

Kauffman, John

From: Flory, Shirley
Sent: Friday, March 25, 2011 4:52 PM
To: RES Distribution; Cruz, Holly; Nguyen, Quynh; Santiago, Patricia; Weaver, Kathy; Wertz, Trent
Subject: RES PLAN OF THE WEEK: MARCH 28-APRIL 1, 2011
Attachments: POW-03 28 11.pdf

RES PLAN OF THE WEEK: MARCH 28-APRIL 1, 2011

Significant Public Meetings

March 29 Commission Briefing: Small Modular Reactors, 9:00 am-12:00 noon, OWFN 1st Floor Commissioners Hearing Room.

Significant Internal Activities/Non-Public Meetings

March 28 HTGR Agreement with China, 10:00-10:30 am, OWFN 6B4.

March 28 Discussion of Key Messages for Chairman's Participation in Upcoming NEA and ENSRE G Conference, 10:30-11:30 am, OWFN 6B4.

March 28 Dry Run for ACRS Brief on NGNP R&D, 1:00-3:00 pm, Church Street 6B1.

March 28 EDO Scheduling Call, 1:30-2:30 pm, 1-800-857-0150, passcode: 93702.

March 28 EDO Alignment Meeting: Japanese Earthquake Status: Focus on Health Effects of Radiation and Focus on Station Black-Out, 3:00-4:00 pm, OWFN 17B4.

March 29 DACA Monthly Meeting, 10:30-11:30 am, OWFN 4B4.

March 29 Knowledge Transfer Sessions with Brian and Others, 1:00-1:30 pm, Church Street 3C19.

March 29 NEA Activities, Priorities, and Challenges Briefing, 2:00-3:30 pm, OWFN 17B4.

March 29 6 Month Deputy Office Director (Milton Brown) Update with Jennifer Uhle to Discuss FAIMIS Mid-Year Update/Status, 4:30-5:00 pm, Church Street 6A2.

March 29-30 RES/DE/CMB staff will participate in a National Post Irradiation Examination (PIE) Workshop, sponsored by DOE/NE, at Gaithersburg Marriott. The purpose of the workshop is to solicit input from the technical community, in terms of needs, to develop state-of-the art characterization and PIE capabilities in support of nuclear fuels and materials development.

March 30 RES/DE/DICB will support the NRR/NRO DI&C Technical Consistency meeting at OWFN. DICB will update NRR and NRO staff on several DI&C research efforts on failure modes analysis, development of guidance for FPGA review, and work on DI&C regulatory guidance knowledge management and SRP updates. (R. Sydnor, S. Birla, M. Waterman, M. Concepcion)

March 30 International Activities, 8:15-8:45 am, Church Street 6A1.

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| March 30 | Safety Culture Steering Committee Meeting, 10:00-11:00 am, OWFN 6B4. |
| March 30 | TABS Meeting with RES, 10:00-11:00 am, Church Street 6A1. |
| March 30 | Brief for April 14 Japan Commission Briefing, 11:00-11:30 am, Church Street 3C19. |
| March 30 | Focus Group Meeting (OCWE), 11:00 am-12:00 noon, Church Street 5A4. |
| March 30 | NRC: What It Is and What It Does, 11:05-11:40 am, RES presentation – Sheron. |
| March 30 | Leadership Panel Participation, 1:00-2:30 pm, PDC Classroom H. |
| March 30 | Review of Draft SPO Inputs for Other Offices, 1:30-2:30 pm, Church Street 5C19. |
| March 30 | PMDA All Hands – PMDA Front Office, 1:30-3:00 pm, Church Street 6B1. |
| March 30 | Risk Management Team Meeting, 2:00-3:30 pm, OWFN 3B4/CSB 4C19. |
| March 31 | Joint Branch Meeting of RES Operating Experience and Generic Issues Branch and NRR Operating Experience Branch to discuss each branch's activities and to explore opportunities for enhancing cooperation and communication between the branches. Church Street, 2C19 |
| March 31 | RST Team Specific Training, 8:30 am-12:00 pm, IRC. |
| March 31 | NLE-11 RST Team Specific Training Session, 8:30 am-2:30 pm, Op Center, RST Room. |
| March 31 | xLPR Report Discussion, 10:00-11:00 am, Church Street 5A4. |
| March 31 | Code Development and Maintenance Initiative, 1:30-2:30 pm, Church Street 3A4. |
| March 31 | Touch Base with Les Cupidon, 2:00-2:30 pm, Church Street 6A2. |
| March 31 | DSA Foreign Travel Meeting, 2:00-2:30 pm, Church Street 6A1. |
| March 31 | Hold: Future Uses of SOARCA Insights, 3:00-3:30 pm, Church Street 6A2. |
| March 31 | ITBC Closed Session, 3:30-4:30 pm, TWFN 2B5. |
| April 1 | Executive Resources Board (ERB) Meeting, 10:00-11:00 am, OWFN 17B4. |
| April 1 | Sheron Periodic with Commissioner Apostolakis, 11:30 am-12:00 noon. |

April 1 DSA Foreign Travel, 2:00-2:30 pm, Church Street 6A1.

Ongoing and Upcoming International Activities

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| March 28-29 | CSNI/WGRisk Meeting on Digital I&C Taxonomy (Taylor) |
| March 28-31 | CSNI/WGRisk Annual Meeting and Semi-Annual Bureau Meeting (Siu, Coyne) |
| April 11-13 | RES/DE/CMB staff will participate in a Special Meeting on "Fracture of Nuclear Graphite", Oxford, England. Meeting organized by Nuclear Installations Inspectorate and EdF. Selected specialists will discuss current status of understanding graphite core component cracking in gas cooled reactors and focus on identification of gaps for future research. The outcome will inform determination of factor of safety requirements for graphite core components in advanced gas cooled high temperature reactors, such as the ones planned for NGNP. |

Upcoming Activities/Meetings/Accomplishments Planned for the Near Future

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| April 5 | RES will be participating in briefing the ACRS Future Reactors Subcommittee on NGNP R&D Plan (S. Basu) |
| April 5 | RES/DE/CMB staff will participate in an ACRS Meeting on Advanced Reactor Research Plan. Staff will present an update on nuclear graphite research plan. |
| April 6 | RES will be participating in briefing the ACRS Subcommittee on Materials, Metallurgy and Reactor Fuels to discuss the research on Consequential-Stem Generator Tube Rupture. The meeting will be held in TWFN ACRS Hearing Room. (M. Salay, K. Wagner, DE and DRA staff) |
| April 26-28 | RES will be participating in the 4th Annual Very High Temperature Reactor (VHTR) R&D Technical Review Meeting, hosted by DOE and INL. The meeting will be held in Albuquerque, New Mexico. Hotel will be selected soon. (FSTB and NRAB staff) |
| April 26-28 | RES/DE/CMB staff will participate in a DOE NGNP Technical Meeting in Albuquerque, New Mexico. |

Other Issues of Note (New Employees, Recruiting, Non-Op Plan Priority Items)

ROUTINE/RECURRING, LOWER LEVEL MEETINGS

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| March 28 | RES Staff Meeting, 8:45-9:45 am, Church Street 6B1. |
| March 28 | PMDA Weekly BC Meeting, 10:00-11:00 am, Church Street 6A5. |

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| March 28 | DRA Management Meeting, 10:00-11:00 am, Church Street 4C19. |
| March 28 | DE Weekly Staff Meeting, 11:00 am-12:00 noon, Church Street 5C19. |
| March 28 | Spending Plan with CMB, 1:30-2:30 pm, Church Street 5A4. |
| March 28 | Spending Plan with CIB, 3:00-4:00 pm, Church Street 5A4. |
| March 28 | DRA Weekly Counterparts Meeting with Ader/Ruland, 3:00-4:00 pm. |
| March 28 | DRA SLS Weekly Meeting, 1:30-2:30 pm. |
| March 29 | Staff Meeting (CMB & CIB), 8:15-8:45 am, Church Street 5A4. |
| March 29 | RES Front Office Standup Meeting, 8:45-9:45 am, Church Street 6A1. |
| March 29 | Ben Beasley Branch Meeting, 10:00-10:45 am, Church Street 2C19. |
| March 29 | DSA Weekly BC Meeting, 10:30-11:30 am, Church Street 3C19. |
| March 29 | ATMIS/Roadmap Meeting, 11:00-11:30 am, Church Street 6A2. |
| March 29 | ETB (Ott) Weekly Meeting, 11:30 am-12:00 noon. |
| March 29 | Engineering Division Director Technical Consistency Meeting, 1:00-2:00 pm,, OWFN 9B2. |
| March 29 | Spending Plan with MEEB, 2:30-3:30 pm, Church Street 5A4. |
| March 29 | PRAB (Coyne) Weekly Meeting, 4:00-4:30 pm. |
| March 30 | RES Front Office Standup Meeting, 8:45-9:45 am, Church Street 6A1. |
| March 30 | Staff Meeting (MEEB & DIC), 9:45-10:30 am, Church Street 5A4. |
| March 30 | DSA BC/SL (HEB/SPB) Weekly Meeting, 10:00-10:45 am, Church Street 3C17. |
| March 30 | HFRB (Peters) Weekly Meeting, 11:30 am-12:00 noon. |
| March 30 | Spending Plan with SGSEB, 1:30-2:30 pm, Church Street 5A4. |
| March 30 | RES/NRO Advanced Reactor Coordination Meeting, 3:30-4:30 pm, Church Street 6B1. |
| March 30 | PRB (DeMoss) Weekly Meeting, 4:00-4:30 pm. |
| March 31 | Staff Meeting (SGSEB & RGDB), 8:15-8:45 am, Church Street 5A4. |
| March 31 | RES Front Office Standup Meeting, 8:45-9:45 am, Church Street 6A1. |

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| March 31 | DSA BC//SL (RSAB & CDB), 10:00-10:45 am, Church Street 3C17. |
| March 31 | SOARCA Status, 11:00 am-12:00 noon, Church Street 3A4. |
| March 31 | OEGIB (Beasley) Weekly Meeting, 11:30 am-12:00 noon. |
| March 31 | FRB (Salley) Weekly Meeting, 4:00-4:30 pm. |
| April 1 | RES Front Office Standup Meeting, 8:45-9:45 am, Church Street 6A1. |

Kauffman, John

From: Chan, Deborah
Sent: Friday, March 25, 2011 5:11 PM
To: RES Distribution
Subject: PMDA Weekly Notes: 11-12
Attachments: image001.png; image002.emz; image003.png; image004.png; image005.png; image006.png

PMDA Weekly Notes: 11-12 (3/25/11)

Contact: Debbie Chan at 301-251-7466

ACTIONS

For all FO/PMDA Staff: Response to FOIA Request from the Associated Press due Wednesday, March 30 (See e-mail of 3/25/11 from Brett Rini). Contact: Brett Rini or Jazel Parks *NEW*

For all PMDA Staff: PMDA All-Hands Meeting – Wednesday, March 30, 1:30 – 3:00 p.m., Room 6B01 *NEW*

PERSONNEL ACTIONS

RES Arriving Employees

Rich Correia, from NRR to DRA, 3/28/11
Kenn Miller, from NRR to DE/MEEB, 3/28/11

RES Departing Employees

None

Current RES Vacancies

Technical Assistant, DE, GG-14 Posted 3/17 – 4/5/11
Administrative Assistant, DE, GG-7/8 Posted 3/15 – 4/5/11

UPCOMING EVENTS

April

A Probabilistic Risk Assessment View of Consequential Steam Generator Tube Rupture

Date: April 19

Time: 10:00 a.m. – 11:30 a.m.

Place: TWFN Auditorium

Presenters: Selim Sancaktar (DE)

Chernobyl – 25th Anniversary Seminar

Date: April 26

Time: 9:30 a.m. – 11:30 a.m.

Place: TWFN Auditorium

Presenters: Introduction by Mike Weber, Deputy EDO for Materials, Waste, Research and State, Tribal and Compliance Programs and presentations by Frank Congel, Former Director, Division of Incident Response Operations, NSIR and Former Director, OE; and Brian Sheron, Director, RES

REMINDERS

Work Schedule and Premium Pay Guidance for Response to Events in Japan *NEW*

NRC has implemented various work schedule and premium pay flexibilities as it strives to accommodate the challenging and often unpredictable work schedule and premium pay needs of employees responding to events in Japan.

HR has posted the Work Schedule and Premium Pay Guidance on its intranet page and expects to add frequently asked questions. Based on questions received so far, HR notes that:

- For employees on a NEWFlex schedule, HRMS will not accept more than 11.25 hours of regular work per day. Any amount worked beyond that on a single work day must be entered as overtime or compensatory time worked rather than regular time. (Employees on Expanded Compressed schedules may work more than 11.25 regular hours per day.)
- The maximum number of credit hours that an employee may carry over from one pay period to the next remains 24 credit hours. This is restricted by a government wide rule.
- Although the guidance applies to Senior Executive Service members (executives), executives remain ineligible for premium pay or credit hours as a matter of government wide law.

Please see your timekeepers for questions. For further information about selecting work schedules and authorizing premium pay for responders, please contact Lawrence.Davidson, 301-492-2286.

Interim Guidance for Placing and Monitoring of Work with Department of Energy (DOE) Laboratories *NEW*

On March 14, 2011, the Executive Director for Operations issued a memorandum (ML110110581) providing interim guidance for enhanced oversight of the process for placing work with DOE laboratories consistent with recommendations from the Office of the Inspector General. The interim guidance is effective immediately and requires offices to submit Source Selection Justifications (SSJ) in the following cases to the Division of Contracts (DC) for independent review to ensure commercial sources are fully considered:

- **New projects** with a value > \$500K
- **Modifications** involving a change > 20% in the initial ceiling of the basic agreement previously reviewed by DC

DC has 5 business days to review the SSJ and respond. If no response is received from DC within this timeframe, RES may proceed with the project or modification as submitted. Please contact Eddie Colón at 301-251-3302 if you have any questions.

Microsoft Windows 7 and Office 2010 Migration Effort

Software Testing Requirements

The Office of Information Services (OIS) will be migrating NRC workstations in FY 2012 to a new Microsoft Windows 7 platform w/ Office 2010. To ensure a smooth transition, OIS is requiring that all agency desktop applications, custom developed software, and any other commercial applications or add-ins that are currently in

use on an NRC workstation be tested and approved through the Consolidated Test Facility (CTF) by no later than Friday, July 29, 2011. Any software that is not tested during this period will not be approved for use on the new Windows 7 platform.

OIS is offering two ways for staff to test their software. The CTF, located at White Flint in room T-5E32, has five workstations with Microsoft Windows 7 installed for staff to use and validate their software. OIS is also providing staff with a remote testing feature so they can perform their tests from their office computers.

Prior to conducting these tests, staff will be required to install their software on the Windows 7 platform provided.

All software testing conducted must be scheduled using scheduling software on the following OIS Web site:
<http://portal.nrc.gov/edo/ois/icod/ddb/MSW7/default.aspx>

RES has also arranged to have someone from OIS meet with staff to answer any questions they may have about this effort. This meeting is currently scheduled for:

Tuesday, March 29, 2011
11am – 12:00pm (CSB 2-C19)

If you have further questions regarding this matter, please contact the RES IT coordinator on 301.251.8498 or RESHelpDesk@nrc.gov.

Call Forward Instructions for Church Street

Call Forwarding is now available at the Church Street Building. The Call Forward feature is programmed and acts in the same way as the Off-Net Call Forward feature that is available in the other Headquarters locations. This feature allows a user to choose to reroute incoming calls to a telephone number that is internal or external to the agency telephone system. The RES staff is reminded that Management Directive 2.3, "Telecommunications," provides agency policy on the use of telephones.

Call Forwarding can only be activated or deactivated at the desktop telephone unit.

Call Forward Universal (CFU) Instructions

To activate Call Forward:

- Remove handset or press speaker to get dial-tone.
- Enter line feature code (*731) to deactivate any previous programming.

To forward your phone, please do the following:

- Enter *721, listen for dial tone, and then enter 9-XXX-XXX-XXXX. You must dial the "9" to complete the call to the external telephone number. To forward to an internal telephone number, enter 251-XXXX.
- Listen for stutter tone, and the number you dialed will ring. You may now hang up. Your call forwarding is active.

Be Aware: There is no visible or audible reminder that the phone forward feature is enabled. So, please remember to disable if you no longer wish to use it.

To deactivate Call Forward:

- Remove handset or press speaker to get dial-tone.
- Enter line feature code (*731) to deactivate any previous programming.
- Listen for a stutter tone. This will indicate your deactivation was successful.

NOTE: Every time you activate the Call Forward feature, you must enter *731 to ensure that you have removed all previous programming on your telephone number before proceeding to input the new CFU programming.

Please contact the RES help desk, ResHelpDesk.Resource@nrc.gov, for any assistance or contact Shane Rupinta, 301-251-7992.

Voice Mail Forwarding Instructions

This is the procedure to forward your voicemail messages to an alternate phone number(s).

1. Lift the handset off your phone or hit the SPKR (Speaker) button.
2. Press the voicemail button to connect to the voicemail system (301.881.1549) and when the system answers, type in your pin #
3. Select option 4 (Mailbox options)
4. Select option 4 (Notification Options)
5. Select option 3 (Activate message delivery options)
6. Select option 1 (Enable/disable option) enter in the phone number followed by the # sign

To deactivate this option repeat steps 1-6 but when executing step 6 select option 1 to disable the option.

Please contact the RES help desk, ResHelpDesk.Resource@nrc.gov, for any assistance or contact John Wucher, 301-251-7960.

FY11 Personally Identifiable Information (PII) Responsibilities Awareness and Acknowledgement of Understanding Course

The Office of Information Services (OIS) is pleased to announce the availability of the FY11 "Personally Identifiable Information (PII) Responsibilities Awareness and Acknowledgement of Understanding" course in iLearn <https://ilearnnrc.plateau.com/plateau/user/login.jsp> as of January 31, 2011. This course has been automatically assigned to your iLearn Learning Plan.

All employees and contractors must be aware of their responsibilities for protecting PII, understand the consequences for violation of these responsibilities, and acknowledge these understandings at least annually. The completion date for this required training is **June 30, 2011**.

When completing the training outside of headquarters, users should not use CITRIX to access iLearn as this may cause completion issues. Offsite users should navigate to the [iLearn Web site](#).

If you have any questions regarding completion of the training, please contact me via e-mail deonna.purdie@nrc.gov or via phone 301-251-7470.

FY11 Annual Computer Security Awareness Course

All NRC computer users, including federal employees, detailees, interns, and contractors, are required to complete this computer security awareness course annually. The completion date for this course is **August 15, 2011**; however, each office must have a percentage of their users complete the course each quarter starting

with 2nd quarter. For more information about the course, [click here](#). The course has been automatically added to your learning plan. Go to [iLearn](#) to complete the course.

Market Research Course (Web-Based)

The new online Market Research course is now available in iLearn at <https://ilearnnrc.plateau.com/plateau/user/login.jsp>. This course replaces the Acquisition Institute's Market Research (CLC004) course and is required for Federal Acquisition Certification for Contracting Officer Technical Representatives (FAC-COTR) (i.e., RES Project Managers). To access the course, perform a "Search Catalog" in iLearn by entering "Market Research." The course will take about 1 hour to complete. The final exam is comprised of 10 questions, of which at least 8 must be answered correctly. You have unlimited attempts to obtain 80 percent, which is required to pass the course. NRC Project Managers assigned to active contracts must complete the additional training courses required for FAC-COTR and must be certified no later than **June 30, 2011**. Please contact Carolyn Cooper in Division of Contracts at 301-492-3605 if you have any questions or experience problems with the course.

