades to six channel data loggers with strong motion sensors.

² Assumes a conservative estimate of \$8,000/station/year.

The 1-in-4, 250-station network that could be created in the central and eastern US by "leaving behind" one out of every four Transportable Array stations during the years 2011 through 2015.



A large majority of nuclear power plants are located in the central and eastern parts of the US, where it is still possible to "leave behind" 1-in-4 Transportable Array stations for long-term regional observations.



Fact Sheet: The B.5.b Rule (10 CFR 50.54hh/B.5.b)

The following was taken from the Commission Briefing (3/21) notes:

Following the terrorist events of September 11, 2001, the NRC issued EA-02-026, "Order for Interim Safeguards and Security Compensatory Measures" (the ICM Order), February 25, 2002, (designated SGI), which specified interim safeguards and security compensatory measures. Section B.5.b of the ICM Order required licensees to adopt mitigation strategies using readily available resources to maintain or restore core cooling, containment, and SFP cooling capabilities to cope with the loss of large areas of the facility due to large fires and explosions from any cause, including beyond-design-basis aircraft impacts.

In June 2005 the NRC developed a phased approach to implement the B.5.b requirements:

- For Phase 1, the NRC expected licensees to use information from (1) existing programs and equipment and operational know-how, including maintaining capabilities currently in place, (2) industry best practices, and (3) application of generic lessons learned from engineering analyses.
- Phase 2 addressed assessment of SFPs including additional mitigation strategies that use existing or readily available resources to further enhance the plant's effectiveness in maintaining SFP cooling, and identify potential practicable options for the use of generic, deployable, or other backup mitigation capabilities that exceed the NRC's requirements.
- Phase 3 addressed assessment of the reactor and containment mitigation. This change allowed the staff to give priority to the assessment of SFPs before the reactor and containment.

On February 25, 2005, the NRC issued guidance for implementing Section B.5.b of the ICM Order. This included guidance on:

- Actions to Mitigate Fuel damage, which included:
 - Develop procedures to facilitate primary containment to secondary containment venting without AC power as an alternate remove heat from primary containment,
 - Develop/Modify procedures to start safety and or operate equipment to facilitate plant cooldown (Diesel generators, AFPs, RCIC) without DC power,
 - Identification and use of alternate water sources and pumping sources (such as a site fire pump as an alternate supply water for core cooling and SFP water),
 - Development of strategies for use of portable and offsite equipment to support recovery efforts (prefabricated and pre-staged cables, adapters, jumpers spool pieces, equipment needed for primary to secondary containment venting),
- Spent Fuel pool mitigation measures, which included:
 - Strategies for dispersing higher decay power (hottest) fuel amongst older low decay power (coolest) fuel to facilitate cooling, enabling air cooling if water level is lost in the reduced timeframes
 - Maintenance of empty space in the SFP to provide for a downcomer effect, facilitating natural circulation within the pool
 - Provide for emergency water makeup sources, and/or emergency repair

By December 2006, the staff had completed Phase 1 inspections at all operating reactor sites. In December 2006, the NRC endorsed NEI 06-12, Revision 2, "B.5.b Phase 2 & 3 Submittal Guideline," which provided specifications for standard mitigative strategies to address the maintenance or restoration of core cooling, containment and spent fuel pool cooling, including the use of some equipment that would have been beyond readily available. The strategies included those listed below:

- Adding make-up water to the SFP,
- Spraying water on the spent fuel,

- Enhanced initial command and control activities for challenges to core cooling and containment, and
- Enhanced response strategies for challenges to core cooling and containment.

The B.5.b Guidance and NEI 06-12, Revision 2, were used by each licensee in preparing information submitted to the NRC that describes a plant specific approach to implementing mitigating strategies and supports each plant specific license condition.

The NRC Performed Section B.5.b Phase 2 Assessments (June – December 2005) to Identify SFP Mitigation Strategies.

The NRC and Industry Performed B.5.b Phase 3 Assessments (October 2005 – June 2006) to Identify Reactor and Containment Mitigation Strategies.

In 2007, the NRC staff completed safety evaluations of licensee commitments submitted using the NEI 06-12 Guideline and imposed license conditions requiring them to provide a regulatory footprint. By December 2008 the NRC staff completed its inspection to verify the implementation of strategies and guidance at each facility.

On March 27, 2009, the NRC amended 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," and Part 73, "Physical Protection of Plants and Materials," with new requirements.

This rulemaking added 10 CFR 50.54(hh)(2) in order to impose the same mitigating strategies requirements on new reactor applicants and licensees as those imposed by the ICM Order and associated license conditions.

This rulemaking also added paragraph (i) to 10 CFR 50.34, "Contents of applications; technical information," to require submittal of a "description and plans for implementation of the guidance and strategies intended to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with the loss of large areas of the plant due to explosions or fire as required by § 50.54(hh)(2) of this chapter." (A parallel requirement was added as paragraph (d) to 10 CFR 52.80 for reactors licensed under 10 CFR Part 52, under the purview of the Office of New Reactors.)

The Statement of Considerations for this rulemaking specifically noted that the requirements described in Section 50.54(hh) are for addressing certain events that are the cause of large fires and explosions that affect a substantial portion of the nuclear power plant contemplates that the initiating event for such large fires and explosions could be any number of beyond-design basis events, including natural phenomena such as those described in General Design Criteria (i.e., earthquakes, tornadoes, floods, tsunami, and seiches).

Fact Sheet: Generic Issue GI-199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants"

The objective of the GI-199 Safety/Risk Assessment was to perform a conservative, screening-level assessment to evaluate if further investigations of seismic safety for operating reactors in the central and eastern U.S. (CEUS) are warranted consistent with NRC directives.

- The results of the GI-199 safety risk assessment should not be interpreted as definitive estimates of plant-specific seismic risk.
- The nature of the information used (both seismic hazard data and plant-level fragility information) make these estimates useful only as a screening tool. The NRC does not rank plants by seismic risk.

Key Messages from the GI-199 Communications Plan:

- In August 2010, the Safety/Risk Assessment for GI-199 was completed. That assessment found that operating nuclear power plants are safe: Plants have adequate safety margin for seismic issues. The NRC's Safety/Risk Assessment confirmed that overall seismic risk estimates remain small and that adequate protection is maintained.
- Though still small, some seismic hazard estimates have increased: Updates to seismic data and models indicate increased seismic hazard estimates for some operating nuclear power plant sites in the Central and Eastern United States.
- Assessment of GI-199 will continue: Plants are safe (see key message 1), but the NRC has separate criteria for evaluating whether plant improvements may be imposed.

The NRC's Safety/Risk Assessment used readily available information and found that for about one-quarter of the currently operating plants, the estimated core damage frequency change is large enough to warrant further attention. Action may include obtaining additional, updated information and developing methods to determine if plant improvements to reduce seismic risk are warranted.

Note: GI-199 Communication Plan is available in ADAMS: ML081850477.

Status of Operating Plants and Need of Additional Actions due to Japanese Event:

- Currently operating nuclear plants in the United States remain safe, with no need for immediate action.
- This determination is based on NRC staff reviews of updated seismic hazard information and the conclusions of the Generic Issue 199 Screening Panel.
- Existing plants were designed with considerable margin to be able to withstand the ground motions from the "deterministic" or "scenario earthquake" that accounted for the largest earthquake expected in the area around the plant.
- During the mid-to late-1990s, the NRC staff reassessed the margin beyond the design basis as part of the Individual Plant Examination of External Events (IPEEE) program.
- The results of the GI-199 assessment demonstrate that the probability of exceeding the design basis ground motion may have increased at some sites, but only by a relatively small amount. In addition, the Safety/Risk Assessment stage results indicate that the probabilities of seismic core damage are lower than the guidelines for taking immediate action.

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- In summary, US plants are designed for appropriate earthquake levels and are safe. As addressed above, the NRC is conducting a program called Generic Issue 199, which is reviewing the adequacy of the earthquake design of US NPPs in central and eastern North America based on the latest data and analysis techniques. The NRC will look closely at all aspects of the response of the plants in Japan to the earthquake and tsunami to determine if any actions need to be taken in US plants and if any changes are necessary to NRC regulations.

Timeline for Preparation and Issuance of GI-199 Generic Letter:

- The NRC is working on developing a Generic Letter (GL) to request information of all affected plants (96 plants that are east of the Rockies).
- The GL is planned to be issued in draft form within the next 2 months to stimulate discussions with industry in a public meeting.
- Process will be followed, i.e., Committee to Review Generic Requirements, Advisory Committee on Reactor Safeguards Meeting and then GL will be issued as a draft for formal public comments (60 days), followed by a second meeting with ACRS.
- We expect to issue the GL by the end of this calendar year, as the new consensus seismic hazard estimates become available. (This effort is being coordinated with US NRC, DOE, EPRI, and USGS).
- The information from licensees will likely require 3 to 6 months to complete. Staff's review will commence after receiving licensees' responses. Based on staff's review, a determination can be made regarding cost beneficial backfits where it can be justified.

Fact Sheet: Station Blackout Rule

The NRC designated station blackout (SBO), which is a loss of all offsite and onsite ac power concurrent with a turbine trip, as an Unresolved Safety Issue in 1980. In 1988, the Commission concluded that additional SBO regulatory requirements were justified and issued the SBO rule, 10 CFR 50.63, to provide further assurance that a loss of both offsite and onsite emergency AC power systems would not adversely affect public health and safety. As a result of the SBO rule all plants have (1) established SBO coping and recovery procedures; (2) completed training for these procedures; (3) implemented modifications as necessary to cope with an SBO; and (4) ensured a 4-16 hour coping capability. The coping capability was based on the reliability and redundancy of the on-site electrical system, the frequency of a loss of off-site power and the time needed to restore off-site power. The staff also performed pilot inspections at 8 sites to verify proper implementation of the SBO rule.

Based on the outcomes of those inspections the NRC staff concluded that the industry was properly implementing the rule. Each light-water-cooled nuclear power plant licensed to operate must be able to withstand for a specified duration and recover from a station blackout (as defined in 10 CFR 50.2). Forty-four (44) U.S reactors rely on battery power (4-hour coping) and sixty (60) have opted to use an alternate AC source (4 to 16 hour coping) to cope with a SBO. The NRC staff reviewed the responses from every nuclear power plant and issued a SER accepting the proposed coping methods. Studies conducted by the NRC have shown that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in significant risk reduction and have further enhanced defense in depth. The NRC plans to carefully evaluate the lessons learned from the events in Japan to determine if enhancements to the station blackout rule are warranted.

Staff issued implementation guidance, Regulatory Guide (RG) 1.155, "Station Blackout," issued August 1988. Industry Issued SBO Rule Implementation Guidance NUMARC 87-00. During License renewal of power plants, staff reviewed aging management of SBO SSCs. SBO Rule requires that each light-water-cooled nuclear power plant licensed to operate under this part, each light-water-cooled nuclear power plant must be able to withstand for a specified duration and recover from a station blackout as defined in § 50.2. The specified station blackout duration shall be based on the following factors:

- (i) The redundancy of the onsite emergency ac power sources;
- (ii) The reliability of the onsite emergency ac power sources;
- (iii) The expected frequency of loss of offsite power; and
- (iv) The probable time needed to restore offsite power.

SBO Rule also requires that the reactor core and associated coolant, control, and protection systems, including station batteries and any other necessary support systems, must provide sufficient capacity and capability to ensure that the core is cooled and appropriate containment integrity is maintained in the event of a station blackout for the specified duration. The capability for coping with a station blackout of specified duration shall be determined by an appropriate coping analysis. Licensees are expected to have the baseline assumptions, analyses, and related information used in their coping evaluations available for NRC review. Currently, all plants are in compliance with 50.63, "Loss of all Alternating current Power". **All U.S. plants have the capability, capacity, and operating procedures in place to cope with a station blackout event.**

Additional reference: NUREG/CR-6890 (2005) , "Reevaluation of Station Blackout Risk at Nuclear Power Plants."

Terms and Definitions

Acceptable Method – In many places, this standard contains statements indicating that a certain reference provides an “acceptable method” for satisfying the intent of a given requirement. The plain meaning of such a statement is that the referenced method is one way to meet the given requirement. The intent is to be permissive, meaning that the analysis team can use another method, if justified, without prejudice. However, it is important to understand that the intent of the standard goes beyond the plain meaning, as follows: Whenever the phrasing “acceptable method” is used, the intent is that if the analysis uses another method, the other method must satisfy the stated requirement with a comparable level of conservatism considering a similar level of details pertinent to the analysis scope. It is not acceptable to use another method that does not satisfy the requirement at least as well as the acceptable method would satisfy it. Whenever an alternative to the acceptable method is selected, it is understood that the peer review team will pay particular attention to this topic.

Accident Consequences – The extent of plant damage or the radiological release and health effects to the public or the economic costs of a core damage accident.

Accident Sequence – A representation in terms of an initiating event (IE) followed by a sequence of failures or successes of events (such as system, function, or operator performance) that can lead to undesired consequences, with a specified end state (e.g., core damage or large early release).

Accident Sequence Analysis – The process to determine the combinations of IEs, safety functions, and system failures and successes that may lead to core damage or large early release.

Active or Seismogenic Fault – need to add definition of active fault

Aleatory Variability (or Aleatory Uncertainty) – The variability inherent in a nondeterministic (i.e., stochastic, random) phenomenon. Aleatory variability is accounted for by modeling the phenomenon in terms of a probability model. In principle, aleatory uncertainty cannot be reduced by the accumulation of more data or additional information, but the detailed characteristics of the probability model can be improved. Sometimes aleatory variability is called “randomness.”

Annual exceedance frequency (AEF) – Number of times per year that a site’s ground motion is expected to exceed a specified acceleration.

Area Source – An area at the surface of the earth’s crust that is assumed to have experienced relatively uniform earthquake source characteristics for use in the PSHA. (See also “Volumetric Source Zone”.)

At Power – Those plant operating states characterized by the reactor being critical and producing power, with automatic actuation of critical safety systems not blocked and with essential support systems aligned in their normal power operation configuration.

Background Source Zone – A part of the earth’s crust, usually of large surface area dimension, within which potentially damaging earthquakes could occur that are not associated either with known fault sources or even with the uniform pattern, rate, or style of deformation or seismicity commonly identified with volumetric seismic source zones. In PSHA calculations, earthquakes that cannot be associated with other sources default to a background source zone.

Basic Event – An event in a fault tree model that requires no further development, because the appropriate limit of resolution has been reached.

Bounding Analysis – Analysis that uses assumptions such that the assessed outcome will meet or exceed the maximum severity of all credible outcomes.

Capable Tectonic Source – A capable tectonic source is a tectonic structure that can generate both vibratory ground motion and tectonic surface deformation such as faulting or folding at or near the earth's surface in the present seismotectonic regime. It is described by at least one of the following characteristics:

- (1) presence of surface or near-surface deformation of landforms or geologic deposits of a recurring nature within the last approximately 500,000 years or at least once in the last approximately 50,000 years
- (2) a reasonable association with one or more moderate to large earthquakes or sustained earthquake activity that are usually accompanied by significant surface deformation
- (3) a structural association with a capable tectonic source that has characteristics of either item a or b (above), such that movement on one could be reasonably expected to be accompanied by movement on the other

In some cases, the geological evidence of past activity at or near the ground surface along a potential capable tectonic source may be obscured at a particular site. This might occur, for example, at a site having a deep overburden. For these cases, evidence may exist elsewhere along the structure from which an evaluation of its characteristics in the vicinity of the site can be reasonably based. Such evidence is to be used in determining whether the structure is a capable tectonic source within this definition. Notwithstanding the foregoing paragraphs, the association of a structure with geological structures that are at least pre-Quaternary, such as many of those found in the central and eastern regions of the United States, in the absence of conflicting evidence, will demonstrate that the structure is not a capable tectonic source within this definition.

CDFM method – Refers to the Conservative Deterministic Failure Margin (CDFM) method as described in EPRI NP-6041-56, Rev. 1 wherein the seismic margin of the component is calculated using a set of deterministic rules that are more realistic than the design procedures.

Central and Eastern United States (CEUS) – That portion of the United States east of the Rocky Mountains (approximately the 104th parallel).

Certified Seismic Design Response Spectra (CSDRS) – Site-independent seismic design response spectra that have been approved under Subpart B of 10 CFR Part 52 as the seismic design response spectra for an approved certified standard design nuclear power plant. The input or control location for the CSDRS is specified in the certified standard design.

Combined License – A combined construction permit and operating license with conditions for a nuclear power facility issued pursuant to Subpart C of 10 CFR Part 52.

Common-Cause Failure (CCF) – A failure of two or more components during a short period of time as a result of a single shared cause.

Component – An item in a nuclear power plant, such as a vessel, pump, valve, or circuit breaker.

Composite Variability – The composite variability includes the aleatory (randomness) uncertainty (β_R) and the epistemic (modeling and data) uncertainty (β_U). The logarithmic standard deviation of composite variability, β_C , is expressed as $(\beta_R^2 + \beta_U^2)^{1/2}$.

Containment Analysis – The process to evaluate the failure thresholds or leakage rates of the containment.

Containment Failure – Loss of integrity of the containment pressure boundary from a core damage accident that results in unacceptable leakage of radionuclides to the environment.

Controlling Earthquakes – Earthquakes used to determine spectral shapes or to estimate ground motions at the site for some methods of dynamic site response. There may be several controlling earthquakes for a site. As a result of the probabilistic seismic hazard analysis (PSHA), controlling earthquakes are characterized as mean magnitudes and distances derived from a deaggregation analysis of the mean estimate of the PSHA.

Core Damage Frequency (CDF) – Expected number of core damage events per unit of time.

Core damage – Refers to the uncovering and heat-up of the reactor core, to the point that prolonged oxidation and severe fuel damage are not only anticipated but also involve enough of the core to result in off-site public health effects if released. *Seismic core damage frequency* refers to the component of total CDF that is due to seismic events.

Cumulative Absolute Velocity (CAV) – For each component of the free-field ground motion, the CAV should be calculated as follows: (1) the absolute acceleration (g units) time-history is divided into 1-second intervals, (2) each 1-second interval that has at least 1 exceedance of 0.025g is integrated over time, and (3) all the integrated values are summed together to arrive at the CAV. The CAV is exceeded if the calculation is greater than 0.16 g-second. The application of the CAV in siting requires the development of a CAV model because the PSHA calculation does not use time histories directly.

Deaggregation – The process for determining the fractional contribution of each magnitude-distance pair to the total seismic hazard. To accomplish this, a set of magnitude and distance bins are selected and the annual probability of exceeding selected ground acceleration parameters from each magnitude-distance pair is computed and divided by the total probability for earthquakes.

Dependency – Requirement external to an item and upon which its function depends and is associated with dependent events that are determined by, influenced by, or correlated to other events or occurrences.

Design basis earthquake (DBE) or safe shutdown earthquake (SSE) – A *design basis earthquake* is a commonly employed term for the *safe shutdown earthquake (SSE)*; the SSE is the earthquake ground shaking for which certain structures, systems, and components are designed to remain functional. In the past, the SSE has been commonly characterized by a standardized spectral shape associated with a peak *ground acceleration* value.

Design Factor – The ratio between the site-specific GMRS and the UHRS. The design factor is aimed at achieving the target annual probability of failure associated with the target performance goals.

Distribution System – Piping, raceway, duct, or tubing that carries or conducts fluids, electricity, or signals from one point to another.

Early Site Permit – A Commission approval, issued pursuant to Subpart A of 10 CFR Part 52, for a site or sites for one or more nuclear power facilities.

Earthquake Recurrence – The frequency of occurrence of earthquakes as a function of magnitude. Recurrence relationships or curves are developed for each seismic source, and they reflect the frequency of occurrence (usually expressed on an annual basis) of magnitudes up to the maximum, including measures of uncertainty.

Epicenter – The point on the earth's surface directly above the focus (i.e., hypocenter) of the earthquake source.

Epistemic Uncertainty – Uncertainty attributable to incomplete knowledge about a phenomenon that affects the ability to model it. Epistemic uncertainty is captured by considering a range of model parameters within a given expert interpretation or multiple expert interpretations and each of which is assigned an associated weight representing statistical confidence in the alternatives. In principle, epistemic uncertainty can be reduced by the accumulation of additional information associated with the phenomenon. The uncertainty in the parameters of the probability distribution of a random phenomenon is epistemic.

Event Tree – A logic diagram that begins with an IE or condition and progresses through a series of branches that represent expected system or operator performance that either succeeds or fails and arrives at either a successful or failed end state.

External Event – An IE originating outside a nuclear power plant that causes safety system failures, operator errors, or both, that in turn may lead to core damage or large early release. Events such as earthquakes, tornadoes, and floods from sources outside the plant and fires from sources inside or outside the plant are considered external events (see also internal event). By convention, LOSEP not caused by another external event is considered by convention to be an internal event.

Failure Mechanism – Any of the processes that result in failure modes, including chemical, electrical, mechanical, physical, thermal, and human error.

Failure Mode – A specific functional manifestation of a failure (i.e., the means by which an observer can determine that a failure has occurred) by precluding the successful operation of a piece of equipment, a component, or a system (e.g., fails to start, fails to run, leaks).

Failure Probability – The likelihood that an SSC will fail to operate upon demand or fail to operate for a specific mission time.

Failure Rate – Expected number of failures per unit of time, evaluated, for example, by the ratio of the number of failures in a total population of components to the total time observed for that population.

Fault – A fracture in the earth along which blocks of crust on either side have moved with respect to one another.

Fault Source – A fault or zone for which the tectonic features causing earthquakes have been identified. These are usually individual faults, but they may be zones comprising multiple faults or regions of faulting if surface evidence of these faults is lacking but the faults are suspected from seismicity patterns, tectonic interpretations of crustal stress and strain, and other evidence. Regions of blind thrust faults are a good example of the latter.

Fault Tree – A deductive logic diagram that depicts how a particular undesired event can occur as a logical combination of other undesired events.

Fractile Hazard Curve – Epistemic uncertainty is expressed by a distribution of exceedance probability values; a distribution of hazard curves, rather than a single value; or a single curve. In a fractile hazard curve, all the points on the curve correspond to the same fractile of the distribution of the probability of exceedance. A 5% percentile hazard curve indicates that we have a 5% confidence that the calculated hazard would be less than that given by the curve. A 95% percentile hazard curve indicates that we are 95% confident that the hazard is below the hazard given by the hazard curve.

Fragility – Fragility of an SSC is the conditional probability of its failure at a given hazard input level. The input could be earthquake motion, wind speed, or flood level. The fragility model used in seismic PRA is known as a double lognormal model with three parameters, A_m , b_R , and b_U , which are, respectively, the median acceleration capacity, the logarithmic standard deviation of the aleatory (randomness) uncertainty in capacity, and the logarithmic standard deviation of the epistemic (modeling and data) uncertainty in the median capacity.

Frequency of Onset of Significant Inelastic Deformation (FOSID) – The annual probability of the onset of significant inelastic deformation (OSID). OSID is just beyond the occurrence of insignificant (or localized) inelastic deformation, and in this way corresponds to “essentially elastic behavior.” As such, OSID of a structure, system, or component (SSC) can be expected to occur well before seismically induced core damage, resulting in much larger frequencies of OSID than seismic core damage frequency (SCDF) values. In fact, OSID occurs before SSC “failure,” where the term failure refers to impaired functionality.

Ground acceleration – Acceleration produced at the ground surface by seismic waves, typically expressed in units of g , the acceleration of gravity at the earth’s surface.

Ground Motion Response Spectra (GMRS) – A site-specific ground motion response spectra characterized by horizontal and vertical response spectra determined as free-field motions on the ground surface or as free-field outcrop motions on the uppermost in-situ competent material using performance-based procedures. When the GMRS are determined as free-field outcrop motions on the uppermost in-situ competent material, only the effects of the materials below this elevation are included in the site response analysis.

Ground Motion Slope Ratio – Ratio of the spectral accelerations, frequency by frequency, from a seismic hazard curve corresponding to a 10-fold reduction in hazard exceedance frequency. (See Equation 3 in Regulatory Position 5.1.)

Hazard – The physical effects of a natural phenomenon such as flooding, tornado, or earthquake that can pose potential danger (for example, the physical effects such as ground shaking, faulting, landsliding, and liquefaction that underlie an earthquake’s potential danger).

Hazard (as used in probabilistic hazard assessment) – Represents the estimate of expected frequency of exceedance (over some specified time interval) of various levels of some characteristic measure of a natural phenomenon [for example, peak ground acceleration (PGA) to characterize ground shaking from earthquakes]. The time period of interest is often taken as 1 year, in which case the estimate is called the annual frequency of exceedance.

Hazard Curve – A curve that gives the probability of a certain ground motion parameter (usually the PGA, PGV, or response spectral values) being exceeded. Hazard curves are generally generated for periods of exposure of one year, and they give annual probabilities of exceedence.

HCLPF capacity – Refers to the High Confidence of Low Probability of Failure capacity, which is a measure of seismic margin. In seismic PRA, this is defined as the earthquake motion level at which there is a high (95 percent) confidence of a low (at most 5 percent) probability of failure. Using the lognormal fragility model, the HCLPF capacity is expressed as $A_m \exp[-1.65(\beta_R + \beta_U)]$. When the logarithmic standard deviation of composite variability β_c is used, the HCLPF capacity could be approximated as the ground motion level at which the composite probability of failure is at most 1 percent. In this case, HCLPF capacity is expressed as $A_m \exp[-2.33\beta_c]$. In deterministic SMAs, the HCLPF capacity is calculated using the CDFM method.

High confidence of low probability of failure (HCLPF) capacity – A measure of seismic margin. In seismic risk assessment, HCLPF capacity is defined as the earthquake motion level, at which there is high confidence (95%) of a low probability (at most 5%) of failure of a structure, system, or component.

High Winds – Tornadoes, hurricanes (or cyclones or typhoons as they are known outside the United States), extratropical (thunderstorm) winds, and other wind phenomena depending on the site location.

Hypocenter – The point of the earth's crust where a rupture initiates, creating an earthquake.

In-column Motion – Motion that is within a soil column, as opposed to the motion at the surface or treated as if it is at the surface.

Initiating Event (IE) – Any event either internal or external to the plant that perturbs the steady-state operation of the plant, if operating, thereby initiating an abnormal event such as a transient or loss-of-coolant accident (LOCA) within the plant. Initiating events trigger sequences of events that challenge plant control and safety systems whose failure could potentially lead to core damage or large early release.

Intensity – The intensity of an earthquake is a qualitative description of the effects of the earthquake at a particular location, as evidenced by observed effects on humans, on human-built structures, and on the earth's surface at a particular location. Commonly used scales to specify intensity are the Rossi-Forel, Mercalli, and Modified Mercalli. The Modified Mercalli Intensity (MMI) scale describes intensities with values ranging from I to XII in the order of severity. MMI of I indicates an earthquake that was not felt except by a very few, whereas MMI of XII indicates total damage of all works of construction, either partially or completely.

Interfacing Systems LOCA (ISLOCA) – A loss-of-coolant accident (LOCA) when a breach occurs in a system that interfaces with the reactor coolant system (RCS), where isolation between the breached system and the RCS fails. An ISLOCA is usually characterized by the overpressurization of a low-pressure system when subjected to RCS pressure and can result in containment bypass.

Internal Event – An event originating within a nuclear power plant that in combination with safety system failures, operator errors, or both, can affect the operability of plant systems and may lead to

core damage or large early release. By convention, loss of off-site power not caused by an external event is considered to be an internal event, and internal fire is considered to be an external event.

Key Assumption – An assumption made in response to a key source of uncertainty in the knowledge that a different reasonable alternative assumption would produce different results, or an assumption that results in an approximation made for modeling convenience in the knowledge that a more detailed model would produce different results. For the base PRA, the term “different results” refers to a change in the plant risk profile (e.g., total CDF and total LERF, the set of initiating events and accident sequences that contribute most to CDF and to LERF) and the associated changes in insights derived from the changes in risk profile. A “reasonable alternative” assumption is one that has broad acceptance within the technical community and for which the technical basis for consideration is at least as sound as that of the assumption being challenged.

Key Source of Uncertainty – A source of uncertainty that is related to an issue for which there is no consensus approach or model and where the choice of approach or model is known to have an impact on the risk profile (e.g., total CDF and total LERF, the set of initiating events and accident sequences that contribute most to CDF and LERF) or a decision being made using the PRA. Such an impact might occur, for example, by introducing a new functional accident sequence or a change to the overall CDF or LERF estimates significant enough to affect insights gained from the PRA.

Large Early Release – The rapid, unmitigated release of airborne fission products from the containment to the environment occurring before the effective implementation of off-site emergency response and protective actions, such that there is a potential for early health effects.

Large Early Release Frequency (LERF) – The expected number of large early releases per unit of time. A *large early release* is the rapid, unmitigated release of airborne fission products from the containment building to the environment, occurring before the effective implementation of off-site emergency response and protective actions, such that there is a potential for early health effects. *Seismic large early release frequency* refers to the component of total LERF that is due to seismic events.

Level 1 Analysis – Identification and quantification of the sequences of events leading to the onset of core damage.

Level 2 Analysis – Evaluation of containment response to severe accident challenges and quantification of the mechanisms, amounts, and probabilities of subsequent radioactive material releases from the containment.

Liquefaction – The sudden loss of shear strength and rigidity of saturated, cohesionless soils, due to steady-state groundwater flow or vibratory ground motion. The term “seismic liquefaction” is used in this standard for liquefaction phenomena induced by seismic motions.

Magnitude – An earthquake’s magnitude is a measure of the strength of the earthquake as determined from seismographic observations and is an objective, quantitative measure of the size of an earthquake. The magnitude can be expressed in various ways based on seismographic records (e.g., Richter Local Magnitude, Surface Wave Magnitude, Body Wave Magnitude, and Moment Magnitude). Currently, the most commonly used magnitude measurement is the Moment Magnitude, M_w , which is based on the seismic moment computed as the rupture force along the fault multiplied by the average amount of slip, and thus is a direct measure of the energy released during an earthquake.

Maximum Magnitude – The maximum magnitude is the upper bound to earthquake recurrence curves.

Median Hazard Curve – Corresponds to a 50%, or the 50th fractile, hazard curve.

Mean Hazard Curve – Corresponds to the mean of the probability distribution of hazard curves.

Mean Site Amplification Function – The mean amplification function is obtained for each controlling earthquake, by dividing the response spectrum from the computed surface motion by the response spectrum from the input hard rock motion, and computing the arithmetic mean of the individual response spectral ratios.

Nontectonic Deformation – Nontectonic deformation is distortion of surface or near-surface soils or rocks that is not directly attributable to tectonic activity. Such deformation includes features associated with subsidence, karst terrain, glaciation or deglaciation, and growth faulting.

Operating-Basis Earthquake (OBE) – To satisfy the requirements of paragraph IV(a)(2)(A) of Appendix S to 10 CFR Part 50, the operating-basis earthquake (OBE) ground motion is defined as follows:

- (i) For the certified design portion of the plant, the OBE ground motion is one-third of the CSDRS.
- (ii) For the safety-related noncertified design portion of the plant, the OBE ground motion is one-third of the design motion response spectra, as stipulated in the design certification conditions specified in design control document (DCD).
- (iii) The spectrum ordinate criterion to be used in conjunction with Regulatory Guide 1.166, "Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Post-earthquake Actions," issued March 1997, is the lowest of (i) and (ii).

That earthquake ground motion that, when exceeded (along with a CAV value exceedance) requires shutdown of the plant. In the past, the OBE was commonly chosen to be one-half of the safe shutdown earthquake (SSE). However, newer guidance sets the OBE at 1/3 of the SSE unless additional calculations are performed.

Peak Ground Acceleration (PGA) – Maximum absolute value of acceleration displayed on an accelerogram, the largest ground acceleration produced by an earthquake at a site.

Peak Ground Displacement – The largest ground displacements produced by an earthquake at a site.

Peak Ground Velocity – The largest ground velocity produced by an earthquake at a site.

Plant – A general term used to refer to a nuclear power facility (for example, "plant" could be used to refer to a single unit or multiunit site).

Point Estimate – Estimate of a parameter in the form of a single number.

Probabilistic Risk Assessment (PRA) – A qualitative and quantitative assessment of the risk associated with plant operation and maintenance that is measured in terms of frequency of occurrence of risk metrics, such as core damage or a radioactive material release and its effects on the health of the public [also referred to as a probabilistic safety assessment (PSA)].

Probability of Exceedence – The probability that a specified level of seismic hazard will be exceeded at a site or in a region during a specified exposure time.

PRA Configuration Control Plan – The process and document used by the owner of the PRA to define the PRA technical elements that are to be periodically maintained and/or upgraded and to document the methods and strategies for maintenance and upgrading of those PRA technical elements.

Randomness (as used in seismic-fragility analysis) – The variability in seismic capacity arising from the randomness of the earthquake characteristics for the same acceleration and to the structural response parameters that relate to these characteristics. Also see “Aleatory Variability.”

Response Spectrum – A plot of the maximum responses (acceleration, velocity, or displacement) of idealized single-degree-of-freedom oscillators as a function of the natural frequencies of the oscillators for a given damping value. The response spectrum is calculated for a specified vibratory motion input at the oscillators’ supports.

Review Level Earthquake (RLE) – An earthquake larger than the plant SSE and is chosen in seismic margin assessment (SMA) for initial screening purposes. Typically, the RLE is defined in terms of a ground motion spectrum. (Note—A majority of plants in the Eastern and Midwestern United States have conducted SMA reviews for an RLE of 0.3g PGA anchored to a median NUREG0CR-0098 spectrum.)

Ring Area – Annular region bounded by radii associated with the distance rings used in hazard deaggregation (RG 1.208, Appendix D, Table D.1, “Recommended Magnitude and Distance Bins”).

Risk – Probability and consequences of an event, as expressed by the “risk triplet” that is the answer to the following three questions: (a) What can go wrong? (b) How likely is it? and (c) What are the consequences if it occurs?

Safe Shutdown Earthquake Ground Motion (SSE) – The vibratory ground motion for which certain structures, systems, and components are designed, pursuant to Appendix S to 10 CFR Part 50, to remain functional. The SSE for the site is characterized by both horizontal and vertical free-field ground motion response spectra at the free ground surface. [paragraph IV(a)(1)(i) of Appendix S, “Earthquake Engineering Criteria for Nuclear Power Plants,” to Title 10, Part 50, “Domestic Licensing of Production and Utilization Facilities,” of the Code of Federal Regulations (10 CFR Part 50).]

Staff’s current guidance on SSE is found in Regulatory Guide 1.208 (2007)

Safe Shutdown Equipment List (SSEL) – The list of all SSCs that require evaluation in the seismic-margins-calculation task of an SMA. Note that this list can be different from the seismic equipment list (SEL) used in a seismic PRA.

Safety Function – Function that must be performed to control the sources of energy in the plant and radiation hazards.

Safety Related – SSCs that are relied upon to remain functional during and following design-basis events to ensure (a) the integrity of the reactor coolant pressure boundary, (b) the capability to shut down the reactor and maintain it in a safe shutdown condition, or (c) the capability to prevent or mitigate the consequences of accidents that could result in potential off-site exposures comparable to the applicable exposures established by the regulatory authority.

Safety Systems – Those systems that are designed to prevent or mitigate a design-basis accident.

Screening Analysis – An analysis that eliminates items from further consideration based on their negligible contribution to the frequency of an accident or of its consequences.

Screening Criteria – The values and conditions used to determine whether an item is a negligible contributor to the probability of an accident sequence or its consequences.

Seismic Design Category (SDC) – A category assigned to an SSC that is a function of the severity of adverse radiological and toxicological effects of the hazards that may result from the seismic failure of the SSC on workers, the public, and the environment. SSCs may be assigned to SDCs that range from 1 through 5. For example, a conventional building whose failure may not result in any radiological or toxicological consequences is assigned to SDC-1; a safety-related SSC in a nuclear material processing facility with a large inventory of radioactive material may be placed in SDC-5. In this standard, the term SDC has a different meaning than in the International Building Code. ANSI/ANS-2.26-2004 [1] provides guidance on the assignment of SSCs to SDCs.

Seismic Equipment List (SEL) – The list of all SSCs that require evaluation in the seismic-fragilities task of a seismic PRA. Note that this list can be different from the SSEL used in an SMA.

Seismic Hazard – Any physical phenomenon, such as ground motion or ground failure, that is associated with an earthquake and may produce adverse effects on human activities (such as posing a risk to a nuclear facility).

Seismic margin – The difference between a plant's capacity and its seismic design basis (*safe shutdown earthquake, or SSE*).

Seismic Margin Assessment (SMA) – The process or activity to estimate the seismic margin of the plant and to identify any seismic vulnerabilities in the plant. This is described further in Appendix C.

Seismic Risk – The risk (frequency of occurrence multiplied by its consequence) of severe earthquake-initiated accidents at a nuclear power plant. A severe accident is an accident that causes core damage, and, possibly, a subsequent release of radioactive materials into the environment. Several risk metrics may be used to express *seismic risk*, such as *seismic core damage frequency* and *seismic large early release frequency*.

Seismic Source – A general term referring to both seismogenic sources and capable tectonic sources. A seismogenic source is a portion of the earth assumed to have a uniform earthquake potential (same expected maximum earthquake and recurrence frequency), distinct from the seismicity of the surrounding regions. A capable tectonic source is a tectonic structure that can generate both vibratory ground motion and tectonic surface deformation such as faulting or folding at or near the earth's surface. In a probabilistic seismic hazard analysis (PSHA), all seismic sources in the site region with a potential to contribute to the frequency of ground motions (i.e., the hazard) are considered.

Seismic Spatial Interaction – An interaction that could cause an equipment item to fail to perform its intended safety function. It is the physical interaction of a structure, pipe, distribution system, or other equipment item with a nearby item of safety equipment caused by relative motions from an earthquake. The interactions of concern are (a) proximity effects, (b) structural failure and falling, and (c) flexibility of attached lines and cables.

Seismic Source Characteristics (SSC) – The parameters that characterize a seismic source for PSHA, including source geometry, probability of activity, maximum magnitude, and earthquake recurrence.

Seismic Wave Transmission (Site Amplification) – The amplification (increase or decrease) of earthquake ground motion by rock and soil near the earth's surface in the vicinity of the site of interest. Topographic effects, the effect of the water table, and basin edge wave-propagation effects are sometimes included under site response.

Seismogenic Crust – The brittle portion of the earth's crust capable of generating earthquakes.

Seismogenic Source – A portion of the earth that is assumed to have a uniform earthquake potential (same expected maximum earthquake and recurrence frequency), distinct from that of surrounding sources. A seismogenic source will generate vibratory ground motion but is assumed to not cause surface displacement. Seismogenic sources cover a wide range of seismotectonic conditions, from a well-defined tectonic structure to simply a large region of diffuse seismicity.

Seismotectonic – Rock-deforming processes and resulting structures and seismicity that occur over large sections of the earth's crust and upper mantle.

Senior Seismic Hazard Analysis Committee (SSHAC) – A committee sponsored by the NRC, DOE, and EPRI to review the state of the art and improve the overall stability of the PSHA process. SSHAC [4] concluded that most of the differences were consequences of differences in the process of elicitation of the information from experts. SSHAC made recommendations on the process, which are now almost uniformly adopted by analysts worldwide.

Severe Accident – An accident that usually involves extensive core damage and fission product release into the reactor vessel, containment, or the environment.

Shall, Should, and May – The word "shall" is used to denote a requirement; the word "should" is used to denote a recommendation; and the word "may" is used to denote permission, neither a requirement nor a recommendation.

Required Plant Shutdown Criteria – Appendix S to 10 CFR Part 50 (3) has the following information: Required Plant Shutdown. If vibratory ground motion exceeding that of the Operating Basis Earthquake Ground Motion or if significant plant damage occurs, the licensee must shut down the nuclear power plant. If systems, structures, or components necessary for the safe shutdown of the nuclear power plant are not available after the occurrence of the Operating Basis Earthquake Ground Motion, the licensee must consult with the Commission and must propose a plan for the timely, safe shutdown of the nuclear power plant. Prior to resuming operations, the licensee must demonstrate to the Commission that no functional damage has occurred to those features necessary for continued operation without undue risk to the health and safety of the public and the licensing basis is maintained.

Significant Contributor – (a) In the context of an accident sequence, a significant basic event or an initiating event that contributes to a significant sequence; (b) in the context of an accident progression sequence, a contributor that is an essential characteristic (e.g., containment failure mode, physical phenomena) of a significant accident progression sequence, and if not modeled would lead to the omission of the sequence.

Significant Basic Event – A basic event that has a Fussell-Vesely importance greater than 0.005 OR a risk-achievement worth greater than 2. significant cutset (relative to sequence): Those cutsets that,

when rank ordered by decreasing frequency, comprise 95 percent of the sequence CDF OR that individually contribute more than 1 percent to the sequence CDF.

Significant Cutset (relative to CDF) – Those cutsets that, when rank ordered by decreasing frequency, comprise 95 percent of the CDF OR that individually contribute more than 1 percent to CDF.

Significant Accident Sequence – A significant accident sequence is one of the set of sequences, defined at the functional or systemic level that, when rank ordered by decreasing frequency, comprise 95 percent of the core damage frequency (CDF), OR that individually contribute more than; 1 percent to the CDF.

Significant Accident Progression Sequence – One of a set of containment event tree sequences that, when rank ordered by decreasing frequency, comprise 95 percent of the large early release frequency (LERF), OR that individually contribute more than; 1 percent to the LERF.

Site Response (Amplification) – The amplification (i.e., increase or decrease) of earthquake ground motion by rock and soil near the earth's surface in the vicinity of the site of interest. Topographic effects, the effect of the water table, and basin edge wave-propagation effects are sometimes included under site response.

Spectral Acceleration – Peak acceleration response of an oscillator as a function of period or frequency and damping ratio when subjected to an acceleration time history. It is equal to the peak relative displacement of a linear oscillator of frequency, f , attached to the ground, times the quantity $(2Bf)^2$. It is expressed in units of gravity (g) or cm/second².

Stable Continental Region (SCR) – An SCR is composed of continental crust, including continental shelves, slopes, and attenuated continental crust, and excludes active plate boundaries and zones of currently active tectonics directly influenced by plate margin processes. It exhibits no significant deformation associated with the major Mesozoic-to-Cenozoic (last 240 million years) orogenic belts. It excludes major zones of Neogene (last 25 million years) rifting, volcanism, or suturing.

Stationary Poisson Process – A probabilistic model of the occurrence of an event over time (or space) that has the following characteristics: (1) the occurrence of the event in small intervals is constant over time (or space), (2) the occurrence of two (or more) events in a small interval is negligible, and (3) the occurrence of the event in non-overlapping intervals is independent.

Structure, System, or Component – A “structure” is an element, or a collection of elements, to provide support or enclosure, such as a building, free-standing tanks, basins, dikes, or stacks. A “system” is a collection of components assembled to perform a function, such as piping; cable trays; conduits; or heating, ventilation, and air-conditioning. A “component” is an item of mechanical or electrical equipment, such as a pump, valve, or relay, or an element of a larger array, such as a length of pipe, elbow, or reducer.

Support System – A system that provides a support function (e.g., electric power, control power, or cooling) for one or more other systems.

System Failure – Loss of the ability of a system to perform a modeled function.

Systems Analysis – That portion of the external events PRA analysis that applies to evaluating the impact of external events within the plant PRA model. In this context, the term “systems analysis”

encompasses the tasks related to identification of the SSCs to be included in the analysis, event sequence modeling, analysis of the failure of individual system functions within the sequences, and the integration and quantification of the overall PRA model.

Target Performance Goal (PF) – Target annual probability of exceeding the 1 E-05 frequency of onset of significant inelastic deformation (FOSID) limit state.

Tectonic Structure – A large-scale dislocation or distortion, usually within the earth's crust. Its extent may be on the order of tens of meters (yards) to hundreds of kilometers (miles).

Uncertainty – A representation of the confidence in the state of knowledge about the parameter values and models used in constructing the PRA. Also see "Variability," "Epistemic Uncertainty," and "Aleatory Variability."

Uncertainty (as used in seismic-fragility analysis) – The variability in the median seismic capacity arising from imperfect knowledge about the models and model parameters used to calculate the median capacity.

Uniform Hazard Response Spectrum (UHRS) – A plot of a ground response parameter (for example, spectral acceleration or spectral velocity) that has an equal likelihood of exceedance at different frequencies.

Up to Date – As used in this standard [for example, when the standard speaks of an "up-to-date database" in (HLR-HA-B)], the concept is that a reasonable attempt should be made to use all available data at the time of the application. However, routine updating of the data is not required if the data used reasonably represent what is needed for the application.

Variability – See "Epistemic Uncertainty" and "Aleatory Variability."

Verify – To determine that a particular action has been performed in accordance with the rules and requirements of this standard, either by witnessing the action or by reviewing records.

Volumetric Source Zone – A volume of the earth's crust within which future seismicity is assumed to have distributions of source properties and locations of energy release that do not vary in time and space.

Walkdown – Inspection of local areas in a nuclear power plant where SSCs are physically located in order to ensure accuracy of procedures and drawings, equipment location, operating status, and environmental effects or system interaction effects on the equipment that could occur during accident conditions. For seismic-PRA and SMA reviews, the walkdown is explicitly used to confirm preliminary screening and to collect additional information for fragility or margin calculations.

Within Motion – An earthquake record modified for use in a site response model. Within motions are developed through deconvolution of a surface recording to account for the properties of the overburden material at the level at which the record is to be applied. The within motion can also be called the "bedrock motion" if it occurs at a high-impedance boundary where rock is first encountered.

List of Questions

| | |
|--|----------|
| Natural Hazards and Ground Shaking Design Levels | 1 |
| 1) Does the NRC consider earthquakes of magnitude 9? | 1 |
| 2) Did the Japanese underestimate the size of the maximum credible earthquake that could affect the plants? | 1 |
| 3) Can an earthquake and tsunami as large as happened in Japan also happen here? | 1 |
| 4) What if an earthquake like the Sendai earthquake occurred near a US plant? | 1 |
| 5) What magnitude earthquake are US nuclear plants designed to? | 1 |
| 6) How many US reactors are located in active earthquake zones? | 2 |
| 7) Has this changed our perception of earthquake risk to the plants in the US? | 3 |
| 8) Why do we have confidence that US nuclear power plants are adequately designed for earthquakes and tsunamis? | 3 |
| 9) Can significant damage to a nuclear plant like we see in Japan happen in the US due to an earthquake? Are the Japanese nuclear plants similar to US nuclear plants? | 3 |
| 10) If the earthquake in Japan was a larger magnitude than considered by plant design, why can't the same thing happen in the US? | 3 |
| 11) What level of earthquake hazard are the US reactors designed for? | 3 |
| 12) How was the seismic design basis for existing nuclear plants established? | 4 |
| 13) What is the likelihood of the design basis or "SSE" ground motions being exceeded over the life of a nuclear plant? | 4 |
| 14) What is magnitude anyway? What is the Richter Scale? What is intensity? | 4 |
| 15) How do magnitude and ground motion relate to each other? | 5 |
| 16) Which reactors are along coastal areas that could be affected by a tsunami? | 5 |
| 17) How are combined seismic and tsunami events treated in risk space? Are they considered together? | 5 |
| 18) How are aftershocks treated in terms of risk assessment? | 6 |
| 19) Could a "mega-tsunami" strike the U.S. East Coast as indicated in a recent Washington Post Weather Gang article? | 6 |
| Design Against Natural Hazards & Plant Safety in the US..... | 7 |
| 20) Are US nuclear plants designed for tsunamis? If so, what level of tsunami are they designed for? 7 | |
| 21) Is there a minimum earthquake shaking that nuclear plants designed for? | 7 |

| | |
|--|-----------|
| 22) Which plants are close to known active faults? What are the faults and how far away are they from the plants?..... | 7 |
| 23) Is there margin above the design basis?..... | 7 |
| 24) Are US plants safe? Would a plant in the U.S. be able to withstand a large earthquake?..... | 8 |
| 25) Could an accident sequence like the one at Japan's Fukushima Daiichi nuclear plants happen in the US? | 8 |
| 26) Should US nuclear facilities be required to withstand earthquakes and tsunamis of the kind just experienced in Japan? If not, why not? | 8 |
| 27) Do any plants have special design considerations associated with seismic design?..... | 9 |
| 28) How do we know equipment will work if the magnitude is bigger than expected, like in Japan? | 9 |
| 29) How do we know that the equipment in plants is safe in earthquakes? | 9 |
| 30) Are US plants susceptible to the same kind of loss of power as happened in Japan? | 9 |
| 31) How do we know that the emergency diesel generators will not fail to operate like in Japan? | 10 |
| 32) Is there a risk of loss of water during tsunami drawdown? Is it considered in design? | 10 |
| 33) Are aftershocks considered in the design of equipment at the plants? Are aftershocks considered in design of the structure? | 10 |
| 34) Are there any special issues associated with seismic design at the plants? For example, Diablo Canyon has special requirements. Are there any others?..... | 10 |
| 35) Is the NRC planning to require seismic isolators for the next generation of nuclear power plants? How does that differ from current requirements and/or precautions at existing US nuclear power plants? | 10 |
| 36) Are there any US nuclear power plants that incorporate seismic isolators? What precautions are taken in earthquake-prone areas? | 11 |
| 37) Do you think that the recent Japan disaster will cause any rethinking of the planned seismic isolation guidelines, particularly as it regards earthquakes and secondary effects such as tsunamis? | 11 |
| Seismically Induced Fire..... | 12 |
| 38) How does the NRC address seismic-induced fire?..... | 12 |
| 39) Does the NRC require the fire protection water supply system be designed to withstand an earthquake? | 12 |
| 40) How are safe shutdown equipment protected from an oil spill which can cause potential fire? | 12 |
| 41) How are safe shutdown equipment protected from a hydrogen fire? | 13 |

| | |
|---|-----------|
| Seismically Induced Internal Flooding | 14 |
| 42) How does the NRC consider seismically induced equipment failures leading to internal flooding? | 14 |
| 43) How is the potential source of internal flooding from the seismically induced equipment failures postulated in the internal flood analysis? | 14 |
| 44) Are the non-safety-related equipment failures assumed to occur at the same time? | 15 |
| About Japanese Hazard, Design and Earthquake Impact..... | 16 |
| 45) Was the damage to the Japanese nuclear plants mostly from the earthquake or the tsunami?..... | 16 |
| 46) What was the disposition of the plant during the time after the earthquake struck and before the tsunami arrived? Was there indication of damage to the plant solely from the earthquake (if so, what systems) and did emergency procedures function during this time. | 16 |
| 47) What magnitude earthquake was the plant designed to withstand? For example, what magnitude earthquake was the plant expected to sustain with damage but continued operation? And with an expected shutdown but no release of radioactive material?..... | 16 |
| 48) Did this reactor sustain damage in the July 16, 2007 earthquake, as the Kashiwazaki power plant did? What damage and how serious was it? | 16 |
| 49) Was the Fukushima power plant designed to withstand a tsunami of any size? What specific design criteria were applied? | 17 |
| 50) What is the design level of the Japanese plants? Was it exceeded?..... | 17 |
| 51) What are the Japanese S_1 and S_2 ground motions and how are they determined? | 17 |
| 52) Did this earthquake affect the Kashiwazaki-Kariwa nuclear power plant? | 18 |
| 53) How high was the tsunami at the Fukushima nuclear power plants? | 18 |
| 54) Wikileaks has a story that quotes US embassy correspondence and some un-named IAEA expert stating that the Japanese were warned about this ... Does the NRC want to comment? | 18 |
| Impact at US Nuclear Power Plants During the March 11, 2011 Earthquake and Tsunami? ... | 20 |
| 55) Was there any damage to US reactors from either the earthquake or the resulting tsunami? | 20 |
| 56) Have any lessons for US plants been identified? | 20 |
| NRC Response and Future Licensing Actions | 21 |
| 57) What is the NRC doing about the emergencies at the nuclear power plants in Japan? Are you sending staff over there? | 21 |
| 58) With NRC moving to design certification, at what point is seismic capability tested – during design or modified to be site-specific? If in design, what strength seismic event must these be built to withstand? | 21 |

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|---|--|-----------|
| 59) | What are the near term actions that U.S. plants are taking in consideration of the events in Japan? | 21 |
| 60) | What are the immediate steps NRC is taking? | 22 |
| 61) | Should U.S. residents be using Potassium iodide? | 22 |
| Reassessment of US Plants and Generic Issue 199 (GI-199) | | 23 |
| 62) | What is Generic Issue 199 about? | 23 |
| 63) | Does the NRC have a position on the MSNBC article that ranked the safety of US plants? | 23 |
| 64) | A recent Can we get the rankings of the plants in terms of safety? (Actually this answer should be considered any time GI-199 data is used to “rank” plants) | 23 |
| 65) | What are the current findings of GI-199? | 23 |
| 66) | If the plants are designed to withstand the ground shaking why is there so much risk from the design level earthquake? | 23 |
| 67) | Overall, how would the NRC characterize the CDF numbers? A quirk of numbers? A serious concern? | 24 |
| 68) | Describe the study and what it factored in – plant design, soils, previous quakes, etc. | 24 |
| 69) | Explain “seismic curve” and “plant level fragility curve” | 24 |
| 70) | Explain the “weakest link model” | 25 |
| 71) | What would constitute fragility at a plant? | 25 |
| 72) | Can someone put that risk factor into perspective, using something other than MSNBC’s chances of winning the lottery? | 25 |
| 73) | What, if anything, can be done at a site experiencing such a risk? (Or at Limerick in particular.) | 25 |
| 74) | Has anyone determined that anything SHOULD be done at Limerick or any of the other PA plants? | 25 |
| 75) | Page 20 of the report: This result confirms NRR’s conclusion that currently operating plants are adequately protected against the change in seismic hazard estimates because the guidelines in NRR Office Instruction LIC-504 “Integrated Risk-Informed Decision Making Process for Emergent Issues” are not exceeded. Can someone please explain? | 25 |
| 76) | Is the earthquake safety of US plants reviewed once the plants are constructed? | 26 |
| 77) | Does the NRC ever review tsunami risk for existing plants? | 26 |
| 78) | Does GI-199 consider tsunami? | 26 |
| 79) | Where can I get current information about Generic Issue 199? | 26 |
| 80) | Are all US plants being evaluated as a part of Generic Issue 199? | 26 |

| | |
|--|-----------|
| 81) Are the plants safe? If you are not sure they are safe, why are they not being shut down? If you are sure they are safe, why are you continuing evaluations related to this generic issue?..... | 27 |
| 82) What do you mean by "increased estimates of seismic hazards" at nuclear power plant sites? | 27 |
| 83) Does the SCDF represent a measurement of the risk of radiation RELEASE or only the risk of core damage (not accounting for secondary containment, etc.)? | 28 |
| 84) Did an NRC spokesperson tell MSNBC's Bill Dedman that the weighted risk average was invalid and useless? He contends to us that this is the case. | 28 |
| 85) 3. If it was "invalid" as he claims, why would the USGS include that metric?..... | 28 |
| 86) Can you explain the weighted average and how it compares to the weakest link average? | 28 |
| 87) Ultimately would you suggest using one of the models (average, weighted, weakest link) or to combine the information from all three?..... | 28 |
| 88) Were there any other factual inaccuracies or flaws in Mr. Dedman's piece you would like clarify/point out. | 28 |
| 89) Mr. Dedman infers that the plant quake risk has grown (between the 1989 and 2008 estimates) to the threshold of danger and may cross it in the next study. Is this the NRC's position? | 29 |
| 90) What document has the latest seismic hazard estimates (probabilistic or not) for existing nuclear power plants in the western US?..... | 29 |
| 91) The GI-199 documents refer to newer data on the way. Have NRC, USGS et al. released those? I'm referring to this: "New consensus seismic-hazard estimates will become available in late 2010 or early 2011 (these are a product of a joint NRC, US Department of Energy, US Geological Survey (USGS) and Electric Power Research Institute (EPRI) project). These consensus seismic hazard estimates will supersede the existing EPRI, Lawrence Livermore National Laboratory, and USGS hazard estimates used in the GI-199 Safety/Risk Assessment." | 29 |
| 92) What is the timetable now for consideration of any regulatory changes from the GI-199 research?..... | 30 |
| Seismic Probabilistic Risk Assessment (SPRA)..... | 31 |
| 93) The NRC increasingly uses risk-information in regulatory decisions. Are risk-informed PRAs useful in assessing an event such as this? | 31 |
| State-of-the-art Reactor Consequence Analysis (SOARCA)..... | 32 |
| 94) What severe accident research is the U.S. Nuclear Regulatory Commission (NRC) doing? ... | 32 |
| 95) Why is the NRC performing the SOARCA study? | 32 |
| 96) Does the NRC intend to revisit previous risk studies? | 32 |
| 97) How will the SOARCA study be different from earlier studies?..... | 33 |

| | |
|--|-----------|
| Defense-in-Depth and Severe Accident Management..... | 34 |
| 99) Although there undoubtedly will be many lessons learned about severe accidents from the tragic events at Fukushima, have you identified any early lessons? | 34 |
| 100) What procedures do U.S. plants have for responding to an unexpected event like the events in Japan. | 34 |
| 101) What are Severe Accident Management Guidelines | 35 |
| Spent Fuel Pools and Independent Spent Fuel Storage Installations | 36 |
| 102) Are Independent Spent Fuel Storage Installations (ISFSIs) required to withstand the same ground shaking as the reactor? | 36 |
| 103) What do we know about the potential for and consequences of a zirconium fire in the spent fuel pool? | 36 |
| 104) Can a zirconium fuel fire be prevented by wide spacing of spent fuel assemblies in the spent fuel pool? | 36 |
| 105) Are the implications of new seismic hazard estimates being considered for the storage of spent fuel? | 36 |
| 106) What are the design acceptance criteria for cooling systems for the spent fuel pools? | 37 |
| 107) How does B.5.b apply to spent fuel pools?..... | 37 |
| Station Blackout | 39 |
| 108) What is the definition of station blackout? | 39 |
| 109) What is the existing regulatory requirement regarding SBO?..... | 39 |
| 110) How many plants have an alternate ac (AAC) source with the existing EDGs | 39 |
| 111) How many plants cope with existing class 1E batteries?..... | 39 |
| 112) What are the coping duration determined for the plants based on the SBO Rule ?..... | 39 |
| 113) How is coping duration determined? | 40 |
| 114) When does the SBO event start? | 40 |
| 115) When does the SBO event end? | 40 |
| 116) Did the NRC review the licensee's actions to meet the SBO rule? | 40 |
| 117) Are all plants designed to mitigate a station blackout event? | 40 |
| Emergency Preparedness (Emphasis on B.5.b) | 41 |
| 118) Is the emergency preparedness planning basis for nuclear power plants is valid? | 41 |
| 119) What is B.5.b? | 41 |
| 120) What were Phases 1, 2, and 3 of the B.5.b? | 41 |
| 121) Has the NRC inspected full implementation of the mitigating strategies? | 42 |

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|--|-----------|
| 122) What additional action has been taken? | 42 |
| 123) Is more information available about the mitigating strategies and inspections and reviews conducted? | 42 |
| Other External Hazards..... | 43 |
| 124) How many plants are in hurricane zones? | 43 |
| 125) How many plants are susceptible to flooding? | 43 |
| 126) How many plants are susceptible to blizzard? | 43 |
| 127) How many plants are susceptible to tornadoes? | 43 |
| Plant-Specific Questions | 44 |
| San Onofre Nuclear Generating Station (SONGS) Questions | 44 |
| 128) Could an earthquake and tsunami the size of the one in Japan happen at San Onofre? | 44 |
| 129) What magnitude earthquake are currently operating US nuclear plants such as SONGS designed to? | 44 |
| 130) Could San Onofre withstand an earthquake of the magnitude of the Japanese earthquake? | 44 |
| 131) Is possible to have a tsunami at San Onofre that is capable of damaging the plant? | 44 |
| 132) Has the earthquake hazard at San Onofre been reviewed like Diablo Canyon nuclear power plant is doing? Are they planning on doing an update before relicensing? | 45 |
| 133) How do we know that the emergency diesel generators in San Onofre will not fail to operate like in Japan? | 45 |
| 134) Was there any damage to San Onofre from either the earthquake or the resulting tsunami? | 45 |
| 135) What about emergency planning for San Onofre. Does it consider tsunami? | 45 |
| 136) SONGS received a white finding in 2008 for 125VDC battery issue related to the EDGs that went undetected for 4 years. NRC issued the white finding as there was increased risk that one EDG may not have started due to a low voltage condition on the battery on one Unit (Unit 2). Aren't all plants susceptible to the unknown? Is there any assurance the emergency cooling systems will function as desired in a Japan-like emergency? | 46 |
| 137) What is the height of water that SONGS is designed to withstand? | 46 |
| 138) What about drawdown and debris? | 46 |
| 139) Will this be reviewed in light of the Japan earthquake. | 46 |
| 140) Could all onsite and offsite power be disrupted from SONGS in the event of a tsunami, and if that happened, could the plant be safely cooled down if power wasn't restored for days after? | 46 |
| 141) Are there any faults nearby SONGS that could generate a significant tsunami? | 47 |

| | |
|---|----|
| 142) What magnitude or shaking level is SONGS designed to withstand? How likely is an earthquake of that magnitude for the SONGS site? | 47 |
| 143) Could SONGS withstand an earthquake of the magnitude of the Japanese earthquake? | 47 |
| 144) What about the evacuation routes at SONGS? How do we know they are reasonable? | 47 |
| 145) Regarding tsunami at DCNPP and SONGS, is the tsunami considered separately from flooding in licensing? And from the design perspective, is the flood still the controlling event for those plants rather than the tsunami? | 47 |
| 146) What is the design level flooding for San Onofre? Can a tsunami be larger? | 48 |
| 147) Is there potential linkage between the South Coast Offshore fault near SONGS and the Newport-Inglewood Fault system and/or the Rose Canyon fault? Does this potential linkage impact the maximum magnitude that would be assigned to the South Coast Offshore fault and ultimately to the design basis ground motions for this facility? | 48 |
| Diablo Canyon Nuclear Power Plant (DCNPP) Questions | 49 |
| 148) Could an earthquake and tsunami the size of the one in Japan happen at Diablo Canyon? | 49 |
| 149) What magnitude earthquake are currently operating US nuclear plants such as Diablo Canyon designed to? | 49 |
| 150) Could the newly discovered Shoreline Fault produce a larger "Scenario Earthquake"? | 49 |
| 151) Could Diablo Canyon withstand an earthquake of the magnitude of the Japanese earthquake? | 49 |
| 152) Is Diablo Canyon's equipment vulnerable to tsunami? | 49 |
| 153) How do we know that the emergency diesel generators in Diablo Canyon will not fail to operate like in Japan? | 49 |
| 154) Was there any damage to Diablo Canyon from either the earthquake or the resulting tsunami? | 50 |
| 155) How do we know the evacuation routes in the region around Diablo Canyon are realistic? | 50 |
| 156) Now after the Japan tragedy, will the NRC finally hear us (A4NR) and postpone DC license renewal until seismic studies are complete? How can you be sure that what happened there is not going to happen at Diablo with a worse case earthquake and tsunami? | 50 |
| 157) The evacuation routes at DCNPP see are not realistic. Highway 101 is small...and can you imagine what it will be like with 40K people on it? Has the evacuation plan been updated w/ all the population growth? | 50 |
| 158) Are there local offshore fault sources capable of producing a tsunami with very short warning times? | 50 |
| 159) Are there other seismically induced failure modes (other than tsunami) that would yield LTSBO? Flooding due to dam failure or widespread liquefaction are examples. | 50 |

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|---|-------------------------------------|
| 160) Ramifications of beyond design basis events (seismic and tsunami) and potential LTSBO on spent fuel storage facilities? | 50 |
| 161) Why did the Emergency Warning go out for a 'tsunami' that was only 6 ft (1.8 m) high? Do these guys really know what they're doing? Would they know it if a big one was really coming? Crying wolf all the time doesn't instill a lot of confidence. | 51 |
| 162) How big did the Japanese think an earthquake and tsunami could be before March 11, 2011? Why were they so wrong (assuming this earthquake/tsunami was bigger than what they had designed the plant for)?..... | Error! Bookmark not defined. |
| The Japanese were supposed to have one of the best tsunami warning systems around. What went wrong last week? | 51 |
| 163) Shouldn't the NRC make licensees consider a Tsunami coincident with a seismic event that triggers the Tsunami? | 51 |
| 164) Given that SSCs get fatigued over time, shouldn't the NRC consider after-shocks in seismic hazard analyses? | 51 |
| 165) Did the Japanese also consider an 8.9 magnitude earthquake and resulting tsunami "way too low a probability for consideration"?..... | 51 |
| 166) GI-199 shows that the scientific community doesn't know everything about the seismicity of CEUS. And isn't there a prediction that the West coast is likely to get hit with some huge earthquake in the next 30 years or so? Why does the NRC continue to license plants on the west coast? 51 | |
| 167) Has anyone done work to look at the effect of many cycles of low amplitude acceleration following a larger event. How do we know a plant would be fit to start back up after an event? We cannot possibly do NDE on everything to determine if flaws have propagated to the point where they need to be replaced. | 52 |
| 168) Aren't the California plants right on the San Andreas fault? | 53 |
| Indian Point Questions..... | 53 |
| 169) Why is Indian Point safe if there is a fault line so close to it?..... | 53 |
| Pending and Unanswered Questions from Members of Congress..... | 55 |
| 170) Received 3/16/11 from Congresswoman Lowey..... | 55 |
| 171) From 3/16/11 Press Release from Senators Boxer and Feinstein | 55 |
| 172) From 3/15/11 Press Release from Congresspeople Markey and Capps..... | 57 |
| Additional Information: Useful Tables..... | 59 |
| Table of Design Basis Ground Motions for US Plants | 59 |
| Table of SSE, OBE and Tsunami Water Levels..... | 61 |
| Table of Plants Near Known Active Faults or in High or Moderate Seismicity Zones..... | 66 |

| | |
|---|-----------|
| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE), and Seismic Core Damage Frequencies | 67 |
| Table: Design Basis Ground Motions and New Review Level Ground Motions Used for Review of Japanese Plants..... | 72 |
| Table: Status of Review of Japanese NPPs to New Earthquake Levels Based on 2006 Guidance | 74 |
| Additional Information: Useful Plots..... | 75 |
| Plot of Mapped Active Quaternary Faults and Nuclear Plants in the US..... | 75 |
| Nuclear Plants in the US Compared to the USGS National Seismic Hazard Maps..... | 76 |
| USGS US National Seismic Hazard Maps..... | 76 |
| Plot of Nuclear Plants in the US Compared to Recent Earthquakes..... | 77 |
| UCERF Map of California Earthquake Probabilities for Northern versus Southern California | 77 |
| Plot of ground motion acceleration (PGA) from Japanese earthquake | 78 |
| Plot of Tsunami Wave Heights at 5 Meter Bathymetry Offshore at the Japanese Plants (NOAA)..... | 80 |
| Plot of Tsunami Wave Heights in the Pacific (NOAA) | 81 |
| Fact Sheets..... | 82 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (High level overview) | 82 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (The policy work version) | 83 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (The cliff notes)... | 85 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Tsunami | 86 |
| Fact Sheet: Tsunami Assessment Method for Nuclear Power Plants in Japan..... | 87 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Flooding..... | 88 |
| 173) Does the NRC consider severe floods in the design of nuclear power plants? | 88 |
| 174) What about droughts and conditions which lead to low water? Are these considered? | 89 |
| 175) Periods of long rainfall can cause the groundwater elevation to rise which can cause structures such as deeply embedded tanks to fail due to buoyancy. Are nuclear power plants designed to withstand this effect? | 89 |
| 176) Some of the Reports from the National Weather Service used to estimate the design precipitation are 30-40 years old. Are these estimates still valid?..... | 89 |
| Fact Sheet: Summarization of Seismological Information from Regional Instrumentation | 90 |
| Fact Sheet: Regulatory Framework for Protection of Nuclear Power Plants against Tsunami Flooding | 91 |
| Fact Sheet: Seismic Zones and US Plants..... | 94 |
| Fact Sheet: Seismicity of the Central and Eastern US (In-depth technical information)..... | 98 |
| Fact Sheet: US Portable Array Information..... | 100 |
| Fact Sheet: The B.5.b Rule (10 CFR 50.54hh/B.5.b)..... | 102 |

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Fact Sheet: Generic Issue GI-199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants" 104

Fact Sheet: Station Blackout Rule 106

Terms and Definitions 107

List of Questions..... 120

From: Burnell, Scott
To: Hayden, Elizabeth
Cc: Screnci, Diane; Sheehan, Neil
Subject: RE: Need talking points on GSI-199
Date: Wednesday, March 23, 2011 12:33:00 PM

I believe the existing seismic Q&A on the Japan page covers this to some degree.

From: Hayden, Elizabeth
Sent: Wednesday, March 23, 2011 12:30 PM
To: Burnell, Scott
Cc: Screnci, Diane; Sheehan, Neil
Subject: Need talking points on GSI-199

Scott, Neil

I need you to draft some talking points on GSI-199 that summarizes briefly what has happened between the USGS data in 2008 to what we did with that information and what we are doing now and plan to do in the future (GL, analysis, inspections per what timeline?) We also need to clarify what the list of 27 plants mean etc.

A specific question from Hannah Northey, Greenwire, is when did NRC start looking at plants with regard to the 2008 data from USGS? Please call her at (b)(6) to clarify specifics on GSI-199.

Beth Hayden
Senior Advisor
Office of Public Affairs
U.S. Nuclear Regulatory Commission
--- Protecting People and the Environment
301-415-8202
elizabeth.hayden@nrc.gov

SSSS/148

From: Burnell, Scott
To: Daly, Matthew; Brenner, Eliot
Subject: RE: Questions re temps at FD plant
Date: Wednesday, March 23, 2011 11:05:00 AM

Hi Matthew;

We're simply not in a position to be commenting on "the latest snapshot" of conditions at the plants, and certainly not at the level of detail you're asking for.

The best reply I can give you is that the NRC continues to evaluate information from multiple sources regarding conditions at the Fukushima Daiichi site and the nearby environment. Our ongoing evaluation continues to support the agency's recommendation last week that U.S. citizens should remain 50 miles from the site.

Thanks.

Scott Burnell
Public Affairs Officer
Nuclear Regulatory Commission

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

From: Daly, Matthew [<mailto:MDaly@ap.org>]
Sent: Wednesday, March 23, 2011 10:56 AM
To: Brenner, Eliot; Burnell, Scott
Subject: Questions re temps at FD plant

Hi Eliot, Scott,

We are trying to learn what are the temperatures and pressures inside the 6 reactor vessels at Fukushima and the temperatures inside the 7 spent fuel pools at FD1. Are they rising or falling? Does TEPCO have seawater or any other cooling water circulating around or inside all those cores? Are the temperatures in cores and spent fuel pools under control, or are they perhaps getting hotter and hotter and hotter? Is there any significant danger of further fuel melting in any of the cores? Any info you can provide on these questions, which come from our folks in Japan, much appreciated. Best, Matthew

Matthew Daly
Environment/Energy Correspondent
The Associated Press
1100 13th Street NW, Suite 700
Washington, DC 20005
202-641-9541 direct
(b)(6) cell
<http://twitter.com/MatthewDalyWDC>

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SSSS/150

and delete this e-mail. Thank you.
[IP_US_DISC]
msk dccc60c6d2c3a6438f0cf467d9a4938

From: Burnell, Scott
To: Dennig, Robert
Cc: Collins, Timothy; Bettie, Jerome
Subject: RE: Vent paths
Date: Wednesday, March 23, 2011 1:11:00 PM

I'll reply that the second pathway is standby gas treatment ducting. Thanks!

From: Dennig, Robert
Sent: Wednesday, March 23, 2011 1:08 PM
To: Burnell, Scott
Cc: Collins, Timothy; Bettie, Jerome
Subject: RE: Vent paths

The vent pathways for US Mark I's are (1) standby gas treatment system ducting, and (2) hardened vent from the torus.

From: Burnell, Scott
Sent: Wednesday, March 23, 2011 1:04 PM
To: Dennig, Robert
Cc: Collins, Timothy; Bettie, Jerome
Subject: RE: Vent paths

All;

The question is purely based on the EDO's comments Monday morning, we only need to explain the two U.S. vent paths.

Scott

From: Dennig, Robert
Sent: Wednesday, March 23, 2011 12:21 PM
To: Burnell, Scott
Cc: Collins, Timothy; Bettie, Jerome
Subject: RE: Vent paths

It's complicated.