RECENT PMDA ANNOUNCEMENTS

None

Kauffman, John

From: OST02 HOC

Sent: Friday, March 25, 2011 6:17 PM

To: Abrams, Charlotte; Abu-Eid, Bobby; Adams, John; Afshar-Tous, Mugeh; Ahn, Hosung; Alemu, Bezakulu; Algama, Don; Alter, Peter; Anderson, Brian; Anderson, James; Arndt, Steven; Arribas-Colon, Maria; Ashkeboussi, Nima; Athey, George; Baker, Stephen; Ballam, Nick; Barnhurst, Daniel; Barr, Cynthia; Barss, Dan; Bazian, Samuel; Bens, Michelle; Bergman, Thomas; Berry, Rollie; Bhachu, Ujagar; Bloom, Steven; Blount, Tom; Boger, Bruce; Bonnette, Cassandra; Borchardt, Bill; Bowers, Anthony; Bowman, Gregory; Boyce, Tom (RES); Brandon, Lou; Brandt, Philip; Brenner, Eliot; Brock, Kathryn; Brown, Cris; Brown, David; Brown, Eva; Brown, Frederick; Brown, Michael; Bukharin, Oleg; Burnell, Scott; Bush-Goddard, Stephanie; Campbell, Stephen; Camper, Larry; Carpenter, Cynthia; Carter, Mary; Case, Michael; Casto, Greg; Cecere, Bethany; Cervera, Margaret; Chazell, Russell; Chen, Yen-Ju; Cheok, Michael; Chokshi, Niles; Chowdhury, Prosanta; Chung, Donald; Circle, Jeff; Clement, Richard; Clinton, Rebecca; Coggins, Angela; Collins, Frank; Cool, Donald; Correia, Richard; Corson, James; Costa, Arlon; Couret, Ivonne; Craffey, Ryan; Crutchley, Mary Glenn; Cruz, Zahira; Cuadrado, Leira; Dacus, Eugene; DeCicco, Joseph; Decker, David; Dembek, Stephen; Devlin, Stephanie; Dimmick, Lisa; Doane, Margaret; Dorman, Dan; Dorsey, Cynthia; Dozier, Jerry; Drake, Margaret; Droggitis, Spiros; Dube, Donald; Dudes, Laura; Eads, Johnny; Emche, Danielle; English, Lance; Erlanger, Craig; Esmaili, Hossein; Figueroa, Roberto; Fiske, Jonathan; Flanders, Scott; Flannery, Cindy; Floyd, Daphene; Foggie, Kirk; Foster, Jack; Fragoyannis, Nancy; Franovich, Rani; Frazier, Alan; Freshman, Steve; Fuller, Edward; Galletta, Thomas; Gambone, Kimberly; Gardocki, Stanley; Gartman, Michael; Gibson, Kathy; Glitter, Joseph; Gilmer, James; Glenn, Nichole; Gordon, Dennis; Gott, William; Grant, Jeffery; Greenwood, Carol; Greenwood, Carol; Grimes, Kelly; Grobe, Jack; Gross, Allen; Gulla, Gerald; Hale, Jerry; Hardesty, Duane; Hardin, Kimberly; Hardin, Leroy; Harrington, Holly; Harris, Tim; Harrison, Donnie; Hart, Ken; Hart, Michelle; Harvey, Brad; Hasselberg, Rick; Hayden, Elizabeth; Helton, Donald; Henderson, Karen; Hiland, Patrick; Holahan, Patricia; Holahan, Vincent; Holian, Brian; HOO Hoc; Horn, Brian; Howard, Tabitha; Huffert, Anthony; Hurd, Sapna; Huyck, Doug; Imboden, Andy; Isom, James; Jackson, Karen; Jacobson, Jeffrey; Jervay, Richard; Jessie, Janelle; Johnson, Michael; Jolicoeur, John; Jones, Andrea; Jones, Cynthia; Jones, Henry; Kahler, Carolyn; Kammerer, Annie; Karas, Rebecca; Kauffman, John; Khan, Omar; Kolb, Timothy; Kotzalas, Margie; Kowalczyk, Jeffrey; Kratchman, Jessica; Kugler, Andrew; Lamb, Christopher; Lane, John; Larson, Emily; Laur, Steven; LaVie, Steve; Lewis, Robert; Li, Yong; Lichtz, Taylor; Lising, Jason; Lombard, Mark; Lubinski, John; Lui, Christina; Lukes, Kim; Lynch, Jeffery; Ma, John; Mamish, Nader; Manahan, Michelle; Marksberry, Don; Marshall, Jane; Masao, Nagai; Maupin, Cardelia; Mayros, Lauren; Mazaika, Michael; McConnell, Keith; McCoppin, Michael; McDermott, Brian; McGinty, Tim; McGovern, Denise; McIntyre, David; McMurtry, Anthony; Merritt, Christina; Meyer, Karen; Miller, Charles; Miller, Chris; Milligan, Patricia; Miranda, Samuel; Mohseni, Aby; Moore, Scott; Morlang, Gary; Morris, Scott; Mroz (Sahm), Sara; Munson, Clifford; Murray, Charles; Nerret, Amanda; Nguyen, Caroline; Norris, Michael; Norton, Charles; Opara, Stella; Ordaz, Vonna; Owens, Janice; Padovan, Mark; Parillo, John; Patel, Jay; Patel, Pravin; Patrick, Mark; Perin, Vanice; Pope, Tia; Powell, Amy; Purdy, Gary; Quinlan, Kevin; Raddatz, Michael; Ragland, Robert; Ralph, Melissa; Ramsey, Jack; Reed, Elizabeth; Reed, Sara; Reed, Wendy; Reeves, Rosemary; Reis, Terrence; Resner, Mark; Riley (OCA), Timothy; Riner, Kelly; Rini, Brett; Roach, Edward; Robinson, Edward; Rodriguez-Luccioni, Hector; Roggenbrodt, William; Ropon, Kimberly; Rosales-Cooper, Cindy; Rosenberg, Stacey; Ross-Lee, MaryJane; Roundtree, Amy; Ruland, William; Russell, Tonya; Ryan, Michelle; Salay, Michael; Salter, Susan; Salus, Amy; Sanfilippo, Nathan; Santos, Daniel; Scarbrough, Thomas; Schaperow, Jason; Schmidt, Duane; Schmidt, Rebecca; Schoenebeck, Greg; Schrader, Eric; Schwartzman, Jennifer; Seber, Dogan; See, Kenneth; Shane, Raeann; Shea, James; Shepherd, Jill; Sheron, Brian; Skarda, Raymond; Skeen, David; Sloan, Scott; Smiroldo, Elizabeth; Smith, Brooke; Smith, Stacy; Smith, Theodore; Stahl, Eric; Stang, Annette; Stark, Johnathan; Steger (Tucci), Christine; Stieve, Alice; Stone, Rebecca; Stransky, Robert; Sturz, Fritz; Sullivan, Randy; Summers, Robert; Sun, Casper; Tappert, John; Tegeler, Bret; Temple, Jeffrey; Thaggard, Mark; Thomas, Eric; Thorp, John; Tiruneh, Nebiyu; Tobin, Jennifer; Trefethen, Jean; Tschiltz, Michael; Turtill, Richard; Uhle, Jennifer; Valencia, Sandra; Vaughn, James; Vick, Lawrence; Virgilio, Martin; Virgilio, Rosetta; Ward, Leonard; Ward, William; Wastler, Sandra; Watson, Bruce; Webber, Robert; Weber, Michael; White, Bernard; Wiggins, Jim; Williams, Donna; Williams, Joseph; Williamson, Linda; Willis, Dori; Wimbush, Andrea;

To: Wittick, Brian; Wray, John; Wright, Lisa (Gibney); Wright, Ned; Wunder, George; Young, Francis; Zimmerman, Jacob; Zimmerman, Roy
Subject: JAPANESE EARTHQUAKE ERO STAFFING MARCH 27 - APRIL 2 (PAYPERIOD 8, WEEK 1)
Attachments: MASTER RESPONDER SCHEDULE FOR JAPAN EARTHQUAKE.pdf

Attached is the OPS Center Watchbill for Sunday, March 27 – Saturday, April 2. All positions except the PMTR RAAD, Sunday, 3pm – 11pm, are filled through Monday days (7:00am-3:00pm). Please contact the various Team Coordinators and OST02.HOC@nrc.gov if you would like to work any open slots.

If you need to change the schedule please send an email to OST02.HOC@nrc.gov and your teams coordinator

EST Admin Support
NRC Operations Center
301-816-5100 x5600

EST Admin Support
NRC Operations Center
eMail: OST02.HOC@nrc.gov

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| Position | Date | Time | Staff |
|----------------------------|-----------|------------|-------------------|
| Executive Team | | | |
| ET Director | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Jennifer Uhle |
| Sun | 27-Mar | 7am - 3pm | Jim Dyer |
| Sun | 27-Mar | 3pm-11pm | Brian Sheron |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Jim Wiggins |
| Mon | 28-Mar | 7am - 3pm | Mike Weber |
| Mon | 28-Mar | 3pm-11pm | Roy Zimmerman |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Jim Wiggins |
| Tue | 29-Mar | 7am - 3pm | Mike Weber |
| Tue | 29-Mar | 3pm-11pm | Roy Zimmerman |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Jim Wiggins |
| Wed | 30-Mar | 7am - 3pm | |
| Wed | 30-Mar | 3pm-11pm | Roy Zimmerman |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Jim Wiggins |
| Thur | 31-Mar | 7am - 3pm | |
| Thur | 31-Mar | 3pm-11pm | Brian Sheron |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Cynthia Carpenter |
| Fri | 1-Apr | 7am - 3pm | Mike Weber |
| Fri | 1-Apr | 3pm-11pm | |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Cynthia Carpenter |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Cynthia Carpenter |
| ET Response Advisor | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Chris Miller |
| Sun | 27-Mar | 7am - 3pm | Tom Blount |
| Sun | 27-Mar | 3pm-11pm | Brian McDermott |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Scott Morris |
| Mon | 28-Mar | 7am - 3pm | Tom Blount |
| Mon | 28-Mar | 3pm-11pm | Brian McDermott |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Chris Miller |
| Tue | 29-Mar | 7am - 3pm | Tom Blount |
| Tue | 29-Mar | 3pm-11pm | Brian McDermott |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Scott Morris |
| Wed | 30-Mar | 7am - 3pm | Tom Blount |
| Wed | 30-Mar | 3pm-11pm | Brian McDermott |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Scott Morris |
| Thur | 31-Mar | 7am - 3pm | |
| Thur | 31-Mar | 3pm-11pm | Mark Thaggard |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Scott Morris |
| Fri | 1-Apr | 7am - 3pm | |
| Fri | 1-Apr | 3pm-11pm | Mark Thaggard |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Scott Morris |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm-7am | Brian McDermott |

Japan Earthquake ERO Staffing Roster
Mar 27-Apr 2, 2011
Pay Period 8 - Week 1

| ET Rx Prot Measures & State Coordinator | | | |
|---|-----------|------------|---------------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | N/A |
| Sun | 27-Mar | 7am - 3pm | N/A |
| Sun | 27-Mar | 3pm-11pm | N/A |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | N/A |
| Mon | 28-Mar | 7am - 3pm | N/A |
| Mon | 28-Mar | 3pm-11pm | N/A |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | N/A |
| Tue | 29-Mar | 7am - 3pm | N/A |
| Tue | 29-Mar | 3pm-11pm | N/A |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | N/A |
| Wed | 30-Mar | 7am - 3pm | N/A |
| Wed | 30-Mar | 3pm-11pm | N/A |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | N/A |
| Thur | 31-Mar | 7am - 3pm | N/A |
| Thur | 31-Mar | 3pm-11pm | N/A |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | N/A |
| Fri | 1-Apr | 7am - 3pm | N/A |
| Fri | 1-Apr | 3pm-11pm | N/A |
| Fri-Sat | 4/1-4/2 | 11pm-7am | N/A |
| Sat | 2-Apr | 7am - 3pm | N/A |
| Sat | 2-Apr | 3pm-11pm | N/A |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | N/A |
| Executive Briefing Team | | | |
| EBT Admin. Assistant | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Jonathan Fiske |
| Sun | 27-Mar | 7am - 3pm | Annette Stang |
| Sun | 27-Mar | 3pm-11pm | Carolyn Kahler |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Christina Merritt |
| Mon | 28-Mar | 7am - 3pm | Louise Lovell |
| Mon | 28-Mar | 3pm-11pm | Annette Stang |
| Mon-Tue | 3/28-3/29 | 11pm - 9am | Jonathan Fiske |
| Tue | 29-Mar | 9am - 3pm | Sapna Hurd |
| Tue | 29-Mar | 3pm-11pm | Tonya Russell |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Christina Merritt |
| Wed | 30-Mar | 7am - 3pm | Carolyn Kahler/Sapna Hurd |
| Wed | 30-Mar | 3pm-11pm | Tonya Russell |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | |
| Thur | 31-Mar | 7am - 3pm | Louise Lovell |
| Thur | 31-Mar | 3pm-11pm | Sapna Hurd |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | |
| Fri | 1-Apr | 7am - 3pm | Annette Stang |
| Fri | 1-Apr | 3pm-11pm | Sapna Hurd |
| Fri-Sat | 4/1-4/2 | 11pm-7am | |
| EBT Coordinator | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Jim Anderson |
| Sun | 27-Mar | 7am - 3pm | Eddie Robinson |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|-------------------------------|-----------|------------|-----------------|
| Sun | 27-Mar | 3pm-11pm | Nicole Glenn |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Caroline Nguyen |
| Mon | 28-Mar | 7am - 3pm | Yen Chen |
| Mon | 28-Mar | 3pm-11pm | Sara Mroz |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Jim Anderson |
| Tue | 29-Mar | 7am - 3pm | Yen Chen |
| Tue | 29-Mar | 3pm-11pm | Sara Mroz |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Jim Anderson |
| Wed | 30-Mar | 7am - 3pm | Yen Chen |
| Wed | 30-Mar | 3pm-11pm | Sara Mroz |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Jim Anderson |
| Thur | 31-Mar | 7am - 3pm | Yen Chen |
| Thur | 31-Mar | 3pm-11pm | Sara Mroz |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Jim Anderson |
| Fri | 1-Apr | 7am - 3pm | Yen Chen |
| Fri | 1-Apr | 3pm-11pm | Sara Mroz |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Jim Anderson |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |
| | | | |
| Executive Support Team | | | |
| EST Status Officer | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Jeff Grant |
| Sun | 27-Mar | 7am - 3pm | Jane Marshall |
| Sun | 27-Mar | 3pm-11pm | Bill Gott |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Jeff Grant |
| Mon | 28-Mar | 7am - 3pm | Jane Marshall |
| Mon | 28-Mar | 3pm-11pm | Bill Gott |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Jeff Grant |
| Tue | 29-Mar | 7am - 3pm | Jane Marshall |
| Tue | 29-Mar | 3pm-11pm | Bill Gott |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Jeff Grant |
| Wed | 30-Mar | 7am - 3pm | Jane Marshall |
| Wed | 30-Mar | 3pm-11pm | Bill Gott |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Jeff Grant |
| Thur | 31-Mar | 7am - 3pm | Jane Marshall |
| Thur | 31-Mar | 3pm-11pm | Bill Gott |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Jeff Grant |
| Fri | 1-Apr | 7am - 3pm | Jane Marshall ? |
| Fri | 1-Apr | 3pm-11pm | Bill Gott |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Jeff Grant |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |
| | | | |
| EST Actions Officer | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | N/A |
| Sun | 27-Mar | 7am - 3pm | Kelly Grimes |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|----------------|
| Sun | 27-Mar | 3pm-11pm | Melissa Ralph |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | N/A |
| Mon | 28-Mar | 7am - 3pm | Zahira Cruz |
| Mon | 28-Mar | 3pm-11pm | Melissa Ralph |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | N/A |
| Tue | 29-Mar | 7am - 3pm | |
| Tue | 29-Mar | 3pm-11pm | Melissa Ralph |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | N/A |
| Wed | 30-Mar | 7am - 3pm | Wendy Reed |
| Wed | 30-Mar | 3pm-11pm | Melissa Ralph |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | N/A |
| Thur | 31-Mar | 7am - 3pm | Jonathan Fiske |
| Thur | 31-Mar | 3pm-11pm | Melissa Ralph |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | N/A |
| Fri | 1-Apr | 7am - 3pm | Wendy Reed |
| Fri | 1-Apr | 3pm-11pm | Melissa Ralph |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Don Algama |
| Sat | 2-Apr | 7am - 3pm | Anthony Bowers |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | N/A |
| | | | |

EST Coordinator

| | | | |
|----------|-----------|------------|----------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Steve Campbell |
| Sun | 27-Mar | 7am - 3pm | Tonya Russell |
| Sun | 27-Mar | 3pm-11pm | Stella Opara |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Taylor Lichatz |
| Mon | 28-Mar | 7am - 3pm | Tony McMurtray |
| Mon | 28-Mar | 3pm-11pm | Rebecca Stone |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Stacy Smith |
| Tue | 29-Mar | 7am - 3pm | Anthony Bowers |
| Tue | 29-Mar | 3pm-11pm | Tony McMurtray |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Rebecca Stone |
| Wed | 30-Mar | 7am - 3pm | Taylor Lichatz |
| Wed | 30-Mar | 3pm-11pm | Tony McMurtray |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Rebecca Stone |
| Thur | 31-Mar | 7am - 3pm | Anthony Bowers |
| Thur | 31-Mar | 3pm-11pm | Tony McMurtray |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Rebecca Stone |
| Fri | 1-Apr | 7am - 3pm | Steve Campbell |
| Fri | 1-Apr | 3pm-11pm | Tony McMurtray |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Rebecca Stone |
| Sat | 2-Apr | 7am - 3pm | Stacy Smith |
| Sat | 2-Apr | 3pm-11pm | Steve Campbell |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Rebecca Stone |
| | | | |

EST Chronology Officer

| | | | |
|---------|-----------|------------|-------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Thomas Scarbrough |
| Sun | 27-Mar | 7am - 3pm | Hector Rodriguez |
| Sun | 27-Mar | 3pm-11pm | Rebecca Karas |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|-----------------------------|-----------|------------|-------------------|
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Thomas Scarbrough |
| Mon | 28-Mar | 7am - 3pm | Hector Rodriguez |
| Mon | 28-Mar | 3pm-11pm | Rebecca Karas |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | |
| Tue | 29-Mar | 7am - 3pm | Vanice Perin |
| Tue | 29-Mar | 3pm-11pm | Rebecca Karas |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | |
| Wed | 30-Mar | 7am - 3pm | Hector Rodriguez |
| Wed | 30-Mar | 3pm-11pm | Rebecca Karas |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Thomas Scarbrough |
| Thur | 31-Mar | 7am - 3pm | Vanice Perin |
| Thur | 31-Mar | 3pm-11pm | Rebecca Karas |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Nick Ballam |
| Fri | 1-Apr | 7am - 3pm | Sandra Valencia |
| Fri | 1-Apr | 3pm-11pm | Rebecca Karas |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Nick Ballam |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |
| EST Response Ops Mgr | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Roberto Figueroa |
| Sun | 27-Mar | 7am - 3pm | Omar Khan |
| Sun | 27-Mar | 3pm-11pm | Cris Brown |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Roberto Figueroa |
| Mon | 28-Mar | 7am - 3pm | Karen Jackson |
| Mon | 28-Mar | 3pm-11pm | Cris Brown |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Omar Khan |
| Tue | 29-Mar | 7am - 3pm | Bob Stransky |
| Tue | 29-Mar | 3pm-11pm | Cris Brown |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Karen Jackson |
| Wed | 30-Mar | 7am - 3pm | Omar Khan |
| Wed | 30-Mar | 3pm-11pm | Cris Brown |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Bob Stransky |
| Thur | 31-Mar | 7am - 3pm | Karen Jackson |
| Thur | 31-Mar | 3pm-11pm | Omar Khan |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Bob Stransky |
| Fri | 1-Apr | 7am - 3pm | Roberto Figueroa |
| Fri | 1-Apr | 3pm-11pm | Karen Jackson |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Omar Khan |
| Sat | 2-Apr | 7am - 3pm | Roberto Figueroa |
| Sat | 2-Apr | 3pm-11pm | Karen Jackson |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Omar Khan |
| EST Admin. Assistant | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | N/A |
| Sun | 27-Mar | 7am - 3pm | Karen Meyer |
| Sun | 27-Mar | 3pm-11pm | Cynthia Dorsey |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | N/A |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|-----------------------|-----------|------------|----------------------|
| Mon | 28-Mar | 7am - 3pm | Michelle Manahan |
| Mon | 28-Mar | 3pm-11pm | Carol Greenwood |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | N/A |
| Tue | 29-Mar | 7am - 3pm | Michelle Manahan |
| Tue | 29-Mar | 3pm-11pm | Mary Glenn Crutchley |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | N/A |
| Wed | 30-Mar | 7am - 3pm | Cynthia Dorsey |
| Wed | 30-Mar | 3pm-11pm | Mary Glenn Crutchley |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | N/A |
| Thur | 31-Mar | 7am - 3pm | Amy Salus |
| Thur | 31-Mar | 3pm-11pm | Tabitha Howard |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | N/A |
| Fri | 1-Apr | 7am - 3pm | Carol Greenwood |
| Fri | 1-Apr | 3pm-11pm | Tabitha Howard |
| Fri-Sat | 4/1-4/2 | 11pm-7am | N/A |
| Sat | 2-Apr | 7am - 3pm | Karen Meyer |
| Sat | 2-Apr | 3pm-11pm | Cynthia Dorsey |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | N/A |
| Liaison Team | | | |
| LT Director | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Marissa Bailey |
| Sun | 27-Mar | 7am - 3pm | Mike Tschiltz |
| Sun | 27-Mar | 3pm-11pm | Marrisa Bailey |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Mark Thaggard |
| Mon | 28-Mar | 7am - 3pm | Allen Howe |
| Mon | 28-Mar | 3pm-11pm | Marrisa Bailey |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | |
| Tue | 29-Mar | 7am - 3pm | Allen Howe |
| Tue | 29-Mar | 3pm-11pm | Marrisa Bailey |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | |
| Wed | 30-Mar | 7am - 3pm | Allen Howe |
| Wed | 30-Mar | 3pm-11pm | Marrisa Bailey |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | |
| Thur | 31-Mar | 7am - 3pm | John Adams |
| Thur | 31-Mar | 3pm-11pm | Mark Lombard |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Bob Webber |
| Fri | 1-Apr | 7am - 3pm | John Adams |
| Fri | 1-Apr | 3pm-11pm | Mark Lombard |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Tom Bergman |
| Sat | 2-Apr | 7am - 3pm | John Adams |
| Sat | 2-Apr | 3pm-11pm | Mark Lombard |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Tom Bergman |
| LT Coordinator | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Milt Murray |
| Sun | 27-Mar | 7am - 3pm | Lisa Gibney |
| Sun | 27-Mar | 3pm-11pm | Jeff Temple |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Milt Murray |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|----------------|
| Mon | 28-Mar | 7am - 3pm | Jeff Temple |
| Mon | 28-Mar | 3pm-11pm | Rani Franovich |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Janelle Jessie |
| Tue | 29-Mar | 7am - 3pm | Milt Murray |
| Tue | 29-Mar | 3pm-11pm | Rani Franovich |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Janelle Jessie |
| Wed | 30-Mar | 7am - 3pm | Milt Murray |
| Wed | 30-Mar | 3pm-11pm | Jeff Temple |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Janelle Jessie |
| Thur | 31-Mar | 7am - 3pm | Milt Murray |
| Thur | 31-Mar | 3pm-11pm | Jeff Temple |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Rani Franovich |
| Fri | 1-Apr | 7am - 3pm | Jeff Temple |
| Fri | 1-Apr | 3pm-11pm | Janelle Jessie |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Rani Franovich |
| Sat | 2-Apr | 7am - 3pm | Jeff Temple |
| Sat | 2-Apr | 3pm-11pm | Milt Murray |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |

LT State Liaison

| | | | |
|----------|-----------|---------|---------------------------------|
| Sat-Sun | 3/26-3/27 | 9pm-7am | A. Rivera/A. Noonan (ON CALL) |
| Sun | 27-Mar | 7am-2pm | Alison Rivera (ON CALL) |
| Sun | 27-Mar | 2pm-9pm | Alison Rivera (ON CALL) |
| Sun-Mon | 3/27-3/28 | 9pm-7am | Alison Rivera (ON CALL) |
| Mon | 28-Mar | 7am-2pm | C. Maupin/C. Flannery (ON CALL) |
| Mon | 28-Mar | 2pm-9pm | Stuart Easson |
| Mon-Tue | 3/28-3/29 | 9pm-7am | R. Virgilio (ON CALL) |
| Tue | 29-Mar | 7am-2pm | C. Maupin/C. Flannery (ON CALL) |
| Tue | 29-Mar | 2pm-9pm | Stuart Easson |
| Tue-Wed | 3/29-3/30 | 9pm-7am | Richard Turtill (ON CALL) |
| Wed | 30-Mar | 7am-2pm | Cindy Flannery |
| Wed | 30-Mar | 2pm-9pm | Michelle Ryan |
| Wed-Thur | 3/30-3/31 | 9pm-7am | Richard Turtill (ON CALL) |
| Thur | 31-Mar | 7am-2pm | Amanda Noonan |
| Thur | 31-Mar | 2pm-9pm | Michelle Ryan |
| Thur-Fri | 3/31-4/1 | 9pm-7am | Richard Turtill (ON CALL) |
| Fri | 1-Apr | 7am-2pm | Kim Lukes |
| Fri | 1-Apr | 2pm-9pm | Alison Rivera |
| Fri-Sat | 4/1-4/2 | 9pm-7am | Richard Turtill (ON CALL) |
| Sat | 2-Apr | 7am-2pm | Amanda Noonan (ON CALL) |
| Sat | 2-Apr | 2pm-9pm | Amanda Noonan (ON CALL) |
| Sat-Sun | 2-Apr | 9pm-7am | Amanda Noonan (ON CALL) |

LT Federal Liaison (2)

| | | | |
|---------|-----------|------------|----------------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Scott Sloan |
| Sun | 27-Mar | 7am - 3pm | Susan Salter / Lisa Gibney |
| Sun | 27-Mar | 3pm-11pm | Jerry Hale |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Scott Sloan |
| Mon | 28-Mar | 7am - 3pm | Susan Salter / Lisa Gibney |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|-----------------------------|
| Mon | 28-Mar | 3pm-11pm | Lisa Wright |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Ned Wright |
| Tue | 29-Mar | 7am - 3pm | Susan Salter / Jerry Hale |
| Tue | 29-Mar | 3pm-11pm | Lisa Wright |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Ned Wright |
| Wed | 30-Mar | 7am - 3pm | Bethany Cecere / Jerry Hale |
| Wed | 30-Mar | 3pm-11pm | Lisa Wright |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Ned Wright |
| Thur | 31-Mar | 7am - 3pm | Jeff Temple / Jason Lising |
| Thur | 31-Mar | 3pm-11pm | Ted Smith |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Ned Wright |
| Fri | 1-Apr | 7am - 3pm | Jeff Lynch / Beth Reed |
| Fri | 1-Apr | 3pm-11pm | Jerry Hale |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Jason Lising |
| Sat | 2-Apr | 7am - 3pm | Beth Reed |
| Sat | 2-Apr | 3pm-11pm | Bethany Cecere |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Jason Lising |

LT Congressional Liaison (2)

| | | | |
|----------|-----------|------------|----------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Amy Powell (ON CALL) |
| Sun | 27-Mar | 7am - 3pm | Amy Powell (ON CALL) |
| Sun | 27-Mar | 3pm-11pm | Amy Powell (ON CALL) |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Amy Powell (ON CALL) |
| Mon | 28-Mar | 7am - 3pm | Amy Powell (ON CALL) |
| Mon | 28-Mar | 3pm-11pm | Amy Powell (ON CALL) |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Amy Powell (ON CALL) |
| Tue | 29-Mar | 7am - 3pm | Amy Powell (ON CALL) |
| Tue | 29-Mar | 3pm-11pm | Amy Powell (ON CALL) |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Amy Powell (ON CALL) |
| Wed | 30-Mar | 7am - 3pm | Amy Powell (ON CALL) |
| Wed | 30-Mar | 3pm-11pm | Amy Powell (ON CALL) |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Amy Powell (ON CALL) |
| Thur | 31-Mar | 7am - 3pm | Amy Powell (ON CALL) |
| Thur | 31-Mar | 3pm-11pm | Amy Powell (ON CALL) |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Amy Powell (ON CALL) |
| Fri | 1-Apr | 7am - 2pm | Amy Powell (ON CALL) |
| Fri | 1-Apr | 2pm-9pm | Amy Powell (ON CALL) |
| Sat | 2-Apr | 7am - 2pm | Amy Powell (ON CALL) |
| Sat | 2-Apr | 2pm-9pm | Amy Powell (ON CALL) |
| Sun | 3-Apr | 7am-2pm | Amy Powell (ON CALL) |

LT International Liaison (2)

| | | | |
|---------|-----------|------------|-----------------------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Cindy Rosales/ Elizabeth Smioldo |
| Sun | 27-Mar | 7am - 3pm | Jill Shepard/ Karen Henderson |
| Sun | 27-Mar | 3pm-11pm | Nancy Fragoyannis/ Jenny Tobin |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Steve Baker / Brian Wittick |
| Mon | 28-Mar | 7am - 3pm | Jill Shepard/ Karen Henderson |
| Mon | 28-Mar | 3pm-11pm | Nancy Fragoyannis / Cindy Rosales |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Steve Baker / Brian Wittick |

Japan Earthquake ERO Staffing Roster
Mar 27-Apr 2, 2011
Pay Period 8 - Week 1

| | | | |
|---------------------------------|-----------|------------|--|
| Tue | 29-Mar | 7am - 3pm | Jill Shepard/ Karen Henderson |
| Tue | 29-Mar | 3pm-11pm | Nancy Fragoyannis / Gerri Fehst |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Steve Baker / Brian Wittick |
| Wed | 30-Mar | 7am - 3pm | Eric Stahl / Lauren Mayros (J. Tobin 12-3) |
| Wed | 30-Mar | 3pm-11pm | Danielle Emche / Mugah Afshar-Tous |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Jen Schwartzman / Charlotte Abrams |
| Thur | 31-Mar | 7am - 3pm | Jill Shepard / Lauren Mayros |
| Thur | 31-Mar | 3pm-11pm | Gerri / Mugah Afshar-Tous |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Jen Schwartzman / Charlotte Abrams |
| Fri | 1-Apr | 7am - 3pm | Cindy Rosales/ Lauren Mayros |
| Fri | 1-Apr | 3pm-11pm | Gerri/ Mugah Afshar-Tous |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Jen Schwartzman / Charlotte Abrams |
| Sat | 2-Apr | 7am - 3pm | Steve Bloom/ Karen Henderson |
| Sat | 2-Apr | 3pm-11pm | Janice Owens / Jenny Tobin |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Gerri Fehst / Elizabeth Smioldo |
| Protective Measures Team | | | |
| PMTR Director | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Randy Sullivan |
| Sun | 27-Mar | 7am - 3pm | Don Cool |
| Sun | 27-Mar | 3pm-11pm | Vince Holahan |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | John Tappert |
| Mon | 28-Mar | 7am - 3pm | Don Cool |
| Mon | 28-Mar | 3pm-11pm | Vince Holahan |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | John Tappert |
| Tue | 29-Mar | 7am - 3pm | Terry Reis |
| Tue | 29-Mar | 3pm-11pm | Vince Holahan |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Patricia Milligan |
| Wed | 30-Mar | 7am - 3pm | Terry Reis |
| Wed | 30-Mar | 3pm-11pm | Vince Holahan |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Patricia Milligan |
| Thur | 31-Mar | 7am - 3pm | Randy Sullivan |
| Thur | 31-Mar | 3pm-11pm | Terry Reis |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Christiana Lui |
| Fri | 1-Apr | 7am - 3pm | Randy Sullivan |
| Fri | 1-Apr | 3pm-11pm | Don Cool |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Christiana Lui |
| Sat | 2-Apr | 7am - 3pm | Randy Sullivan |
| Sat | 2-Apr | 3pm-11pm | Don Cool |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Christiana Lui |
| PMTR Coordinator | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Lou Brandon |
| Sun | 27-Mar | 7am - 3pm | Ryan Craffey |
| Sun | 27-Mar | 3pm-11pm | Jay Patel |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Lou Brandon |
| Mon | 28-Mar | 7am - 3pm | Duane Hardesty |
| Mon | 28-Mar | 3pm-11pm | Nima Ashkeboussi |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Lou Brandon |

Japan Earthquake ERO Staffing Roster
Mar 27-Apr 2, 2011
Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|------------------|
| Tue | 29-Mar | 7am - 3pm | Duane Hardesty |
| Tue | 29-Mar | 3pm-11pm | Nima Ashkeboussi |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Lou Brandon |
| Wed | 30-Mar | 7am - 3pm | Michael Raddatz |
| Wed | 30-Mar | 3pm-11pm | Jay Patel |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Ryan Craffey |
| Thur | 31-Mar | 7am - 3pm | Duane Hardesty |
| Thur | 31-Mar | 3pm-11pm | Michael Raddatz |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | |
| Fri | 1-Apr | 7am - 3pm | Duane Hardesty |
| Fri | 1-Apr | 3pm-11pm | Nima Ashkeboussi |
| Fri-Sat | 4/1-4/2 | 11pm-7am | |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |

PMTR Prot Actions Asst Dir

| | | | |
|----------|-----------|------------|----------------------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Greg Casto |
| Sun | 27-Mar | 7am - 3pm | Kevin Williams |
| Sun | 27-Mar | 3pm-11pm | Tim Harris |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Greg Casto/Jessical Kratchman |
| Mon | 28-Mar | 7am - 3pm | Sandra Wastler |
| Mon | 28-Mar | 3pm-11pm | Mike McCoppin |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Greg Casto/Jessical Kratchman |
| Tue | 29-Mar | 7am - 3pm | |
| Tue | 29-Mar | 3pm-11pm | Tim Harris |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Greg Casto |
| Wed | 30-Mar | 7am - 3pm | Alemu Bezakulu |
| Wed | 30-Mar | 3pm-11pm | Sandra Wastler |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Greg Casto |
| Thur | 31-Mar | 7am - 3pm | Jessica Kratchman |
| Thur | 31-Mar | 3pm-11pm | Tim Harris |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | |
| Fri | 1-Apr | 7am - 3pm | Sandra Wastler/Jessica Kratchman |
| Fri | 1-Apr | 3pm-11pm | |
| Fri-Sat | 4/1-4/2 | 11pm-7am | |
| Sat | 2-Apr | 7am - 3pm | Alemu Bezakulu |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |

PMTR RAAD

| | | | |
|---------|-----------|------------|---------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Mike Norris |
| Sun | 27-Mar | 7am - 3pm | Michelle Hart |
| Sun | 27-Mar | 3pm-11pm | |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Mike Norris |
| Mon | 28-Mar | 7am - 3pm | Steve LaVie |
| Mon | 28-Mar | 3pm-11pm | Michelle Hart |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Mike Norris |
| Tue | 29-Mar | 7am - 3pm | |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|---------------|
| Tue | 29-Mar | 3pm-11pm | |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Mike Norris |
| Wed | 30-Mar | 7am - 3pm | |
| Wed | 30-Mar | 3pm-11pm | Steve LaVie |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | |
| Thur | 31-Mar | 7am - 3pm | Michelle Hart |
| Thur | 31-Mar | 3pm-11pm | |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | |
| Fri | 1-Apr | 7am - 3pm | |
| Fri | 1-Apr | 3pm-11pm | Steve LaVie |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Michelle Hart |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |

PMTR Dose Assessment (RASCAL) - Need 2

| | | | |
|----------|-----------|------------|---------------------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | John Parillo/Ron LaVera |
| Sun | 27-Mar | 7am - 3pm | Tony Huffert |
| Sun | 27-Mar | 3pm-11pm | Casper Sun/Ed Roach |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Margaret Cervera/John Parillo |
| Mon | 28-Mar | 7am - 3pm | Rich Clement/Tony Huffert |
| Mon | 28-Mar | 3pm-11pm | Bernie White/Casper Sun |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Margaret Cervera/John Parillo |
| Tue | 29-Mar | 7am - 3pm | Tony Huffert/Rich Clement |
| Tue | 29-Mar | 3pm-11pm | Casper Sun |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Margaret Cervera/Bernie White |
| Wed | 30-Mar | 7am - 3pm | Tony Huffert/Rich Clement |
| Wed | 30-Mar | 3pm-11pm | Casper Sun |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Margaret Cervera/John Parillo |
| Thur | 31-Mar | 7am - 3pm | Rich Clement/Joe DeCicco |
| Thur | 31-Mar | 3pm-11pm | Bernie White (Maybe)/Casper Sun |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | John Parillo |
| Fri | 1-Apr | 7am - 3pm | /Rich Clement |
| Fri | 1-Apr | 3pm-11pm | Casper Sun |
| Fri-Sat | 4/1-4/2 | 11pm-7am | John Parillo |
| Sat | 2-Apr | 7am - 3pm | Tony Huffert |
| Sat | 2-Apr | 3pm-11pm | Casper Sun |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |

PMTR GIS Analyst

| | | | |
|---------|-----------|------------|------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | N/A |
| Sun | 27-Mar | 7am - 3pm | (ON CALL) |
| Sun | 27-Mar | 3pm-11pm | N/A |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | N/A |
| Mon | 28-Mar | 7am - 3pm | (ON CALL) |
| Mon | 28-Mar | 3pm-11pm | N/A |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | N/A |
| Tue | 29-Mar | 7am - 3pm | (ON CALL) |
| Tue | 29-Mar | 3pm-11pm | N/A |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|-----------|
| Tue-Wed | 3/29-3/30 | 11pm - 7am | N/A |
| Wed | 30-Mar | 7am - 3pm | (ON CALL) |
| Wed | 30-Mar | 3pm-11pm | N/A |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | N/A |
| Thur | 31-Mar | 7am - 3pm | (ON CALL) |
| Thur | 31-Mar | 3pm-11pm | N/A |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | N/A |
| Fri | 1-Apr | 7am - 3pm | (ON CALL) |
| Fri | 1-Apr | 3pm-11pm | N/A |
| Fri-Sat | 4/1-4/2 | 11pm-7am | N/A |
| Sat | 2-Apr | 7am - 3pm | (ON CALL) |
| Sat | 2-Apr | 3pm-11pm | N/A |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | N/A |

PMTR Meteorologist

| | | | |
|----------|-----------|------------|-----------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | N/A |
| Sun | 27-Mar | 7am - 3pm | (ON CALL) |
| Sun | 27-Mar | 3pm-11pm | N/A |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | N/A |
| Mon | 28-Mar | 7am - 3pm | (ON CALL) |
| Mon | 28-Mar | 3pm-11pm | N/A |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | N/A |
| Tue | 29-Mar | 7am - 3pm | (ON CALL) |
| Tue | 29-Mar | 3pm-11pm | N/A |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | N/A |
| Wed | 30-Mar | 7am - 3pm | (ON CALL) |
| Wed | 30-Mar | 3pm-11pm | N/A |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | N/A |
| Thur | 31-Mar | 7am - 3pm | (ON CALL) |
| Thur | 31-Mar | 3pm-11pm | N/A |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | N/A |
| Fri | 1-Apr | 7am - 3pm | (ON CALL) |
| Fri | 1-Apr | 3pm-11pm | N/A |
| Fri-Sat | 4/1-4/2 | 11pm-7am | N/A |
| Sat | 2-Apr | 7am - 3pm | (ON CALL) |
| Sat | 2-Apr | 3pm-11pm | N/A |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | N/A |

Reactor Safety Team**RST Director**

| | | | |
|---------|-----------|------------|---------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Dave Skeen |
| Sun | 27-Mar | 7am - 3pm | Pat Hiland |
| Sun | 27-Mar | 3pm-11pm | Fred Brown |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Dave Skeen |
| Mon | 28-Mar | 7am - 3pm | Pat Hiland |
| Mon | 28-Mar | 3pm-11pm | Fred Brown |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Dave Skeen |
| Tue | 29-Mar | 7am - 3pm | Jennifer Uhle |
| Tue | 29-Mar | 3pm-11pm | Fred Brown |

Japan Earthquake ERO Staffing Roster
Mar 27-Apr 2, 2011
Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|---------------|
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Dave Skeen |
| Wed | 30-Mar | 7am - 3pm | Jennifer Uhle |
| Wed | 30-Mar | 3pm-11pm | Fred Brown |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Mike Case |
| Thur | 31-Mar | 7am - 3pm | Jennifer Uhle |
| Thur | 31-Mar | 3pm-11pm | Bill Ruland |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Mike Case |
| Fri | 1-Apr | 7am - 3pm | Jennifer Uhle |
| Fri | 1-Apr | 3pm-11pm | Bill Ruland |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Mike Case |
| Sat | 2-Apr | 7am - 3pm | Brian Holian |
| Sat | 2-Apr | 3pm-11pm | Bill Ruland |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Mike Case |

RST Coordinator

| | | | |
|----------|-----------|------------|------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Brett Rini |
| Sun | 27-Mar | 7am - 3pm | Peter Alter |
| Sun | 27-Mar | 3pm-11pm | Rick Hasselberg |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Frank Collins |
| Mon | 28-Mar | 7am - 3pm | Peter Alter |
| Mon | 28-Mar | 3pm-11pm | Rick Hasselberg |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Mike Morlang |
| Tue | 29-Mar | 7am - 3pm | Peter Alter |
| Tue | 29-Mar | 3pm-11pm | Greg Schoenebeck |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Mike Morlang |
| Wed | 30-Mar | 7am - 3pm | Peter Alter |
| Wed | 30-Mar | 3pm-11pm | Greg Schoenebeck |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Frank Collins |
| Thur | 31-Mar | 7am - 3pm | Peter Alter |
| Thur | 31-Mar | 3pm-11pm | Greg Schoenebeck |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Frank Collins |
| Fri | 1-Apr | 7am - 3pm | Brett Rini |
| Fri | 1-Apr | 3pm-11pm | |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Frank Collins |
| Sat | 2-Apr | 7am - 3pm | Peter Alter |
| Sat | 2-Apr | 3pm-11pm | Brett Rini |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Oleg Bukharin |

Severe Accident/PRA

| | | | |
|---------|-----------|------------|-----------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Ray Skarda |
| Sun | 27-Mar | 7am - 3pm | Andy Howe |
| Sun | 27-Mar | 3pm-11pm | Jeff Mitman |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Jim Gilmer |
| Mon | 28-Mar | 7am - 3pm | Jeff Circle |
| Mon | 28-Mar | 3pm-11pm | Len Ward |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Steve Arndt |
| Tue | 29-Mar | 7am - 3pm | Hossein Esmaili |
| Tue | 29-Mar | 3pm-11pm | Ed Fuller |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Steve Arndt |