We (NRR/SCVB) do not know the Japanese plant configuration, and we don't know what they did to vent. US BWR Mark I's can vent through the standby gas treatment system, as designed, if AC power is available, but would not do so if there was indication of fuel damage or AC power was lost. US BWR Mark1's have another path from the torus that bypasses the standby gas treatment system and goes directly to atmosphere. This vent path is "hardened" to withstand high pressure, and can be operated with or without power. The preferred vent path under conditions such as Fukushima would be the hardened vent.

From: Burnell, Scott
Sent: Wednesday, March 23, 2011 11:06 AM
To: Dennig, Robert
Cc: Collins, Timothy
Subject: FW: Vent paths

Bob;

SSSS/151

Is this an acceptable answer? Thanks.

Scott

From: Collins, Timothy
Sent: Wednesday, March 23, 2011 10:21 AM
To: Burnell, Scott; Thadani, Mohan
Cc: Nelson, Robert
Subject: RE: Vent paths

Mohan,

This is my understanding:

The second (less desirable) path takes suction off the drywell airspace (as opposed to the suppression pool airspace). The suppression pool airspace suction path is preferable because it provides for a fission product scrubbing of the discharge through the suppression pool prior to the release. There is no scrubbing of the release if the drywell airspace suction path is used.

Can you confirm?

Tim C

From: Burnell, Scott
Sent: Wednesday, March 23, 2011 9:32 AM
To: Thadani, Mohan; Collins, Timothy
Cc: Nelson, Robert
Subject: FW: Vent paths

Mohan, Tim;

The Mark I hits just keep on a-coming... Not a lot of detail needed here, I think. Thanks.

Scott

From: Xie, Yanmei [mailto:yanmei_xie@platts.com]
Sent: Tuesday, March 22, 2011 3:24 PM
To: Burnell, Scott
Subject: Vent paths

Hi, Scott,

Sorry for my steam of questions. During yesterday's briefing, Mr. Borchardt provided the following answer to one of the questions. He said there are two vents paths off of US Mark I containments, but he only mentioned one. Would you be able to find out what the other path is? Thank you!

MR. BORCHARDT: There's two vent paths off
15 of the U.S. Mark I containments. The preferred vent path takes suction, if you

16 will, or has a release path from the airspace above a pool of water that's in the
17 basement, it's in the torus of the Mark I containment, and that would allow for the
18 steam that went into the torus to be scrubbed of fission products, so you would
19 have a release; it would relieve the pressure, which is the main objective of the
20 vent, is, you want to maintain the containment integrity. And it's preferable to
21 vent it on purpose to get the pressure so that you don't have a catastrophic
22 failure of the containment. So it's at least my
24 belief that you wouldn't have the hydrogen accumulation in the upper levels of
25 the reactor building, which we believe is the cause of the explosions. Now, the
26

1 spent fuel pools on these designs are also on that same level, on the upper level
2 of the reactor building. So it's, the hardened vent wouldn't do anything to help
3 hydrogen that came from the spent fuel pool

Yanmei Xie

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From: Coe, Doug
To: Beasley, Benjamin; Kauffman, John; Killian, Lauren
Cc: Burnell, Scott; Hayden, Elizabeth; Skeen, David; Hiland, Patrick
Subject: RE: ACTION: Talking points on GI-199
Date: Wednesday, March 23, 2011 1:45:13 PM

Ben/John/Lauren,

Can we help out OPA by extracting bullets per Eric Leed's request? Just pull directly from the Comm plan but put into a brief but logical flow of bullets.

From: Hiland, Patrick
Sent: Wednesday, March 23, 2011 1:39 PM
To: Leeds, Eric
Cc: Khanna, Meena; Burnell, Scott; Hayden, Elizabeth; Grobe, Jack; Skeen, David; Coe, Doug; Beasley, Benjamin
Subject: RE: ACTION: Talking points on GI-199

We have a communication plan; I'll retrieve and make sure up to date.

From: Leeds, Eric
Sent: Wednesday, March 23, 2011 1:38 PM
To: Hiland, Patrick; Skeen, David
Cc: Khanna, Meena; Burnell, Scott; Hayden, Elizabeth; Grobe, Jack
Subject: ACTION: Talking points on GI-199

DE –

Please provide OPA with talking points on GI-199. Scott Burnell is their POC. They need high level info – the schedule for review, upcoming public meetings, why it's ok to wait, what we'll do with the info once we get it, etc. I don't think we need hard-core technical bullets on response spectra, etc, but we do need to be able to tell the public WHY things are ok right now (not just repeat reactors are safe right now), and what we'll do going forward.

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

SSSS/152

From: Landau, Mindy
To: Burnell, Scott
Subject: Re: NRC Reply - Market Watch NY
Date: Wednesday, March 23, 2011 1:45:21 PM

Got it

Sent from my NRC Blackberry
Mindy Landau
(b)(6)
Mindy.Landau@nrc.gov

From: Burnell, Scott
To: Landau, Mindy; Couret, Ivonne
Sent: Wed Mar 23 13:44:39 2011
Subject: RE: NRC Reply - Market Watch NY

No, not our jurisdiction.

From: Landau, Mindy
Sent: Wednesday, March 23, 2011 1:41 PM
To: Burnell, Scott
Subject: Fw: NRC Reply - Market Watch NY

I assume we don't want to venture into this territory?

Sent from my NRC Blackberry
Mindy Landau
(b)(6)
Mindy.Landau@nrc.gov

From: Gelsi, Steven <SGelsi@marketwatch.com>
To: Landau, Mindy
Sent: Wed Mar 23 13:26:47 2011
Subject: RE: NRC Reply - Market Watch NY

Hello Mindy

Is it possible to look up any proposed nuclear plants that have received an investment from Tokyo Electric Power? They had planned to invest in a plant being built by NRG and I wanted to see if there were any other. Thanks.

Steve Gelsi
Energy Reporter
MarketWatch
(b)(6)

From: Landau, Mindy [mailto:Mindy.Landau@nrc.gov]
Sent: Wednesday, March 16, 2011 4:18 PM
To: Gelsi, Steven
Subject: RE: NRC Reply - Market Watch NY

Steve, we have no confirmation of that.

Mindy Landau (assisting Public Affairs)

From: Gelsi, Steven <SGelsi@marketwatch.com>
To: Couret, Ivonne
Sent: Wed Mar 16 11:21:43 2011
Subject: RE: NRC Reply - Market Watch NY

Hello Ivonne

ABC news reported about two hours ago that a large American nuclear response team of hundreds of military and other folks is on its way to Japan.
I didn't see anything else about this on your web site? Could you confirm?

From: Couret, Ivonne [mailto:Ivonne.Couret@nrc.gov]
Sent: Monday, March 14, 2011 1:13 PM
To: Gelsi, Steven
Subject: RE: NRC Reply - Market Watch NY

11:45a.m.

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs



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From: Gelsi, Steven [mailto:SGelsi@marketwatch.com]
Sent: Monday, March 14, 2011 1:11 PM
To: Couret, Ivonne
Subject: RE: NRC Reply - Market Watch NY

Thanks how long has this been out? Dow Jones Newswires just flashed headlines on it

From: Couret, Ivonne [mailto:Ivonne.Couret@nrc.gov]
Sent: Monday, March 14, 2011 1:08 PM
To: Gelsi, Steven
Subject: RE: NRC Reply - Market Watch NY

Ivonne L. Couret
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From: Gelsi, Steven [mailto:SGelsi@marketwatch.com]
Sent: Monday, March 14, 2011 1:06 PM
To: Couret, Ivonne
Subject: RE: NRC Reply - Market Watch NY

Hello could you please send over release ASAP about Japan formally asking US for help in cooling reactors? Thanks

STEVE GELSI

From: Couret, Ivonne [mailto:Ivonne.Couret@nrc.gov]
Sent: Sunday, March 13, 2011 1:00 PM
To: Gelsi, Steven
Subject: RE: NRC Reply - Market Watch NY

New Reactor Application under review - <http://www.nrc.gov/reactors/new-reactors/col.html> - There have been request from the licensee specifically talking about Vogtle Limited Work Authorization (LWA)

Limited work authority regulations to allow some preconstruction activities without NRC approval, such as site clearing, road building, and transmission line routing. Other activities require authorization by NRC. Thus applicants must place request for LWA. Does this help? Ivonne

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs



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<http://portal.nrc.gov/OCM/opa/blog/default.aspx>



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From: Gelsi, Steven [mailto:SGelsi@marketwatch.com]
Sent: Sunday, March 13, 2011 12:46 PM
To: Couret, Ivonne
Subject: RE: NRC Reply - Market Watch NY

Thanks – Ivonne, you said no construction permits have yet been issued, but there have been preliminary construction plants issued for at least one project.

From: Couret, Ivonne [mailto:Ivonne.Couret@nrc.gov]
Sent: Sunday, March 13, 2011 12:42 PM
To: Gelsi, Steven
Subject: NRC Reply - Market Watch NY

Steve -

Website link to BWR backgrounder – Diagrams hyperlinked
Information Digest provide summary of NRC regulatory activities is plain English -
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>
Details of current operating commercial Nuclear Reactors – Appendix A (attached)

Another resource is NEI.org website at <http://www.nei.org/newsandevents/information-on-the-japanese-earthquake-and-reactors-in-that-region>
Trust this helps. Ivonne

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs



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ivonne.couret@nrc.gov

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From: [Burnell, Scott](#)
To: [John Siciliano](#)
Subject: RE: Japan or safety review SECYs
Date: Wednesday, March 23, 2011 4:51:00 PM

Please keep an eye on the NRC home page and your e-mail if you're on our listserv.

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

From: John Siciliano [<mailto:jsiciliano@iwpnews.com>]
Sent: Wednesday, March 23, 2011 4:29 PM
To: Burnell, Scott
Subject: Japan or safety review SECYs

Scott -- Has there been any new staff briefs, SECYs on the nuclear review or Japan crisis?

--

John Siciliano, Managing Editor, Energy Washington Week (www.energywashington.com),

(b)(6)

SSSS/153

From: Burnell, Scott
To: John Siciliano
Subject: RE: Japan or safety review SECYs
Date: Thursday, March 24, 2011 8:59:00 AM

Hello John;

I hope you saw the press release as it went out late yesterday afternoon:

<http://www.nrc.gov/reading-rm/doc-collections/news/2011/11-055.pdf>

Thanks.

Scott

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

From: John Siciliano [<mailto:jsiciliano@iwpnews.com>]

Sent: Wednesday, March 23, 2011 4:29 PM

To: Burnell, Scott

Subject: Japan or safety review SECYs

Scott -- Has there been any new staff briefs, SECYs on the nuclear review or Japan crisis?

--

John Siciliano, Managing Editor, Energy Washington Week (www.energywashington.com),

(b)(6)

SSSS/154

From: [Lobsenz, George](#)
To: [Burnell, Scott](#)
Cc: [Brenner, Eliot](#)
Subject: RE: NRC response to Fukushima
Date: Wednesday, March 23, 2011 3:37:49 PM

Thanks Scott--(b)(6)

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Wednesday, March 23, 2011 3:37 PM
To: Lobsenz, George
Cc: Brenner, Eliot
Subject: RE: NRC response to Fukushima

Sorry, George, just that busy a day – phone # to call you @?

From: Lobsenz, George [mailto:George.Lobsenz@ihs.com]
Sent: Wednesday, March 23, 2011 3:35 PM
To: Burnell, Scott
Cc: Brenner, Eliot
Subject: NRC response to Fukushima

Hi guys-sorry to be a nudge, but the hour grows late and I would like to confirm NRC response to Japanese accident. I am seeing stories, but no NRC press release, on the agency picking 27 plants for new seismic reviews and that Jaczko has personally committed to a Indian Point review. Can you confirm and provide any specifics? Thanks

George

SSSS/155

From: [Burnell, Scott](#)
To: scott.disavino@thomsonreuters.com
Cc: kevin.krolicki@thomsonreuters.com; [Brenner, Eliot](#)
Subject: RE: international standards
Date: Wednesday, March 23, 2011 4:42:00 PM

Off the record, rephrase as you see fit –

The NRC-driven Mark I improvements rolled out nigh on 20 years ago, one would generally tend to think that would be a considerable amount of time for other regulators to consider such actions.

From: scott.disavino@thomsonreuters.com [mailto:scott.disavino@thomsonreuters.com]
Sent: Wednesday, March 23, 2011 3:39 PM
To: OPA Resource; Burnell, Scott
Cc: kevin.krolicki@thomsonreuters.com
Subject: international standards

Hi Scott or whoever is on

We're looking at international nuclear safety standards or best practices – specifically related to venting of the pressure vessel, radiation filters and redundant monitors for equipment in the plants

It's come to light that Japanese safety regulators may not have included these best practices in their reactors

I don't expect the NRC will bad mouth the Japanese regulators – at least not on the record

Can you talk about how the United States rolls out best practices –

Any specific mention of the venting, filters and redundant systems would be great

We're just looking for information on background –

But anything you can say on the record would be great,

Thanks,

Scott

Scott DiSavino
Correspondent
Thomson Reuters

Phone: 1 646 223 6072
Mobile: (b)(6)

SSSS/156

Email - scott.disavino@thomsonreuters.com

Reuters (Instant) Messaging - scott.disavino.thomsonreuters.com@reuters.net

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From: [Burnell, Scott](#)
To: scott.disavino@thomsonreuters.com
Cc: kevin.krolicki@thomsonreuters.com
Subject: RE: NRC certification of GE reactor design
Date: Thursday, March 24, 2011 9:20:00 AM

Just working through the backlog...

The NRC addressed Mark I containment issues in the 1980s and 1990s. Every Mark I plant's torus (which holds the "suppression pool" meant to condense steam releases from the reactor) was strengthened to ensure it would withstand the physical effects of a full steam release. Every Mark I plant installed hardened vents to allow controlled releases to the atmosphere in order to avoid hydrogen buildup – this enhances the plant's ability to maintain core cooling and prevent fuel damage. The NRC continues to conclude the BWR Mark I reactor and containment provide an appropriate means of protecting public health and safety.

How's that?

From: scott.disavino@thomsonreuters.com [mailto:scott.disavino@thomsonreuters.com]
Sent: Wednesday, March 23, 2011 4:16 PM
To: Burnell, Scott
Cc: kevin.krolicki@thomsonreuters.com
Subject: RE: NRC certification of GE reactor design

Thanks Scott

A different tack on the Japan regulators question

Do you have a list of recommended upgrades to the Mach 1 reactors in the US

Dealing with ventilation and filtering of the containment and vessel, hydrogen mitigation devices and redundant monitoring controls

We can compare what the NRC recommended (or required) to what the Japanese regulators imposed

Thanks,

Scott

Scott DiSavino
Correspondent
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Phone: 1 646 223 6072
Mobile: 1 (b)(6)

Email - scott.disavino@thomsonreuters.com

SSSS/157

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thomsonreuters.com

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Wednesday, March 23, 2011 1:34 PM
To: DiSavino, Scott P. (M Edit Ops)
Cc: O'Grady, Eileen (M Edit Ops); Rascoe, Ayesha r. (M Edit Ops)
Subject: RE: NRC certification of GE reactor design

Hello all again;

The current ESBWR certification schedule projects the NRC's final action late in 2011.

The agency has yet to determine what, if any, schedule impacts the events in Japan will have on new reactor certification and licensing reviews.

Scott

From: scott.disavino@thomsonreuters.com [mailto:scott.disavino@thomsonreuters.com]
Sent: Wednesday, March 23, 2011 1:31 PM
To: Burnell, Scott
Cc: eileen.ograde@thomsonreuters.com; ayesha.rascoe@thomsonreuters.com
Subject: RE: NRC certification of GE reactor design

Hi Scott,

A simple question on the ESBWR report – has Japan changed it in anyway –

My understanding is that this report is a step in the process to get to approving the design

Also any best guess on when this design will get a decision – fall 2011 – and that has Japan changed that date

Thanks,

Scott

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thomsonreuters.com

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]

Sent: Wednesday, March 23, 2011 12:52 PM
To: DiSavino, Scott P. (M Edit Ops)
Cc: O'Grady, Eileen (M Edit Ops); Rascoe, Ayesha r. (M Edit Ops)
Subject: RE: NRC certification of GE reactor design

Hello all!

(I feel I should do a Dinah Shore wave or something – yes, I'm a little brain-fried)

That's the "coming up tomorrow" FRN, if I recall correctly. If you're inclined to write something along the lines of "The NRC is expected to announce tomorrow draft language to certify the ESBWR," I wouldn't be in a position to argue but I also couldn't say anything additional. If you can wait until the "formal" Federal Register Notice tomorrow, things will be clearer all around. Is that OK?

Scott

From: scott.disavino@thomsonreuters.com [mailto:scott.disavino@thomsonreuters.com]
Sent: Wednesday, March 23, 2011 12:21 PM
To: OPA Resource; Burnell, Scott
Cc: eileen.ograde@thomsonreuters.com; ayesha.rascoe@thomsonreuters.com
Subject: RE: NRC certification of GE reactor design

Hi Scott or whoever is on at the NRC,

Ayesha Rascoe sent this over on the ESBWR – I'm guessing it's some step in the process to certifying the design, which I thought was not to be done until the fall of 2011

I guess I have a few questions

- Does this filing have anything to do with the events in Japan
- What does this filing mean
- does the NRC still expect to make a decision on the modified AP1000 and ESBWR designs in the fall of 2011
- And does the NRC expect to make decisions on any other designs this year

Thanks,

Scott

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thomsonreuters.com

From: Rascoe, Ayesha r. (M Edit Ops)
Sent: Wednesday, March 23, 2011 11:13 AM
To: DiSavino, Scott P. (M Edit Ops)
Subject: NRC certification of GE reactor design

Hey Scott,

This was in Federal Register today, its talking about design certification for the GE ESBWR reactor design. I don't know if this means they are certifying design or if this is news, so wanted to run by you.

http://www.ofr.gov/OFRUpload/OFRData/2011-06839_PI.pdf

Ayesha

Ayesha Rascoe
Energy Reporter
Thomson Reuters

Phone: 1-202-310-5683

Mobile: (b)(6)

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From: [Burnell, Scott](#)
To: [McIntyre, David](#)
Subject: FW: MEDIA FOLLOW UP SECOND EMAIL - aging reactors questions - chemical and engineering news
Date: Thursday, March 24, 2011 8:34:00 AM
Importance: High

Dave – anything from your spent fuel discussions yesterday that directly relate to Jeff's #4? I've got the rest.

From: Couret, Ivonne
Sent: Wednesday, March 23, 2011 5:18 PM
To: Burnell, Scott
Subject: MEDIA FOLLOW UP SECOND EMAIL - aging reactors questions - chemical and engineering news
Importance: High

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

Visit our online photo gallery. Incorporate graphics and photographs to tell your story!
<http://www.nrc.gov/reading-rm/photo-gallery/>

2010-2011 Information Digest - Where you can find NRC Facts at a Glance
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

From: Janbergs, Holly **On Behalf Of** OPA Resource
Sent: Wednesday, March 23, 2011 4:06 PM
To: Couret, Ivonne
Subject: FW: aging reactors

From: Jeffrey Johnson [mailto:J_Johnson@acs.org]
Sent: Wednesday, March 23, 2011 4:01 PM
To: OPA Resource
Subject: RE: aging reactors

Ok--tried to get reaction yesterday with no luck...so will be more specific today but I need a response:

1. What does NRC require today to make up for shortcomings in the Mark 1 reactors?
2. Are there additional NRC requirements for reactors operating in the 40 to 60 year lifetimes?
3. Is NRC considering extending them to 80 years?
4. In light of Japan's problem with spent fuel pools, will NRC speed up efforts to get waste into dry cask storage? And what percentage of spent fuel is currently in dry casks today?
5. Why not take a pause in operations of older reactors in light of situation in Japan while

5555/158

NRC conducts its review due to Japan issue?

Thanks for time—I know you are working hard but I have to file this story. Best, jeff johnson,
chemical and engineering news

From: Jeffrey Johnson
Sent: Tuesday, March 22, 2011 3:54 PM
To: 'opa.resource@nrc.gov'
Subject: aging reactors

Hi...I am writing an article on the age of U.S. basic baseload electricity generators...nuclear and coal-fired units. I am using the GE Mark 1 and the Japanese incident to get into story. I am trying to figure out if the 23 U.S. mark 1 units are identical to the Japanese units and if not how are they different? And what is the difference between the GE Mark 2,3,4 units. I see from the NRC information digest, they all are boiling water reactors but is there more to it? For instance, do any of them have sturdier containment structures and do they all store spent fuel next to the reactor? I am writing now and will try to be brief in my questions. But I would appreciate a relatively quick call back...give me a time and I will be available. Thanks, Jeff Johnson, Chemical & Engineering News

(b)(6)

From: [Jeffrey Johnson](#)
To: [Burnell, Scott](#)
Cc: [Couret, Ivonne](#)
Subject: RE: MEDIA FOLLOW UP SECOND EMAIL - aging reactors questions - chemical and engineering news
Date: Thursday, March 24, 2011 8:53:44 AM

Scott...I understand...this is a hard and busy time...will look at and respond if questions...I have been freaking out with this story and several others, which are not nuclear related...thank you for help, jeff

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Thursday, March 24, 2011 8:51 AM
To: Jeffrey Johnson
Cc: Couret, Ivonne
Subject: RE: MEDIA FOLLOW UP SECOND EMAIL - aging reactors questions - chemical and engineering news

Hi Jeff;

I do apologize for the delays, we're all pushing as hard as we can.

- 1) The Mark I containment issues were addressed in the 1980s and 1990s. Every Mark I plant's torus (which holds the "suppression pool" meant to condense steam releases from the reactor) was strengthened to ensure it would withstand the physical effects of a full steam release. Every Mark I plant installed hardened vents to allow controlled releases to the atmosphere in order to avoid hydrogen buildup – this enhances the plant's ability to maintain core cooling and prevent fuel damage. The NRC continues to conclude the BWR Mark I reactor and containment provide an appropriate means of protecting public health and safety.
- 2) License renewal reviews examine the potential environmental effects of an additional 20 years of operation, as well as a plant's ability to deal with the effects of aging on plant systems (particularly passive systems not covered by the NRC's "Maintenance Rule"). Regardless of where a plant is in its operating life (year 5, year 35, year 41 if renewed, etc) it must meet all relevant NRC regulations in order to continue operating. A renewed license is not a guarantee of 20 additional years, it only gives the plant the opportunity to continue meeting NRC requirements.
- 3) The NRC is working collaboratively with the Department of Energy and industry research to examine the technical issues relevant to possibly extending reactor licenses a second time. This is ongoing research – no agency decision on "second renewals" is expected for several years.
- 4) The NRC's position is that the fuel is stored safely, in pool or in cask, and there is not a safety reason to move fuel to cask. This topic will likely be part of our review of the Japan situation. About 22% of spent fuel is currently in cask, according to this 2010 report from Congressional Research Service to the BRC:
http://www.brc.gov/pdfFiles/CRS_BlueRibbonCommissionWastePolicyHistory.pdf
- 5) The NRC continues to conclude that all U.S. nuclear power plants are appropriately designed and operated to withstand the largest earthquakes considered possible at their

sites, based on analysis of thousands of years of a site's geologic record. All coastal plants are appropriately designed and operated to withstand the largest tsunami, storm surge or other flooding considered possible at their sites. The outline of the NRC's safety review is in the press release we put out late yesterday: <http://www.nrc.gov/reading-rm/doc-collections/news/2011/11-055.pdf>

Thanks, and let me know if you need anything else.

Scott

From: Jeffrey Johnson [mailto:J_Johnson@acs.org]

Sent: Wednesday, March 23, 2011 4:01 PM

To: OPA Resource

Subject: RE: aging reactors

Ok--tried to get reaction yesterday with no luck...so will be more specific today but I need a response:

1. What does NRC require today to make up for shortcomings in the Mark 1 reactors?
2. Are there additional NRC requirements for reactors operating in the 40 to 60 year lifetimes?
3. Is NRC considering extending them to 80 years?
4. In light of Japan's problem with spent fuel pools, will NRC speed up efforts to get waste into dry cask storage? And what percentage of spent fuel is currently in dry casks today?
5. Why not take a pause in operations of older reactors in light of situation in Japan while NRC conducts its review due to Japan issue?

Thanks for time—I know you are working hard but I have to file this story. Best, jeff johnson, chemical and engineering news

From: Jeffrey Johnson

Sent: Tuesday, March 22, 2011 3:54 PM

To: 'opa.resource@nrc.gov'

Subject: aging reactors

Hi...I am writing an article on the age of U.S. basic baseload electricity generators...nuclear and coal-fired units. I am using the GE Mark 1 and the Japanese incident to get into story. I am trying to figure out if the 23 U.S. mark 1 units are identical to the Japanese units and if not how are they different? And what is the difference between the GE Mark 2,3,4 units. I see from the NRC information digest, they all are boiling water reactors but is there more to it? For instance, do any of them have sturdier containment structures and do they all store spent fuel next to the reactor? I

am writing now and will try to be brief in my questions. But I would appreciate a relatively quick call back...give me a time and I will be available. Thanks, Jeff Johnson, Chemical & Engineering News (b)(6)

From: Burnell, Scott
To: scott.disavino@thomsonreuters.com; OPA Resource
Cc: eileen.ogrady@thomsonreuters.com
Subject: RE: NRC lessons learned
Date: Thursday, March 24, 2011 8:58:00 AM

Hi All;

As always, I apologize for the delay. You've seen the press release on the review: <http://www.nrc.gov/reading-rm/doc-collections/news/2011/11-055.pdf>
And that's all the detail we have at this point – as the task force moves forward we'll provide info as it becomes available.

As for the AP1000 and ESBWR (please do keep an eye on the home page, BTW), the passive systems are focused on maintaining long-term core cooling and/or controlling pressure buildup in containment. Spent fuel pools essentially just sit there at normal atmospheric pressure and below the boiling point of water, so maintaining their water levels is relatively simple, even if there's an issue with the pool's normal water circulation systems.

Keep those cards and letters coming, we'll turn responses around as fast as we can.

Scott

From: scott.disavino@thomsonreuters.com [mailto:scott.disavino@thomsonreuters.com]
Sent: Wednesday, March 23, 2011 4:44 PM
To: OPA Resource; Burnell, Scott
Cc: eileen.ogrady@thomsonreuters.com
Subject: NRC lessons learned

Hi Scott,

Working on another story on new designs and possible changes for those new designs and existing designs

The NRC has a 30 and 90 day review of the existing plants

What systems are you looking at, I've heard

- Flood control
- Backup power systems – generators and batteries
- Hydrogen mitigation devices
- Venting of reactor vessel and primary containment

SSSS/159

- Control room ventilation

Basically all the things that went wrong at Daiichi – if I'm missing something – you can fill in the blanks

A separate question – the AP 1000 and ESBWR – the passive systems are they to shut the reactor only or do they also keep the spent fuel pools hydrated

Thanks,

Scott

Scott DiSavino
Correspondent
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From: Mensah, Tanya
To: Quay, Theodore; Banic, Merrilee; Tam, Peter; Guzman, Richard; Kim, James; Sexton, Kimberly; Clark, Michael; Hott, Christopher; Gulla, Gerald; Markley, Michael; Setzer, Thomas; Khanna, Meena
Cc: Blount, Tom; Lyon, Fred; Polickoski, James; Rosenberg, Stacey; Weil, Jenny; Burnell, Scott
Subject: Internal Planning Meeting: 2.206 Petitions Related To the Recent Earthquake In Japan
Attachments: Conference Details (MAR 24 2011--0900 AM ET--Conf# 6348388).msg

When: Thursday, March 24, 2011 9:00 AM-10:00 AM (GMT-05:00) Eastern Time (US & Canada).
Where: HQ-OWFN-12B06-12p

Note: The GMT offset above does not reflect daylight saving time adjustments.

~~*~*~*~*~*~*~*

Agenda:

Current Inventory of 2.206 petitions related to the recent earthquake.

Per MD 8.11, can these petitions be consolidated? If so, discuss path to inform NRR ET via the PRB Chairman.

Discussion of next steps per MD 8.11, coordination with petitioners that request an opportunity to address the PRB before we meet internally to make the initial recommendation, and the PRB Internal meeting to make the initial recommendation.

B. Dial-In: (b)(6) Participant passcode: (b)(6) (12 lines available)

Thanks all for your support,

Tanya Mensah (meeting contact)

SSSS/160

Attachment Conference Details (MAR 24 2011--0900 AM ET--C.msg (2560 Bytes) cannot be converted to PDF format.

From: Burnell, Scott
To: Crowley, Kevin
Cc: Brenner, Eliot
Subject: RE: WashPost Op-ed
Date: Thursday, March 24, 2011 9:50:00 AM

Hello Kevin;

Certainly, I'll share whatever response we produce. Thanks.

Scott

From: Crowley, Kevin [mailto:KCrowley@nas.edu]
Sent: Thursday, March 24, 2011 9:50 AM
To: Burnell, Scott
Subject: FW: WashPost Op-ed

Scott: No doubt you have seen this. If your agency responds I would be very interested in receiving a copy. Many thanks. Kevin

http://www.washingtonpost.com/opinions/how-we-can-reduce-the-risk-of-another-fukushima/2011/03/23/ABpyI3KB_story.html

How we can reduce the risk of another Fukushima

By Matthew Bunn, Wednesday, March 23, 7:39 PM

In 2006, a National Academy of Sciences committee recommended two simple steps to prevent spent nuclear fuel from catching fire: putting old, cool fuel next to the new, hot fuel discharged from a reactor, and adding sprayers that could dispense water if the cooling water in the pool was lost. But no such action has been taken, either in the United States or in Japan — where the most deadly danger at Fukushima nuclear plant since the recent earthquake and subsequent tsunami has been the risk that uncovered spent fuel in the storage pools would catch fire, spreading radioactive material miles downwind. Nor has much of the older spent fuel been moved out of pools into safer dry casks made of steel and concrete — another possibility to reduce the risk.

The radioactive steam that rose over Fukushima should be a searing reminder of the costs of failing to identify such dangers and fix them. A serious blow has been dealt to public confidence in the nuclear industry and its overseers.

Every country operating nuclear facilities needs to undertake an urgent review — by an independent international team, not by the companies that own the plants or the agencies that have long regulated them — of whether there are risk-reduction steps as compelling as those the academy recommended that have not been taken. (Indeed, another simple academy recommendation that was not followed was that a group independent of both the U.S. nuclear industry and its regulators should review the security of spent fuel pools.)

The European Union has announced that its member states will work together to review the safety of all E.U. reactors in the coming months. The rest of the world must do likewise — as well as invite separate teams to review security.

The risk is not just accidents but attacks. Al-Qaeda has repeatedly considered sabotaging

SSSS/161

nuclear facilities. The 2006 study focused primarily on the danger that terrorists might succeed in draining the water from a spent-fuel storage pool, the same outcome raising risks in Japan. Moreover, al-Qaeda has long sought to get stolen nuclear material to make a crude nuclear bomb — which government studies in the United States and elsewhere have repeatedly concluded a sophisticated group might be able to do if it got enough weapons-usable nuclear material.

Nuclear facilities around the world are much less prepared for security incidents than for accidents. While U.S. reactors are required to have armed guard forces, many reactors abroad — and even some sites with potential nuclear bomb material — have none. One senior U.S. nuclear official I spoke to last fall described security for most of the reactors he had visited abroad as “frightening.” Everyone in the civilian nuclear industry is taught to focus on safety from day one, while on security, nuclear workers and managers might get a half-hour briefing once a year. All this needs to change.

At the nuclear security summit President Obama convened last spring, leaders from 47 countries agreed on the goal of securing all vulnerable nuclear materials worldwide within four years — but a great deal remains to be done to realize that ambition.

The International Atomic Energy Agency (IAEA) provides safety and security reviews for countries that request them — but it will need more money and additional experts to carry out these assessments on the scale required. It will take time for the IAEA to assemble teams, and major obstacles are likely to include complacency, secrecy, sovereignty concerns and bureaucratic impediments.

As it outlines questions, it should start here:

1 Why haven't operators of nuclear plants been required to rearrange the fuel in reactors and provide sprayers, as the academy recommended?

1 Why was the Fukushima site required to have only eight hours of battery supply in case it lost power? Why are some U.S. reactors allowed to have only four?

1 Why were the backup diesel generators down low, where they might be swamped by a tsunami, rather than up high?

1 Why aren't reactors and sites with potential nuclear bomb material in all countries required to be protected against the kinds of attacks and theft attempts that terrorists and criminals have shown they have the capability to carry out?

1 Shouldn't all such facilities be required to have on-site armed guards, capable of holding off an attack until off-site forces arrive?

The task is urgent. While the odds are against another accident occurring tomorrow — more than two decades elapsed between Chernobyl and Fukushima — no one knows when terrorists might choose to strike.

Ultimately, regular independent, international reviews should be the norm in nuclear operations worldwide. All countries must demonstrate that they are doing everything practicable to prevent the next Fukushima — or something far worse.

Matthew Bunn, an associate professor at the Harvard Kennedy School and a former adviser in the White House Office of Science and Technology Policy, is the author of “Securing the Bomb 2010: Securing All Nuclear Materials in Four Years.”

Jennifer A. Walsh

Media Officer

Office of News & Public Information

(202) 334-2183

jwalsh@nas.edu

National Academy of Sciences

National Research Council

From: Burnell, Scott
To: Nelson, Robert
Subject: Re: Few more questions
Date: Thursday, March 24, 2011 11:00:23 AM

Thanks very much!

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Nelson, Robert
To: Burnell, Scott
Sent: Thu Mar 24 10:59:28 2011
Subject: RE: Few more questions

Operating: ANO1; Crystal River 3; Davis Besse; Oconee 1, 2 & 3; TMI 1. Total – 7

Under Construction or Deferred Policy: Bellefonte 1 & 2 Total – 2

Permanently Shutdown – Formerly Licensed: Nuclear Ship Savannah; Indian Point 1; Rancho Seco; TMI 2. Total – 4

I suggest providing her with a link to NUREG-1350, Volume 22

NELSON

From: Burnell, Scott
Sent: Thursday, March 24, 2011 10:04 AM
To: Nelson, Robert
Subject: FW: Few more questions
Importance: High

Bob;

This is related to the ongoing Japan coverage. Is there a quick answer to #1? I would think she's correct, but please set me straight. Thanks.

Scott

From: Jeanine.Prezioso@thomsonreuters.com [mailto:Jeanine.Prezioso@thomsonreuters.com]
Sent: Thursday, March 24, 2011 8:28 AM
To: Dricks, Victor
Subject: Few more questions
Importance: High

Dear Victor,

I spoke with you yesterday about the Babcock & Wilcox reactors in the U.S.

SSSS/162

Thank you for your time.

I do have a few more questions and I am hoping you can either help me or point me to someone who can or to a spot on your web site where I might find the following:

1) I want to be sure that only 10 Babcock & Wilcox reactors have ever operated in the U.S. (I was told 10 and have that list, including the TMI Unit 2 and two decommissioned, so there are currently 7 operating).

2) How many Babcock & Wilcox reactor orders were cancelled and/or part of requests for new licenses that were then denied or held up?

3) After the TMI incident, the NRC ordered shut the 7 reactors with that design for a period of time until they made upgrades (see article below). I need to know how long each was shut. I know you must have that in public records someplace but can you tell me where and I will go through each set of filings?

4) TMI Unit 1 had its license suspended after the Unit 2 accident for a period of time. Where can I find information about that (when it was built, how many MWe and how long the license was suspended?)

Again, thank you for your time with this. Naturally I am on a deadline and would like to start working to find this out as soon as possible (today).

Best regards,
Jeanine

News

7 nuclear reactors in U.S. are ordered to be closed

Reuter News Agency

435 words

28 April 1979

The Globe and Mail

GLOB

P15

English

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WASHINGTON (Reuter) - The U.S. Nuclear Regulatory Commission yesterday ordered a shutdown of seven nuclear reactors built by the same company that designed the crippled Three Mile Island plant in Pennsylvania.

The commissioners insisted on a formal shutdown order although their staff members already had gained the voluntary agreement of power companies operating the plants to close them for

modifications.

The NRC said the formal order was issued to point out clearly the relationship "between the regulated and regulators." But the move raised possible new complications that could delay reopening of the five power utilities operating the seven reactors. It sets in motion a legal process that would allow anyone who wished to demand a public hearing before any of the plants resumed operation.

"There are certain procedural formalities that can become cumbersome," said NRC chairman Joseph Hendrie, who had opposed issuing the order.

Commissioner Victor Gilinsky, who favored the procedure, told his colleagues: "Particularly after Three Mile Island, we ought to avoid any suggestion of informal arrangements."

Harold Denton, chairman of the NRC's nuclear reactor regulation branch, announced earlier yesterday that the five utilities who operate the reactors, all made by Babcock and Wilcox, had agreed to close them for modification.

Mr. Denton said he believed the modifications could be carried out in a month in most cases.

NRC sources said that by winning agreement of the power companies involved, all seven reactors would be back in operation before the peak period of summer power use.

The NRC has been meeting for the past three days to consider whether to follow a recommendation by its staff and order the reactors closed down for changes.

But a compromise agreement was reached with the companies under which they voluntarily agreed to shut off the reactors to carry out the modifications.

One of the power companies, Duke Power Company of South Carolina, which operates three reactors, agreed to close down one of them today and the other two on a staggered schedule next month. This may allow Duke Power to keep at least one reactor in operation if they are able to complete the modifications in time.

The modifications involve development of certain emergency procedures, changes in emergency cooling systems and operator training.

Originally, NRC commissioners expressed concern at the prospect of closing the plants because there was no indication when they could be put back into service.

They also were concerned at the effect the closures could have on the production of electricity at a time of dwindling oil supplies.

Jeanine Prezioso

Editor, North American Power & Gas Forum

Reuters News

Thomson Reuters

3 Times Square

19th Floor

New York, NY 10036

Phone: 646-223-6241

Mobile: (b)(6)

jeanine.prezioso@thomsonreuters.com

www.thomsonreuters.com

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From: [Burnell, Scott](#)
To: Jeanine.Prezioso@thomsonreuters.com
Subject: RE: Few more questions
Date: Thursday, March 24, 2011 11:13:00 AM

Hi Jeanine;

The staff provided me these statistics for your first question:

Operating Reactors: Arkansas Nuclear One 1; Crystal River 3; Davis Besse; Oconee 1, 2 & 3; TMI 1. Total – 7

Under Construction or Deferred Policy: Bellefonte 1 & 2 Total – 2

Permanently Shutdown – Formerly Licensed: Indian Point 1; Rancho Seco; TMI 2. Total – 3

Please let me know if that's sufficient. Thanks.

Scott

From: Jeanine.Prezioso@thomsonreuters.com [mailto:Jeanine.Prezioso@thomsonreuters.com]
Sent: Thursday, March 24, 2011 10:04 AM
To: Burnell, Scott
Cc: Dricks, Victor; PDR Resource
Subject: RE: Few more questions

Hi Scott,
Ok, thanks.
Jeanine

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Thursday, March 24, 2011 10:02 AM
To: Prezioso, Jeanine (M Edit Ops)
Cc: Dricks, Victor; PDR Resource
Subject: RE: Few more questions

Hi Jeanine;

I appreciate that you're writing on a deadline, and Victor provided what assistance he could. Your questions are really specific to NRC Headquarters, so please stick with me as your contact on this.

I'll check with our staff on your first question. The other three questions refer to agency actions at times prior to electronic record-keeping, so our Public Document Room will have to help you with those searches. I'm not even certain our records at this point would show the specific vendors considered for plants that were eventually cancelled.

I can suggest a book by former NRC Historian Samuel Walker, "Three Mile Island: A Nuclear Crisis in Historical Perspective," that might have some of the detail you're looking for.

http://en.wikipedia.org/wiki/Three_Mile_Island:_A_Nuclear_Crisis_in_Historical_Perspective

I'll pass along whatever the staff have on your first question as soon as possible.

Scott

From: Jeanine.Prezioso@thomsonreuters.com [mailto:Jeanine.Prezioso@thomsonreuters.com]

Sent: Thursday, March 24, 2011 8:28 AM

To: Dricks, Victor

Subject: Few more questions

Importance: High

Dear Victor,

I spoke with you yesterday about the Babcock & Wilcox reactors in the U.S.

Thank you for your time.

I do have a few more questions and I am hoping you can either help me or point me to someone who can or to a spot on your web site where I might find the following:

- 1) I want to be sure that **only 10 Babcock & Wilcox** reactors **have ever** operated in the U.S. (I was told 10 and have that list, including the TMI Unit 2 and two decommissioned, so there are currently 7 operating).
- 2) How many Babcock & Wilcox reactor orders were cancelled and/or part of requests for new licenses that were then denied or held up?
- 3) After the TMI incident, the NRC ordered shut the 7 reactors with that design for a period of time until they made upgrades (see article below). I need to know how long each was shut. I know you must have that in public records someplace but can you tell me where and I will go through each set of filings?
- 4) TMI Unit 1 had its license suspended after the Unit 2 accident for a period of time. Where can I find information about that (when it was built, how many MWe and how long the license was suspended?)

Again, thank you for your time with this. Naturally I am on a deadline and would like to start working to find this out as soon as possible (today).

Best regards,
Jeanine

From: Wellock, Thomas
To: Burnell, Scott
Subject: RE: Few more questions
Date: Thursday, March 24, 2011 11:14:07 AM

Scott,

Regarding questions,

Jeanine should check the NRC Information Digest for basic information on plants. It has several relevant appendices in the back with the data she seeks.

- 1) Actually 11 commercial plants from B&W. The NS plant at Savannah was a very small 74 MWt B&W reactor. Operated from 1965 to 1970. It was given a commercial license.
- 2) Bellefonte Units 1&2, Midland Units 1&2, WPPSS Units 1&4,
- 3) I am working on this. May have an answer this afternoon.
- 4) She can check Appendix A for the basic information on when it was built, etc. The plant remained shuttered till October 2, 1985 when the Supreme Court refused further appeals to the NRC's permission to restart the plant. It went on line a week later.

Tom

From: Burnell, Scott
Sent: Thursday, March 24, 2011 10:02 AM
To: Jeanine.Prezioso@thomsonreuters.com
Cc: Dricks, Victor; PDR Resource
Subject: RE: Few more questions

Hi Jeanine;

I appreciate that you're writing on a deadline, and Victor provided what assistance he could. Your questions are really specific to NRC Headquarters, so please stick with me as your contact on this.

I'll check with our staff on your first question. The other three questions refer to agency actions at times prior to electronic record-keeping, so our Public Document Room will have to help you with those searches. I'm not even certain our records at this point would show the specific vendors considered for plants that were eventually cancelled.

I can suggest a book by former NRC Historian Samuel Walker, "Three Mile Island: A Nuclear Crisis in Historical Perspective," that might have some of the detail you're looking for.

http://en.wikipedia.org/wiki/Three_Mile_Island:_A_Nuclear_Crisis_in_Historical_Perspective

I'll pass along whatever the staff have on your first question as soon as possible.

Scott

From: [Nelson, Robert](#)
To: [Burnell, Scott](#)
Subject: RE: Few more questions
Date: Thursday, March 24, 2011 10:49:25 AM

Pages 113 and 114

NELSON

From: Burnell, Scott
Sent: Thursday, March 24, 2011 10:46 AM
To: Nelson, Robert
Subject: Re: Few more questions

Didn't recall the decomm plants' NSSS vendor being listed.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Nelson, Robert
To: Burnell, Scott
Sent: Thu Mar 24 10:44:40 2011
Subject: RE: Few more questions

We should be able to answer #1 quickly. The NRC Info Digest includes a listing of all reactors both operating and decommissioned and their NSSS in App A & B

NELSON

From: Burnell, Scott
Sent: Thursday, March 24, 2011 10:04 AM
To: Nelson, Robert
Subject: FW: Few more questions
Importance: High

Bob;

This is related to the ongoing Japan coverage. Is there a quick answer to #1? I would think she's correct, but please set me straight. Thanks.

Scott

From: Jeanine.Prezioso@thomsonreuters.com [mailto:Jeanine.Prezioso@thomsonreuters.com]
Sent: Thursday, March 24, 2011 8:28 AM
To: Dricks, Victor
Subject: Few more questions
Importance: High

From: Burnell, Scott
To: Bagchi, Goutam
Cc: Kammerer, Annie; Ake, Jon; Munson, Clifford; Karas, Rebecca; Chokshi, Nilesh; Harrington, Holly; Brenner, Eliot
Subject: RE: Tsunami/Nuclear Plants
Date: Thursday, March 24, 2011 7:47:00 AM

Hello Goutam;

I appreciate your wanting to be as helpful as possible to Robin, but in the future please limit your responses to forwarding requests such as this directly to OPA.resource@nrc.gov without additional comment. I am quite concerned that your "Some precautionary measures are being taken by the industry also here in the US." quote is going to be misinterpreted as "official" word from the NRC that plants are taking active measures beyond their current designs, when all INPO did is recommend plants review their current design bases and mitigative measures.

Scott

From: Bagchi, Goutam
Sent: Thursday, March 24, 2011 7:36 AM
To: McDowell, Robin
Subject: RE: Tsunami/Nuclear Plants

Hello,

In order to ensure that you get the best comprehensive answers to your questions I have forwarded your request to our Office of Public Affairs. As you know, seismic and tsunami risk to nuclear power facilities is a complex issue, so you will need to do your research. Many lessons are learned when a very large event like the 2004 Indian Ocean earthquake and now the 2011 Magnitude 9 earthquake occur, there is much to learn about the geophysics and the behavior of nuclear power plants. For this we need more time. You may want to contact the Tsunami Research Institute at the Tokyo University. Some precautionary measures are being taken by the industry also here in the US. The Institute of Nuclear Power Operations is the central US repository of operating experience and they have made precautionary recommendations. Best regards and

Thank you,
Goutam Bagchi
Senior Advisor
Division of Site & Environmental Reviews
Office of New Reactors
From: McDowell, Robin [mailto:rmcdowell@ap.org]
Sent: Thursday, March 24, 2011 5:44 AM
To: Bagchi, Goutam
Subject: Tsunami/Nuclear Plants

Mr. Bagchi,

I'm a reporter from The Associated Press based in Asia and am

SSSS/163

working on a story about the risk nuclear power plants positioned along coasts face from tsunamis.

Since this was also the topic of the 2005 workshop in Kalpakkam, in which you took part, do you think you might be able to discuss this by telephone or email?

Were specific recommendations made at the workshop, for instance? In the case of Japan (off-the-record is fine) do you think they were followed?

Also:

_Given historical records on tsunamis, what nuclear power plants across the globe are most vulnerable?

_Is there a need for more risk analysis and planning for tsunamis by plants in general?

_What lessons can we learn from Fukushima Dai-ichi disaster?

Thanks in advance for any help you can offer.

Cheers

Robin

Robin McDowell
AP Bureau Chief
Jakarta, Indonesia

(b)(6)

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From: [Burnell, Scott](#)
To: [Bagchi, Goutam](#)
Subject: RE: Tsunami/Nuclear Plants
Date: Thursday, March 24, 2011 10:03:00 AM

Thank you, Goutam. She's reached out to me directly so I'll take it from here.

From: Bagchi, Goutam
Sent: Thursday, March 24, 2011 10:03 AM
To: Burnell, Scott
Subject: FW: Tsunami/Nuclear Plants

Scott,

Please note that I do not intend to respond any further.

*Thank you,
Goutam*

From: McDowell, Robin [mailto:rmcdowell@ap.org]
Sent: Thursday, March 24, 2011 8:58 AM
To: Bagchi, Goutam
Subject: RE: Tsunami/Nuclear Plants

Thanks very much for this.

I know it's still early but would love to hear what the general thoughts are about lessons learned and where we might go from here.

I look forward to talking to folks in your Public Affairs office and will make sure I get in touch with the Tsunami Research Institute in Tokyo and with the US Institute of Nuclear Power Operations.

Really appreciate your help.

All the best,

Robin

Robin McDowell
AP Jakarta
(b)(6)

From: Bagchi, Goutam [mailto:Goutam.Bagchi@nrc.gov]
Sent: Thu 3/24/2011 11:36 AM
To: McDowell, Robin
Subject: RE: Tsunami/Nuclear Plants

Hello,

In order to ensure that you get the best comprehensive answers to your questions I have forwarded your request to our Office of Public Affairs. As you know, seismic

From: Burnell, Scott
To: McDowell, Robin
Subject: RE: Tsunami/Nuclear Plants
Date: Thursday, March 24, 2011 9:15:00 AM

Hi Robin;

The staff pointed me at the IAEA for more information on that workshop:

<http://www.iaea.org/newscenter/news/2005/tsunami.html>

Hope that's useful. Thanks.

Scott

From: McDowell, Robin [mailto:rmcdowell@ap.org]
Sent: Thursday, March 24, 2011 8:58 AM
To: Burnell, Scott
Subject: RE: Tsunami/Nuclear Plants

Hi Scott,

Thanks so much for getting in touch with me and for your offer to help.

I'll start by looking at the sites you've listed below.

Will get back to you soon.

Cheers

Robin

Robin McDowell
AP Jakarta

(b)(6)

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Thu 3/24/2011 12:02 PM
To: McDowell, Robin
Cc: OPA Resource
Subject: RE: Tsunami/Nuclear Plants

Hello Robin;

As Goutam said, he's forwarded your request to me in the Office of Public Affairs. I'm the agency spokesperson who deals with reactor issues, so I'll be happy to see what additional information we can provide you. I'll check on which agency sponsored the workshop you mentioned and see what documents were produced afterwards.

The NRC can only speak to U.S. nuclear power plants, and the agency continues to conclude all U.S. reactors are appropriately designed and operated to withstand the strongest earthquake expected at their sites, and that coastal plants are appropriately

From: Burnell, Scott
To: Bagchi, Goutam
Subject: RE: Tsunami/Nuclear Plants
Date: Thursday, March 24, 2011 8:35:00 AM

Thanks.

From: Bagchi, Goutam
Sent: Thursday, March 24, 2011 8:35 AM
To: Burnell, Scott
Subject: RE: Tsunami/Nuclear Plants

Scott,

It was jointly sponsored by IAEA and Atomic Energy Regulatory Board, India.

*Thank you,
Goutam*

From: Burnell, Scott
Sent: Thursday, March 24, 2011 8:03 AM
To: Bagchi, Goutam
Subject: RE: Tsunami/Nuclear Plants

Goutam;

Do you recall who sponsored the 2005 workshop Robin mentioned? Or if there's a Web page with follow-up documents from the workshop? Thank you.

Scott

From: Bagchi, Goutam
Sent: Thursday, March 24, 2011 7:36 AM
To: McDowell, Robin
Subject: RE: Tsunami/Nuclear Plants

Hello,

In order to ensure that you get the best comprehensive answers to your questions I have forwarded your request to our Office of Public Affairs. As you know, seismic and tsunami risk to nuclear power facilities is a complex issue, so you will need to do your research. Many lessons are learned when a very large event like the 2004 Indian Ocean earthquake and now the 2011 Magnitude 9 earthquake occur, there is much to learn about the geophysics and the behavior of nuclear power plants. For this we need more time. You may want to contact the Tsunami Research Institute at the Tokyo University. Some precautionary measures are being taken by the industry also here in the US. The Institute of Nuclear Power Operations is the central US repository of operating experience and they have made precautionary recommendations. Best regards and

From: Koller, Greg L
To: Burnell, Scott
Subject: FW: Tsunami/Nuclear Plants
Date: Thursday, March 24, 2011 11:16:36 AM

Scott, I will be directing this Jakarta-based AP reporter to you. Let us know if you want us to support any response.

Greg Koller
Manager, NEWS & MEDIA RELATIONS
(509) 372-4864

From: Prasad, Rajiv
Sent: Thursday, March 24, 2011 8:07 AM
To: Koller, Greg L
Cc: Vail, Lance W; Fayer, Michael J; Hickey, Eva E
Subject: FW: Tsunami/Nuclear Plants

From: McDowell, Robin [mailto:rmcdowell@ap.org]
Sent: Thursday, March 24, 2011 2:47 AM
To: Prasad, Rajiv
Subject: Tsunami/Nuclear Plants

Dear Dr. Prasad,

I'm a reporter from The Associated Press based in Asia and am working on a story about the risk nuclear power plants positioned along coasts face from tsunamis.

Do you think you might be able to discuss this by telephone or email?

I notice you took part in the 2005 workshop in Kalpakkam. Were specific recommendations made at the workshop, for instance? In the case of Japan (off-the-record is fine) do you think they were followed?

Also:

_Given historical records on tsunamis, what nuclear power plants in the U.S. or elsewhere across the globe are most vulnerable?

_Is there a need for more risk analysis and planning for tsunamis by plants in general?

_What lessons can we learn from Fukushima Dai-ichi disaster?

Thanks in advance for any help you can offer.

Cheers

Robin

SSSS/164

Robin McDowell
AP Bureau Chief
Jakarta, Indonesia

(b)(6)

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From: ET07 Hoc
To: Harrington, Holly; Burnell, Scott; McIntyre, David; Billings, Sally
Subject: RE: Q&As
Date: Thursday, March 24, 2011 11:23:38 AM

Thanks

From: Harrington, Holly
Sent: Thursday, March 24, 2011 11:23 AM
To: Burnell, Scott; ET07 Hoc; McIntyre, David; Billings, Sally
Subject: RE: Q&As

There is no "distribution list" for Q&As or talking points. We are posting them on WebEOC. We have not updated the Q&As, originally developed for the chairman, in some time. But there are some additional Q&As on other subjects that have been developed separately and should also be available via WebEOC.

From: Burnell, Scott
Sent: Thursday, March 24, 2011 10:45 AM
To: ET07 Hoc; McIntyre, David; Harrington, Holly
Subject: Re: Q&As

Holly's in the best position to explain how we're handling this.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: ET07 Hoc
To: Burnell, Scott; McIntyre, David
Sent: Thu Mar 24 10:42:10 2011
Subject: Q&As

Does OPA maintain the distribution list for the Japan Event Q&As?

Sally Billings
ET Status Officer

SSSS/165

From: Carpenter, Gene
To: Burnell, Scott; Chandrathil, Prema
Subject: Slate Article
Date: Thursday, March 24, 2011 1:28:44 PM
Attachments: Slate Nuclear-Age.pdf

You forgot to mention the recent LB60 Workshop, where we got mostly positive responses to extending to 80.

C.E. (Gene) Carpenter, Jr.
Group Lead for Aging Management Issues
301-251-7632 (work)

(b)(6)

 (mobile)
Gene.Carpenter@nrc.gov

SSSS/166

Slate

Nuclear's Age

How do inspectors ensure the safety of older nuclear reactors?

By Brian Palmer

Posted Tuesday, March 22, 2011, at 6:12 PM ET

Japanese regulators granted a 10-year extension to an aging reactor at the Fukushima Daiichi nuclear plant despite observing damaged components, according to a report in the New York Times. Inspectors spent just three days looking around, which is apparently very brief. What do inspectors look for in a graying reactor?

Rust, cracks, and pits, among other things. Nuclear reactors have thousands of parts—valves, pumps, pipes, turbines, etc. Inspectors monitor all these bits and pieces, but the greatest concerns in older plants are the reactor vessel, which houses the core, and the containment structure, which is the last line of defense between the fissioning uranium and the public. Radiation and ordinary weathering processes can undermine these components, so inspectors have to routinely measure the thickness of their walls and check for signs of corrosion or cracks in order to ensure that the barriers remain leak-proof.

Sixty years ago, when commercial nuclear reactors were in development, engineers couldn't say for sure how long a reactor

vessel might last. Its 6- to 8-inch-thick steel walls are bombarded with radiation, and go through extreme heating and cooling cycles whenever the reactor is restarted—which happens every 18 or 24 months during the refueling process. (If one of those walls becomes brittle, it's necessary to shut down the reactor permanently, since replacing a reactor vessel requires dismantling half of the plant. Researchers are experimenting with technologies to repair damaged parts of the wall, but none of these methods has been deployed in a commercial reactor.)

To test the soundness of the vessels over time, nuclear engineers keep metal samples of the same type and thickness as the vessel wall itself inside the reactor during operation. They remove them periodically and examine them for wear.

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Nuclear's Age

The assumption is that the samples are suffering the same effects as the reactor vessel. The current consensus is that, under normal operating conditions, a vessel can last for at least 60 years.

While early nuclear scientists were acutely concerned about the reactor vessel, most had confidence in the hardness of the containment structures. After all, the thick metal and concrete walls outside the reactor are, in theory, insulated from the harsh conditions of a nuclear reactor. They are designed to withstand earthquakes and other acts of nature, and aren't exposed to a regular barrage of radiation. By the late 1980s, however, inspectors began to notice flaws. More than one-quarter of the containment systems at the 104 nuclear reactors operating in the United States have now shown some form of degradation, which can be caused by freeze-thaw cycles, erosion, and even plant matter growing through the concrete. Unlike reactor vessels, however, it's economically feasible to repair damaged containment structures.

There are several ways to monitor a containment structure. Inspectors conduct visual examinations, either with the naked eye or a magnifying glass, in search of rust or pitting. They can apply a liquid to the wall, wipe off surface fluid, and see if any managed to

penetrate. Some engineers create a magnetic field in the wall, then spread a thin layer of iron particles. If the characteristic magnetic field pattern is disrupted, it suggests the presence of cracks. Sound waves, radiography, electrical resistance, and compression tests can also indicate flaws.

In the United States, the 1954 Atomic Energy Act (PDF) initially limited nuclear plant licenses to 40 years. As the first generation of nuclear reactors approached and surpassed the middle of their 40-year lifespan, the Nuclear Regulatory Commission published procedures in 1995 to offer license extensions. Today, most expiration dates have been put off by two decades, and there's talk of extending the limits up to 80 total years of operation. The possibility has split the scientific community, largely because of potentially undetectable effects of aging.

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Nuclear's Age

Got a question about today's news? Ask the Explainer.

Explainer thanks Scott Burnell and Prema Chandrathil of the Nuclear Regulatory Commission, John Lee of the University of Michigan, and Akira Tokuhiro of the University of Idaho.

is a freelance writer living in New York City. He can be reached at .

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From: McIntyre, David
To: Brenner, Eliot
Cc: Burnell, Scott; Hayden, Elizabeth
Subject: RE: FW: URGENT ACTION: NRR Issuance of a RIS Related to The Japan Earthquake By 3/25/11
Date: Thursday, March 24, 2011 1:49:07 PM

OK, thanks.

From: Brenner, Eliot
Sent: Thursday, March 24, 2011 1:45 PM
To: McIntyre, David
Cc: Burnell, Scott; Hayden, Elizabeth
Subject: RE: FW: URGENT ACTION: NRR Issuance of a RIS Related to The Japan Earthquake By 3/25/11

Beth will take this one.

From: McIntyre, David
Sent: Thursday, March 24, 2011 1:42 PM
To: Brenner, Eliot
Cc: Burnell, Scott
Subject: FW: FW: URGENT ACTION: NRR Issuance of a RIS Related to The Japan Earthquake By 3/25/11

We're all flat-out, including you, as you sent this to my personal email. I'll do this if Scott is handing the UCS/Containment accident pressure charges.

From: (b)(6) [mailto:(b)(6)] **On Behalf Of** Dave McIntyre
Sent: Thursday, March 24, 2011 1:36 PM
To: McIntyre, David
Subject: Fwd: FW: URGENT ACTION: NRR Issuance of a RIS Related to The Japan Earthquake By 3/25/11

----- Forwarded message -----

From: Brenner, Eliot <Eliot.Brenner@nrc.gov>
Date: Thu, Mar 24, 2011 at 1:32 PM
Subject: FW: URGENT ACTION: NRR Issuance of a RIS Related to The Japan Earthquake By 3/25/11
To: Dave McIntyre <(b)(6)>

David: Is this something you can take on?

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

From: Burnell, Scott
Sent: Thursday, March 24, 2011 1:28 PM
To: Harrington, Holly; Brenner, Eliot; Hayden, Elizabeth
Subject: FW: URGENT ACTION: NRR Issuance of a RIS Related to The

SSSS/167

Japan Earthquake By 3/25/11
Importance: High

We need a press release, I'm the best option, but I'm flat-out with existing stuff. Perhaps Dave?

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

From: Mensah, Tanya
Sent: Thursday, March 24, 2011 1:23 PM
To: McIntosh, Angela; Doolittle, Elizabeth; Sullivan, Frederick; Tabatabai, Omid
Cc: Hawes, Cathy; Rosenberg, Stacey; Hilton, Nick; Hill, Leslie; Donnell, Tremaine; QTE Resource; Burnell, Scott; OGCMailCenter Resource; Banic, Merrilee; Russell, Andrea
Subject: URGENT ACTION: NRR Issuance of a RIS Related to The Japan Earthquake By 3/25/11

Good afternoon:

NRR/DPR was assigned to develop a RIS today (it is due tomorrow). The only information that I have at the moment is the intent of the RIS (see below).

Dave Beaulieu and Tom Alexion have the lead to develop the RIS. Tom Alexion plans to send a draft RIS to you all (or to a POC that you designate) either late today, or early tomorrow, with concurrence requested by 2:30 pm tomorrow (Friday) afternoon, if possible.

NRR may need a POC from your Office to concur on the RIS. The NRR technical leads have not yet identified the addressees that would be impacted and are still working on the RIS. Thus, if you believe your licensees would be impacted by issuance of this RIS (based upon the intent provided below), please advise us so that you can be added on concurrence. If you are not sure and need to see the draft prior to making a decision, that is fine. Please be sure to confirm with Tom who the POC is for your Office.

As soon as Tom has a draft available, he will forward it to you or the POC that you designate. In the meantime, please advise your senior management, as NRR will need expedited support (if the RIS is applicable to your licensees) to facilitate parallel concurrence.

I am also copying the contacts that normally review and concur on a RIS from OGC, OE, PMDA, OIS, and technical editor. OPA is copied for awareness only.

INTENT

The U.S. Nuclear Regulatory Commission (NRC) is issuing this regulatory issue summary (RIS) to request that addressees with on-going environmental monitoring programs voluntary report to the NRC confirmed anomalous environmental radioactivity measurements likely caused by radioactive

material released by the Fukushima Daiichi Nuclear Power Station in Japan following the March 11, 2011, Tohoku-Taiheiyoku-Oki earthquake. This magnitude 9.0 earthquake and the subsequent tsunami caused significant damage to at least four of the six units of the Fukushima Daiichi Nuclear Power Station as the result of a sustained loss of both the offsite and on-site power systems. The information collected will be used to enhance the Federal and state monitoring programs.

Thanks again for your time and support,

Tanya Mensah, Generic Communications Program Manager
301-415-3610

From: Mensah, Tanya
To: Quav, Theodore; Banic, Merrilee; Tam, Peter; Guzman, Richard; Kim, James; Sexton, Kimberly; Clark, Michael; Hott, Christopher; Gulla, Gerald; Markley, Michael; Setzer, Thomas; Khanna, Meena
Cc: Blount, Tom; Lyon, Fred; Polickoski, James; Rosenberg, Stacey; Weil, Jenny; Burnell, Scott; Salgado, Nancy; Pascarelli, Robert; Oesterle, Eric
Subject: Summary of The Internal Planning Meeting: 2.206 Petitions Related To the Recent Earthquake In Japan
Date: Thursday, March 24, 2011 3:29:36 PM

Good afternoon,

Thanks again for your time earlier today. I followed up with Tom Blount and provided him with a verbal summary of our discussion and next steps. Specifically:

- We are not recommending consolidation of any 2.206 petitions (at the moment) related to the Japan EQ. Efficiencies are better gained by improving the coordination of PRB calls w/ petitioners and internal PRB meetings.
- Rich Guzman's 2.206 for NMP (Floyd Rudman) does not meet the criteria for entry into the 2.206 process. The letter consists of questions to the NRC staff, thus, Rich will respond via general correspondence. He will coordinate his response through Mike Cullingford since Mr. Rudman resides in Canada.
- The letter from Mr. Bill Linton will be assigned to a petition manager since it requests an immediate shutdown of US reactors. Mike Markley will provide Tanya Mensah with the name of the petition manager.

Tom understands the views of the PRB members and staff represented at today's meeting and did not have any objections to our next steps. If I neglected to include any relevant discussion from our meeting, please advise me so that I can update this summary.

Participation (in person or by phone*):

- Tanya Mensah, NRR/DPR
- Jenny Weil, OCA*
- Tom Setzer, RI*
- Peter Tam, NRR/DORL*
- Kimberly Sexton, OGC
- Michael Clark, OGC
- Gerry Gulla, OE
- Jim Kim, NRR/DORL

SSSS/168

- Lee Banic, NRR/DPR
- Rich Guzman, NRR/DORL
- Nancy Salgado, NRR/DORL
- Mike Markley, NRR/DORL
- Eric Oesterle, NRR/DORL
- Meena Khana, NRR/DE

Thanks for your support,

Tanya

-----Original Appointment-----

From: Mensah, Tanya

Sent: Wednesday, March 23, 2011 2:58 PM

To: Mensah, Tanya; Quay, Theodore; Banic, Merrilee; Tam, Peter; Guzman, Richard; Kim, James; Sexton, Kimberly; Clark, Michael; Hott, Christopher; Gulla, Gerald; Markley, Michael; Setzer, Thomas; Khanna, Meena

Cc: Blount, Tom; Lyon, Fred; Polickoski, James; Rosenberg, Stacey; Weil, Jenny; Burnell, Scott; Salgado, Nancy; Pascarelli, Robert

Subject: Internal Planning Meeting: 2.206 Petitions Related To the Recent Earthquake In Japan

When: Thursday, March 24, 2011 9:00 AM-10:00 AM (GMT-05:00) Eastern Time (US & Canada).

Where: HQ-OWFN-12B06-12p

A. Agenda:

- Current Inventory of 2.206 petitions related to the recent earthquake.
- Per MD 8.11, can these petitions be consolidated? If so, discuss path to inform NRR ET via the PRB Chairman.
- Discussion of next steps per MD 8.11, coordination with petitioners that request an opportunity to address the PRB before we meet internally to make the initial recommendation, and the PRB Internal meeting to make the initial recommendation.

B. Dial-In: (b)(6); Participant passcode: (b)(6) (12 lines available)

<< Message: Conference Details (MAR 24, 2011--09:00 AM ET--Conf# 6348388) >>

Thanks all for your support,

Tanya Mensah (meeting contact)

From: [Malik, Naureen](#)
To: [Burnell, Scott](#)
Subject: RE: New Reactor Review
Date: Thursday, March 24, 2011 3:12:04 PM

Hi Scott, I had reference to the word longer in several areas and in one area that the review could take longer, but at the same time you said it remains to be seen. Would you like to say anything about that.

I really do need to use that quote – or something akin to it – for the story.

Naureen S. Malik
Energy Reporter
Dow Jones Newswires
1211 6th Avenue, 5th
New York, NY 10036
(W): (212) 416-4210
(M): (b)(6)

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Thursday, March 24, 2011 3:10 PM
To: Malik, Naureen
Subject: RE: New Reactor Review

Hi Naureen;

The longer quote is fine. I believe the shorter one is more in reference to how the first reviews have taken longer than the staff's "optimal" estimates. Does that match your notes? Thanks.

Scott

From: Malik, Naureen [mailto:Naureen.Malik@dowjones.com]
Sent: Thursday, March 24, 2011 3:07 PM
To: Burnell, Scott
Subject: New Reactor Review
Importance: High

Hi Scott,

I'm planning to write a story about how the review of new reactors could be extended to take into account the events in Japan.

In my notes I have these quotes – But wanted to run them by you in case you wanted to talk about it a little bit more. .

"It could take longer" to get through the design review process. But before and after this quote you said something to this effect -- "It remains to be seen as to whether or not any lessons learned from events in Japan will affect those schedules."

I'm planning to use both but again wanted to see if you wanted to talk about it a bit more.

SSSS/169

I will include a detailed description about the review process and how it is really unclear how Japan will impact this process.

Thank you,
Naureen

Naureen S. Malik
Energy Reporter
Dow Jones Newswires
1211 6th Avenue, 5th
New York, NY 10036
(W): (212) 416-4210
(M): (b)(6)

From: [Malik, Naureen](#)
To: [Burnell, Scott](#)
Subject: RE: New Reactor Review
Date: Thursday, March 24, 2011 3:17:23 PM

I should say that it ties into this other idea you said:

"The design certification process would take into account the most severe extreme events that can be envisioned for the United States."

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Thursday, March 24, 2011 3:10 PM
To: Malik, Naureen
Subject: RE: New Reactor Review

Hi Naureen;

The longer quote is fine. I believe the shorter one is more in reference to how the first reviews have taken longer than the staff's "optimal" estimates. Does that match your notes? Thanks.

Scott

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Importance: High

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In my notes I have these quotes – But wanted to run them by you in case you wanted to talk about it a little bit more. .

"It could take longer" to get through the design review process. But before and after this quote you said something to this effect -- "It remains to be seen as to whether or not any lessons learned from events in Japan will affect those schedules."

I'm planning to use both but again wanted to see if you wanted to talk about it a bit more. I will include a detailed description about the review process and how it is really unclear how Japan will impact this process.

Thank you,
Naureen

From: Sheehan, Neil
To: Don Argott; Burnell, Scott
Cc: Couret, Ivonne; Sheena Joyce
Subject: RE: request for an interview
Date: Thursday, March 24, 2011 4:10:05 PM

Don,

Since you're based in Philly, Region I (King of Prussia) would probably be able to help you. That would be me or Diane Screnci. Again, that would be in a few weeks when things are a bit quieter.

Neil Sheehan
NRC Public Affairs
(610) 337-5331

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

From: Don Argott [mailto:dargott@914pictures.com]
Sent: Thursday, March 24, 2011 4:08 PM
To: Burnell, Scott
Cc: Sheehan, Neil; Couret, Ivonne; Sheena Joyce
Subject: Re: request for an interview

Scott,

I totally understand. No, I was asking who the best person to speak with was. I'll follow up with you in a few weeks as I know how busy everyone is.

Thanks.
Don

Don Argott
Director
9.14 Pictures, Inc.
(b)(6)
<http://914pictures.com/>

On Mar 24, 2011, at 4:03 PM, Burnell, Scott wrote:

> Hello Don;
>
> I've been just as swamped as Neil and everyone in public affairs --
> did you ask me directly about a Japan-related interview?? In any
> case, we're consolidating all those requests here at HQ and we'll
> figure them out once the situation calms down. Thanks.
>
> Scott
>
> -----Original Message-----
> From: Don Argott [mailto:[\(b\)\(6\)](mailto:(b)(6))]
> Sent: Thursday, March 24, 2011 4:01 PM
> To: Burnell, Scott
> Cc: Sheena Joyce
> Subject: request for an interview
>
> Scott,

SSSS / 170

>
> How are you? Wanted to get back in touch to see if you could help put
> us in touch with some NRC spokespeople that we may be able to
> interview for our documentary? Specifically people who can speak to
> how the Japan crisis is affecting US nuclear policy. We already
> reached out to Neil Sheehan and have yet to hear, but I'm sure there
> are other people who are just as qualified to speak to us.
>
> Please let me know.
>
> Best,
>
> Don
>
> Don Argott
> Director
> 9.14 Pictures, Inc.
> (b)(6)
> <http://914pictures.com/>
>

From: Harrington, Holly
To: Burnell, Scott; Hayden, Elizabeth
Subject: RE: Price-Anderson QA ready for use
Date: Thursday, March 24, 2011 5:00:09 PM

I think we should discuss first before opening this can of worms. I'm not seeing/hearing a lot of questions about this and if we post it, we may create an issue where one does not currently exist.

From: Burnell, Scott
Sent: Thursday, March 24, 2011 4:51 PM
To: Hayden, Elizabeth; Harrington, Holly
Subject: RE: Price-Anderson QA ready for use

I don't see why not.

From: Hayden, Elizabeth
Sent: Thursday, March 24, 2011 4:50 PM
To: Burnell, Scott
Subject: RE: Price-Anderson QA ready for use

Are these appropriate for the Web?

*Beth Hayden
Senior Advisor
Office of Public Affairs
U.S. Nuclear Regulatory Commission
--- Protecting People and the Environment
301-415-8202
elizabeth.hayden@nrc.gov*

From: Burnell, Scott
Sent: Thursday, March 24, 2011 4:09 PM
To: Brenner, Eliot; Hayden, Elizabeth; Couret, Ivonne; McIntyre, David; Janbergs, Holly; Screnci, Diane; Sheehan, Neil; Hannah, Roger; Ledford, Joey; Chandrathil, Prema; Mitlyng, Viktoria; Dricks, Victor; Uselding, Lara
Subject: Price-Anderson QA ready for use

These are good to go, folks!

SSSS/171

From: Burnell, Scott
To: "william_freebairn@platts.com"; Brenner, Eliot
Cc: "Steven_Dolley@platts.com"
Subject: Re: licensing implications of fukushima
Date: Thursday, March 24, 2011 5:02:45 PM

Eliot does.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Freebairn, William <william_freebairn@platts.com>
To: Burnell, Scott
Cc: Dolley, Steven <Steven_Dolley@platts.com>
Sent: Thu Mar 24 16:57:21 2011
Subject: RE: licensing implications of fukushima

Thanks, just to keep bugging you, do you guys have any comment on the OIG report about Part 21 rules being unsatisfactory?

Appreciate it.

Bill

William Freebairn
Senior Editor/Platts
(202) 383-2164 

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Thursday, March 24, 2011 4:42 PM
To: Freebairn, William
Cc: Dolley, Steven
Subject: RE: licensing implications of fukushima

Hi All;

The NRO staff's current schedule continues to call for final decisions on certifying the amended AP1000 later this year and the ESBWR by the end of the year. It is yet to be determined if events in Japan and the NRC's review of them will have any impacts on those schedules.

I'm checking on the TI. Thanks.

Scott

From: Freebairn, William [mailto:william_freebairn@platts.com]
Sent: Thursday, March 24, 2011 4:32 PM
To: Burnell, Scott
Cc: Dolley, Steven
Subject: RE: licensing implications of fukushima

Thanks, Scott, if you send via e-mail can you be sure to copy Steve Dolley, since I will be heading off to Browns Ferry in an hour and may not be able to check e-mail tomorrow morning.

Bill

William Freebairn

Senior Editor/Platts
(202) 383-2164

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Thursday, March 24, 2011 11:58 AM
To: Freebairn, William
Subject: RE: licensing implications of fukushima

Hi Bill;

I'll get you what I can as soon as I can. Thanks in advance for your patience.

Scott

From: Freebairn, William [mailto:william_freebairn@platts.com]
Sent: Thursday, March 24, 2011 11:52 AM
To: Burnell, Scott
Subject: licensing implications of fukushima

Hi Scott, we're doing a story for Inside NRC on what the implications of the Fukushima review are on licensing actions such as renewals, design certifications and COLs. I am quoting some people saying NRC is likely to pause in making those decisions, others say the issuance of the Vermont Yankee renewal and the ESBWR rule publication are signs you will go forward with no change to schedules. Do you expect to continue licensing reviews as per previously issues schedules? Could resource requirements from the Fukushima reviews force some delays?

On a somewhat separate topic, we were wondering if there is a temporary instruction yet on these Fukushima implications and whether we could get a copy.

I'm working on a tight deadline today, so would need a response by 5 at the latest on the licensing question.

Thanks

Bill

William Freebairn

Senior Editor
Platts Nuclear Publications
(202) 383-2164
www.platts.com

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From: Kammerer, Annie
To: Burnell, Scott; Hayden, Elizabeth; Hiland, Patrick
Cc: Kauffman, John; Munson, Clifford; Ake, Jon; Bensi, Michelle
Subject: RE: NextEra Energy Questions
Date: Friday, March 25, 2011 2:08:15 PM

Whatever is needed to close it out.

From: Burnell, Scott
Sent: Friday, March 25, 2011 6:35 AM
To: Kammerer, Annie; Hayden, Elizabeth; Hiland, Patrick
Cc: Kauffman, John; Munson, Clifford; Ake, Jon; Bensi, Michelle
Subject: Re: NextEra Energy Questions

If no one objects, I can talk to Waldron at the OPA level of detail, which appears to be what he needs.

Sent from an NRC Blackberry

Scott Burnell

(b)(6)

From: Kammerer, Annie
To: Hayden, Elizabeth; Hiland, Patrick
Cc: Burnell, Scott; Kauffman, John; Munson, Clifford; Ake, Jon; Bensi, Michelle
Sent: Thu Mar 24 22:25:35 2011
Subject: RE: NextEra Energy Questions

Here's a possible response. Perhaps Cliff or Jon can take a look.

- 1) We are trying to understand why our plants in low-seismic areas (see below) would appear on the list of 27 plants that the NRC intends to review for seismic issues. While the story below notes that these plants have been identified based on "largest increase in seismic risk from a 1980s-era USGS study," the USGS maps show a low probability for seismic activity. I'm not aware of any major changes that would have increased seismic risk... can you help explain?

First, it should be clarified that the list of 27 plants is only provided to show that there is sufficient reason to move the project to the next phase of the generic issue program. These are not the only plants that will be reassessed. Due to the significant uncertainty in the data available, all plants in the central and eastern US will receive the generic letter and will be reassessed. Further, in light of the events in Japan, there is discussion within the NRC of including those in the west as well.

The GI-199 study considers both overall risk and also changes in risk. Both the approach to assessing seismic hazard and the data available to seismologists have improved significantly since the 1980. As a result, estimates of seismic hazard, although still low, have increased since that time. This is the result of a steady improvement in the understanding of seismic hazard over time. It is important to note that it is not the seismic activity, or the seismic hazard itself, that has increased; but rather it is the understanding of it that has changed. (Information on how the USGS seismic hazard maps are developed is available at the USGS website). The larger change in the risk

SSSS / 172

(in terms of core damage frequency) associated with some sites in the study directly reflects the change in assessed hazard.

3) My basic understanding- especially in the case of St. Lucie and Duane Arnold- is that highly conservative values were input into your screening process for plants with low-seismic probability, therefore moving plants like those previously mentioned up in the listing. Can you help me to understand this?

The screening process that was undertaken used data currently available to the NRC, principally from the IPEEE study conducted in the mid-90s. Licensees of nuclear plants in moderate to high seismicity areas tended to provide more detailed information regarding the seismic resistance of the structures, systems, and components than plants in low seismicity areas. Therefore when considering loads beyond the seismic design, NRC staff tended to have more detailed information to rely on for plants in moderate to high seismicity zones; and had to make conservative assumptions for plants in low seismicity regions.

Annie

From: Hayden, Elizabeth
Sent: Thursday, March 24, 2011 5:11 PM
To: Hiland, Patrick
Cc: Burnell, Scott; Kammerer, Annie; Kauffman, John
Subject: FW: NextEra Energy Questions

Pat,

Can you help me out in answering t least the 2 highlighted questions from FPL? The licensee sounds like this is all a surprise to him.

Beth Hayden

From: Waldron, Michael [mailto:Michael.Waldron@fpl.com]
Sent: Thursday, March 24, 2011 4:03 PM
To: Hayden, Elizabeth
Subject: NextEra Energy Questions

Beth:

Good to speak with you. I will have our licensing folks look for the letter that apparently went out last fall. In the meantime, however, I'm trying to answer a number of questions pertaining to the article below.

1) We are trying to understand why our plants in low-seismic areas (see below) would appear on the list of 27 plants that the NRC intends to review for seismic issues. While the story below notes that these plants have been identified based on "largest increase in seismic risk from a 1980s-era USGS study," the USGS maps show a low probability for seismic activity. I'm not aware of any major changes that would have increased seismic risk... can you help explain?

2) How does the Commission plan to conduct this evaluation? For instance, are you asking us for data, are you running models based on government geologic information? Is there something specific we should be preparing for if, in fact, you are going to do this review?

3) My basic understanding, especially in the case of St. Lucie and Duane Arnold, is that highly conservative values were input into your screening process for plants with low seismic probability, therefore moving plants like those previously mentioned up in the listing. Can you help me to understand this?

As you can imagine, this list has raised a number of questions for us since geologic maps tend to tell a different story. We're really just trying to figure this out at this point. If you could respond as quickly as possible, I would certainly appreciate it. Thanks again for your help.

Mike

US NRC to check seismic risk of 27 nuke units;

Washington (Platts)--23Mar2011/1033 am EDT/1433 GMT

The US Nuclear Regulatory Commission will conduct a seismic risk assessment of Entergy's Indian Point plant in New York next year, the first of 27 reviews of nuclear power units at 17 plants, agency spokeswoman Beth Hayden said Tuesday.

Separately, NRC Chairman Gregory Jaczko "has personally committed to inspect Indian Point," located about 35 miles north of New York City, although "no date has not been determined" for the visit, Hayden said.

The NRC reported these nuclear units will receive the seismic review next year: Indian Point 2, Indian Point 3, Limerick 1, Limerick 2, Peach Bottom 2, Peach Bottom 3, Seabrook, Crystal River 3, Farley 1, Farley 2, North Anna 1, North Anna 2, Oconee 1, Oconee 2, Oconee 3, St. Lucie 1, St. Lucie 2, Sequoyah 1, Sequoyah 2, Summer, Watts Bar 1, Dresden 2, Dresden 3, Duane Arnold, Perry 1, River Bend and Wolf Creek.

The earthquake risk review is part of a new assessment NRC conducted based on 2008 revised US Survey data of seismic activity in the eastern and central US, said Scott Burnell, an NRC spokesman. The review pre-dated the earthquake and tsunami that wreaked havoc this month on the Fukushima nuclear stations.

Burnell categorized the findings as a "very broad brush indicator" that is not sufficient to determine the odds for earthquakes at a given nuclear reactor site.

The NRC is planning to send letters to plant operators late this year.

"The expectation is this analysis would show where plants could improve what already is an acceptable response to seismic events," Burnell said. The 27 units selected for review showed the largest increase in seismic risk from a 1980s-era USGS study, he said.

The Indian Point site was selected as the first to be inspected by NRC next year because the revised seismic data showed the largest increase in seismic risk increase from the previous study, Hayden said.

Senator Barbara Boxer, chairman of the Senate Environment and Public Works Committee and Senator Dianne Feinstein, both Democrats, on March 16 wrote to Jaczko asking that NRC inspect both the Diablo Canyon and San Onofre nuclear units, saying they are concerned that the plants "are near earthquake faults."

New York Governor Andrew Cuomo, a Democrat, urged NRC to shut Indian Point during the past decade when he was the state's attorney general. Cuomo raised concerns about the two-unit plant's proximity to the Ramapo fault and its discharge of heated water into the Hudson River.

"It is essential that the NRC move quickly to answer the significant and long-standing safety questions surrounding Indian Point," Cuomo said in a statement Tuesday.

Entergy said in a statement Tuesday: "All citizens of New York need to have access to the pertinent facts regarding Indian Point. We strongly believe that knowing the facts will answer the public's questions and will also clearly demonstrate that this facility is safe -- designed with a margin of safety beyond the strongest earthquake anticipated in the area. Accordingly, Entergy welcomes Governor Cuomo's call for a review of Indian Point by the federal Nuclear Regulatory Commission and stands ready to assist."



**Michael Waldron | Director
Nuclear Communications**

Office: 561.694.3618 | **Mobile:** (b)(6)

Email: Michael.Waldron@nrc.gov

From: Brenner, Eliot
To: Burnell, Scott
Subject: Re: GI 199 Talking Points/Q&As
Date: Friday, March 25, 2011 11:16:10 AM

For no more than 15 minutes. Need to round up 2 cats for 1230 appt.

Eliot Brenner
Director, Office of Public Affairs
US Nuclear Regulatory Commission
Protecting People and the Environment
301 415 8200

C: (b)(6)

Sent from my Blackberry

From: Burnell, Scott
To: Brenner, Eliot
Sent: Fri Mar 25 11:13:49 2011
Subject: RE: GI 199 Talking Points/Q&As

Let me get Val to set up a line – aim for 11:45?

From: Brenner, Eliot
Sent: Friday, March 25, 2011 11:13 AM
To: Burnell, Scott
Subject: Re: GI 199 Talking Points/Q&As

Now works. Don't we have some firm answers?

Eliot Brenner
Director, Office of Public Affairs
US Nuclear Regulatory Commission
Protecting People and the Environment
301 415 8200

C: (b)(6)

Sent from my Blackberry

From: Burnell, Scott
To: Brenner, Eliot
Sent: Fri Mar 25 11:11:42 2011
Subject: FW: GI 199 Talking Points/Q&As

Can we arrange a conference call with your participation? We're at the "yelling at the tech staff" point and I need to offer myself as a target instead, at the very least.

From: Sheehan, Neil
Sent: Friday, March 25, 2011 10:45 AM
To: Burnell, Scott; Harrington, Holly; Brenner, Eliot; Hayden, Elizabeth; McIntyre, David; Couret, Ivonne; Janbergs, Holly; Screnci, Diane; Hannah, Roger; Ledford, Joey; Chandrathil, Prema; Mitlyng, Viktoria; Uselding, Lara; Dricks, Victor
Cc: Anderson, Brian; Khanna, Meena
Subject: RE: GI 199 Talking Points/Q&As

If that's the case, that represents a change.

SSSS/173

From Page 20 of the Comm Plan we received on Sept. 14, 2010, regarding GI-199:

"Listed below are plants that are currently above the Generic Issues Program (GIP) numerical risk threshold for an issue to continue to be evaluated for possible regulatory action. During the analysis, this group of plants were referred to as the 'plants in the *continue* region.' " The list of 27 reactors follows that.

The question is, when did we broaden back out to all of the plants? And why was this not communicated to us?

From: Burnell, Scott
Sent: Friday, March 25, 2011 10:35 AM
To: Harrington, Holly; Brenner, Eliot; Hayden, Elizabeth; McIntyre, David; Couret, Ivonne; Janbergs, Holly; Screnci, Diane; Sheehan, Neil; Hannah, Roger; Ledford, Joey; Chandrathil, Prema; Mitleyng, Viktoria; Uselding, Lara; Dricks, Victor
Cc: Anderson, Brian; Khanna, Meena
Subject: RE: GI 199 Talking Points/Q&As
Importance: High

All;

A discussion with the NRR branch chief in charge of GI-199 confirms that ALL U.S. PLANTS will receive the Generic Letter on this issue (although its title might not reference GI-199) later this year.

ALL 104 plants will be covered by NRC actions based on GI-199.

Scott

From: Burnell, Scott
Sent: Friday, March 25, 2011 10:06 AM
To: Anderson, Brian
Cc: Harrington, Holly; Brenner, Eliot
Subject: FW: GI 199 Talking Points/Q&As
Importance: High

We need EXTREME clarity on the GL – ALL 104 plants, or all CEUS plants??

From: Harrington, Holly
Sent: Friday, March 25, 2011 9:59 AM
To: Burnell, Scott
Subject: FW: GI 199 Talking Points/Q&As

Scott – please respond to Eliot immediately

From: Brenner, Eliot
Sent: Friday, March 25, 2011 9:52 AM
To: Harrington, Holly
Subject: Re: GI 199 Talking Points/Q&As

We have a california problem. Aren't ALL plants getting a letter or inspected under the letter that went out last week? I need to be able to say something to california press that makes them feel loved and wanted if necessary, and the chairman will get the question as well.

Eliot Brenner

Director, Office of Public Affairs

US Nuclear Regulatory Commission

Protecting People and the Environment

301 415 8200

C: (b)(6)

Sent from my Blackberry

From: Harrington, Holly

To: Brenner, Eliot; Burnell, Scott; Couret, Ivonne; Hayden, Elizabeth; McIntyre, David; Chandrathil, Prema; Dricks, Victor; Hannah, Roger; Ledford, Joey; Mitlyng, Viktoria; Screnci, Diane; Sheehan, Neil; Uselding, Lara

Cc: Anderson, Brian

Sent: Fri Mar 25 09:12:49 2011

Subject: GI 199 Talking Points/Q&As

Thanks for Brian for these!

They are also posted in our G drive's Japan folder and on WebEOC

From: Burnell, Scott
To: Harrington, Holly
Subject: FW: Radioactive water leaking from the #3 vessel.
Date: Friday, March 25, 2011 11:06:00 AM

My thought is to check with ET in Ops Ctr, although I'm disinclined to play "what we think" at this point.

From: tom.doggett@thomsonreuters.com [mailto:tom.doggett@thomsonreuters.com]
Sent: Friday, March 25, 2011 10:54 AM
To: Burnell, Scott
Subject: Radioactive water leaking from the #3 vessel.

Hey Scott,

We (and many other news organizations) have a lot of reporting this morning saying the radiation in the water at the Fukushima plants that was 10,000 times normal may have come from the #3 reactor core, indicating a breach of the containment vessel. This is what authorizes in Japan are suggesting.

Does the NRC share this same view, based on what the agency's people on the ground in Japan are saying or what the NRC is hearing from U.S. or Japanese authorities?

Does the NRC believe the radioactive water is leaking, or is likely leaking, from the #3 reactor?

Thanks--Tom

Tom Doggett
Energy Correspondent
Reuters News Agency
202-898-8320 (work)
(b)(6) (cell)

This email was sent to you by Thomson Reuters, the global news and information company. Any views expressed in this message are those of the individual sender, except where the sender specifically states them to be the views of Thomson Reuters.

SSSS/174

From: Burnell, Scott
To: tom.doggett@thomsonreuters.com
Cc: Brenner, Eliot
Subject: RE: Radioactive water leaking from the #3 vessel.
Date: Friday, March 25, 2011 11:20:00 AM

Hi Tom;

Our overall stance on this hasn't changed -- we're just not in a position to be commenting on the latest "snapshot" of conditions. We continue to monitor the best available information coming from the site; nothing we've seen to this point would cause us to revise the recommendations we issued on the 16th. Thanks.

Scott

From: tom.doggett@thomsonreuters.com [mailto:tom.doggett@thomsonreuters.com]
Sent: Friday, March 25, 2011 10:54 AM
To: Burnell, Scott
Subject: Radioactive water leaking from the #3 vessel.

Hey Scott,

We (and many other news organizations) have a lot of reporting this morning saying the radiation in the water at the Fukushima plants that was 10,000 times normal may have come from the #3 reactor core, indicating a breach of the containment vessel. This is what authorizes in Japan are suggesting.

Does the NRC share this same view, based on what the agency's people on the ground in Japan are saying or what the NRC is hearing from U.S. or Japanese authorities?

Does the NRC believe the radioactive water is leaking, or is likely leaking, from the #3 reactor?

Thanks--Tom

Tom Doggett
Energy Correspondent
Reuters News Agency
202-898-8320 (work)

(b)(6) (cell)

This email was sent to you by Thomson Reuters, the global news and information company. Any views expressed in this message are those of the individual sender, except where the sender specifically states them to be the views of Thomson Reuters.

From: Burnell, Scott
To: "George.Lobsenz@ihs.com"; Brenner, Eliot
Subject: Re: Does NRC want to comment on this?
Date: Friday, March 25, 2011 2:46:02 PM

George;

The NRC responds to FOIAs as promptly and as completely as possible. It's impossible at this point to provide any timelines for full responses to any recent Japan event-related FOIAs.

Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

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

From: Lobsenz, George <George.Lobsenz@ihs.com>
To: Burnell, Scott
Sent: Fri Mar 25 14:44:35 2011
Subject: Does NRC want to comment on this?

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

From: landerson@hastingsgroup.com [mailto:landerson@hastingsgroup.com]
Sent: Friday, March 25, 2011 1:58 PM
To: globsenz@accessintel.com
Subject: News - Japan Reactor Crisis/FOIA Filing - 3 Groups Seeking Full Fukushima Radiation Data From DOE, NRC

FUKUSHIMA-RELATED FOIA REQUEST: FULL DATA SOUGHT ON RADIATION LEVELS THAT LED TO NRC CHAIR'S CALL FOR 50-MILE EVACUATION RADIUS FOR AMERICANS IN JAPAN

Why Aren't Japanese and American Citizens Getting All the Facts? "Extreme" Step Seen As Indication of Much Higher Radiation Levels Than Revealed So Far by NRC, Japanese Government

WASHINGTON, D.C. - March 25, 2011 - Three groups - Friends of the Earth (FOE), the Nuclear Information and Resource Service (NIRS) and Physicians for Social Responsibility (PSR) - announced today that they have filed a Freedom of Information Act (FOIA) request to get to the bottom of what led the U.S. government to call for a 50-mile evacuation radius for Americans near the Japanese reactor crisis in Fukushima.

The FOIA requests filed with the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Department of Energy (DOE) are available online at <http://foe.org/sites/default/files/FOE-NIRS-PSR-RadiationFOIA-3-22-11.pdf>. The three groups are not satisfied that the incomplete summary provided so far by the DOE at <http://www.energy.gov/news/10194.htm> provides the full picture of the scale of the radiation.

On March 16, 2011, NRC Commissioner Gregory B. Jazcko told Congress that he was recommending the 50-mile evacuation radius. (See <http://www.nrc.gov/about-nrc/organization/commission/comm-gregory-jazcko/0317nrc-transcript-jazcko.pdf>.) The scope of the recommended evacuation is highly unusual and suggestive of extraordinarily high radiation levels in excess of those reported to the public in Japan and the U.S., the three groups said. In the U.S., nuclear reactor licensees and local governments are only asked to provide for evacuation out to 10 miles.

As concerns grow about food and water contamination in Japan, the three groups filing the FOIA

SSSS/175

request are seeking to determine the answer to this key question: What made Jaczko exceed the limits of his own agency's regulations by five times?

Tom Clements, Southeastern nuclear campaign coordinator, Friends of the Earth, said: "The radiation monitoring information being collected by the U.S. Government in Japan is of urgent interest to the public in the U.S. and internationally and we expect an expedited response to the FOIA request. If the full data set is not immediately released, the government can rightly be accused of attempting to cover up the radiation threat posed by the disaster. This would severely undermine regulators' credibility."

Michael Mariotte, executive director, Nuclear Information and Resource Service, Takoma Park, MD, said: "By recommending a 50-mile evacuation zone for U.S. residents, NRC Chairman Jaczko gave a strong signal that the Fukushima accident was much worse than reported by the Japanese government and the utility. We believe that he was getting information about the severity of the accident from airborne radiation measurements taken by U.S. Department of Energy aircraft. But neither DOE nor the NRC has published those measurements in full."

Attorney Diane Curran of Harmon, Curran, Spielberg & Eisenberg, LLP, who filed the FOIA request for the groups, said: "We think the American and Japanese public have a right to see the complete details of the Fukushima radiation data and, therefore, we have requested the NRC and the DOE to release the information under the Freedom of Information Act. If necessary, we are prepared to go to federal court to get the uncensored set of measurements."

As the FOIA request explains, the three groups "seek expedited release" of the requested information, "so that they may timely inform their members and the general public about the unfolding events at the Fukushima reactors, including the significance of the public health and environmental threat posed by radiation releases from the Fukushima reactors. Requesters believe that requested disclosures will do a great deal to fill currently existing information gaps and resolve inconsistencies in the currently available reports about the severity of the Japanese radiological releases."

The groups also contend that expedited release of the information is justified in order to allow them to participate in and comment on any proceedings the federal government may undertake to evaluate the lessons learned from the Fukushima accident, including the 90-day review of the safety of U.S. reactors recently announced by the NRC. According to the FOIA request letter, a better understanding of the severity of the Fukushima releases is "essential to Requesters' ability to evaluate and participate in any such review."

MEDIA CONTACTS: Leslie Anderson, (b)(6) or landerson@hastingsgroup.com

This email was sent to globsenz@accessintel.com

From: Burnell, Scott
To: "Tennille.Tracy@dowjones.com"; Brenner, Eliot
Subject: Re: FOIA on radiation data
Date: Friday, March 25, 2011 2:43:26 PM

The response stands as-is. Don't mean to be short, but that's all I can offer.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Tracy, Tennille <Tennille.Tracy@dowjones.com>
To: Burnell, Scott
Cc: Brenner, Eliot
Sent: Fri Mar 25 14:41:42 2011
Subject: RE: FOIA on radiation data

Any thoughts on what they are contending? I mean, these guys are suggesting that our government had evidence to suggest radiation levels around Fukushima were higher or worse than Japanese officials were saying? Any thoughts on that?

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 2:37 PM
To: Tracy, Tennille
Cc: Brenner, Eliot
Subject: Re: FOIA on radiation data

The NRC responds to FOIAs as promptly and as completely as possible. It's impossible at this point to provide any timelines for full responses to any recent Japan event-related FOIAs.

Thanks.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Tracy, Tennille <Tennille.Tracy@dowjones.com>
To: Burnell, Scott
Sent: Fri Mar 25 14:27:44 2011
Subject: FOIA on radiation data

Scott ... A coalition of environmental and social groups are filing a FOIA with NRC and DOE to get data on radiation levels around Fukushima. They are contending that the US knew that radiation levels were worse than what Japanese officials were saying. Can I get a comment from you guys?

<http://www.foe.org/fukushima-related-foia-request>

Tennille Tracy
Dow Jones Newswires | Wall Street Journal
Office: 202.862.6619 | Cell: (b)(6)

SSSS/176

1025 Connecticut Ave NW, Washington D.C., 20036

From: McIntyre, David
To: Burnell, Scott
Subject: RE: Science Mag on SNF pool #4 at Fukushima req b
Date: Friday, March 25, 2011 2:52:23 PM

I'll knock him down.

From: Eli Kintisch [mailto:ekintisch@aaaas.org]
Sent: Friday, March 25, 2011 2:50 PM
To: Burnell, Scott
Cc: McIntyre, David
Subject: Science Mag on SNF pool #4 at Fukushima req b

Scott:

My story's due on Monday morning, but I will have till tuesday AM to add information if need be. Could I speak to NRC staff about this on Sunday or Monday? Jaczko?

Best, Eli

Eli Kintisch, Reporter
Science Magazine
(b)(6)

>>> Eli Kintisch 3/25/2011 2:49 PM >>>

Scott:

1. Would NRC let me speak to Sandia scientists for a story about what we know occurred in this pool? There's a lot of wrong information out there, and I'd like some experts to help me lay out the facts as we know them.

Below is a preliminary sketch I've prepared to help me write my story. In an interview with Sandia staff, I'd go through the evidence for

2. Here is an email I just sent Sandia's press person Jim D:

Jim: I get that NRC would ask Sandia not to comment on Sandia _studies_ on nuclear matters, but I don't see why they have authority to tell you not to comment on Fukushima.

SSSS/177

a) You're just contractors for them, and your work is not related to Japan

b) your paychecks are not from NRC, but nnsa/sandia. In fact I'm sure some of your best experts who have worked on reactors/SNF studies do work for other clients, not just the NRC.

Thanks, Eli

On 15 March a hydrogen explosion blew out the outer structure of Reactor #4 at Fukushima Daiichi Nuclear Power Plant in Japan. Since then, crews have extinguished multiple fires while struggling to keep spent nuclear fuel in the pool there cool. Scientists had theorized that the spent fuel, if allowed to heat up, could cause an explosion, but it had never happened before. Now experts are asking several key questions as they piece together events:

1. **What caused the loss of water in the pool, and how did the water level get?** Whether the water drained, evaporated or boiled off would provide clues for what happened next. U.S. Nuclear Regulatory Commission chair Greg Jaczko claimed on 16 March that the pool, which holds 400,000 liters of water was empty at one point
2. **What caused the hydrogen explosion?** Zirconium alloy, which makes up the tubes in which uranium fuel pellets, reacts with steam to form hydrogen, which can ignite in the presence of oxygen. But without chemical samples and temperature or pressure readings it's hard to know for sure that this was what caused the explosion.
3. **What temperature was the water?** For several days after the crisis began, Japanese authorities were reporting a constant temperature of 84 deg C for the pool. Then they stopped reporting it. Such relatively cool temperatures are inconsistent with the 600 deg C + temperatures that the Zirconium reaction requires.
4. **Why have recorded levels of Cesium-137 outside the plant remained low?** If multiple fires have ravaged the spent fuel pools, there is a risk that long-lived radionuclides, primarily cesium, have melted and aerosolized. But while high radiation levels have kept crews from Reactor 4, there has been few reports of cesium particles escaping from the plant.

From: Brenner, Eliot
To: Burnell, Scott; McIntyre, David
Subject: RE: Science Mag on SNF pool #4 at Fukushima req a
Date: Friday, March 25, 2011 3:22:26 PM

These both are so far ahead of what is known it's almost funny. I doubt that Sandia has any better information than we do. Technically, we can't keep these guys from talking but DOE can. I will reply that if they have discussions that do not touch on NRC-contracted work that's up to Sandia, but we recommend going through NNSA or DOE.

Eliot

From: Burnell, Scott
Sent: Friday, March 25, 2011 2:54 PM
To: Brenner, Eliot; McIntyre, David
Subject: Fw: Science Mag on SNF pool #4 at Fukushima req a

And the other

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Eli Kintisch <ekintisch@aaas.org>
To: Burnell, Scott
Cc: McIntyre, David
Sent: Fri Mar 25 14:49:31 2011
Subject: Science Mag on SNF pool #4 at Fukushima req a

Scott:

1. Would NRC let me speak to Sandia scientists for a story about what we know occurred in this pool? There's a lot of wrong information out there, and I'd like some experts to help me lay out the facts as we know them.

Below is a preliminary sketch I've prepared to help me write my story. In an interview with Sandia staff, I'd go through the evidence for

2. Here is an email I just sent Sandia's press person Jim D:

Jim: I get that NRC would ask Sandia not to comment on Sandia _studies_ on nuclear matters, but I don't see why they have authority to tell you not to comment on Fukushima.

a) You're just contractors for them, and your work is not related to Japan

SSSS / 178

b) your paychecks are not from NRC, but nnsa/sandia. In fact I'm sure some of your best experts who have worked on reactors/SNF studies do work for other clients, not just the NRC.

Thanks, Eli

On 15 March a hydrogen explosion blew out the outer structure of Reactor #4 at Fukushima Daiichi Nuclear Power Plant in Japan. Since then, crews have extinguished multiple fires while struggling to keep spent nuclear fuel in the pool there cool. Scientists had theorized that the spent fuel, if allowed to heat up, could cause an explosion, but it had never happened before. Now experts are asking several key questions as they piece together events:

- 1. What caused the loss of water in the pool, and how did the water level get?**
Whether the water drained, evaporated or boiled off would provide clues for what happened next. U.S. Nuclear Regulatory Commission chair Greg Jaczko claimed on 16 March that the pool, which holds 400,000 liters of water was empty at one point
- 2. What caused the hydrogen explosion?** Zirconium alloy, which makes up the tubes in which uranium fuel pellets, reacts with steam to form hydrogen, which can ignite in the presence of oxygen. But without chemical samples and temperature or pressure readings its hard to know for sure that this was what caused the explosion.
- 3. What temperature was the water?** For several days after the crisis began, Japanese authorities were reporting a constant temperature of 84 deg C for the pool. Then they stopped reporting it. Such relatively cool temperatures are inconsistent with the 600 deg C + temperatures that the Zirconium reaction requires.
- 4. Why have recorded levels of Cesium-137 outside the plant remained low?** If multiple fires have ravaged the spent fuel pools, there is a risk that long-lived radionuclides, primarily cesium, have melted and aerosolized. But while high radiation levels have kept crews from Reactor 4, there has been few reports of cesium particles escaping from the plant.

Eli Kintisch, Reporter
Science Magazine

(b)(6)

From: Annette Heist
To: Burnell, Scott
Subject: RE: Science Friday, March 2011 edition
Date: Friday, March 25, 2011 2:26:32 PM

Hi Scott--

Any chance this might happen for next week? April 8? We can go later in April; just trying to plan ahead a bit here.

Thanks very much,
Annette

Annette Heist
Senior Producer, NPR's Science Friday
M-Th 610.381.5653
Friday 1-4 PM Eastern (studio) 212.880.3520
cell (b)(6)
sciencefriday.com

From: Burnell, Scott [Scott.Burnell@nrc.gov]
Sent: Tuesday, March 22, 2011 11:59 AM
To: Annette Heist
Cc: Brenner, Eliot
Subject: RE: Science Friday, March 2011 edition

Hi Annette;

Oh, later in April is practically New Year's at this point. OK, knowing the basic topic we'll see what's possible. Thanks once again for including us at this point in the conversation.

Scott

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

From: Annette Heist [mailto:AHeist@npr.org]
Sent: Tuesday, March 22, 2011 11:57 AM
To: Burnell, Scott
Cc: Brenner, Eliot
Subject: RE: Science Friday, March 2011 edition

Hi there--

Thanks for your reply. (I had an underscore in your email address, that's why it bounced.)

For the show, we'd like to talk about reactor design here in the US--how reactors are/ aren't different from the reactors in Japan, what the newest designs are, whether older designs need to be changed or retrofitted. We would also like to talk about the recent UCS report on power plant safety. We'd likely have someone from the UCS join the conversation as well.

We aren't looking for this Friday, but perhaps a Friday in April? Right now, any Friday in April except for the 8th would work for us.

If someone from the NRC can join us, I would schedule a preinterview with that person, to go over more specifically what we would like to talk about and to answer any questions that person might have about the show.

Thanks very much for your help Scott. Let me know if I can provide any more information.

Annette

Annette Heist
Senior Producer, NPR's Science Friday
M-Th 610.381.5653
Friday 1-4 PM Eastern (studio) 212.880.3520
cell (b)(6)
sciencefriday.com

5555/179

From: Burnell, Scott [Scott.Burnell@nrc.gov]
Sent: Tuesday, March 22, 2011 11:44 AM
To: Annette Heist
Cc: Brenner, Eliot
Subject: Science Friday, March 2011 edition

Hi Annette;

I'm not sure why the e-mail bounced, and I greatly appreciate the invitation. Please let me know with as much specificity as possible what you're planning to discuss, as well as the time requirements, and we'll see what can be done. No promises, of course, given the level of effort in directly responding to events in Japan.

Scott

From: Annette Heist
To: Burnell, Scott
Subject: RE: Science Friday, March 2011 edition
Date: Friday, March 25, 2011 4:22:13 PM

Sorry I did mean next week, April 1. We'd like to get the Chairman or a senior staff person. Shall we wait a couple more weeks?

Thank you.

Annette

Annette Heist
Senior Producer, NPR's Science Friday
M-Th 610.381.5653
Friday 1-4 PM Eastern (studio) 212.880.3520
cell (b)(6)
sciencefriday.com

From: Burnell, Scott [Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 2:40 PM
To: Annette Heist; Brenner, Eliot
Subject: Re: Science Friday, March 2011 edition

Hi Annette;

That's two weeks out- do you mean the preinterview for next week? We're not yet back to normal, so it's still up in the air. I can just about guarantee the Chairman or other senior staff are unavailable. How low can you go, to use a turn of phrase? Thanks.

Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

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

From: Annette Heist <AHeist@npr.org>
To: Burnell, Scott
Sent: Fri Mar 25 14:25:24 2011
Subject: RE: Science Friday, March 2011 edition

Hi Scott--

Any chance this might happen for next week? April 8? We can go later in April; just trying to plan ahead a bit here.

Thanks very much,

Annette

Annette Heist
Senior Producer, NPR's Science Friday
M-Th 610.381.5653
Friday 1-4 PM Eastern (studio) 212.880.3520
cell (b)(6)
sciencefriday.com

From: Burnell, Scott [Scott.Burnell@nrc.gov]
Sent: Tuesday, March 22, 2011 11:59 AM
To: Annette Heist
Cc: Brenner, Eliot

From: Brenner, Eliot
To: Burnell, Scott; "Annette Heist"
Subject: RE: Science Friday, March 2011 edition
Date: Friday, March 25, 2011 4:32:55 PM

No. I would recommend a waive off for next week as well. We are just swamped. There are 250 people here doing nothing but japan, 24 hours a day. There is so much we don't know and it's way way early in this event, despite the fact two weeks have passed.

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

From: Burnell, Scott
Sent: Friday, March 25, 2011 4:30 PM
To: 'Annette Heist'
Cc: Brenner, Eliot
Subject: RE: Science Friday, March 2011 edition

I'd counsel waiting -- next week for the show I can pretty much wave off right now. Eliot might have a better handle on overall scheduling.

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

From: Annette Heist [mailto:AHeist@npr.org]
Sent: Friday, March 25, 2011 4:21 PM
To: Burnell, Scott
Subject: RE: Science Friday, March 2011 edition

Sorry I did mean next week, April 1. We'd like to get the Chairman or a senior staff person. Shall we wait a couple more weeks?

Thank you.

Annette

Annette Heist
Senior Producer, NPR's Science Friday
M-Th 610.381.5653
Friday 1-4 PM Eastern (studio) 212.880.3520
cell (b)(6)
sciencefriday.com

From: Burnell, Scott [Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 2:40 PM
To: Annette Heist; Brenner, Eliot
Subject: Re: Science Friday, March 2011 edition

Hi Annette;

That's two weeks out- do you mean the preinterview for next week? We're not yet back to normal, so it's still up in the air. I can just about guarantee the Chairman or other senior staff are unavailable. How low can you go, to use a turn of phrase? Thanks.

Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

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

From: Annette Heist <AHeist@npr.org>
To: Burnell, Scott

From: Burnell, Scott
To: "Nancy.Gaarder@owh.com"
Subject: Re: World-Herald accuracy check.
Date: Friday, March 25, 2011 2:16:39 PM

I don't think I'd be able to locate any actual ACRS members on short notice, unfortunately.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Gaarder, Nancy <Nancy.Gaarder@owh.com>
To: Burnell, Scott
Sent: Fri Mar 25 13:41:45 2011
Subject: RE: World-Herald accuracy check.

Absolutely...in the meantime, is there anyone at teh ACRS that you can refer me to....or can you do double duty later today?

Thanks.

Omaha World-Herald

www.omaha.com

Nancy Gaarder

Reporter
Office: 402-444-1102
Fax: 402-444-1231
Email: Nancy.Gaarder@owh.com
1314 Douglas St.- Suite 700
Omaha, NE 68102

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 12:40 PM
To: Gaarder, Nancy
Subject: RE: World-Herald accuracy check.

I'm about to leave the office and a Blackberry stinks for editing – can I try and get back to you later this afternoon?

From: Gaarder, Nancy [mailto:Nancy.Gaarder@owh.com]
Sent: Friday, March 25, 2011 1:36 PM
To: Burnell, Scott
Subject: World-Herald accuracy check.

Scott,

Thank you,

I'm just sending the sidebar so as to not abuse your time.....it's the more technical of the two. Feel

SSSS/180

free to make any corrections or suggestions.

Also, could you recommend a way for me to reach someone at the ACRS? I'd like to be sure I'm characterizing the committee's position correctly.

Thank you,

Nancy

Iowa's Duane Arnold Energy Center is one of nine 'Mark 1' nuclear reactors nationwide that have increased power substantially beyond their original design, something that a federal nuclear panel says compromises safety and an expert on reactor safety says puts Americans at risk.

Officials at Nebraska's similarly designed Cooper Nuclear Station have not ruled out undertaking a similar expansion.

Nationwide, the power increases have "put millions of Americans at undue and elevated risk, and it was done simply for business purposes instead of safety," said David Lochbaum, who is one of four people who will be witnesses Tuesday during a Senate briefing on the Japan crisis.

Lochbaum, who has worked at nuclear power plants, is director of the nuclear power project at the Union of Concerned Scientists.

Duane Arnold has increased the power it generates by 20 percent using the controversial process.

The Mark 1 label refers to the type of system in place to contain radiation in the event of a serious accident. Lochbaum said the problem extends to about XX other reactors that share similarities to the Mark 1.

The Nuclear Regulatory Commission, which regulates nuclear reactors, is giving this type of reactor credit for existing processes because significant changes at the plant aren't possible.

NRC COMMENT HERE?

The credit applies to the 'pressure cooker' aspect of their design. This keeps the air and water inside the vessel that houses the reactor at pressure higher than the outside air. The concern is that because of the extra stress from the accelerated reaction process, some part of the system, possibly a pipe, will rupture and pressure will be lost. That could lead to a loss of water needed to cool the system.

The federal Advisory Committee on Reactor Safeguards, which reviews emergency systems for the Nuclear Regulatory Commission, has been in a long-running disagreement with the agency it advises, saying the credit erodes too much of the reactors' safety margin.

Less than a month before the disaster in Japan, the committee reiterated its concerns.

"The disagreement between our position and the (NRC's) appears to have increased...", chairman Said Abdel-Khalik wrote NRC chairman Gregory Jaczko on Feb. 17.

"Crediting containment accident pressure is a serious compromise of the independence of the prevention and mitigation functions, a basic element of the defense-in-depth philosophy."

This defense in depth is the foundation of nuclear plant safety and is one of the first thing utility owners cite when talking about safety.

This "uprate" as it is called hasn't been undertaken unilaterally by plant owners. They've only been able to do it because they've gotten the OK of the Nuclear Regulatory Commission, the federal agency responsible for overseeing nuclear power plants.

MORE NRC COMMENT? Or NEI comment

Renee Nelson, a spokeswoman for Duane Arnold Energy Center, said th plant was only able to do that after demonstrating that it could operate safely.

"We conducted extensive engineering analysis and conducted special testing of critical safety components. All testing, analysis, and independent government reviews proved that the plant would continue to operate safely," she said.

That sort of reassurance doesn't allay the concerns of someone like Lochbaum.

"It was disgraceful for the NRC to do that (allow the credits).," Lochbaum said in a media briefing last week. "The NRC's bowing to industry pressure, putting financial motives ahead of public safety, and there's no excuse for doing that."

John McClure, interim president and chief executive officer at Nebraska Public Power District, said the utility has contemplated a similar power uprate.

"We have been looking at a power uprate," McClure said. "We have not made a decision to do it, we haven't made a decision not to do...we're a long way from a decision."

Cooper recently increased output by about 1.6 percent power boost by retooling equipment so that it was generating as much electricity as it had long been entitled to do.

McClure said the problems in Japan may have changed prospects for the much larger uprates.

"It's fair to say the events in Japan will make future power uprates more challenging," he said.

Omaha World-Herald

www.omaha.com

Nancy Gaarder

Reporter

Office: 402-444-1102

Fax: 402-444-1231

Email: Nancy.Gaarder@owh.com

1314 Douglas St. - Suite 700

Omaha, NE 68102

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 10:41 AM
To: Gaarder, Nancy
Subject: RE: followup question from omaha world-herald

Hi Nancy;

I'm pressed for time but I'll try to look things over from a factual standpoint. Thanks.

Scott

From: Gaarder, Nancy [mailto:Nancy.Gaarder@owh.com]
Sent: Friday, March 25, 2011 10:19 AM
To: Burnell, Scott
Subject: RE: followup question from omaha world-herald

Yes, it is. Thank you.

Would you or someone at the NRC be willing to read through my 2 stories to see if there are gross (or even minor!) errors?

I realize you might take issue with some of the points of view.....

They are still in draft form....but I could send you copies of the drafts....

Thank you,

Nancy

Omaha World-Herald

www.omaha.com

Nancy Gaarder

Reporter

Office: 402-444-1102

Fax: 402-444-1231

Email: Nancy.Gaarder@owh.com

1314 Douglas St. - Suite 700

Omaha, NE 68102

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 9:14 AM
To: Gaarder, Nancy
Subject: RE: followup question from omaha world-herald

Hi Nancy;

Mark I BWRs that have referenced CAP in approved uprate applications include Brunswick units 1&2, Dresden units 2&3, Duane Arnold, Hatch unit 1, Quad Cities units 1&2 and Vermont Yankee. Browns Ferry units 1, 2 and 3 and the Monticello plant are the four on the "pending" uprate list.

Is that what you need? Thanks.

Scott

From: Gaarder, Nancy [mailto:Nancy.Gaarder@owh.com]
Sent: Thursday, March 24, 2011 6:32 PM
To: Burnell, Scott
Subject: RE: followup question from omaha world-herald

Hi Scott,

Could you please send me the list of nine reactors awarded a CAP, and the four in line?

(I wouldn't need it right away....just whenever you're able to send a statement on the CAP provision.)

Thank you,

Nancy

Omaha World-Herald

www.omaha.com

Nancy Gaarder

Reporter
Office: 402-444-1102
Fax: 402-444-1231
Email: Nancy.Gaarder@owh.com
1314 Douglas St. - Suite 700
Omaha, NE 68102

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Thursday, March 24, 2011 2:38 PM
To: Gaarder, Nancy; Dricks, Victor; Mitlyng, Viktoria
Subject: RE: followup question from omaha world-herald

I don't show Cooper as being in either the approved or under review categories for an extended uprate, so the answer is no.

From: Gaarder, Nancy [mailto:Nancy.Gaarder@owh.com]
Sent: Thursday, March 24, 2011 3:35 PM
To: Burnell, Scott; Dricks, Victor; Mitlyng, Viktoria
Subject: RE: followup question from omaha world-herald

Thank you Scott, and Victor -- and Viktoria (who apparently also received this request.)

May I ask, was Cooper at Brownville, Neb., one of the remaining four?

Thank you again for your help. I do appreciate it.

Nancy

Omaha World-Herald

www.omaha.com

Nancy Gaarder

Reporter

Office: 402-444-1102

Fax: 402-444-1231

Email: Nancy.Gaarder@owh.com

1314 Douglas St.- Suite 700

Omaha, NE 68102

From: Burnell, Scott [<mailto:Scott.Burnell@nrc.gov>]
Sent: Thursday, March 24, 2011 2:32 PM
To: Dricks, Victor; Gaarder, Nancy
Subject: RE: followup question from omaha world-herald

Hi Nancy;

Victor asked me to check with the staff here at headquarters – nine reactors, including Duane Arnold, credited CAP in their Extended Power Uprate requests. The NRC is reviewing four other reactors' EPU requests that involve CAP. Thanks.

Scott Burnell
Public Affairs Officer
Nuclear Regulatory Commission

From: Gaarder, Nancy [<mailto:Nancy.Gaarder@owh.com>]
Sent: Thursday, March 24, 2011 12:42 PM
To: Dricks, Victor
Subject: followup question from omaha world-herald

Hi Victor,

I'm following up on the Duane Arnold question: Would you be able to tell me how many BWR/Mark 1 reactors have been given credit for containment overpressure as part of a power uprate?

Thank you,

Nancy

Omaha World-Herald

www.omaha.com

Nancy Gaarder

Reporter

Office: 402-444-1102

Fax: 402-444-1231

Email: Nancy.Gaarder@owh.com

1314 Douglas St.- Suite 700

Omaha, NE 68102

From: Gaarder, Nancy
To: Burnell, Scott
Subject: RE: World-Herald accuracy check.
Date: Friday, March 25, 2011 5:04:19 PM

Yes: (b)(6)

Thank you.

Omaha World-Herald

www.omaha.com

Nancy Gaarder

Reporter

Office: 402-444-1102

Fax: 402-444-1231

Email: Nancy.Gaarder@owh.com

1314 Douglas St. - Suite 700

Omaha, NE 68102

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 4:04 PM
To: Gaarder, Nancy
Subject: RE: World-Herald accuracy check.

Nancy;

Are you at your desk? I'd like to call.

Scott

From: Gaarder, Nancy [mailto:Nancy.Gaarder@owh.com]
Sent: Friday, March 25, 2011 1:42 PM
To: Burnell, Scott
Subject: RE: World-Herald accuracy check.

Absolutely...in the meantime, is there anyone at teh ACRS that you can refer me to....or can you do double duty later today?

Thanks.

Omaha World-Herald

www.omaha.com

Nancy Gaarder

Reporter

Office: 402-444-1102

Fax: 402-444-1231

Email: Nancy.Gaarder@owh.com

1314 Douglas St. - Suite 700

Omaha, NE 68102

From: Hackett, Edwin
To: Burnell, Scott; Dricks, Victor
Subject: RE: World-Herald accuracy check.
Date: Saturday, March 26, 2011 9:06:28 AM

Thanks Scott - in the press of business yesterday, I never got back to this after the Ops Center. I did receive an email from her that I will forward to you.

Ed

From: Burnell, Scott
Sent: Friday, March 25, 2011 2:41 PM
To: Hackett, Edwin; Dricks, Victor
Subject: Re: World-Herald accuracy check.

On second thought, could you confer with Victor before calling? Thanks.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Hackett, Edwin
To: Burnell, Scott
Sent: Fri Mar 25 14:29:35 2011
Subject: RE: World-Herald accuracy check.

Sure

From: Burnell, Scott
Sent: Friday, March 25, 2011 2:28 PM
To: Hackett, Edwin
Subject: Re: World-Herald accuracy check.

All things being equal, I don't know that she'd benefit from any further CAP discussion. I'm on my way home to take care of something -- feel that you could handle the committee line on CAP without me on the line?

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Hackett, Edwin
To: Burnell, Scott
Sent: Fri Mar 25 14:24:38 2011
Subject: RE: World-Herald accuracy check.
Hi Scott,

The ACRS Members generally do not respond to these requests individually, but I can always help you guys out if you need it.

Thanks,

Ed

From: Burnell, Scott
Sent: Friday, March 25, 2011 2:22 PM
To: Hackett, Edwin
Subject: Fw: World-Herald accuracy check.

Ed;

I doubt anyone's available to talk CAP with her, but I'm just being thorough. Thanks.

Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Gaarder, Nancy <Nancy.Gaarder@owh.com>
To: Burnell, Scott
Sent: Fri Mar 25 13:41:45 2011
Subject: RE: World-Herald accuracy check.
Absolutely...in the meantime, is there anyone at teh ACRS that you can refer me to....or can you do double duty later today?

Thanks.

Omaha World-Herald
www.omaha.com <<http://www.omaha.com/>>

Nancy Gaarder
Reporter
Office: 402-444-1102
Fax: 402-444-1231
Email: Nancy.Gaarder@owh.com <<mailto:Nancy.Gaarder@owh.com>>
1314 Douglas St.- Suite 700
Omaha, NE 68102

From: Burnell, Scott [<mailto:Scott.Burnell@nrc.gov>]
Sent: Friday, March 25, 2011 12:40 PM
To: Gaarder, Nancy
Subject: RE: World-Herald accuracy check.
I'm about to leave the office and a Blackberry stinks for editing – can I try and get back to you later this afternoon?

From: Gaarder, Nancy [<mailto:Nancy.Gaarder@owh.com>]
Sent: Friday, March 25, 2011 1:36 PM
To: Burnell, Scott
Subject: World-Herald accuracy check.

Scott,

Thank you,

I'm just sending the sidebar so as to not abuse your time.....it's the more technical of the two. Feel free to make any corrections or suggestions.

Also, could you recommend a way for me to reach someone at the ACRS? I'd like to be sure I'm

From: Burnell, Scott
To: "DCappiello@ap.org"
Subject: Re: CLARIFICATION
Date: Friday, March 25, 2011 3:07:19 PM

Yes. I do appreciate the attention to detail, Dina.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Cappiello, Dina <DCappiello@ap.org>
To: Burnell, Scott
Sent: Fri Mar 25 15:06:23 2011
Subject: RE: CLARIFICATION

To double and triple check -- while B.5.b could extend coping time, regs to date only require 4 to 8 hour coping time in SBO, yes?

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 2:56 PM
To: Cappiello, Dina
Subject: Re: CLARIFICATION

Nope -- as I said earlier, that's SOARCA specific.

Sorry to be short -- life just keeps piling on.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Cappiello, Dina <DCappiello@ap.org>
To: Burnell, Scott
Sent: Fri Mar 25 14:54:38 2011
Subject: RE: CLARIFICATION

Is this OK?

NRC staff typically focus on addressing accident situations that pose risks that are greater than 1 in 1 million.

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 1:44 PM
To: Cappiello, Dina
Subject: RE: CLARIFICATION

I'm sure you realize I'm looking at that sentence with more than the average reader's knowledge. To my eye, it's saying they are the same, when we have nowhere near

SSSS/189

enough information to compare all the U.S. improvements to whatever was done in Japan. A rewrite along the lines of "Fukushima and Peach Bottom share a design history, although Peach Bottom received several upgrades to its containment in the 1980s and 1990s" would satisfy my concerns.

From: Cappiello, Dina [mailto:DCappiello@ap.org]
Sent: Friday, March 25, 2011 1:40 PM
To: Burnell, Scott
Subject: RE: CLARIFICATION

I'm not saying they are same condition. Since our risk models are based on conditions here, I don't see why the second sentence is a problem. And trust me, I'm spelling out all the stuff we have done to mitigate.

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 1:39 PM
To: Cappiello, Dina
Subject: RE: CLARIFICATION

I can't argue with the first sentence, given the context of our discussion. I do hope you have room to point out the same simulations showed the event could be mitigated.

The second one I have to disagree strongly with. Can you provide me a source for explicitly equating Peach Bottom and Fukushima, given all the work U.S. plants did to improve Mark I containment performance?

From: Cappiello, Dina [mailto:DCappiello@ap.org]
Sent: Friday, March 25, 2011 1:34 PM
To: Burnell, Scott
Subject: RE: CLARIFICATION

My attempt at describing unmitigated:

In one scenario recently simulated by the Nuclear Regulatory Commission, it would take less than a day for radiation to escape from a reactor at a nuclear power plant outside of Lancaster, Pa., following a complete loss of electrical power and all defenses to respond to it. That plant, the Peach Bottom Atomic Power Station, has reactors of the same older make and model as those crippled and releasing radiation at Japan's Fukushima Dai-ichi plant.

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 1:33 PM
To: Cappiello, Dina
Subject: RE: CLARIFICATION

For the purposes of appropriately using SOARCA's limited resources, the staff determined the 1×10^{-6} probability to be a good cutoff point for the scenarios they would examine.

The NRC's ongoing regulatory process doesn't have a "probable" cutoff point for examining how plants would respond to potential events.

From: Cappiello, Dina [mailto:DCappiello@ap.org]
Sent: Friday, March 25, 2011 1:28 PM
To: Burnell, Scott
Subject: CLARIFICATION

In our interview the other day, you said this:

We are going to focus on those events that are considered probable. Greater than 1 in 1 million chance per year of damaging the core.

So does NRC consider events probable when they are about 1 in 1 million chance?

Dina Cappiello
Environment/Energy Reporter
The Associated Press
1100 13th Street NW, Suite 700
Washington, DC 20005
(202)-641-9446 (o)
(202)-403-3582 (f)

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| (b)(6) |
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[IP_US_DISC]msk dccc60c6d2c3a6438f0cf467d9a4938

From: [Cappiello, Dina](#)
To: [Burnell, Scott](#)
Subject: RE: CLARIFICATION
Date: Friday, March 25, 2011 6:46:33 PM

Scott,

Story is finished. It is now in the editing process. Thanks for all your help on this, and your quick replies.

Dina

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 4:34 PM
To: Cappiello, Dina
Subject: RE: CLARIFICATION

Yes, that works.

From: Cappiello, Dina [mailto:DCappiello@ap.org]
Sent: Friday, March 25, 2011 4:34 PM
To: Burnell, Scott
Subject: RE: CLARIFICATION

I have complete loss of electrical power – again...lay people. That works, right?

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 4:31 PM
To: Cappiello, Dina
Subject: RE: CLARIFICATION

'Zactly. SBO is more than a Loss of Offsite Power.

From: Cappiello, Dina [mailto:DCappiello@ap.org]
Sent: Friday, March 25, 2011 4:30 PM
To: Burnell, Scott
Subject: RE: CLARIFICATION

So no generators.

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 4:27 PM
To: Cappiello, Dina
Subject: RE: CLARIFICATION

Station blackout is exactly what it implies – no A/C power of any kind.

From: Cappiello, Dina [mailto:DCappiello@ap.org]
Sent: Friday, March 25, 2011 4:12 PM
To: Burnell, Scott
Subject: RE: CLARIFICATION

5555/182

Can't be easy can it. I want to double-check one other thing. Station Blackout refers to loss of offsite, onsite power and alternate power yes? Or does it include generator use? I need to clarify that it assumes generators are out too.

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 3:52 PM
To: Cappiello, Dina
Subject: RE: CLARIFICATION

The requirements were rolled out shortly after 9/11 through Orders to all operating reactors. The regulations were formalized in March 2009.

From: Cappiello, Dina [mailto:DCappiello@ap.org]
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When did 8.5.b come out?

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
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To: Cappiello, Dina
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Nope -- as I said earlier, that's SOARCA specific.

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Scott Burnell
(b)(6)

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To: Burnell, Scott
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[IP_US_DISC]msk dccc60c6d2c3a6438f0cf467d9a4938

From: Cappiello, Dina
To: Burnell, Scott
Subject: Re: CLARIFICATION
Date: Saturday, March 26, 2011 12:32:37 PM

Yeah, the guys vetting this story know a lot about nuclear so they have lots of questions.

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Saturday, March 26, 2011 12:22 PM
To: Cappiello, Dina
Subject: RE: CLARIFICATION

I hope they're going to give you comp time for all this "on vacation" stuff...

I don't have a specific percentage, but it's not "assumptions" we're talking at that point, it's detailed computer codes predicting the behavior of the fuel rods, etc. It's reasonable to say the SOARCA models for the unmitigated scenarios predict accident progressions that melt enough of the core to fail the reactor vessel and then containment.

Will that help?

From: Cappiello, Dina [DCappiello@ap.org]
Sent: Saturday, March 26, 2011 12:21 PM
To: Burnell, Scott
Subject: Re: CLARIFICATION

Another one from eds..in SOARCA is there a degree of core damage assumed to get to 20 hours release into environment. Is it partial melt? Full melt? I know it says 1-4 percent released, but I didn't see degree of melting

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Saturday, March 26, 2011 10:43 AM
To: Cappiello, Dina
Subject: RE: CLARIFICATION

Hi Dina;

The NRC certainly reviewed what was learned from the 2003 blackout, here's the press release we issued:

<http://adamswebsearch2.nrc.gov/idmws/ViewDocByAccession.asp?AccessionNumber=ML042260480>

I don't recall any specific mitigation actions for the blackout.

As we briefly touched on yesterday, a loss of offsite power is compensated for by the diesels. Without the diesels you're in a station blackout. Is that helpful?

And SOARCA's modeling is based on the reactor being tripped (chain reaction shut off) by the seismic event, so the safety systems are dealing with decay heat, again as we discussed several days ago.

Go on vacation already!!! :-)

Scott

From: Cappiello, Dina [DCappiello@ap.org]

SSSS/18B

Sent: Saturday, March 26, 2011 9:41 AM
To: Burnell, Scott
Subject: Re: CLARIFICATION

Scott,

Sorry to bother you on a Saturday...but here is another question from the editors, which I think I can answer but wanted to make sure I was right.

They want to know if NRC put in place any mitigation after the 2003 Canadian-US blackout.

I told them I only knew of station blackout rule and B.5.b. rules. It said that since a grid blackout which would lead to loss of offsite power is different from a station blackout it may not have led to any mitigation. Is that correct?

Also, does SOARCA assume that no shut down has taken place at reactors?

Dina

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 04:52 PM
To: Cappiello, Dina
Subject: RE: CLARIFICATION

It would be accurate to say "the simulation described in a 2009 presentation," since I don't have a hard date on when it was run.

From: Cappiello, Dina [mailto:DCappiello@ap.org]
Sent: Friday, March 25, 2011 4:48 PM
To: Burnell, Scott
Subject: RE: CLARIFICATION

I need a year on the Peach Bottom simulation from SOARCA...is is 2009, like presentation?>

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Friday, March 25, 2011 4:34 PM
To: Cappiello, Dina
Subject: RE: CLARIFICATION

Yes, that works.

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Scott Burnell
202-441-0471

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To: Burnell, Scott
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[IP_US_DISC]msk dccc60c6d2c3a6438f0cf467d9a4938

From: Burnell, Scott
To: Conatser, Richard; Shoop, Undine; Alexion, Thomas
Subject: Re: NRC guidance for Fukushima
Date: Monday, March 28, 2011 6:12:02 AM

I believe that's squarely in NRR mgmt territory.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Conatser, Richard
To: Shoop, Undine; Alexion, Thomas; Burnell, Scott
Sent: Mon Mar 28 06:07:01 2011
Subject: RE: NRC guidance for Fukushima

How should we respond to this question from a licensee?

From: ROBERTS, MICHAEL B [mailto:(b)(6)]
Sent: Saturday, March 26, 2011 12:39 PM
To: Conatser, Richard
Subject: NRC guidance for Fukushima

Following Chernobyl the NRC issued Information Notice 86-32 requiring utilities to report activity identified in their REMP programs.

Does the NRC have plans for a similar request?

5555/1874

From: Mayfield, Michael
To: Burnell, Scott
Subject: RE: Tuesday's Commission Briefing
Date: Monday, March 28, 2011 7:59:21 AM

That's why you get the big bucks!!!!!!

From: Burnell, Scott
Sent: Monday, March 28, 2011 7:59 AM
To: Mayfield, Michael; Coffin, Stephanie; McIntyre, David
Subject: RE: Tuesday's Commission Briefing

Oh, joy.

From: Mayfield, Michael
Sent: Monday, March 28, 2011 7:58 AM
To: Coffin, Stephanie; McIntyre, David; Burnell, Scott
Subject: RE: Tuesday's Commission Briefing

To our surprise, Chris Mowry (B&W) has a slide entitled "Protection against "Fukushima-type" Events". Oh well. His slides came in Sunday afternoon and will be posted by SECY this morning (may already be up).

That is the only slide in any of the presentations that goes to this subject.

From: Coffin, Stephanie
Sent: Saturday, March 26, 2011 12:02 PM
To: McIntyre, David
Cc: Mayfield, Michael
Subject: RE: Tuesday's Commission Briefing

There is no discussion of Japan planned by either the external panel members or by the staff for this meeting.

From: McIntyre, David
Sent: Friday, March 25, 2011 4:29 PM
To: Coffin, Stephanie
Subject: Tuesday's Commission Briefing

Hi Stephanie – OPA is getting several inquiries from media wondering if your small modular reactors briefing to the Commission next Tuesday might be devoted to Japan. Have you had any inkling that might happen?

Thanks,
Dave Mc

David McIntyre
Public Affairs Officer

SSSS/185

U.S. Nuclear Regulatory Commission

(301) 415-8206 (direct)

(b)(6) (mobile)

Protecting People & the Environment

From: King, Mark
To: OBryan, Phil; Burnell, Scott
Subject: RE: Could you help me find answers? - Questions regarding Brunswick and hydrogen issues in Japan - UCS discussing
Date: Monday, March 28, 2011 8:35:01 AM

Scott, - if you need anything more on this topic / issue - the Senior Resident Inspector at Brunswick (**Phil O'Bryan**) has offered to help.
But - I think ~~the deadline~~ on this story has passed --- so I would assume no more follow-up is needed at this point.

Thanks Phil / (unless you hear otherwise from Scott... no additional actions needed),
Mark

From: OBryan, Phil
Sent: Monday, March 28, 2011 8:27 AM
To: King, Mark
Subject: RE: Could you help me find answers? - Questions regarding Brunswick and hydrogen issues in Japan - UCS discussing

Mark , I've been out of the office for training. Did you get everything you needed on this?

From: King, Mark
Sent: Tuesday, March 22, 2011 1:16 PM
To: Garmon-Candelaria, David; Bernardo, Robert
Cc: NRR_DIRS_IOEB Distribution; Tabatabai, Omid; Musser, Randy; OBryan, Phil; Kolcum, Gregory; Saba, Farideh
Subject: FW: Could you help me find answers? - Questions regarding Brunswick and hydrogen issues in Japan - UCS discussing
Importance: High

A reporter is asking question on **Brunswick test** / report and hydrogen explosions that may relate to Japan event.

If anyone has insights / awareness of this – let me know.

The Union of Concerned Scientists said “A little-known test performed decades ago at the **Brunswick**” that **could explain the hydrogen explosions at Japan’s Fukushima Daiichi plant**. See the UCS analysis below. Could you help me get answers to the following questions?

1. Did the test actually happen? If so,
2. Why was the test performed and when was it performed?
3. Did the UCS analysis below accurately reflect the test and the test result?
4. Did Brunswick report the test results to NRC or the industry? If so,
5. Did either the NRC or industry require or suggest any modifications to mitigate the risk?
6. Did Brunswick take measures to mitigate the risk?

Thanks, don't do a search (I will do that) – just in case you were aware of something already because of the on-going issues.

I have **CC'd the Brunswick Branch Chief** (Randy. Musser) **and SRI/RI** (Phil. O'Bryan, SRI:G. Kolcum, RI) and PM (FARIDEH SABA) so they are aware that Brunswick site is being discussed by the USC - see (March 18 write up) at http://allthingsnuclear.org/tagged/Japan_nuclear at: the UCS link below [Japan nuclear](#) - FYI.

Mark

SSSS/186

From: Thomas, Eric
Sent: Tuesday, March 22, 2011 12:02 PM
To: King, Mark
Subject: FW: Could you help me find answers?
Importance: High

Any ideas?

Eric Thomas

U.S. Nuclear Regulatory Commission
NRR/DIRS/IOEB
OWFN-7E24
eric.thomas@nrc.gov
301-415-6772 (office)
(b)(6) (mobile)

From: Burnell, Scott
Sent: Tuesday, March 22, 2011 11:18 AM
To: Nelson, Robert; Meighan, Sean; Thomas, Eric
Subject: FW: Could you help me find answers?
Importance: High

Bob et al;

Deadline's actually noon tomorrow but with a research project like this that's not much help. I would think we could focus on the end result – improved drywell seals, if my quick read of the UCS item is worth anything. Thanks!

Scott

From: Xie, Yanmei [mailto:yanmei_xie@platts.com]
Sent: Tuesday, March 22, 2011 10:57 AM
To: Burnell, Scott; Brenner, Eliot
Subject: FW: Could you help me find answers?

And my deadline is 5pm today.

Yanmei Xie
Associate Editor
Platts Nuclear Publications
Office: (202) 383-2161
Mobile: (b)(6)
www.platts.com

From: Xie, Yanmei
Sent: Tuesday, March 22, 2011 10:56 AM
To: 'Brenner, Eliot'; 'Burnell, Scott'
Subject: Could you help me find answers?

Hi, Eliot and Scott,

I hope you guys were able to catch some much needed rest during the weekend. I feel a little ashamed to say that my weekend was actually quite relaxing, while two of my colleagues were on duty.

The Union of Concerned Scientists said "A little-known test performed decades ago at the Brunswick" could explain the hydrogen explosions at Japan's Fukushima Daiichi plant. See the UCS analysis below. Could you help me get answers to the following questions?

7. Did the test actually happen? If so,
8. Why was the test performed and when was it performed?
9. Did the UCS analysis below accurately reflect the test and the test result?
10. Did Brunswick report the test results to NRC or the industry? If so,
11. Did either the NRC or industry require or suggest any modifications to mitigate the risk?
12. Did Brunswick take measures to mitigate the risk?

Your help is greatly appreciated!

Possible Cause of Reactor Building Explosions

| by [Dave Lochbaum](#) | [nuclear power](#) | [nuclear power safety](#) | [Japan nuclear](#) |

Dramatic videos show the explosions that severely damaged the reactor buildings at first Unit 1 and then Unit 3 at the stricken Fukushima Dai-Ichi nuclear plant in Japan. The explosions are attributed to the ignition of hydrogen gas that collected within the reactor buildings. This was early in the crisis, and before the spent fuel pools are thought to have lost water and started producing hydrogen. The hydrogen was likely produced by damaged fuel rods in the reactor core. To reduce pressure in the reactor vessel, some of that hydrogen was released from the vessel into the primary containment structure of the reactor.

A key, unsolved riddle is how a significant amount of hydrogen escaped from the primary containment into the reactor building, and how this low-probability event would have happened in multiple reactors.

How Hydrogen Got into Primary Containment

Figure 1 shows a cross-sectional view of a boiling water reactor with a Mark I containment like that at Fukushima Dai-Ichi. The reactor core is housed within a metal reactor vessel. The reactor vessel is enclosed within the primary containment structure. The reactor building completely surrounds the containment structure. The reactor building walls are made of 18 to 30 inch-thick concrete up to the elevation of the refueling platform. The walls are made of metal from that elevation to the roof.

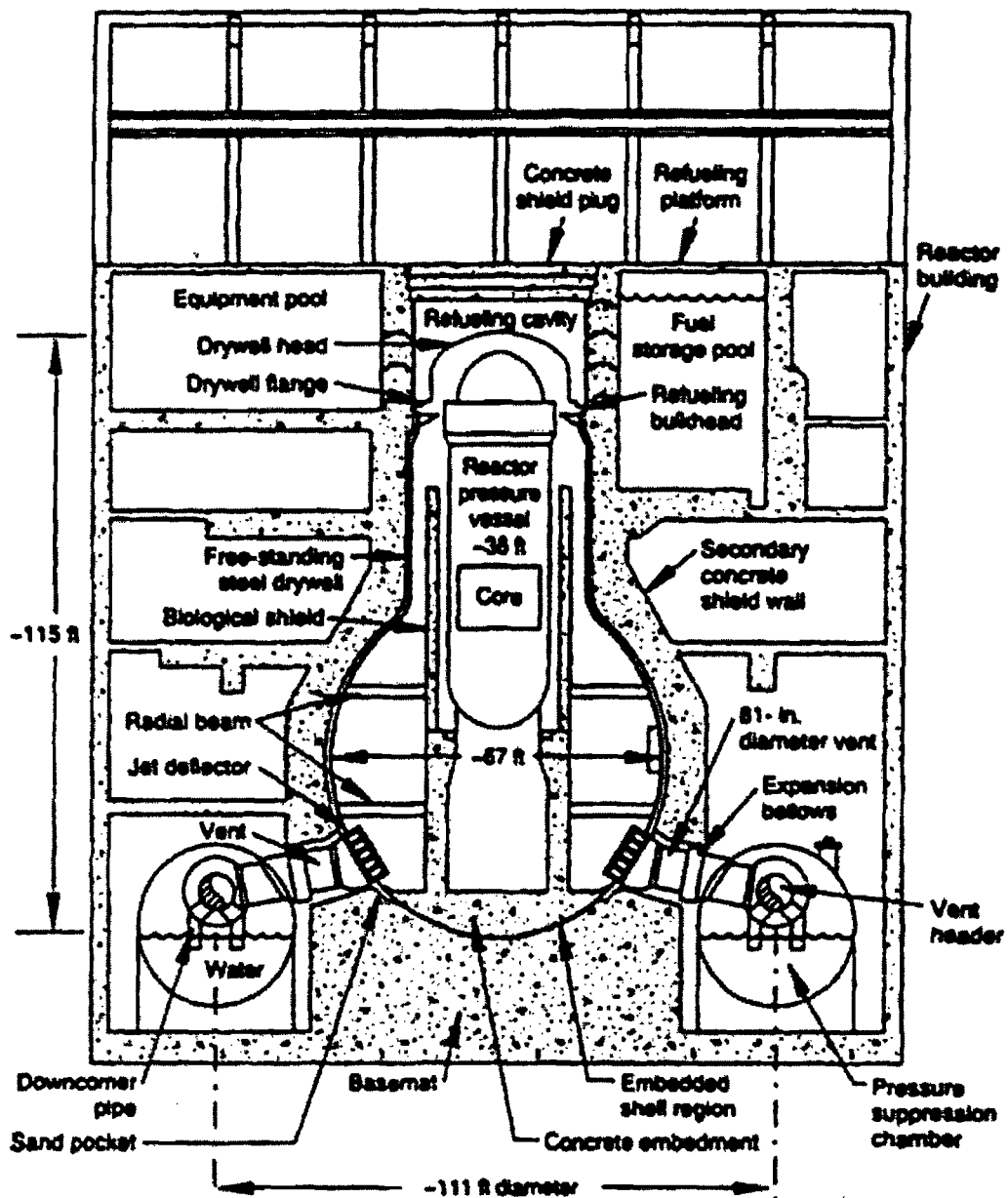


Figure 1

The hydrogen gas most likely came from a chemical reaction between water and the metal cladding of fuel rods in the reactor cores when the water level inside the reactor vessels dropped low enough to expose at least the upper core regions. The hydrogen gas initially collected in the reactor vessel. To cool the fuel in the reactor, workers attempted to pump seawater into the reactor vessel. As pressure inside the reactor vessel increased, it kept water from flowing into the reactor. Periodically, workers opened valves to vent steam and gas from the reactor vessel to into the pressure suppression chamber (also called the torus). The gas, including hydrogen, collected in the torus and periodically equalized with the air space in the drywell.

When pressure in the primary containment (the combination of the drywell and the torus) rose too high, workers vented the containment to the atmosphere. This vent piping passed through the reactor building, but discharged well outside of it, and should not have led to a hydrogen buildup inside the building.

How Hydrogen May Have Gotten from Primary Containment into the Reactor Building

The destruction of the Unit 1 and 3 reactor buildings appears to have been caused by hydrogen explosions. As noted above, an unanswered question is how the hydrogen got into the reactor buildings. A little-known test performed decades ago at the Brunswick nuclear plant in North Carolina may hold the key to answering that question.

To satisfy a requirement in the American Society of Mechanical Engineers (ASME) code for prototype containment designs, workers performed a structural integrity test on the reactor at Brunswick in the 1970s.

The primary containment structure at Brunswick was designed to withstand an internal pressure of 62 pounds per square inch (psi). The ASME code required it to be tested at 71 psi. This test involved pumping air into the containment structure until the pressure rose to 71 psi. The pumps would then be turned off and the pressure would be monitored for several hours to verify that it remained fairly constant, indicating that the primary containment was intact and not leaking. During this time, workers would record data from strain gauges and other instrumentation to verify that structural loads were properly distributed.