Japan Earthquake ERO Staffing Roster
Mar 27-Apr 2, 2011
Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|-----------------|
| Wed | 30-Mar | 7am - 3pm | Jim Gilmer |
| Wed | 30-Mar | 3pm-11pm | Hossein Esmaili |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Steve Arndt |
| Thur | 31-Mar | 7am - 3pm | Don Chung |
| Thur | 31-Mar | 3pm-11pm | Hossein Esmaili |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Steve Arndt |
| Fri | 1-Apr | 7am - 3pm | Jeff Mitman |
| Fri | 1-Apr | 3pm-11pm | Don Hilton |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Ray Skarda |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |

BWR Expertise

| | | | |
|----------|-----------|------------|--------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Eva Brown |
| Sun | 27-Mar | 7am - 3pm | Mike Brown |
| Sun | 27-Mar | 3pm-11pm | Chuck Norton |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Eva Brown |
| Mon | 28-Mar | 7am - 3pm | Mike Brown |
| Mon | 28-Mar | 3pm-11pm | Chuck Norton |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Jim Shea |
| Tue | 29-Mar | 7am - 3pm | Mike Brown |
| Tue | 29-Mar | 3pm-11pm | Chuck Norton |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Jim Shea |
| Wed | 30-Mar | 7am - 3pm | Mike Brown |
| Wed | 30-Mar | 3pm-11pm | Chuck Norton |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Jim Shea |
| Thur | 31-Mar | 7am - 3pm | Mike Brown |
| Thur | 31-Mar | 3pm-11pm | Chuck Norton |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Jim Shea |
| Fri | 1-Apr | 7am - 3pm | Mike Brown |
| Fri | 1-Apr | 3pm-11pm | Chuck Norton |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Eva Brown |
| Sat | 2-Apr | 7am - 3pm | Mike Brown |
| Sat | 2-Apr | 3pm-11pm | Chuck Norton |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Eva Brown |

RST Comm/ERDS Operator

| | | | |
|---------|-----------|------------|------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Denise McGovern |
| Sun | 27-Mar | 7am - 3pm | Mark Padovan |
| Sun | 27-Mar | 3pm-11pm | Bill Roggenbrodt |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Denise McGovern |
| Mon | 28-Mar | 7am - 3pm | Mark Padovan |
| Mon | 28-Mar | 3pm-11pm | Rick Jervey |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Brian Horn |
| Tue | 29-Mar | 7am - 3pm | John Thorp |
| Tue | 29-Mar | 3pm-11pm | Andy Kugler |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Brian Horn |
| Wed | 30-Mar | 7am - 3pm | Steve Bloom |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|------------------|
| Wed | 30-Mar | 3pm-11pm | Bill Roggenbrodt |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | |
| Thur | 31-Mar | 7am - 3pm | Jerry Dozier |
| Thur | 31-Mar | 3pm-11pm | John Thorp |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | |
| Fri | 1-Apr | 7am - 3pm | Andy Kugler |
| Fri | 1-Apr | 3pm-11pm | |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Liliana Ramadan |
| Sat | 2-Apr | 7am - 3pm | John Thorp |
| Sat | 2-Apr | 3pm-11pm | Mark Padovan |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |
| | | | |

RST Support (Seismology Q&A)

| | | | |
|----------|-----------|------------|-----------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | (ON CALL) |
| Sun | 27-Mar | 7am - 3pm | (ON CALL) |
| Sun | 27-Mar | 3pm-11pm | (ON CALL) |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | (ON CALL) |
| Mon | 28-Mar | 7am - 3pm | (ON CALL) |
| Mon | 28-Mar | 3pm-11pm | (ON CALL) |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | (ON CALL) |
| Tue | 29-Mar | 7am - 3pm | (ON CALL) |
| Tue | 29-Mar | 3pm-11pm | (ON CALL) |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | (ON CALL) |
| Wed | 30-Mar | 7am - 3pm | (ON CALL) |
| Wed | 30-Mar | 3pm-11pm | (ON CALL) |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | (ON CALL) |
| Thur | 31-Mar | 7am - 3pm | (ON CALL) |
| Thur | 31-Mar | 3pm-11pm | (ON CALL) |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | (ON CALL) |
| Fri | 1-Apr | 7am - 3pm | (ON CALL) |
| Fri | 1-Apr | 3pm-11pm | (ON CALL) |
| Fri-Sat | 4/1-4/2 | 11pm-7am | (ON CALL) |
| Sat | 2-Apr | 7am - 3pm | (ON CALL) |
| Sat | 2-Apr | 3pm-11pm | (ON CALL) |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | (ON CALL) |
| | | | |

RST Support (Structural)

| | | | |
|----------|-----------|------------|---------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Off (ON CALL) |
| Sun | 27-Mar | 7am - 3pm | Off (ON CALL) |
| Sun | 27-Mar | 3pm-11pm | Off (ON CALL) |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Off (ON CALL) |
| Mon | 28-Mar | 7am - 3pm | Off (ON CALL) |
| Mon | 28-Mar | 3pm-11pm | Off (ON CALL) |
| Mon-Tues | 3/28-3/29 | 11pm - 7am | Off (ON CALL) |
| Tues | 29-Mar | 7am - 3pm | Off (ON CALL) |
| Tues | 29-Mar | 3pm-11pm | Off (ON CALL) |
| Tues-Wed | 3/29-3/30 | 11pm - 7am | Off (ON CALL) |
| Wed | 30-Mar | 7am - 3pm | Off (ON CALL) |
| Wed | 30-Mar | 3pm-11pm | Off (ON CALL) |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|---------------|
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Off (ON CALL) |
| Thur | 31-Mar | 7am - 3pm | Off (ON CALL) |
| Thur | 31-Mar | 3pm-11pm | Off (ON CALL) |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Off (ON CALL) |
| Fri | 1-Apr | 7am - 3pm | Off (ON CALL) |
| Fri | 1-Apr | 3pm-11pm | Off (ON CALL) |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Off (ON CALL) |

Miller, Chris

From: Miller, Chris
Sent: Sunday, March 27, 2011 6:58 AM
To: Blount, Tom; Dyer, Jim
Subject: FW: Good info.
Attachments: Fukuchima_eng_20110320.pps

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

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

Steve Campbell
EST Coordinator

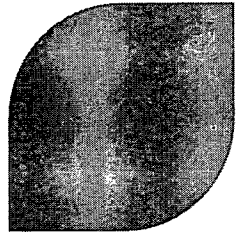
From: Jervey, Richard
Sent: Saturday, March 26, 2011 11:15 PM
To: OST01 HOC; RST02 Hoc
Subject: FW: Good info.

Regards,

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



The Fukushima Daiichi Incident



1. Plant Design
2. Accident Progression
3. Radiological releases
4. Spent fuel pools
5. Sources of Information

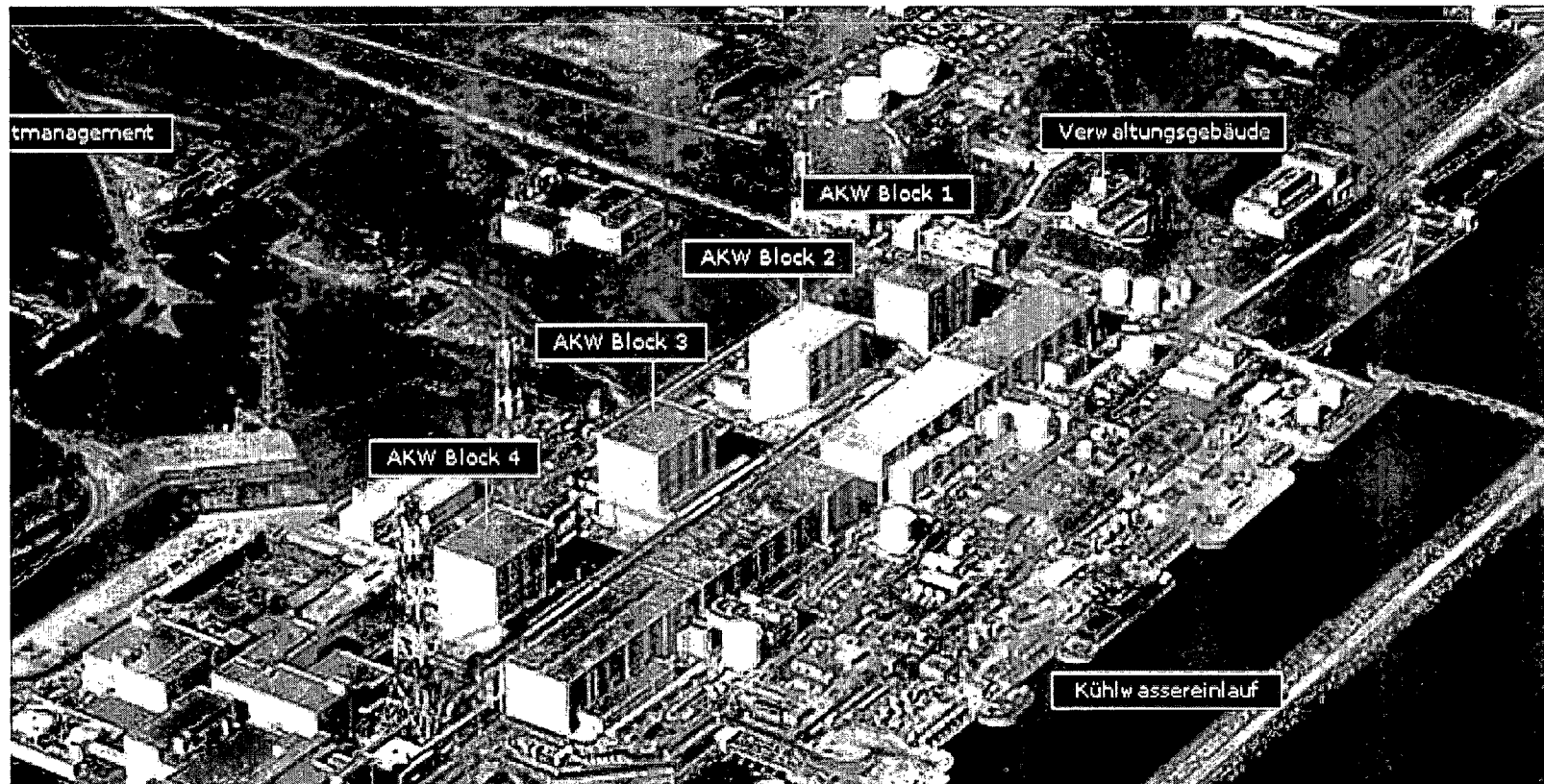
Matthias Braun
PEPA4-G, AREVA-NP GmbH
Matthias.Braun@AREVA.com

The Fukushima Daiichi Incident

1. Plant Design

► Fukushima Daiichi (Plant I)

- ◆ Unit I - GE Mark I BWR (439 MW), Operating since 1971
- ◆ Unit II-IV - GE Mark I BWR (760 MW), Operating since 1974

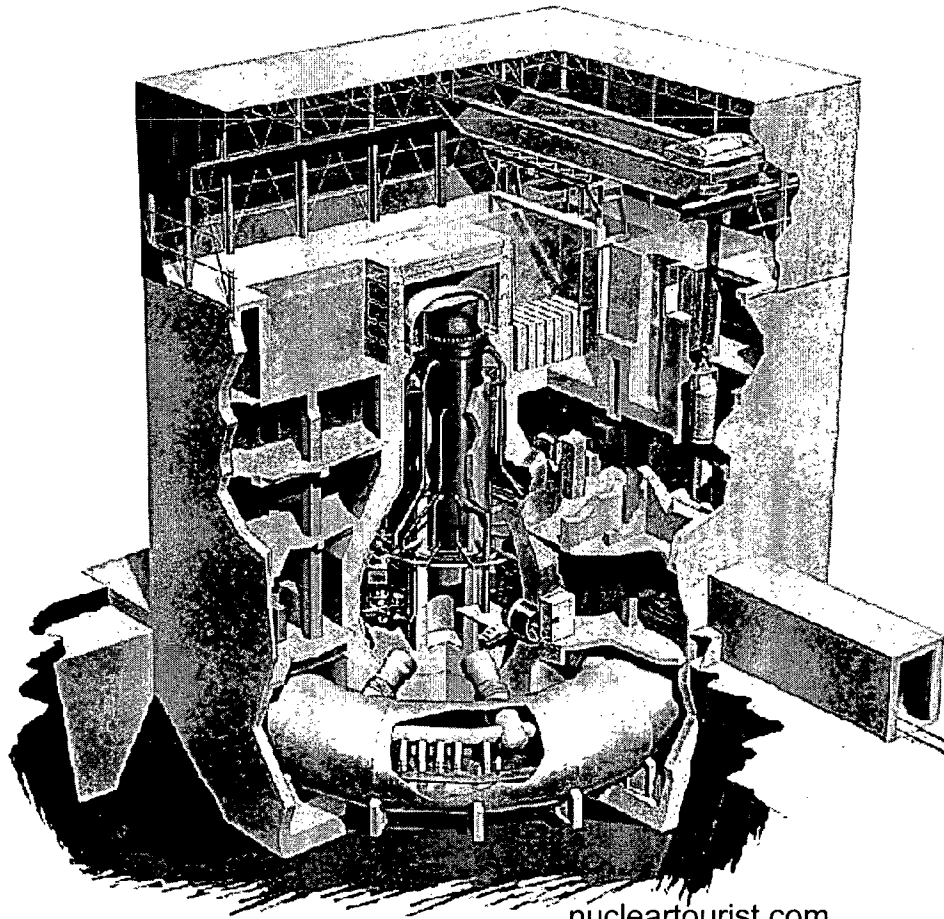


The Fukushima Daiichi Incident

1. Plant Design

► Building structure

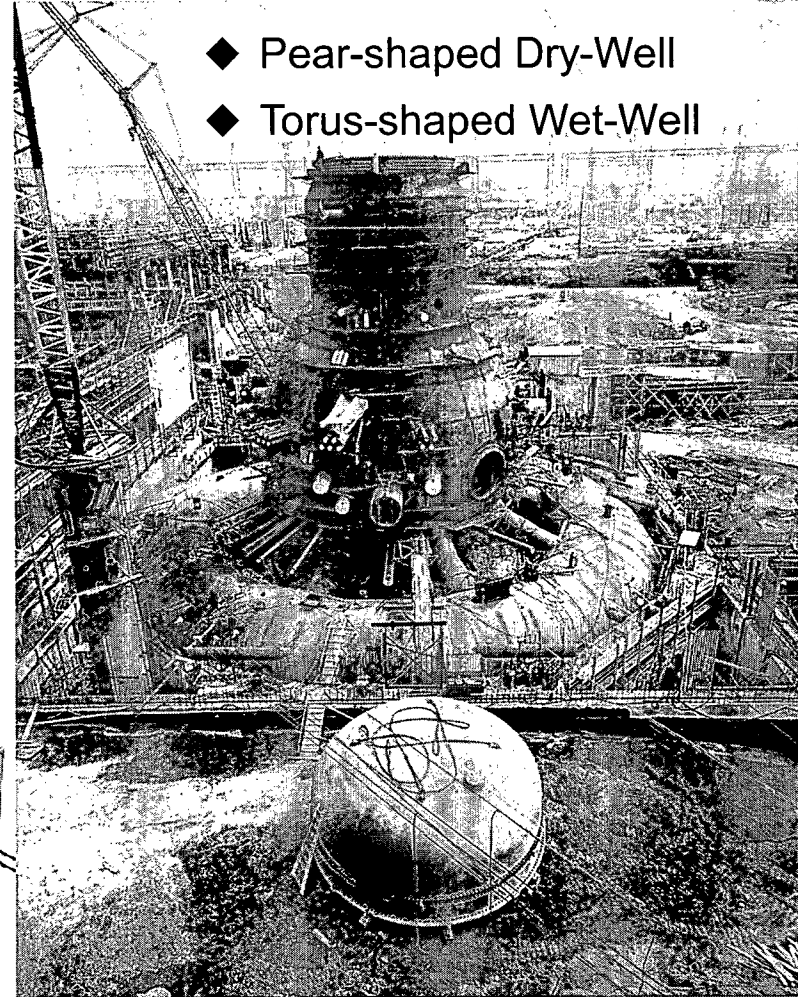
- ◆ Concrete Building
- ◆ Steel-framed Service Floor