But as workers increased the containment pressure they encountered a problem. The pressure stopped increasing and remained constant at 70 psi. The pumps continued to push air into the containment, but its pressure just stopped increasing. This unexpected plateau started a hunt for air leaking from the containment somewhere.

A hissing sound attracted workers to the top of the containment structure. They identified air leaking through the drywell flange area (see Figure 1). The metal drywell head (see Figure 2) is bolted to the metal drywell with a rubber O-ring between the surfaces to provide a good seal fit.

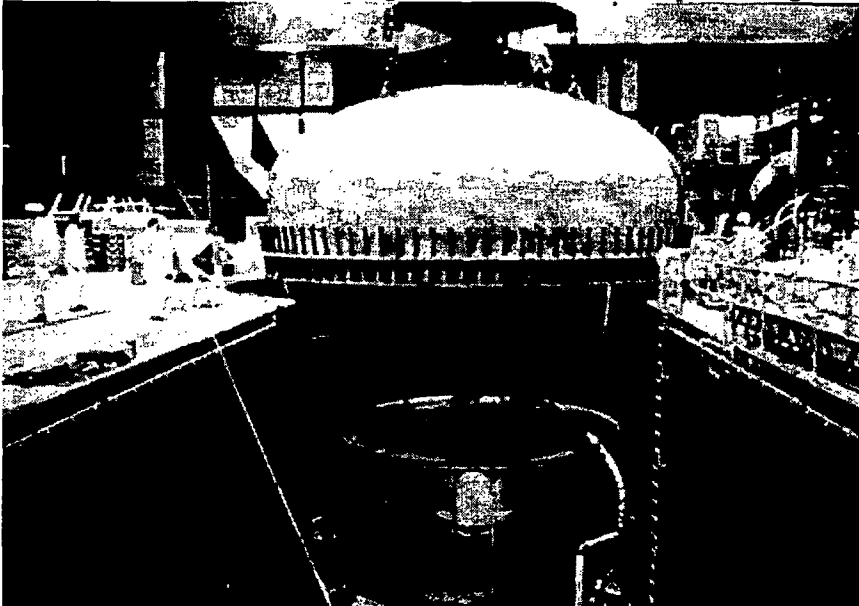


Figure 2

Workers found that the containment pressure of 70 psi pushing upward against the inner dome of the drywell head lifted it off the drywell flange enough to provide a pathway for air to leak from the containment. That air leaked into the area labeled refueling cavity in Figure 1. The refueling cavity is located outside the primary containment but inside the reactor building.

At Brunswick, workers tightened the drywell head bolts beyond the amount specified in the reactor plans in order to reduce the leak rate and continue the test. While workers conducted pressure tests at all nuclear reactors prior to initial startup and periodically thereafter, these tests were performed at or below the containment design-pressure of 62 psi. So none of them reached the pressure that caused the leak around the drywell head.

In other words, had Brunswick not featured a prototype containment design, its initial and recurring pressure tests would have been conducted at 62 psi, not 71 psi. Leaking from the drywell head was not observed until the containment pressure rose to 70 psi.

How does this Brunswick containment testing experience relate to the reactor building explosions experienced at Fukushima Dai-Ichi Units 1 and 3?

Like Brunswick, the containment design at those reactors features a drywell head bolted onto the lower portion of the drywell. Workers at these reactors faced significant problems cooling the reactor cores. The combined effects of the earthquake and tsunami left the reactors without an electrical power. The only dc-powered (i.e., battery-powered) backup system was lost when the batteries were exhausted. Workers turned to their only remaining option: injecting sea water into the reactor vessels to cool the reactor cores.

The pumps used to pump seawater into the vessel operated at low pressure. When seawater entered the reactor vessel, it was heated by the hot reactor core to the point of boiling. Steam produced by the boiling increased the pressure inside the reactor vessel. To prevent this rising pressure from hindering seawater from being pumped into reactor, workers periodically vented the reactor vessel. This carried steam and gas, including hydrogen, into the primary containment. This flow in turn increased the pressure inside containment. When containment pressure rose too high, workers vented the containment to the atmosphere.

The workers properly sought to minimize the amount of gas they vented from containment to the atmosphere to lessen the amount of radiation released. They did this by allowing the containment pressure to rise as high as tolerable between ventings.

It is possible that the containment pressures rose high enough to replicate the Brunswick experience by lifting the drywell head enough to allow hydrogen and other gases to leak into the refueling cavity and reactor building. If so, hydrogen could build up to an explosive mixture.

This tragedy will be closely examined for its causes. That scrutiny must determine how hydrogen got into the reactor building early in the crisis. The drywell head pathway may be that answer.

Answering this question is critical to prevent hydrogen explosions at the other reactors at Fukushima.

If this mechanism is the cause of the leak, it could be averted easily and effectively simply by changing the venting procedures so that workers vent the containment pressure to the atmosphere more frequently and do not let it build up to such high level. Taking such action might moderately increase the amount of radioactive gases vented into the atmosphere, but could eliminate a source of hydrogen inside the reactor buildings that could cause another explosion.

Authorities should launch an investigation to pinpoint the source of the hydrogen leak to eliminate this risk in the future. But in the meantime, since the Brunswick test showed that this containment is vulnerable to high-pressure leaking, Tokyo Electric Power Co. can and should take immediate steps to avoid creating such a leak by changing its procedures to vent the containment before it builds up to such high pressure (70 psi).

Yanmei Xie

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From: Harrington, Holly
To: RMTPACTSU_ELNRC; Burnell, Scott; McIntyre, David
Cc: LIA11 Hoc
Subject: RE: Awareness: Marshall Shield to President Obama: I MUST BE SENT TO JAPAN TODAY!
Date: Monday, March 28, 2011 8:43:14 AM
Sensitivity: ~~Confidential~~

In my opinion, this requires no action from the NRC.

From: RMTPACTSU_ELNRC [mailto:RMTPACTSU_ELNRC@ofda.gov]
Sent: Saturday, March 26, 2011 11:37 AM
To: Harrington, Holly; Burnell, Scott; McIntyre, David
Cc: LIA11 Hoc
Subject: Awareness: Marshall Shield to President Obama: I MUST BE SENT TO JAPAN TODAY!
Sensitivity: ~~Confidential~~

Holly, Scott, David:

I'm sure that you are well aware of this individual and his messages. USAID has received over 50 messages in the last few days and has reported him to their Security Office. I would, however, like to draw your attention his latest e-mail which specifically names the NRC.

Thanks!
Michael I. Dudek

From: Marshall Shield [mailto:corp@myshield.us]
Sent: Friday, March 25, 2011 9:07 PM
To: RMTPACTSU_ELC
Cc: president@whitehouse.gov; The.Secretary@hq.doe.gov; 'Marshall Shield'
Subject: President Obama: I MUST BE SENT TO JAPAN TODAY!
Importance: High
Sensitivity: ~~Confidential~~

March 25, 2011 6:00 PM PST USA

To: President Obama
Ambassador Ichiro Fujisaki
Secretary of Energy: Dr. Steven Chu: Japan - IAEA
Corporate Executives: Tokyo Electric Power
U.S. NUCLEAR REGULATORY COMMISSION
IEEE

From: Marshall Shield

Subject: Expertise to solve nuclear reactor problems: Second to NONE!

SSSS / 187

I spent a year in Japan and loved every second I was there, a wonderful country with wonderful persons....I am looking forward to working with the Nuclear problems has a GS-15, I know what to do and what equipment it will take to get all the reactors under control, plus I will stay until all reactors are stable!

I've sent my information to the above, as of today, many have responded: Marshall Shield is the BEST person to be sent to work with the Tokyo Electric Power personnel.

The U.S. Nuclear Regulatory Commission agrees with me! I've sent my documents: World Disaster – Nuclear Plants Survival and a request for a Task Force to support/advise/consult all nuclear plant owners/operators/engineers around the world. I am writing/compiling a book in all languages' for the countries that have/will have nuclear power plants, which includes the procedures described here:

World Disasters – Nuclear Plants survival

- What the owners/operators/engineers must do to protect their nuclear plants, so they can survive a natural disaster
- Instant response team to support them, available 24/7, anywhere on Planet Earth
- Steps to recover: Power/Computers/Cooling
- Schedule/Steps to provide proper shut down to stable conditions
- Importance to have backup power/water pumps online: 24/7
- These back up units have to be protected, to preclude their destruction during a natural disaster
- Operations/turnover from disaster situation to shut down/standby
- Source for all hardware/software/systems to help any troubled reactor
- To provide instant support (During Disaster Support) via the fastest transportation available
- Training for Owners*Operators*Engineers*Technicians to ensure a faster/proper recovery process

I must be sent to help!

I know how to seal the radiation, to STOP it from getting into the atmosphere/environment!

What is the cost to send me? (Pennies)

Or

The probable cost to Japan & the Environment if you don't?
(Trillions)!

I am available to fly from SeaTac or US Air Force
Base McCord or US Navy Base Whidbey Island Naval
base within hours!

I am the best man to solve these critical problems
and am available to go today!

Marshall Shield

Office: 360-336-3057 PST USA

Cellular: (b)(6)

Email: ceo@myshield.us

From: Brenner, Eliot
To: Hayden, Elizabeth; Akstulewicz, Brenda; Chandrathil, Prema; McIntyre, David; Screnci, Diane; Harrington, Holly; Couret, Ivonne; Janbergs, Holly; Ledford, Joey; Sheehan, Neil; Hannah, Roger; Burnell, Scott; Uselding, Lara; Shannon, Valerie; Dricks, Victor; Mityng, Viktoria
Subject: Jaczko japan trip
Date: Monday, March 28, 2011 8:44:36 AM

Here is the statement put out by the embassy. Refer callers to this and go no further please, other than on background to say this is a short trip because the chairman has to be back to attend a congressional hearing wednesday:

The Chairman of the Nuclear Regulatory Commission, Dr. Gregory Jaczko, traveled to Tokyo on March 28 to convey directly to his Japanese counterparts a message of support and cooperation, and to assess the current situation.

Following his meetings with senior Japanese government and TEPCO officials, Chairman Jaczko said, "Our nuclear experts are working closely with their Japanese counterparts, and we both continue to share expert analysis as we move forward to address this challenge. I reconfirmed in my meetings that we are prepared to provide any assistance we can in the days to come."

Chairman Jaczko further added, "The unprecedented challenge before us remains serious and our best experts remain fully engaged to help Japan address the situation."

Eliot Brenner
Director, Office of Public Affairs
Nuclear Regulatory Commission
Rockville, Md.
O: 301-415-8200
C: (b)(6)

5555/188

From: Burnell, Scott
To: Chokshi, Niles; Munson, Clifford; Ake, Jon; Brenner, Eliot; Hayden, Elizabeth
Subject: RE: Peter Yanev??
Date: Monday, March 28, 2011 9:23:00 AM

Understood – I just wanted to make sure there wasn't some new contract we'd issued regarding Fukushima. Thanks.

From: Chokshi, Niles
Sent: Monday, March 28, 2011 9:22 AM
To: Munson, Clifford; Burnell, Scott; Ake, Jon; Brenner, Eliot; Hayden, Elizabeth
Subject: Re: Peter Yanev??

Peter is a very well known eq engineer. He was the founder of EQE. He is known for post eq investigations. To my knowledge he has been inactive for few years. I know him very well.

Sent from NRC Blackberry
Niles

(b)(6)

From: Munson, Clifford
To: Chokshi, Niles
Sent: Mon Mar 28 07:53:30 2011
Subject: FW: Peter Yanev??

Do you know Peter? Did he do work for us?

From: Munson, Clifford
Sent: Monday, March 28, 2011 7:52 AM
To: Ake, Jon; Burnell, Scott; Bensi, Michelle
Cc: Brenner, Eliot; Hayden, Elizabeth
Subject: RE: Peter Yanev??

He is a structural engineer and works for Risk Solutions International. See link for more info.

Cliff

<http://www.rsirisk.com/yanev.html>

From: Ake, Jon
Sent: Sunday, March 27, 2011 8:17 PM
To: Burnell, Scott; Munson, Clifford; Bensi, Michelle
Cc: Brenner, Eliot; Hayden, Elizabeth
Subject: RE: Peter Yanev??

Scott, I have heard the name but I am not familiar with the guy. I'll check around.
Jon

From: Burnell, Scott

SSSS/189

Sent: Sunday, March 27, 2011 8:54 AM
To: Munson, Clifford; Ake, Jon; Bensi, Michelle
Cc: Brenner, Eliot; Hayden, Elizabeth
Subject: Peter Yanev??
Importance: High

Cliff, Jon, Michelle;

This is from today's New York Times piece on the tsunami at Fukushima:
http://www.nytimes.com/2011/03/27/world/asia/27nuke.html?_r=1&hp=&pagewanted=all

"They had years to prepare at that point, after Kashiwazaki, and I am seeing the same thing at Fukushima," said Peter Yanev, an expert in seismic risk assessment based in California, who has studied Fukushima for the United States Nuclear Regulatory Commission and the Energy Department.

Do we know this guy? I know we've been very careful to avoid commenting on Fukushima, and certainly not in this way! I'm thinking Yanev overstated his credentials and the reporter didn't check with us.

I'm much less concerned with the article's slam against us for "not going far enough" with risk-based seismic analysis, that's nothing new.

Scott

From: Beltz, Terry
To: Burnell, Scott; Shannon, Valerie
Subject: RE: Request For Information
Date: Monday, March 28, 2011 10:06:36 AM
Attachments: Responses to Oskar Zarzycki's Questions.docx

Scott and Valerie

I do not wish to ignore Oskar, so I've taken some time to develop a brief response to most of his questions.

I'd appreciate a review to ensure that I'm not saying anything incorrect or out-of-line. I would also be responsive to any assistance on Questions 6, 7, 8 and 9.

Thanks,



Terry A. Beltz, Senior Project Manager
NRR/ADRO/DORL/LPL3-1
(301) 415-3049 O-8E8
Terry.Beltz@nrc.gov

From: Burnell, Scott
Sent: Friday, March 25, 2011 2:25 PM
To: Beltz, Terry; Shannon, Valerie
Cc: Pascarelli, Robert
Subject: Re: Request For Information

Hi Terry;

You can always punt to DOE on the fusion question. The other "red" questions we can help you with. It's all up to you on responding, particularly in light of Japan. Thanks.

Scott

Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Beltz, Terry
To: Shannon, Valerie
Cc: Pascarelli, Robert; Burnell, Scott
Sent: Fri Mar 25 14:19:12 2011
Subject: FW: Request For Information

5555/190

Val

Below is the e-mail that I received and that we briefly discussed over the phone.

Please let me know how you would like me to handle this. As I mentioned, some of the questions are very benign; however, those questions highlighted in RED require a bit more information or may be somewhat sensitive in nature.

Thanks,



Terry A. Beltz, Senior Project Manager
NRR/ADRO/DORL/LPL3-1
(301) 415-3049 O-8E8
Terry.Beltz@nrc.gov

From: Oskar Zarzycki [mailto:ozarzycki@madison.k12.wi.us]
Sent: Friday, March 25, 2011 1:41 PM
To: Beltz, Terry
Cc: Katie Johnson
Subject: Request For Information

Hi, my name is Oskar Zarzycki. I'm an 8th grade student at Spring Harbor Middle School in Madison, Wisconsin. I'm doing a report on nuclear energy. I need an interview as one of my sources, would you be willing to answer a few questions for me?

How soon do you think that the fusion will become a useful power source of energy?

What do you do with the waste of the Point Beach plant?

Why did you go into the nuclear field?

What is your favorite part of the job?

What is your least favorite part of the job?

Of all the ways accidents could happen, what is the biggest risk that Point Beach faces that might cause a meltdown?

What is the worst incident that occurred at Point Beach?

How do they monitor exposure for workers?

Has anyone had to leave to quit/transfer due to over exposure?

Thank you for your time.

From: Couret, Ivonne
To: Brenner, Eliot; Hayden, Elizabeth
Cc: Janbergs, Holly; Harrington, Holly; Burnell, Scott; McIntyre, David; Screnci, Diane; Sheehan, Neil; Dricks, Victor; Uselding, Lara; Chandrathil, Prema; Mitlyng, Viktoria; Hannah, Roger; Ledford, Joey; Medina, Veronika; Holian, Brian; Valentine, Nicholee
Subject: FYI - Hearing on the hill this week
Date: Monday, March 28, 2011 2:49:47 PM
Importance: High

FYI this week's schedule of hearing. Ivonne

From: Riley (OCA), Timothy
Sent: Monday, March 28, 2011 2:46 PM
To: Couret, Ivonne
Subject: RE: Hearing on the hill this week

Here are the hearings for this week:

Tuesday, March 29, 10:00 am,-- Senate Energy and Natural Resources Committee
366 Dirksen Senate Office Building
Mr. Bill Borchardt: **Update on Fukushima**

Wednesday, March 30, 10:00 am, House Transportation and Infrastructure
Subcommittee on Economic Development, Public Buildings, and Emergency Management
2253 Rayburn House Office Building
Mr. Mike Weber: **Emergency Management Programs**

Wednesday, March 30, 10:00 am, Senate Appropriations Energy and Water
Subcommittee
138 Dirksen Senate Office Building
Chairman Jaczko: **Review of Nuclear Safety**

Thursday, March 31, 10:00 am, House Appropriations Energy and Water
Subcommittee
2362B Rayburn House Office Building
Chairman Jaczko

Timothy Riley
Congressional Affairs Officer
U. S. Nuclear Regulatory Commission
Office of Congressional Affairs
Phone: 301-415-8492
Blackberry: (b)(6)

From: Couret, Ivonne
Sent: Monday, March 28, 2011 12:11 PM
To: Riley (OCA), Timothy
Subject: Hearing on the hill this week

Can you send me a link to the different Hearing on the Hill that the NRC will be participating this week and next. Thanks, Ivonne

SSSS/191

Ivonne L. Couret
Public Affairs Officer
Office of Public Affairs
Media Desk
opa.resource@nrc.gov
301-415-8200

Visit our online photo gallery. Incorporate graphics and photographs to tell your story!
<http://www.nrc.gov/reading-rm/photo-gallery/>

2010-2011 Information Digest - Where you can find NRC Facts at a Glance
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>

From: Nelson, Robert
To: Leeds, Eric; Grobe, Jack; Boger, Bruce; Burnell, Scott; LIA06 Hoc; Roberts, Darrell; Lara, Julio; Kennedy, Kriss; Croteau, Rick; Landau, Mindy; Steger (Tucci), Christine; Bahadur, Sher; Blount, Tom; Brown, Frederick; Cheok, Michael; Evans, Michele; Ferrell, Kimberly; Galloway, Melanie; Gitter, Joseph; Givvines, Mary; Hiland, Patrick; Holian, Brian; Howe, Allen; Lee, Samson; Lubinski, John; McGinty, Tim; Quay, Theodore; Ruland, William; Skeen, David; Thomas, Brian; Westreich, Barry
Cc: West, Steven; Shear, Gary; Broadus, Doug; Campbell, Stephen; Carlson, Robert; Chernoff, Harold; Kulesa, Gloria; Markley, Michael; Pascarelli, Robert; Salgado, Nancy; Simms, Sophonia; Wall, Scott; Guzman, Richard; Lyon, Fred; Meighan, Sean; Nguyen, Quynh; Oesterle, Eric; Polickoski, James; Tam, Peter; Thomas, Eric
Subject: FYI: NRR External Comm Team SitRep - 3/28
Date: Monday, March 28, 2011 3:56:40 PM
Attachments: image001.png




1. Reminder - To assist you in responding to questions that you may get from both internal and external stakeholders, there are several sets of Q&A's that have been approved by OPA on the NRR SharePoint page under the heading "Japan Event Information" at the following link: <http://portal.nrc.gov/edo/nrr/default.aspx>. All of this info has been screened for public release. A link is provided to the Japan Event Information portion of the public web site.
2. For the longer term, we are currently in the process of developing a category-question-driven Q&A database that we believe can be used agency-wide to help respond to inquiries. We have just begun populating it with OPA approved Q&A's but still have some ways to go. We are working to get buy-in for its use as an agency-wide tool.
3. A spent fuel white paper was developed over the weekend with coordination by the Ops Center. It was provided to the White House. For this reason, OPA has recommended that we control its distribution. Please contact Mike Markley or Eric Oesterle if you want access to this paper.
4. Link to EPA website on Japanese Nuclear Emergency:
<http://www.epa.gov/japan2011/index.html>
5. On Thursday, 3/31, there will be a category 1 public meeting with PG&E to discuss the licensee's plans to submit an amendment to incorporate a methodology for the review of new geotechnical information in the design and licensing basis for Diablo Canyon Power Plant, Unit Nos. 1 and 2. The meeting will be held in the Commission hearing room from 1 to 4. The meeting will be web cast and significant stakeholder interest is expected.
6. Completed screening of 4 potentially sensitive licensing actions (7 TACs) resulting in normal processing for each.
7. The NRR Comm Team will be meeting with Mindy Landau, OEDO, and her staff later this week to exchange information and improve coordination of communications.
8. We prepared an estimate of approx 1400 staff-hours and 22,000 pages to respond to the FOIA requesting all exemptions approved for power reactors.

Robert A. Nelson

Robert A. Nelson
NRR External Communications Coordinator, Japan Event
Deputy Director
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation



SSSS/198

☐ E-mail: robert.nelson@nrc.gov |  Office: (301) 415-1453 |  Cell: (b)(6) |  Fax: (301) 415-2102

From: Brenner, Eliot
To: Burnell, Scott
Subject: RE: Jaczko in Japan
Date: Monday, March 28, 2011 6:07:02 PM

done

From: Burnell, Scott
Sent: Monday, March 28, 2011 6:02 PM
To: Brenner, Eliot
Subject: Re: Jaczko in Japan

You got this one?

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Daly, Matthew <MDaly@ap.org>
To: Brenner, Eliot; Burnell, Scott
Sent: Mon Mar 28 18:00:41 2011
Subject: Jaczko in Japan

From AP story:

¶ Gregory Jaczko, head of the U.S. Nuclear Regulatory Commission, arrived in Tokyo on Monday to meet with Japanese officials and discuss the situation.

¶ "The unprecedented challenge before us remains serious, and our best experts remain fully engaged to help Japan," Jaczko was quoted as saying in a U.S. Embassy statement.

So when does he come back? And can we interview when he does? (Or even by phone somewhere en route)

Any details appreciated.

Matthew Daly

Environment/Energy Correspondent

The Associated Press

1100 13th Street NW, Suite 700

Washington, DC 20005

202-641-9541 direct

(b)(6)

cell

SSSS/193

<http://twitter.com/MatthewDalyWDC>

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[IP_US_DISC]msk dccc60c6d2c3a6438f0cf467d9a4938

From: Harrington, Holly
To: Brenner, Eliot; Akstulewicz, Brenda; Chandrathil, Prema; McIntyre, David; Screnci, Diane; Couret, Iyonne; Janbergs, Holly; Ledford, Joey; Sheehan, Neil; Hannah, Roger; Burnell, Scott; Uselding, Lara; Shannon, Valerie; Dricks, Victor; Mittyng, Viktoria
Subject: RE: Seismic Q&As March 28th 10pm update
Date: Tuesday, March 29, 2011 9:09:58 AM

This is already saved in our G drive, Crisis Communication folder, Japan subfolder . . .

From: Brenner, Eliot
Sent: Tuesday, March 29, 2011 7:30 AM
To: Akstulewicz, Brenda; Chandrathil, Prema; McIntyre, David; Screnci, Diane; Harrington, Holly; Couret, Iyonne; Janbergs, Holly; Ledford, Joey; Sheehan, Neil; Hannah, Roger; Burnell, Scott; Uselding, Lara; Shannon, Valerie; Dricks, Victor; Mittyng, Viktoria
Subject: FW: Seismic Q&As March 28th 10pm update

This may come in handy, all 100-plus pages of it.

Eliot

From: Kammerer, Annie
Sent: Monday, March 28, 2011 10:32 PM
To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc
Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Giltter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Nilesh; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffry; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas; Webb, Michael; Manoly, Kamal; Khanna, Meena; Screnci, Diane; Thomas, Eric; Nguyen, Quynh; Meighan, Sean; FOIA Response.hoc
Resource: Bensi, Michelle; 'rmtpactsu_elnrc@ofda.gov'
Subject: Seismic Q&As March 28th 10pm update

All,

It seems that some people actually missed getting the Q&As since I'm starting to get emails asking if I can do an update. Sorry it's been a while, for some reason my workload seems to have exploded...LOL. (*Actually I really have no excuse as Shelby has been a compiling machine!*). We've added several new sections including **ACRONYMS**, located near the back. (*Thanks to Stephanie Devlin for pulling the acronyms together*)

Now that the agency is moving out of the heart of the emergency response phase, and looking towards short, medium and long term actions and goals, our little seismic group has been discussing what to do with this document; and specifically how to make it useful beyond this event. We've discussed the fact that ever since the Kashiwazaki earthquake, we have recognized the need to develop a "generic" seismic Q&A document so that the agency can hit the ground running in cases such as this. It is obvious to us that we now have the guts of the document we've envisaged for years in one 140 page compilation; and it's time to make it happen!

So the next time you see this document (which won't be for a while), it will be radically transformed. We'll be putting all the "static" information in the front, and will be pulling the japan earthquake-specific information into a separate section. It will be more user friendly and will be easier to find any new information. It's unclear to us how long these updates will be useful, but we suspect, not much longer. So, now's the time to start wrapping it up and putting a bow on it...

We hope the new document will be worth the wait...

<< File: Seismic Questions for Incident Response 3-28-11 9pm.pdf >>

Dr. Annie Kammerer, P.E.

US NRC/RES/DE

(301) 251-7695 Office

SSSS/194

(b)(6)

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

From: Kammerer, Annie

Sent: Wednesday, March 23, 2011 3:15 AM

To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc

Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffry; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas; Webb, Michael; Manoly, Kamal; Khanna, Meena; Screnci, Diane; Thomas, Eric; Nguyen, Quynh; Meighan, Sean; FOIA Response.hoc Resource; Bensi, Michelle

Subject: Seismic Q&As March 22th 10pm update

All,

Attached please find an updated set of Q&As. I also included some new Q&As for SONGS and Diablo Canyon, just in case anyone is interested.

This version has an expanded set of definitions and new sections on station blackout, spent fuel, flooding and some other topics. It also has fewer duplicate questions.

Let me also pass on a tidbit of info. According to TEPCO (via an NEI press release), the tsunami at Fukushima was 14 meters and the design tsunami level was 5.7 meters. The reactors and backup power sources were at 10 meters and at 13 meters. Ouch.

Cheers,

Annie

From: Kammerer, Annie

Sent: Sunday, March 20, 2011 11:00 PM

To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc

Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffry; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas; Webb, Michael; Manoly, Kamal; Khanna, Meena; Screnci, Diane; Thomas, Eric; Nguyen, Quynh; Meighan, Sean; FOIA Response.hoc Resource; Bensi, Michelle

Subject: Seismic Q&As March 20th 8pm update

All,

Here's today's version. It includes updates on related topics for tomorrow's briefing. Also, some of the sections have been streamlined and some (though not all) of the answers have been updated.

The biggest news from the seismic team's perspective is that starting tomorrow a very bright young risk analyst (Michelle Bensi) who recently joined us from UC Berkeley (my beloved alma mater) will be helping with the compilation of this document. That will allow our team to spend more time cleaning and streamlining it; which inevitably will make it more user friendly...and shorter! Starting with tomorrow's version her name will start to show up on the front.

Best of luck to everyone with the briefing tomorrow!

Annie

From: Kammerer, Annie

Sent: Saturday, March 19, 2011 9:00 AM

To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc

Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Nilesh; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffery; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas; Webb, Michael; Manoly, Kamal; Khanna, Meena; Screnci, Diane; Thomas, Eric; Nguyen, Quynh; Meighan, Sean; FOIAResource.hoc@nrc.gov

Subject: Seismic Q&As March 19th 8am update

All,

Here is today's updated version. Lot of new fact sheets have been prepared for various briefings and for Monday's public meeting!

However, the big news of the day is that we just sent off a 6 page, 22 question, much better edited version for a public Q&A set. It's all in OPA's capable hands now. I think it's pretty good...but then I'm biased.

Cheers,

Annie

From: Kammerer, Annie

Sent: Friday, March 18, 2011 6:51 AM

To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc

Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Glitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Nilesh; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffery; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas; Webb, Michael; Manoly, Kamal; Khanna, Meena; Screnci, Diane; Thomas, Eric; Nguyen, Quynh; Meighan, Sean

Subject: RE: Seismic Q&As March 18th 5am update

All,

Please see the updated version of the Seismic Q&As.

Among today's highlights:

*We added a Terms and Definitions section at the end of the document. (We know that an acronyms list would be helpful too, but it will have to wait a little) *The "additional information" section has been split into tables, plots, and fact sheets
*A high-level draft fact sheet on NRC's seismic regulations has been added *We added a section to track outstanding questions that have come in from congress. This will support those who get the tickets in the short terms (most likely NRR). The questions will be moved to the appropriate sections long term (as long as they are not duplicates.)

I'm sure we all agree this has been a crazy week!. We're hoping that the weekend workload is lighter (if only because we won't get as many email from in house) and we can clean up this document and fill in some of the missing answers in preparation for the news story changing. We're trying hard to get out in front of the next wave.

Cheers,

Annie

From: Kammerer, Annie

Sent: Thursday, March 17, 2011 2:36 AM

To: Kammerer, Annie; Hiland, Patrick; Skeen, David; Case, Michael; RST01 Hoc

Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Giitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Giitter, Joseph; Howe, Allen; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Munson, Clifford; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Murphy, Andrew; Pires, Jose; Hogan, Rosemary; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael; Orders, William; Santiago, Patricia; Snodderly, Michael; Baggett, Steven; Sosa, Belkys; Davis, Roger; Franovich, Mike; Castleman, Patrick; Sharkey, Jeffery; Boska, John; Ma, John; Tegeler, Bret; Patel, Pravin; Shams, Mohamed; Morris, Scott; Brenner, Eliot; Harrington, Holly; Seber, Dogan; Ledford, Joey; Johnson, Michael; Virgilio, Martin; Holahan, Vincent; Bergman, Thomas

Subject: Seismic Q&As March 17th 2am update All,

As promised, a sharepoint site has been set up where our friends in NRR will be posting the latest version of the Seismic Q&A document on an ongoing basis. If someone would prefer to use the sharepoint site, instead of being on this distribution list, please let me know...

<http://portal.nrc.gov/edo/nrr/NRR%20TA/FAQ%20Related%20to%20Events%20Occuring%20in%20Japan/Forms/AllItems.aspx>

This latest update has a number of new questions (not many with answers today, but we are working hard). A high priority question we are working on is "how many plants are near a mapped active fault". We're focusing on anything within 50 miles. We're also pulling relevant questions from the congressional inquiries we just received; and will also give these high priority to support any needs by NRR.

Many new figures and some draft fact sheets have added to the "additional information" section. These include the NRO half of a tsunami fact sheet...a description of the tsunami research is still to come from RES.

Some good news: Yesterday's version seems to have been widely forwarded around the agency. So, we are also starting to get some excellent questions from staff looking forward. This is allowing us to feel that we are finally getting out in front of things to a small degree. Also, our team has grown and we now have someone acting as source of seismic expertise for the 11pm to 7 am shift. This means that we now have seismic experts available to the RST and OPA at the Op Center 24 hours, with 2 people during the day. That extra support is allowing us to get this out at least an hour earlier today ☺

We are continuing to compile the questions that come in and update the seismic Q&A document. If you have suggested changes, or want to provide missing answers, please forward them to me for compilation.

This is a living document and will be updated daily in the foreseeable future.

Happy St. Paddy's Day. May the world (especially our friends in Japan) have the luck of the Irish today.

Cheers,

Annie

Dr. Annie Kammerer, PE

Senior Seismologist and Earthquake Engineer US Nuclear Regulatory Commission Office of Nuclear Regulatory Research
Washington DC 20555

(b)(6) mobile

(b)(6) BB

From: Kammerer, Annie

Sent: Tuesday, March 15, 2011 3:41 AM

To: Hiland, Patrick; Skeen, David

Cc: Howe, Allen; Nelson, Robert; Stutzke, Martin; Giitter, Joseph; Rihm, Roger; McDermott, Brian; Hasselberg, Rick; Kammerer, Annie; Chokshi, Niles; Munson, Clifford; Cook, Christopher; Flanders, Scott; Ross-Lee, MaryJane; Brown, Frederick; Giitter, Joseph; Howe, Allen; Case, Michael; Ruland, William; Dudes, Laura; Karas, Rebecca; Ake, Jon; Munson, Clifford; Hogan, Rosemary; Uhle, Jennifer; Marshall, Michael; Uselding, Lara; Randall, John; Allen, Don; Burnell, Scott; Hayden, Elizabeth; Pires, Jose; Graves, Herman; Candra, Hernando; Murphy, Andrew; Murphy, Andrew; Pires, Jose; Hogan, Rosemary; Sheron, Brian; Dricks, Victor; Warnick, Greg; Reynoso, John; Lantz, Ryan; Markley, Michael

Subject: latest version of Q&As

All,

This is the first draft of the seismic-specific Q&As. It is pretty rough and there are many answers still missing, but people have contributed a lot and we thought it may be useful for many people trying to answer questions coming in.

We are continuing to compile the questions that come in and update the seismic Q&A document. If you have suggested changes, or want to provide missing answers, please forward them to me for compilation.

This is a living document and will be updated daily in the foreseeable future.

Annie

Dr. Annie Kammerer, PE

Senior Seismologist and Earthquake Engineer US Nuclear Regulatory Commission Office of Nuclear Regulatory Research
Washington DC 20555

(b)(6) mobile

(b)(6) BB

Attachment released in its entirety

Reviewer Note(s)

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Compiled Seismic Questions for NRC Response to the March 11, 2011 Japanese Earthquake and Tsunami

This is current as of 3-28-11 at 10 pm.

The keeper of this file is Annie Kammerer. Please provide comments, additions and updates to Annie with CC to Clifford Munson, Jon Ake and Michelle Bensi.

A SharePoint site has been set up so that anyone can download the latest Q&As. The site is found at NRC>NRR>NRR TA or at <http://portal.nrc.gov/edo/nrr/NRR%20TA/FAQ%20Related%20to%20Events%20Occuring%20in%20Japan/Forms/AllItems.aspx>

A list of topics is shown in the Table of Contents at the front of this document.

A list of all questions is provided at the end of the document.

A list of terms and definitions is provided at the end of the document.

A list of acronyms is provided at the end of the document

We greatly appreciate the assistance of the many people who have contributed to this document. Please do not distribute beyond the NRC.

CONTENTS

| | |
|--|-----------|
| Natural Hazards and Ground Shaking Design Levels | 1 |
| Design Against Natural Hazards & Plant Safety in the US..... | 8 |
| Seismically Induced Fire | 13 |
| Seismically Induced Internal Flooding..... | 15 |
| About Japanese Hazard, Design and Earthquake Impact..... | 17 |
| Impact at US Nuclear Power Plants During the March 11, 2011 Earthquake and Tsunami? ... | 20 |
| NRC Response and Future Licensing Actions..... | 22 |
| Reassessment of US Plants and Generic Issue 199 (GI-199)..... | 24 |
| Seismic Probabilistic Risk Assessment (SPRA)..... | 32 |
| State-of-the-art Reactor Consequence Analysis (SOARCA)..... | 33 |
| Defense-in-Depth and Severe Accident Management..... | 35 |
| Spent Fuel Pools and Independent Spent Fuel Storage Installations | 37 |
| Station Blackout | 40 |
| Emergency Preparedness (Emphasis on B.5.b)..... | 42 |
| Other External Hazards..... | 44 |
| Plant-Specific Questions | 45 |
| San Onofre Nuclear Generating Station (SONGS) Questions | 45 |
| Diablo Canyon Nuclear Power Plant (DCNPP) Questions | 49 |
| Indian Point Questions..... | 56 |
| Questions posed by utilities | 57 |
| Pending and Unanswered Questions from Members of Congress and industry | 58 |
| Additional Information: Useful Tables | 62 |
| Table of Design Basis Ground Motions for US Plants | 62 |
| Table of SSE, OBE and Tsunami Water Levels..... | 64 |
| Table of Plants Near Known Active Faults or in High or Moderate Seismicity Zones..... | 69 |
| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE), and Seismic Core Damage Frequencies | 70 |
| Table: Design Basis Ground Motions and New Review Level Ground Motions Used for Review of Japanese Plants..... | 75 |
| Table: Status of Review of Japanese NPPs to New Earthquake Levels Based on 2006 Guidance | 76 |
| Additional Information: Useful Plots | 77 |
| Plot of Mapped Active Quaternary Faults and Nuclear Plants in the US..... | 77 |

| | |
|--|------------|
| Nuclear Plants in the US Compared to the USGS National Seismic Hazard Maps..... | 78 |
| USGS US National Seismic Hazard Maps..... | 78 |
| Plot of Nuclear Plants in the US Compared to Recent Earthquakes..... | 79 |
| UCERF Map of California Earthquake Probabilities for Northern versus Southern California | 79 |
| Plot of ground motion acceleration (PGA) from Japanese earthquake..... | 80 |
| Plot of Tsunami Wave Heights at 5 Meter Bathymetry Offshore at the Japanese Plants (NOAA)..... | 83 |
| Plot of Tsunami Wave Heights in the Pacific (NOAA) | 84 |
| Plant Status (6pm, Japan time, on 3-25-11) | 85 |
| Fact Sheets | 88 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (High level overview) | 88 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (The policy work version) | 89 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (The cliff notes)... | 91 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Tsunami | 92 |
| Fact Sheet: Tsunami Assessment Method for Nuclear Power Plants in Japan..... | 93 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Flooding | 94 |
| Fact Sheet: Summarization of Seismological Information from Regional Instrumentation | 96 |
| Fact Sheet: Seismic considerations of Western U.S. NPP sites | 97 |
| Fact Sheet: Regulatory Framework for Protection of Nuclear Power Plants against Tsunami Flooding | 100 |
| Fact Sheet: Seismic Zones and US Plants | 103 |
| Fact Sheet: Seismicity of the Central and Eastern US (In-depth technical information) | 107 |
| Fact Sheet: US Portable Array Information..... | 109 |
| Fact Sheet: The B.5.b Rule (10 CFR 50.54hh/B.5.b)..... | 111 |
| Fact Sheet: Generic Issue GI-199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants" | 113 |
| Fact Sheet: Station Blackout Rule | 115 |
| Other useful resources: | 116 |
| Acronyms | 117 |
| Terms and Definitions | 120 |
| List of Questions..... | 132 |

Natural Hazards and Ground Shaking Design Levels

1) Does the NRC consider earthquakes of magnitude 9?

Public response: This earthquake was caused by a "subduction zone" event, which is the type of earthquake that can produce the largest magnitudes. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of northern California, Oregon and Washington. As a result, magnitude 9 events would only be considered for this particular seismic source. The NRC requires all credible earthquakes that may impact a site to be considered.

Additional, technical, non-public information: None.

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

Public response: The magnitude of the earthquake was somewhat greater than was expected for that part of the subduction zone. However, the Japanese nuclear plants were recently reassessed using ground motion levels similar to those that are believed to have occurred at the sites. The ground motions against which the Japanese nuclear plants were reviewed were expected to result from earthquakes that were smaller, but were much closer to the sites. The NRC does not currently have information on the maximum tsunami height that was expected at the sites.

Additional, technical, non-public information: Jon Ake is doing some review of the data to determine the likely return period of this motion.

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

Public response: See below.

4) What if an earthquake like the Sendai earthquake occurred near a US plant?

Public response: This earthquake occurred on a "subduction zone", which is the type of tectonic region that produces earthquakes of the largest magnitude. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. Subduction zone earthquakes are also required to produce the kind of massive tsunami seen in Japan. In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of northern California, Oregon and Washington. So, a continental earthquake and tsunami as large as in Japan could only happen there. The only nuclear plant near the Cascadia subduction zone is the Columbia Generating Station. This plant is located a large distance from the coast (approximately 225 miles) and the subduction zone (approximately 300 miles), so the ground motions estimated at the plant are far lower than those seen at the Fukushima plants. This distance also precludes the possibility of a tsunami affecting the plant. Outside of the Cascadia subduction zone, earthquakes are not expected to exceed a magnitude of approximately 8. Magnitude is measured on a log scale and so a magnitude 9 earthquake produces about ten times stronger shaking and releases about 31 times more energy than a magnitude 8 earthquake.

Additional, technical, non-public information: None.

5) What magnitude earthquake are US nuclear plants designed to?

Public Answer: Ground motion is a function of both the magnitude of an earthquake and the distance from the fault to the site. Nuclear plants, and in fact all engineered structures, are actually designed

based on ground motion levels, not earthquake magnitudes. The existing nuclear plants were designed based on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquakes expected in the area around the plant. A margin is further added to the predicted ground motions to provide added robustness.

Additional, technical non-public information: In the past, "deterministic" or "scenario based" or "maximum credible earthquake" analyses were used to determine ground shaking (seismic hazard) levels. Seismic hazard for the new plants is determined using a probabilistic seismic hazard assessment approach that explicitly addresses uncertainty and the potential for beyond-design-basis earthquakes, as described in Regulatory Guide 1.208. Probabilistic methods account for possible earthquakes of various magnitudes that come from potential sources (including background seismicity) and the likelihood that each particular hypothetical earthquake occurs. The ground motions that are used as seismic design bases at US nuclear power plants are called the Safe Shutdown Earthquake ground motion (SSE) and are described mathematically through use of a response spectrum. On the west coast of the US, the two nuclear power plants are designed to specific ground motions that are determined from earthquakes of about magnitude 7 (SONGS) and 7.5 (Diablo) on faults located just offshore of the plants. Because the faults are well characterized, the magnitude and distances are known. However the design and licensing bases are still the ground motions...not the earthquakes. The earthquakes on these faults are mainly strike-slip (horizontal motion) type earthquakes, not subduction zone earthquakes. Therefore, the likelihood of a tsunami from these faults is remote.

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

6) How many US reactors are located in active earthquake zones?

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

Additional, technical non-public information: The preliminary consensus opinion by NRC staff is that there are approximately 9 plants in the moderate seismicity zones in the CEUS: 4 or 5 in the Charleston SZ (depending on whose interpretation you use, it varies widely), 1 in the Wabash valley SZ, 2 in the East Tennessee SZ, 1 in the Central Virginia SZ. But some of these are open to interpretation and debate. This does not have a simple answer and NRC seismic staff are developing a fact sheet to respond to this question. There are also two plants that are in highly seismicity areas of California. Unfortunately, the extent of the moderate seismicity zones in the US are open to interpretation and are a matter of scientific debate.

Please note that although the earthquakes in the CEUS are rare, they can be big. The most widely felt earthquakes within the continental US were the 1811-12 New Madrid sequence and the 1886 Charleston, SC, which were estimated to be between about magnitude 7.0 to 7.75.

7) Has this changed our perception of earthquake risk to the plants in the US?

Public Answer: The NRC continues to determine that US nuclear plants are safe. This does not change the NRC's perception of earthquake hazard (i.e., ground motion levels) at US nuclear plants. It is too early to tell what the lessons from this earthquake are. The NRC will look closely at all aspects of response of the plants to the earthquake and tsunami to determine if any actions need to be taken in US nuclear plants and if any changes are necessary to NRC regulations.

Additional, technical, non-public information: We expect that there would be lessons learned and we may need to seriously relook at common cause failures, including dam failure and tsunami.

8) Why do we have confidence that US nuclear power plants are adequately designed for earthquakes and tsunamis?

Public Answer: [use the first paragraph of the response below]

Additional, technical, non-public information: None.

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

Public Answer: All US nuclear plants are built to withstand environmental hazards, including earthquakes and tsunamis. Even those nuclear plants that are located within areas with low and moderate seismic activity are designed for safety in the event of such a natural disaster. The NRC requires that safety-significant structures, systems, and components be designed to take into account even rare and extreme seismic and tsunami events. In addition to the design of the plants, significant effort goes into emergency response planning and accident management. This approach is called defense-in-depth.

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

Additional technical, non-public information: See notes under question "What magnitude earthquake are US nuclear plants designed to?"

10) If the earthquake in Japan was a larger magnitude than considered by plant design, why can't the same thing happen in the US?

Public response: ~~Discuss in terms of, IPEEE, Seismic PRA to be provided by Niles~~

Additional, technical, non-public information: ADD

11) What level of earthquake hazard are the US reactors designed for?

Public Answer: Each reactor is designed for a different ground motion that is determined on a site-specific basis. The existing nuclear plants were designed on a "deterministic" or "scenario earthquake" basis that accounts for the largest earthquakes expected in the area around the plant, without consideration of the likelihood of the earthquakes considered, and with an additional factor applied for conservatism. New reactors are designed using probabilistic techniques that characterize both the ground motion levels and uncertainty at the proposed site. These probabilistic techniques account for the ground motions that may result from all potential seismic sources in the region around the site. Technically speaking, this is the ground motion with an annual frequency of occurrence of 1×10^{-4} /year, but this can be thought of as the ground motion that occurs every 10,000 years on average. One

important aspect is that probabilistic hazard and risk-assessment techniques account for beyond-design basis events. NRC's Generic Issue 199 (GI-199) project is using the latest probabilistic techniques used for new nuclear plants to review the safety of the existing plants. [see questions in the section about GI-199 for more information]

Additional technical, non-public information: Note to OPA: This may perhaps seem like an oddly worded general question because the word "hazard" has several meanings, but in fact it is a specific technical question. If you see "earthquake hazard levels" or similar language, check with the seismic staff.

12) How was the seismic design basis for existing nuclear plants established?

Public Answer: The seismic ground motions used for the design basis of existing nuclear plants were determined from the evaluation of the maximum historic earthquake within 200 miles of the site, without explicitly considering the time spans between such earthquakes; safety margin was then added beyond this maximum historic earthquake to form a hypothetical *design basis earthquake*. The relevant regulation for currently operating plants is 10 CFR Part 100, Appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants" (<http://www.nrc.gov/reading-rm/doc-collections/cfr/part100/part100-appa.html>).

Additional, technical, non-public information: None.

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

Public response: The ground motions that are used as seismic design bases at US nuclear plants are called the Safe Shutdown Earthquake ground motion (SSE). In the mid to late 1990s, the NRC staff reviewed the potential for ground motions beyond the design basis as part of the Individual Plant Examination of External Events (IPEEE). From this review, the staff determined that seismic designs of operating nuclear plants in the US have adequate safety margins for withstanding earthquakes. Currently, the NRC is in the process of conducting GI-199 to again assess the resistance of US nuclear plants to earthquakes. Based on NRC's preliminary analyses to date, the mean probability of ground motions exceeding the SSE over the life of the plant for the plants in the Central and Eastern United States is less than about 1%.

It is important to remember that structures, systems and components are required to have "adequate margin," meaning that they must continue be able withstand shaking levels that are above the plant's design basis.

Additional technical, non-public information: There is a section of this document focused on questions related to GI-199.

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

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

each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

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

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

Additional, technical non-public information: None.

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

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

Additional, technical non-public information: None.

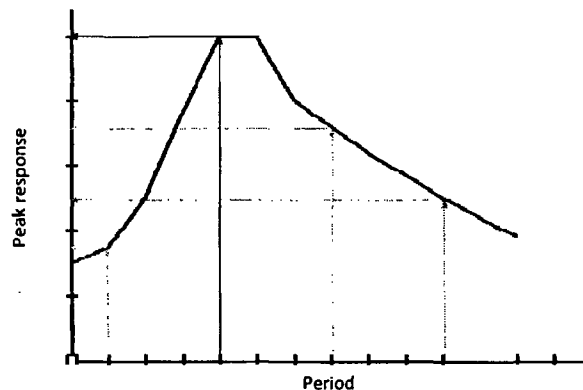
16) What is a seismic response spectrum?

Public Answer: not yet available

Draft of a simple "non-technical answer" (needs revision): For a given earthquake, different types of structures will respond to the earthquake ground motion differently depending on the characteristics of the structure and earthquake ground motion. For example, a rigid short building will "feel" an earthquake very differently than a tall flexible building. In fact, if the rigid short building and the flexible tall building are subjected to the exact same ground motion, one building may be damaged while the other is relatively unharmed. One important difference between these two buildings is a characteristic known as the natural period of vibration of the building. While defining the period of a building is a complicated engineering problem, as a general rule, a short rigid building will tend to have a short period while the tall flexible building will tend to have a long period of vibration.

If the natural period of the response of a building is "in tune" with the vibrations of the earthquake, it will experience resonance and the building may be badly damaged. (Many people have experienced resonance when using a playground swing. Pushing a swing in time with the interval of the swing causes the swing to go higher while pushing the swing at a faster or slower tempo will cause the swing to slow down.) In the example above, the short rigid building will tend to resonate and be damaged by seismic waves with short wavelengths (periods), while the tall flexible building will tend to resonate and be damaged by seismic waves with long wavelengths.

A response spectrum is a plot of the peak response of different oscillators (e.g. simple buildings) with varying natural periods that are subjected to the same base ground motion. An example of a response spectrum used for design is shown below:



Seismic response spectra are used by earthquake engineers to analyze the performance of structures and components subjected to the ground motion caused by earthquakes. The design response spectrum tells the engineer how strong the earthquake forces on the structure will be depending on its natural period of vibration.

17) Which reactors are along coastal areas that could be affected by a tsunami?

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

Additional, technical non-public information: A table with information on tsunami design levels is provided in the "Additional Information" section of this document.

18) How are combined seismic and tsunami events treated in risk space? Are they considered together?

The PRA Standard (ASME/ANS-Ra-Sa2009) does address the technical requirements for both seismic events and tsunamis (tsunami hazard under the technical requirements for external flooding analysis). But together? The standard does note that uncertainties associated with probabilistic analysis of tsunami hazard frequency are large and that an engineering analysis can usually be used to screen out tsunamis.

19) How are aftershocks treated in terms of risk assessment?

Seismic PRAs do not consider the affect of aftershocks since there are not methods to predict equipment fragility after the first main shock.

20) Could a "mega-tsunami" strike the U.S. East Coast as indicated in a recent Washington Post Weather Gang article?

Public Answer: Please verify information before public release.

Additional, technical, non-public information: The Washington Post Weather Gang article is based on a scenario involving a mega-tsunami caused by a massive landslide in the Canary Islands. This scenario has

been debunked by the scientific community (including the NRC's tsunami research program). Volcanic flank failures on the Canary Islands will produce a mega-tsunami in the very near area, but won't be noticeable in the United States. Refer to the 2008 USGS report on tsunamis for additional information: [insert citation].

Design Against Natural Hazards & Plant Safety in the US

21) Are US nuclear plants designed for tsunamis? If so, what level of tsunami are they designed for?

Public Answer: Yes. Plants are built to withstand a variety of environmental hazards and those plants that might face a threat from tsunami are required to withstand large waves and the maximum wave height at the intake structure (which varies by plant.) Like seismic hazard, the level of tsunami that each plant is designed for is site-specific and is appropriate for what may occur at each location. [See table with tsunami design heights in Tables section of document]

Additional, technical, non-public information: Tsunami are considered in the design of US nuclear plants. Nuclear plants are designed to withstand flooding from not only tsunami, but also hurricane and storm surge; therefore there is often significant margin against tsunami flooding. However, it should be noted that Japanese experience (prior to the March 2011 earthquake) has shown that drawdown can be a significant problem.

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

22) Is there a minimum earthquake shaking that nuclear plants are designed for?

Public Answer: Yes. According to Appendix S to 10 CFR Part 50, the foundation level ground motion must be represented by an appropriate response spectrum with a peak ground acceleration of at least 0.1g.

Additional, technical, non-public information: NOTE TO OPA: this comes straight from RG1.208 and it, therefore, approved for public release. If you get this question, we can help make it more user friendly.

23) Which plants are close to known active faults? What are the faults and how far away are they from the plants?

Public Answer: Jon to develop answer with Dogan's help. I created a placeholder table for your use "Table of Plants Near Known Active Faults" to be populated in the additional information section. The plots that Dogan made are in the additional information section under "Plot of Mapped Active Quaternary Faults and Nuclear Plants in the US".

Additional, technical, non-public information: ADD

24) Is there margin above the design basis?

Public Answer: Yes, there is margin beyond the design basis. In the mid to late 1990s, NRC staff reviewed the plants' assessments of potential consequences of severe earthquakes (earthquakes beyond the safety margin included in each plant's design basis), which licensees performed as part of the Individual Plant Examination of External Events (or IPEEE) program. From this review, the staff determined that seismic designs of operating plants in the United States have adequate safety margins, for withstanding earthquakes, built into the designs.

General Design Criterion (GDC) 2, "Design Bases for Protection Against Natural Phenomena," in Appendix A requires that the design bases include sufficient margin to account for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

Additional, technical, non-public information: None.

25) Are US plants safe? Would a plant in the U.S. be able to withstand a large earthquake?

Public Answer: US plants are designed for appropriate earthquake shaking levels that are based on historical data for the site plus additional margin to account for uncertainties. Currently, the NRC is conducting a program called Generic Issue 199, which is reviewing the adequacy of the earthquake design of US NPPs in central and eastern North America based on the latest data and analysis techniques. The NRC will look closely at all aspects of the response of the plants in Japan to the earthquake and tsunami to determine if any actions need to be taken in US plants and if any changes are necessary to NRC regulations.

Additional, technical, non-public information: None.

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

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

In addition, US nuclear plant designs and operating practices since the terrorist events of September 11, 2001, are designed to mitigate severe accident scenarios such as aircraft impact, which include the complete loss of offsite power and all on-site emergency power sources.

US nuclear plant designs include consideration of seismic events and tsunamis'. It is important not to extrapolate earthquake and tsunami data from one location of the world to another when evaluating these natural hazards. These catastrophic natural events are very region- and location-specific, based on tectonic and geological fault line locations.

Additional technical, non-public information: None

27) Should US nuclear facilities be required to withstand earthquakes and tsunamis of the kind just experienced in Japan? If not, why not?

Public response: US nuclear reactors are designed to withstand an earthquake equal to the most significant historical event or the maximum projected seismic event and associated tsunami without any breach of safety systems.

The lessons learned from this experience must be reviewed carefully to see whether they apply to US nuclear power plants. It is important not to extrapolate earthquake and tsunami data from one location of the world to another when evaluating these natural hazards, however. These catastrophic natural events are very region- and location-specific, based on tectonic and geological fault line locations.

The United States Geological Survey (USGS) conducts continuous research of earthquake history and geology, and publishes updated seismic hazard curves for various regions in the continental US. These curves are updated approximately every six years. NRC identified a generic issue (GI-199) that is currently undergoing an evaluation to assess implications of this new information to nuclear plant sites

located in the central and eastern United States. The industry is working with the NRC to address this issue.

Additional technical, non-public information: None

28) Do any plants have special design considerations associated with seismic design?

Public response: Many plants have unique features. However, the most notable design element is the automatic reactor trip systems in Diablo Canyon and San Onofre.

Additional, technical, non-public information: None

29) How do we know equipment will work if the magnitude is bigger than expected, like in Japan?

Public response: [see below]

30) How do we know that the equipment in plants is safe in earthquakes?

Public response: All equipment important to safety (required to safely shutdown a nuclear power plant) has significant seismic margin and is qualified to withstand earthquakes in accordance with plants' licensing basis and NRC regulations.

Additional, technical, non-public information: 10 CFR 50, Appendix A, General Design Criterion 2 and 4, 10 Part 100, and Appendix S. Guidance: Regulatory Guides 1.100, IEEE 344 and ASME QME-1. See also part 100 Reactor Site Criteria

31) Are US plants susceptible to the same kind of loss of power as happened in Japan?

Public response: NRC previously recognized that there is the possibility of a total loss of AC power at a site, called a 'Station Blackout', or SBO. Existing Regulations require the sites to be prepared for the possibility of an SBO. In addition to battery powered back-up system to immediately provide power for emergency systems, NRC regulations require the sites to have a detailed plan of action to address the loss of AC power while maintaining control of the reactor.

There has also been an understanding that sites can lose offsite power as well. Of course, this can be caused by earthquake. However, hurricane- or tornado-related high winds may potentially damage the transmission network in the vicinity of a nuclear plant as well. Flood waters can also affect transformers used to power station auxiliary system. These types of weather related events have the potential to degrade the offsite power source to a plant.

The onsite Emergency Diesel Generators need fuel oil stored in tanks that are normally buried underground. These tanks and associated pumps and piping require protection from the elements. Above ground tanks have tornado and missile protection.

In case both offsite and onsite power supplies fail, NRC has required all licensee to evaluate for a loss of all AC power (station blackout) scenario and implement coping measures to safely shutdown the plant law 10 CFR 50.63.

Additional, technical, non-public information: Additional SBO information is found in a fact sheet on the subject at the back of the document. Some plants have safeguards equipment below sea level and rely on watertight doors or Bilge pumps to remove water from equipment required to support safe shutdown. Overflowing rivers can result in insurmountable volume of water flooding the vulnerable areas. SBO definition in 10CFR50.2, SBO plan requirements in 10CFR50.63.

32) How do we know that the emergency diesel generators will not fail to operate like in Japan?

Public response: Emergency Diesel Generators (EDGs) are installed in a seismically qualified structure and are seismic Category I equipment. Even if these EDGs did fail, plants can safely shutdown using station blackout power source law 10 CFR 50.63. In 1988 the NRC concluded that additional regulatory requirements were justified in order to provide further assurance that a loss of both offsite and onsite emergency ac power systems would not adversely affect public health and safety and the station blackout rule was enacted. Studies conducted by the NRC since this rule has been in effect confirms that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in significant risk reduction and have further enhanced defense-in-depth. However, we plan to carefully evaluate the lessons learned from the events in Japan to determine if enhancements to the station blackout rule are warranted.

Additional, technical, non-public information: None.

33) Is there a risk of loss of water during tsunami drawdown? Is it considered in design?

Public response: Yes. Section 2.4.6 (Tsunami Hazards) of NUREG 0800 Standard Review Plan specifically addresses tsunami drawdown in the safety review of new reactor applications.

Additional, technical, non-public information: None.

34) Are aftershocks considered in the design of equipment at the plants? Are aftershocks considered in design of the structure?

Public response: ADD

Additional, technical, non-public information: ADD

35) Are there any special issues associated with seismic design at the plants? For example, Diablo Canyon has special requirements. Are there any others?

Public response: Both SONGS and Diablo canyon are licensed with an automatic trip for seismic events.

Additional, technical, non-public information: ADD

36) Is the NRC planning to require seismic isolators for the next generation of nuclear power plants? How does that differ from current requirements and/or precautions at existing US nuclear power plants?

Public response: The NRC would not require isolators for the next generation of plants. However, it is recognized that a properly designed isolation system can be very effective in mitigating the effect of earthquake. Currently the NRC is preparing guidance for plant designers considering the use of seismic isolation devices.

Additional, technical, non-public information: A NUREG is in the works in the office of research. It is expected to be available for comment in 2011.

37) Are there any US nuclear power plants that incorporate seismic isolators? What precautions are taken in earthquake-prone areas?

Public response: No currently constructed nuclear power plants in the US use seismic isolators. However seismic isolation is being considered for a number of reactor designs under development. Currently seismic design of plants is focused on assuring that design of structures, systems, and components are designed and qualified to assure that there is sufficient margin beyond the design basis ground motion.

Additional, technical, non-public information: None.

- 38) Do you think that the recent Japan disaster will cause any rethinking of the planned seismic isolation guidelines, particularly as it regards earthquakes and secondary effects such as tsunamis?

Public response: Whenever an event like this happens, the NRC thoroughly reviews the experience and tries to identify any lessons learned. The NRC further considers the need to change guidance or regulations. In this case, the event will be studied and any necessary changes will be made to the guidance under development. However, it should be noted that Japan does not have seismically isolated nuclear plants.

Additional, technical, non-public information: None.

Seismically Induced Fire

39) How does the NRC address seismic-induced fire?

Public Response: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: The NRC's rules for fire protection are independent of the event that caused the fire. The power plant operators are required to evaluate all the fire hazards in the plant and make sure a fire will not prevent a safe plant shutdown. The NRC's guidance says that power plant operators should assume that a fire can happen at any time. The rules do not require specific consideration of a fire that starts as a result of an earthquake. In addition, we do not require analysis of more than one fire at a time at one reactor.

40) Does the NRC require the fire protection water supply system be designed to withstand an earthquake?

Public Response: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: The NRC recommends the licensee follow the applicable National Fire Protection Association (NFPA) codes and standards for the fire protection systems or provide an acceptable alternative. This would include local building code earthquake requirements. Since 1976, the NRC has recommended that, "At a minimum, the fire suppression system should be capable of delivering water to manual hose stations located within hose reach of areas containing equipment required for safe plant shutdown following the safe shutdown earthquake (SSE)." For plants located, "in areas of high seismic activity, the staff will consider on a case-by-case basis the need to design the fire detection and suppression system to be functional following the SSE." This is the guidance provided to plants that were licensed to operate, or had construction permits prior to July 1, 1976. For plants with applications docketed but construction permit not received as of July 1, 1976, they were required, "in the event of the most severe earthquake, i.e., the SSE, the fire suppression system should be capable of delivering water to manual hose stations located within hose reach of areas containing equipment required for safe plant shutdown."

The NRC's guidance since 1976 also recommends that fire detection, alarm, and suppression systems function as designed after less severe earthquakes that are expected to occur once every 10 years. The guidance further recommends plant operators in areas of high seismic activity consider the need to design those fire protection systems to function after a severe earthquake.

41) How are safe shutdown equipment protected from an oil spill which can cause potential fire?

Public Response: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: In general, the NRC recommends that curbing and dikes be located around all equipment that presents an oil fire hazard. In one special case, the Reactor Cooling Pumps (RCPs) located inside the containment of Pressurized Water Reactors (PWRs) the NRC requires that plants have a seismically qualified oil collection system. The purpose of this requirement is that in the event of a severe earthquake the lubrication oil is not spread out inside containment.

42) How are safe shutdown equipment protected from a hydrogen fire?

Public Response: The below is from an internal document. This needs to be cleared before it can be used.

Additional, technical, non-public information: Hydrogen can be normally found in a couple areas of the plant. For example, most all large electric generating stations (Nuclear, Coal, Oil, Gas and Hydro) use hydrogen as a blanket in the electric generator. This hydrogen storage is typically well separated from safe shutdown equipment. Hydrogen may also be generated in Battery Rooms during charging and discharging of the stations emergency batteries. The battery rooms are typically equipped with hydrogen detectors set to alarm at about 2% (Hydrogen's lower flammable limit is 4.1%). The ventilation system is typically run to prevent any hydrogen build up. In PWR's hydrogen is used as a cover gas in the Volume Control Tank (VCT). This gas is kept at a normally lower pressure (15-20 psig) to allow oxygen scavenging in the tank. Systems like this typically have devices such as excess flow check valves that automatically isolate the system if excess flow occurs. The NRC recommends that pipes that contain hydrogen are designed to withstand a severe earthquake. This design includes a separate pipe wrapped around the hydrogen pipe that vents any leaked hydrogen to the outside.

[Also please note that this is general information. Mark Salley noted that if the question relates to H2 generated as a part of fuel failure there is a whole other conversation that needs to happen. Please contact him with questions.]

Seismically Induced Internal Flooding

43) How does the NRC consider seismically induced equipment failures leading to internal flooding?

Public Response: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: 10 CFR Part 50 Appendix A General Design Criterion (GDC) 2 requires, in part, that structures, systems, and components (SSCs) important to safety be designed to withstand the effects of earthquakes without loss of capability to perform their safety functions. 10 CFR Part 50 Appendix A, GDC 4 requires the SSCs important to safety being designed to accommodate the effects of the flooding associated with seismic events. NUREG-0800, Standard Review Plan, Section 3.4.1, "Internal Flood Protection for Onsite Equipment Failures," provide guidance for the NRC staff to consider seismically induced equipment failures (pipe breaks, tank failures) that could affect safety-related SSCs to perform their safety functions.

The specific areas of review include the following :

- Identify all safety-related SSCs that must be protected against flooding;
- The location of the safety-related SSCs relative to the **internal flood level** (from internal flood analysis) in various buildings, rooms, and enclosures that house safety-related SSCs;
- Possible flow paths from interconnected non-safety-related areas to rooms that house safety-related SSCs;
- The adequacy of the isolation, if applicable, from sources causing the flood (e.g., tank of water)
- Provisions for protection against possible in-leakage sources (from outside to inside of the structures)
- All SSCs that could be a potential source of internal flooding (e.g. pipe breaks and cracks, tank and vessel failures, backflow through drains), **which includes seismically induced equipment failures**, are included for the internal flood analysis – see Q&A (2);
- Design features that will be used to mitigate the effects of internal flooding (e.g., adequate drainage, sump pumps, etc.);
- Safety-related structures that are protected from below-grade groundwater seepage by means of a permanent dewatering system.

44) How is the potential source of internal flooding from the seismically induced equipment failures postulated in the internal flood analysis?

Public Response: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: All of the non-safety-related systems in the room are assumed to fail. However, the analysis systematically considers the flooding condition/level caused by only one system at a time. By considering the pipe size, volume of the source tank, and the isolation valves, the limiting case, which is the one that releases the largest volume of water, is used to determine the internal flood level. All of the safety-related SSCs are designed to be located above the calculated flood level caused by the limiting case.

45) Are the non-safety-related equipment failures assumed to occur at the same time?

Public Response: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

~~Official Use Only~~

Additional, technical, non-public information: No. As stated earlier, for design basis flood analysis, it is assumed that a system (containing water source) fails one at a time. Then, the most limiting case, a system breach that causes highest level of flooding, is applied in the design of the location of the safety-related systems.

About Japanese Hazard, Design and Earthquake Impact

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

Public response: Because this event happened in Japan, it is hard for NRC staff to make the assessment necessary to understand exactly what happened at this time. In the nuclear plants there may have been some damage from the shaking, and the earthquake caused the loss of offsite power. However, the tsunami appears to have played a key role in the loss of other power sources at the site producing station blackout, which is a critical factor in the ongoing problems.

Additional, technical, non-public information: None

47) What was the disposition of the plant during the time after the earthquake struck and before the tsunami arrived? Was there indication of damage to the plant solely from the earthquake (if so, what systems) and did emergency procedures function during this time.

Public response: Given that the Fukushima plant is not in the US, the NRC does not yet have enough information to answer this question.

Additional, technical, non-public information: Typically there would be the opportunity to get this data, but given the situation it is not clear.

48) What magnitude earthquake was the plant designed to withstand? For example, what magnitude earthquake was the plant expected to sustain with damage but continued operation? And with an expected shutdown but no release of radioactive material?

Public response: There are two shaking levels relevant to the Fukushima plant, the original design level ground motion and a newer review level ground motion. As a result of a significant change in seismic regulations in 2006, NISA, the Japanese regulator initiated a program to reassess seismic hazard and seismic risk for all nuclear plants in Japan. This resulted in new assessments of higher ground shaking levels (i.e. seismic hazard) and a review of seismic safety for all Japanese plants. The program is still ongoing, but has already resulted in retrofit in some plants. Therefore, it is useful to discuss both the design level and a review level ground motion for the plants. A relevant table is found a few questions down, and also in the "Additional Information: Useful Tables" section.

| Plant sites | Contributing earthquakes used for determination of hazard | New DBGM S ₁ | Original DBGM S ₁ |
|-------------|---|-------------------------|------------------------------|
| Fukushima | Magnitude 7.1 Earthquake near the site | 600 gal (0.62g) | 370 gal (0.37g) |

Additional, technical, non-public information: Add

49) Did this reactor sustain damage in the July 16, 2007 earthquake, as the Kashiwazaki power plant did? What damage and how serious was it?

Public response: Neither Fukushima power plant was affected by the 2007 earthquake.

Additional, technical, non-public information: None.

50) Was the Fukushima power plant designed to withstand a tsunami of any size? What specific design criteria were applied?

Public response: Japanese plants are designed to withstand both earthquake and tsunami. An English explanation of how Tsunami hazard assessments are undertaken for Japanese plants is found in Annex II to IAEA Guidance on Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations Assessment of Tsunami Hazard: Current Practice in Some States in Japan. The design ground motions are as shown above. We do not have information on the design basis tsunami.

Additional, technical, non-public information: Annie has a copy of the draft annex and will put them into ADAMS

51) What is the design level of the Japanese plants? Was it exceeded?

Public response: As a result of a significant change in seismic regulations in 2006, the Japanese regulator initiated a program to reassess seismic hazard and seismic risk for all nuclear plants in Japan. This resulted in new assessments of higher ground shaking levels (i.e. seismic hazard) and a review of seismic safety for all Japanese plants. The program is still on-going, but has already resulted in retrofit in some plants. Therefore, it is useful to discuss both the design level and a review level ground motion for the plants, as shown below.

Currently we do not have official information. However, it appears that the ground motions (in terms of peak ground acceleration) are similar to the S_s shaking levels, although the causative earthquakes are different. Thus the design basis was exceeded, but the review level may not have been.

Table: Original Design Basis Ground Motions (S_2) and New Review Level Ground Motions (S_s) Used for Review of Japanese Plants

| Plant sites | Contributing earthquakes used for determination of hazard | New DBGM S_s | Original DBGM S_1 |
|-------------|---|-----------------|---------------------|
| Onagawa | Soutei Miyagiken-oki (M8.2) | 580 gal (0.59g) | 375 gal (0.38g) |
| Fukushima | Earthquake near the site (M7.1) | 600 gal (0.62g) | 370 gal (0.37g) |
| Tokai | Earthquakes specifically undefined | 600 gal (0.62g) | 380 gal (0.39g) |
| Hamaoka | Assumed Tokai (M8.0), etc. | 800 gal (0.82g) | 600 gal (0.62g) |

Additional, technical, non-public information: A PDF file provided by John Anderson (prepared by Japanese colleagues) indicates that the majority of the recorded ground motions during the main shock were below the attenuation curve by Si & Midorikawa (1999). Most of the recorded motions fit well to median minus 1 sigma of their GMPE. There are also about a dozen stations with the recorded ground motions above 1g. The highest recorded PGA (~3g) is at the K-Net station MYG004. We can use this information to try to estimate motions at the plants as soon as someone catches a breath.

52) What are the Japanese S_1 and S_s ground motions and how are they determined?

Public response: Japanese nuclear power plants are designed to withstand specified earthquake ground motions, previously specified as S_1 and S_2 , but now simply S_s . The design basis earthquake ground motion S_1 was defined as the largest earthquake that can reasonably be expected to occur at the site of a nuclear power plant, based on the known seismicity of the area and local faults that have shown activity during the past 10,000 years. A power reactor could continue to operate safely during an S_1

level earthquake, though in practice they are set to trip at lower levels. The S_2 level ground motion was based on a larger earthquake from faults that have shown activity during the past 50,000 years and assumed to be closer to the site. The revised seismic regulations in May 2007 replaced S_1 and S_2 with S_5 . The S_5 design basis earthquake is based on evaluating potential earthquakes from faults that have shown activity during the past 130,000 years. The ground motion from these potential earthquakes are simulated for each of the sites and used to determine the revised S_5 design basis ground motion level. Along with the change in definition, came a requirement to consider "residual risk", which is a consideration of the beyond-design-basis event.

Additional, technical, non-public information: None

53) Did this earthquake affect the Kashiwazaki-Kariwa nuclear power plant?

Public response: No, this earthquake did not affect Kashiwazaki-Kariwa nuclear power plant and all reactors remained in the state of operation prior to the March 11, 2011, Japan earthquake. It also did not trip during an earthquake of magnitude XX that occurred on the western side subsequent to the 8.9 earthquake. This is very important for the stability of Japan's energy supply due to the loss of production at TEPCO's Fukushima nuclear power plants.

Additional, technical, non-public information: None

54) How high was the tsunami at the Fukushima nuclear power plants?

Public response: The tsunami modeling team at the National Oceanic and Atmospheric Administration's Pacific Marine Environmental Lab have estimated the wave height offshore (at the 5 meter bathymetric line) to be approximately 8 meters in height at Fukushima Daiichi and approximately 7 meters in Fukushima Daini. This is based on recordings from NOAA's Deep-ocean Assessment and Reporting of Tsunamis (DART) buoys and a high resolution numerical model developed for the tsunami warning system. NEI subsequently reported that TEPCO believes that TEPCO believes the tsunami that inundated the Fukushima Daiichi site was 14 meters high at the plant location. This is not inconsistent as wave heights increase as they come ashore. NEI also noted that design basis tsunami for the site was 5.7 meters, and the reactors and backup power sources were located 10 to 13 meters above sea level, according to TEPCO.

Additional, technical, non-public information: NOAA's PMEL center has provided us their best numbers for all the plants on the NW coast of Japan. These can be found in the Additional Information section in the back of this document.

55) Wikileaks has a story that quotes US embassy correspondence and some un-named IAEA expert stating that the Japanese were warned about this ... Does the NRC want to comment?

<http://www.dailymail.co.uk/news/article-1366721/Japan-tsunami-Government-warned-nuclear-plants-withstand-earthquake.html>

Public response: TBD: Annie to explain the history of their recent retrofit program.

Additional, technical, non-public information: The article talks about that the plants and that they were checked for a magnitude 7, but the earthquake was a 9. The reality is that they assumed the magnitude 7 close in had similar ground motions to a 9 farther away. They did check (and retrofit) the plant to the ground motions that they probably saw (or nearly). The problem was the tsunami. We probably need a small write up so that staff understands, even if we keep it internal.

Impact at US Nuclear Power Plants During the March 11, 2011 Earthquake and Tsunami?

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

Public Answer: No

Additional, technical non-public information: Two US plants on the Pacific Ocean (Diablo Canyon and San Onofre) experienced higher than normal sea level due to tsunami. However, the wave heights were consistent with previously predicted levels and this had no negative impact to the plants. In response, Diablo Canyon Units 1 and 2 declared an "unusual event" based on tsunami warning following the Japanese earthquake. They have since exited the "unusual event" declaration, based on a downgrade to a tsunami advisory.

57) Have any lessons for US plants been identified?

Public Answer: The NRC is in the process of following and reviewing the event in real time. This will undoubtedly lead to the identification of issues that warrant further study. However, a complete understanding of lessons learned will require more information than is currently available to NRC staff.

Additional, technical non-public information: We need to take a closer look at common cause failures, such as earthquake and tsunami, and earthquake and dam failure.

58) It appears that the estimates of the tsunami are changing frequently. The NOAA and TEPCO estimates are different. Why?

The following is based on an email and added here for record-keeping (it needs to be revised into a formal Q&A):

NOAA best prediction of 8m offshore (at the 5 meter bathymetric line) and TEPCO's most recent estimate of 14m runup onshore are consistent. A tsunami has two phases of response. In the open ocean it is very well behaved and calculations are highly accurate. As it gets close to shore and the shoaling effect begins, the behavior starts to go non-linear and very high resolution bathymetric (an topographic) information is required for a very precise prediction of runup (onto land) at any particular point on the coastline. However, it is well understood that as a tsunami wave comes onshore it grows in size significantly. Therefore, NOAA's calculation of 8 meters offshore and TEPCO's (most recently) announcement of 14 meters onshore are consistent.

This is the third estimate that TEPCO has published, and we do not have information about why their estimates are changing.

59) How well can we predict a tsunami wave height? What have we learned about our prediction abilities based on the events in Japan?

The following is based on an email and added here for record-keeping (it needs to be revised into a formal Q&A):

First, it's very important to understand that the method used by the Japanese nuclear industry is very different from how assessments are made in the US. The under-prediction of the possible tsunami in Japan does not indicate a problem in the US. The Japanese approach is heavily focused on using their extensive database of past events and doing modeling based on segmented faults.

NOAA's tsunami warning system models (NOAA, not the USGS) have been extremely well validated over time (with hundreds of real tsunami), and that continues to be the case. But, that is up to water depth where they have the necessary resolution of bathymetric data (and where the non-linear response begins in earnest). As a result of this fact, there is an effort currently to collect very high resolution data for the entire US pacific coast and to implement it into the NOAA database (currently the resolution of US data is not uniform). This will make US Pacific coast onshore runup predictions highly accurate.

NRC Response and Future Licensing Actions

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

Public Answer: We are closely following events in Japan, working with other agencies of the federal government and with our counterparts in that country. In addition, we currently have a team of experts in boiling water reactors working in Japan.

Additional technical, non-public information: NOTE TO OPA: please check the current staffing in Japan to provide more accurate information. This is changing on an ongoing basis. We are taking the knowledge that the staff has about the design of the US nuclear plants and we are applying this knowledge to the Japan situation. For example, this includes calculations of severe accident mitigation that have been performed.

61) With NRC moving to design certification, at what point is seismic capability tested – during design or modified to be site-specific? If in design, what strength seismic event must these be built to withstand?

Public Answer: During design certification, vendors propose a seismic design in terms of a ground motion spectrum for their nuclear facility. This spectrum is called a standard design response spectrum and is developed so that the proposed nuclear facility can be sited at most locations in the central and eastern United States. The vendors show that this design ground motion is suitable for a variety of different subsurface conditions such as hard rock, deep soil, or shallow soil over rock. Combined License and Early Site Permits applicants are required to develop a site specific ground motion response spectrum that takes into account all of the earthquakes in the region surrounding their site as well as the local site geologic conditions. Applicants estimate the ground motion from these postulated earthquakes to develop seismic hazard curves. These seismic hazard curves are then used to determine a site specific ground motion response spectrum that has a maximum annual likelihood of 1×10^{-4} of being exceeded. This can be thought of as a ground motion with a 10,000 year return period. This site specific ground motion response spectrum is then compared to the standard design response spectrum for the proposed design. If the standard design ground motion spectrum envelopes the site specific ground motion spectrum then the site is considered to be suitable for the proposed design. If the standard design spectrum does not completely envelope the site specific ground motion spectrum, then the COL applicant must do further detailed structural analysis to show that the design capacity is adequate. Margin beyond the standard design and site specific ground motions must also be demonstrated before fuel loading can begin.

Additional technical, non-public information: None.

62) What are the near term actions that U.S. plants are taking in consideration of the events in Japan?

Public Answer: The U.S. nuclear energy industry has already started an assessment of the events in Japan and is taking steps to ensure that U.S. reactors could respond to events that may challenge safe operation of the facilities. These actions include:

- Verify each plant's capability to manage major challenges, such as aircraft impacts and losses of large areas of the plant due to natural events, fires or explosions.
- Verify each plant's capability to manage a total loss of off-site power.

- Verify the capability to mitigate flooding and the impact of floods on systems inside and outside the plant.
- Perform walk-downs and inspection of important equipment needed to respond successfully to extreme events like fires and floods.

Additional technical, non-public information: Note to OPA: This was a Q&A from the 3/21 briefing. please check that this is OK to provide to the public before doing so.

63) What are the immediate steps NRC is taking?

Public Answer: To date (march 20, 2011) the NRC has taken the following steps:

- The Nuclear Regulatory Commission has issued an Information Notice to all currently operating U.S. nuclear power plants, describing the effects of the March 11 earthquake and tsunami on Japanese nuclear power plants.
- The notice provides a brief overview of how the earthquake and tsunami are understood to have disabled several key cooling systems at the Fukushima Daiichi nuclear power station, and also hampered efforts to return those systems to service. The notice is based on the NRC's current understanding of the damage to the reactors and associated spent fuel pools as of Friday, March 18.
- The notice reflects the current belief that the combined effects of the March 11 earthquake and tsunami exceeded the Fukushima Daiichi plant's design limits. The notice also recounts the NRC's efforts, post-9/11, to enhance U.S. plants' abilities to cope with severe events, such as the loss of large areas of a site, including safety systems and power supplies.

The NRC expects U.S. nuclear power plants will review the entire notice to determine how it applies to their facilities and consider actions, as appropriate.

Additional technical, non-public information: Note to OPA: This was a Q&A from the 3/21 briefing. please check that this is OK to provide to the public before doing so.

64) Should U.S. residents be using Potassium iodide?

Public Response: It is the responsibility of the individual States to decide on the use of KI. It is EPA's responsibility to inform states of projected doses. Due to the extremely low levels of radioactivity expected on the U.S. West coast and Pacific States/territories, the NRC staff does not recommend use of KI.

Additional technical, non-public information: None.

Reassessment of US Plants and Generic Issue 199 (GI-199)

65) What is Generic Issue 199 about?

Public Answer: Generic Issue 199 investigates the safety and risk implications of updated earthquake-related data and models. These data and models suggest that the probability for earthquake ground motion above the seismic design basis for some nuclear plants in the Central and Eastern United States, although is still low, is larger than previous estimates.

Additional, technical, non-public information: See additional summary/discussion of GI-199 and terms below.

66) Does the NRC have a position on the MSNBC article that ranked the safety of US plants?

Public Response: [see below]

67) A recent Can we get the rankings of the plants in terms of safety? (Actually this answer should be considered any time GI-199 data is used to "rank" plants)

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

Additional, technical, non-public information: NOTE TO OPA: Add the answer to "What are the current findings of GI-199", to create a longer answer if it is appropriate.

68) What are the current findings of GI-199?

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

Additional, technical, non-public information: None.

69) If the plants are designed to withstand the ground shaking why is there so much risk from the design level earthquake

Much of the risk in the total risk levels provided in the report comes from earthquakes stronger than the safe shutdown ground motion. The anything indicated in the geologic record used to determine the design requirements at these sites. The numbers are based on an evaluation of all of the potential

seismic sources in the CEUS and are used to produce seismic hazard estimates (curves) for each site. The GI-199 effort to date has performed a screening assessment to determine if further, more detailed studies are warranted. This study has utilized information from plant-specific evaluation of external hazards, including earthquakes. That information was gathered to identify potential seismic vulnerabilities, not to produce robust risk estimates. Therefore, the GI-199 results should be viewed as preliminary and not definitive.

70) Overall, how would the NRC characterize the CDF numbers? A quirk of numbers? A serious concern?

Public Response: The objective of the GI-199 Safety/Risk Assessment was to perform a conservative, screening-level assessment to evaluate if further investigations of seismic safety for operating reactors in the central and eastern US (CEUS) are warranted consistent with NRC directives. The results of the GI-199 SRA should not be interpreted as definitive estimates of plant-specific seismic risk. The nature of the information used (both seismic hazard data and plant-level fragility information) make these estimates useful only as a screening tool. The use of the absolute value of the seismic hazard-related risk, as done in the MSNBC article, is not the intended use, and the NRC considers it an inappropriate use of the results.

The study is still underway and it is too early to predict the final outcome. However, staff has determined that there is no immediate safety concern and that overall seismic risk estimates remain small. If at any time the NRC determines that an immediate safety concern exists, action to address the issue will be taken. However, the NRC is focused on assuring safety during even very rare and extreme events. Therefore, the NRC has determined that assessment of updated seismic hazards and plant performance should continue.

Additional, technical, non-public information: None.

71) Describe the study and what it factored in – plant design, soils, previous quakes, etc.

Public Response: The study considers the factors that impact estimates of both the seismic hazard (i.e. ground shaking levels) at the site and the plants resistance to earthquakes (mathematically represented by the plant level fragility curve). Previous quakes, the tectonic environment, and the soils that underlie the site are all used in the development of the ground shaking estimates used in the analyses. Plant design and the seismic resistance of the important structures, systems, and components are all used in the development of plant level fragility curves.

Additional, technical, non-public information: None.

72) Explain “seismic curve” and “plant level fragility curve”.

Public Response: A seismic curve is a graphical representation of seismic hazard. Seismic hazard in this context is the highest level of ground motion expected to occur (on average) at a site over different periods of time. Plant level fragility is the probability of damage to plant structures, systems and components as a function of ground shaking levels.

Additional, technical, non-public information: None.

73) Explain the “weakest link model”.

Public Response: The weakest link model is a method for evaluating the importance of different frequencies of ground vibration to the overall plant performance. The model and its details are not integral to understanding the fundamental conclusions of the study.

Additional, technical, non-public information: None.

74) What would constitute fragility at a plant?

Public Response: Fragility is a term that relates the probability of failure of an individual structure, system or component to the level of seismic shaking it experiences. Plant level fragility is the probability of damage to sets of plant structures, systems and components as a function of ground shaking levels.

Additional, technical, non-public information: None.

75) Can someone put that risk factor into perspective, using something other than MSNBC's chances of winning the lottery?

Public Response: As noted above, the risk factors determined in GI-199 were conservative estimates of risk intended for use as a screening tool. Use of these factors beyond this intended purpose is inappropriate.

Additional, technical, non-public information: None.

76) What, if anything, can be done at a site experiencing such a risk? (Or at Limerick in particular.)

Public Response: The probabilistic seismic risk analyses (SPRA) that are performed to determine the core damage frequency (CDF) numbers also provides a significant amount of information on what the plant vulnerabilities are. This allows the analyst to determine what can be done to the plant to address the risk.

Additional, technical, non-public information: None.

77) Has anyone determined that anything SHOULD be done at Limerick or any of the other PA plants?

Public Response: The fundamental conclusion of the report is that "work to date supports a decision to continue ...; the methodology, input assumptions, and data are not sufficiently developed to support other regulatory actions or decisions." The NRC is planning to issue a Generic Communication to operating reactor licensees in the CEUS requesting additional information. This includes the plants in PA.

Additional, technical, non-public information: None.

78) Page 20 of the report: This result confirms NRR's conclusion that currently operating plants are adequately protected against the change in seismic hazard estimates because the guidelines in NRR Office Instruction LIC-504 "Integrated Risk-Informed Decision Making Process for Emergent Issues" are not exceeded. Can someone please explain?

Public response: Can someone help with this?

Additional, technical, non-public information: None.

79) Is the earthquake safety of US plants reviewed once the plants are constructed?

Public response: Yes, earthquake safety is reviewed during focused design inspections, under the Generic Issues Program (GI-199) and as part of the Individual Plant Evaluation of External Events program (IPEEE) that was conducted in response to Generic Letter 88-20 Supplement 4.

Additional, technical, non-public information: None.

80) Does the NRC ever review tsunami risk for existing plants?

Public Answer: The NRC has not conducted a generic issue program on tsunami risk to date. However, some plants have been reviewed as a result of the application for a license for a new reactor. In the ASME/ANS 2009 seismic probabilistic risk assessment standard, all external hazards are included.

Additional, technical, non-public information: None.

81) Does GI-199 consider tsunami?

Public response: GI-199 stems from the increased in perceived seismic hazard focused on understanding the impact of increased ground motion on the risk at a plant. GI-199 does not consider tsunami

Additional, technical, non-public information: In the past there has been discussion about a GI program on tsunami, but the NRC's research and guidance was not yet at the point it would be effective. We are just getting to this stage and the topic should be revisited.

82) Where can I get current information about Generic Issue 199?

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

Additional, technical, non-public information: The GI-199 section of the NRC internal GIP website (<http://www.internal.nrc.gov/RES/projects/GIP/Individual%20GIs/GI-0199.html>) contains additional information about Generic Issue 199 (GI-199) and is available to NRC staff.

83) Are all US plants being evaluated as a part of Generic Issue 199?

Public Answer: Currently the scope of the Generic Issue 199 (GI-199) Safety/Risk Assessment is limited to all plants in the Central and Eastern United States. Although plants at the Columbia, Diablo Canyon, Palo Verde, and San Onofre sites are not included in the GI-199 Safety/Risk Assessment, the Information Notice on GI-199 is addressed to all operating power plants in the US (as well as all independent spent fuel storage installation licensees). The staff will also consider inclusion of operating reactors in the Western US in its future generic communication information requests.

Additional, technical, non-public information: The staff is currently developing specific information needs to be included in a Generic Letter to licensees in the CEUS.

84) Are the plants safe? If you are not sure they are safe, why are they not being shut down? If you are sure they are safe, why are you continuing evaluations related to this generic issue?

Public Answer: Yes, currently operating nuclear plants in the United States remain safe, with no need for immediate action. This determination is based on NRC staff reviews associated with Early Site Permits (ESP) and updated seismic hazard information, the conclusions of the Generic Issue 199 Screening Panel (comprised of technical experts), and the conclusions of the Safety/Risk Assessment Panel (also comprised of technical experts).

No immediate action is needed because: (1) existing plants were designed to withstand anticipated earthquakes with substantial design margins, as confirmed by the results of the Individual Plant Examination of External Events program; (2) the probability of exceeding the *safe shutdown earthquake* ground motion may have increased at some sites, but only by a relatively small amount; and (3) the Safety/Risk Assessment Stage results indicate that the probabilities of seismic core damage are lower than the guidelines for taking immediate action.

Even though the staff has determined that existing plants remain safe, the Generic Issues Program criteria (Management Directive 6.4) direct staff to continue their analysis to determine whether any cost-justified plant improvements can be identified to make plants enhance plant safety.

Additional, technical, non-public information : The Safety/Risk Assessment results confirm that plants are safe. The relevant risk criterion for GI-199 is total *core damage frequency* (CDF). The threshold for taking immediate regulatory action (found in NRR Office Instruction LIC-504, see below) is a total CDF greater than or on the order of 10^{-3} (0.001) per year. For GI-199, the staff calculated seismic CDFs of 10^{-4} (0.0001) per year and below for nuclear power plants operating in the Central and Eastern US (CEUS) (based on the new US Geological Survey seismic hazard curves). The CDF from internal events (estimated using the staff-developed Standardized Plant Analysis of Risk models) and fires (as reported by licensees during the IPEEE process and documented in NUREG-1742), when added to the seismic CDF estimates results in the total risk for each plant to be, at most, 4×10^{-4} (0.0004) per year or below. This is well below the threshold (a CDF of 10^{-3} [0.001] per year) for taking immediate action. Based on the determination that there is no need for immediate action, and that this issue has not changed the licensing basis for any operating plant, the CEUS operating nuclear power plants are considered safe. In addition, as detailed in the GI-199 Safety/Risk Assessment there are additional, qualitative considerations that provide further support to the conclusion that plants are safe.

Note: The NRC has an integrated, risk-informed decision-making process for emergent reactor issues (NRR Office Instruction LIC-504, ADAMS Accession No. ML100541776 [not publically available]). In addition to deterministic criteria, LIC-504 contains risk criteria for determining when an emergent issue requires regulatory action to place or maintain a plant in a safe condition.

85) What do you mean by "increased estimates of seismic hazards" at nuclear power plant sites?

Public Answer: *Seismic hazard* (earthquake hazard) represents the chance (or probability) that a specific level of ground motion could be observed or exceeded at a given location. Our estimates of seismic hazard at some Central and Eastern United States locations have changed based on results from recent research, indicating that earthquakes occurred more often in some locations than previously estimated. Our estimates of seismic hazard have also changed because the models used to predict the level of ground motion, as caused by a specific magnitude earthquake at a certain distance from a site, changed. The increased estimates of seismic hazard at some locations in the Central and Eastern United States were discussed in a memorandum to the Commission, dated July 26, 2006. (The memorandum is available in the NRC Agencywide Documents Access and Management System [ADAMS] under Accession No. ML052360044).

Additional, technical, non-public information: See additional discussion of terms at the end of the document.

86) Does the SCDF represent a measurement of the risk of radiation RELEASE or only the risk of core damage (not accounting for secondary containment, etc.)?

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

87) Did an NRC spokesperson tell MSNBC's Bill Dedman that the weighted risk average was invalid and useless? He contends to us that this is the case.

Public Response: No. See Answers below.

88) 3. If it was "invalid" as he claims, why would the USGS include that metric?

Public Response: The weighted average is not invalid (see Answer 5 below). All of the values in Appendix D were developed by NRC staff. Table D-1 in Appendix D uses the (2008) US Geological Survey (USGS) seismic source model, but the Seismic Core Damage Frequency results were developed by US NRC staff. The USGS seismic source model is the same one used to develop the USGS National Seismic Hazard Maps.

89) Can you explain the weighted average and how it compares to the weakest link average?

Public Response: Tables D-1 through D-3 in Appendix D of the US NRC study show the "simple" average of the four spectral frequencies (1, Hz, 5 Hz, 10 Hz, peak ground acceleration (PGA)), the "IPEEE weighted" average and the "weakest link" model. These different averaging approaches are explained in Appendix A.3 (simple average and IPEEE weighted average) and Appendix A.4 (weakest link model). The weighted average uses a combination of the three spectral frequencies (1, 5, and 10 Hz) at which the most important structures, systems, and components of nuclear power plants will resonate. The weakest link is the largest SCDF value from among the four spectral frequencies noted above.

90) Ultimately would you suggest using one of the models (average, weighted, weakest link) or to combine the information from all three?

Public Response: Most nuclear power plant structures, systems, and components resonate at frequencies between 1 and 10 Hz, so there are different approaches to averaging the Seismic Core Damage Frequency (SCDF) values. By using multiple approaches, the NRC staff gains a better understanding of the uncertainties involved in the assessments.

91) Were there any other factual inaccuracies or flaws in Mr. Dedman's piece you would like clarify/point out.

Public Response: The US Nuclear Regulatory Commission study, released in September, 2010, was prepared as a screening assessment to evaluate if further investigations of seismic safety for operating reactors in the central and eastern US (CEUS) are warranted, consistent with NRC directives. The report clearly states that "work to date supports a decision to continue ...; the methodology, input assumptions, and data are not sufficiently developed to support other regulatory actions or decisions." Accordingly, the results were not used to rank or compare plants. The study produced plant-specific results of the estimated change in risk from seismic hazards. The study did not rely on the absolute value of the seismic risk except to assure that all operating plants are safe. The plant-specific results were used in aggregate to determine the need for continued evaluation and were included in the report for openness and transparency. The use of the absolute value of the seismic hazard-related risk, as done in the MSNBC article, is not the intended use, and the NRC considers it an inappropriate use of the results.

92) Mr. Dedman infers that the plant quake risk has grown (between the 1989 and 2008 estimates) to the threshold of danger and may cross it in the next study. Is this the NRC's position?

Public Response: The US NRC evaluation is still underway and it is too early to predict the final outcome. However, staff has determined that there is no immediate safety concern and that overall seismic risk estimates remain small. If at any time the NRC determines that an immediate safety concern exists, action to address the issue will be taken. However, the NRC is focused on assuring safety during even very rare and extreme events. Therefore, the NRC has determined that assessment of updated seismic hazards and plant performance should continue

93) What document has the latest seismic hazard estimates (probabilistic or not) for existing nuclear power plants in the western US?

Public Response: At this time the staff has not formally developed updated probabilistic seismic hazard estimates for the existing nuclear power plants in the Western US. However, NRC staff during the mid- to late-1990's reviewed the plants' assessments of potential consequences of severe ground motion from earthquakes beyond the plant design basis as part of the Individual Plant Examination of External Events (IPEEE) program. From this review, the NRC staff determined that the seismic designs of operating plants in the US have adequate safety margin. NRC staff has continued to stay abreast of the latest research on seismic hazards in the Western US and interface with colleagues at the US Geological Survey. The focus of Generic Issue 199 has been on the CEUS. However, the Information Notice that summarized the results of the Safety/Risk Assessment was sent to all existing power reactor licensees. The documents that summarize existing hazard estimates are contained in the Final Safety Analysis Reports (FSARS) and in the IPEEE submittals. It must be noted that following 9/11 the IPEEE documents are no longer publicly available.

Additional, technical, non-public information: None

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

Public Response: The new consensus hazard curves are being developed in a cooperative project that has NRC, US Department of Energy, US Geological Survey (USGS) and Electric Power Research Institute (EPRI) participation. The title is: The Central and Eastern US Seismic Source Characterization (CEUS-SSC) project. The project is being conducted following comprehensive standards to ensure quality and regulatory defensibility. It is in its final phase and is expected to be publicly released in the fall of 2011. The project manager is Larry Salamone (Lawrence.salamone@srs.gov, 803-645-9195) and the technical lead on the project is Dr. Kevin Coppersmith (925-974-3335, kcoppersmith@earthlink.net). Additional information on this project can be found at: <http://mydocs.epri.com/docs/ANT/2008-04.pdf>, and http://my.epri.com/portal/server.pt?open=512&objID=319&&PageID=218833&mode=2&in_hi_us_erid=2&cached=true.

Additional, technical, non-public information: None

95) What is the timetable now for consideration of any regulatory changes from the GI-199 research?

Public Response: The NRC is working on developing a Generic Letter (GL) to request information from affected licensees. The GL will likely be issued in a draft form within the next 2 months to stimulate discussions with industry in a public meeting. After that it has to be approved by the Committee to Review Generic Requirements, presented to the Advisory Committee on Reactor Safeguards and issued as a draft for formal public comments (60 days). After evaluation of the public comments it can then be finalized for issuance. We expect to issue the GL by the end of this calendar year, as the new consensus seismic hazard estimates become available. The information from licensees will likely require 3 to 6 months to complete. Staff's review will commence after receiving licensees' responses. Based on staff's review, a determination can be made regarding cost beneficial backfits where it can be justified.

Additional, technical, non-public information: None

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1. Please explain in plain language how the NRC determined plants are safe with regard to the results of our GI199 assessment report..
2. The GI199 Safety/Risk Assessment states 24 plants "lie in the continue zone" (pg 23) These plants "need more assessment." What are these 24 plants? Why are these plants that require further evaluation safe? (pg 23 and Figure 8)
3. Why is the list of plants identified by the NRC for further evaluation under GI199 different than those identified by MSNBC as the "top 10" likely to fail due to seismic event?
4. Why are plants safe when MSNBC calculations indicate several hundred percent increases in the risk of a seismic event that damages the core?
5. Why do Indian Point 2 and Indian Point 3 plants have different probabilities of failing due to a seismic event when the plants are located next to each other? Is IP3 calculated to be the most likely to fail due to a seismic event? Why? Why is IP2 different? Aren't these plant at the same location and very similar design?
6. Why is Pilgrim not in the NRC "continue to evaluate zone" but second on the MSNBC list as moist likely to fail due to a seismic event?

Seismic Probabilistic Risk Assessment (SPRA)

- 96) The NRC increasingly uses risk-information in regulatory decisions. Are risk-informed PRAs useful in assessing an event such as this?

Public response: Nilesch Chokshi to provide Q&As on SPRA

Additional, technical, non-public information: None

State-of-the-art Reactor Consequence Analysis (SOARCA)

97) What severe accident research is the U.S. Nuclear Regulatory Commission (NRC) doing?

Public Answer: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: The NRC and its contractor presently are completing a research project entitled "State-of-the-Art Reactor Consequence Analysis" (SOARCA). This research project develops best estimates of the potential public health effects from a nuclear power plant accident where low-likelihood scenarios could release radioactive material into the environment and potentially cause offsite consequences. The project also evaluates and improves, as appropriate, methods and models for evaluating outcomes of such severe accidents. In addition, research is being conducted to develop advanced risk assessment modeling techniques (e.g., dynamic probabilistic risk assessment (PRA) using simulation based methods) to improve the state-of-the practice in PRA severe accident modeling. Key goals of this research include increased analysis realism, reduced reliance on modeling simplification, and improved the treatment of human interactions with the reactor plant system.

98) Why is the NRC performing the SOARCA study?

Public Answer: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: NRC is doing this study to develop the most realistic evaluations for the potential consequences of severe nuclear accidents. Over the years, NRC, industry, and international nuclear safety organizations have completed substantial research on plant response to hypothetical accidents that could damage the core and containment. The results have significantly improved NRC's ability to analyze and predict how nuclear plant systems and operators would respond to severe accidents. Also, plant owners have improved the plant design, emergency procedures, maintenance programs, and operator training, all of which have improved plant safety. Emergency preparedness measures also have been refined and improved to further protect the public in the highly unlikely event of a severe accident. Combining all of this new information and analysis will improve the realism of accident consequence evaluations.

99) Does the NRC intend to revisit previous risk studies?

Public Answer: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: The last NRC-sponsored Level 3 probabilistic risk assessment (PRA) studies to estimate the integrated risk to the public from severe nuclear reactor accidents were conducted in the late 1980s with the results published in a collection of reports and a corresponding summary document, NUREG-1150, "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants." Based on advances in both nuclear power plant safety and PRA technology since NUREG-1150 was published, the NRC staff is considering conducting new Level 3 PRA studies to update its understanding of the integrated risk to the public from accidents involving nuclear power plant sites. The NRC staff is currently conducting a scoping study to develop various options for proceeding with Level 3 PRA activities, and plans to provide the Commission with these potential options and a specific recommendation for proceeding by July 2011.

100) How will the SOARCA study be different from earlier studies?

Public Answer: The below is from the internal Q&As for the 3/21 briefing. This needs to be cleared before it can be used.

Additional, technical, non-public information: The SOARCA project will:

- Use an improved understanding of source terms and severe accident phenomenology.
- Credit the use of severe accident mitigation strategies and procedures.
- Use updated emergency preparedness modeling.
- Account for plant improvements.
- Use modern computer resources and advanced software to yield more accurate results.

In addition, the SOARCA project is designed to be a more realistic estimate. Some of the earlier studies also were designed to be best estimates; however, because they were limited by the available knowledge of accident phenomenology, these older studies were conservative (particularly the very improbable severe accidents) in their estimates of off-site releases and early fatalities. The SOARCA project will provide the latest basis from which the public and decision makers can assess the consequences of severe reactor accidents.

Defense-in-Depth and Severe Accident Management

This is not exactly related to seismic questions. I read these with great interest. I believe there are many staff who would like to be more informed about this topic. So, I have included it.

102) Although there undoubtedly will be many lessons learned about severe accidents from the tragic events at Fukushima, have you identified any early lessons?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: There will undoubtedly be many lessons learned in the months and years to come as we learn more about the tragic events at the Fukushima Daiichi plant in Japan. However, one of the early lessons is this: You can't anticipate — either in the deterministic design basis of the plant or through probabilistic risk assessment models — everything that could happen. That is why the NRC's defense-in-depth philosophy is fundamental to ensuring that safety is achieved, even under extreme circumstances, such as those experienced at the Fukushima Daiichi plant. This NRC focus on defense-in-depth has led to a number of improvements in the design and operation of U.S. Nuclear Power Plants:

- Studies of severe accident prevention and mitigation in the 1980s led to a number of improvements at plants, such as installation of hardened vents at BWRs with Mark I containments. (See "fact sheet" for more detail.)
- Also, in the 1980s (specifically in 1988) the NRC concluded that additional regulatory requirements were justified in order to provide further assurance that a loss of both offsite and onsite emergency ac power systems would not adversely affect public health and safety and the station blackout rule was enacted. Studies conducted by the NRC since this rule has been in effect confirms that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in significant risk reduction and have further enhanced defense-in-depth. However, we plan to carefully evaluate the lessons learned from the events in Japan to determine if enhancements to the station blackout rule are warranted. (See "fact sheet" on station black-out.)
- Operator procedures that are symptom-based and ensure that operators primary focus is maintaining the critical safety functions such as ensuring the core is cooled and covered.
- Addition procedures for operators to use in the event of a severe accident (Severe Accident Mitigation Guidelines (SAMG)).
- Provisions in 10 CFR 50.54hh that require licensees to develop and implement guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities in situations involving loss of large areas of the plant due to explosions or fire.

103) What procedures do U.S. plants have for responding to an unexpected event like the events in Japan.

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: One of the most significant lessons learned from the Three Mile Island Accident in 1979 was that operating procedures need to be symptom based and less prescriptive. Procedures that previously directed operators to take a series of actions based on a preestablished accident were replaced with procedures that directed operators to maintain the critical safety functions, such as keeping the core covered and cooled. Operators routinely practice these

procedures on a plant specific simulator to ensure that they can be implemented for a wide range of accident scenarios, including a station blackout scenario, or other events caused by an earthquake or a flood.

104) What are Severe Accident Management Guidelines

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: SAMGs are the set of guidelines employed to manage the in-plant response following a severe accident (i.e., Beyond design basis events that are expected to have resulted in significant core damage).

The *ultimate objective* of SAMGs is to protect the health and safety of the public from the hazards associated with the uncontrolled release of radioactive materials

The *operational objective* of SAMGs is to protect or restore, if possible, the integrity of the three physical barriers (fuel, reactor coolant system, and containment) to contain fission products.

Some important aspects of the guidelines are as follows:

- SAMGs go beyond the Emergency Operating Procedures (EOPs)
- SAMGs identify all possible means of achieving the operational objective, including the use of non-safety-related equipment and capabilities on site (including capabilities from other units)
- plant-specific SAMGs identify the various safety functions and list the capabilities to achieve that function, with some high-level procedure-like guidance.

Spent Fuel Pools and Independent Spent Fuel Storage Installations

105) Are Independent Spent Fuel Storage Installations (ISFSIs) required to withstand the same ground shaking as the reactor?

Public Response: Nuclear plant licensees use the same Safe Shutdown Earthquake (SSE) ground motion developed for the nuclear plant site for the design basis ground motion for the spent fuel dry cask storage facilities (also known as independent spent fuel storage installations, or ISFSIs) located at that site. Some reactor licensees have ISFSIs under a site-specific 10 CFR Part 72 license, and these licensees are required to use the same Part 50 reactor SSE for their design basis earthquake, in accordance with 10 CFR 72.102(f)(1). Other reactor licensees have onsite ISFSIs under the general license provisions of 10 CFR 72.210; they are similarly required to apply the same seismic design bases for the Part 50 license to the ISFSI design, in accordance with 10 CFR 72.212(b)(3).

Additional, technical, non-public information: none.

106) What do we know about the potential for and consequences of a zirconium fire in the spent fuel pool?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Spent fuel pools contain large amounts of water to keep the fuel cooled, and no fire can result as long as the water covers the fuel. Should the pool not be cooled for a substantial amount of time (on the order of days), the water in the pool may boil off. Should that continue and the fuel be exposed, the fuel could overheat. In the worst case, the zirconium cladding could oxidize and burn. The result of such a fire would be significant damage to the fuel, also the fire has the potential to propagate to the other assemblies, as well as release of hydrogen gas and volatile radioactive materials.

107) Can a zirconium fuel fire be prevented by wide spacing of spent fuel assemblies in the spent fuel pool?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Wider spacing would help in preventing a fire. Preventing a fire requires coolability in absence of water submersion. This depends on the heat and the assembly arrangement in the pool. A checkerboard arrangement (no two assemblies in adjacent locations) is coolable in about one third the time needed for a fully loaded (no open locations) pool. Other arrangements can also mitigate the potential of the onset of zirconium fires.

108) Are the implications of new seismic hazard estimates being considered for the storage of spent fuel?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Yes, while the GI-199 Safety/Risk Assessment focused solely on operating power reactors in the Central and Eastern U.S., spent fuel storage has been considered by NRC.

The NRC Office of Nuclear Materials Safety and Safeguards (NMSS) was informed of GI-199 and a preliminary screening review was performed in November, 2008 by the NMSS Division of Spent Fuel Storage and Transportation. There is a total of 40 operating independent spent fuel storage installations

(ISFSIs) in the Central and Eastern U.S. (CEUS). Except for a wet storage facility at G. E. Morris located in Illinois, the ISFSIs are co-located at the operating and permanently shutdown reactor sites. A review of design earthquakes (DE) used at the existing ISFSI locations in CEUS indicated that the safety margin (defined for ISFSIs as the ratio of DE/SSE, where SSE is the safe shutdown earthquake discussed in answer A8) for the cask designs were in the range of 1.20 ~ 3.90.

Therefore, NMSS considers that there is significant margin built into the existing designs and has confidence that the ISFSIs can continue to operate safely while the licensees' investigate this issue using their site specific information. Even so, holders of operating license for ISFSIs are included among addressees in the Information Notice on GI-199. Spent fuel pools (SFPs) were not specifically evaluated as part of GI-199. However, based on their design attributes (as follows), SFPs remain safe. SFPs are constructed of reinforced concrete, several feet thick, with a stainless steel liner to prevent leakage and maintain water quality. Due to their configuration, SFPs are inherently structurally-rugged and are designed to the same seismic requirements and ground motion intensity as the nuclear plant. However, the spent fuel cooling systems are not always seismic category 1.

Note: Typically, SFPs are about 40 feet deep and vary in width and length. The fuel is stored in stainless steel racks and submerged with approximately 23 feet of water above the top of the stored fuel. Each plant has a preferred SFP make-up water source (the refueling water storage tank for pressurized water reactors and the condensate storage tank for boiling water reactors). SFPs have alternate means of make-up such as service water systems and the fire water system. SFPs are also typically designed (e.g. with anti-siphon check valves) and instrumented such that leakage is minimized and promptly detected.

109) What are the design acceptance criteria for cooling systems for the spent fuel pools?

Public Response: The Standard Review Plan (NUREG0-800) acceptance Criteria for SP Cooling includes the following aspects:

General Design Criterion (GDC) 2 contained in Appendix A to 10 CFR Part 50, as related to structures housing the system and the system itself being capable of withstanding the effects of natural phenomena such as earthquakes, tornadoes, and hurricanes. Acceptance for meeting this criterion is based on conformance to positions C.1, C.2, C.6, and C.8 of RG 1.13 and position C.1 of RG 1.29 for safety-related and position C.2 of RG 1.29 for nonsafety-related portions of the system.

This criterion does not apply to the cleanup portion of the system and need not apply to the cooling system if the fuel pool makeup water system and its source meet this criterion, the fuel pool building and its ventilation and filtration system meet this criterion, and the ventilation and filtration system meets the guidelines of RG 1.52.

The cooling and makeup system should be designed to Quality Group C requirements in accordance with RG 1.26. However, when the cooling system is not designated Category I it need not meet the requirements of ASME Section XI for in-service inspection of nuclear plant components.

110) How does B.5.b apply to spent fuel pools?

Public Response: The answer below is a compilation of two questions contained in the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Section B.5.b of the ICM Order required licensees to "Develop specific guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities using existing or readily available resources (equipment and personnel) that can be effectively implemented under the circumstances associated with loss of large areas of the plant due to explosions or fire." Phase 1 was part of a larger NRC effort to enhance the safety and security of the nation's nuclear power plants. In Phase 2, the NRC independently looked at additional

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ways to protect the spent fuel pools at nuclear power plants. The NRC's plant-specific assessments identified both "readily available" and other resources that could be used to mitigate damage to spent fuel pools and the surrounding areas. The assessments considered damage that could have been caused by land, water, or air attacks.

Station Blackout

This is not exactly related to seismic questions. But, similar to the above topics, I read these with great interest. I believe there are many staff who would like to be more informed about this topic and this is an excellent summary. So, I have included it here.

A Factsheet related to station blackout has been added (see pg XX).

111) What is the definition of station blackout?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Station blackout (SBO) means the complete loss of alternating current (ac) electric power to the essential and nonessential switchgear buses in a nuclear power plant (i.e., loss of offsite electric power system concurrent with turbine trip and unavailability of the onsite emergency ac power system). Station blackout does not include the loss of available ac power to buses fed by station batteries through inverters or by alternate ac sources as defined in this section, nor does it assume a concurrent single failure or design basis accident. At single unit sites, any emergency ac power source(s) in excess of the number required to meet minimum redundancy requirements (i.e., single failure) for safe shutdown (non-DBA) is assumed to be available and may be designated as an alternate power source(s) provided the applicable requirements are met. At multi-unit sites, where the combination of emergency ac power sources exceeds the minimum redundancy requirements for safe shutdown (non-DBA) of all units, the remaining emergency ac power sources may be used as alternate ac power sources provided they meet the applicable requirements. If these criteria are not met, station blackout must be assumed on all the units.

112) What is the existing regulatory requirement regarding SBO?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Each light-water-cooled nuclear power plant licensed to operate must be able to withstand for a specified duration and recover from a station blackout as defined in Sec. 50.2.

113) How many plants have an alternate ac (AAC) source with the existing EDGs

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: 60 plants

114) How many plants cope with existing class 1E batteries?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: 44 plants

115) What are the coping duration determined for the plants based on the SBO Rule ?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: 4-16 hours (4 hours only with batteries; 4-16 with AAC)

116) How is coping duration determined?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: The specified station blackout duration shall be based on the following factors:

- (i) The redundancy of the onsite emergency ac power sources;
- (ii) The reliability of the onsite emergency ac power sources;
- (iii) The expected frequency of loss of offsite power; and
- (iv) The probable time needed to restore offsite power.

117) When does the SBO event start?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: The onset of a loss of offsite power and onsite power as verified by the control room indications

118) When does the SBO event end?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Either onsite or offsite power is recovered.

119) Did the NRC review the licensee's actions to meet the SBO rule?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Yes. The NRC staff reviewed the responses from each licensee and issued a SER accepting the proposed coping methods. All plants have (1) established SBO coping and recovery procedures; (2) completed training for these procedures; (3) implemented modifications as necessary to cope with an SBO; and (4) ensured a 4-16 hour coping capability. In addition, the staff performed pilot inspections at 8 sites to verify the implementation of the SBO rule implementation. No issues were identified during initial implementation.

120) Are all plants designed to mitigate a station blackout event?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Yes. All plants have the capability to withstand and recover from a SBO event. In 1988, the NRC concluded that additional regulatory requirements were justified in order to provide further assurance that a loss of both offsite and onsite emergency ac power systems—a station blackout condition—would not adversely affect public health and safety. Studies conducted by the NRC have shown that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in significant risk reduction and have further enhanced defense in depth.

Emergency Preparedness (Emphasis on B.5.b)

Although this is not strictly seismic, it is often the case that design for mitigation actions taken for one issue have impact on others. It seems apparent that the actions taken for B.5.b are going to have an impact on the assessment of seismic risk at the plants.

121) Is the emergency preparedness planning basis for nuclear power plants is valid?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Yes- NRC continues to conduct studies to determine the vulnerability of nuclear power plants and the adequacy of licensee programs to protect public health and safety. Whether the initiating event is a severe earthquake, a terrorist based event, or a nuclear accident, the EP planning basis provides reasonable assurance that the public health and safety will be protected. EP plans have always been based on a range of postulated events that would result in a radiological release, including the most severe.

122) What is B.5.b?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: After the terrorist attacks of 9/11, the NRC issued an Interim Compensatory Measures (ICM) Order on February 25, 2002, requiring power reactor licensees to take certain actions to prevent or mitigate terrorist attacks. Section B.5.b of the ICM Order required licensees to "Develop specific guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities using existing or readily available resources (equipment and personnel) that can be effectively implemented under the circumstances associated with loss of large areas of the plant due to explosions or fire."

123) What were Phases 1, 2, and 3 of the B.5.b?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information:

Phase 1: Phase 1 was part of a larger NRC effort to enhance the safety and security of the nation's nuclear power plants. The Phase 1 effort was initiated as part of the February 2002 ICM Order. The Order, among other things, required licensees to look at what might happen if a nuclear power plant lost large areas due to explosions or fire. The licensees then were required to identify – and later implement – strategies that would maintain or restore cooling for the reactor core, containment building, and spent fuel pool. The requirements listed in Section B.5.b of the ICM Order directed licensees to identify "mitigative strategies" (meaning the measures licensees could take to reduce the potential consequences of a large fire or explosion) that could be implemented with resources already existing or "readily available."

Phase 2: In Phase 2, the NRC independently looked at additional ways to protect the spent fuel pools at nuclear power plants. The NRC's plant-specific assessments identified both "readily available" and other resources that could be used to mitigate damage to spent fuel pools and the surrounding areas. The assessments considered damage that could have been caused by land, water, or air attacks.

Phase 3: In Phase 3, each nuclear power plant licensee identified ways to improve its ability to protect the reactor core and containment from a terrorist attack. This was done by identifying both "readily available" and other resources that could be used to mitigate loss of large areas of the plant due to fires

and explosions. In addition, the NRC independently assessed the plant and audited the licensee's effort to identify additional mitigation strategies.

124) Has the NRC inspected full implementation of the mitigating strategies?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: All phases of the B.5.b mitigating strategies were complete and inspected by December 2008.

125) What additional action has been taken?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: On March 27, 2009, the NRC amended 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," which added 10 CFR 50.54(hh)(2) in order to impose the same mitigating strategies requirements on new reactor applicants and licensees as those imposed by the ICM Order and associated license conditions. The Statement of Considerations for this rulemaking specifically noted that the requirements described in Section 50.54(hh) are for addressing certain events that are the cause of large fires and explosions and in addition, the rule contemplates that the initiating event for such large fires and explosions could be any number of beyond-design basis events, including natural phenomena such as earthquakes, tornadoes, floods, and tsunamis.

126) Is more information available about the mitigating strategies and inspections and reviews conducted?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: In general, the B.5.b mitigating strategies are plans, procedures, and pre-staged equipment whose intent is to minimize the effects of adverse events or accidents due to terrorist attacks. The NRC does not publicly release information that could assist terrorists to make nuclear power plants less safe. Since the NRC cannot share the details of the mitigating strategies with the public, we have given briefings to elected officials such as state governors and members of Congress to share sensitive unclassified or classified information, as appropriate. In addition, the NRC

Other External Hazards

127) How many plants are in hurricane zones?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: The plants near Gulf of Mexico and East coast as far north as Pilgrim have experienced Hurricane force winds in the past. Approximately 30 plants fall in this category.

128) How many plants are susceptible to flooding?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Most nuclear plants are close to large bodies of water and are situated on flat lands. Approximately 80% of the plants fall in this category. There are a few plants that may NOT be vulnerable to flooding such as Palo Verde.

129) How many plants are susceptible to blizzard?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: The plants in California, Arizona, South Texas, Louisiana and Florida are not expected to fall in this category. Approximately 80% of the plants are likely to experience blizzard conditions or adverse wintry weather conditions.

130) How many plants are susceptible to tornadoes?

Public Response: The below comes from the Q&As for the 3/21 commissioner's briefing. Please make sure these are OK to provide to the public before doing so.

Additional, technical, non-public information: Majority of the plants in the Midwest and the South have had tornado activity in the area. Approximately 50% of the operating plants

Plant-Specific Questions

San Onofre Nuclear Generating Station (SONGS) Questions

131) Could an earthquake and tsunami the size of the one in Japan happen at San Onofre?

No. This earthquake occurred on a "subduction zone", which is the type of tectonic region that produces the largest magnitudes earthquake. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. Subduction zone earthquakes are also required to produce the kind of massive tsunami seen in Japan. In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of far northern California, Oregon and Washington. So, a continental earthquake and tsunami as large as in Japan could only happen there. Outside of the Cascadia subduction zone, earthquakes are not expected to exceed a magnitude of approximately 8.25; and that would only occur on the largest fault lines, such as the San Andreas fault, which is 50 miles away onshore.

132) What magnitude earthquake are currently operating US nuclear plants such as SONGS designed to?

Each reactor is designed for a different ground motion that is determined on a site-specific basis. Ground motion is a function of both the magnitude of an earthquake and the distance from the fault to the site; and it is ground motion that causes damage. So, Nuclear plants, and in fact all engineered structures, are actually designed based on ground motion levels, not earthquake magnitudes. The existing nuclear plants were designed based on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquakes expected in the area around the plant. The scenario earthquake at SONGS is a magnitude 7 approximately 5 miles from the main plant. This earthquake results in a ground motion that has a peak ground acceleration of 0.67g, that is 67% of the acceleration of gravity.

133) Could San Onofre withstand an earthquake of the magnitude of the Japanese earthquake?

It could withstand the ground shaking experienced by the Japanese nuclear plants. As discussed above, it is actually ground motions that structures, systems, and components "feel". We do not have direct recordings of ground motion at the Japanese reactors. However, we do have estimates of shaking that come from a ShakeMap produced by the K-NET system. The ground motion at the Japanese nuclear reactors is believed to be somewhat on the order of the 0.67g, or possibly slightly higher, that San Onofre peak ground acceleration has been analyzed to. However, US nuclear plants have additional seismic margin, as demonstrated by the result of the Individual Plant Examination of External Events program carried out by the NRC in the mid-90s.

It should be noted that, the Fukushima plant also withstood the earthquake. In the hour or so after the earthquake the Fukushima plant's safety systems, including the diesel generators, performed as expected and effectively shut down the reactor. The cause of the problems at the plant stemmed from the loss of emergency power that appears to be the direct result of the subsequent tsunami, which far exceeded the design basis tsunami for the Fukushima plant.

134) Is possible to have a tsunami at San Onofre that is capable of damaging the plant?

Public Information: The San Onofre Units 2 and 3 plant grade is elevation +30.0 feet MLLW. San Onofre has reinforced concrete cantilevered retaining seawall and screen well perimeter wall designed to withstand the design basis earthquake, followed by the maximum predicted tsunami with coincident storm wave action. The controlling tsunami for San Onofre occurring during simultaneous high tide and

storm surge produces a maximum runup to elevation +15.6 feet MLLW at the Unit 2 and 3 seawall. When storm waves are superimposed, the predicted maximum runup is to elevation +27 MLLW. Tsunami protection for the SONGS site is provided by a reinforced concrete seawall constructed to elevation +30.0 MLLW. A tsunami larger than this is extremely unlikely.

Additional, technical, non-public information: None

135) Has the earthquake hazard at San Onofre been reviewed like Diablo Canyon nuclear power plant is doing? Are they planning on doing an update before relicensing?

Relicensing does not evaluate seismic hazard or other siting issues. Seismic safety is part of NRC's ongoing licensing activities. If an immediate safety concern emerged, the issue would be addressed as part of NRC's response, regardless of relicensing status.

The closest active fault is approximately five miles offshore from San Onofre, a system of folds and faults exist called the offshore zone of deformation (OZD). The OZD includes the Newport-Inglewood-Rose Canyon fault system. The Cristianitos fault is ½ mile southeast, but is an inactive fault. Other faults such as the San Andreas and San Jacinto, which can generate a larger magnitude earthquake, are far enough away that they would produce ground motions much less severe than earthquakes in the OZD for San Onofre.

Notwithstanding the above, the NRC is considering extending the Generic Issue 199 program to all operating reactors. This would require a reassessment of hazard for San Onofre using the latest probabilistic seismic hazard assessment approaches. Based on a preliminary assessment using the source model developed by the USGS for the national seismic hazard maps, the annual probability of occurrence of a 0.67g ground motion at the San Onofre site is only slightly higher than is than the annual probability of occurrence that is recommended for new nuclear plants.

Additional, technical, non-public information: Past history relative to nearby major quakes have been of no consequences to San Onofre. In fact, three major earthquakes from 1992 to 1994 (Big Bear, Landers and Northridge), ranging in distance from 70-90 miles away and registering approximately 6.5 to 7.3 magnitude, did not disrupt power production at San Onofre. The plant is expected to safely shutdown if a major earthquake occurs nearby. Safety related structures, systems and components have been designed and qualified to remain functional and not fail during and after an earthquake.

136) How do we know that the emergency diesel generators in San Onofre will not fail to operate like in Japan?

Emergency Diesel Generators (EDGs) are installed in a seismically qualified structure and are seismic Category I equipment. Even if these EDGs did fail, plants can safely shutdown using station blackout power source law 10 CFR 50.63. In 1988 the NRC concluded that additional regulatory requirements were justified in order to provide further assurance that a loss of both offsite and onsite emergency ac power systems would not adversely affect public health and safety and the station blackout rule was enacted. Studies conducted by the NRC since this rule has been in effect confirms that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in significant risk reduction and have further enhanced defense-in-depth. However, we plan to carefully evaluate the lessons learned from the events in Japan to determine if enhancements to the station blackout rule are warranted.

137) Was there any damage to San Onofre from either the earthquake or the resulting tsunami?

There was no damage at the San Onofre nuclear plant from either the earthquake or tsunami.

138) What about emergency planning for San Onofre. Does it consider tsunami?

Public Response: FEMA reviews off-site evacuation plans formally every 2 years during a biennial emergency preparedness exercise. NRC evaluates on-site evacuation plans during the same exercise. Population studies are formally done every 10 years, and evacuation time estimates are re-evaluated at that time. FEMA reviews these evacuation plans, and will conclude their acceptability through a finding of "reasonable assurance" that the off-site facilities and infrastructure is capable of protecting public health and safety in the event of an emergency at San Onofre. The next such exercise is planned for April 12, 2011.

The San Onofre emergency plan initiates the emergency response organization and results in declaration of emergency conditions via their Emergency Action Levels. The facility would then make protective action recommendations to the Governor, who would then decide on what protective actions would be ordered for the residents around San Onofre. The consideration of tsunami would be contained in the State and local (City, County) emergency plans, which are reviewed by FEMA.

Additional, technical, non-public information: None

139) SONGS received a white finding in 2008 for 125VDC battery issue related to the EDGs that went undetected for 4 years. NRC issued the white finding as there was increased risk that one EDG may not have started due to a low voltage condition on the battery on one Unit (Unit 2). Aren't all plants susceptible to the unknown? Is there any assurance the emergency cooling systems will function as desired in a Japan-like emergency?

Public response: The low voltage condition was caused by a failure to properly tighten bolts on a electrical breaker that connected the battery to the electrical bus that would be relied on to start the EDG in case of a loss of off-site power. This was corrected immediately on identification and actions taken to prevent its reoccurrence. The 3 other EDGs at SONGS were not affected.

Additional, technical, non-public information: None

140) What is the height of water that SONGS is designed to withstand?

Public Response: 30 feet (9.1 meters). Information for all plants can be found in the "Additional Information" section of this document.

Additional, technical, non-public information: None

141) What about drawdown and debris?

Public Response: *Good question...can HQ answer? Goutam, Henry, or Rich...can you help with this one?*

Additional, technical, non-public information: None

142) Will this be reviewed in light of the Japan earthquake.

Public Response: The NRC will do a thorough assessment of the lessons learned from this event and will review all potential issues at US nuclear plants as a result.

Additional, technical, non-public information: None

143) Could all onsite and offsite power be disrupted from SONGS in the event of a tsunami, and if that happened, could the plant be safely cooled down if power wasn't restored for days after?

Public Response: Seismic Category I equipment is equipment that is essential to the safe shutdown and isolation of the reactor or whose failure or damage could result in significant release of radioactive

material. All Seismic Category I equipment at SONGS is designed to function following a DBE with ground acceleration of 0.67g.

The operating basis earthquake (1/2 of the DBE) is characterized by maximum ground shaking of 0.33g. Historically, even this level of ground shaking has not been observed at the site. Based on expert analysis, the average recurrence interval for 0.33g ground shaking at the San Onofre site would be in excess of 1000 years and, thus, the probability of occurrence in the 40-year design life of the plant would be less than 1 in 25. The frequency of the DBE would be much more infrequent, and very unlikely to occur during the life of the plant. Even if an earthquake resulted in greater than the DBE movement/acceleration at SONGS, the containment structure would ultimately protect the public from harmful radiation release, in the event significant damage occurred to Seismic category 1 equipment.

Additional, technical, non-public information: None

144) Are there any faults nearby SONGS that could generate a significant tsunami?

Public Response: Current expert evaluations estimate a magnitude 7 earthquake about 4 miles (6.4 km) from SONGS. This is significantly less than the Japan earthquake, and SONGS has been designed to withstand this size earthquake without incident. ~~Should discuss the different tectonic nature (not a subduction zone like Japan)?~~

Additional, technical, non-public information: None

145) What magnitude or shaking level is SONGS designed to withstand? How likely is an earthquake of that magnitude for the SONGS site?

Public Response: The design basis earthquake (DBE) is defined as that earthquake producing the maximum vibratory ground motion that the nuclear power generating station is designed to withstand without functional impairment of those features necessary to shut down the reactor, maintain the station in a safe condition, and prevent undue risk to the health and safety of the public. The DBE for SONGS was assessed during the construction permit phase of the project. The DBE is postulated to occur near the site (5 miles (8km)), and the ground accelerations are postulated to be quite high (0.67g), when compared to other nuclear plant sites in the U.S (0.25g or less is typical for plants in the eastern US). Based on the unique seismic characteristics of the SONGS site, the site tends to amplify long-period motions, and to attenuate short-period motions. These site-specific characteristics were accounted for in the SONGS site-specific seismic analyses.

Additional, technical, non-public information: None

146) Could SONGS withstand an earthquake of the magnitude of the Japanese earthquake?

Public Response: We do not have current information on the ground motion at the Japanese reactors. SONGS was designed for approximately a 7.0 magnitude earthquake 4 miles (6.4 km) away. The Japanese earthquake was much larger (8.9), but was also almost 9 miles (14.5 km) away. The local ground motion at a particular plant is significantly affected by the local soil and bedrock conditions. SONGS was designed (0.67g) to withstand more than 2 times the design motion at average US plants.

Additional, technical, non-public information: None

147) What about the evacuation routes at SONGS? How do we know they are reasonable?

Public Response: FEMA reviews off-site evacuation plans formally every 2 years during a biennial emergency preparedness exercise. NRC evaluates on-site evacuation plans during the same exercise. Population studies are formally done every 10 years, and evacuation time estimates are re-evaluated at that time. FEMA reviews these evacuation plans, and will conclude their acceptability through a finding of "reasonable assurance" that the off-site facilities and infrastructure is capable of protecting public

health and safety in the event of an emergency at SONGS. The next such exercise is planned for April 12, 2011.

Additional, technical, non-public information: None

- 148) Regarding tsunami at DCNPP and SONGS, is the tsunami considered separately from flooding in licensing? And from the design perspective, is the flood still the controlling event for those plants rather than the tsunami?**

Public response: See below

- 149) What is the design level flooding for San Onofre? Can a tsunami be larger?**

Public response: San Onofre is located above the flood level associated with tsunami. San Onofre has reinforced concrete cantilevered retaining seawall and screen well perimeter wall designed to withstand the design basis earthquake, followed by the maximum predicted tsunami with coincident storm wave action

Additional, technical, non-public information: None

Additional songs questions

Diablo Canyon Nuclear Power Plant (DCNPP) Questions

- 150) Could an earthquake and tsunami the size of the one in Japan happen at Diablo Canyon?**

No. This earthquake occurred on a "subduction zone", which is the type of tectonic region that produces the largest magnitudes earthquake. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. Subduction zone earthquakes are also required to produce the kind of massive tsunami seen in Japan. In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of far northern California, Oregon and Washington. So, a continental earthquake and tsunami as large as in Japan could only happen there. Outside of the Cascadia subduction zone, earthquakes are not expected to exceed a magnitude of approximately 8.25; and that would only occur on the largest fault lines, such as the San Andreas fault, which is 50 miles away onshore.

- 151) What magnitude earthquake are currently operating US nuclear plants such as Diablo Canyon designed to?**

Each reactor is designed for a different ground motion that is determined on a site-specific basis. Ground motion is a function of both the magnitude of an earthquake and the distance from the fault to the site; and it is ground motion that causes damage. So, Nuclear plants, and in fact all engineered structures, are actually designed based on ground motion levels, not earthquake magnitudes. The existing nuclear plants were designed based on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquakes expected in the area around the plant. The scenario earthquake at Diablo is a magnitude 7.5 on the Hosgri Fault 3 miles from the main plant. This earthquake results in a ground motion that has a peak ground acceleration of 0.75g, that is 75% of the acceleration of gravity.

- 152) Could the newly discovered Shoreline Fault produce a larger "Scenario Earthquake"?**

The NRC's preliminary analyses indicate that the ground motions from the largest earthquakes expected on the smaller Shoreline Fault do not exceed the ground motions from the Hosgri Fault, for which the plant has already been analyzed and been found to be safe. NRC is currently reviewing the Final Report

on the Shoreline Fault that was submitted to the NRC earlier this year. The NRC is performing an independent analysis of potential ground motions based the data contained in the report and other information. Much of the data on the Shoreline Fault comes from the USGS in Menlo Park.

153) Could Diablo Canyon withstand an earthquake of the magnitude of the Japanese earthquake?

It could withstand the ground shaking experienced by the Japanese nuclear plants. As discussed above, it is actually ground motions that structures, systems, and components "feel". We do not have direct recordings of ground motion at the Japanese reactors. However, we do have estimates of shaking that come from a ShakeMap produced by the the K-NET system. The ground motion at the Japanese nuclear reactors is believed to be somewhat smaller than the 0.75g peak ground acceleration that Diablo Canyon has been analyzed to. Do, Diablo Canyon could withstand the ground shaking experienced by the Fukushima plant.

In fact, the Fukushima plant also withstood the earthquake. In the hour or so after the earthquake the Fukushima plant's safety systems, including the diesel generators, performed as expected and effectively shut down the reactor. The cause of the problems at the plant stemmed from the loss of emergency power that appears to be the direct result of the subsequent tsunami, which far exceeded the design basis tsunami for the Fukushima plant.

154) Is Diablo Canyon's equipment vulnerable to tsunami?

Nuclear plants are designed to withstand protection against natural phenomena such as tsunami, earthquakes. Diablo Canyon's main plant is located above the flood level associated with tsunami. The intake structures and Auxiliary Sea Water System at Diablo canyon are designed for combination of tsunami and storm wave activity.

155) How do we know that the emergency diesel generators in Diablo Canyon will not fail to operate like in Japan?

FEMA reviews off-site evacuation plans formally every 2 years during a biennial emergency preparedness exercise. NRC evaluates on-site evacuation plans during the same exercise. Population studies are formally done every 10 years, and evacuation time estimates are re-evaluated at that time. FEMA reviews these evacuation plans, and will conclude their acceptability through a finding of "reasonable assurance" that the off-site facilities and infrastructure is capable of protecting public health and safety in the event of an emergency at DCNPP.

156) Was there any damage to Diablo Canyon from either the earthquake or the resulting tsunami?

A small tsunami did hit the region around Diablo Canyon. There was no damage at the nuclear plant.

157) How do we know the evacuation routes in the region around Diablo Canyon are realistic?

FEMA reviews off-site evacuation plans formally every 2 years during a biennial emergency preparedness exercise. NRC evaluates on-site evacuation plans during the same exercise. Population studies are formally done every 10 years, and evacuation time estimates are re-evaluated at that time. FEMA reviews these evacuation plans, and will conclude their acceptability through a finding of "reasonable assurance" that the off-site facilities and infrastructure is capable of protecting public health and safety in the event of an emergency at DCNPP.

- 158) Now after the Japan tragedy, will the NRC finally hear us (A4NR) and postpone DC license renewal until seismic studies are complete? How can you be sure that what happened there is not going to happen at Diablo with a worse cast earthquake and tsunami?

Public response: ADD

Additional, technical, non-public information: ADD

- 159) The evacuation routes at DCNPP see are not realistic. Highway 101 is small...and can you imagine what it will be like with 40K people on it? Has the evacuation plan been updated w/ all the population growth?

Public Response: FEMA reviews off-site evacuation plans formally every 2 years during a biennial emergency preparedness exercise. NRC evaluates on-site evacuation plans during the same exercise. Population studies are formally done every 10 years, and evacuation time estimates are re-evaluated at that time. FEMA reviews these evacuation plans, and will conclude their acceptability through a finding of "reasonable assurance" that the off-site facilities and infrastructure is capable of protecting public health and safety in the event of an emergency at DCNPP.

Additional, technical, non-public information: None

- 160) Are there local offshore fault sources capable of producing a tsunami with very short warning times?

Public Response: ADD- question forwarded to region

Additional, technical, non-public information: ADD

- 161) Are there other seismically induced failure modes (other than tsunami) that would yield LTSBO? Flooding due to dam failure or widespread liquefaction are examples.

Public Response: ADD question forwarded to region

Additional, technical, non-public information: ADD

- 162) Ramifications of beyond design basis events (seismic and tsunami) and potential LTSBO on spent fuel storage facilities?

Public Response: ADD question forwarded to region

Additional, technical, non-public information: ADD

- 163) Why did the Emergency Warning go out for a 'tsunami' that was only 6 ft (1.8 m) high? Do these guys really know what they're doing? Would they know it if a big one was really coming? Crying wolf all the time doesn't instill a lot of confidence.

Public Response: The warning system performed well. The 6 foot (1.8 meters) wave was predicted many hours before and arrived at the time it was predicted. Federal officials accurately predicted the tsunami arrival time and size; allowing local official to take appropriate measures as they saw necessary to warn and protect the public. It should be understood that even a 6 foot tsunami is very dangerous. Tsunamis have far more energy and power than wind-driven waves.

Additional, technical, non-public information: ADD

The Japanese were supposed to have one of the best tsunami warning systems around. What went wrong last week?

Public Response: ADD can HQ answer?

Additional, technical, non-public information: ADD

NOTE: need to add to SONGS and DCNPP... Canyon and San Onofre IPEEEs - based on the Technical Evaluation Reports, Diablo did consider a locally induced tsunami in a limited way (the aux service water pumps were assumed to become flooded following a seismic event) while SONGS did not consider a coupled seismic/tsunami event.

- 164) Shouldn't the NRC make licensees consider a Tsunami coincident with a seismic event that triggers the Tsunami?

ADD

- 165) Given that SSCs get fatigued over time, shouldn't the NRC consider after-shocks in seismic hazard analyses?

ADD

- 166) Did the Japanese also consider an 8.9 magnitude earthquake and resulting tsunami "way too low a probability for consideration"?

ADD

- 167) GI-199 shows that the scientific community doesn't know everything about the seismicity of CEUS. And isn't there a prediction that the West coast is likely to get hit with some huge earthquake in the next 30 years or so? Why does the NRC continue to license plants on the west coast?

Work the following into Q&As as time permits.

After an earthquake, in order to restart, In practice a licensee needs to determine from engineering analysis that the stresses on the plant did not exceed their licensed limits. That would be a very tall order for a plant that experienced a beyond design basis earthquake, and probably is why it had taken Japan so long to restore the KK plants following the earlier earthquake.

- 168) Has anyone done work to look at the effect of many cycles of low amplitude acceleration following a larger event. How do we know a plant would be fit to start back up after an event? We cannot possibly do NDE on everything to determine if flaws have propagated to the point where they need to be replaced.

169) Aren't the California plants right on the San Andreas fault?

No. Both plants are approximately 50 miles from the San Andreas Fault. However, both are closer to other active fault zones. Diablo Canyon is closer to the Hosgri fault zone and has been retrofit to be safe in ground motions from a magnitude 7.5 earthquake on the Hosgri, which is 3 miles away. Recently there was a new fault, called the Shoreline fault discovered, about a 1/2 mile from the plant. But it is smaller and only capable of about a 6.5 earthquake at the most. The ground motions from the Hosgri's 7.5 earthquake would be larger than an 6.5 on the Shoreline fault. San Onofre is closes to the Newport-Inglewood fault which is about 5 miles away and capable of a magnitude 7. San Onofre was built to withstand the ground motions from that earthquake.

The following questions are from a series of questions asked by a reporter:

170) I heard that, at the urging of PG&E, effective acceleration was calculated at an average value, rather than peak. Is this true?

NRC response:

To be clear, the term "average" value in this case refers to the average of the two horizontal components of motion (accelerations) as recorded by seismographs. The maximum motion is the largest motion in any horizontal direction. It is most common to calculate the peak ground acceleration as an average horizontal value, rather than the maximum in any single direction, because that is what ground motion prediction equations are developed for and that is what is used in design. This is done because the weakest direction of a structure is rarely exactly aligned with the direction that has the single largest acceleration pulse.

Ground motion prediction equations are statistical relationships that provide the range of ground motion values for a particular magnitude and distance pair. The peak ground acceleration is typically determined as the maximum single value of the average of the horizontal accelerations. It should be noted also that the peak acceleration ground motions predicted are a distribution, rather than a single value (consider that not every time you record a magnitude 7 earthquake from 10 kilometers away are you going to get the same exact values; there is natural variability.) So, the ground motions they used are not the "average" value from that distribution, but rather the +1 standard deviation motions (i.e. the ground motions that have an 84% chance of being greater than the actual ground motions recorded for a particular magnitude-distance pair.) So, what 0.75g actually represents is the 84th percentile peak ground acceleration motions (where the motions are the average of the horizontal directions). This is the standard approach for a deterministic assessment.

171) (Continued from previous question) A so-called "tau factor" was used, which reduced it again to .67g. Can you please explain this?

NRC Response:

During the operating license review for the evaluation of the Diablo Canyon plant for the Hosgri earthquake (HE), the licensee used NRC-outlined procedures and parameters that were considered appropriate for the evaluation of the seismic response of plant structures, including an adjustment of the response spectra to account for the filtering effect of the large building foundations (Tau filtering procedure) (Reference Supplement 5 of NRC Safety Evaluation Report). It should be noted that the Tau factors were used for the evaluation of the seismic response of the Diablo Canyon plant structures only for the HE, and not for the design earthquake (DE) and the original Double Design earthquake (DDE or Safe Shutdown Earthquake (SSE)). It is further noted that the Tau effect in the HE evaluation is generally analogous to the combined effects of soil structure interaction (SSI) between plant structures and underlying foundation rock, foundation embedment, and ground motion incoherence effects associated with the horizontal spatial variation of the free-field ground-shaking on the seismic response of plant structures.

The NRC does not readily have a count of nuclear plants that have used the Tau factor approach for evaluation of seismic response of plant structures. Such information may be typically found in the updated Final Safety Analysis Report (FSAR) of the plant, which is a public document. Detailed state-of-the-art SSI analyses including the effects of incoherence and embedment are being used by applicants for new reactors.

172) (Continued from previous question) To assess the strength of concrete, actual values were used, rather than code allowable minimums. Can you please explain this?

NRC Response:

The NRC does not readily have a count of nuclear plants that have made such changes to design concrete compressive strength of concrete structures. Such information may be typically found in the updated FSAR of the plant, which is a public document. Diablo Canyon did use an increased concrete compressive strength only for design evaluation of its containment structures for accident load combination that includes the HE seismic design spectrum based on a postulated magnitude 7.5 earthquake on the Hosgri Fault 3 miles from the Diablo Canyon site with a peak ground acceleration of 0.75g. The specified minimum compressive strength of concrete was used for all other load combinations including those with the original operating-basis design earthquake and the original Double Design earthquake (or SSE).

Indian Point Questions

173) Why is Indian Point safe if there is a fault line so close to it?

Public Response: The Ramapo fault system, located near the Indian Point Nuclear Power Plant, is an example of an old fault system that, based on geologic field evidence, has not been active in the last 65.5 million years. The Ramapo fault system extends primarily from southeastern New York to northern New Jersey and is made up of a series of northeast-oriented faults. Even though there is minor earthquake activity in the vicinity of the Ramapo faults, this earthquake activity cannot be directly correlated with any individual fault within the Ramapo fault system.

US nuclear power plants are designed and built to withstand the largest expected earthquake in the site region, based on observed historical seismicity and field evidence for prehistoric earthquakes, and are also designed to incorporate seismic safety margins. A potential earthquake in and around the vicinity of the Ramapo fault system was taken into account during the NRC licensing process for the Indian Point plants, and the plant design incorporated the largest expected earthquake in the site region. In summary, the Ramapo fault system exhibits no definitive evidence for recent fault displacement (i.e., no evidence for fault activity in the last 65.5 million years) and the Indian Point nuclear power plant was designed and built to safely shutdown in the event of an earthquake having the highest magnitude observed in the site region. Therefore, the NRC concluded that the risk of significant damage to the Indian Point reactors due to a potential earthquake is acceptable.

Additional, technical, non-public information: The information above and following is consistent with the literature and the UFSAR for IP related to the Ramapo fault. The Ramapo fault system, which passes through the Indian Point area, is a group of Mesozoic age faults, extending from southeastern New York to northern New Jersey, as well as further southwest. The fault system is composed of a series of southeast-dipping, northeast-striking faults. Various faults of the system contain evidence of repeated slip in various directions since Proterozoic time, including Mesozoic extensional reactivation. However, the USGS staff, who reviewed 31 geologic features in the Appalachian Mountains and Coastal Plain and compiled a National Database on Quaternary Faulting (Crone and Wheeler, 2000), listed the Ramapo fault system as low risk because the fault system lacks evidence for Quaternary slip. They further pointed out that the Ramapo fault system, and 17 other geologic features, "have little or no published geologic evidence of Quaternary tectonic faulting that could indicate the likely occurrence of earthquakes larger than those observed historically" (Wheeler and Crone, 2004). Among these faults, the Ramapo fault system is one of the three that underwent a paleoseismological study. In two trenches excavated across the Ramapo fault, no evidence of Quaternary tectonic faulting was found (Wheeler and Crone, 2000). Because the Ramapo fault system is relatively inactive, , and because the plants are designed to safely shutdown in the event of an earthquake of the highest intensity ever recorded in that area, the NRC has concluded that the risk of significant damage to the reactors due to a probable earthquake in the area is extremely small.

The letter that was sent to the NRC from Rep Lowey refers to the Ramapo seismic zone (RSZ) and the Dobbs Ferry fault. The letter incorrectly states that the Dobbs Ferry fault is located within the Ramapo seismic zone. Based on the literature, it is not. It is close, but it is considered to be in the Manhattan Prong more to the east (more like 10-15 miles away) while the Ramapo fault system is considered to be in the Reading Prong (a couple of miles away from IP). Also for clarification, the seismicity is considered to be within the Precambrian/Paleozoic basement at depths greater than the Mesozoic Newark Basin where the RSZ is situated.

Questions posed by utilities

The following questions were received from NextEra Energy. Responses are the most recent as of 6pm on 3-25-11.