nuclearartourist.com

► Containment

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

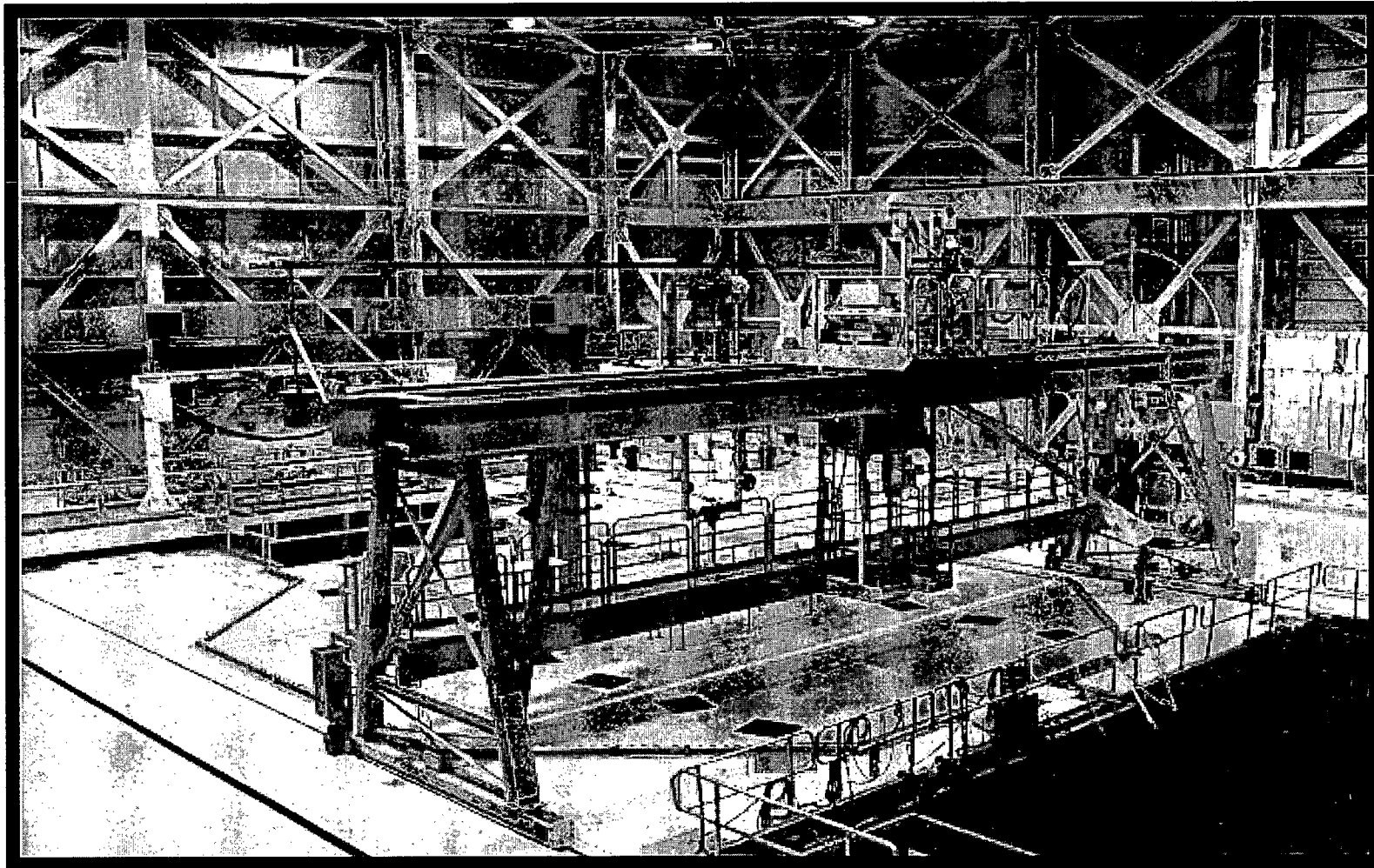


en.wikipedia.org/wiki/Browns_Ferry_Nuclear_Power_Plant

The Fukushima Daiichi Incident

1. Plant Design

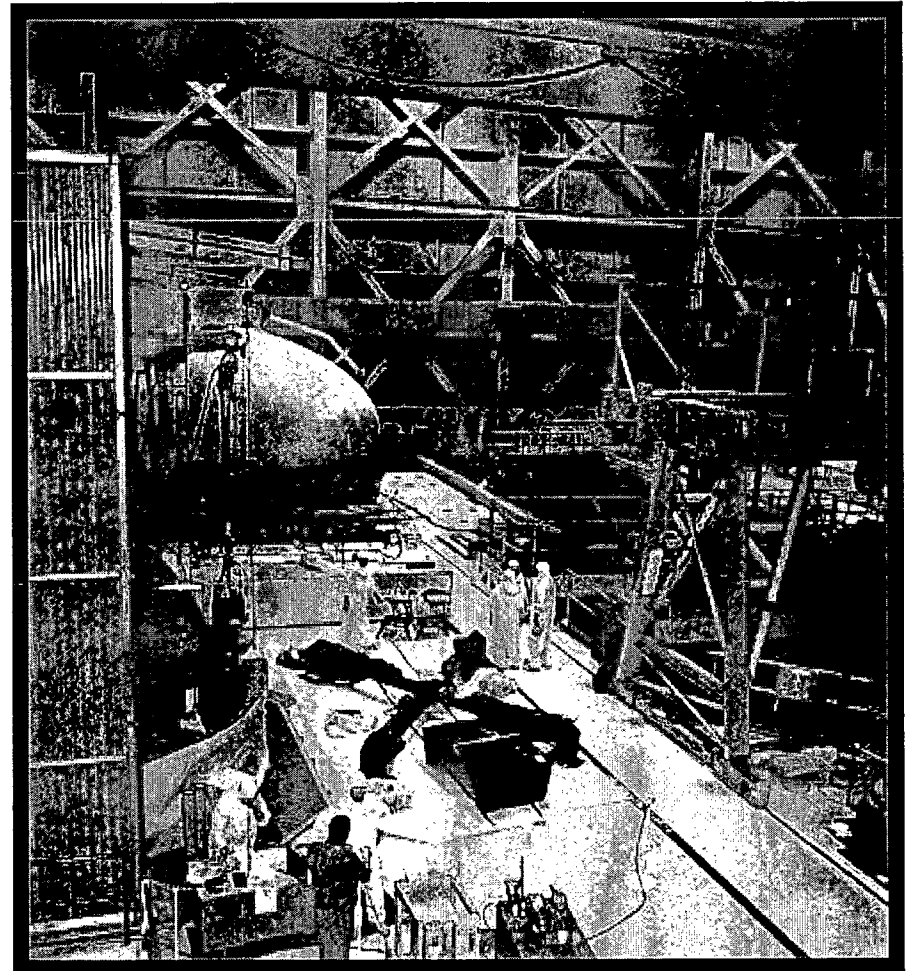
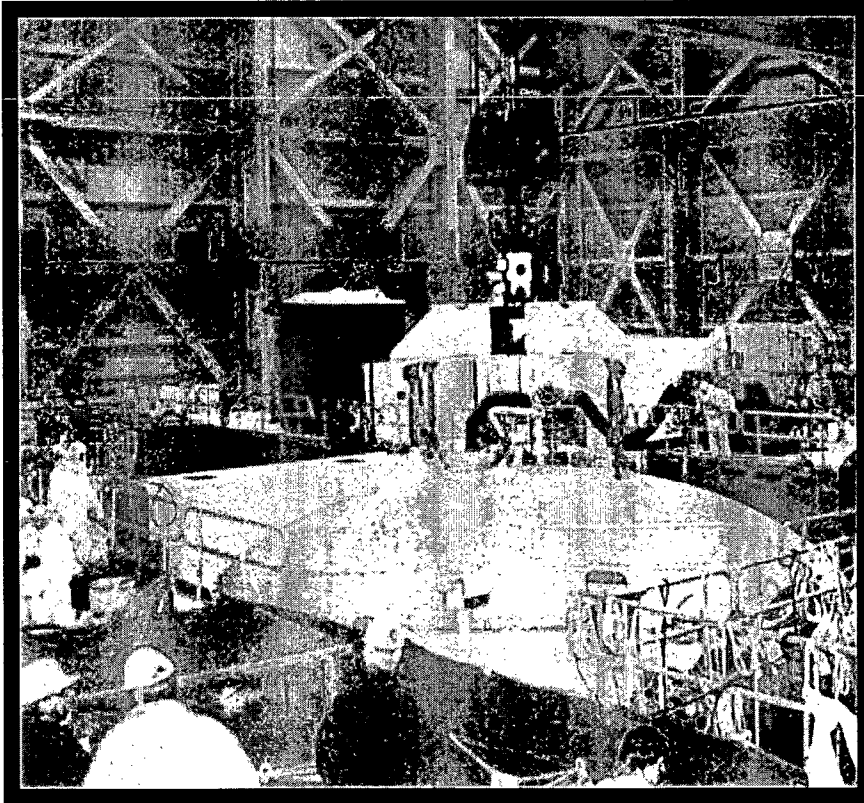
► Service Floor



The Fukushima Daiichi Incident

1. Plant Design

- ▶ Lifting the Containment closure head



The Fukushima Daiichi Incident

1. Plant Design

▶ Reactor Service Floor
(Steel Construction)

▶ Concrete Reactor Building
(secondary Containment)

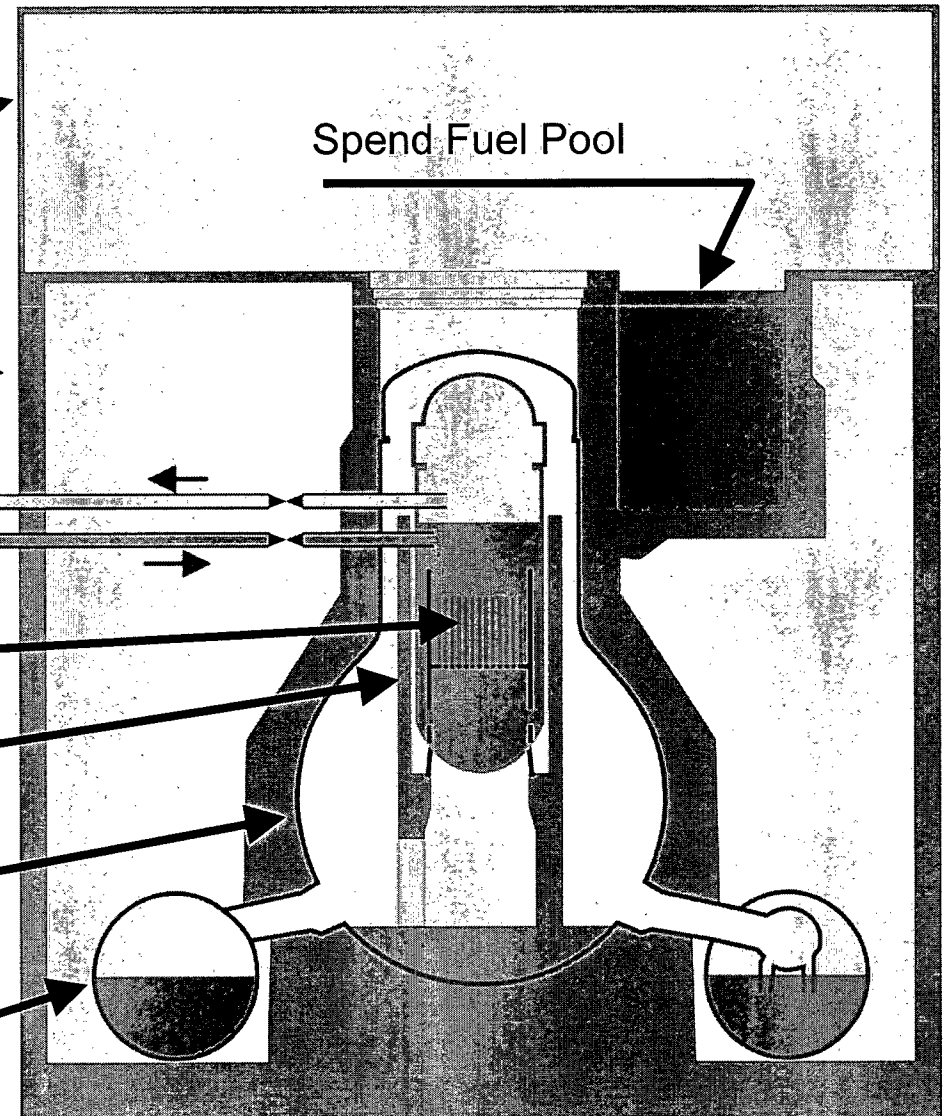
Fresh Steam line
Main Feedwater

▶ Reactor Core

▶ Reactor Pressure Vessel

▶ Containment (Dry well)

▶ Containment (Wet Well) /
Condensation Chamber



The Fukushima Daiichi Incident

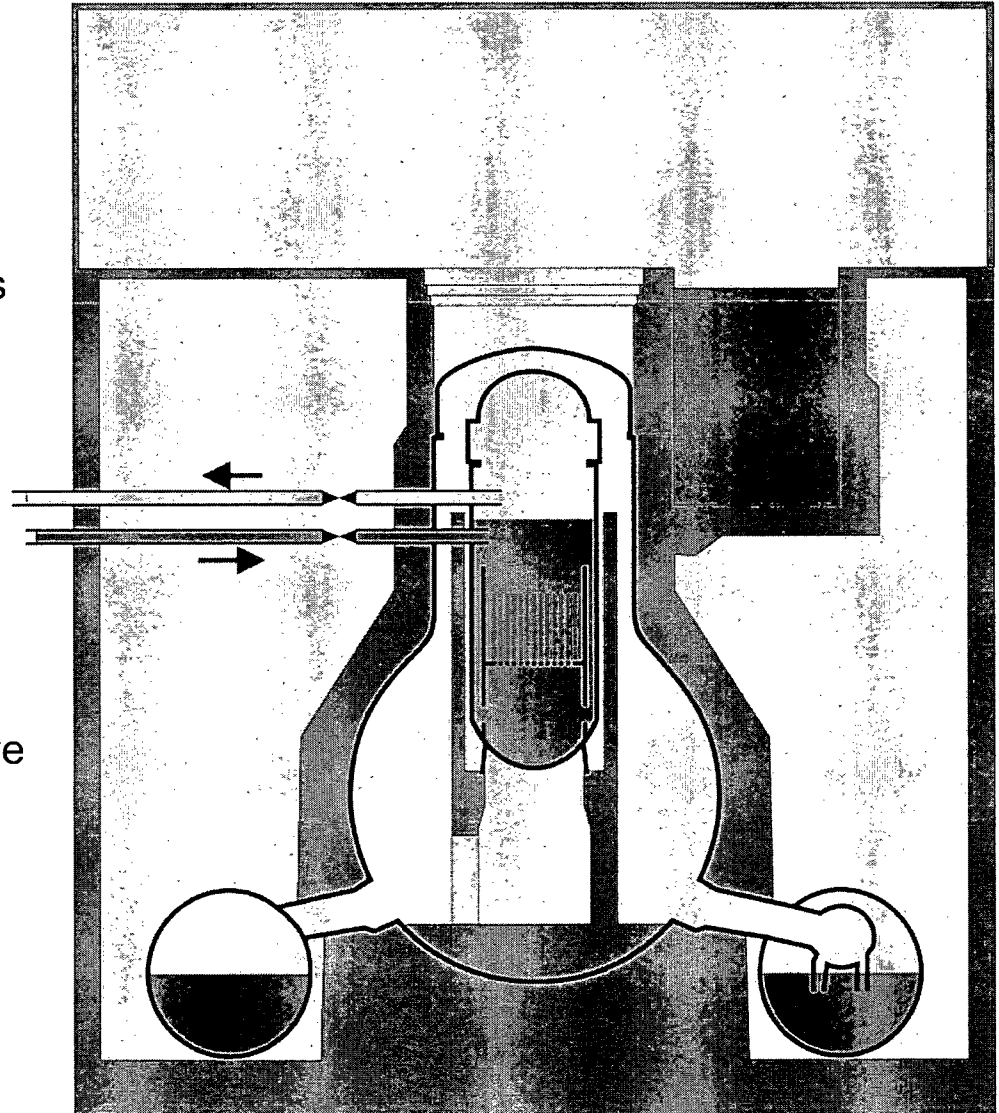
2. Accident progression

► 11.3.2011 14:46 - Earthquake

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

► SCRAM

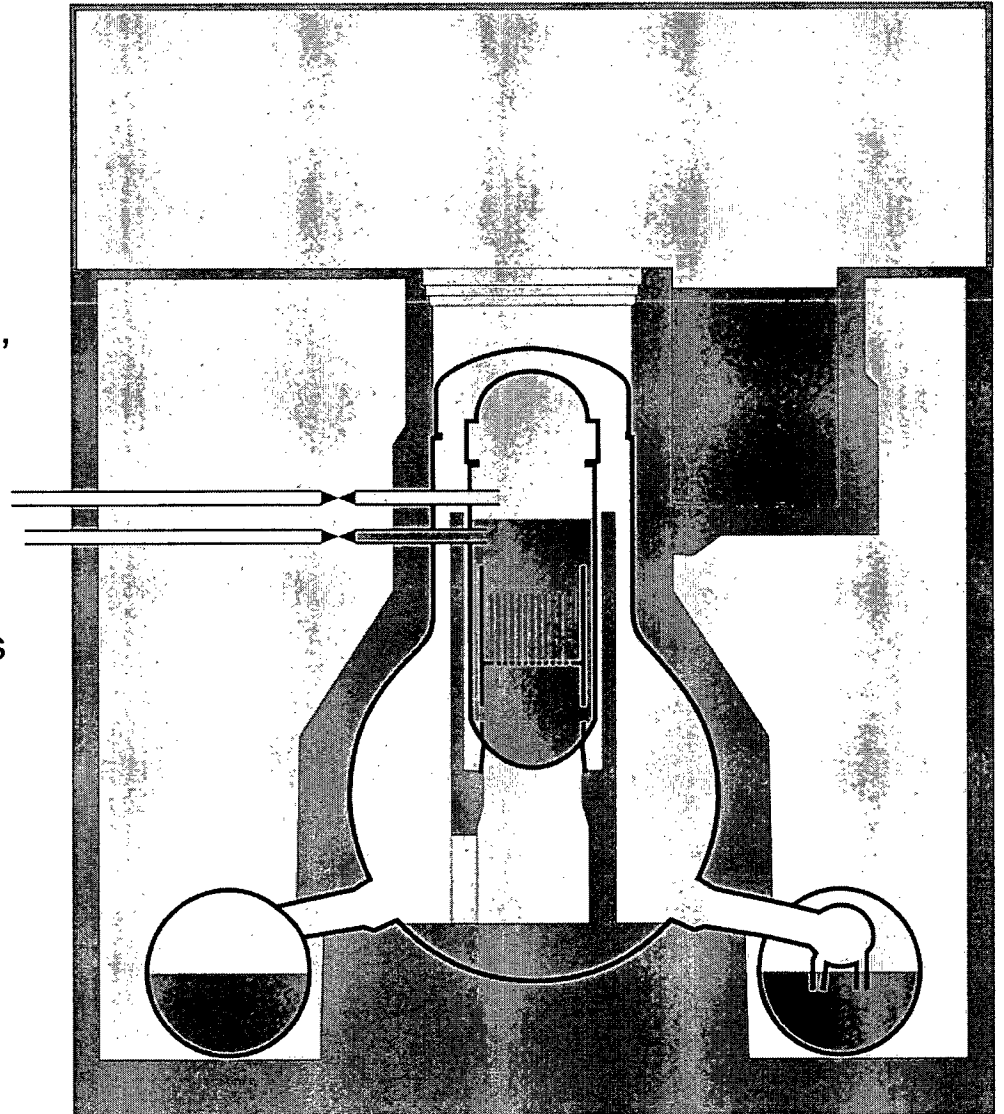
- ◆ Power generation due to Fission of Uranium stops
- ◆ Heat generation due to radioactive Decay of Fission Products
 - After Scram ~6%
 - After 1 Day ~1%
 - After 5 Days ~0.5%



The Fukushima Daiichi Incident

2. Accident progression

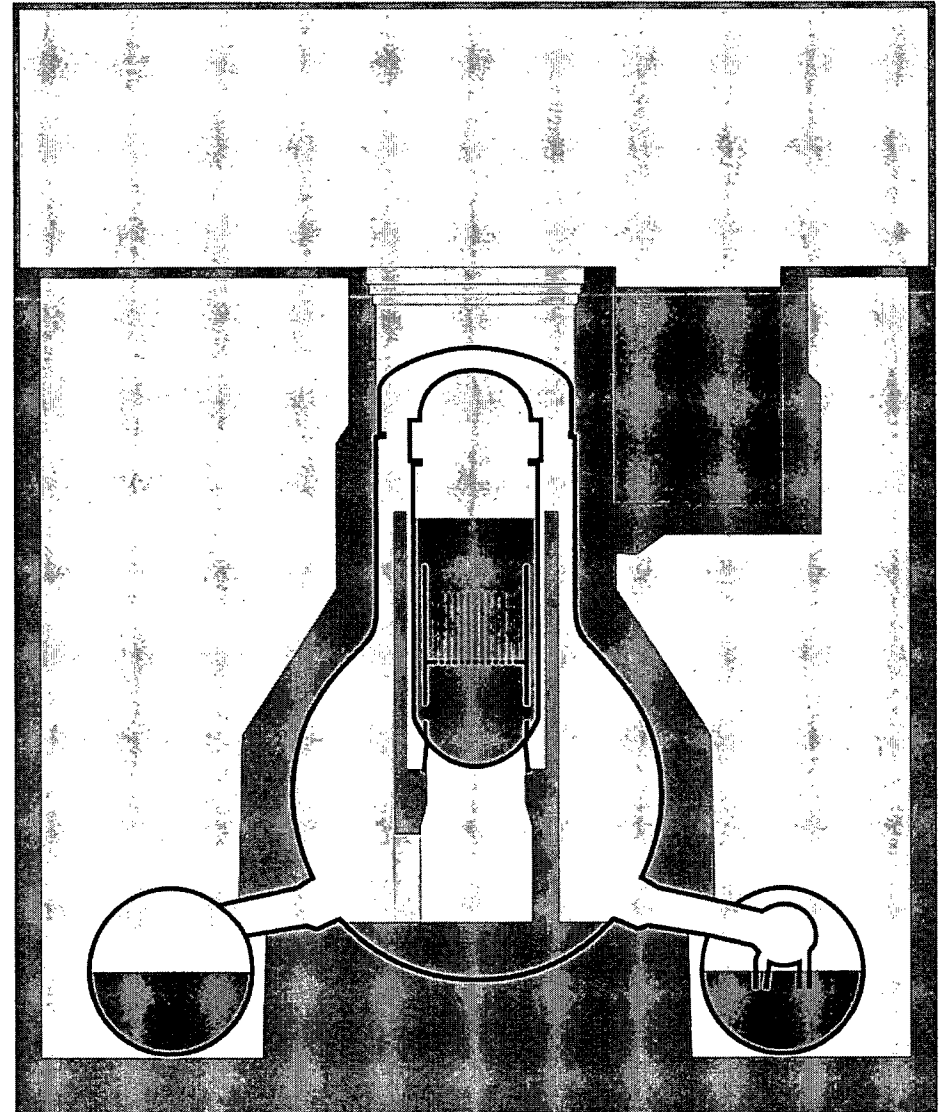
- ▶ Containment Isolation
 - ◆ Closing of all non-safety related Penetrations of the containment
 - ◆ Cuts off Machine hall
 - ◆ If containment isolation succeeds, a large early release of fission products is highly unlikely
- ▶ Diesel generators start
 - ◆ Emergency Core cooling systems are supplied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