- 174) We are trying to understand why our plants in low-seismic areas (see below) would appear on the list of 27 plants that the NRC intends to review for seismic issues. While the story below notes that these plants have been identified based on "largest increase in seismic risk from a 1980s-era USGS study," the USGS maps show a low probability for seismic activity. I'm not aware of any major changes that would have increased seismic risk... can you help explain?**

Answer: First, it should be clarified that the list of 27 plants is only provided to show that there is sufficient reason to move the project to the next phase of the generic issue program. These are not the only plants that will be reassessed. Due to the significant uncertainty in the data available, all plants in the central and eastern US were expected to receive the generic letter and will be reassessed. Further, in light of the events in Japan, it has been decided that all 104 operating reactors will be reassessed.

The GI-199 study considers both overall risk and also changes in risk. Both the approach to assessing seismic hazard and the data available to seismologists have improved significantly since the 1980. As a result, estimates of seismic hazard, although still low, have increased since that time. This is the result of a steady improvement in the understanding of seismic hazard over time. It is important to note that it is not the seismic activity, or the seismic hazard itself, that has increased; but rather it is the understanding of it that has changed. (Information on how the USGS seismic hazard maps are developed is available at the USGS website). The larger change in the risk (in terms of core damage frequency) associated with some sites in the study directly reflects the change in assessed hazard.

- 175) My basic understanding - especially in the case of St. Lucie and Duane Arnold - is that highly conservative values were input into your screening process for plants with low-seismic probability, therefore moving plants like those previously mentioned up in the listing. Can you help me to understand this?**

Answer: The screening process that was undertaken used data currently available to the NRC, principally from the IPEEE study conducted in the mid-90s. Licensees of nuclear plants in moderate to high seismicity areas tended to provide more detailed information regarding the seismic resistance of the structures, systems, and components than plants in low seismicity areas. Therefore when considering loads beyond the seismic design, NRC staff tended to have more detailed information to rely on for plants in moderate to high seismicity zones; and had to make conservative assumptions for plants in low seismicity regions.

Pending and Unanswered Questions from Members of Congress and Industry

The below questions are gleaned from the congressional letters coming into the NRC. Because they generally cover different topics, they are being kept together as sets to assist the office assigned with response. Once a formal response is developed and sent, the questions will be moved to the appropriate sections.

176) Received 3/16/11 from Congresswoman Lowey

The key elements of the congresswoman's letter are as follows:

The Ramapo Seismic Zone is a particular threat because the zone passes within two miles of Indian Point. The Ramapo Seismic zone includes the Dobbs Ferry fault in Westchester, which generated a 4.1 magnitude earthquake in 1955. The Columbia University study suggests that this pattern of subtle but active faults increases the risk to the New York City area and that an earthquake with a magnitude of 7.0 on the Richter scale is within reach. Disturbingly, Entergy measures the risk of an earthquake near Indian Point to be between 1.0 and 3.0 on the Richter scale, despite evidence to the contrary.

The NRC should study Indian Point's risk of, and ability to sustain a disaster, including the impact of earthquakes and hurricanes, as well as collateral impacts such as loss of power, inability to cool reactors and emergency evacuation routes. The NRC should evaluate how a similar incident in the New York metropolitan area could be further complicated due to a dramatically higher population and the effectiveness of the proposed evacuation routes.

Public Response: Please see response in the Indian Point section.

Additional, technical, non-public information: None.

177) From 3/16/11 Press Release from Senators Boxer and Feinstein

Plant Design and Operations

1. What changes to the design or operation of the Diablo Canyon and SONGS facilities have improved safety at the plants since they began operating in the mid-1980s?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

2. What emergency notification systems have been installed at California nuclear power plants? Has there ever been a lapse of these systems during previous earthquakes or emergencies?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

3. What safety measures are in place to ensure continued power to California reactors in the event of an extended power failure?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

Type of Reactor

4. What are the differences and similarities between the reactors being used in California (pressurized water reactors) and those in Japan (boiling water reactors), as well as the

facilities used to house the reactors, including the standards to which they were built and their ability to withstand natural and manmade disasters?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

Earthquakes and Tsunamis

5. We have been told that both Diablo Canyon and San Onofre Nuclear Generating Station are designed to withstand the maximum credible threat at both plants, which we understand to be much less than the 9.0 earthquake that hit Japan. What assumptions have you made about the ability of both plants to withstand an earthquake or tsunami? Given the disaster in Japan, what are our options to provide these plants with a greater margin for safety?

Public Response: Annie and Kamal developing response

Additional, technical, non-public information: ADD

6. Have new faults been discovered near Diablo Canyon or San Onofre Nuclear Generating Station since those plants began operations? If so, how have the plants been modified to account for the increased risk of an earthquake? How will the NRC consider information on ways to address risks posed by faults near these plants that is produced pursuant to state law or recommendations by state agencies during the NRC relicensing process?

Public Response: Annie and Kamal developing response

Additional, technical, non-public information: ADD

7. What are the evacuation plans for both plants in the event of an emergency? We understand that Highway 1 is the main route out of San Luis Obispo, what is the plan for evacuation of the nearby population if an earthquake takes out portions of the highway and a nuclear emergency occurs simultaneously?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

8. What is the NRC's role in monitoring radiation in the event of a nuclear accident both here and abroad? What is the role of EPA and other federal agencies?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

9. What monitoring systems currently are in place to track potential impacts on the US, including California, associated with the events in Japan?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

10. 6. Which federal agency is leading the monitoring effort and which agencies have responsibility for assessing human health impacts? What impacts have occurred to date on the health or environment of the US or are currently projected or modeled in connection with the events in Japan?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

11. What contingency plans are in place to ensure that the American public is notified in the event that hazardous materials associated with the events in Japan pose an imminent threat to the US?

Public Response: NRR/DORL developing response

Additional, technical, non-public information: ADD

178) From 3/15/11 Press Release from Congresspeople Markey and Capps

Note that these are only the seismic questions. There are other questions that are structural

1. Provide the Richter or moment magnitude scale rating for each operating nuclear reactor in the United States. If no such information exists, on what basis can such an assertion be made regarding the design of any single nuclear power plant?

Public Response: US nuclear power plants are designed for different ground motions determined on a site-specific basis, which are called the Safe Shutdown Earthquake ground motions (SSE). Each nuclear power plant is designed to a ground motion level that is appropriate for the geology and tectonics in the region surrounding the plant location. Ground motion, or shaking, is a function of both earthquake magnitude and distance from the fault to the site. The magnitude alone cannot be used to predict ground motions. Currently operating nuclear power plants developed their SSEs based on a "deterministic" or "scenario earthquake" basis that account for the largest earthquake expected in the area around the plant. ^①

Please see the available table of Design Basis Ground Motions for US Plants in the Additional Information: Useful Tables.

Additional, technical, non-public information: ADD

2. The San Onofre reactor is reportedly designed to withstand a 7.0 earthquake, and the Diablo Canyon reactor is designed to withstand a 7.5 magnitude. According to the Southern California Earthquake Center (SCEC), there is an 82% probability of an earthquake 7.0 magnitude in the next 30 years, and a 37 percent probability that an earthquake of 7.5 magnitude will occur. Shouldn't these reactors be retrofitted to ensure that they can withstand a stronger earthquake than a 7.5? If not, why not?

Public Response: This needs to be edited and enhanced. The question arises from an un-cited reference to the Uniform California Earthquake Rupture Forecast (UCERF). The UCERF was developed by a multidisciplinary group of scientists and engineers called the Working Group on California Earthquake Probabilities (WGCEP). The goal of the UCERF model is to determine earthquake rupture probabilities of various magnitudes for different regions of California. The probability values cited in the Congressional Inquiry are from the UCERF for the entire Southern California region, not specifically for the region near either SONGS or DCNPP. The faults located near DCNPP and SONGS contribute nothing to the cited probability values, in the sense that their contributions are mathematically insignificant. The cited probabilities are totally dominated by the San Andreas, San Jacinto, Imperial and other highly active faults along the plate boundary in Southern California. These faults are all located at great distances from DCNPP and SONGS. As noted in the answer to Question #1, NPPs are not designed for earthquake magnitudes but for anticipated ground shaking. The ground shaking hazard posed by earthquakes located at distances equal to the faults important to the UCERF model is very low, much less than the hazard estimated for the nearby faults used to develop the design ground motions for the subject plants. In summary, the specific probability values cited in the letter do not apply to either DCNPP and SONGS; the actual probabilities at the NPP sites are far less.

Additional, technical, non-public information: The colors in UCERF Figure 2 represent the probabilities of having a nearby earthquake rupture (within 3 or 4 miles) of magnitude 6.7 or larger in the next 30 years. Therefore, reading the colors off of Figure 2, the San Onofre and Diablo Canyon NPPs have a $\leq 10\%$ probability of having a $\geq M6.7$ earthquake rupture within 3 to 4 miles in the next 30 years. Therefore, retrofitting these reactors to withstand earthquakes of M7.5 or stronger based on the UCERF study would put an unnecessary burden on the licensees.

3. Provide specific information regarding the differences in safety-significant structures between a nuclear power plant that is located in a seismically active area and one that is not. Provide, for each

operating nuclear reactor in a seismically active area, a full list and description of the safety-significant design features that are included that are not included in similar models that are not located in seismically active areas.

Public Response: This is a rough draft. We need to get some reviews of this. Assumed NRR will have ultimate responsibility for the response.

There are no differences in safety requirements for nuclear power plants located in seismically active areas and ones that are not. Regardless of site seismicity, Appendix S to 10 CFR Part 50 requires for site-specific SSE ground motions, structures, systems, and components will remain functional and within applicable stress, strain, and deformation limits. The required safety functions of SSCs must be assured during and after the vibratory ground motion through design, testing, or qualification methods. The evaluation must take into account soil-structure interaction effects and the expected duration of the vibratory motions. Appendix S also requires that the horizontal component of the SSE ground motion in the free field at the foundation elevation of structures must be an appropriate response spectrum with peak ground acceleration (PGA) of at least 0.10g. Design basis loads for nuclear power plant structures, important to safety, include combined loads for seismic, wind, tornado, normal operating conditions (pressure and thermal), and accident conditions. Codes and standards, such as the American Institute of Concrete (ACI-349) and the American Institute of Steel Construction (AISC N690), are used in the design of nuclear power plant structures to ensure a conservative, safe design under design basis loads. In addition to the nominal seismic design, all new generation reactors have to demonstrate a seismic margin of 1.67 relative to the site-specific seismic demands.

For the current operating fleet of nuclear power reactors, site-to-site differences in structural design can result from differences in external site hazards such as seismic, wind, tornado, and tsunamis. For a low-seismicity region, wind or tornado loads may control the design. Conversely, for a high-seismicity region, seismic loads will likely control. Structures in high-seismicity regions have robust designs with typically higher capacity shear walls, as an example. Systems and components will also be more robust and are designed and tested to higher levels of acceleration.

Additional, technical, non-public information: ADD

4. In your opinion, can any operating nuclear reactors in the United States withstand an earthquake of the magnitude experience in Japan?

Public Response: The March 11, 2011, magnitude 9 earthquake that recently affected Japan is different than earthquakes that could affect US nuclear plants. Each US nuclear plant is designed to a ground-shaking level that is appropriate for its location, given the possible earthquake sources that may affect the site and its tectonic environment. The Japan earthquake was caused by a "subduction zone" event, which is the type of mechanism that produces the largest possible magnitude earthquakes. In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of northern California, Oregon and Washington, so an earthquake this large could only happen in that region. The only plant in that area is Columbia Generating Station, which is approximately 225 miles (363 km) from the coast and the subduction zone. Outside of the Cascadia subduction zone, earthquakes are not expected to exceed a magnitude of approximate 8, which has 31 times less energy than a magnitude 9.

Additional, technical, non-public information: ADD

179) Questions suggested by ANS for inclusion in a public FAQ document:

1. How badly were the SFP structures damaged by the earthquake?
2. Was the SFP water drained due to the earthquake? If yes, over what period of time?
3. Are the SFPs structurally sound enough to be refilled with water, a slurry, or sand?

4. What are the SFP loadings (# F/As, weight, heat load, radioactivity)?
5. How much has the cladding in the SFPs been oxidized (perhaps as inferred from the hydrogen released)?
6. What is the degree of fuel melting in the SFPs?
7. Is the fuel in the SFPs in a coolable geometry?
8. What effect has the spraying with water cannons and concrete pumping truck had (fuel cooling, fuel degradation, water accumulation)?
9. What are the options to refill the SFPs with water, i.e., plant systems, external systems, water supplies, heat sink?
10. Will refilling the SFPs with water cause the fuel within to "slump" as occurred at TMI?
11. Will refilling the SFPs with water produce massive amounts of hydrogen? If yes, is it likely to explode before it is vented from the building?
12. Will refilling the SFPs with water produce a potential nuclear criticality?
13. What special precautions and being taken, e.g., shielding being installed around cooling system components to accommodate high levels of contamination in and radiation from the water to be circulated from the SFPs (and reactor assemblies), to ensure worker protection prior to activating installed cooling systems?
14. Is filling the SFPs with a slurry or sand being aggressively evaluated?

Additional Information: Useful Tables

Table of Design Basis Ground Motions for US Plants

| Design Basis Earthquake Information | | | | | |
|-------------------------------------|--|-------------------------------------|--|---------------------------------|----------------|
| Nuclear Plant By State/Location | Maximum Observed Or Inferred Intensity (MMI Scale) | Relative Distance Of Seismic Source | Design SSE Peak Acceleration, <i>g</i> | OBE Peak Acceleration, <i>g</i> | Soil Condition |
| New York | | | | | |
| Fitzpatrick | VI | Near | 0.15 | 0.08 | Soil |
| Ginna 1 | VIII/IX | >60 miles | 0.2 | 0.08 | Rock |
| Indian Point 2, 3 | VII | Near | 0.15 | 0.1 | Rock |
| Nine Mile Point 1 | IX-X | >60 miles | 0.11 | 0.06 | Rock |
| Nine Mile Point 2 | VI | Near | 0.15 | 0.075 | Rock |
| New Jersey | | | | | |
| Salem 1,2 | VII-VIII | Near | 0.2 | 0.1 | Deep Soil |
| Connecticut | | | | | |
| Millstone 1, 2, 3 | VII | Near | 0.17 | 0.07 | Rock |
| Vermont | | | | | |
| Vermont Yankee | VI | Near | 0.14 | 0.07 | Rock |
| Ohio | | | | | |

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| | | | | | |
|--------------------|----------|------|------|------|-----------|
| Davis Besse 1 | VII | Near | 0.15 | 0.08 | Rock |
| Perry 1 | VII | Near | 0.15 | 0.08 | Rock |
| Georgia | | | | | |
| Hatch 1, 2 | VII | Near | 0.15 | 0.08 | Deep Soil |
| Vogtle 1, 2 | VII-VIII | Near | 0.2 | 0.12 | Deep Soil |
| Tennessee | | | | | |
| Sequoyah 1, 2 | VIII | Near | 0.18 | 0.09 | Rock |
| Watts Bar 1 | VIII | Near | 0.18 | 0.09 | Rock |
| California | | | | | |
| San Onofre 2, 3 | IX-X | Near | 0.67 | 0.34 | Soil |
| Diablo Canyon 1, 2 | X-XI | Near | 0.75 | 0.20 | Rock |
| Florida | | | | | |
| Crystal River 3 | V | Near | 0.10 | 0.05 | Rock |
| St. Lucie 1, 2 | VI | Near | 0.10 | 0.05 | Soil |
| Turkey Point 3, 4 | VII | Near | 0.15 | 0.05 | Rock |

NOTES:

MMI=Modified Mercalli Intensity, a measure of observed/reported damage and severity of shaking.

Relative distance measure used in FSAR to develop SSE acceleration, "Near" indicates distance less than 10 miles.

SSE=Safe Shutdown Earthquake ground motion, for horizontal acceleration, in units of earth's gravity, *g*.

OBE=Operating Basis Earthquake ground motion, level of horizontal acceleration, which if exceeded requires plant shutdown.

Table of SSE, OBE and Tsunami Water Levels

| Nuclear Plant Name By State/ Location | Safe Shutdown Earthquake (SSE) Peak Acceleration (g) | Operating Basis Earthquake (OBE) Peak Acceleration (g) | Probable Maximum Tsunami OR Maximum Tsunami Water Level |
|---|--|--|---|
| Alabama | | | |
| Browns Ferry | 0.200 | 0.100 | N/A (Non-Coastal) |
| Farley | 0.100 | 0.050 | N/A (Non-Coastal) |
| Arkansas | | | |
| Arkansas Nuclear | 0.200 | | N/A (Non-Coastal) |
| Arizona | | | |
| Palo Verde | 0.200 | 0.100 | N/A (Non-Coastal) |
| California | | | |
| Diablo Canyon | 0.400 | 0.200 | The design basis maximum combined wave runup is the greater of that determined for near-shore or distantly-generated tsunamis, and results from near-shore tsunamis. For distantly-generated tsunamis, the combined runup is 30 feet. For near-shore tsunamis, the combined wave runup is 34.6 feet, as determined by hydraulic model testing. The safety-related equipment is installed in watertight compartments to protect it from adverse sea wave events to elevation +48 feet above mean lower low water line (MLLWL). |
| San Onofre | 0.670 | 0.340 | The controlling tsunami occurs during simultaneous high tide and storm surge produces a maximum runup to elevation +15.6 feet mean lower low water line (MLLWL) at the Unit 2 and 3 seawall. When storm waves are superimposed, the predicted maximum runup is to elevation +27 MLLWL. Tsunami protection for the SONGS site is provided by a reinforced concrete seawall constructed to elevation +30.0 MLLWL. |
| Connecticut | | | |
| Millstone | 0.170 | 0.090 | 18 ft SWL |
| Florida | | | |
| Crystal River | 0.050 | 0.025 | N/A (Non-Coastal) |
| St. Lucie | 0.100 | 0.050 | No maximum tsunami level, bounded by PMH surge of +18 MLW wave runup, with plant openings at +19.5 MLW |

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| Nuclear Plant Name By State/ Location | Safe Shutdown Earthquake (SSE) Peak Acceleration (g) | Operating Basis Earthquake (OBE) Peak Acceleration (g) | Probable Maximum Tsunami OR Maximum Tsunami Water Level |
|---|---|---|--|
| Turkey Point | 0.150 | 0.050 | No maximum tsunami level, bounded by PMH surge of +18.3 MLW water level, site protected to +20 MLW with vital equipment protected to +22 MLW |
| Georgia | | | |
| Hatch | 0.150 | 0.080 | N/A (Non-Coastal) |
| Vogtle | 0.200 | 0.120 | N/A (Non-Coastal) |
| Illinois | | | |
| Braidwood | 0.200 | 0.090 | N/A (Non-Coastal) |
| Byron | 0.200 | 0.090 | N/A (Non-Coastal) |
| Clinton | 0.250 | 0.100 | N/A (Non-Coastal) |
| Dresden | 0.200 | 0.100 | N/A (Non-Coastal) |
| LaSalle | 0.200 | 0.100 | N/A (Non-Coastal) |
| Quad Cities | 0.240 | 0.120 | N/A (Non-Coastal) |
| Iowa | | | |
| Duane Arnold | 0.120 | 0.060 | N/A (Non-Coastal) |
| Kansas | | | |
| Wolf Creek | 0.120 | 0.060 | N/A (Non-Coastal) |
| Louisiana | | | |
| River Bend | 0.100 | 0.050 | |
| Waterford | 0.100 | | Floods – 30 feet MSL |
| Maryland | | | |
| Calvert Cliffs | 0.150 | 0.080 | 14 ft design wave |
| Massachusetts | | | |
| Pilgrim | 0.150 | 0.080 | *Storm flooding design basis - 18.3ft |
| Michigan | | | |
| D.C. Cook | 0.200 | 0.100 | N/A |
| Fermi | 0.150 | 0.080 | N/A |
| Palisades | 0.200 | 0.100 | N/A |
| Missouri | | | |
| Callaway | 0.200 | | N/A (Non-Coastal) |

| Nuclear Plant Name By State/ Location | Safe Shutdown Earthquake (SSE) Peak Acceleration (g) | Operating Basis Earthquake (OBE) Peak Acceleration (g) | Probable Maximum Tsunami OR Maximum Tsunami Water Level |
|---|---|---|--|
| Mississippi | | | |
| Grand Gulf | 0.150 | 0.075 | N/A |
| Minnesota | | | |
| Monticello | 0.120 | 0.060 | N/A (Non-Coastal) |
| Prarie Island | 0.120 | 0.060 | N/A (Non-Coastal) |
| Nebraska | | | |
| Cooper | 0.200 | 0.100 | N/A (Non-Coastal) |
| Fort Calhoun | 0.170 | 0.080 | N/A (Non-Coastal) |
| New York | | | |
| Fitzpatrick | 0.150 | 0.080 | N/A (Non-Coastal) |
| Ginna | 0.200 | 0.080 | N/A |
| Indian Point | 0.150 | 0.100 | 15 ft msl |
| Nine Mile Point, Unit 1 | 0.110 | 0.060 | N/A |
| Nine Mile Point, Unit 2 | 0.150 | 0.075 | N/A |
| New Hampshire | | | |
| Seabrook | 0.250 | 0.125 | (+) 15.6' MSL Still Water Level (Tsunami Flooding -Such activity is extremely rare on the US Atlantic coast and would result in only minor wave action inside the harbor.) |
| New Jersey | | | |
| Hope Creek | 0.200 | 0.100 | 35.4 MSL The maximum probable tsunami produces relatively minor water level changes at the site. The maximum runup height reaches an elevation of 18.1 feet MSL with coincident 10 percent exceedance high tide) |
| Oyster Creek | 0.184 | 0.092 | (+) 23.5' MSL Still Water Level (Probable Maximum Tsunami - Tsunami events are not typical of the eastern coast of the United States and have not, therefore, been addressed.) |
| Salem | 0.200 | 0.100 | 21.9 MSL (There is no evidence of surface rupture in East Coast earthquakes and no history of significant tsunami activity in the region) |
| North Carolina | | | |
| Brunswick | 0.160 | 0.030 | N/A |

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| Nuclear Plant Name By State/ Location | Safe Shutdown Earthquake (SSE) Peak Acceleration (g) | Operating Basis Earthquake (OBE) Peak Acceleration (g) | Probable Maximum Tsunami OR Maximum Tsunami Water Level |
|--|---|---|--|
| McGuire | 0.150 | 0.080 | N/A (Non-Coastal) |
| Shearon Harris | 0.150 | | N/A (Non-Coastal) |
| Ohio | | | |
| Davis-Besse | 0.150 | 0.080 | N/A |
| Perry | 0.150 | 0.080 | N/A |
| Pennsylvania | | | |
| Beaver Valley | 0.130 | 0.060 | N/A (Non-Coastal) |
| Limerick | 0.150 | 0.075 | N/A (Non-Coastal) |
| Peach Bottom | 0.120 | 0.050 | N/A (Non-Coastal) |
| Three Mile Island | 0.120 | 0.060 | N/A (Non-Coastal) |
| Susquehanna | 0.150 | 0.080 | N/A (Non-Coastal) |
| South Carolina | | | |
| Catawba | 0.150 | 0.080 | N/A (Non-Coastal) |
| Oconee | 0.150 | 0.050 | N/A (Non-Coastal) |
| Robinson | 0.200 | 0.100 | N/A (Non-Coastal) |
| V.C. Summer | 0.250 | 0.150 | N/A (Non-Coastal) |
| Tennessee | | | |
| Sequoyah | 0.180 | 0.090 | N/A (Non-Coastal) |
| Watts Bar, Unit 1 | 0.180 | 0.090 | N/A (Non-Coastal) |
| Texas | | | |
| Comanche Peak | 0.120 | 0.060 | N/A |
| South Texas Project | 0.100 | 0.050 | N/A |
| Vermont | | | |
| Vermont Yankee | 0.140 | 0.070 | N/A |
| Virginia | | | |
| North Anna | 0.180 | | N/A |
| Surry | 0.150 | 0.080 | N/A |
| Washington | | | |
| Columbia | 0.250 | | N/A (Non-Coastal) |

| Nuclear Plant Name By State/ Location | Safe Shutdown Earthquake (SSE) Peak Acceleration (g) | Operating Basis Earthquake (OBE) Peak Acceleration (g) | Probable Maximum Tsunami OR Maximum Tsunami Water Level |
|--|--|---|--|
| Wisconsin | | | |
| Kewaunee | 0.120 | 0.060 | N/A |
| Point Beach | 0.120 | | N/A |
| Definition of Safe Shutdown Earthquake | The safe-shutdown earthquake (SSE) for the site is the ground motion response spectra (GMRS), which also satisfies the minimum requirement of paragraph IV(a)(1)(i) of Appendix S, "Earthquake Engineering Criteria for Nuclear Power Plants," to Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," of the Code of Federal Regulations (10 CFR Part 50). | | |
| Definition of Operating Basis Earthquake: | To satisfy the requirements of paragraph IV(a)(2)(A) of Appendix S to 10 CFR Part 50, the operating-basis earthquake (OBE) ground motion is defined as follows: <ul style="list-style-type: none">(i) For the certified design portion of the plant, the OBE ground motion is one-third of the CSDRS.(ii) For the safety-related noncertified design portion of the plant, the OBE ground motion is one-third of the design motion response spectra, as stipulated in the design certification conditions specified in design control document (DCD).(iii) The spectrum ordinate criterion to be used in conjunction with Regulatory Guide 1.166, "Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Post-earthquake Actions," issued March 1997, is the lowest of (i) and (ii). | | |

Table of Plants Near Known Active Faults or in High or Moderate Seismicity Zones

It should be noted that in much of the Central and Eastern US, the seismicity comes from "background" seismicity. Background seismicity is earthquake activity, where the earthquakes cannot be tied to known faults.

| Plant (state) | Nearest Active Fault or Seismic Zone | Distance to Fault or Range of Distances to Zones | Type of Faulting Mechanism | Range of Maximum Magnitude (M _w) | OBE (E) | SSE (E) |
|--------------------|--------------------------------------|--|----------------------------|---|---------|---------|
| Diablo Canyon (CA) | Hosgri Fault | 5 miles | Predominantly Strike Slip | 7.5 | | |
| | Shoreline Fault | 0.5 miles | Strike Slip | 6.25 to 6.75 best estimate by NRC staff in RIL 09-001. Final report on the fault in review by NRC staff | | |
| San Onofre (CA) | | | | | | |
| Comanche Peak | | | | | | |

| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE), and Seismic Core Damage Frequencies | | | | | | | |
|---|----------|-----------|---|-------------------|--|-------------------------------------|--------|
| Plant | Docket | SSE (g's) | Frequency of Exceeding the SSE (per year) | RLE (HCLPF) (g's) | Seismic Core Damage Frequency (per year) | IPEEE Method | Source |
| Arkansas 1 | 05000313 | 0.2 | 2.8E-04 | 0.3 | 4.1E-06 | 0.3g full-scope EPRI SMA | GI-199 |
| Arkansas 2 | 05000368 | 0.2 | 9.7E-05 | 0.3 | 4.1E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Beaver Valley 1 | 05000334 | 0.12 | 3.3E-04 | n/a | 4.8E-05 | seismic PRA | GI-199 |
| Beaver Valley 2 | 05000412 | 0.12 | 2.7E-04 | n/a | 2.2E-05 | seismic PRA | GI-199 |
| Braidwood 1 | 05000456 | 0.2 | 6.7E-05 | 0.3 | 7.3E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Braidwood 2 | 05000457 | 0.2 | 6.7E-05 | 0.3 | 7.3E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Browns Ferry 1 | 05000259 | 0.2 | 2.5E-04 | 0.3 | 3.7E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Browns Ferry 2 | 05000260 | 0.2 | 2.5E-04 | 0.26 | 5.4E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Browns Ferry 3 | 05000296 | 0.2 | 2.5E-04 | 0.26 | 5.4E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Brunswick 1 | 05000325 | 0.16 | 7.3E-04 | 0.3 | 1.5E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Brunswick 2 | 05000324 | 0.16 | 7.3E-04 | 0.3 | 1.5E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Byron 1 | 05000454 | 0.2 | 5.2E-05 | 0.3 | 5.8E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Byron 2 | 05000455 | 0.2 | 5.2E-05 | 0.3 | 5.8E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Callaway | 05000483 | 0.2 | 3.8E-05 | 0.3 | 2.0E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Calvert Cliffs 1 | 05000317 | 0.15 | 1.9E-04 | n/a | 1.0E-05 | seismic PRA | GI-199 |
| Calvert Cliffs 2 | 05000318 | 0.15 | 1.9E-04 | n/a | 1.2E-05 | seismic PRA | GI-199 |
| Catawba 1 | 05000413 | 0.15 | 1.4E-04 | n/a | 3.7E-05 | seismic PRA | GI-199 |
| Catawba 2 | 05000414 | 0.15 | 1.4E-04 | n/a | 3.7E-05 | seismic PRA | GI-199 |
| Clinton | 05000461 | 0.25 | 5.8E-05 | 0.3 | 2.5E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Columbia | 05000397 | 0.25 | 1.7E-04 | n/a | 2.1E-05 | seismic PRA | IPEEE |
| Comanche Peak 1 | 05000445 | 0.12 | 1.6E-05 | 0.12 | 4.0E-06 | reduced-scope EPRI SMA; SSE = 0.12g | GI-199 |
| Comanche Peak 2 | 05000446 | 0.12 | 1.6E-05 | 0.12 | 4.0E-06 | reduced-scope EPRI SMA; SSE = 0.12g | GI-199 |
| Cooper | 05000298 | 0.2 | 1.5E-04 | 0.3 | 7.0E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Crystal River 3 | 05000302 | 0.1 | 8.9E-05 | 0.1 | 2.2E-05 | reduced-scope EPRI SMA; SSE = 0.1g | GI-199 |
| D.C. Cook 1 | 05000315 | 0.2 | 2.1E-04 | n/a | 2.2E-05 | seismic PRA | GI-199 |
| D.C. Cook 2 | 05000316 | 0.2 | 2.1E-04 | n/a | 2.2E-05 | seismic PRA | GI-199 |

| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE) and Seismic Core Damage Frequencies | | | | | | | |
|--|----------|-----------|---|-------------------|--|-------------------------------------|--------|
| Plant | Docket | SSE (g's) | Frequency of Exceeding the SSE (per year) | RLE (HCLPF) (g's) | Seismic Core Damage Frequency (per year) | IPEEE Method | Source |
| Davis Besse | 05000346 | 0.15 | 6.3E-05 | 0.26 | 6.7E-06 | reduced-scope EPRI SMA | GI-199 |
| Diablo Canyon 1 | 05000275 | 0.75 | 2.0E-04 | n/a | 4.1E-05 | seismic PRA | IPEEE |
| Diablo Canyon 2 | 05000323 | 0.75 | 2.0E-04 | n/a | 4.1E-05 | seismic PRA | IPEEE |
| Dresden 2 | 05000237 | 0.2 | 9.7E-05 | 0.26 | 1.9E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Dresden 3 | 05000249 | 0.2 | 9.7E-05 | 0.26 | 1.9E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Duane Arnold | 05000331 | 0.12 | 2.3E-04 | 0.12 | 3.2E-05 | reduced-scope EPRI SMA; SSE = 0.12g | GI-199 |
| Farley 1 | 05000348 | 0.1 | 1.0E-04 | 0.1 | 2.8E-05 | reduced-scope EPRI SMA; SSE = 0.1g | GI-199 |
| Farley 2 | 05000364 | 0.1 | 1.0E-04 | 0.1 | 2.8E-05 | reduced-scope EPRI SMA; SSE = 0.1g | GI-199 |
| Fermi 2 | 05000341 | 0.15 | 1.0E-04 | 0.3 | 4.2E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Fitzpatrick | 05000333 | 0.15 | 3.2E-04 | 0.22 | 6.1E-06 | 0.3g focused-scope NRC SMA | GI-199 |
| Fort Calhoun 1 | 05000285 | 0.17 | 3.7E-04 | 0.25 | 5.4E-06 | 0.3g focused-scope NRC SMA | GI-199 |
| Ginna | 05000244 | 0.2 | 1.0E-04 | 0.2 | 1.3E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Grand Gulf | 05000416 | 0.15 | 1.0E-04 | 0.15 | 1.2E-05 | reduced-scope EPRI SMA; SSE = 0.15g | GI-199 |
| Hatch 1 | 05000400 | 0.148 | 3.9E-04 | 0.29 | 2.3E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Hatch 2 | 05000321 | 0.15 | 2.7E-04 | 0.3 | 2.5E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Hope Creek | 05000366 | 0.2 | 9.7E-05 | 0.3 | 2.5E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Indian Point 2 | 05000354 | 0.15 | 4.9E-04 | n/a | 2.8E-06 | seismic PRA | GI-199 |
| Indian Point 3 | 05000247 | 0.15 | 4.9E-04 | n/a | 3.3E-05 | seismic PRA | GI-199 |
| Kewaunee | 05000286 | 0.12 | 2.8E-04 | n/a | 1.0E-04 | seismic PRA | GI-199 |
| LaSalle 1 | 05000305 | 0.2 | 1.7E-04 | n/a | 5.1E-06 | seismic PRA | GI-199 |
| LaSalle 2 | 05000373 | 0.2 | 1.7E-04 | n/a | 2.8E-06 | seismic PRA | GI-199 |
| Limerick 1 | 05000374 | 0.15 | 1.8E-04 | n/a | 2.8E-06 | seismic PRA | GI-199 |
| Limerick 2 | 05000352 | 0.15 | 1.8E-04 | 0.15 | 5.3E-05 | reduced-scope EPRI SMA | GI-199 |
| McGuire 1 | 05000353 | 0.15 | 9.5E-05 | 0.15 | 5.3E-05 | reduced-scope EPRI SMA | GI-199 |
| McGuire 2 | 05000369 | 0.15 | 9.5E-05 | n/a | 3.1E-05 | seismic PRA | GI-199 |

| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE) and Seismic Core Damage Frequencies | | | | | | | |
|--|----------|-----------|---|-------------------|--|--|--------|
| Plant | Docket | SSE (g's) | Frequency of Exceeding the SSE (per year) | RLE (HCLPF) (g's) | Seismic Core Damage Frequency (per year) | IPEEE Method | Source |
| Millstone 1 | 05000370 | 0.254 | 9.3E-05 | n/a | 3.1E-05 | seismic PRA | GI-199 |
| Millstone 2 | 05000336 | 0.17 | 8.3E-05 | 0.25 | 1.1E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Millstone 3 | 05000423 | 0.17 | 8.3E-05 | n/a | 1.5E-05 | seismic PRA | GI-199 |
| Monticello | 05000263 | 0.12 | 9.3E-05 | 0.12 | 1.9E-05 | modified focused/expended reduced-scope EPRI SMA | GI-199 |
| Nine Mile Point 1 | 05000220 | 0.11 | 1.5E-04 | 0.27 | 4.2E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Nine Mile Point 2 | 05000410 | 0.15 | 4.8E-05 | 0.23 | 5.6E-06 | SPRA and focused-scope EPRI SMA | GI-199 |
| North Anna 1 | 05000338 | 0.12 | 2.1E-04 | 0.16 | 4.4E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| North Anna 2 | 05000339 | 0.12 | 2.1E-04 | 0.16 | 4.4E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Oconee 1 | 05000269 | 0.1 | 9.7E-04 | n/a | 4.3E-05 | seismic PRA | GI-199 |
| Oconee 2 | 05000270 | 0.1 | 9.7E-04 | n/a | 4.3E-05 | seismic PRA | GI-199 |
| Oconee 3 | 05000287 | 0.1 | 9.7E-04 | n/a | 4.3E-05 | seismic PRA | GI-199 |
| Oyster Creek | 05000219 | 0.17 | 1.5E-04 | n/a | 1.4E-05 | seismic PRA | GI-199 |
| Palisades | 05000255 | 0.2 | 1.4E-04 | n/a | 6.4E-06 | seismic PRA | GI-199 |
| Palo Verde 1 | 05000528 | 0.258 | 3.5E-05 | 0.3 | 3.8E-05 | 0.3g full-scope EPRI SMA | IPEEE |
| Palo Verde 2 | 05000529 | 0.258 | 3.5E-05 | 0.3 | 3.8E-05 | 0.3g full-scope EPRI SMA | IPEEE |
| Palo Verde 3 | 05000530 | 0.258 | 3.5E-05 | 0.3 | 3.8E-05 | 0.3g full-scope EPRI SMA | IPEEE |
| Peach Bottom 2 | 05000277 | 0.12 | 2.0E-04 | 0.2 | 2.4E-05 | modified focused-scope EPRI SMA | GI-199 |
| Peach Bottom 3 | 05000278 | 0.12 | 2.0E-04 | 0.2 | 2.4E-05 | modified focused-scope EPRI SMA | GI-199 |
| Perry | 05000440 | 0.15 | 2.2E-04 | 0.3 | 2.1E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Pilgrim 1 | 05000293 | 0.15 | 8.1E-04 | n/a | 6.9E-05 | seismic PRA | GI-199 |
| Point Beach 1 | 05000266 | 0.12 | 2.0E-04 | n/a | 1.1E-05 | seismic PRA | GI-199 |
| Point Beach 2 | 05000301 | 0.12 | 2.0E-04 | n/a | 1.1E-05 | seismic PRA | GI-199 |
| Prairie Island 1 | 05000282 | 0.12 | 2.0E-04 | 0.28 | 3.0E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Prairie Island 2 | 05000306 | 0.12 | 2.0E-04 | 0.28 | 3.0E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Quad Cities 1 | 05000254 | 0.24 | 8.2E-04 | 0.09 | 2.7E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Quad Cities 2 | 05000265 | 0.24 | 8.2E-04 | 0.09 | 2.7E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| River Bend | 05000458 | 0.1 | 2.4E-04 | 0.1 | 2.5E-05 | reduced-scope EPRI SMA; SSE = | GI-199 |

| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE), and Seismic Core Damage Frequencies | | | | | | | |
|---|----------|---------|---|-------------------|--|------------------------------------|--------|
| Plant | Docket | SSE (g) | Frequency of Exceeding the SSE (per year) | RLE (HCLPF) (g/s) | Seismic Core Damage Frequency (per year) | IPEEE Method | Source |
| | | | | | | 0.1g | |
| Robinson (HR) | 05000261 | 0.2 | 1.1E-03 | 0.28 | 1.5E-05 | 0.3g full-scope EPRI SMA | GI-199 |
| Saint Lucie | 05000335 | 0.1 | 1.4E-04 | 0.1 | 4.6E-05 | reduced-scope EPRI SMA; SSE = 0.1g | GI-199 |
| Salem 1 | 05000389 | 0.2 | 2.6E-04 | 0.1 | 4.6E-05 | reduced-scope EPRI SMA; SSE = 0.1g | GI-199 |
| Salem 2 | 05000272 | 0.2 | 2.6E-04 | n/a | 9.3E-06 | seismic PRA | GI-199 |
| San Onofre 2 | 05000361 | 0.67 | 1.2E-04 | n/a | 1.7E-05 | seismic PRA | IPEEE |
| San Onofre 3 | 05000362 | 0.67 | 1.2E-04 | n/a | 1.7E-05 | seismic PRA | IPEEE |
| Seabrook | 05000311 | 0.25 | 1.3E-04 | n/a | 9.3E-06 | seismic PRA | GI-199 |
| Sequoyah 1 | 05000443 | 0.18 | 7.1E-04 | n/a | 2.2E-05 | seismic PRA | GI-199 |
| Sequoyah 2 | 05000327 | 0.18 | 7.1E-04 | 0.27 | 5.1E-05 | 0.3g full-scope EPRI SMA | GI-199 |
| Shearon Harris 1 | 05000328 | 0.15 | 4.6E-05 | 0.27 | 5.1E-05 | 0.3g full-scope EPRI SMA | GI-199 |
| South Texas 1 | 05000498 | 0.1 | 3.0E-05 | n/a | 6.2E-06 | seismic PRA | GI-199 |
| South Texas 2 | 05000499 | 0.1 | 3.0E-05 | n/a | 6.2E-06 | seismic PRA | GI-199 |
| Summer | 05000395 | 0.15 | 3.9E-04 | 0.22 | 3.8E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Surry 1 | 05000280 | 0.15 | 2.2E-04 | n/a | 5.7E-06 | seismic PRA | GI-199 |
| Surry 2 | 05000281 | 0.15 | 2.2E-04 | n/a | 5.7E-06 | seismic PRA | GI-199 |
| Susquehanna 1 | 05000387 | 0.1 | 1.9E-04 | 0.21 | 1.3E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Susquehanna 2 | 05000388 | 0.1 | 1.9E-04 | 0.21 | 1.3E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Three Mile Island 1 | 05000289 | 0.12 | 1.0E-04 | n/a | 4.0E-05 | seismic PRA | GI-199 |
| Turkey Point 3 | 05000250 | 0.15 | 3.8E-05 | 0.15 | 1.0E-05 | site-specific approach; SSE=0.15g | GI-199 |
| Turkey Point 4 | 05000251 | 0.15 | 3.8E-05 | 0.15 | 1.0E-05 | site-specific approach; SSE=0.15g | GI-199 |
| Vermont Yankee | 05000271 | 0.14 | 1.2E-04 | 0.25 | 8.1E-06 | 0.3g focused-scope EPRI SMA | GI-199 |
| Vogtle 1 | 05000424 | 0.2 | 1.5E-04 | 0.3 | 1.8E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Vogtle 2 | 05000425 | 0.2 | 1.5E-04 | 0.3 | 1.8E-05 | 0.3g focused-scope EPRI SMA | GI-199 |
| Waterford 3 | 05000382 | 0.1 | 1.1E-04 | 0.1 | 2.0E-05 | reduced-scope EPRI SMA; SSE = 0.1g | GI-199 |
| Watts Bar | 05000390 | 0.18 | 2.9E-04 | 0.3 | 3.6E-05 | 0.3g focused- | GI-199 |

| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE), and Seismic Core Damage Frequencies | | | | | | | |
|---|----------|-----------|---|-------------------|--|------------------------|--------|
| Plant | Docket | SSE (g's) | Frequency of Exceeding the SSE (per year) | RLE (HCLPF) (g's) | Seismic Core Damage Frequency (per year) | IPEEE Method | Source |
| | | | | | | scope EPRI SMA | |
| Wolf Creek | 05000482 | 0.12 | 3.7E-05 | 0.2 | 1.8E-05 | reduced-scope EPRI SMA | GI-199 |
| 25th percentile | | | 9.6E-05 | | 6.0E-06 | | |
| min | | | 1.6E-05 | | 2.0E-06 | | |
| median | | | 1.7E-04 | | 1.5E-05 | | |
| mean | | | 3.1E-04 | | 2.1E-05 | | |
| max | | | 3.9E-03 | | 1.0E-04 | | |
| 75th percentile | | | 2.6E-04 | | 3.2E-05 | | |

**Table: Design Basis Ground Motions and New Review Level Ground Motions
Used for Review of Japanese Plants**

| Plant sites | Contributing earthquakes | New DBGM S₂ | Original DBGM S₂ |
|---------------------------|--|-----------------------------------|--|
| Tomari | Earthquakes undefined specifically | 550 Gal | 370 Gal |
| Onagawa | Soutei Miyagiken-oki (M8.2) | 580 | 375 |
| Higashidoori | Earthquakes undefined specifically | 450 | 375 |
| Fukushima | Earthquake near the site (M7.1) | 600* | 370 |
| Tokai | Earthquakes undefined specifically | 600 | 380 |
| Hamaoka | Assumed Tokai (M8.0), etc. | 800 | 600 |
| Shika | Sasanami-oki Fault (M7.6) | 600 | 490 |
| Tsuruga | Urazoko-Uchiikemi Fault (M6.9), etc. → Mera-Kareizaki - Kaburagi(M7.8), Shelf edge+B+Nosaka (M7.7) | 800 | 532 |
| Mihama | C, Fo-A Fault (M6.9)→ Shelf edge+B+Nosaka(M7.7) | 750 | 405 |
| Ohi | C, Fo-A Fault (M6.9)→Fo-A+Fo-B (M7.4) | 700 | 405 |
| Takahama | Fo-A Fault (M6.9) →Fo-A+Fo-B(M7.4) | 550 | 370 |
| Shimane | Shinji Fault (M7.1) | 600 | 456 |
| Ikata | Central Tectonic Structure (M7.6) | 570 | 473 |
| Genkai | Takekoba F. (M6.9) → Enhanced uncertainty consideration | 540 | 370 |
| Sendai | Gotandagawa F.(M6.9), F-A(M6.9) | 540 | 372 |
| Kashiwazaki-Kariwa | F-B Fault (M7.0), Nagaoka-plain-west Fault (M8.1) | 2300 (R1 side) 1209 (R5 side) | 450 |
| Monju (Proto Type FBR) | Shiraki-Niu F.(M6.9) , C F.(M6.9)→Shelf edge+B+Nosaka(M7.7), Small Damping | 760 | 408 |
| Shimokita Reprocessing F. | Deto-Seiho F.(M6.8), Yokohama F.(M6.8) | 450 | 320 |

*A recent news story contains information that conflicts with the estimate of 370gal. We believe that we have determined that these numbers are for the rock levels and that the estimates in the news story are at the foundation level of each power block. A figure is being developed to explain this.

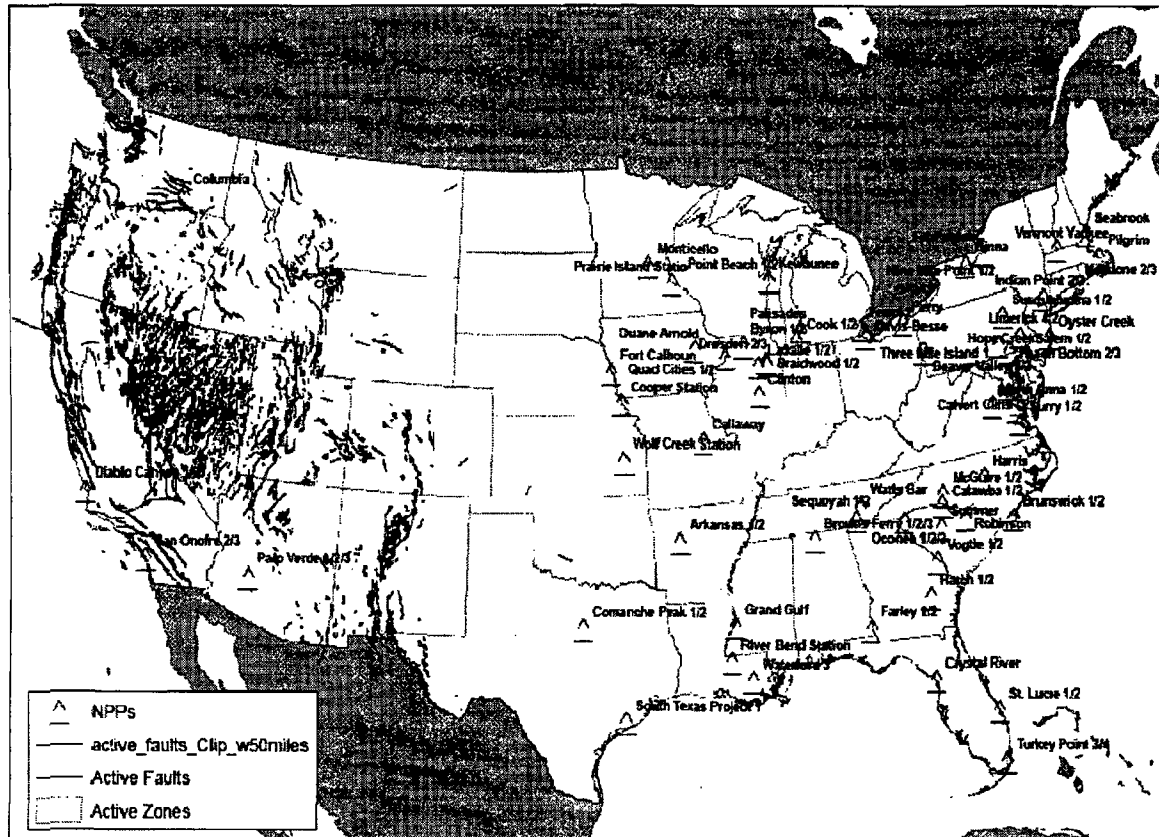
Table: Status of Review of Japanese NPPs to New Earthquake Levels Based on 2006 Guidance

| Utility | Site (Unit) | Type | Dec.2010 |
|--|---------------------|----------------|----------------|
| Hokkaido | Tomari | PWR | △ |
| Tohoku | Onagawa (Unit1) | BWR | ◎ |
| | Higashi-dori | BWR | △ |
| Tokyo | Kashiwazaki-Kariwa | BWR | Unit 1,5,6,7 ◎ |
| | Fukushima-No1 | BWR | Unit 3 ◇, 5 ◎ |
| | Fukushima-No2 | BWR | Unit 4,5 ◎ |
| Chubu | Hamaoka | BWR | △ |
| Hokuriku | Shika (Unit 2) | BWR | ◎ |
| Kansai | Mihama(Unit 1) | PWR | ◎ |
| | Ohi(Unit 3,4) | PWR | ◎ |
| | Takahama (Unit 3,4) | PWR | ◎ |
| Chugoku | Shimane (Unit 1, 2) | BWR | ◎ |
| Shikoku | Ikata (Unit 3) | PWR | ◎ |
| Kyushu | Genkai (Unit 3) | PWR | ◎ |
| | Sendai (Unit 1) | PWR | ◎ |
| Japan Atomic Power | Tokai-Daini | BWR | ○ |
| | Tsuruga | BWR/PWR | △ |
| JAEA | Monju | Proto Type FBR | ◎ |
| Japan Nuc. Fuel | Rokkasyo | Reprocessing | ◎ |
| ◎: NSC review finished, ○: NISA review finished and in NSC review, △: Under review by NISA | | | |

Additional Information: Useful Plots

Plot of Mapped Active Quaternary Faults and Nuclear Plants in the US

It is important to note that this plot somewhat misleading as faults in the central and eastern US are not well characterized. For example, the faults responsible for very large historic events, such as the 1811 and 1812 New Madrid Earthquakes, and the 1886 Charleston Earthquakes have not been conclusively located.



Nuclear Plants in the US Compared to the USGS National Seismic Hazard Maps

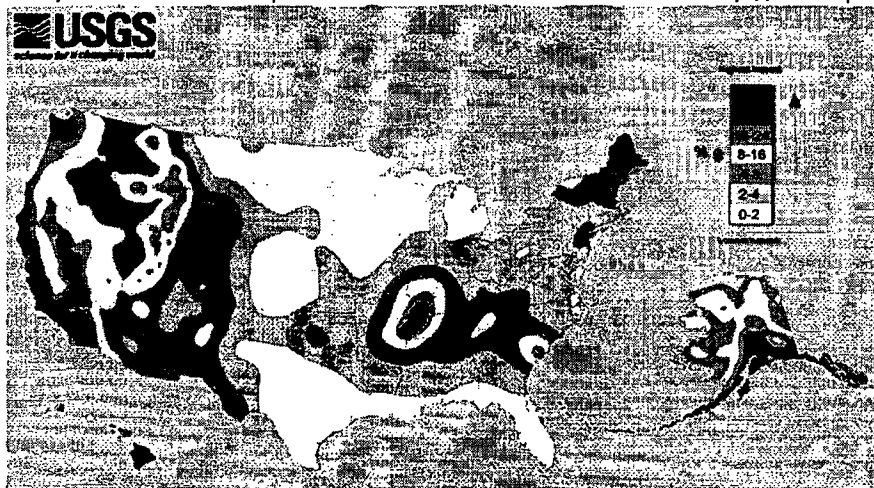


Figure 1: US Nuclear Plants overlain on the USGS National Seismic Hazard Map (PGA of 10% in 50 years from the USGS 2002 maps)

As you can see the seismic source regions in the central and eastern east are not well defined. So to state a specific number of plants that are in the moderate seismicity zones is challenging and open to interpretation. This is just one interpretation, which is provided by the USGS.

USGS US National Seismic Hazard Maps

Many version of this map are available at the USGS website at <http://earthquake.usgs.gov/hazards/>

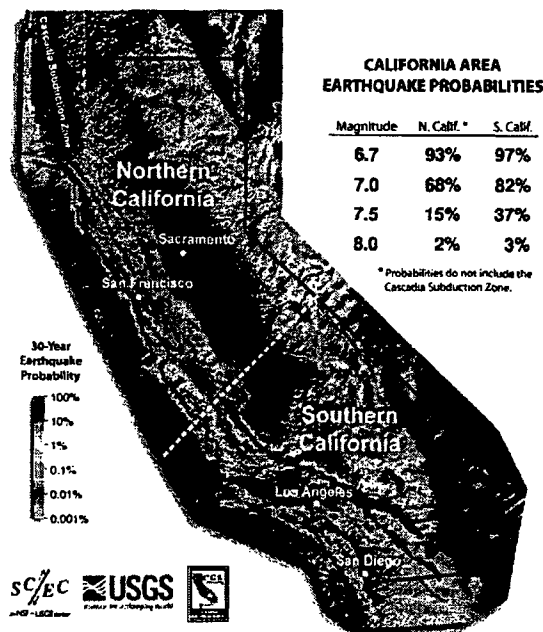


Plot of Nuclear Plants in the US Compared to Recent Earthquakes

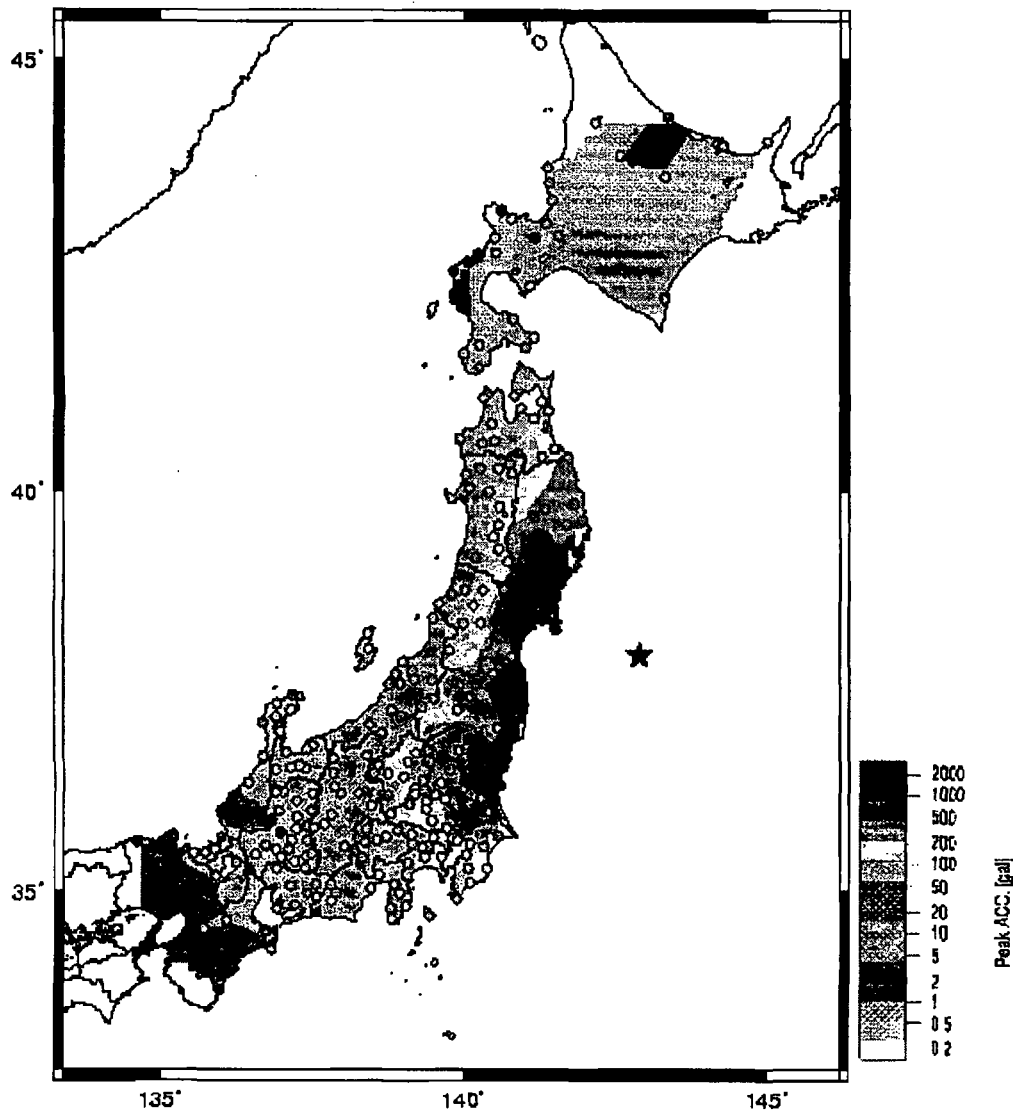


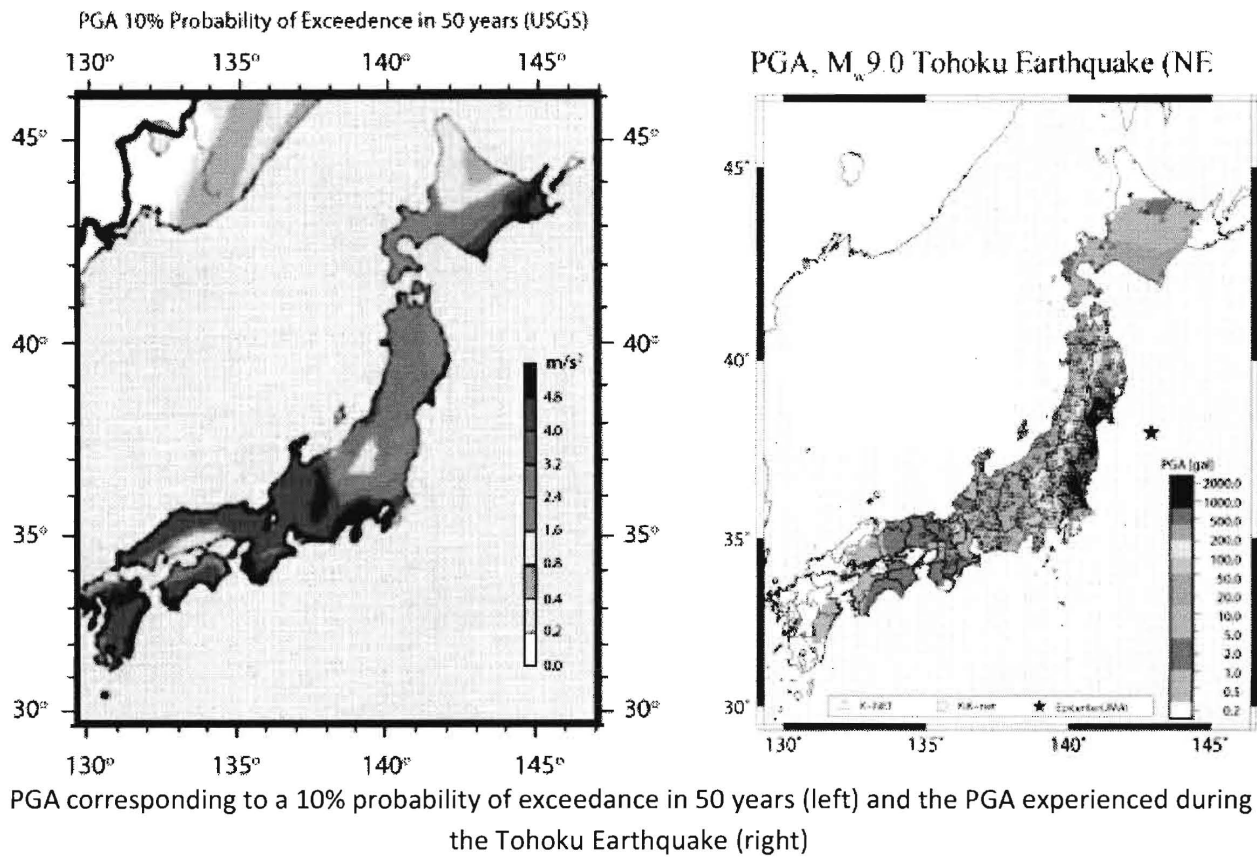
UCERF Map of California Earthquake Probabilities for Northern versus Southern California

This is included in this document as Markey (inaccurately) used the below statistics to say that the probability of a magnitude 7 at SONGS was 82%. The dashed line of this California map is the boundary between northern and southern California used in the UCERF study. As shown in the table, the 30-year probability of an earthquake of magnitude 7.5 or larger is higher in the southern half of the state (37%) than in the northern half (15%).



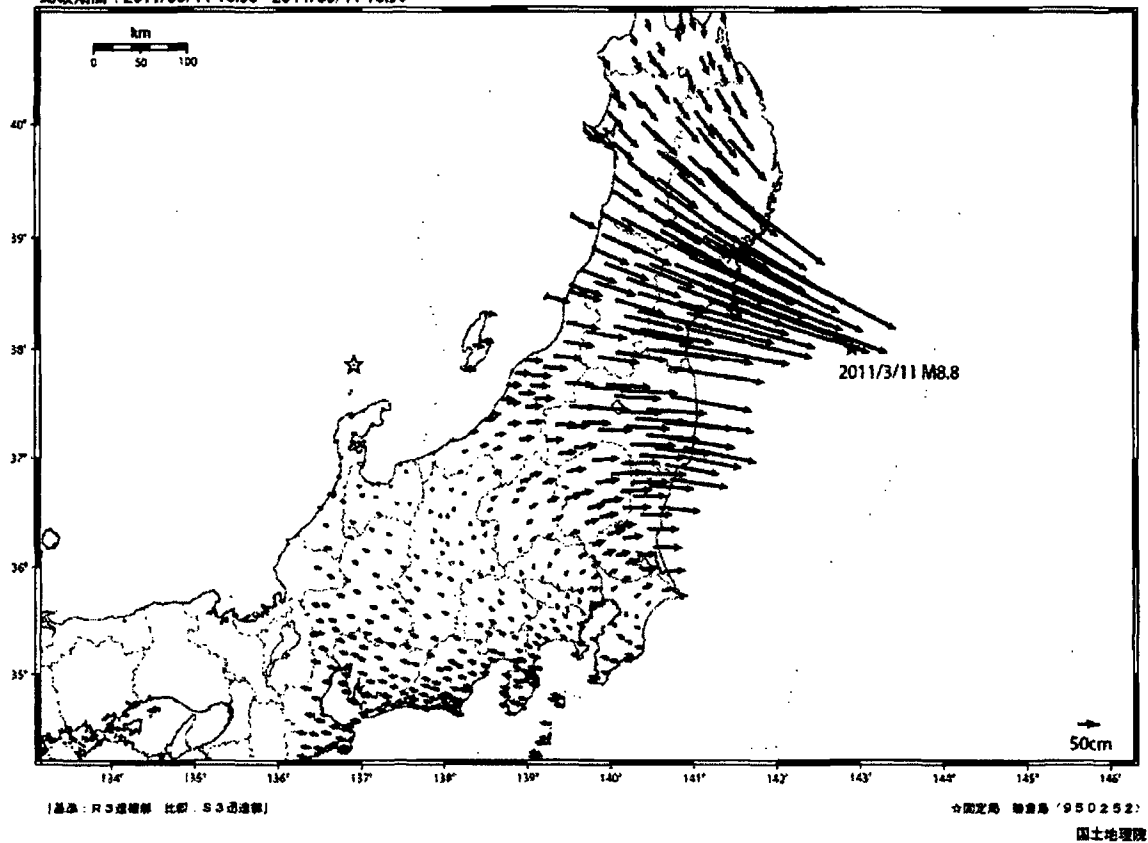
Plot of ground motion acceleration (PGA) from Japanese earthquake





変動ベクトル図 (水平)

基準期間 : 2011/03/01 21:00 - 2011/03/08 21:00
比較期間 : 2011/03/11 16:30 - 2011/03/11 16:30

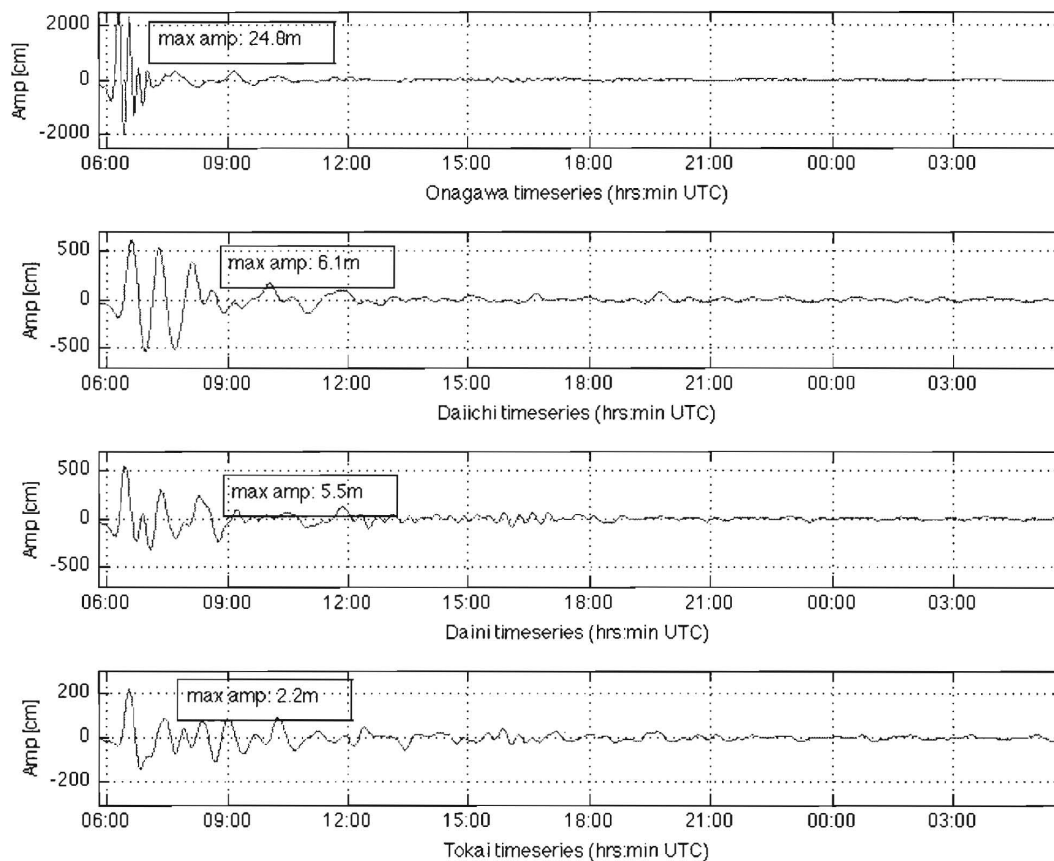


Coseismic slip during the M9.0 earthquake

Plot of Tsunami Wave Heights at 5 Meter Bathymetry Offshore at the Japanese Plants (NOAA)

These are results from high-resolution models run by PMEL NOAA staff, who do modeling for the tsunami warning system. While the available bathymetry and topography data used in the model are not of the highest quality at that location, NOAA has confidence in the results, which show good comparisons between model flooding estimates and inundation observations inferred from satellite images. DART measurements are used in the modeling. The images show model time series very close to a shoreline, at about 5m depth. The runup heights (maximum elevation of flooded area) may be different from these amplitudes at shoreline (can be higher or lower, depending on the topographic profile). According to TEPCO, the wave height onshore at the Fukushima plant was 14 meters high.

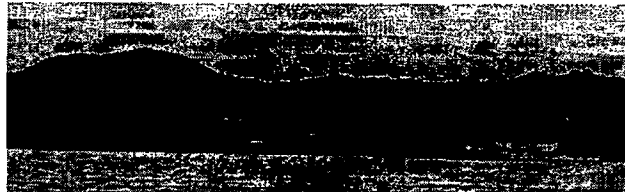
Offshore wave amplitudes, scaled to the coastline



Plot of Tsunami Wave Heights in the Pacific (NOAA)



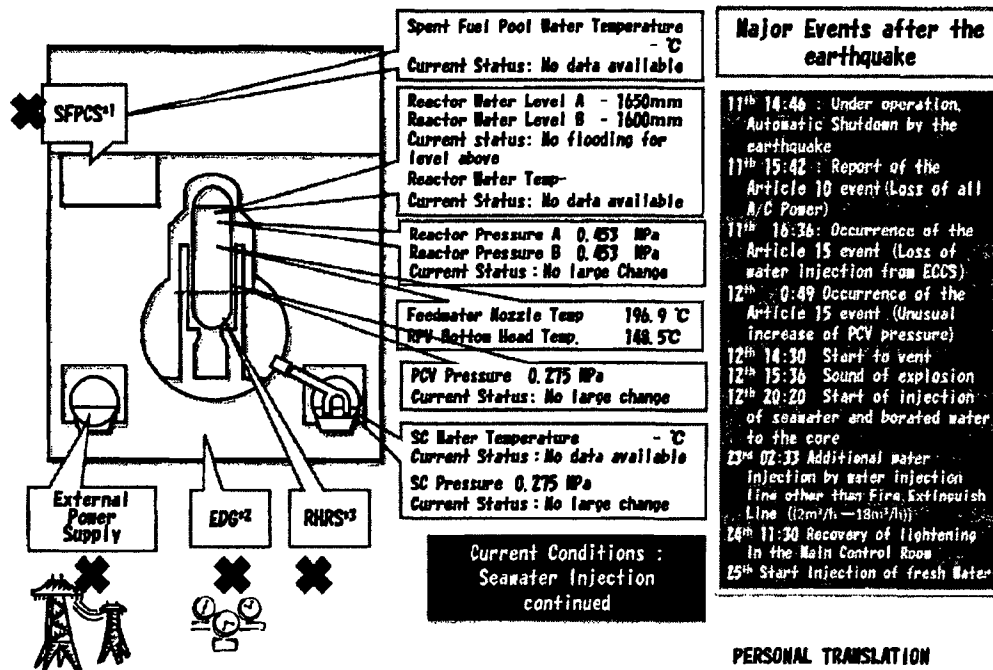
This shows the effect on the US coastline.



I found the numbers at the Onagawa plant unimaginable, so I found a side view picture. It's hard to tell the elevation of the plant.

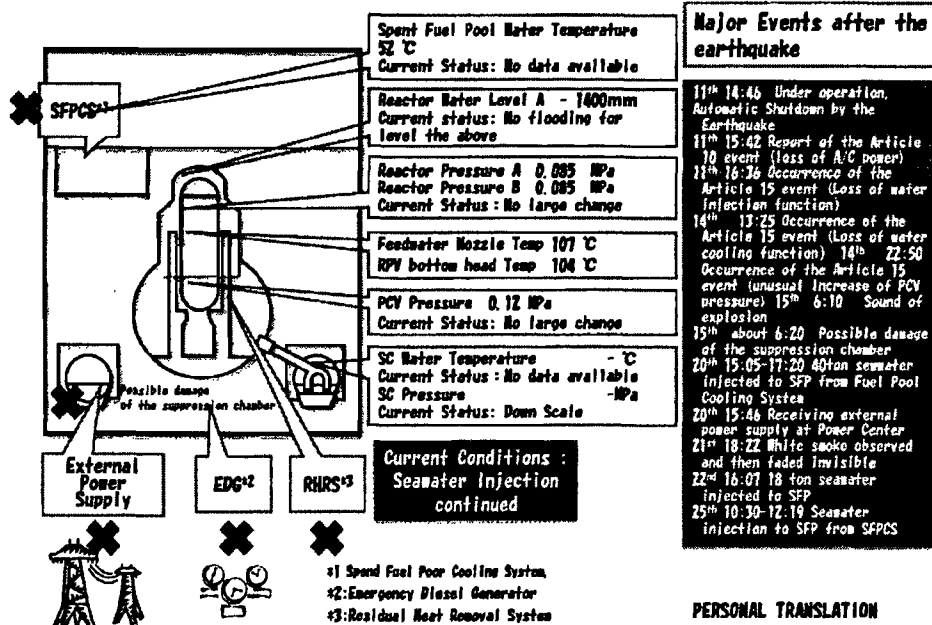
Plant Status (6pm, Japan time, on 3-25-11)

**Current Status of Fukushima Dai-ichi Nuclear Power
Stations Unit 1 (As of 18:00 March 25th, 2011)**



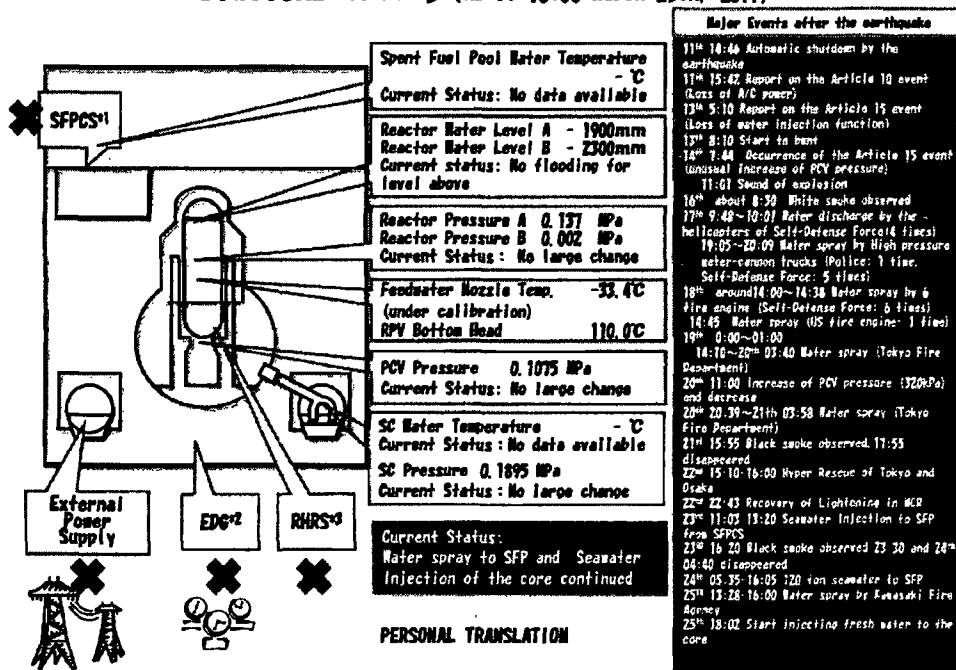
PERSONAL TRANSLATION

**Current Status of Fukushima Dai-ichi Nuclear Power
Stations Unit 2 (As of 18:00 March 25th, 2011)**

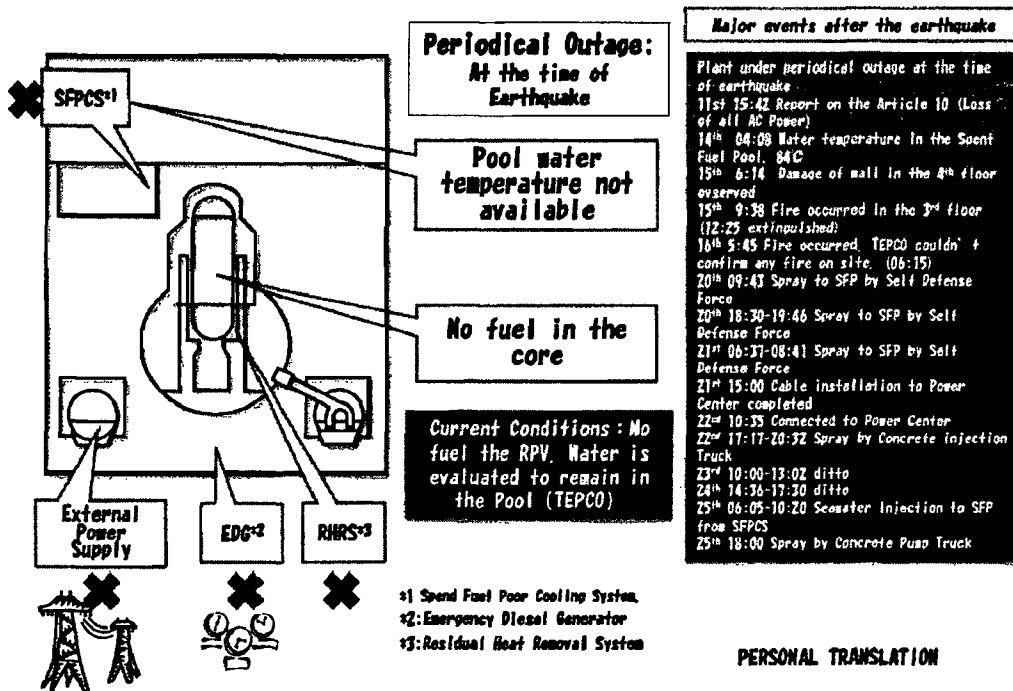


PERSONAL TRANSLATION

Current Status of Fukushima Dai-ichi Nuclear Power Stations Unit 3 (As of 18:00 March 25th, 2011)



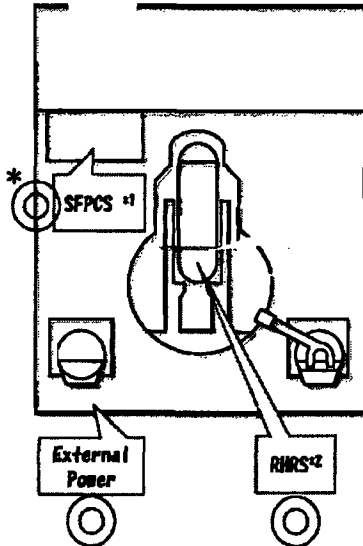
Current Status of Fukushima Dai-ichi Nuclear Power Stations Unit 4 (As of 18:00 March 25th, 2011)



~~Official Use Only~~

Current Status of Fukushima Dai-ichi Nuclear Power Stations Unit 5 (As of 18:00 March 25th, 2011)

Water Temperature in SFP: 37.9 °C
Current Status: Recovery of SFPCS ^{z1}



Periodical Outage: At the time of Earthquake

Reactor Pressure :
0.108MPa
Reactor Water Level :
2.288mm
Reactor Water
Temperature :
43.2°C
Current Status : Pressure
etc. under control

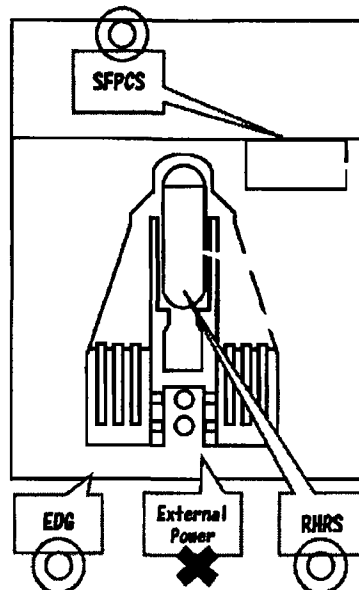
PRV Temp. : Monitored by
RPV water

^{z1}: Spent Fuel Pool Cooling
System
^{z2}: Residual Heat Removal System

Current Status :
20th 14:30 cold shutdown
21st 11:36 Start receiving
electricity from external
power supply
23rd 17:24 PHR pump
automatically stopped when
switched to permanent power
supply
24th 16:14 Repair of RHR
pump completed
24th 16:35 Start cooling

PERSONAL TRANSLATION

Conditions of Fukushima Dai-ichi Nuclear Power Stations Unit 6 (As of 18:00 March 25th, 2011)



Periodical Outage: At the time of Earthquake

Pool Water : 37.9 °C
Current Status : Recovery of
heat removal established

Reactor Pressure : 0.108 MPa
Reactor Water Level : 2.288mm
Reactor Water Tem : 43.2°C
Current Status : Pressure
under control

PRV Temp. : Monitored by
RPV water

^{z1}: Spent Fuel Pool Cooling System,
^{z2}: Emergency Diesel Generator
^{z3}: Residual Heat Removal System

Current Status :
20th 19:27 cold shutdown
22nd 19:52 Start receiving
electricity at startup
transformer

PERSONAL TRANSLATION

Fact Sheets

Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (High level overview)

The seismic regulatory basis for licensing of the currently operating nuclear power reactors is contained in the following regulations: 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," including the "General Design Criteria for Nuclear Power Plants," and 10 CFR Part 100 ("Seismic and Geologic Siting Criteria For Nuclear Power Plants") and Appendix A to that Part, which describes the general criteria that guide the evaluation of the suitability of proposed sites for nuclear power plants. General Design Criterion (GDC) 2, "Design Bases for Protection Against Natural Phenomena," in Appendix A requires that the structures and components in nuclear power plants be designed to withstand the effects of natural phenomena, including earthquakes and tsunamis, without loss of capability to perform their intended safety functions. GDC 2 also requires that the design bases include sufficient margin to account for the limited accuracy, quantity, and period of time in which the historical data have been accumulated. The earthquake which could cause the maximum vibratory ground motion at the site is designated as the **Safe Shutdown Earthquake (SSE)**. Under SSE ground motions, nuclear power plant structures and components must remain functional and within applicable stress, strain, and deformation limits. Each plant must also have seismic instrumentation to determine if the **Operating Basis Earthquake (OBE)**, typically one-half or one-third the level of the SSE, has been exceeded. If the OBE is exceeded or significant plant damage has occurred, then the nuclear power plant must be shutdown.

Each plant is designed to a ground-shaking level (the SSE) that is appropriate for its location, given the possible earthquake sources that may affect the site and its tectonic environment. Ground shaking is a function of both the magnitude of the earthquake, the distance of the earthquake to the site, and the local geology. The magnitude alone cannot be used to predict ground motions. The existing plants were designed on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquake expected in the area around the plant. This required an assessment of earthquakes that had occurred in the region around each plant site.

Design basis loads for nuclear power plant structures include combined loads for seismic, wind, tornado, normal operating conditions (pressure and thermal), and accident conditions. Codes and standards, such as the American Society of Mechanical Engineers, the American Concrete Institute, and the American Institute of Steel Construction, are used in the design of nuclear power plant structures to ensure a conservative, safe design under design basis loads.

In the mid to late 1990s, NRC staff reviewed the potential consequences of severe earthquakes (earthquakes beyond the safety margin included in each plant's design basis), as part of the Individual Plant Examination of External Events (or IPEEE) program. From this review, the staff determined that seismic designs of operating plants in the United States have adequate safety margins, for withstanding earthquakes, built into the designs. Currently, the NRC staff is reassessing the seismic designs of operating plants through our Generic Issues program. The initial results of this assessment found that: 1) seismic hazard estimates have increased at some operating plants in the central and eastern US; 2) there is no immediate safety concern, plants have significant safety margin and overall seismic risk estimates remain small; and 3) assessment of updated seismic hazards and plant performance should continue.

Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (The policy wonk version)

(Don't clean up upon his return from vaca) NRC's regulatory framework for seismic safety of nuclear reactors and facilities is based on: reactor site suitability with respect to geological, seismological, hydrological and other site specific hazards; classification of structures, systems and components (SSCs) as Seismic Category I, seismic design of Seismic Category I SSCs, seismic and environmental qualification of Category I SSCs; and maintenance and in-service inspection of equipment and structures, including the containment structure. The NRC's regulatory framework with respect to seismic issues has evolved through time.

Currently Operating Reactors (licensed prior to 1997):

The seismic regulatory basis for licensing of the currently operating nuclear power reactors is contained in the following regulations: 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," including the "General Design Criteria for Nuclear Power Plants," and 10 CFR Part 100 ("Seismic and Geologic Siting Criteria For Nuclear Power Plants") and Appendix A to that Part which describes general criteria that guide the evaluation of the suitability of proposed sites for nuclear power plants.

General Design Criterion (GDC) 2, "Design Bases for Protection Against Natural Phenomena," in Appendix A requires that the SSCs important to safety be designed to withstand the effects of natural phenomena, including earthquakes, tsunamis, and seiches without loss of capability to perform their intended safety functions. GDC 2 requires that the design bases shall include sufficient margin to account for the limited accuracy, quantity, and period of time in which the historical data have been accumulated, and shall consider appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena. The earthquake which could cause the maximum vibratory ground motion at the site is designated the **Safe Shutdown Earthquake (SSE)**.

Each plant is designed to a ground-shaking level (the SSE) that is appropriate for its location, given the possible earthquake sources that may affect the site and its tectonic environment. Ground shaking is a function of both the magnitude of an earthquake and the distance from the fault to the site. The magnitude alone cannot be used to predict ground motions. The existing plants were designed on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquake expected in the area around the plant based on an assessment of earthquakes that had occurred in the region historically. There is no specification of frequency of occurrence in the deterministic approach. There is no requirement for a periodic reassessment of the seismic design basis.

Paragraph VI(a)(3) of Appendix A requires that suitable seismic instrumentation must be provided so that the seismic response of nuclear power plant features important to safety can be determined promptly after an earthquake to permit comparison of such response to that used as the design basis. Such a comparison is needed to decide whether the plant can continue to be operated safely and to permit appropriate action in a timely manner. Appendix A requires that in addition to seismic loads, including aftershocks, applicable concurrent functional and accident induced loads shall be taken into account in the design of safety-related SSCs. Paragraph VI(c) requires that seismically induced flood, water waves from either locally or distantly generated seismic activity and other design conditions shall be taken into account in nuclear power plant design.

Proposed New Reactors (submitted after 1997):

In 1997 new rules governing reactor siting were established. 10 CFR Part 50 Appendix A (GDC 2), 100.23 and Appendix S establish the seismic design basis for plants licensed after January 10, 1997. Similar to pre-1997, Appendix S defines the SSE as "*the Safe-shutdown earthquake ground motion is the vibratory ground motion for which certain structures, systems, and components must be designed to remain functional.*" 10 CFR Part 100.23 "Geologic and Seismic Siting Criteria" requires that the applicant determine the SSE and its uncertainty, the potential for surface tectonic and nontectonic deformations.

Regulatory Guide 1.165 (and subsequently Regulatory Guide 1.208) provides guidance on satisfying 10 CFR Part 100.23, one of which is performing a probabilistic seismic hazard assessment (**PSHA**).

Appendix S to 10 CFR Part 50 requires for SSE ground motions, SSCs will remain functional and within applicable stress, strain, and deformation limits. The required safety functions of SSCs must be assured during and after the vibratory ground motion through design, testing, or qualification methods. The evaluation must take into account soil-structure interaction effects and the expected duration of the vibratory motions. Appendix S also requires that the horizontal component of the SSE ground motion in the free field at the foundation elevation of structures must be an appropriate response spectrum with a peak ground acceleration (PGA) of at least 0.10g. Design basis loads for nuclear power plant structures, important to safety, include combined loads for seismic, wind, tornado, normal operating conditions (pressure and thermal), and accident conditions. Codes and standards, such as the ASME B&PV Code, the American Institute of Concrete Institute (ACI-359/ASME Section III Division 2, ACI-349) and the American Institute of Steel Construction (AISC N690), are used in the design of nuclear power plant structures to ensure a conservative, safe design under design basis loads.

In contrast to the deterministic approach used prior to 1997, the probabilistic method is used and explicitly accounts for possible earthquakes of various magnitudes that come from all plausible potential sources (including background seismicity) and the likelihood that each particular hypothetical earthquake occurs. The PSHA process provides a complete characterization of the ground motion and comprehensively addresses uncertainties in nuclear power plant seismic demands. The PSHA results are major input to seismic risk evaluation using either SPRA or SMA approaches. As for plants licensed prior to 1997, there is no requirement for a periodic reassessment of the seismic design basis.

In addition to the nominal seismic design, all new generation reactors have to demonstrate a **Seismic margin of 1.67** relative to the site-specific seismic demands. These designs are required to perform a Probabilistic Risk Assessment (PRA) based seismic margins analysis (SMA) to identify the vulnerabilities of their design to seismic events. The minimum high confidence, low probability of failure (HCLPF) for the plant should be at least 1.67 times the ground motion acceleration of the design basis safe-shutdown earthquake (SSE).

The Standard Review Plan (NUREG-0800), Regulatory Guides and Interim Staff Guidance provide the basis for staff reviews of existing reactors and new license applications. Appendix S, "Earthquake Engineering Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," requires that suitable instrumentation must be provided so that the seismic response of nuclear power plant features important to safety can be evaluated promptly after an earthquake. Paragraph 10 CFR 50.54(ff) and Paragraph IV(a)(3) of Appendix S to 10 CFR Part 50 requires shutdown of the nuclear power plant if vibratory ground motion exceeding that of the operating basis earthquake ground motion (OBE) occurs. The OBE is typically one-half or one-third the level of the SSE. If systems, structures, or components necessary for the safe shutdown of the nuclear power plant are not available after occurrence of the OBE, the licensee must consult with the NRC and must propose a plan for the timely, safe shutdown of the nuclear power plant. Paragraph IV(c) requires that seismically induced flood, water waves from either locally or distantly generated seismic activity and other design conditions shall be taken into account in nuclear power plant design so as to prevent undue risk to health and safety of the public.

Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (The cliff notes)

NRC Regulations and Guidelines for Seismic Safety:

- The seismic regulatory basis for licensing of the currently operating nuclear power reactors is contained in the following regulations:
 - 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," including the "General Design Criteria for Nuclear Power Plants," and
 - 10 CFR Part 100 ("Seismic and Geologic Siting Criteria For Nuclear Power Plants") and Appendix A to that Part, which describes the general criteria that guide the evaluation of the suitability of proposed sites for nuclear power plants.
- In addition, General Design Criterion (GDC) 2, "Design Bases for Protection Against Natural Phenomena," in Appendix A requires that:
 - The structures and components in nuclear power plants be designed to withstand the effects of natural phenomena, including earthquakes and tsunamis, without loss of capability to perform their intended safety functions.
 - GDC 2 also requires that the design bases include sufficient margin to account for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.
 - The earthquake which could cause the maximum vibratory ground motion at the site is designated as the **Safe Shutdown Earthquake (SSE)**. Under SSE ground motions, nuclear power plant structures and components must remain functional and within applicable stress, strain, and deformation limits.
 - Each plant must also have seismic instrumentation to determine if the **Operating Basis Earthquake (OBE)**, typically one-half or one-third the level of the SSE, has been exceeded. If the OBE is exceeded or significant plant damage has occurred, then the nuclear power plant must be shutdown.

Plant Design /Design Basis (Seismic):

- Each plant is designed to a ground-shaking level (the SSE) that is appropriate for its location, given the possible earthquake sources that may affect the site and its tectonic environment. Ground shaking is a function of both the magnitude of the earthquake, the distance of the earthquake to the site, and the local geology. The magnitude alone cannot be used to predict ground motions. The existing plants were designed on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquake expected in the area around the plant. This required an assessment of earthquakes that had occurred in the region around each plant site.
- Design basis loads for nuclear power plant structures include combined loads for seismic, wind, tornado, normal operating conditions (pressure and thermal), and accident conditions. Codes and standards, such as the American Society of Mechanical Engineers, the American Concrete Institute, and the American Institute of Steel Construction, are used in the design of nuclear power plant structures to ensure a conservative, safe design under design basis loads.

Fact Sheet: Summarization of the NRC's Regulatory Framework for Tsunami

Review Guidance and Guidelines Related to Tsunami:

- General Design Criterion 2 (GDC 2), 10CFR50, requires, in part, that structures, systems, and components important to safety be designed to withstand the effects of natural phenomena such as floods, tsunami, and seiches without loss of capability to perform their safety functions. Design bases for these SSCs are also required to reflect:
- 10 CFR 100.23, requires, in part, that the size of seismically induced floods and water waves that could affect a site from either locally or distantly generated seismic activity must be determined.
- RG 1.102 – Flood Protection for Nuclear Power Plants, describes types of flood protection acceptable to the NRC staff
 - Exterior Barriers (e.g.)
 - Levee – embankment to protect land from inundation
 - Seawall or floodwall - a structure separating land and water areas, primarily to prevent erosion and other damages due to wave action
 - Bulkhead – similar to seawall, purpose is to restrain the land area
 - Incorporated Barriers
 - Protection provided by specially designed walls and penetration closures. Walls are usually reinforced concrete designed to resist static and dynamic forces of a Design Basis Flood Level of a Probable Maximum Flood.
- RG 1.59 – Design Basis Floods for Nuclear Power Plants
 - The most severe seismically induced floods reasonably possible should be considered for each site.
 - Tsunami requires consideration of seismic events of the severity of the Safe Shutdown Earthquake occurring at the location that would produce the worst such flood at the nuclear power plant site.
- US NRC, Standard Review Plan, "Probable Maximum Tsunami Flooding," Section 2.4.6, Rev. 2
 - Areas of Review
 - Probable maximum tsunami postulated for a site should include wave runup and drawdown
 - Hydrologic characteristics of maximum locally and distantly generated tsunami (e.g., volcanoes, landslides)
 - Geological and seismic characteristics of potential tsunami faults (e.g., magnitude, focal depth, source dimensions, fault orientation, and vertical displacement)

Fact Sheet: Tsunami Assessment Method for Nuclear Power Plants in Japan

[This section is a placeholder and needs to be expanded]

- An overview of the tsunami assessment method for NPP in Japan is available in ADAMs: ML110770010
- Information is also available at:
http://www.jsce.or.jp/committee/ceofnp/Tsunami/eng/tsunami_eng.html
- The Japan Society of Civil Engineers is currently finalizing guidance PTHA = probabilistic tsunami hazard analysis

Fact Sheet: Summarization of the NRC's Regulatory Framework for Flooding

Flooding Issues:

- General Design Criterion 2 (GDC 2), 10CFR50, requires, in part, that structures, systems, and components important to safety be designed to withstand the effects of natural phenomena such as floods, tsunami, and seiches without loss of capability to perform their safety functions. Design bases for these SSCs are also required to reflect:
 - Appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding region, with sufficient margin for the limited accuracy and quantity of the historical data and the period of time in which the data have been accumulated.
 - Appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena.
 - The importance of the safety functions to be performed.
- Design basis floods for most of the present fleet of operating reactors were calculated using deterministic methods to determine the maximum credible flood levels at the site. These deterministic methods include the site specific calculation of parameters such as the probable maximum precipitation, which is defined as the theoretically greatest depth of precipitation for a given duration that is physically possible over a particular drainage basin. Other potential flooding hazards such as flooding due to storm surge, river flooding, coastal flooding including tsunamis, are evaluated at each site using maximum credible levels from each hazard. Over the life of the operating reactor, if new information becomes available that could affect the design basis, licensees are required to evaluate the new information. Based on this review, if needed, licensees are required to take appropriate mitigation measures, update their final safety analysis report and submit it to the NRC for review and approval.
- In order to impose new requirements on existing plants, the NRC must be able to justify the new requirements in accordance with the "Backfit Rule" (10 CFR 50.109).

Questions and Answers for Flooding Issues

180) Does the NRC consider severe floods in the design of nuclear power plants?

Yes. NRC regulations require that nuclear power plants are, at all times, capable of safely shutting down and maintaining a safe shutdown condition under severe flooding situations. Safety-related Structures, Systems and Components (SSCs) of Nuclear reactors in the U.S. are required to withstand the design basis flood (DBF). The design basis flood may be caused by the following natural Phenomena:

- Intense rainfall occurring at the site (known as local intense precipitation).
- Intense rainfall (known as the Probable Maximum Precipitation) occurring on other areas of the watershed leading to riverine or coastal flooding (known as Probable Maximum Flood" or "PMF".
- Floods from upstream dam failure or a combination of upstream dam failures.
- Failure of On-site Water Control or Storage Structures (i.e. tanks).
- Storm Surge, Seiche and Tsunami including wave effects.(See Tsunami Q&A Sheet)
- Flooding caused by ice effects (i.e. ice dams both upstream and downstream).
- Floods caused by diversions of stream channels toward the site.

- Other potential site specific flood hazard(s).

181) What about droughts and conditions which lead to low water? Are these considered?

Yes. Impacts to the plant from low water conditions brought about by ice effects, downstream dam breach, tsunamis, hurricanes and channel diversions away from the site are reviewed to ensure the plant remains safe under these scenerios.

182) Periods of long rainfall can cause the groundwater elevation to rise which can cause structures such as deeply embedded tanks to fail due to buoyancy. Are nuclear power plants designed to withstand this effect?

Yes. Worst-case groundwater levels are estimated for each site and the impacts of these levels are considered in the design of the plant to ensure the plant remains safe under these conditions. During the safety review, impacts due to groundwater levels and other hydrodynamic effects on the design bases of plant foundations and other safety-related structures systems and components (SSCs) are evaluated. Impacts to a safety-related structure such as a deeply embedded tank or a structure containing a deeply embedded tank are considered in the safety review.

183) Some of the Reports from the National Weather Service used to estimate the design precipitation are 30-40 years old. Are these estimates still valid?

The NRC has funded research by the U.S. Bureau of Reclamation to review the information and methods developed by the National Weather Service and the U.S. Army Corps of Engineers (HMR 51), focusing on South and North Carolina. To date, reviews of precipitation records from extreme storm events (e.g., tropical storms, hurricanes) since the publication of HMR 51 does not indicate any exceedance or potential for exceedance of those precipitation (PMP) estimates in this region. We have not seen any information or data that would indicate that HMR precipitation (PMP) estimates for the U.S. have been exceeded. As expected, individual point rainfall gauges have recorded rainfall amounts that have exceeded these areal estimates.

Fact Sheet: Summarization of Seismological Information from Regional Instrumentation

Placeholder: text document available from Rasool. It just needs to be formatted and added to this section.

Fact Sheet: Seismic considerations of Western U.S. NPP sites

Placeholder: to be developed (Information below is based on a presentation by C. Munson and J. Ake).

Regulatory Background:

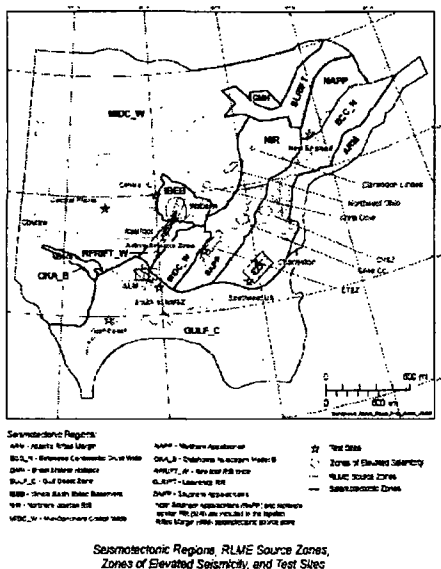
- The principal geologic and seismic considerations for site suitability and engineering criteria are given in 10 CFR 100.23 and Appendix S to Part 50.
- Regulatory Guide 1.208 provides more detailed guidance on:
 - Investigations and applications of PSHA and development of the ground motion response spectra (GMRS). Contains some general discussion on WUS approaches
 - Application of the Senior Seismic Hazard Analysis Committee (SSHAC) guidelines for determination of source characterization and GMPEs (NUREG/CR-6372)
 - Integrated site response (NUREG/CR-6728)
- ANS/ANSI Standards 2.27 (*Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments*) and 2.29 (*Probabilistic Seismic Hazards Analysis*) have been issued subsequent to the publication of RG 1.208
- Regulatory requirements are the same for WUS and CEUS

WUS Seismic Siting Considerations:

- For NPP siting studies in the central and eastern U.S. (CEUS), NRC staff has endorsed existing regional seismic source characterization (EPRI-SOG-1989, LLNL-1994) and ground motion models (EPRI-GM-2004) as starting points for seismic hazard assessment.
- A new multi-sponsor source characterization project will replace EPRI-SOG and LLNL: CEUS-SSC (2011). Site specific updates still required.
- No such endorsed regional studies exist for potential NPP sites in the western U.S. (WUS).

CEUS-SSC Model:

- Discrete seismic sources and regional zones of seismic activity defined.
- Developed following SSHAC Guidelines
- Areas west of ~103.5 W do not have established source characterization or ground motion models.



USGS-National Seismic Hazard Mapping Project: WUS Source Characterization Model:

- Identified major regional zones and fault sources.

- Focus on hazard impacts at annual exceedance levels of interest to Building Codes, potential for missing issues important to critical facilities.
- National fold and fault database a valuable tool for starting any new PSHA in WUS.

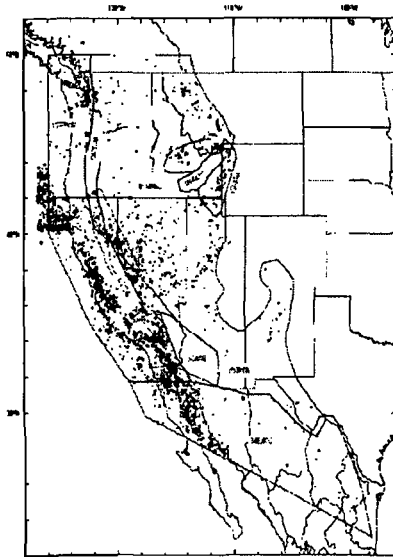


Figure 15. Network of identified faults (solid lines), seismicity (dots), regional stress (arrows), and local seismicity (circles) in California. The map shows the distribution of faults and seismicity in California. The map includes latitude and longitude coordinates. Faults are represented by lines, and seismicity is indicated by dots. The map shows a high density of faults and seismicity in the central and southern parts of the state, particularly along the San Andreas Fault system.

Identified Faults in the WUS:

- There are many more identified faults in the WUS than in the CEUS. Not all well characterized.
- Within 320 km regional area of investigation potential for large number of sources requiring characterization.
- May require hazard informed, phased approach



Uncertainty and SSHAC:

- Significant uncertainties exist regarding appropriate ground motion and seismo-tectonic models, robustness and applicability of various of data sets, etc.

- SSHAC provides a framework for incorporating experts into scientific assessments through structured processes and interactions
- Fundamental concepts behind guidelines
 - Views of the larger technical community are fundamental inputs
 - Competing scientific hypotheses can be considered and uncertainties captured
 - PSHA is a snapshot in time of our knowledge and uncertainties
- **Application of SSHAC Guidelines necessary for new WUS sites**

Significant Seismic Siting Considerations for WUS:

- Goal: Efficient review process consistent with NRC Regulations and Guidance
- Potential Issues:
 - Transition between CEUS and WUS ground motion characteristics, Intermountain West
 - Definition of "rock" shear-wave velocity
 - Specific details for performing hazard informed screening evaluations (focus on characterizing important sources)
 - Robustness of data used in screening assessments
 - Applicability of minimum slip-rate estimates as a screening tool
 - Development of comprehensive, regional moment magnitude based seismicity catalog
 - Maximum magnitude determination for background zones
 - Appropriate minimum magnitude for hazard calculations
 - Applicability of geodetic information for seismic source characterization
 - Appropriate SSHAC Level for new studies (Level 3/4)
 - Methodologies and bases for smoothing of seismicity
 - Development of realistic spectral shapes for regions influenced by Cascadia subduction zone
 - Consider what has been working in the CEUS

Path Forward:

- Interaction with Stakeholders (Industry, DOE, USGS)
- Develop Interim Staff Guidance
- Emphasize integration between site characterization/hazard assessment and engineering
- Evaluate the potential for engineering solutions (ex., base isolation)

Fact Sheet: Regulatory Framework for Protection of Nuclear Power Plants against Tsunami Flooding

Nuclear power plants are designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions. The word tsunami literally means harbor wave. Tsunamis can be generated by large offshore earthquakes (usually greater than magnitude 6.5), submarine or on shore land slides or volcanoes. Some large onshore earthquakes close to the shoreline can generate tsunami. The Nuclear Regulatory Commission (NRC) requires all nuclear power plants to be protected against earthquakes, tsunamis and other natural hazards.

Background

Protection against tsunami effects was required for all operating plants and is required for all new reactors. Following the Indian Ocean tsunami on December 26, 2004, the President moved to protect lives and property by launching an initiative to improve domestic tsunami warning capabilities. This plan was placed under the auspices of the National Science and Technology Council through the President's initiative in July 2005 in the context of a broad national effort of tsunami risk reduction, and United States participated in international efforts to reduce tsunami risk worldwide. In response to the president's initiative, the NRC reviewed its licensing criteria and conducted independent studies and participated in international forums under the auspices of the International Atomic Energy Agency with many participating countries including India and Japan. The final report of the study was published in April 2009 as NUREG/CR 6966, "Tsunami Hazard Assessment at Nuclear Power Plant Sites in the United States of America," ADAMS Accession # ML0915901933. NRC revised its Standard Review Plan for conducting safety reviews of nuclear power plants in 2007. Section 2.4.6 specifically addresses tsunamis. The Office of Nuclear Regulatory Research is conducting tsunami studies in collaboration with the United States Geological Survey and has published a report on tsunami hazard in the Atlantic, Gulf and Pacific coastal areas. Selected nuclear power plants now get tsunami warning notification. The agency requires plant designs to withstand the effects of natural phenomena including effects of tsunamis. The agency's requirements, including General Design Criteria for licensing a plant, are described in Title 10 of the *Code of Federal Regulations* (10 CFR). These license requirements consist of incorporating margins in the initiating hazard and additional margins are due to traditional engineering practices such as "safety factors." Practices such as these add an extra element of safety into design, construction, and operations.

The NRC has always required licensees to design, operate, and maintain safety-significant structures, systems, and components to withstand the effects of natural hazards and to maintain the capability to perform their intended safety functions. The agency ensures these requirements are satisfied through the licensing, reactor oversight, and enforcement processes.

Tsunami Hazard Evaluation

Tsunami hazard evaluation is one component of the complete hydrological review requirements provided in the Standard Review Plan under Chapter 2.4. The safety determination of reactor sites requires consideration of major flood causing events, including consideration of combined flood causing conditions. These conditions include Probable Maximum Flood (PMF) on Streams and Rivers, Potential Dam Failures, Probable Maximum Surge and Seiche Flooding and Probable Maximum Tsunami Hazards, among others. The most significant flooding event is called the design basis flood and flooding protection requirements are correlated to this flood level in 2.4.10.

The Probable Maximum Tsunami (PMT) is defined as that tsunami for which the impact at the site is derived from the use of best available scientific information to arrive at a set of scenarios reasonably expected to affect the nuclear power plant site taking into account (a) appropriate consideration of the most severe of the natural phenomena that have been historically reported or determine from

geological and physical data for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated, (b) appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena, and (c) the importance of the safety functions to be performed.

Site-specific tsunami data are collected from historical tsunami records, paleotsunami evidence, regional tsunami assessments, site-specific tsunami mechanisms, site-specific data, such as submarine survey of sea bed and approach channel geometry. Effects of tsunami on a nuclear power plant can be flooding due to water run up, hydro-dynamic pressure on exterior walls of structures, impact of floating debris, and foundation scouring. In addition, tsunami can draw down water from the intake source of plant cooling water.

The tsunami database is available for interactive search and downloads on the internet at <http://www.ngdc.noaa.gov/hazard/tsu.shtml>.

Tsunami Safety Assessment

The licensing bases for existing nuclear power plants are based on historical data at each site. This data is used to determine probable maximum tsunami and the tsunami effects are evaluated for each site with potential for tsunami flooding. The potential for tsunami hazard is determined on a hierarchical analysis process that can identify tsunami potential based primarily on distance from tsunami source and site elevation. The NRC also required existing plants to assess their potential vulnerability to external events, as part of the Individual Plant Examination of External Events Program. This process ensured that existing plants are not vulnerable to tsunami hazard, and they continue to provide adequate public health and safety.

Today, the NRC utilizes a risk-informed regulatory approach, including insights from probabilistic assessments and traditional deterministic engineering methods to make regulatory decisions about existing plants (e.g., licensing amendment decisions). Any new nuclear plant the NRC licenses will use a probabilistic, performance-based approach to establish the plant's seismic hazard and the seismic loads for the plant's design basis.

Operating Plants

The NRC is fully engaged in national international tsunami hazard mitigation programs, and is conducting active research to refine the tsunami sources in the Atlantic, Gulf Coast and Pacific Coast areas. Diablo Canyon (DC) and San Onofre (SONGS) are two nuclear plant sites that have potential for tsunami hazard. Both the DC (main plant) and SONGS are located above the flood level associated with tsunami. However, the intake structures and Auxiliary Sea Water System at DC are designed for combination of tsunami-storm wave activity to 45 ft msl. SONGS has a reinforced concrete cantilevered retaining seawall and screen well perimeter wall designed to withstand the design basis earthquake, followed by the maximum predicted tsunami with coincident storm wave action, designed to protect at approximately 27 ft msl. These reactors are adequately protected against tsunami effects. Distant tsunami sources for DC include the Aleutian area, Kuril-Kamchatka region, and the South American coast (for Songs the Aleutian area). Distant sources for SONGS is limited by the presence of a broad continental shelf. Local or near sources for DC include the Santa Lucia Bank and Santa Maria Basin Faults (for Songs the Santa Ana wind).

Additional Information

To read more about risk-related NRC policy, see the fact sheets on Probabilistic Risk Assessment (<http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/probabilistic-risk-asses.html>) and Nuclear Reactor Risk (<http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/reactor-risk.html>). Each provides more information on the use of probability in evaluating hazards (including earthquakes) and their potential impact on plant safety margins. Other regulatory framework includes General Design Criterion 2, 10 CFR Part 100.23, Regulatory Guide 1.102 "Flood Protection for Nuclear Power Plants", Rev. 1 1976,

~~Official Use Only~~

Regulatory Guide 1.59 "Design Basis for Nuclear Power Plants" Rev. 2 1977 (update in progress), and
USNRC Standard Review Plan "Probable Maximum Tsunami Flooding" Section 2.4.6, Rev. 2.
March 2011

Fact Sheet: Seismic Zones and US Plants

Note: This is some basic information, staff is developing this into a fact sheet

Some Key Points:

- Although we often think of the US as having “active” and “non-active” earthquake zones, earthquakes can actually happen almost anywhere. Seismologists typically separate the US into low, moderate, and high seismicity zones; not into “active” and “inactive”.
- The boundaries of the low, medium and high zones are not hard, are not well constrained, and are open to interpretation. Below we’ve pulled together a list based on our judgment and based on multiple interpretations in the technical community. But this is just for guidance; it is subjective.
- Faults are often well mapped and characterized in active zones, such as the west. But there are very few mapped faults in the east, which doesn’t mean that there aren’t earthquakes. For example, the most widely felt historical earthquakes in the US occurred in the New Madrid seismic zone in 1811 and 1812. The zones is (clearly shown on figure 1, the hazard map. However, the fault has never been identified and so is only shown as an area source on figure 2. In fact, most CEUS earthquakes are not tied to a known fault.
- The NRC has a seismic research program which has—with DOE and EPRI—sponsored and undertaken a ground breaking project to create a new state of the art seismic source model for the central and eastern US. This project, the Central and Eastern US Seismic Source Characterization for Nuclear Facilities project, is expected to finish at the end of this year.
- The NRC is also undertaking the Generic Issue 199 program to reassess seismic risk in light of the potential for higher seismic hazard (ground shaking) in the CEUS. This shows an ongoing dedication to seismic safety.
- The NRC requires that every nuclear plant be designed for site-specific ground motions that are appropriate for their locations. In addition, the NRC has specified a minimum ground motion level to which nuclear plants must be designed.

This is a preliminary (and subjective) list from seismic staff: Please consider this sensitive information
High Seismicity:

- Diablo Canyon
- SONGS

Moderate Seismicity:

Charleston Seismic Zone

- Brunswick
- Robinson
- Summer
- Vogtle
- Hatch (maybe depends on interpretation)

Wabash Valley Seismic Zone

- Clinton

East Tennessee Seismic Zone (a real point of contention)

- Watts Bar

- Sequoia
- Central Virginia Seismic Zone
- North Anna

Notes:

Also minimum standard on shaking

Note that new Madrid has several subzones.

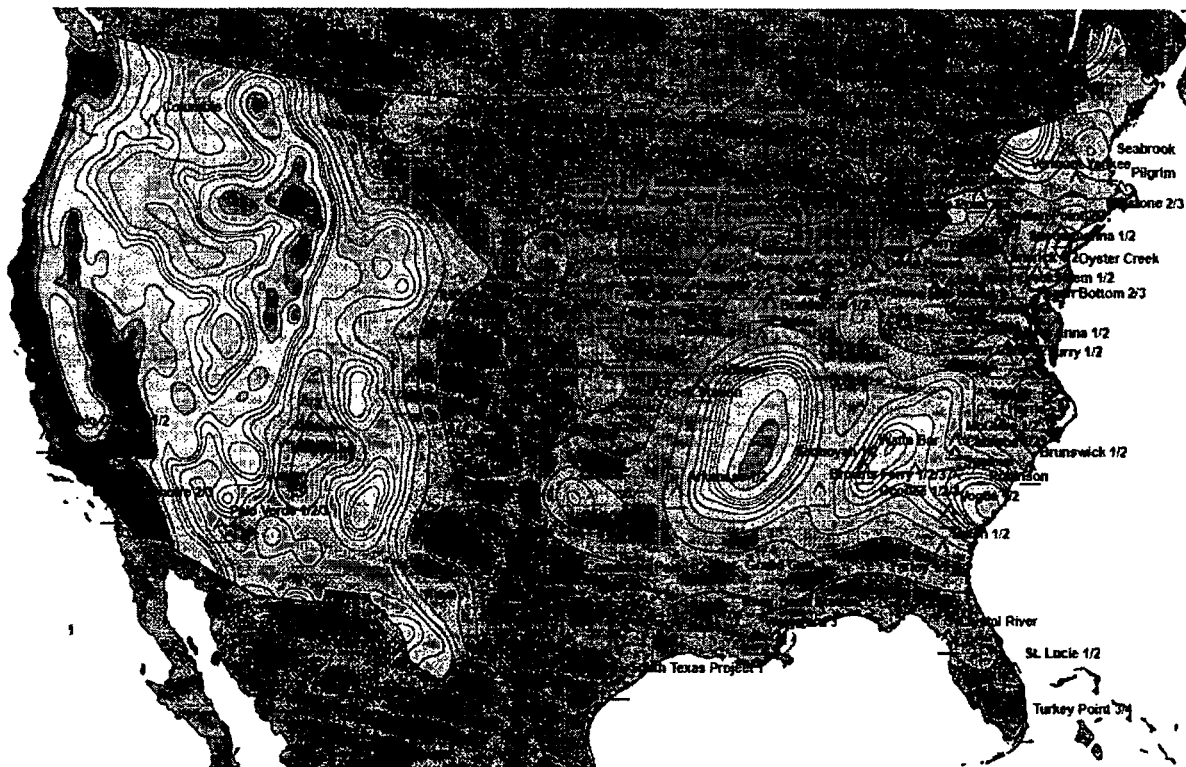


Figure 1: US Nuclear Plants overlain on the USGS National Seismic Hazard Map

As you can see the seismic source regions in the central and eastern east are not well defined. So to state a specific number of plants that are in the moderate seismicity zones is challenging and open to interpretation. This is just one interpretation, which is provided by the USGS.



Figure 2: This figure shows mapped active faults and US Nuclear plants

As you can see, there are very few mapped active faults in the east, which doesn't mean that there aren't earthquakes. The most widely felt historical earthquakes in the US happened in the New Madrid seismic zone (clearly shown on figure 1, the hazard map). However, the fault is not shown here because we can't find it under all that Mississippi sand! You can (faintly) see the source one interpretation of a source zone on the figure. However, this is just the interpretation that was in the GIS map we were working with. We will likely put nested "blobs" onto this figure to the widest and narrowest zone interpretations.

If someone asks about plants being very near mapped active faults, there are two...but that doesn't mean that there isn't hazard elsewhere because in the central and eastern US the seismicity comes from "seismic zones" not faults. It's a hard balance between saying things that make it seem that we have a lot of problems and saying things that make it seem we are underestimate the hazard or not taking it seriously.

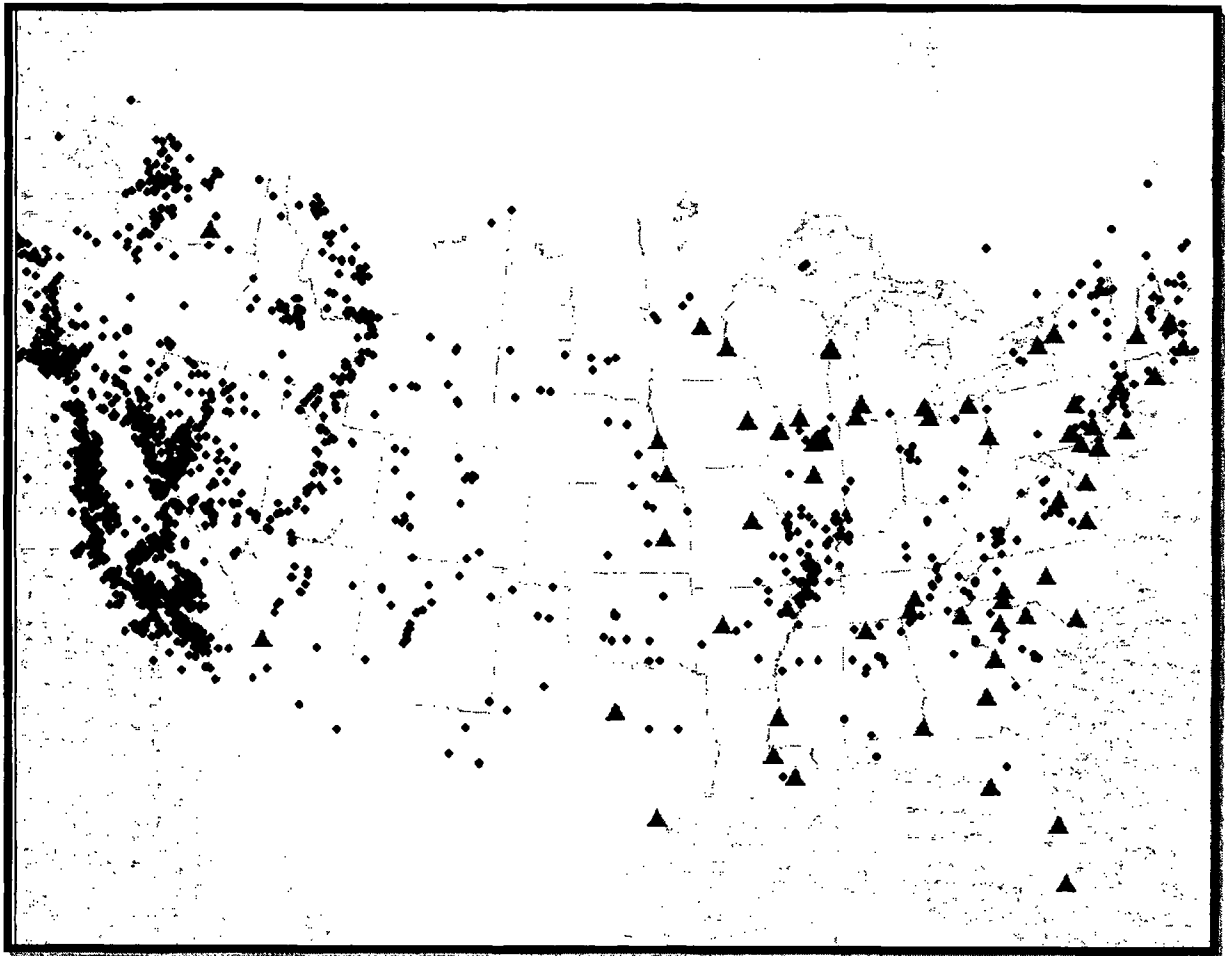


Figure 3: Earthquakes Plotted with US Nuclear Plants

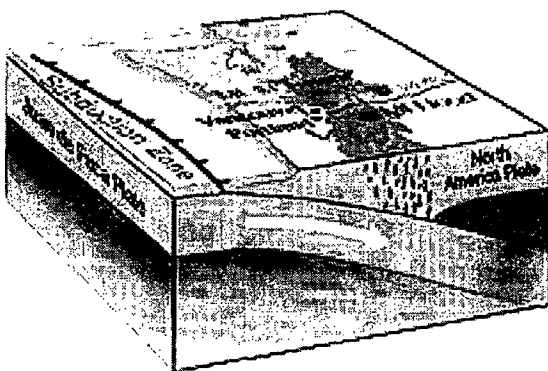
We are remaking a plot like this with a more complete set of earthquake (we're not sure that the time frame of the quakes is), this speaks to the fact that earthquakes occur everywhere, even where we don't have mapped faults.

Fact Sheet: Seismicity of the Central and Eastern US (In-depth technical information)

Key Points:

2. To date, very large earthquakes (Magnitudes greater than 8.25) have only occurred in specific geological settings, in particular the interfaces between tectonic plates in major **subduction zones**. The only subduction zone that potentially impacts the continental US is the Cascadia zone off the coast of northern California, Oregon and Washington.
3. Recent analyses of the magnitudes of the largest earthquakes **not associated** with subduction zones indicates magnitudes are less than ~8.25.
4. The size (magnitude) of earthquakes is proportional to the fault area that slips in a given earthquake. The prediction of earthquake magnitudes for a specific fault considers the dimensions of the fault. Extremely large earthquakes do not occur on small faults.
5. Nuclear power plants are licensed based on vibratory ground shaking, not earthquake magnitude. The ground shaking (accelerations) are used to estimate forces which are used in the seismic design process. In many cases smaller magnitude earthquakes closer to a site produce more severe ground shaking than larger, more distant earthquakes. Hence it is important to consider all potential earthquake sources regardless of magnitude.

Discussion: Earthquakes with very large magnitudes such as the March 2011 earthquake off the northeast coast of the Japanese island of Honshu occur within subduction zones, which are locations where one of the earth's tectonic plates is subducting beneath (being thrust under) another. The fault that defines the Japan Trench plate boundary dips to the west, i.e., becomes deeper towards the coast of Honshu. Large offshore earthquakes have historically occurred in the same subduction zone (in 1611, 1896, and 1933) all of which produced significant tsunami waves. The magnitudes of these previous large earthquakes have been estimated to be between 7.6 and 8.6. Prior to March 2011, the Japan Trench subduction zone has produced nine earthquakes with magnitudes greater than 7 just since 1973. The only subduction zone that is capable of directly impacting the continental US is the Cascadia subduction zone, which lies off of the coast of northern California, Oregon, and Washington. The fault surface defined by this interface dips to the east (becomes deeper) beneath the coast. The Cascadia subduction zone is capable of producing very large earthquakes if all or a large portion of the fault area ruptures in a single event. However, the rate of earthquake occurrence along the Cascadia subduction zone is much less than has been observed along the Japan Trench subduction zone. The only operating nuclear power plant in that area is Columbia, which is far from the coast (~220 miles/350 km) and the Cascadia subduction zone. The occurrence of earthquakes on the Cascadia subduction zone has been considered in the evaluation of the Columbia NPP.



Schematic Illustration of the Cascadia Subduction Zone

The size (magnitude) of earthquakes is proportional to the surface area of a fault that slips in a given earthquake. Large earthquakes are associated with large (long) faults. Hence, the prediction of earthquake magnitudes for a specific fault considers the dimensions of the fault. Identification of fault size

is usually based on geologic mapping or the evaluation of spatial patterns of small earthquakes. To provide **a point of comparison**, the length of the fault that slipped during the March 11, 2011 magnitude 9 Japanese earthquake was >620 km, the length of the fault(s) that slipped during the magnitude 7.3 1992 Landers, CA earthquake was ~90 km and the estimated length of the Hosgi fault near Diablo Canyon NPP is 140 km and a magnitude of 7.5 is assigned to that fault. A number of major crustal faults or fault zones (not associated with the Cascadia subduction zone) have been identified that have produced earthquakes of magnitude 7.5 to 8 in the continental US (including California). ***These fault sources have been identified and characterized in seismic hazard assessments.***

Seismic designs at US nuclear power plants are developed in terms of seismic ground motion spectra, which are called the Safe Shutdown Earthquake ground motion response spectra (SSE). Each nuclear power plant is designed to a ground motion level that is appropriate for the geology and tectonics in the region surrounding the plant location. Currently operating nuclear power plants developed their SSEs based on a "deterministic" or "scenario earthquake" basis that account for the largest earthquake expected in the area around the plant. Seismic activity in the regions surrounding US plants is much lower than that for Japan since **most US plants are located in the interior of the stable continental US**. The largest earthquakes within the continental US are the 1811-12 New Madrid sequence and the 1886 Charleston, SC, which were estimated to be between about magnitude 6.8 to 7.5. On the west coast of the US, the two nuclear power plants are designed to specific ground motions from earthquakes of about magnitude 7+ on faults located just offshore of the plants. The earthquakes on these faults are mainly strike-slip (horizontal motion on near vertical planes) type earthquakes, not subduction zone earthquakes. This fault geometry does not produce large tsunamigenic waves. Therefore, the likelihood of a significant tsunami from these faults is very remote.

Fact Sheet: US Portable Array Information

NOTE: This is provided because IRIS participants let us know that there was a discussion about the NRC's involvement in this program during a meeting with congressional staffers. We have been involved in this for the last couple years.



The Incorporated Research Institutions for Seismology is the Consortium of United States Universities with Major Research Programs in Seismology and Related Fields.

The Transportable Array: A Science Investment that Can Be Leveraged

IRIS is installing the Transportable Array – a set of 400 broadband seismic instruments – in each of more than 1600 sites across the contiguous United States. The instruments operate at each site for two years and then are removed and redeployed further east. Roughly 1100 stations have been installed since 2003, and instruments have been removed from more than 600 of those sites in the western United States.

The National Science Foundation is funding the full cost to “roll” the Transportable Array across the US, more than \$90,000,000 over ten years. Comparatively small incremental investments could add significant data that are relevant to the safety of nuclear power plants. These efforts would be uniquely cost effective, since NSF is already funding installation, and they would feed data into an existing, standardized and widely used data management system that already incorporates the vast majority of seismic data from US networks. But these opportunities are time constrained: the array will be fully installed in the contiguous 48 states by late 2013.

More Value from Longer Term Regional Observations

A dense, uniform seismic network is necessary for long-term, broad-area seismic monitoring of the central and eastern United States due to low event recurrence rates and the risk of significant earthquakes ($M > 5$) anywhere in the region. Monitoring seismicity in the central and eastern US can be improved by turning selected sites into permanent seismic stations. A total of more than 35 Transportable Array stations have already been “adopted” by several organizations, creating a permanent legacy, but only in the western United States.

A strategic “1-in-4” plan would involve “adoption” of systematically selected stations in the central and eastern United States – every other station in both the east-west and north-south directions, creating a uniform grid of some 250 stations. Long-term regional operation could be combined with two optional enhancements to create a unique observatory for the study of seismicity, source characteristics, attenuation, and local ground acceleration.

Enhancement 1: Acquire Higher Frequency Data

Crustal rigidity in the central and eastern US makes it desirable to record high frequency characteristics of local and regional earthquakes. The existing instruments could be reconfigured to record high frequencies but doing so would nearly triple the data flow, necessitating improvements to the communications infrastructure.

Enhancement 2: Add Strong Motion Sensors

Acquiring strong motion sensors and reconfiguring field computers that record and telemeter the data would help to measure unique effects of severe shaking. The design anticipated this augmentation, and several stations in California and Washington were operated that way. Upgrade would be more efficient at sites that have not yet been installed.

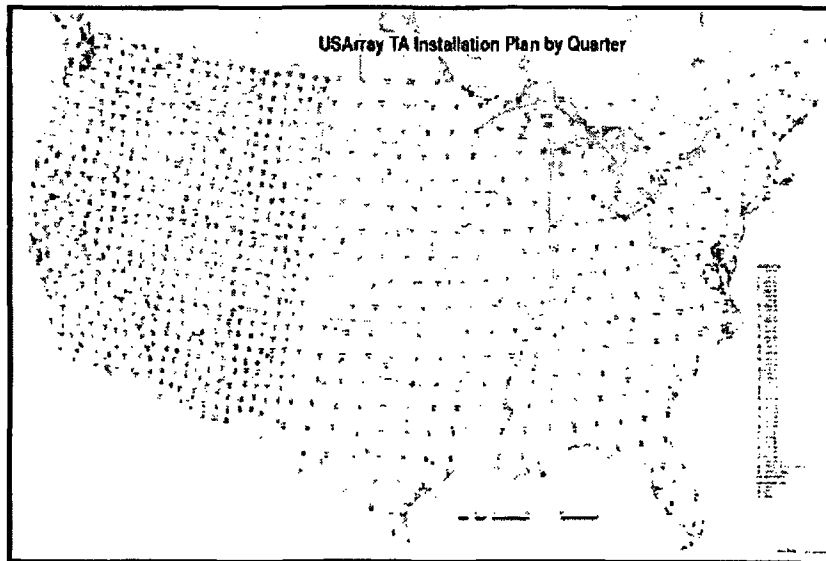
Estimate of annual acquisition and O&M costs for the 1-in-4, 250-station network in central and eastern US.

| Year | Stations | Acquisition ¹ | O&M ² | Total |
|------|----------|--------------------------|------------------|-------------|
| 2011 | 50 | \$1,800,000 | \$ 400,000 | \$2,200,000 |
| 2012 | 50 | \$1,800,000 | \$ 800,000 | \$2,600,000 |
| 2013 | 50 | \$1,800,000 | \$1,200,000 | \$3,000,000 |
| 2014 | 50 | \$1,800,000 | \$1,600,000 | \$3,400,000 |
| 2015 | 50 | \$1,800,000 | \$2,000,000 | \$3,800,000 |
| 2016 | — | — | \$2,000,000 | \$2,000,000 |

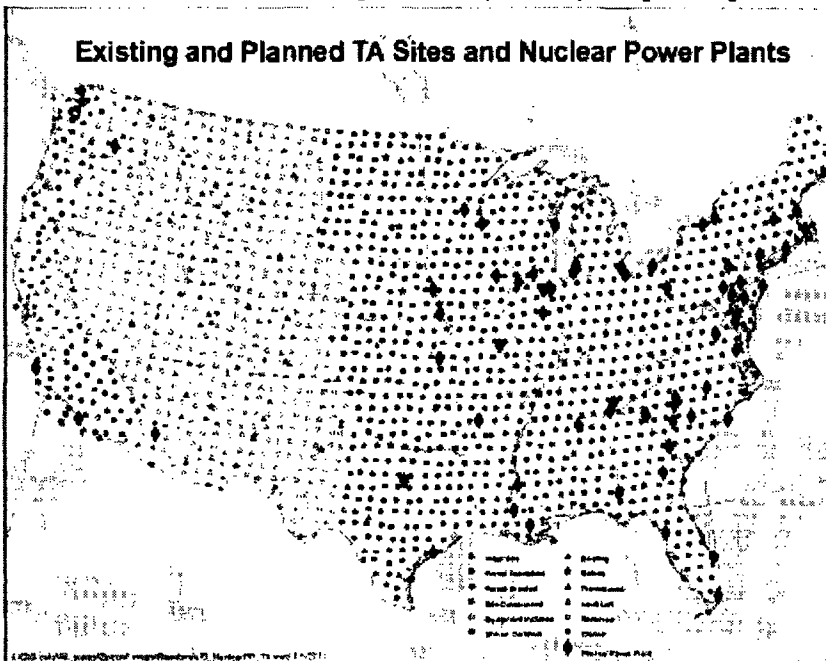
¹ Assumes upgrades to six channel data loggers with strong motion sensors.

² Assumes a conservative estimate of \$8,000/station/year.

The 1-in-4, 250-station network that could be created in the central and eastern US by "leaving behind" one out of every four Transportable Array stations during the years 2011 through 2015.



A large majority of nuclear power plants are located in the central and eastern parts of the US, where it is still possible to "leave behind" 1-in-4 Transportable Array stations for long-term regional observations



Fact Sheet: The B.5.b Rule (10 CFR 50.54hh/B.5.b)

The following was taken from the Commission Briefing (3/21) notes:

Following the terrorist events of September 11, 2001, the NRC issued EA-02-026, "Order for Interim Safeguards and Security Compensatory Measures" (the ICM Order), February 25, 2002, (designated SGI), which specified interim safeguards and security compensatory measures. Section B.5.b of the ICM Order required licensees to adopt mitigation strategies using readily available resources to maintain or restore core cooling, containment, and SFP cooling capabilities to cope with the loss of large areas of the facility due to large fires and explosions from any cause, including beyond-design-basis aircraft impacts.

In June 2005 the NRC developed a phased approach to implement the B.5.b requirements:

- For Phase 1, the NRC expected licensees to use information from (1) existing programs and equipment and operational know-how, including maintaining capabilities currently in place, (2) industry best practices, and (3) application of generic lessons learned from engineering analyses.
- Phase 2 addressed assessment of SFPs including additional mitigation strategies that use existing or readily available resources to further enhance the plant's effectiveness in maintaining SFP cooling, and identify potential practicable options for the use of generic, deployable, or other backup mitigation capabilities that exceed the NRC's requirements.
- Phase 3 addressed assessment of the reactor and containment mitigation. This change allowed the staff to give priority to the assessment of SFPs before the reactor and containment.

On February 25, 2005, the NRC issued guidance for implementing Section B.5.b of the ICM Order. This included guidance on:

- Actions to Mitigate Fuel damage, which included:
 - Develop procedures to facilitate primary containment to secondary containment venting without AC power as an alternate remove heat from primary containment,
 - Develop/Modify procedures to start safety and or operate equipment to facilitate plant cooldown (Diesel generators, AFPs, RCIC) without DC power,
 - Identification and use of alternate water sources and pumping sources (such as a site fire pump as an alternate supply water for core cooling and SFP water),
 - Development of strategies for use of portable and offsite equipment to support recovery efforts (prefabricated and pre-staged cables, adapters, jumpers spool pieces, equipment needed for primary to secondary containment venting),
- Spent Fuel pool mitigation measures, which included:
 - Strategies for dispersing higher decay power (hottest) fuel amongst older low decay power (coolest) fuel to facilitate cooling, enabling air cooling if water level is lost in the reduced timeframes
 - Maintenance of empty space in the SFP to provide for a downcomer effect, facilitating natural circulation within the pool
 - Provide for emergency water makeup sources, and/or emergency repair

By December 2006, the staff had completed Phase 1 inspections at all operating reactor sites. In December 2006, the NRC endorsed NEI 06-12, Revision 2, "B.5.b Phase 2 & 3 Submittal Guideline," which provided specifications for standard mitigative strategies to address the maintenance or restoration of core cooling, containment and spent fuel pool cooling, including the use of some equipment that would have been beyond readily available. The strategies included those listed below:

- Adding make-up water to the SFP,
- Spraying water on the spent fuel,
- Enhanced initial command and control activities for challenges to core cooling and containment, and

- Enhanced response strategies for challenges to core cooling and containment.

The B.5.b Guidance and NEI 06-12, Revision 2, were used by each licensee in preparing information submitted to the NRC that describes a plant specific approach to implementing mitigating strategies and supports each plant specific license condition.

The NRC Performed Section B.5.b Phase 2 Assessments (June – December 2005) to Identify SFP Mitigation Strategies.

The NRC and Industry Performed B.5.b Phase 3 Assessments (October 2005 – June 2006) to Identify Reactor and Containment Mitigation Strategies.

In 2007, the NRC staff completed safety evaluations of licensee commitments submitted using the NEI 06-12 Guideline and imposed license conditions requiring them to provide a regulatory footprint. By December 2008 the NRC staff completed its inspection to verify the implementation of strategies and guidance at each facility.

On March 27, 2009, the NRC amended 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," and Part 73, "Physical Protection of Plants and Materials," with new requirements.

This rulemaking added 10 CFR 50.54(hh)(2) in order to impose the same mitigating strategies requirements on new reactor applicants and licensees as those imposed by the ICM Order and associated license conditions.

This rulemaking also added paragraph (i) to 10 CFR 50.34, "Contents of applications; technical information," to require submittal of a "description and plans for implementation of the guidance and strategies intended to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with the loss of large areas of the plant due to explosions or fire as required by § 50.54(hh)(2) of this chapter." (A parallel requirement was added as paragraph (d) to 10 CFR 52.80 for reactors licensed under 10 CFR Part 52, under the purview of the Office of New Reactors.)

The Statement of Considerations for this rulemaking specifically noted that the requirements described in Section 50.54(hh) are for addressing certain events that are the cause of large fires and explosions that affect a substantial portion of the nuclear power plant contemplates that the initiating event for such large fires and explosions could be any number of beyond-design basis events, including natural phenomena such as those described in General Design Criteria (i.e., earthquakes, tornadoes, floods, tsunami, and seiches).

Fact Sheet: Generic Issue GI-199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants"

The objective of the GI-199 Safety/Risk Assessment was to perform a conservative, screening-level assessment to evaluate if further investigations of seismic safety for operating reactors in the central and eastern U.S. (CEUS) are warranted consistent with NRC directives.

- (i) The results of the GI-199 safety risk assessment should not be interpreted as definitive estimates of plant-specific seismic risk.
- (ii) The nature of the information used (both seismic hazard data and plant-level fragility information) make these estimates useful only as a screening tool. The NRC does not rank plants by seismic risk.

Key Messages from the GI-199 Communications Plan:

- (i) In August 2010, the Safety/Risk Assessment for GI-199 was completed. That assessment found that operating nuclear power plants are safe: Plants have adequate safety margin for seismic issues. The NRC's Safety/Risk Assessment confirmed that overall seismic risk estimates remain small and that adequate protection is maintained.
- (ii) Though still small, some seismic hazard estimates have increased: Updates to seismic data and models indicate increased seismic hazard estimates for some operating nuclear power plant sites in the Central and Eastern United States.
- (iii) Assessment of GI-199 will continue: Plants are safe (see key message 1), but the NRC has separate criteria for evaluating whether plant improvements may be imposed.

The NRC's Safety/Risk Assessment used readily available information and found that for about one-quarter of the currently operating plants, the estimated core damage frequency change is large enough to warrant further attention. Action may include obtaining additional, updated information and developing methods to determine if plant improvements to reduce seismic risk are warranted.

Note: GI-199 Communication Plan is available in ADAMS: ML081850477.

Status of Operating Plants and Need of Additional Actions due to Japanese Event:

- Currently operating nuclear plants in the United States remain safe, with no need for immediate action.
- This determination is based on NRC staff reviews of updated seismic hazard information and the conclusions of the Generic Issue 199 Screening Panel.
- Existing plants were designed with considerable margin to be able to withstand the ground motions from the "deterministic" or "scenario earthquake" that accounted for the largest earthquake expected in the area around the plant.
- During the mid-to late-1990s, the NRC staff reassessed the margin beyond the design basis as part of the Individual Plant Examination of External Events (IPEEE) program.
- The results of the GI-199 assessment demonstrate that the probability of exceeding the design basis ground motion may have increased at some sites, but only by a relatively small amount. In addition, the Safety/Risk Assessment stage results indicate that the probabilities of seismic core damage are lower than the guidelines for taking immediate action.
- In summary, US plants are designed for appropriate earthquake levels and are safe. As addressed above, the NRC is conducting a program called Generic Issue 199, which is reviewing the adequacy of the earthquake design of US NPPs in central and eastern North America based

on the latest data and analysis techniques. The NRC will look closely at all aspects of the response of the plants in Japan to the earthquake and tsunami to determine if any actions need to be taken in US plants and if any changes are necessary to NRC regulations.

Timeline for Preparation and Issuance of GI-199 Generic Letter:

- The NRC is working on developing a Generic Letter (GL) to request information of all affected plants (96 plants that are east of the Rockies).
- The GL is planned to be issued in draft form within the next 2 months to stimulate discussions with industry in a public meeting.
- Process will be followed, i.e., Committee to Review Generic Requirements, Advisory Committee on Reactor Safeguards Meeting and then GL will be issued as a draft for formal public comments (60 days), followed by a second meeting with ACRS.
- We expect to issue the GL by the end of this calendar year, as the new consensus seismic hazard estimates become available. (This effort is being coordinated with US NRC, DOE, EPRI, and USGS).
- The information from licensees will likely require 3 to 6 months to complete. Staff's review will commence after receiving licensees' responses. Based on staff's review, a determination can be made regarding cost beneficial backfits where it can be justified.

Fact Sheet: Station Blackout Rule

The NRC designated station blackout (SBO), which is a loss of all offsite and onsite ac power concurrent with a turbine trip, as an Unresolved Safety Issue in 1980. In 1988, the Commission concluded that additional SBO regulatory requirements were justified and issued the SBO rule, 10 CFR 50.63, to provide further assurance that a loss of both offsite and onsite emergency AC power systems would not adversely affect public health and safety. As a result of the SBO rule all plants have (1) established SBO coping and recovery procedures; (2) completed training for these procedures; (3) implemented modifications as necessary to cope with an SBO; and (4) ensured a 4-16 hour coping capability. The coping capability was based on the reliability and redundancy of the on-site electrical system, the frequency of a loss of off-site power and the time needed to restore off-site power. The staff also performed pilot inspections at 8 sites to verify proper implementation of the SBO rule.

Based on the outcomes of those inspections the NRC staff concluded that the industry was properly implementing the rule. Each light-water-cooled nuclear power plant licensed to operate must be able to withstand for a specified duration and recover from a station blackout (as defined in 10 CFR 50.2). Forty-four (44) U.S. reactors rely on battery power (4-hour coping) and sixty (60) have opted to use an alternate AC source (4 to 16 hour coping) to cope with a SBO. The NRC staff reviewed the responses from every nuclear power plant and issued a SER accepting the proposed coping methods. Studies conducted by the NRC have shown that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in significant risk reduction and have further enhanced defense in depth. The NRC plans to carefully evaluate the lessons learned from the events in Japan to determine if enhancements to the station blackout rule are warranted.

Staff issued implementation guidance, Regulatory Guide (RG) 1.155, "Station Blackout," issued August 1988. Industry Issued SBO Rule Implementation Guidance NUMARC 87-00. During License renewal of power plants, staff reviewed aging management of SBO SSCs. SBO Rule requires that each light-water-cooled nuclear power plant licensed to operate under this part, each light-water-cooled nuclear power plant must be able to withstand for a specified duration and recover from a station blackout as defined in § 50.2. The specified station blackout duration shall be based on the following factors:

- (iv) The redundancy of the onsite emergency ac power sources;
- (v) The reliability of the onsite emergency ac power sources;
- (vi) The expected frequency of loss of offsite power; and
- (vii) The probable time needed to restore offsite power.

SBO Rule also requires that the reactor core and associated coolant, control, and protection systems, including station batteries and any other necessary support systems, must provide sufficient capacity and capability to ensure that the core is cooled and appropriate containment integrity is maintained in the event of a station blackout for the specified duration. The capability for coping with a station blackout of specified duration shall be determined by an appropriate coping analysis. Licensees are expected to have the baseline assumptions, analyses, and related information used in their coping evaluations available for NRC review. Currently, all plants are in compliance with 50.63, "Loss of all Alternating current Power". **All U.S. plants have the capability, capacity, and operating procedures in place to cope with a station blackout event.**

Additional reference: NUREG/CR-6890 (2005), "Reevaluation of Station Blackout Risk at Nuclear Power Plants."

Other useful resources:

- **Piping systems:**
 - A paper was published in the Journal of Pressure Vessel Technology (May 1995, Volume 117) that provides a regulatory perspective on appropriate seismic loading stress criteria for advanced light-water reactor (ALWR) piping systems. It discusses the comprehensive review program by NRC and industry to develop appropriate design criteria for piping systems in ALWRs.
 - A note from the paper's author (David Terao): In light of the recent Tohoku earthquake, I thought it might be interesting to see what our (NRC's) thoughts on piping seismic design were at that time. In reading it after all these years, I find it provides a regulatory perspective that is still relevant and meaningful today.