The Fukushima Daiichi Incident

2. Accident progression

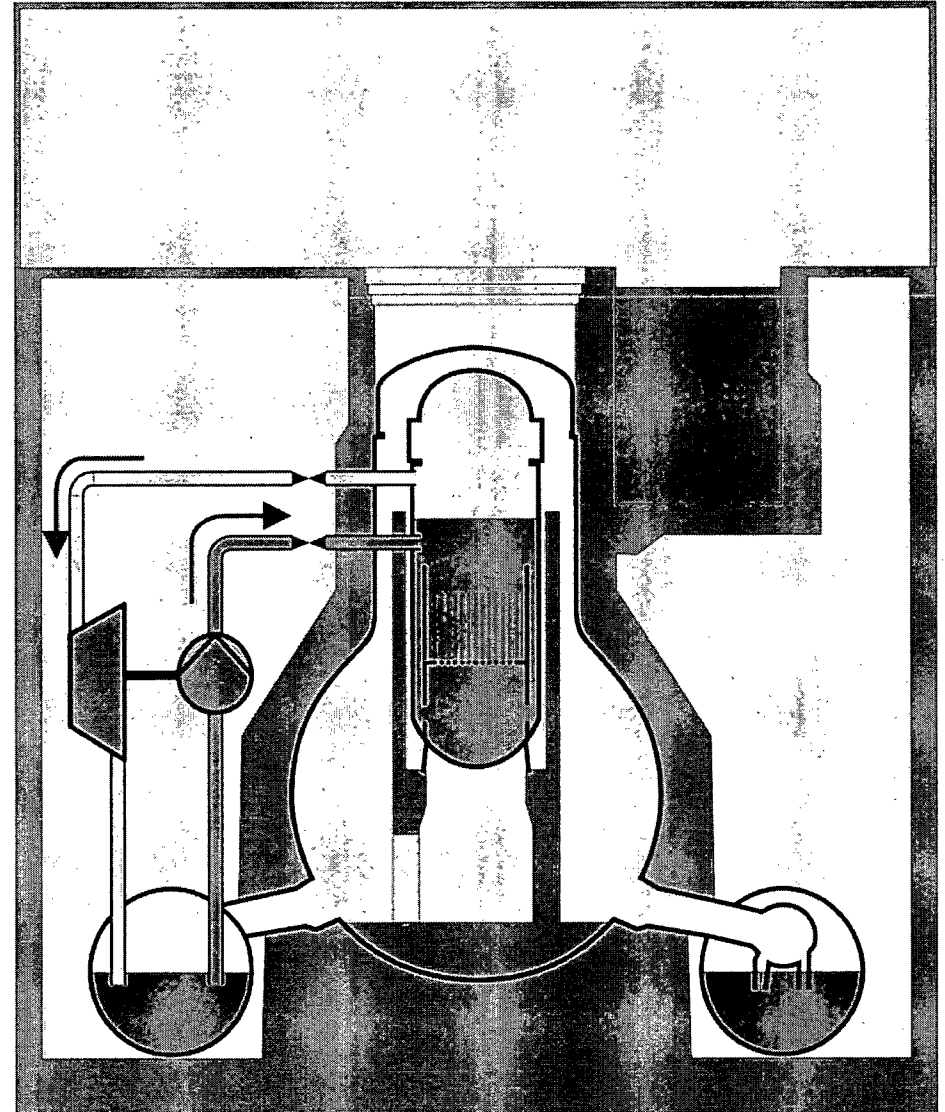
- ▶ 11.3. 15:41 Tsunami hits the plant
 - ◆ Plant Design for Tsunami height of up to 6.5m
 - ◆ Actual Tsunami height >7m
 - ◆ Flooding of
 - Diesel Generators and/or
 - Essential service water building cooling the generators
- ▶ Station Blackout
 - ◆ Common cause failure of the power supply
 - ◆ Only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



The Fukushima Daiichi Incident

2. Accident progression

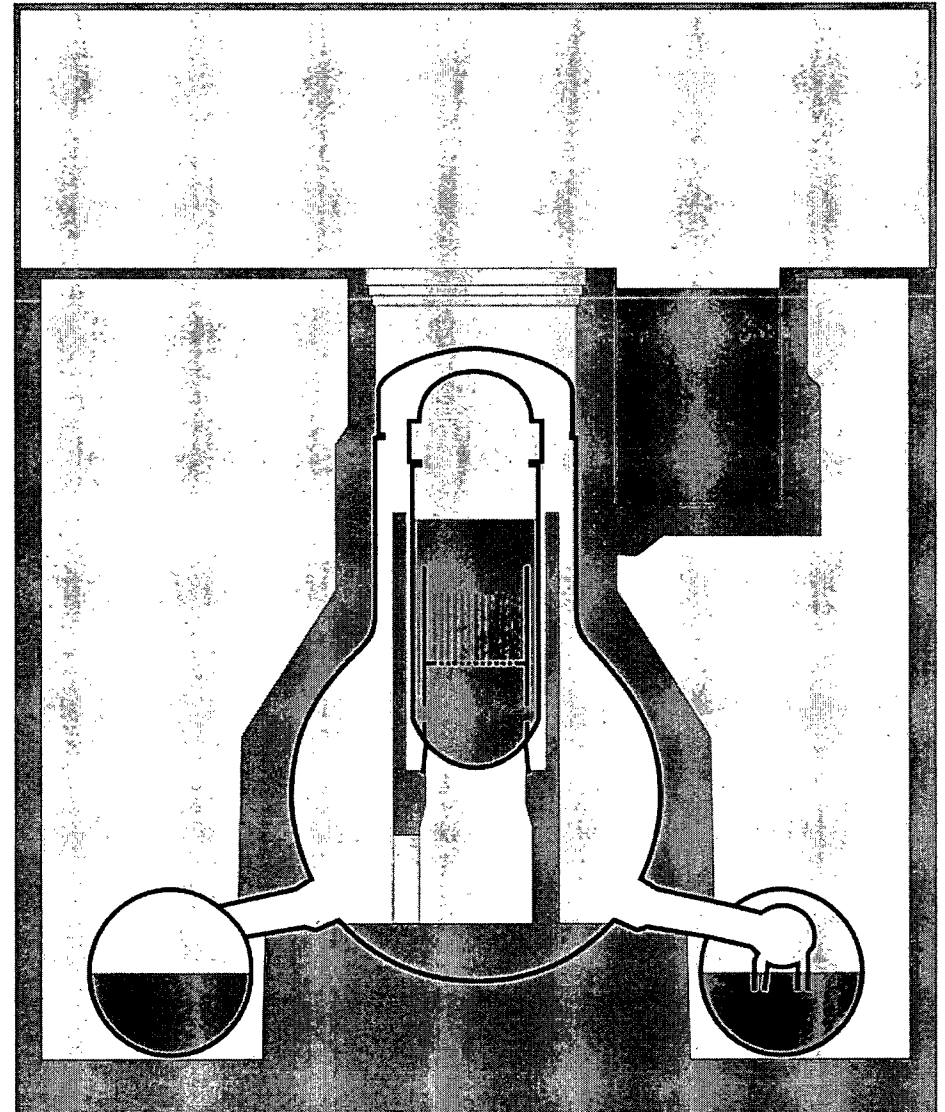
- ▶ Reactor Core Isolation Pump still available
 - ◆ Steam from the Reactor drives a Turbine
 - ◆ Steam gets condensed in the Wet-Well
 - ◆ Turbine drives a Pump
 - ◆ Water from the Wet-Well gets pumped in Reactor
 - ◆ Necessary:
 - Battery power
 - Temperature in the wet-well must be below 100°C
- ▶ As there is no heat removal from the building, the Core isolation pump cant work infinitely



The Fukushima Daiichi Incident

2. Accident progression

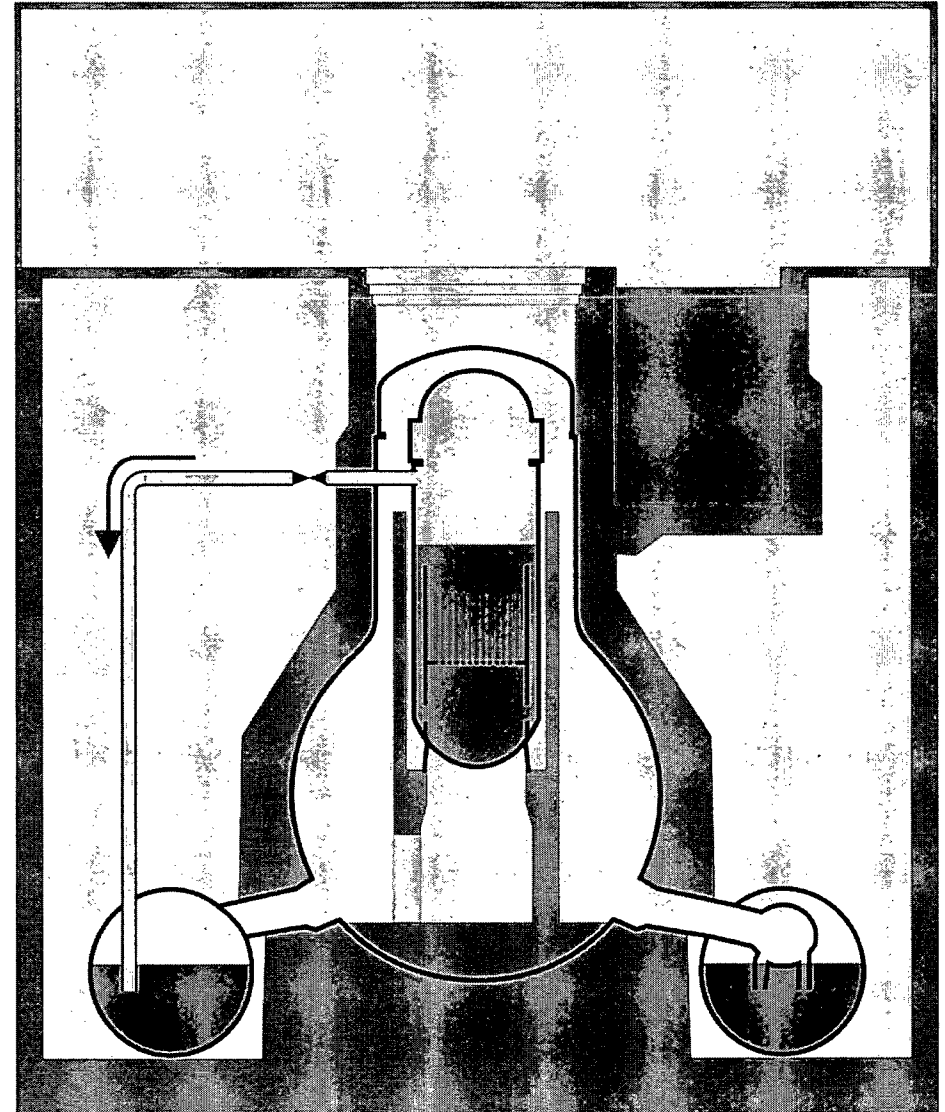
- ▶ Reactor Isolation pump stops
 - ◆ 11.3. 16:36 in Unit 1
(Batteries empty)
 - ◆ 14.3. 13:25 in Unit 2
(Pump failure)
 - ◆ 13.3. 2:44 in Unit 3
(Batteries empty)
- ▶ Decay Heat produces still steam in Reactor pressure Vessel
 - ◆ Pressure rising
- ▶ Opening the steam relieve valves
 - ◆ Discharge Steam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



The Fukushima Daiichi Incident

2. Accident progression

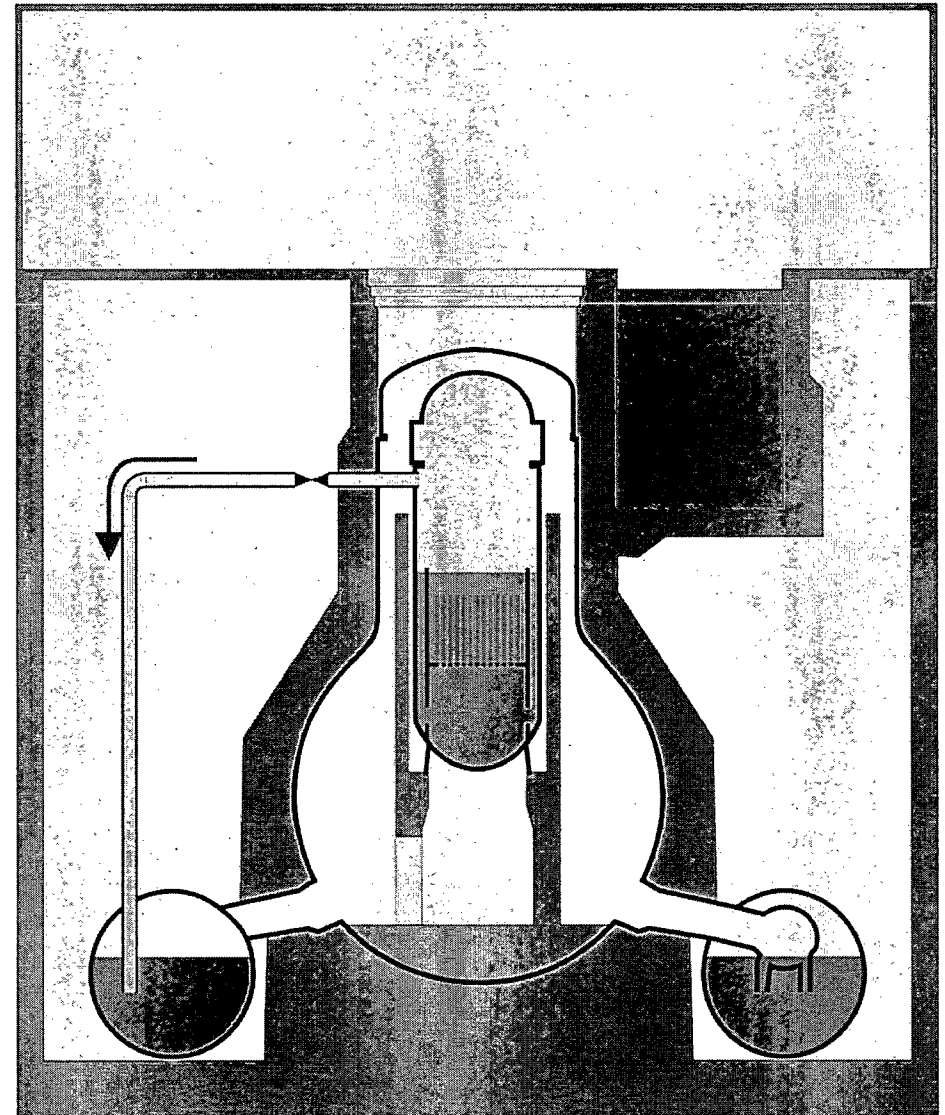
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The Fukushima Daiichi Incident

2. Accident progression

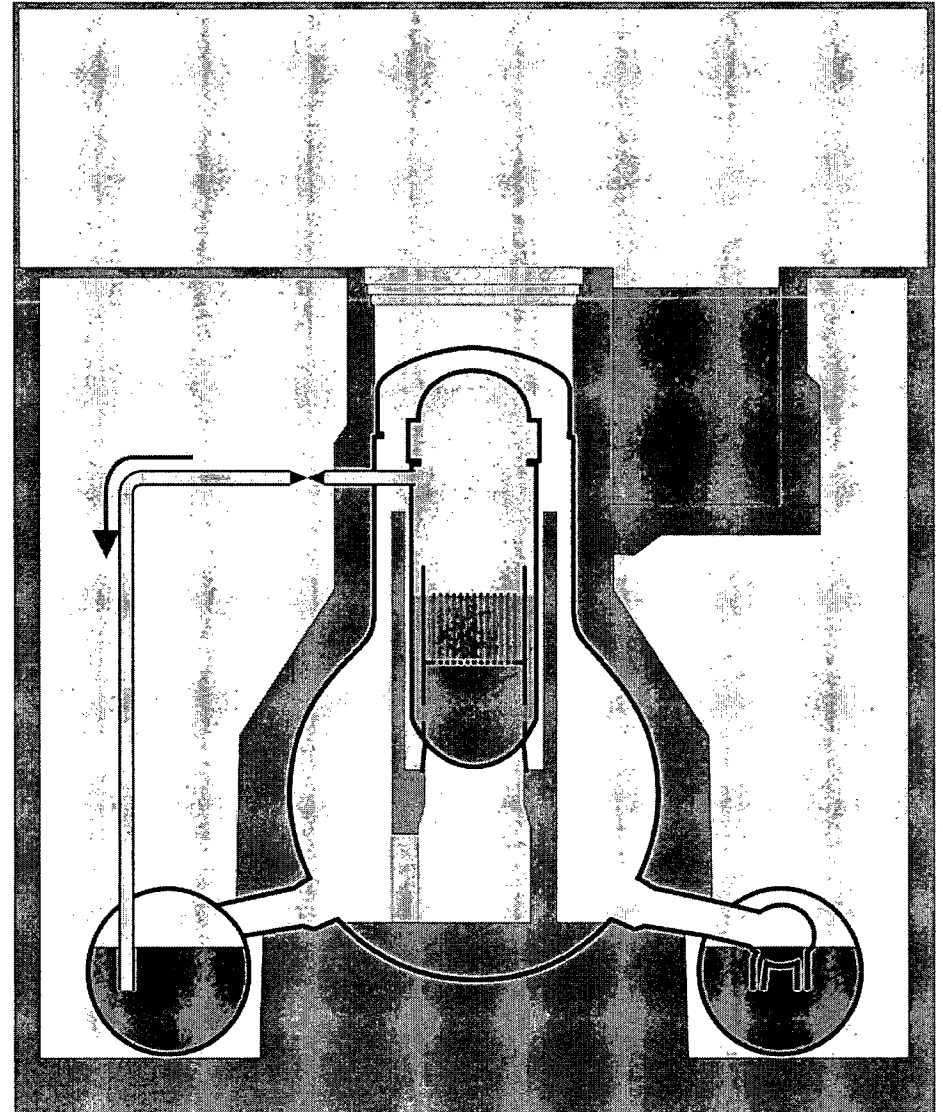
- ▶ Reactor Isolation pump stops
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The Fukushima Daiichi Incident

2. Accident progression

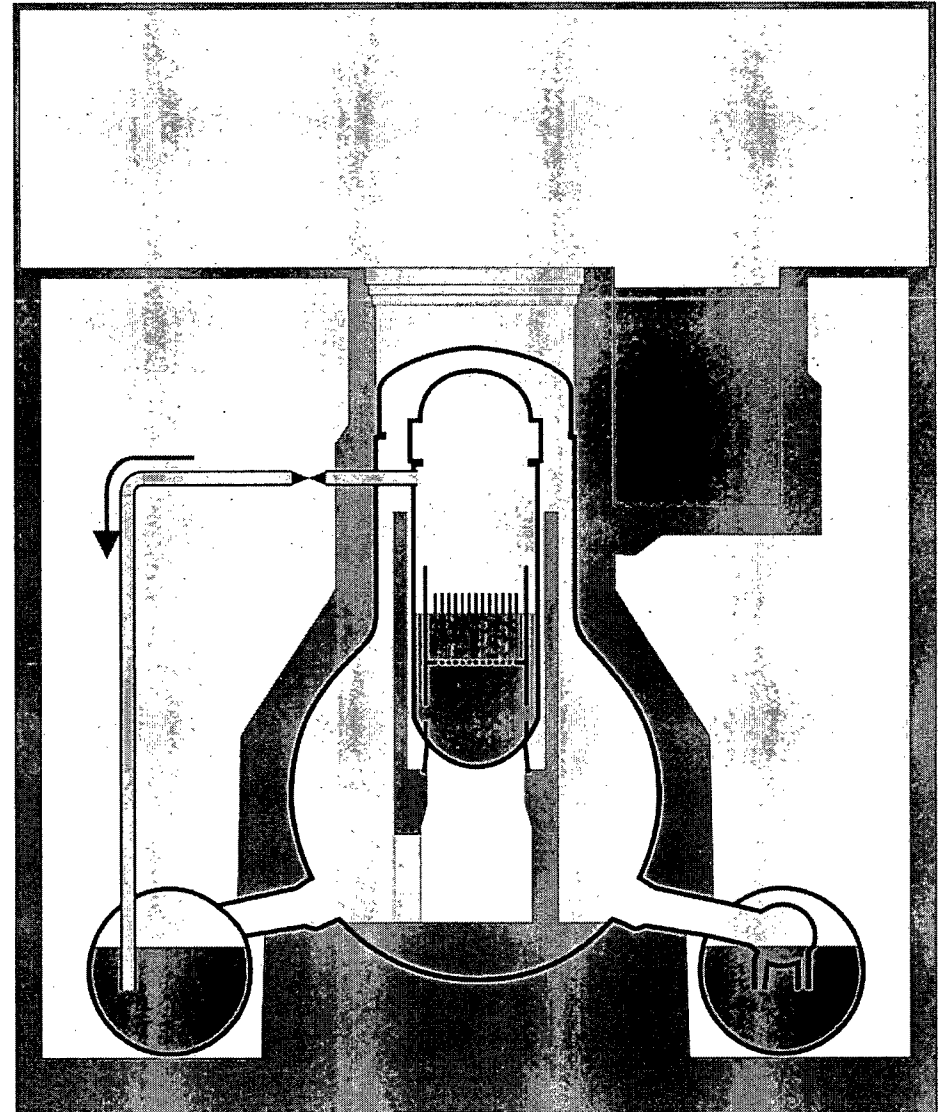
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The Fukushima Daiichi Incident