Acronyms

A4NR – Alliance For Nuclear Responsibility
AAC – Alternate Alternating Current (AC)
ABWR (ABWRs) – Advanced Boiling Water Reactor(s)
ACRS – Advisory Committee on Reactor Safeguards
ACI – American Institute of Concrete
ADAMS – Agency wide Documents Access and Management System
AEF – Annual Exceedance Frequency
AISC – American Institute of Steel Construction
ANS – American Nuclear Society
ASME – American Society of Mechanical Engineers
B&PV – Boiler and Pressure Vessel
BWR (BWRs) – Boiling Water Reactor(s)
CAV – Cumulative Absolute Velocity
CCF – Common-Cause Failure
CEUS – Central and Eastern United States
CEUS-SSC – Central and Eastern United States Seismic Source Characterization
CDF – Core Damage Frequency
CDFM – Conservative Deterministic Failure Method
CFR – Code of Federal Regulations
COL – Combined License
COLA – Combined License Application
CSDRS – Certified Seismic Design Response Spectra
DART – Deep-ocean Assessment and Reporting of Tsunamis
DBE – Design Basis Earthquake
DBF – Design Basis Flood
DBGM – Design Basis Ground Motion
DC – Diablo Canyon, or Design Certification
DCD – Design Control Document
DCNPP – Diablo Canyon Nuclear Power Plant
DOE – Department of Energy
DORL – Division of Operating Reactor Licensing
EAL (EALs) – Emergency Action Level(s)
EDG (EDGs) – Emergency Diesel Generator(s)
EOP (EOPs) – Emergency Operating Procedure(s)
EPRI – Electric Power Research Institute
EPRI SMA – Electric Power Research Institute Seismic Margin Assessment
ESP (ESPs) – Early Site Permit(s)
FBR – Fast Breeder Reactor
FEMA – Federal Emergency Management Agency
FOSID – Frequency of Onset of Significant Inelastic Deformation
FSAR (FSARs) – Final Safety Analysis Report(s)
GDC – General Design Criterion
GMPE – Ground Motion Prediction Equation
GI – Generic Issue
GIP – Generic Issues Program

GIS – Graphic Information System
GL – Generic Letter
GMRS – Ground Motion Response Spectra
HCLPF – High Confidence of Low Probability of Failure
HMR – Hydrometeorological Reports
HQ – Headquarters
IAEA – International Atomic Energy Agency
ICM – Interim Compensatory Measures
IE (IEs) – Internal Event(s), or Initiating Event(s)
IEEE – Institute of Electrical and Electronics Engineers
IP – Office of International Programs
IPEEE (IPEEEs) – Individual plant examination for external event(s)
IRIS – Incorporated Research Institutions for Seismology
ISLOCA – Interfacing Systems Loss-of-Coolant Accident
KKNPP – Kashiwazaki-Kariwa Nuclear Power Plant
LERF – Large Early Release Frequency
LIC – a type of NRC document
LOCA – Loss-of-Coolant Accident
LOSP – Loss of Offsite Power
LTSBO – Long-Term Station Blackout
MLLW – Mean Lower Low Water
MLLWL – Mean Lower Low Water Line
MLW – Mean Low Water
MMI – Modified Mercalli Intensity
MSL – MEAN Sea Level
MSNBC – Microsoft/National Broadcasting Company
N/A (n/a) – Not applicable
NFPA – National Fire Protection Association
NISA – Nuclear and Industrial Safety Agency
NOAA – National Oceanic and Atmospheric Administration
NPP (NPPs) – Nuclear Power Plant(s)
NRC – Nuclear Regulatory Commission
NRO – Office of New Reactors
NRR – Office of Reactor Regulations
NSF – National Science Foundation
NUREG – NRC Regulatory Guidance Document
NWS – National Weather Service
OBE – Operating-Basis Earthquake
OPA – Office of Public Affairs
OSID – Onset of Significant Inelastic Deformation
PDF – Portable Document Format
PF – Target Performance Goal
PGA – Peak Ground Acceleration
PMEL – Pacific Marine Environmental Laboratory
PMF – Probable Maximum Flood
PMH – Probable Maximum Hurricane
PMP – Probable Maximum Precipitation
PMT – Probable Maximum Tsunami

PRA – Probabilistic Risk Assessment
PSA – Probabilistic Safety Assessment
PSHA – Probabilistic Seismic Hazard Analysis
PWR (PWRs) – Pressurized Water Reactor(s)
QME – Qualification of Active Mechanical Equipment
Q&As – Questions and Answers
RCP (RCPs) – Reactor Cooling Pump(s)
RCS – Reactor Coolant System
RES – Office of Nuclear Regulatory Research
RG – Regulatory Guide
RIL – Research Information Letter
RLE – Review Level Earthquake
RSZ – Ramapo Source Zone
SAMG (SAMGs) – Severe Accident Mitigation Guidelines(s)
SBO – Station blackout
SCDF – Seismic Core Damage Frequency
SCEC – Southern California Earthquake Center
SCR – Stable Continental Region
SDC – Seismic Design Category
SEL – Seismic Equipment List
SMA – Seismic Margin Assessment
SONGS – San Onofre Nuclear Generating Station
SPRA – Seismic Probabilistic Risk Assessment
SRA – Seismic Risk Assessment
 S_s, S_1, S_2 – Specified Earthquake Ground Motions
SSC (SSCs) – Seismic Source Characteristics (Characterizations), or Structure, System, or Component
SSE – Safe Shutdown Earthquake
SSEL – Safe Shutdown Equipment List
SSHAC – Senior Seismic Hazard Analysis Committee
SZ – Seismic Zone
TEPCO – Tokyo Electric Power Company
UCERF – Uniform California Earthquake Rupture Forecast
UHRs (UHS) – Uniform Hazard Response Spectra
US – United States
USACE – United States Army Corps of Engineers
USGS – United States Geological Survey
VCT – Volume Control Tank
VDC – Volts Direct Current (DC)

Terms and Definitions

Acceptable Method – In many places, this standard contains statements indicating that a certain reference provides an “acceptable method” for satisfying the intent of a given requirement. The plain meaning of such a statement is that the referenced method is one way to meet the given requirement. The intent is to be permissive, meaning that the analysis team can use another method, if justified, without prejudice. However, it is important to understand that the intent of the standard goes beyond the plain meaning, as follows: Whenever the phrasing “acceptable method” is used, the intent is that if the analysis uses another method, the other method must satisfy the stated requirement with a comparable level of conservatism considering a similar level of details pertinent to the analysis scope. It is not acceptable to use another method that does not satisfy the requirement at least as well as the acceptable method would satisfy it. Whenever an alternative to the acceptable method is selected, it is understood that the peer review team will pay particular attention to this topic.

Accident Consequences – The extent of plant damage or the radiological release and health effects to the public or the economic costs of a core damage accident.

Accident Sequence – A representation in terms of an initiating event (IE) followed by a sequence of failures or successes of events (such as system, function, or operator performance) that can lead to undesired consequences, with a specified end state (e.g., core damage or large early release).

Accident Sequence Analysis – The process to determine the combinations of IEs, safety functions, and system failures and successes that may lead to core damage or large early release.

Active or Seismogenic Fault – ~~need to add definition of active fault~~

Aleatory Variability (or Aleatory Uncertainty) – The variability inherent in a nondeterministic (i.e., stochastic, random) phenomenon. Aleatory variability is accounted for by modeling the phenomenon in terms of a probability model. In principle, aleatory uncertainty cannot be reduced by the accumulation of more data or additional information, but the detailed characteristics of the probability model can be improved. Sometimes aleatory variability is called “randomness.”

Annual Exceedance Frequency (AEF) – Number of times per year that a site’s ground motion is expected to exceed a specified acceleration.

Area Source – An area at the surface of the earth’s crust that is assumed to have experienced relatively uniform earthquake source characteristics for use in the PSHA. (See also “Volumetric Source Zone”.)

At Power – Those plant operating states characterized by the reactor being critical and producing power, with automatic actuation of critical safety systems not blocked and with essential support systems aligned in their normal power operation configuration.

Background Source Zone – A part of the earth’s crust, usually of large surface area dimension, within which potentially damaging earthquakes could occur that are not associated either with known fault sources or even with the uniform pattern, rate, or style of deformation or seismicity commonly identified with volumetric seismic source zones. In PSHA calculations, earthquakes that cannot be associated with other sources default to a background source zone.

Basic Event – An event in a fault tree model that requires no further development, because the appropriate limit of resolution has been reached.

Bounding Analysis – Analysis that uses assumptions such that the assessed outcome will meet or exceed the maximum severity of all credible outcomes.

Capable Tectonic Source – A capable tectonic source is a tectonic structure that can generate both vibratory ground motion and tectonic surface deformation such as faulting or folding at or near the earth’s surface in the present seismotectonic regime. It is described by at least one of the following characteristics:

1. presence of surface or near-surface deformation of landforms or geologic deposits of a recurring nature within the last approximately 500,000 years or at least once in the last approximately 50,000 years
2. a reasonable association with one or more moderate to large earthquakes or sustained earthquake activity that are usually accompanied by significant surface deformation
3. a structural association with a capable tectonic source that has characteristics of either item a or b (above), such that movement on one could be reasonably expected to be accompanied by movement on the other

In some cases, the geological evidence of past activity at or near the ground surface along a potential capable tectonic source may be obscured at a particular site. This might occur, for example, at a site having a deep overburden. For these cases, evidence may exist elsewhere along the structure from which an evaluation of its characteristics in the vicinity of the site can be reasonably based. Such evidence is to be used in determining whether the structure is a capable tectonic source within this definition. Notwithstanding the foregoing paragraphs, the association of a structure with geological structures that are at least pre-Quaternary, such as many of those found in the central and eastern regions of the United States, in the absence of conflicting evidence, will demonstrate that the structure is not a capable tectonic source within this definition.

CDFM Method – Refers to the Conservative Deterministic Failure Margin (CDFM) method as described in EPRI NP-6041-56, Rev. 1 wherein the seismic margin of the component is calculated using a set of deterministic rules that are more realistic than the design procedures.

Central and Eastern United States (CEUS) – That portion of the United States east of the Rocky Mountains (approximately the 104th parallel).

Certified Seismic Design Response Spectra (CSDRS) – Site-independent seismic design response spectra that have been approved under Subpart B of 10 CFR Part 52 as the seismic design response spectra for an approved certified standard design nuclear power plant. The input or control location for the CSDRS is specified in the certified standard design.

Combined License – A combined construction permit and operating license with conditions for a nuclear power facility issued pursuant to Subpart C of 10 CFR Part 52.

Common-Cause Failure (CCF) – A failure of two or more components during a short period of time as a result of a single shared cause.

Component – An item in a nuclear power plant, such as a vessel, pump, valve, or circuit breaker.

Composite Variability – The composite variability includes the aleatory (randomness) uncertainty (β_R) and the epistemic (modeling and data) uncertainty (β_U). The logarithmic standard deviation of composite variability, β_c , is expressed as $(\beta_R^2 + \beta_U^2)^{1/2}$.

Containment Analysis – The process to evaluate the failure thresholds or leakage rates of the containment.

Containment Failure – Loss of integrity of the containment pressure boundary from a core damage accident that results in unacceptable leakage of radionuclides to the environment.

Controlling Earthquakes – Earthquakes used to determine spectral shapes or to estimate ground motions at the site for some methods of dynamic site response. There may be several controlling earthquakes for a site. As a result of the probabilistic seismic hazard analysis (PSHA), controlling earthquakes are characterized as mean magnitudes and distances derived from a deaggregation analysis of the mean estimate of the PSHA.

Core Damage Frequency (CDF) – Expected number of core damage events per unit of time.

Core Damage – Refers to the uncovering and heat-up of the reactor core, to the point that prolonged oxidation and severe fuel damage are not only anticipated but also involve enough of the core to result

in off-site public health effects if released. *Seismic core damage frequency* refers to the component of total CDF that is due to seismic events.

Cumulative Absolute Velocity (CAV) – For each component of the free-field ground motion, the CAV should be calculated as follows: (1) the absolute acceleration (g units) time-history is divided into 1-second intervals, (2) each 1-second interval that has at least 1 exceedance of 0.025g is integrated over time, and (3) all the integrated values are summed together to arrive at the CAV. The CAV is exceeded if the calculation is greater than 0.16 g-second. The application of the CAV in siting requires the development of a CAV model because the PSHA calculation does not use time histories directly.

Deaggregation – The process for determining the fractional contribution of each magnitude-distance pair to the total seismic hazard. To accomplish this, a set of magnitude and distance bins are selected and the annual probability of exceeding selected ground acceleration parameters from each magnitude-distance pair is computed and divided by the total probability for earthquakes.

Dependency – Requirement external to an item and upon which its function depends and is associated with dependent events that are determined by, influenced by, or correlated to other events or occurrences.

Design Basis Earthquake (DBE) or Safe Shutdown Earthquake (SSE) – A *design basis earthquake* is a commonly employed term for the *safe shutdown earthquake (SSE)*; the SSE is the earthquake ground shaking for which certain structures, systems, and components are designed to remain functional. In the past, the SSE has been commonly characterized by a standardized spectral shape associated with a peak *ground acceleration* value.

Design Factor – The ratio between the site-specific GMRS and the UHRS. The design factor is aimed at achieving the target annual probability of failure associated with the target performance goals.

Distribution System – Piping, raceway, duct, or tubing that carries or conducts fluids, electricity, or signals from one point to another.

Early Site Permit (ESP) – A Commission approval, issued pursuant to Subpart A of 10 CFR Part 52, for a site or sites for one or more nuclear power facilities.

Earthquake Recurrence – The frequency of occurrence of earthquakes as a function of magnitude. Recurrence relationships or curves are developed for each seismic source, and they reflect the frequency of occurrence (usually expressed on an annual basis) of magnitudes up to the maximum, including measures of uncertainty.

Epicenter – The point on the earth's surface directly above the focus (i.e., hypocenter) of the earthquake source.

Epistemic Uncertainty – Uncertainty attributable to incomplete knowledge about a phenomenon that affects the ability to model it. Epistemic uncertainty is captured by considering a range of model parameters within a given expert interpretation or multiple expert interpretations and each of which is assigned an associated weight representing statistical confidence in the alternatives. In principle, epistemic uncertainty can be reduced by the accumulation of additional information associated with the phenomenon. The uncertainty in the parameters of the probability distribution of a random phenomenon is epistemic.

Event Tree – A logic diagram that begins with an IE or condition and progresses through a series of branches that represent expected system or operator performance that either succeeds or fails and arrives at either a successful or failed end state.

External Event – An IE originating outside a nuclear power plant that causes safety system failures, operator errors, or both, that in turn may lead to core damage or large early release. Events such as earthquakes, tornadoes, and floods from sources outside the plant and fires from sources inside or outside the plant are considered external events (see also internal event). By convention, LOSP not caused by another external event is considered by convention to be an internal event.

Failure Mechanism – Any of the processes that result in failure modes, including chemical, electrical, mechanical, physical, thermal, and human error.

Failure Mode – A specific functional manifestation of a failure (i.e., the means by which an observer can determine that a failure has occurred) by precluding the successful operation of a piece of equipment, a component, or a system (e.g., fails to start, fails to run, leaks).

Failure Probability – The likelihood that an SSC will fail to operate upon demand or fail to operate for a specific mission time.

Failure Rate – Expected number of failures per unit of time, evaluated, for example, by the ratio of the number of failures in a total population of components to the total time observed for that population.

Fault – A fracture in the earth along which blocks of crust on either side have moved with respect to one another.

Fault Source – A fault or zone for which the tectonic features causing earthquakes have been identified. These are usually individual faults, but they may be zones comprising multiple faults or regions of faulting if surface evidence of these faults is lacking but the faults are suspected from seismicity patterns, tectonic interpretations of crustal stress and strain, and other evidence. Regions of blind thrust faults are a good example of the latter.

Fault Tree – A deductive logic diagram that depicts how a particular undesired event can occur as a logical combination of other undesired events.

Fractile Hazard Curve – Epistemic uncertainty is expressed by a distribution of exceedence probability values; a distribution of hazard curves, rather than a single value; or a single curve. In a fractile hazard curve, all the points on the curve correspond to the same fractile of the distribution of the probability of exceedence. A 5% percentile hazard curve indicates that we have a 5% confidence that the calculated hazard would be less than that given by the curve. A 95% percentile hazard curve indicates that we are 95% confident that the hazard is below the hazard given by the hazard curve.

Fragility – Fragility of an SSC is the conditional probability of its failure at a given hazard input level. The input could be earthquake motion, wind speed, or flood level. The fragility model used in seismic PRA is known as a double lognormal model with three parameters, A_m , b_R , and b_U , which are, respectively, the median acceleration capacity, the logarithmic standard deviation of the aleatory (randomness) uncertainty in capacity, and the logarithmic standard deviation of the epistemic (modeling and data) uncertainty in the median capacity.

Frequency of Onset of Significant Inelastic Deformation (FOSID) – The annual probability of the onset of significant inelastic deformation (OSID). OSID is just beyond the occurrence of insignificant (or localized) inelastic deformation, and in this way corresponds to “essentially elastic behavior.” As such, OSID of a

structure, system, or component (SSC) can be expected to occur well before seismically induced core damage, resulting in much larger frequencies of OSID than seismic core damage frequency (SCDF) values. In fact, OSID occurs before SSC “failure,” where the term failure refers to impaired functionality.

Ground Acceleration – Acceleration produced at the ground surface by seismic waves, typically expressed in units of g , the acceleration of gravity at the earth’s surface.

Ground Motion Response Spectra (GMRS) – A site-specific ground motion response spectra characterized by horizontal and vertical response spectra determined as free-field motions on the ground surface or as free-field outcrop motions on the uppermost in-situ competent material using performance-based procedures. When the GMRS are determined as free-field outcrop motions on the uppermost in-situ competent material, only the effects of the materials below this elevation are included in the site response analysis.

Ground Motion Slope Ratio – Ratio of the spectral accelerations, frequency by frequency, from a seismic hazard curve corresponding to a 10-fold reduction in hazard exceedance frequency. (See Equation 3 in Regulatory Position 5.1.)

Hazard – The physical effects of a natural phenomenon such as flooding, tornado, or earthquake that can pose potential danger (for example, the physical effects such as ground shaking, faulting, landsliding, and liquefaction that underlie an earthquake’s potential danger).

Hazard (as used in probabilistic hazard assessment) – Represents the estimate of expected frequency of exceedance (over some specified time interval) of various levels of some characteristic measure of a natural phenomenon [for example, peak ground acceleration (PGA) to characterize ground shaking from earthquakes]. The time period of interest is often taken as 1 year, in which case the estimate is called the annual frequency of exceedance.

Hazard Curve – A curve that gives the probability of a certain ground motion parameter (usually the PGA, PGV, or response spectral values) being exceeded. Hazard curves are generally generated for periods of exposure of one year, and they give annual probabilities of exceedence.

HCLPF Capacity – Refers to the High Confidence of Low Probability of Failure capacity, which is a measure of seismic margin. In seismic PRA, this is defined as the earthquake motion level at which there is a high (95 percent) confidence of a low (at most 5 percent) probability of failure. Using the lognormal fragility model, the HCLPF capacity is expressed as $A_m \exp[-1.65(\beta_R + \beta_U)]$. When the logarithmic standard deviation of composite variability β_C is used, the HCLPF capacity could be approximated as the ground motion level at which the composite probability of failure is at most 1 percent. In this case, HCLPF capacity is expressed as $A_m \exp[-2.33\beta_C]$. In deterministic SMAs, the HCLPF capacity is calculated using the CDFM method.

High Confidence of Low Probability of Failure (HCLPF) Capacity – A measure of seismic margin. In seismic risk assessment, HCLPF capacity is defined as the earthquake motion level, at which there is high confidence (95%) of a low probability (at most 5%) of failure of a structure, system, or component.

High Winds – Tornadoes, hurricanes (or cyclones or typhoons as they are known outside the United States), extratropical (thunderstorm) winds, and other wind phenomena depending on the site location.

Hypocenter – The point of the earth’s crust where a rupture initiates, creating an earthquake.

In-column Motion – Motion that is within a soil column, as opposed to the motion at the surface or treated as if it is at the surface.

Initiating Event (IE) – Any event either internal or external to the plant that perturbs the steady-state operation of the plant, if operating, thereby initiating an abnormal event such as a transient or loss-of-coolant accident (LOCA) within the plant. Initiating events trigger sequences of events that challenge plant control and safety systems whose failure could potentially lead to core damage or large early release.

Intensity – The intensity of an earthquake is a qualitative description of the effects of the earthquake at a particular location, as evidenced by observed effects on humans, on human-built structures, and on the earth's surface at a particular location. Commonly used scales to specify intensity are the Rossi-Forel, Mercalli, and Modified Mercalli. The Modified Mercalli Intensity (MMI) scale describes intensities with values ranging from I to XII in the order of severity. MMI of I indicates an earthquake that was not felt except by a very few, whereas MMI of XII indicates total damage of all works of construction, either partially or completely.

Interfacing Systems LOCA (ISLOCA) – A loss-of-coolant accident (LOCA) when a breach occurs in a system that interfaces with the reactor coolant system (RCS), where isolation between the breached system and the RCS fails. An ISLOCA is usually characterized by the overpressurization of a low-pressure system when subjected to RCS pressure and can result in containment bypass.

Internal Event – An event originating within a nuclear power plant that in combination with safety system failures, operator errors, or both, can affect the operability of plant systems and may lead to core damage or large early release. By convention, loss of off-site power not caused by an external event is considered to be an internal event, and internal fire is considered to be an external event.

Key Assumption – An assumption made in response to a key source of uncertainty in the knowledge that a different reasonable alternative assumption would produce different results, or an assumption that results in an approximation made for modeling convenience in the knowledge that a more detailed model would produce different results. For the base PRA, the term “different results” refers to a change in the plant risk profile (e.g., total CDF and total LERF, the set of initiating events and accident sequences that contribute most to CDF and to LERF) and the associated changes in insights derived from the changes in risk profile. A “reasonable alternative” assumption is one that has broad acceptance within the technical community and for which the technical basis for consideration is at least as sound as that of the assumption being challenged.

Key Source of Uncertainty – A source of uncertainty that is related to an issue for which there is no consensus approach or model and where the choice of approach or model is known to have an impact on the risk profile (e.g., total CDF and total LERF, the set of initiating events and accident sequences that contribute most to CDF and LERF) or a decision being made using the PRA. Such an impact might occur, for example, by introducing a new functional accident sequence or a change to the overall CDF or LERF estimates significant enough to affect insights gained from the PRA.

Large Early Release – The rapid, unmitigated release of airborne fission products from the containment to the environment occurring before the effective implementation of off-site emergency response and protective actions, such that there is a potential for early health effects.

Large Early Release Frequency (LERF) – The expected number of large early releases per unit of time. A *large early release* is the rapid, unmitigated release of airborne fission products from the containment building to the environment, occurring before the effective implementation of off-site emergency

response and protective actions, such that there is a potential for early health effects. *Seismic large early release frequency* refers to the component of total LERF that is due to seismic events.

Level 1 Analysis – Identification and quantification of the sequences of events leading to the onset of core damage.

Level 2 Analysis – Evaluation of containment response to severe accident challenges and quantification of the mechanisms, amounts, and probabilities of subsequent radioactive material releases from the containment.

Liquefaction – The sudden loss of shear strength and rigidity of saturated, cohesionless soils, due to steady-state groundwater flow or vibratory ground motion. The term “seismic liquefaction” is used in this standard for liquefaction phenomena induced by seismic motions.

Magnitude – An earthquake’s magnitude is a measure of the strength of the earthquake as determined from seismographic observations and is an objective, quantitative measure of the size of an earthquake. The magnitude can be expressed in various ways based on seismographic records (e.g., Richter Local Magnitude, Surface Wave Magnitude, Body Wave Magnitude, and Moment Magnitude). Currently, the most commonly used magnitude measurement is the Moment Magnitude, M_w , which is based on the seismic moment computed as the rupture force along the fault multiplied by the average amount of slip, and thus is a direct measure of the energy released during an earthquake.

Maximum Magnitude – The maximum magnitude is the upper bound to earthquake recurrence curves.

Median Hazard Curve – Corresponds to a 50%, or the 50th fractile, hazard curve.

Mean Hazard Curve – Corresponds to the mean of the probability distribution of hazard curves.

Mean Site Amplification Function – The mean amplification function is obtained for each controlling earthquake, by dividing the response spectrum from the computed surface motion by the response spectrum from the input hard rock motion, and computing the arithmetic mean of the individual response spectral ratios.

Nontectonic Deformation – Nontectonic deformation is distortion of surface or near-surface soils or rocks that is not directly attributable to tectonic activity. Such deformation includes features associated with subsidence, karst terrain, glaciation or deglaciation, and growth faulting.

Operating-Basis Earthquake (OBE) – To satisfy the requirements of paragraph IV(a)(2)(A) of Appendix S to 10 CFR Part 50, the operating-basis earthquake (OBE) ground motion is defined as follows:

- For the certified design portion of the plant, the OBE ground motion is one-third of the CSDRS.
- For the safety-related noncertified design portion of the plant, the OBE ground motion is one-third of the design motion response spectra, as stipulated in the design certification conditions specified in design control document (DCD).
- The spectrum ordinate criterion to be used in conjunction with Regulatory Guide 1.166, “Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Post-earthquake Actions,” issued March 1997, is the lowest of (i) and (ii).

That earthquake ground motion that, when exceeded (along with a CAV value exceedance) requires shutdown of the plant. In the past, the OBE was commonly chosen to be one-half of the safe shutdown earthquake (SSE). However, newer guidance sets the OBE at 1/3 of the SSE unless additional calculations are performed.

Peak Ground Acceleration (PGA) – Maximum absolute value of acceleration displayed on an accelerogram, the largest ground acceleration produced by an earthquake at a site.

Peak Ground Displacement – The largest ground displacements produced by an earthquake at a site.

Peak Ground Velocity – The largest ground velocity produced by an earthquake at a site.

Plant – A general term used to refer to a nuclear power facility (for example, “plant” could be used to refer to a single unit or multiunit site).

Point Estimate – Estimate of a parameter in the form of a single number.

Probabilistic Risk Assessment (PRA) – A qualitative and quantitative assessment of the risk associated with plant operation and maintenance that is measured in terms of frequency of occurrence of risk metrics, such as core damage or a radioactive material release and its effects on the health of the public [also referred to as a probabilistic safety assessment (PSA)].

Probability of Exceedence – The probability that a specified level of seismic hazard will be exceeded at a site or in a region during a specified exposure time.

PRA Configuration Control Plan – The process and document used by the owner of the PRA to define the PRA technical elements that are to be periodically maintained and/or upgraded and to document the methods and strategies for maintenance and upgrading of those PRA technical elements.

Randomness (as used in seismic-fragility analysis) – The variability in seismic capacity arising from the randomness of the earthquake characteristics for the same acceleration and to the structural response parameters that relate to these characteristics. Also see “Aleatory Variability.”

Response Spectrum – A plot of the maximum responses (acceleration, velocity, or displacement) of idealized single-degree-of-freedom oscillators as a function of the natural frequencies of the oscillators for a given damping value. The response spectrum is calculated for a specified vibratory motion input at the oscillators’ supports.

Review Level Earthquake (RLE) – An earthquake larger than the plant SSE and is chosen in seismic margin assessment (SMA) for initial screening purposes. Typically, the RLE is defined in terms of a ground motion spectrum. (Note—A majority of plants in the Eastern and Midwestern United States have conducted SMA reviews for an RLE of 0.3g PGA anchored to a median NUREGOCR-0098 spectrum.)

Ring Area – Annular region bounded by radii associated with the distance rings used in hazard deaggregation (RG 1.208, Appendix D, Table D.1, “Recommended Magnitude and Distance Bins”).

Risk – Probability and consequences of an event, as expressed by the “risk triplet” that is the answer to the following three questions: (a) What can go wrong? (b) How likely is it? and (c) What are the consequences if it occurs?

Safe Shutdown Earthquake Ground Motion (SSE) – The vibratory ground motion for which certain structures, systems, and components are designed, pursuant to Appendix S to 10 CFR Part 50, to remain functional. The SSE for the site is characterized by both horizontal and vertical free-field ground motion response spectra at the free ground surface. [paragraph IV(a)(1)(i) of Appendix S, “Earthquake Engineering Criteria for Nuclear Power Plants,” to Title 10, Part 50, “Domestic Licensing of Production and Utilization Facilities,” of the Code of Federal Regulations (10 CFR Part 50).]
Staff’s current guidance on SSE is found in Regulatory Guide 1.208 (2007)

Safe Shutdown Equipment List (SSEL) – The list of all SSCs that require evaluation in the seismic-margins-calculation task of an SMA. Note that this list can be different from the seismic equipment list (SEL) used in a seismic PRA.

Safety Function – Function that must be performed to control the sources of energy in the plant and radiation hazards.

Safety Related – SSCs that are relied upon to remain functional during and following design-basis events to ensure (a) the integrity of the reactor coolant pressure boundary, (b) the capability to shut down the reactor and maintain it in a safe shutdown condition, or (c) the capability to prevent or mitigate the consequences of accidents that could result in potential off-site exposures comparable to the applicable exposures established by the regulatory authority.

Safety Systems – Those systems that are designed to prevent or mitigate a design-basis accident.

Screening Analysis – An analysis that eliminates items from further consideration based on their negligible contribution to the frequency of an accident or of its consequences.

Screening Criteria – The values and conditions used to determine whether an item is a negligible contributor to the probability of an accident sequence or its consequences.

Seismic Design Category (SDC) – A category assigned to an SSC that is a function of the severity of adverse radiological and toxicological effects of the hazards that may result from the seismic failure of the SSC on workers, the public, and the environment. SSCs may be assigned to SDCs that range from 1 through 5. For example, a conventional building whose failure may not result in any radiological or toxicological consequences is assigned to SDC-1; a safety-related SSC in a nuclear material processing facility with a large inventory of radioactive material may be placed in SDC-5. In this standard, the term SDC has a different meaning than in the International Building Code. ANSI/ANS-2.26-2004 [1] provides guidance on the assignment of SSCs to SDCs.

Seismic Equipment List (SEL) – The list of all SSCs that require evaluation in the seismic-fragilities task of a seismic PRA. Note that this list can be different from the SSEL used in an SMA.

Seismic Hazard – Any physical phenomenon, such as ground motion or ground failure, that is associated with an earthquake and may produce adverse effects on human activities (such as posing a risk to a nuclear facility).

Seismic margin – The difference between a plant's capacity and its seismic design basis (*safe shutdown earthquake, or SSE*).

Seismic Margin Assessment (SMA) – The process or activity to estimate the seismic margin of the plant and to identify any seismic vulnerabilities in the plant. This is described further in Appendix C.

Seismic Risk – The risk (frequency of occurrence multiplied by its consequence) of severe earthquake-initiated accidents at a nuclear power plant. A severe accident is an accident that causes core damage, and, possibly, a subsequent release of radioactive materials into the environment. Several risk metrics may be used to express *seismic risk*, such as *seismic core damage frequency* and *seismic large early release frequency*.

Seismic Source – A general term referring to both seismogenic sources and capable tectonic sources. A seismogenic source is a portion of the earth assumed to have a uniform earthquake potential (same expected maximum earthquake and recurrence frequency), distinct from the seismicity of the surrounding regions. A capable tectonic source is a tectonic structure that can generate both vibratory ground motion and tectonic surface deformation such as faulting or folding at or near the earth's surface. In a probabilistic seismic hazard analysis (PSHA), all seismic sources in the site region with a potential to contribute to the frequency of ground motions (i.e., the hazard) are considered.

Seismic Spatial Interaction – An interaction that could cause an equipment item to fail to perform its intended safety function. It is the physical interaction of a structure, pipe, distribution system, or other equipment item with a nearby item of safety equipment caused by relative motions from an earthquake. The interactions of concern are (a) proximity effects, (b) structural failure and falling, and (c) flexibility of attached lines and cables.

Seismic Source Characteristics (SSC) – The parameters that characterize a seismic source for PSHA, including source geometry, probability of activity, maximum magnitude, and earthquake recurrence.

Seismic Wave Transmission (Site Amplification) – The amplification (increase or decrease) of earthquake ground motion by rock and soil near the earth's surface in the vicinity of the site of interest. Topographic effects, the effect of the water table, and basin edge wave-propagation effects are sometimes included under site response.

Seismogenic Crust – The brittle portion of the earth's crust capable of generating earthquakes.

Seismogenic Source – A portion of the earth that is assumed to have a uniform earthquake potential (same expected maximum earthquake and recurrence frequency), distinct from that of surrounding sources. A seismogenic source will generate vibratory ground motion but is assumed to not cause surface displacement. Seismogenic sources cover a wide range of seismotectonic conditions, from a well-defined tectonic structure to simply a large region of diffuse seismicity.

Seismotectonic – Rock-deforming processes and resulting structures and seismicity that occur over large sections of the earth's crust and upper mantle.

Senior Seismic Hazard Analysis Committee (SSHAC) – A committee sponsored by the NRC, DOE, and EPRI to review the state of the art and improve the overall stability of the PSHA process. SSHAC [4] concluded that most of the differences were consequences of differences in the process of elicitation of the information from experts. SSHAC made recommendations on the process, which are now almost uniformly adopted by analysts worldwide.

Severe Accident – An accident that usually involves extensive core damage and fission product release into the reactor vessel, containment, or the environment.

Shall, Should, and May – The word "shall" is used to denote a requirement; the word "should" is used to denote a recommendation; and the word "may" is used to denote permission, neither a requirement nor a recommendation.

Required Plant Shutdown Criteria – Appendix S to 10 CFR Part 50 (3) has the following information: Required Plant Shutdown. If vibratory ground motion exceeding that of the Operating Basis Earthquake Ground Motion or if significant plant damage occurs, the licensee must shut down the nuclear power plant. If systems, structures, or components necessary for the safe shutdown of the nuclear power plant are not available after the occurrence of the Operating Basis Earthquake Ground Motion, the licensee must consult with the Commission and must propose a plan for the timely, safe shutdown of the nuclear power plant. Prior to resuming operations, the licensee must demonstrate to the Commission that no functional damage has occurred to those features necessary for continued operation without undue risk to the health and safety of the public and the licensing basis is maintained.

Significant Contributor – (a) In the context of an accident sequence, a significant basic event or an initiating event that contributes to a significant sequence; (b) in the context of an accident progression

sequence, a contributor that is an essential characteristic (e.g., containment failure mode, physical phenomena) of a significant accident progression sequence, and if not modeled would lead to the omission of the sequence.

Significant Basic Event – A basic event that has a Fussell-Vesely importance greater than 0.005 OR a risk-achievement worth greater than 2. significant cutset (relative to sequence): Those cutsets that, when rank ordered by decreasing frequency, comprise 95 percent of the sequence CDF OR that individually contribute more than 1 percent to the sequence CDF.

Significant Cutset (relative to CDF) – Those cutsets that, when rank ordered by decreasing frequency, comprise 95 percent of the CDF OR that individually contribute more than 1 percent to CDF.

Significant Accident Sequence – A significant accident sequence is one of the set of sequences, defined at the functional or systemic level that, when rank ordered by decreasing frequency, comprise 95 percent of the core damage frequency (CDF), OR that individually contribute more than; 1 percent to the CDF.

Significant Accident Progression Sequence – One of a set of containment event tree sequences that, when rank ordered by decreasing frequency, comprise 95 percent of the large early release frequency (LERF), OR that individually contribute more than; 1 percent to the LERF.

Site Response (Amplification) – The amplification (i.e., increase or decrease) of earthquake ground motion by rock and soil near the earth's surface in the vicinity of the site of interest. Topographic effects, the effect of the water table, and basin edge wave-propagation effects are sometimes included under site response.

Spectral Acceleration – Peak acceleration response of an oscillator as a function of period or frequency and damping ratio when subjected to an acceleration time history. It is equal to the peak relative displacement of a linear oscillator of frequency, f , attached to the ground, times the quantity $(2Bf)^2$. It is expressed in units of gravity (g) or cm/second².

Stable Continental Region (SCR) – An SCR is composed of continental crust, including continental shelves, slopes, and attenuated continental crust, and excludes active plate boundaries and zones of currently active tectonics directly influenced by plate margin processes. It exhibits no significant deformation associated with the major Mesozoic-to-Cenozoic (last 240 million years) orogenic belts. It excludes major zones of Neogene (last 25 million years) rifting, volcanism, or suturing.

Stationary Poisson Process – A probabilistic model of the occurrence of an event over time (or space) that has the following characteristics: (1) the occurrence of the event in small intervals is constant over time (or space), (2) the occurrence of two (or more) events in a small interval is negligible, and (3) the occurrence of the event in non-overlapping intervals is independent.

Structure, System, or Component – A "structure" is an element, or a collection of elements, to provide support or enclosure, such as a building, free-standing tanks, basins, dikes, or stacks. A "system" is a collection of components assembled to perform a function, such as piping; cable trays; conduits; or heating, ventilation, and air-conditioning. A "component" is an item of mechanical or electrical equipment, such as a pump, valve, or relay, or an element of a larger array, such as a length of pipe, elbow, or reducer.

Support System – A system that provides a support function (e.g., electric power, control power, or cooling) for one or more other systems.

System Failure – Loss of the ability of a system to perform a modeled function.

Systems Analysis – That portion of the external events PRA analysis that applies to evaluating the impact of external events within the plant PRA model. In this context, the term “systems analysis” encompasses the tasks related to identification of the SSCs to be included in the analysis, event sequence modeling, analysis of the failure of individual system functions within the sequences, and the integration and quantification of the overall PRA model.

Target Performance Goal (PF) – Target annual probability of exceeding the 1 E-05 frequency of onset of significant inelastic deformation (FOSID) limit state.

Tectonic Structure – A large-scale dislocation or distortion, usually within the earth’s crust. Its extent may be on the order of tens of meters (yards) to hundreds of kilometers (miles).

Uncertainty – A representation of the confidence in the state of knowledge about the parameter values and models used in constructing the PRA. Also see “Variability,” “Epistemic Uncertainty,” and “Aleatory Variability.”

Uncertainty (as used in seismic-fragility analysis) – The variability in the median seismic capacity arising from imperfect knowledge about the models and model parameters used to calculate the median capacity.

Uniform Hazard Response Spectrum (UHRS) – A plot of a ground response parameter (for example, spectral acceleration or spectral velocity) that has an equal likelihood of exceedance at different frequencies.

Up to Date – As used in this standard [for example, when the standard speaks of an “up-to-date database” in (HLR-HA-B)], the concept is that a reasonable attempt should be made to use all available data at the time of the application. However, routine updating of the data is not required if the data used reasonably represent what is needed for the application.

Variability – See “Epistemic Uncertainty” and “Aleatory Variability.”

Verify – To determine that a particular action has been performed in accordance with the rules and requirements of this standard, either by witnessing the action or by reviewing records.

Volumetric Source Zone – A volume of the earth’s crust within which future seismicity is assumed to have distributions of source properties and locations of energy release that do not vary in time and space.

Walkdown – Inspection of local areas in a nuclear power plant where SSCs are physically located in order to ensure accuracy of procedures and drawings, equipment location, operating status, and environmental effects or system interaction effects on the equipment that could occur during accident conditions. For seismic-PRA and SMA reviews, the walkdown is explicitly used to confirm preliminary screening and to collect additional information for fragility or margin calculations.

Within Motion – An earthquake record modified for use in a site response model. Within motions are developed through deconvolution of a surface recording to account for the properties of the overburden material at the level at which the record is to be applied. The within motion can also be called the “bedrock motion” if it occurs at a high-impedance boundary where rock is first encountered.

List of Questions

| | |
|--|----------|
| Natural Hazards and Ground Shaking Design Levels | 1 |
| 1) Does the NRC consider earthquakes of magnitude 9? | 1 |
| 2) Did the Japanese underestimate the size of the maximum credible earthquake that could affect the plants? | 1 |
| 3) Can an earthquake and tsunami as large as happened in Japan also happen here? | 1 |
| 4) What if an earthquake like the Sendai earthquake occurred near a US plant? | 1 |
| 5) What magnitude earthquake are US nuclear plants designed to? | 1 |
| 6) How many US reactors are located in active earthquake zones? | 2 |
| 7) Has this changed our perception of earthquake risk to the plants in the US? | 3 |
| 8) Why do we have confidence that US nuclear power plants are adequately designed for earthquakes and tsunamis? | 3 |
| 9) Can significant damage to a nuclear plant like we see in Japan happen in the US due to an earthquake? Are the Japanese nuclear plants similar to US nuclear plants? | 3 |
| 10) If the earthquake in Japan was a larger magnitude than considered by plant design, why can't the same thing happen in the US? | 3 |
| 11) What level of earthquake hazard are the US reactors designed for? | 3 |
| 12) How was the seismic design basis for existing nuclear plants established? | 4 |
| 13) What is the likelihood of the design basis or "SSE" ground motions being exceeded over the life of a nuclear plant? | 4 |
| 14) What is magnitude anyway? What is the Richter Scale? What is intensity? | 4 |
| 15) How do magnitude and ground motion relate to each other? | 5 |
| 16) What is a seismic response spectrum? | 5 |
| 17) Which reactors are along coastal areas that could be affected by a tsunami? | 6 |
| 18) How are combined seismic and tsunami events treated in risk space? Are they considered together? | 6 |
| 19) How are aftershocks treated in terms of risk assessment? | 6 |
| 20) Could a "mega-tsunami" strike the U.S. East Coast as indicated in a recent Washington Post Weather Gang article? | 6 |
| Design Against Natural Hazards & Plant Safety in the US..... | 8 |
| 21) Are US nuclear plants designed for tsunamis? If so, what level of tsunami are they designed for? | 8 |
| 22) Is there a minimum earthquake shaking that nuclear plants are designed for? | 8 |

| | |
|--|-----------|
| 23) Which plants are close to known active faults? What are the faults and how far away are they from the plants? | 8 |
| 24) Is there margin above the design basis? | 8 |
| 25) Are US plants safe? Would a plant in the U.S. be able to withstand a large earthquake? | 9 |
| 26) Could an accident sequence like the one at Japan's Fukushima Daiichi nuclear plants happen in the US? | 9 |
| 27) Should US nuclear facilities be required to withstand earthquakes and tsunamis of the kind just experienced in Japan? If not, why not? | 9 |
| 28) Do any plants have special design considerations associated with seismic design? | 10 |
| 29) How do we know equipment will work if the magnitude is bigger than expected, like in Japan? | 10 |
| 30) How do we know that the equipment in plants is safe in earthquakes? | 10 |
| 31) Are US plants susceptible to the same kind of loss of power as happened in Japan? | 10 |
| 32) How do we know that the emergency diesel generators will not fail to operate like in Japan? | 11 |
| 33) Is there a risk of loss of water during tsunami drawdown? Is it considered in design? | 11 |
| 34) Are aftershocks considered in the design of equipment at the plants? Are aftershocks considered in design of the structure? | 11 |
| 35) Are there any special issues associated with seismic design at the plants? For example, Diablo Canyon has special requirements. Are there any others? | 11 |
| 36) Is the NRC planning to require seismic isolators for the next generation of nuclear power plants? How does that differ from current requirements and/or precautions at existing US nuclear power plants? | 11 |
| 37) Are there any US nuclear power plants that incorporate seismic isolators? What precautions are taken in earthquake-prone areas? | 11 |
| 38) Do you think that the recent Japan disaster will cause any rethinking of the planned seismic isolation guidelines, particularly as it regards earthquakes and secondary effects such as tsunamis? | 12 |
| Seismically Induced Fire | 13 |
| 39) How does the NRC address seismic-induced fire? | 13 |
| 40) Does the NRC require the fire protection water supply system be designed to withstand an earthquake? | 13 |
| 41) How are safe shutdown equipment protected from an oil spill which can cause potential fire? | 13 |
| 42) How are safe shutdown equipment protected from a hydrogen fire? | 14 |

| | |
|---|-----------|
| Seismically Induced Internal Flooding..... | 15 |
| 43) How does the NRC consider seismically induced equipment failures leading to internal flooding? | 15 |
| 44) How is the potential source of internal flooding from the seismically induced equipment failures postulated in the internal flood analysis?..... | 15 |
| 45) Are the non-safety-related equipment failures assumed to occur at the same time? | 15 |
| About Japanese Hazard, Design and Earthquake Impact..... | 17 |
| 46) Was the damage to the Japanese nuclear plants mostly from the earthquake or the tsunami?..... | 17 |
| 47) What was the disposition of the plant during the time after the earthquake struck and before the tsunami arrived? Was there indication of damage to the plant solely from the earthquake (if so, what systems) and did emergency procedures function during this time. | 17 |
| 48) What magnitude earthquake was the plant designed to withstand? For example, what magnitude earthquake was the plant expected to sustain with damage but continued operation? And with an expected shutdown but no release of radioactive material? | 17 |
| 49) Did this reactor sustain damage in the July 16, 2007 earthquake, as the Kashiwazaki power plant did? What damage and how serious was it? | 17 |
| 50) Was the Fukushima power plant designed to withstand a tsunami of any size? What specific design criteria were applied?..... | 18 |
| 51) What is the design level of the Japanese plants? Was it exceeded? | 18 |
| 52) What are the Japanese S_1 and S_2 ground motions and how are they determined?..... | 18 |
| 53) Did this earthquake affect the Kashiwazaki-Kariwa nuclear power plant? | 19 |
| 54) How high was the tsunami at the Fukushima nuclear power plants? | 19 |
| 55) Wikileaks has a story that quotes US embassy correspondence and some un-named IAEA expert stating that the Japanese were warned about this ... Does the NRC want to comment? | 19 |
| Impact at US Nuclear Power Plants During the March 11, 2011 Earthquake and Tsunami? ... | 20 |
| 56) Was there any damage to US reactors from either the earthquake or the resulting tsunami? | 20 |
| 57) Have any lessons for US plants been identified? | 20 |
| 58) It appears that the estimates of the tsunami are changing frequently. The NOAA and TEPCO estimates are different. Why? | 20 |
| 59) How well can we predict a tsunami wave height? What have we learned about our prediction abilities based on the events in Japan?..... | 20 |
| NRC Response and Future Licensing Actions..... | 22 |

| | | |
|--|--|-----------|
| 60) | What is the NRC doing about the emergencies at the nuclear power plants in Japan? Are you sending staff over there? | 22 |
| 61) | With NRC moving to design certification, at what point is seismic capability tested – during design or modified to be site-specific? If in design, what strength seismic event must these be built to withstand? | 22 |
| 62) | What are the near term actions that U.S. plants are taking in consideration of the events in Japan?22 | |
| 63) | What are the immediate steps NRC is taking? | 23 |
| 64) | Should U.S. residents be using Potassium iodide? | 23 |
| Reassessment of US Plants and Generic Issue 199 (GI-199)..... | | 24 |
| 65) | What is Generic Issue 199 about? | 24 |
| 66) | Does the NRC have a position on the MSNBC article that ranked the safety of US plants? .. | 24 |
| 67) | A recent Can we get the rankings of the plants in terms of safety? (Actually this answer should be considered any time GI-199 data is used to “rank” plants) | 24 |
| 68) | What are the current findings of GI-199?..... | 24 |
| 69) | If the plants are designed to withstand the ground shaking why is there so much risk from the design level earthquake..... | 24 |
| 70) | Overall, how would the NRC characterize the CDF numbers? A quirk of numbers? A serious concern?..... | 25 |
| 71) | Describe the study and what it factored in – plant design, soils, previous quakes, etc. | 25 |
| 72) | Explain “seismic curve” and “plant level fragility curve” | 25 |
| 73) | Explain the “weakest link model”. | 25 |
| 74) | What would constitute fragility at a plant? | 26 |
| 75) | Can someone put that risk factor into perspective, using something other than MSNBC’s chances of winning the lottery?..... | 26 |
| 76) | What, if anything, can be done at a site experiencing such a risk? (Or at Limerick in particular.)..... | 26 |
| 77) | Has anyone determined that anything SHOULD be done at Limerick or any of the other PA plants?26 | |
| 78) | Page 20 of the report: This result confirms NRR’s conclusion that currently operating plants are adequately protected against the change in seismic hazard estimates because the guidelines in NRR Office Instruction LIC-504 “Integrated Risk-Informed Decision Making Process for Emergent Issues” are not exceeded. Can someone please explain? | 26 |
| 79) | Is the earthquake safety of US plants reviewed once the plants are constructed? | 26 |
| 80) | Does the NRC ever review tsunami risk for existing plants? | 26 |

| | | |
|---|--|-----------|
| 81) | Does GI-199 consider tsunami? | 27 |
| 82) | Where can I get current information about Generic Issue 199? | 27 |
| 83) | Are all US plants being evaluated as a part of Generic Issue 199? | 27 |
| 84) | Are the plants safe? If you are not sure they are safe, why are they not being shut down? If you are sure they are safe, why are you continuing evaluations related to this generic issue? | 27 |
| 85) | What do you mean by "increased estimates of seismic hazards" at nuclear power plant sites? | 28 |
| 86) | Does the SCDF represent a measurement of the risk of radiation RELEASE or only the risk of core damage (not accounting for secondary containment, etc.)? | 28 |
| 87) | Did an NRC spokesperson tell MSNBC's Bill Dedman that the weighted risk average was invalid and useless? He contends to us that this is the case. | 28 |
| 88) | 3. If it was "invalid" as he claims, why would the USGS include that metric? | 29 |
| 89) | Can you explain the weighted average and how it compares to the weakest link average? | 29 |
| 90) | Ultimately would you suggest using one of the models (average, weighted, weakest link) or to combine the information from all three? | 29 |
| 91) | Were there any other factual inaccuracies or flaws in Mr. Dedman's piece you would like clarify/point out. | 29 |
| 92) | Mr. Dedman infers that the plant quake risk has grown (between the 1989 and 2008 estimates) to the threshold of danger and may cross it in the next study. Is this the NRC's position? | 29 |
| 93) | What document has the latest seismic hazard estimates (probabilistic or not) for existing nuclear power plants in the western US? | 30 |
| 94) | The GI-199 documents refer to newer data on the way. Have NRC, USGS et al. released those? I'm referring to this: "New consensus seismic-hazard estimates will become available in late 2010 or early 2011 (these are a product of a joint NRC, US Department of Energy, US Geological Survey (USGS) and Electric Power Research Institute (EPRI) project). These consensus seismic hazard estimates will supersede the existing EPRI, Lawrence Livermore National Laboratory, and USGS hazard estimates used in the GI-199 Safety/Risk Assessment." | 30 |
| 95) | What is the timetable now for consideration of any regulatory changes from the GI-199 research? | 30 |
| Seismic Probabilistic Risk Assessment (SPRA) | | 32 |
| 96) | The NRC increasingly uses risk-information in regulatory decisions. Are risk-informed PRAs useful in assessing an event such as this? | 32 |
| State-of-the-art Reactor Consequence Analysis (SOARCA) | | 33 |
| 97) | What severe accident research is the U.S. Nuclear Regulatory Commission (NRC) doing? ... | 33 |
| 98) | Why is the NRC performing the SOARCA study? | 33 |

| | | |
|--|--|-----------|
| 99) | Does the NRC intend to revisit previous risk studies? | 33 |
| 100) | How will the SOARCA study be different from earlier studies?..... | 34 |
| Defense-in-Depth and Severe Accident Management..... | | 35 |
| 102) | Although there undoubtedly will be many lessons learned about severe accidents from the tragic events at Fukushima, have you identified any early lessons? | 35 |
| 103) | What procedures do U.S. plants have for responding to an unexpected event like the events in Japan. | 35 |
| 104) | What are Severe Accident Management Guidelines | 36 |
| Spent Fuel Pools and Independent Spent Fuel Storage Installations | | 37 |
| 105) | Are Independent Spent Fuel Storage Installations (ISFSIs) required to withstand the same ground shaking as the reactor? | 37 |
| 106) | What do we know about the potential for and consequences of a zirconium fire in the spent fuel pool? | 37 |
| 107) | Can a zirconium fuel fire be prevented by wide spacing of spent fuel assemblies in the spent fuel pool? | 37 |
| 108) | Are the implications of new seismic hazard estimates being considered for the storage of spent fuel? | 37 |
| 109) | What are the design acceptance criteria for cooling systems for the spent fuel pools? | 38 |
| 110) | How does B.5.b apply to spent fuel pools?..... | 38 |
| Station Blackout | | 40 |
| 111) | What is the definition of station blackout? | 40 |
| 112) | What is the existing regulatory requirement regarding SBO?..... | 40 |
| 113) | How many plants have an alternate ac (AAC) source with the existing EDGs..... | 40 |
| 114) | How many plants cope with existing class 1E batteries?..... | 40 |
| 115) | What are the coping duration determined for the plants based on the SBO Rule ?..... | 40 |
| 116) | How is coping duration determined? | 41 |
| 117) | When does the SBO event start? | 41 |
| 118) | When does the SBO event end? | 41 |
| 119) | Did the NRC review the licensee's actions to meet the SBO rule? | 41 |
| 120) | Are all plants designed to mitigate a station blackout event? | 41 |
| Emergency Preparedness (Emphasis on B.5.b)..... | | 42 |
| 121) | Is the emergency preparedness planning basis for nuclear power plants is valid? | 42 |
| 122) | What is B.5.b? | 42 |

| | |
|--|-----------|
| 123) What were Phases 1, 2, and 3 of the B.5.b? | 42 |
| 124) Has the NRC inspected full implementation of the mitigating strategies? | 43 |
| 125) What additional action has been taken? | 43 |
| 126) Is more information available about the mitigating strategies and inspections and reviews conducted? | 43 |
| Other External Hazards..... | 44 |
| 127) How many plants are in hurricane zones? | 44 |
| 128) How many plants are susceptible to flooding? | 44 |
| 129) How many plants are susceptible to blizzard? | 44 |
| 130) How many plants are susceptible to tornadoes? | 44 |
| Plant-Specific Questions | 45 |
| San Onofre Nuclear Generating Station (SONGS) Questions | 45 |
| 131) Could an earthquake and tsunami the size of the one in Japan happen at San Onofre? | 45 |
| 132) What magnitude earthquake are currently operating US nuclear plants such as SONGS designed to? | 45 |
| 133) Could San Onofre withstand an earthquake of the magnitude of the Japanese earthquake? | 45 |
| 134) Is possible to have a tsunami at San Onofre that is capable of damaging the plant? | 45 |
| 135) Has the earthquake hazard at San Onofre been reviewed like Diablo Canyon nuclear power plant is doing? Are they planning on doing an update before relicensing? | 46 |
| 136) How do we know that the emergency diesel generators in San Onofre will not fail to operate like in Japan? | 46 |
| 137) Was there any damage to San Onofre from either the earthquake or the resulting tsunami? | 46 |
| 138) What about emergency planning for San Onofre. Does it consider tsunami? | 47 |
| 139) SONGS received a white finding in 2008 for 125VDC battery issue related to the EDGs that went undetected for 4 years. NRC issued the white finding as there was increased risk that one EDG may not have started due to a low voltage condition on the battery on one Unit (Unit 2). Aren't all plants susceptible to the unknown? Is there any assurance the emergency cooling systems will function as desired in a Japan-like emergency? | 47 |
| 140) What is the height of water that SONGS is designed to withstand? | 47 |
| 141) What about drawdown and debris? | 47 |
| 142) Will this be reviewed in light of the Japan earthquake. | 47 |

| | |
|---|----|
| 143) Could all onsite and offsite power be disrupted from SONGS in the event of a tsunami, and if that happened, could the plant be safely cooled down if power wasn't restored for days after? | 47 |
| 144) Are there any faults nearby SONGS that could generate a significant tsunami? | 48 |
| 145) What magnitude or shaking level is SONGS designed to withstand? How likely is an earthquake of that magnitude for the SONGS site? | 48 |
| 146) Could SONGS withstand an earthquake of the magnitude of the Japanese earthquake? | 48 |
| 147) What about the evacuation routes at SONGS? How do we know they are reasonable?..... | 48 |
| 148) Regarding tsunami at DCNPP and SONGS, is the tsunami considered separately from flooding in licensing? And from the design perspective, is the flood still the controlling event for those plants rather than the tsunami? | 49 |
| 149) What is the design level flooding for San Onofre? Can a tsunami be larger? | 49 |
| 150) Is there potential linkage between the South Coast Offshore fault near SONGS and the Newport-Inglewood Fault system and/or the Rose Canyon fault? Does this potential linkage impact the maximum magnitude that would be assigned to the South Coast Offshore fault and ultimately to the design basis ground motions for this facility? | 1 |
| 151) Recently, a new fault was discovered near Diablo Canyon Nuclear Power Plant.. Have any new faults been discovered near SONGS?..... | 1 |
| Diablo Canyon Nuclear Power Plant (DCNPP) Questions | 49 |
| 152) Could an earthquake and tsunami the size of the one in Japan happen at Diablo Canyon? . | 49 |
| 153) What magnitude earthquake are currently operating US nuclear plants such as Diablo Canyon designed to?..... | 49 |
| 154) Could the newly discovered Shoreline Fault produce a larger "Scenario Earthquake"?..... | 49 |
| 155) Could Diablo Canyon withstand an earthquake of the magnitude of the Japanese earthquake? | 50 |
| 156) Is Diablo Canyon's equipment vulnerable to tsunami? | 50 |
| 157) How do we know that the emergency diesel generators in Diablo Canyon will not fail to operate like in Japan? | 50 |
| 158) Was there any damage to Diablo Canyon from either the earthquake or the resulting tsunami?..... | 50 |
| 159) How do we know the evacuation routes in the region around Diablo Canyon are realistic? | 50 |
| 160) Now after the Japan tragedy, will the NRC finally hear us (A4NR) and postpone DC license renewal until seismic studies are complete? How can you be sure that what happened there is not going to happen at Diablo with a worse case earthquake and tsunami? | 51 |
| 161) The evacuation routes at DCNPP are not realistic. Highway 101 is small...and can you imagine what it will be like with 40K people on it? Has the evacuation plan been updated w/ all the population growth? | 51 |

| | |
|---|----|
| 162) Are there local offshore fault sources capable of producing a tsunami with very short warning times?..... | 51 |
| 163) Are there other seismically induced failure modes (other than tsunami) that would yield LTSBO? Flooding due to dam failure or widespread liquefaction are examples. | 51 |
| 164) Ramifications of beyond design basis events (seismic and tsunami) and potential LTSBO on spent fuel storage facilities? | 51 |
| 165) Why did the Emergency Warning go out for a 'tsunami' that was only 6 ft (1.8 m) high? Do these guys really know what they're doing? Would they know it if a big one was really coming? Crying wolf all the time doesn't instill a lot of confidence. | 51 |
| The Japanese were supposed to have one of the best tsunami warning systems around. What went wrong last week? | 51 |
| 166) Shouldn't the NRC make licensees consider a Tsunami coincident with a seismic event that triggers the Tsunami? | 52 |
| 167) Given that SSCs get fatigued over time, shouldn't the NRC consider after-shocks in seismic hazard analyses? | 52 |
| 168) Did the Japanese also consider an 8.9 magnitude earthquake and resulting tsunami "way too low a probability for consideration"? | 52 |
| 169) GI-199 shows that the scientific community doesn't know everything about the seismicity of CEUS. And isn't there a prediction that the West coast is likely to get hit with some huge earthquake in the next 30 years or so? Why does the NRC continue to license plants on the west coast? 52 | |
| 170) Has anyone done work to look at the effect of many cycles of low amplitude acceleration following a larger event. How do we know a plant would be fit to start back up after an event? We cannot possibly do NDE on everything to determine if flaws have propagated to the point where they need to be replaced..... | 52 |
| 171) Aren't the California plants right on the San Andreas fault? | 53 |
| 172) I heard that, at the urging of PG&E, effective acceleration was calculated at an average value, rather than peak. For a magnitude 7.5 quake, peak ground acceleration would be 1.25 times gravity at the plant. The change reduced that to .75g, with the adjustment from peak ground acceleration to effective ground acceleration. Is this true? | 54 |
| 173) (Continued from previous question) A so-called "tau factor" was used, which reduced it again to .67g. Can you please explain this? | 54 |
| 174) (Continued from previous question) To assess the strength of concrete, actual values were used, rather than code allowable minimums. Can you please explain this?..... | 55 |
| Indian Point Questions..... | 56 |
| 175) Why is Indian Point safe if there is a fault line so close to it?..... | 56 |

| | |
|--|-----------|
| Questions posed by utilities | 57 |
| 176) We are trying to understand why our plants in low-seismic areas (see below) would appear on the list of 27 plants that the NRC intends to review for seismic issues. While the story below notes that these plants have been identified based on " largest increase in seismic risk from a 1980s-era USGS study," the USGS maps show a low probability for seismic activity. I'm not aware of any major changes that would have increased seismic risk... can you help explain? | 57 |
| 177) My basic understanding - especially in the case of St. Lucie and Duane Arnold - is that highly conservative values were input into your screening process for plants with low-seismic probability, therefore moving plants like those previously mentioned up in the listing. Can you help me to understand this? | 57 |
| Pending and Unanswered Questions from Members of Congress and industry | 58 |
| 178) Received 3/16/11 from Congresswoman Lowey | 58 |
| 179) From 3/16/11 Press Release from Senators Boxer and Feinstein | 58 |
| 180) From 3/15/11 Press Release from Congresspeople Markey and Capps..... | 60 |
| 181) Questions suggested by ANS for inclusion in a public FAQ document: | 61 |
| Additional Information: Useful Tables | 62 |
| Table of Design Basis Ground Motions for US Plants | 62 |
| Table of SSE, OBE and Tsunami Water Levels..... | 64 |
| Table of Plants Near Known Active Faults or in High or Moderate Seismicity Zones..... | 69 |
| Table From GI-199 Program Containing SSE, SSE Exceedance Frequencies, Review Level Earthquakes (RLE), and Seismic Core Damage Frequencies | 70 |
| Table: Design Basis Ground Motions and New Review Level Ground Motions Used for Review of Japanese Plants..... | 75 |
| Table: Status of Review of Japanese NPPs to New Earthquake Levels Based on 2006 Guidance | 76 |
| Additional Information: Useful Plots | 77 |
| Plot of Mapped Active Quaternary Faults and Nuclear Plants in the US..... | 77 |
| Nuclear Plants in the US Compared to the USGS National Seismic Hazard Maps..... | 78 |
| USGS US National Seismic Hazard Maps..... | 78 |
| Plot of Nuclear Plants in the US Compared to Recent Earthquakes..... | 79 |
| UCERF Map of California Earthquake Probabilities for Northern versus Southern California | 79 |
| Plot of ground motion acceleration (PGA) from Japanese earthquake..... | 80 |
| Plot of Tsunami Wave Heights at 5 Meter Bathymetry Offshore at the Japanese Plants (NOAA)..... | 83 |
| Plot of Tsunami Wave Heights in the Pacific (NOAA) | 84 |
| Plant Status (6pm, Japan time, on 3-25-11) | 85 |
| Fact Sheets | 88 |

| | |
|---|------------|
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (High level overview) | 88 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (The policy work version) | 89 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Seismic Safety (The cliff notes)... | 91 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Tsunami | 92 |
| Fact Sheet: Tsunami Assessment Method for Nuclear Power Plants in Japan | 93 |
| Fact Sheet: Summarization of the NRC's Regulatory Framework for Flooding | 94 |
| 182) Does the NRC consider severe floods in the design of nuclear power plants? | 94 |
| 183) What about droughts and conditions which lead to low water? Are these considered? | 95 |
| 184) Periods of long rainfall can cause the groundwater elevation to rise which can cause structures such as deeply embedded tanks to fail due to buoyancy. Are nuclear power plants designed to withstand this effect? | 95 |
| 185) Some of the Reports from the National Weather Service used to estimate the design precipitation are 30-40 years old. Are these estimates still valid? | 95 |
| Fact Sheet: Summarization of Seismological Information from Regional Instrumentation | 96 |
| Fact Sheet: Seismic considerations of Western U.S. NPP sites | 97 |
| Fact Sheet: Regulatory Framework for Protection of Nuclear Power Plants against Tsunami Flooding | 100 |
| Fact Sheet: Seismic Zones and US Plants | 103 |
| Fact Sheet: Seismicity of the Central and Eastern US (In-depth technical information) | 107 |
| Fact Sheet: US Portable Array Information | 109 |
| Fact Sheet: The B.5.b Rule (10 CFR 50.54hh/B.5.b) | 111 |
| Fact Sheet: Generic Issue GI-199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants" | 113 |
| Fact Sheet: Station Blackout Rule | 115 |
| Other useful resources: | 116 |
| Acronyms | 117 |
| Terms and Definitions | 120 |
| List of Questions | 132 |

From: Burnell, Scott
To: Couret, Ivonne; Cullingford, Michael
Subject: Re: NRC Protective Action Recommendations; questions received from JANUS (consulting company) in Japan
Date: Tuesday, March 29, 2011 9:28:53 AM

In that case I'd redirect through OIP as we usually do for foreign vendor requests.

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Couret, Ivonne
To: Burnell, Scott; Cullingford, Michael
Sent: Tue Mar 29 09:27:45 2011
Subject: RE: NRC Protective Action Recommendations; questions received from JANUS (consulting company) in Japan

Scott/Michael:

This is a request from a Japanese Nuclear Industry vendor.
He wants to know further details on the computer calculations from the NRC Press Release. I've attached the two documents for your review. I believe it is a bit a mix bag inquiry not media; however this company tends to publish reports (not specific on website) for the nuclear industry. From what I can decipher he just wants someone to provide further details on our "calculations". Please advise. Ivonne

From: Burnell, Scott
Sent: Tuesday, March 29, 2011 8:47 AM
To: Cullingford, Michael; Couret, Ivonne
Subject: Re: NRC Protective Action Recommendations; questions received from JANUS (consulting company) in Japan

Ivonne;

Please check the company's website and see if this is a media request, a public inquiry or a vendor question so that we can properly respond. Thanks.

Scott

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Cullingford, Michael
To: Burnell, Scott
Sent: Tue Mar 29 08:43:24 2011
Subject: NRC Protective Action Recommendations; questions received from JANUS (consulting company) in Japan

Hi Scott: I received the below enquiry and understand that it should go first to OPA. I am not sure of the process that is followed to respond. I would like to be copied on the response. Thank

SSSS/195

you.....mike

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

From: Junko Sugaya <jsugaya@janus.co.jp>

Sent: Thu, Mar 17, 2011 11:36 am

Subject: NRC Protective Action Recommendations

I would like to ask NRC one thing on NRC News No. 11-050. Please kindly let me know any appropriate person to contact.

I do not care how conservative NRC calculates but please add a little more description on the assumptions. Full core inventories release? People stay outside all day? Please understand how news media and people react the calculation results regardless the assumptions or the real conditions.

I carefully read real trends of radiation monitoring data. It is 0.05 micro Sv/hr, quite normal here in Tokyo. The dose staying here is lower than the dose I fly to DC. Somewhat higher in Ibaraki and Gumma, neighboring prefectures to Fukushima as 0.2 micro Sv/hr but it is still okay to calculate the annual dose of 1.7mSv/yr.

Radiation monitoring data (micro Sv/hr) at each prefecture:
http://www.mext.go.jp/component/a_menu/other/detail/_icsFiles/fieldfile/2011/03/17/1303724_6_3.pdf

This mirror site is more user friendly.

<http://eq.yahoo.co.jp/>

You can see radiation monitoring data on a map around Fukushima NPPs with 20km and 30 km circle lines. This site also provides English table but the information is not as much as Japanese site.

Lastly, I'm fine in Tokyo. I'm so thankful that things are okay with me and my families in this historical disaster. I'm also very thankful for the international specialists' cooperation for this special "operating experience".

Sincerely,

Junko Sugaya

JAPAN NUS Co., Ltd.

TEL: +81-3-5925-6757

FAX: +81-3-5925-6735

E-MAIL: jsugaya@janus.co.jp

JANUS Home Page: <http://www.janus.co.jp/eng/index.html>

From: Anderson, Brian
To: Hayden, Elizabeth; Burnell, Scott; Harrington, Holly
Subject: RE: Random questions
Date: Tuesday, March 29, 2011 12:20:12 PM

Understood. Thanks, Beth.

From: Hayden, Elizabeth
Sent: Tuesday, March 29, 2011 9:19 AM
To: Burnell, Scott; Anderson, Brian; Harrington, Holly
Subject: Re: Random questions

Brian-please use the Japan Activity Code for work you do for OPA.

From: Hayden, Elizabeth
To: Burnell, Scott; Anderson, Brian; Harrington, Holly
Sent: Tue Mar 29 09:08:38 2011
Subject: Re: Random questions

Don't think you were here for the FOIA (3/11-16).

From: Burnell, Scott
To: Anderson, Brian; Harrington, Holly; Hayden, Elizabeth
Sent: Mon Mar 28 14:28:29 2011
Subject: RE: Random questions

Sorry, was in the Fitness Center...

(b)(6)

Just the Monday morning backbrief and a 10:15 Thursday weekly conference call.

Check with Holly and Beth on the last two.

From: Anderson, Brian
Sent: Monday, March 28, 2011 1:35 PM
To: Burnell, Scott
Subject: Random questions

I'll come by to discuss in person...

1. What's the Web EOC address/link?
2. What routine calls/meetings (e.g. today's 11am with Eliot) does OPA have?
3. TAC – should I use the “Japan event” TAC for all of my OPA work, or should I use other TACs, too?
4. Do I have any action related to the FOIA(s) we talked about this morning?

Thanks,
Brian

SSSS/196

From: Burnell, Scott
To: Wilson, George
Cc: Brenner, Eliot
Subject: Fw: CNN: Senate testimony
Date: Tuesday, March 29, 2011 2:02:20 PM
Importance: High

Are the basic #s of 4 vs 8-hour battery plants correct?

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Brenner, Eliot
To: Burnell, Scott; McIntyre, David
Sent: Tue Mar 29 13:45:39 2011
Subject: Fw: CNN: Senate testimony

???

Eliot Brenner
Director, Office of Public Affairs
US Nuclear Regulatory Commission
Protecting People and the Environment
301 415 8200

C: (b)(6)

Sent from my Blackberry

From: Ahlers, Mike <Mike.Ahlers@turner.com>
To: Brenner, Eliot; McIntyre, David
Cc: Meserve, Jeanne <Jeanne.Meserve@turner.com>
Sent: Tue Mar 29 13:34:27 2011
Subject: CNN: Senate testimony

Eliot, David,

Hi there.

We are working on a story about today's Senate hearing on Fukushima.

UCS's David Lochbaum testified (speaking about batteries) that "Eleven U.S. reactors are designed to cope with a station blackout lasting eight hours, as were the reactors in Japan. Ninety-three of our reactors are designed to cope for only four hours."

We understand that he is speaking only about battery power (as opposed to emergency generators, etc.) We intend to use those numbers in the story. Are those numbers correct? Thanks – Mike

Mike Ahlers
Senior Producer, Homeland Security
CNN Washington
202-898-7917 (o)
(b)(6) (cell)
mike.ahlers@turner.com

From: Burnell, Scott
To: Cappiello, Dina
Bcc: Thadani, Mohan
Subject: RE: Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants
Date: Monday, March 21, 2011 4:22:00 PM

OK, I'll see what the staff's availability is at that time. Thanks.

From: Cappiello, Dina [mailto:DCappiello@ap.org]
Sent: Monday, March 21, 2011 4:21 PM
To: Burnell, Scott
Subject: RE: Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants

On Weds, any time after 10:30

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Monday, March 21, 2011 4:19 PM
To: Cappiello, Dina
Subject: RE: Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants

Must be nice to have a single focus... :-)

Anyway – times tomorrow and Wed?

From: Cappiello, Dina [mailto:DCappiello@ap.org]
Sent: Monday, March 21, 2011 4:17 PM
To: Burnell, Scott
Subject: RE: Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants

This is all I'm working on, so that should work.

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Monday, March 21, 2011 4:11 PM
To: Cappiello, Dina
Subject: Re: Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants

OK, name a time and we'll shoot for that.

I might have a BWR containment person Wed., how does that day look for you?

Sent from an NRC Blackberry
Scott Burnell

(b)(6)

From: Cappiello, Dina <DCappiello@ap.org>
To: Burnell, Scott
Cc: Brenner, Eliot
Sent: Mon Mar 21 16:07:42 2011
Subject: RE: Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants

That works. I'm looking through slides now and trying to make sense of them. My brain is mush

SSSSS/197

too.

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Monday, March 21, 2011 4:07 PM
To: Cappiello, Dina
Cc: Brenner, Eliot
Subject: RE: Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants

If I can sop up what's left of my brain currently puddled on the floor, you and I can talk about it. Tomorrow morning perhaps, availability subject to workload?

From: Cappiello, Dina [mailto:DCappiello@ap.org]
Sent: Monday, March 21, 2011 3:59 PM
To: Burnell, Scott
Cc: Brenner, Eliot
Subject: RE: Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants

If NUREG-1150 is not the latest, I will need someone to explain to me how the latest analysis changes things. I am looking at slides now.

From: Burnell, Scott [mailto:Scott.Burnell@nrc.gov]
Sent: Monday, March 21, 2011 3:44 PM
To: Cappiello, Dina
Cc: Brenner, Eliot
Subject: RE: Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants

Dina;

I have to point out that study is now 20 years out of date. The staff has been working on the State-of-the-Art Reactor Consequence Analysis project (<http://www.nrc.gov/about-nrc/regulatory/research/soar.html>) for several years now, and SOARCA also looked at Peach Bottom. We don't have final SOARCA numbers for Peach Bottom, but we have discussed initial findings (<http://www.nrc.gov/about-nrc/regulatory/research/soar/soarca-related-info.html#ric>).

The short version is that NUREG-1150 is no longer considered the agency's latest word on the issue. Thanks.

Scott

From: Cappiello, Dina [mailto:DCappiello@ap.org]
Sent: Monday, March 21, 2011 3:39 PM
To: Burnell, Scott
Subject: Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants

Scott,

I find this NUREG-1150 very interesting in light of the Japan incident, since it evaluates station blackout – which is what happened at least partially over there.

Peach Bottom was used as a model for a BWR plant, and it is also Mark I.

I'm wondering...does NRC have similar assessments for other Mark 1's? Or does Peach Bottom generally serve as model for what would happen?

Once I get through this, I'm also going to need someone to explain it to me.

But we will get there....

Dina

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