2. Accident progression

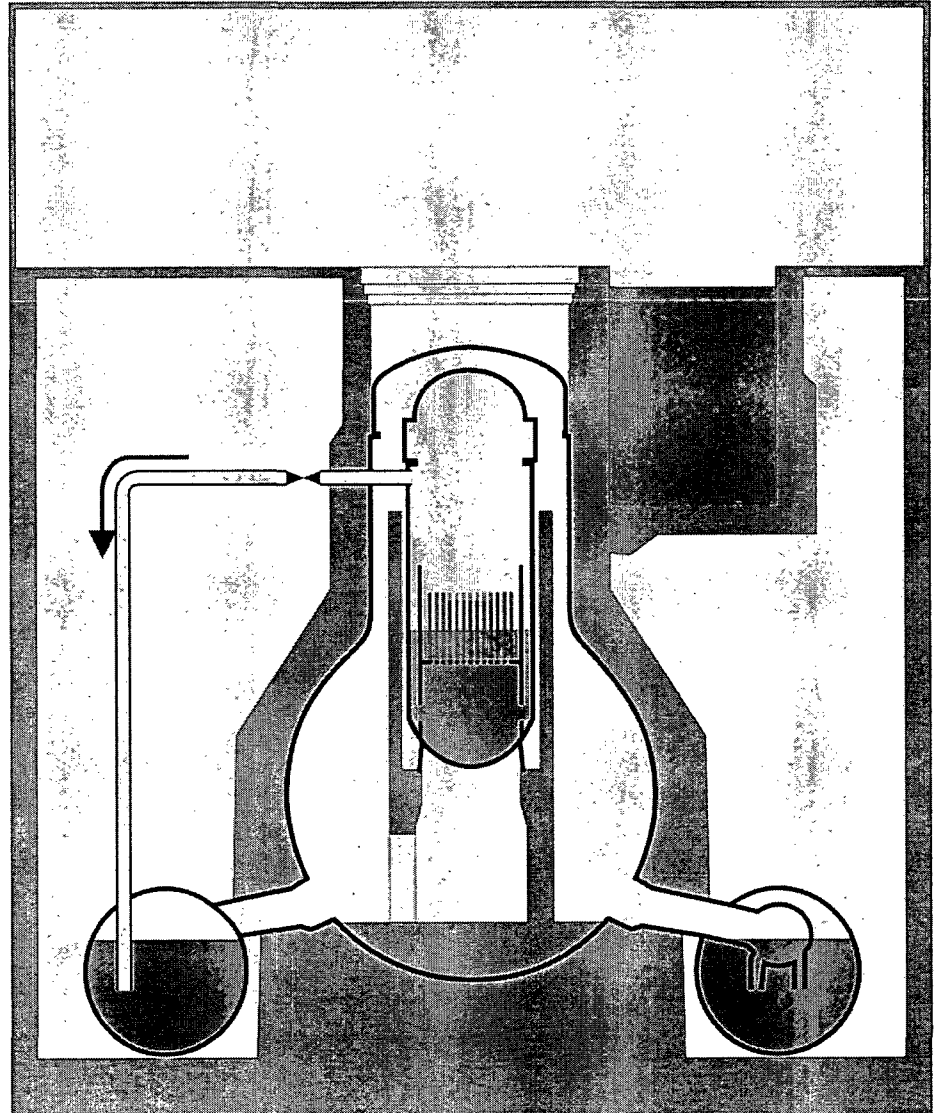
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The Fukushima Daiichi Incident

2. Accident progression

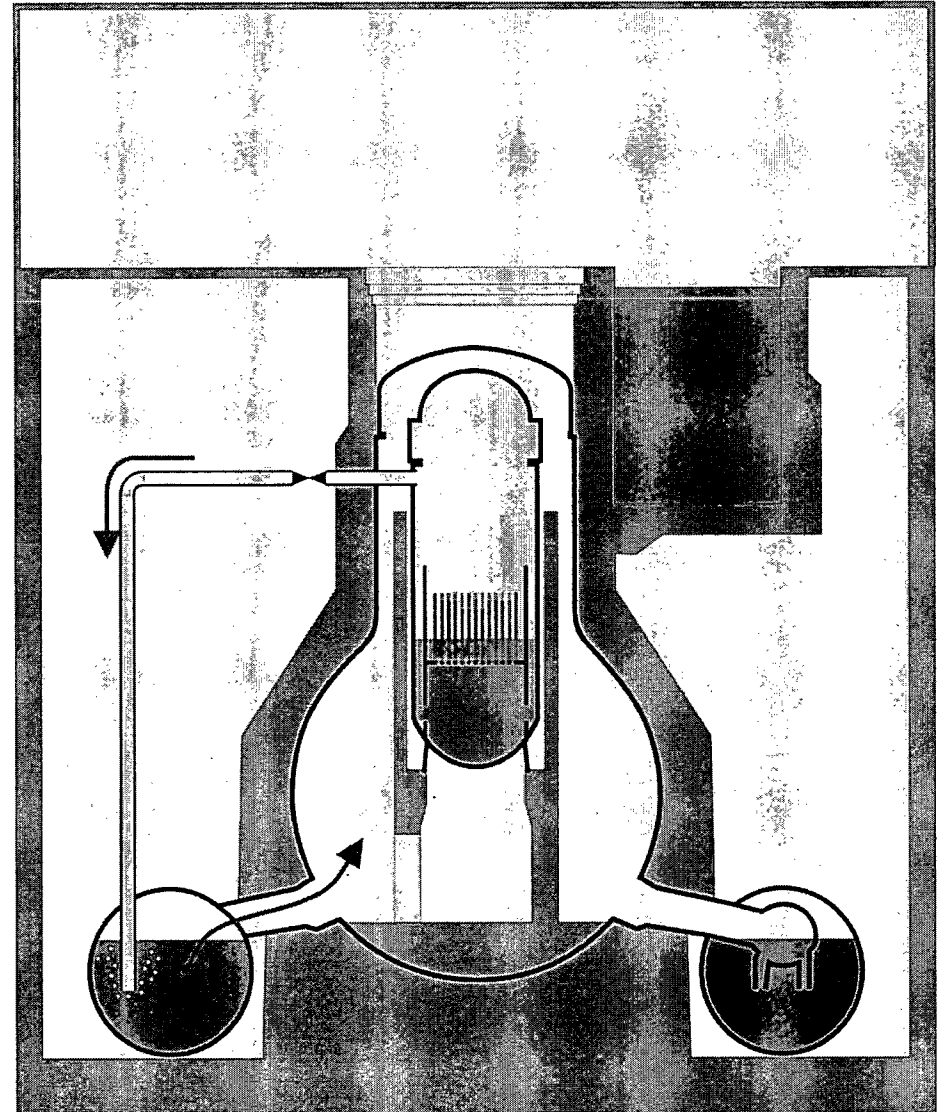
- ▶ Measured, and here referenced Liquid level is the collapsed level. The actual liquid level lies higher due to the steam bubbles in the liquid
- ▶ ~50% of the core exposed
 - ◆ Cladding temperatures rise, but still no significant core damage
- ▶ ~2/3 of the core exposed
 - ◆ Cladding temperature exceeds $\sim 900^{\circ}\text{C}$
 - ◆ Ballooning / Breaking of the cladding
 - ◆ Release of fission products from the fuel rod gaps



The Fukushima Daiichi Incident

2. Accident progression

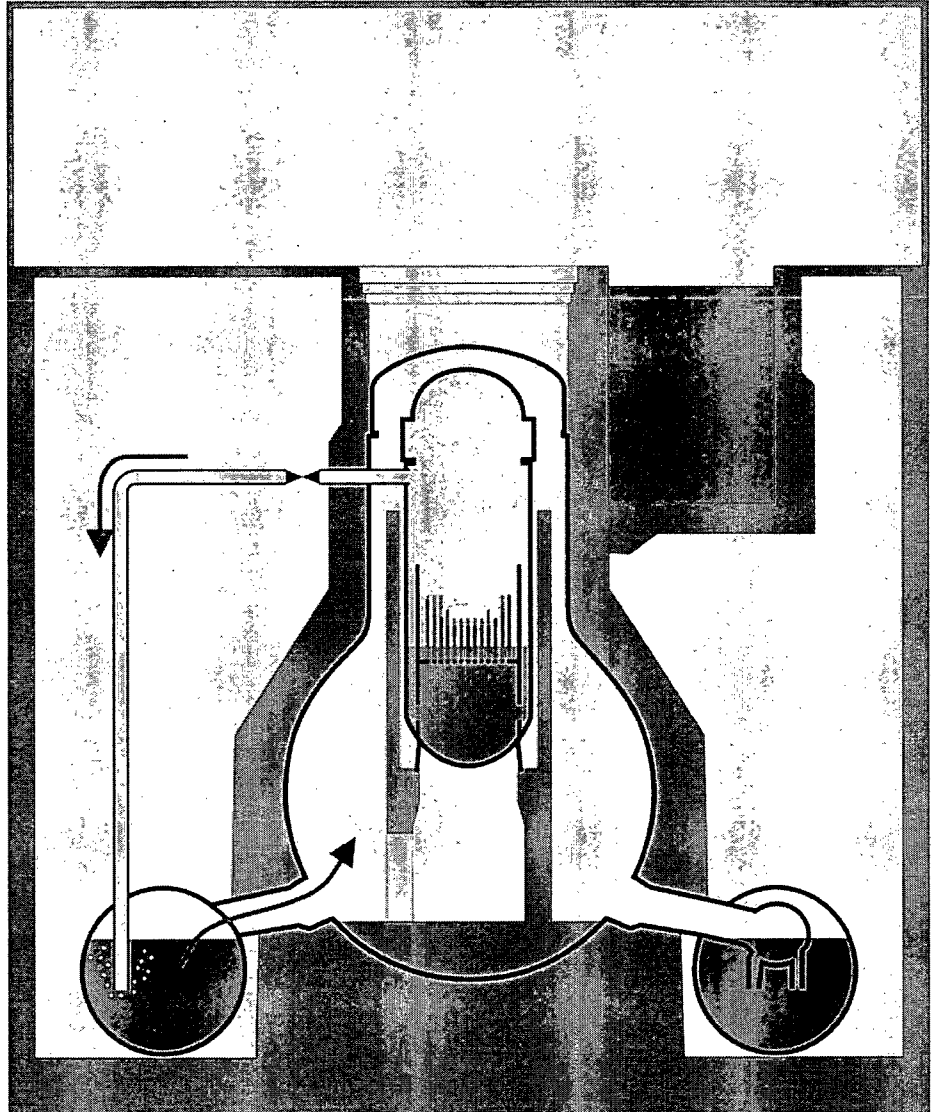
- ▶ ~3/4 of the core exposed
 - ◆ Cladding exceeds ~1200°C
 - ◆ Zirconium in the cladding starts to burn under Steam atmosphere
 - ◆ $\text{Zr} + 2\text{H}_2\text{O} \rightarrow \text{ZrO}_2 + 2\text{H}_2$
 - ◆ Exothermal reaction further heats the core
 - ◆ Generation of hydrogen
 - Unit 1: 300-600kg
 - Unit 2/3: 300-1000kg
 - ◆ Hydrogen gets pushed via the wet-well, the wet-well vacuum breakers into the dry-well



The Fukushima Daiichi Incident

2. Accident progression

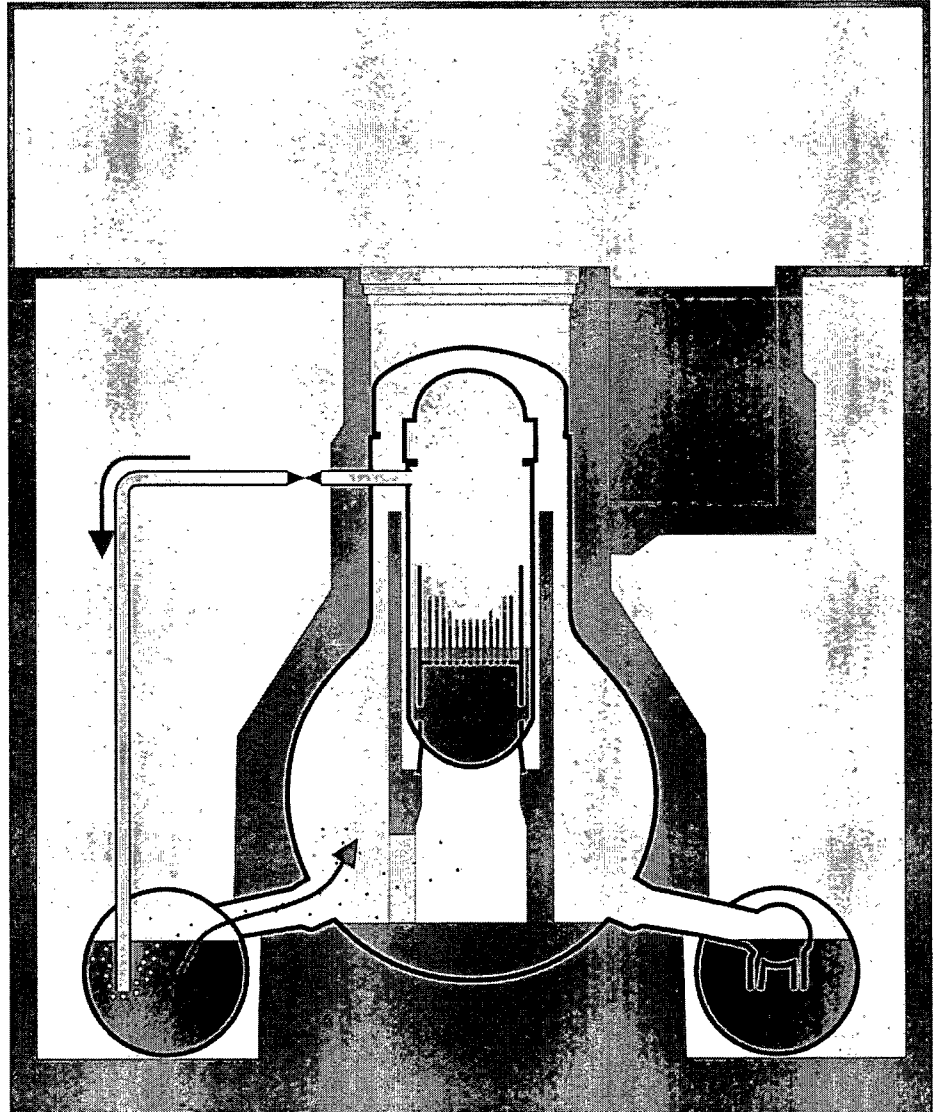
- ▶ at ~1800°C [Unit 1,2,3]
 - ◆ Melting of the Cladding
 - ◆ Melting of the steel structures
- ▶ at ~2500°C [Block 1,2]
 - ◆ Breaking of the fuel rods
 - ◆ debris bed inside the core
- ▶ at ~2700°C [Block 1]
 - ◆ Melting of Uranium-Zirconium eutectics
- ▶ Restoration of the water supply stops accident in all 3 Units
 - ◆ Unit 1: 12.3. 20:20 (27h w.o. water)
 - ◆ Unit 2: 14.3. 20:33 (7h w.o. water)
 - ◆ Unit 3: 13.3. 9:38 (7h w.o. water)



The Fukushima Daiichi Incident

2. Accident progression

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



The Fukushima Daiichi Incident

2. Accident progression

► Containment

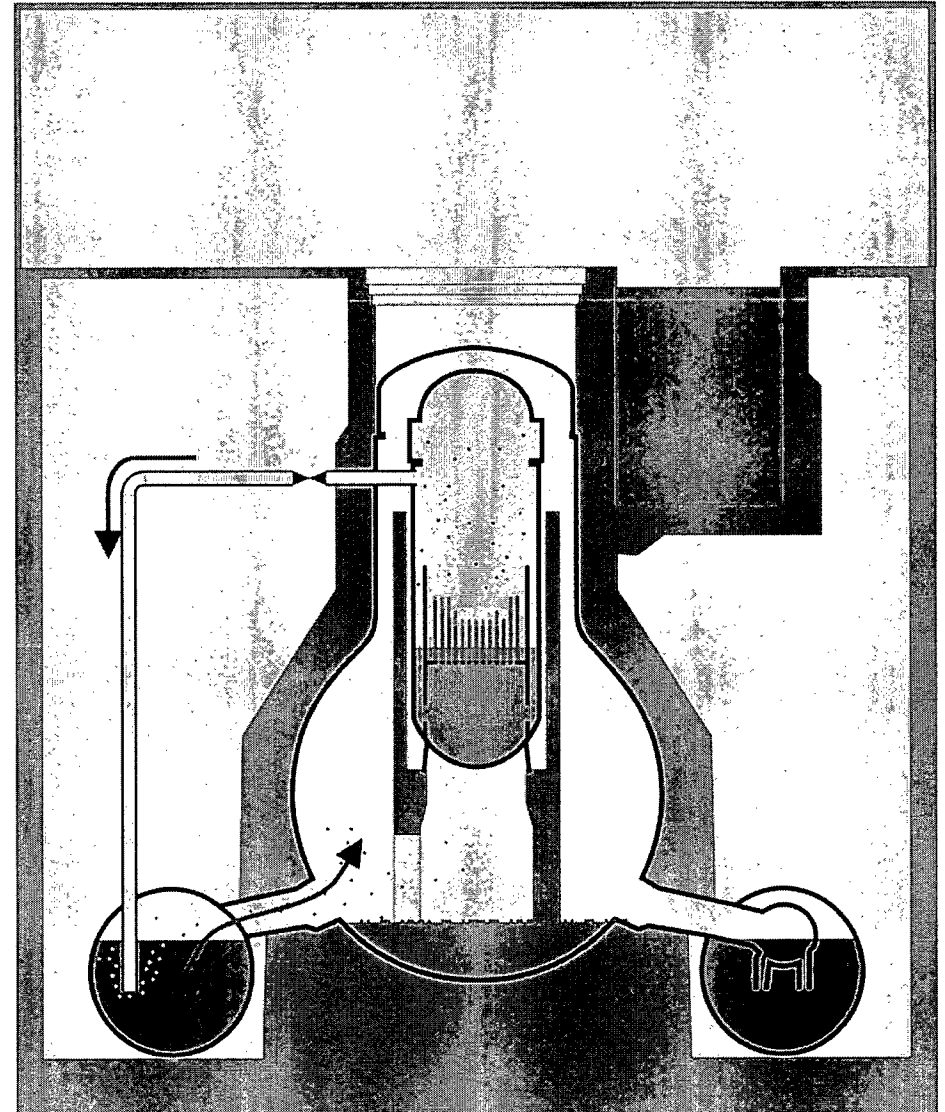
- ◆ Last barrier between Fission Products and Environment
- ◆ Wall thickness ~3cm
- ◆ Design Pressure 4-5bar

► Actual pressure up to 8 bars

- ◆ Normal inert gas filling (Nitrogen)
- ◆ Hydrogen from core oxidation
- ◆ Boiling condensation chamber (like a pressure cooker)

► Depressurization of the containment

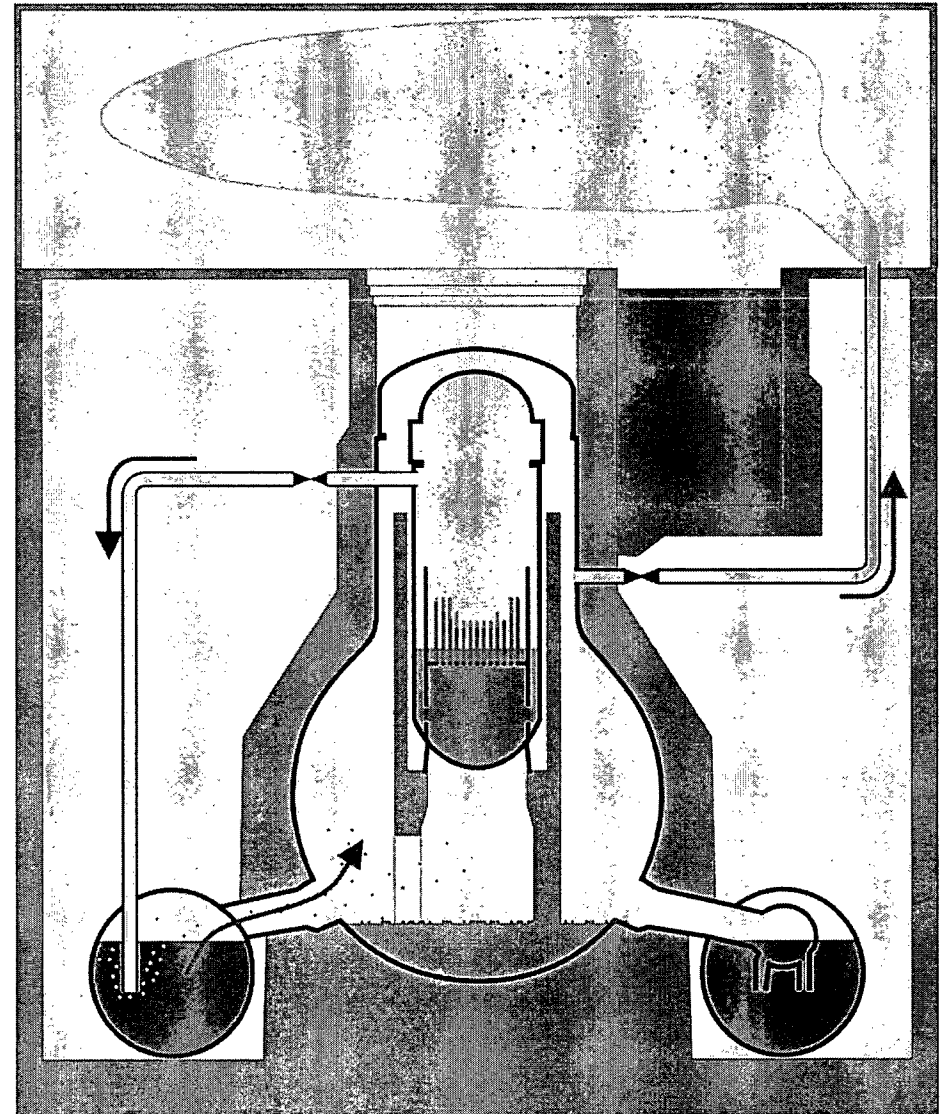
- ◆ Unit 1: 12.3. 4:00
- ◆ Unit 2: 13.3 00:00
- ◆ Unit 3: 13.3. 8.41



The Fukushima Daiichi Incident

2. Accident progression

- ▶ Positive und negative Aspects of depressurizing the containment
 - ◆ Removes Energy from the Reactor building (only way left)
 - ◆ Reducing the pressure to ~4 bar
 - ◆ Release of small amounts of Aerosols (Iodine, Cesium ~0.1%)
 - ◆ Release of all noble gases
 - ◆ Release of Hydrogen
- ▶ Gas is released into the reactor service floor
 - ◆ Hydrogen is flammable

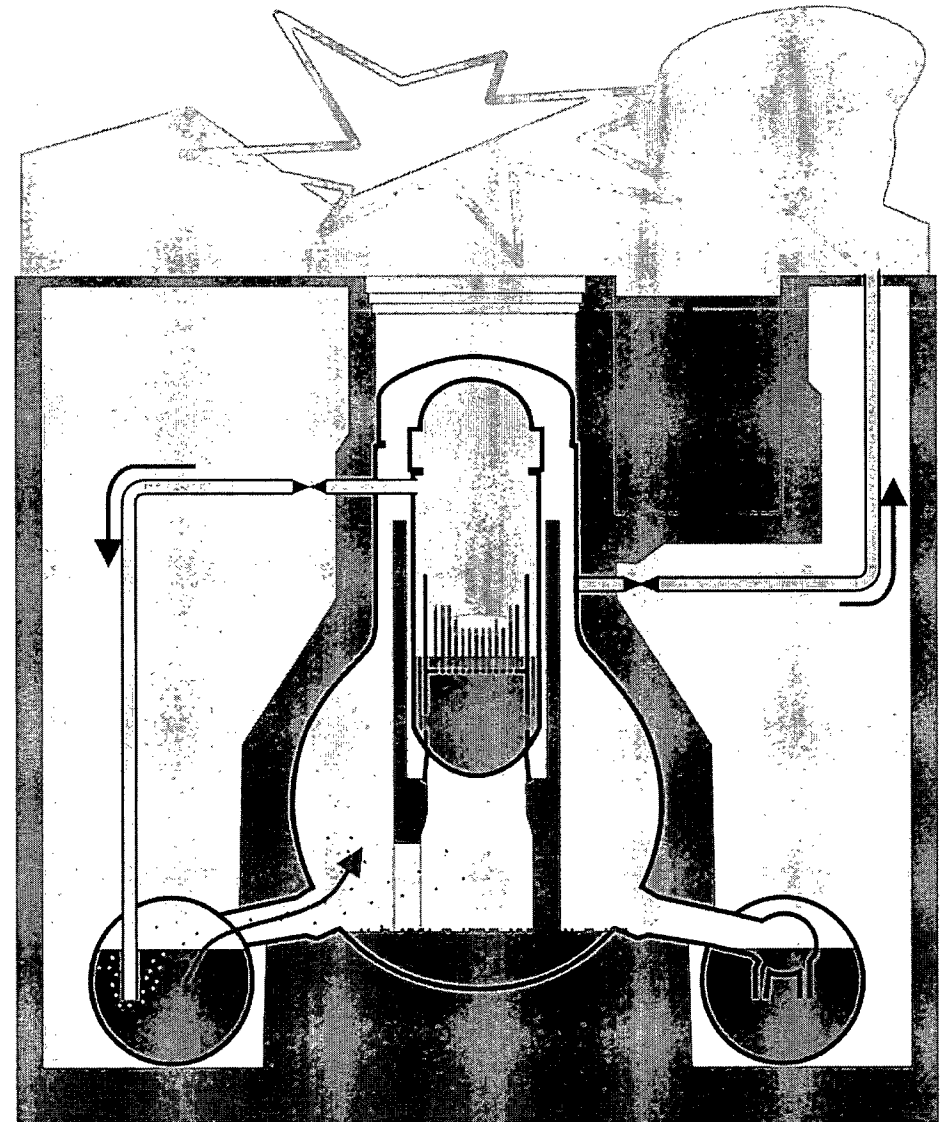
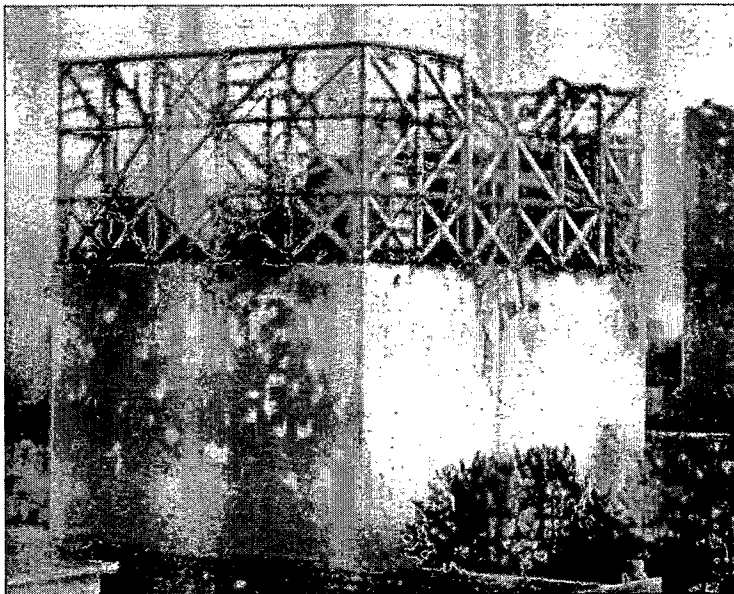


The Fukushima Daiichi Incident

2. Accident progression

► Unit 1 und 3

- ◆ Hydrogen burn inside the reactor service floor
- ◆ Destruction of the steel-frame roof
- ◆ Reinforced concrete reactor building seems undamaged
- ◆ Spectacular but minor safety relevant



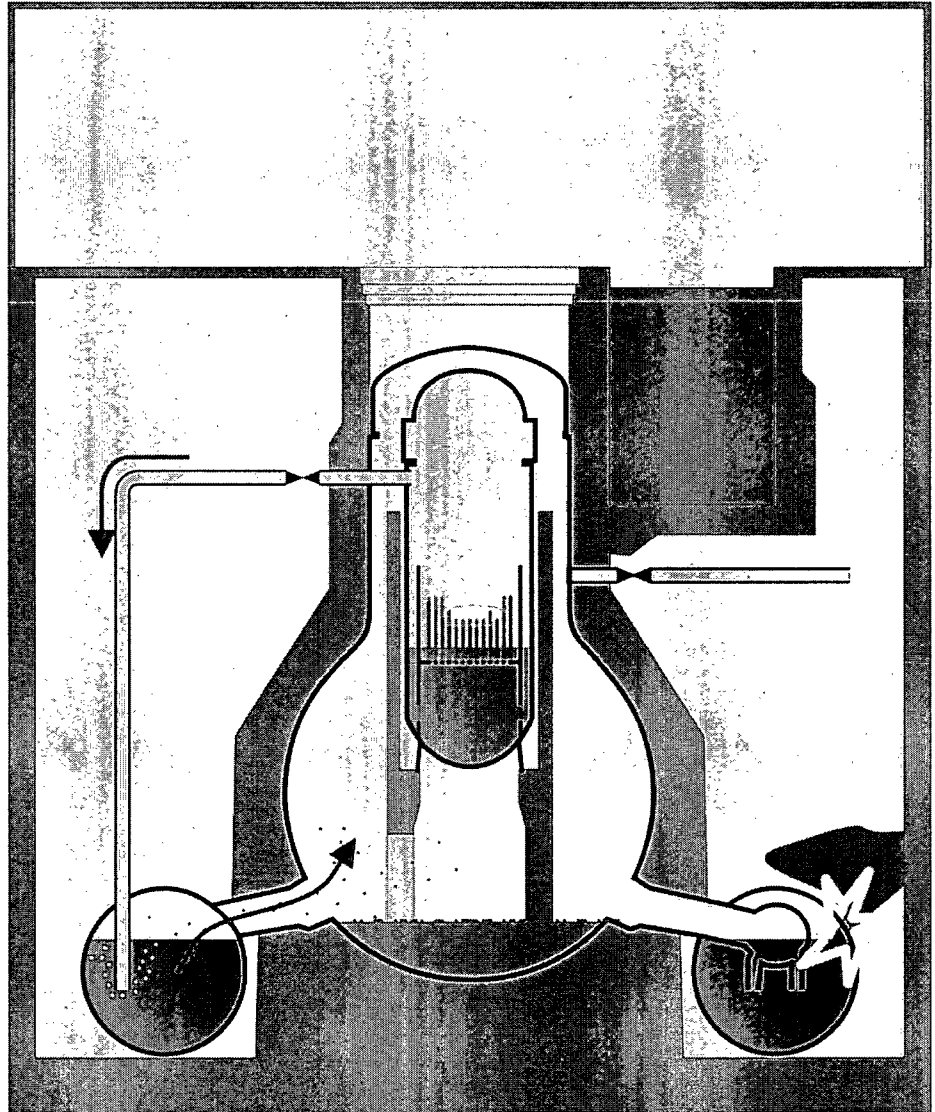
The Fukushima Daiichi Incident

2. Accident progression

► Unit 2

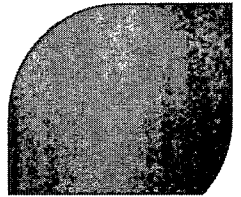
- ◆ Hydrogen burn inside the reactor building
- ◆ Probably damage to the condensation chamber (highly contaminated water)
- ◆ Uncontrolled release of gas from the containment
- ◆ **Release of fission products**
- ◆ Temporal evacuation of the plant
- ◆ High local dose rates on the plant site due to wreckage hinder further recovery work

- ### ► No clear information's why Unit 2 behaved differently

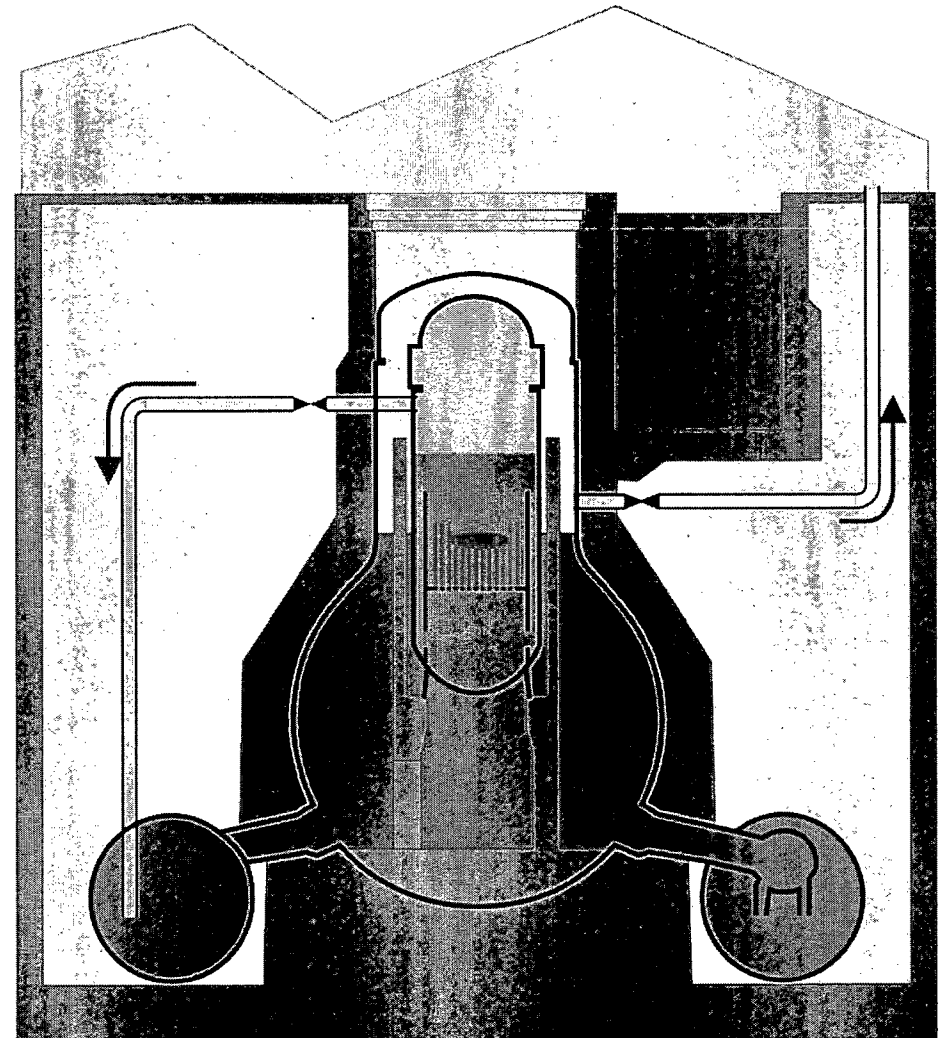


The Fukushima Daiichi Incident

2. Accident progression

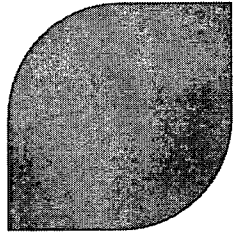


- ▶ Current status of the Reactors
 - ◆ Core Damage in Unit 1,2, 3
 - ◆ Building damage due to various burns Unit 1-4
 - ◆ Reactor pressure vessels flooded in all Units with mobile pumps
 - ◆ At least containment in Unit 1 flooded
- ▶ Further cooling of the Reactors by releasing steam to the atmosphere
- ▶ Only small further releases of fission products can be expected



The Fukushima Daiichi Incident

3. Radiological releases



► Directly on the plant site

◆ Before Explosion in Unit Block 2

- Below 2mSv / h
- Mainly due to released radioactive noble gases
- Measuring posts on west side. Maybe too small values measured due to wind

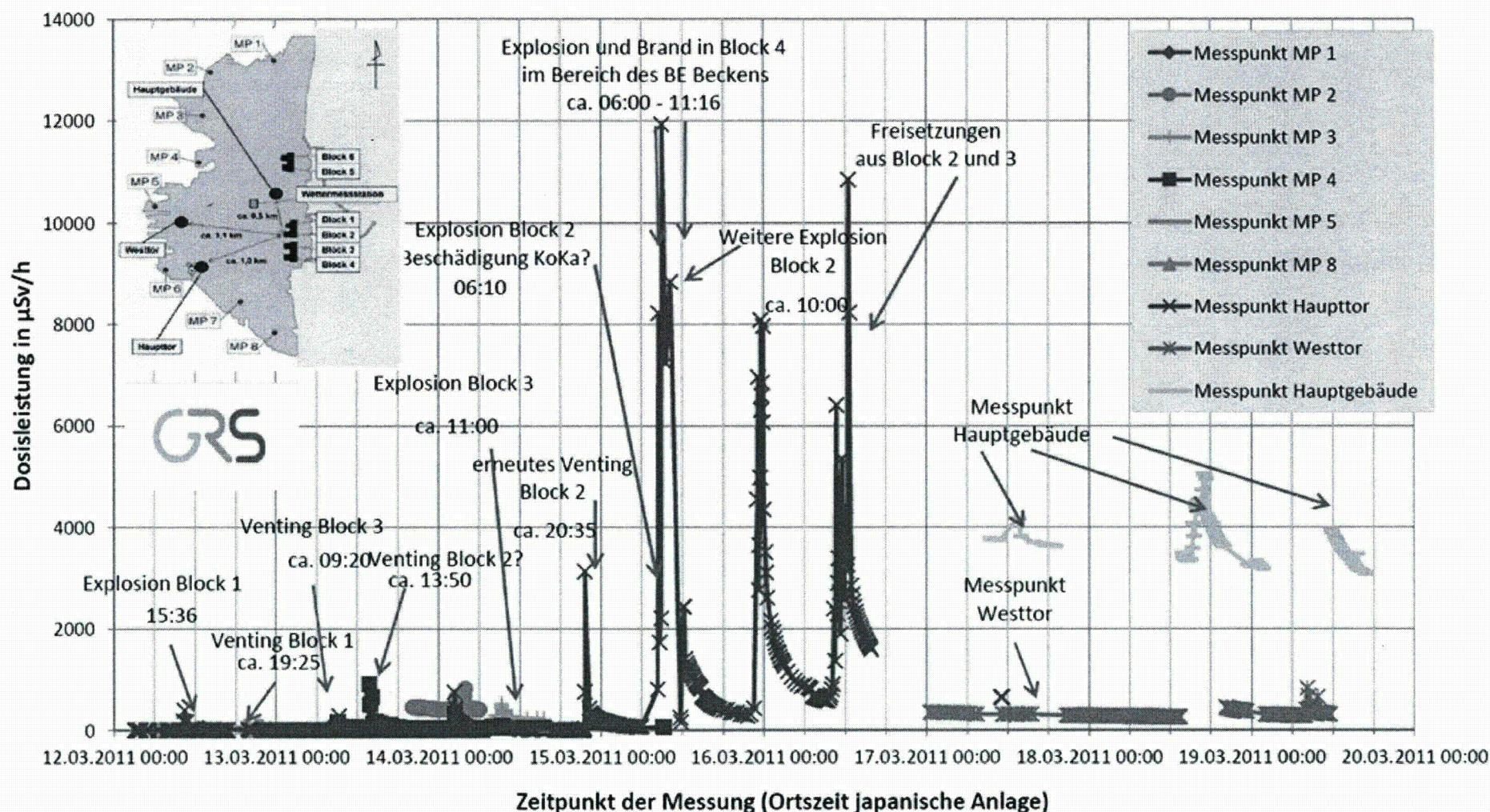
◆ After Explosion in Unit 2 (Damage of the Containment)

- Temporal peak values 12mSv / h
- (Origin not entirely clear)
- Local peak values on site up to 400mSv /h (wreckage / fragments?)
- Currently stable dose on site at 5mSv /h
- Inside the buildings a lot more

◆ Limiting time of exposure of the workers necessary

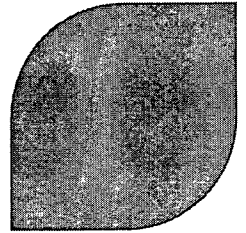
The Fukushima Daiichi Incident

3. Radiological releases



The Fukushima Daiichi Incident

3. Radiological releases

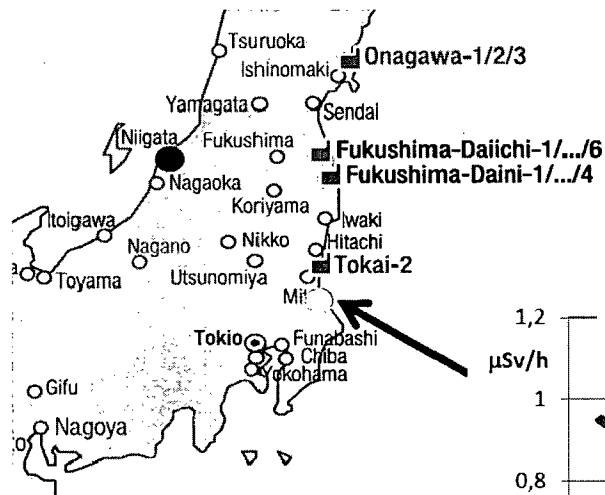
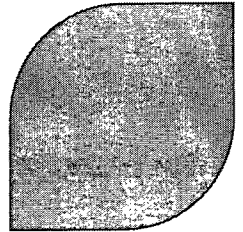


- ▶ Outside the Plant site
 - ◆ As reactor building mostly intact
 - => reduced release of Aerosols (not Chernobyl-like)
 - ◆ Fission product release in steam
 - => fast Aerosol grows, large fraction falls down in the proximity of the plant
 - ◆ Main contribution to the radioactive dose outside plant are the radioactive noble gases
 - ◆ Carried / distributed by the wind, decreasing dose with time
 - ◆ No „Fall-out“ of the noble gases, so no local high contamination of soil

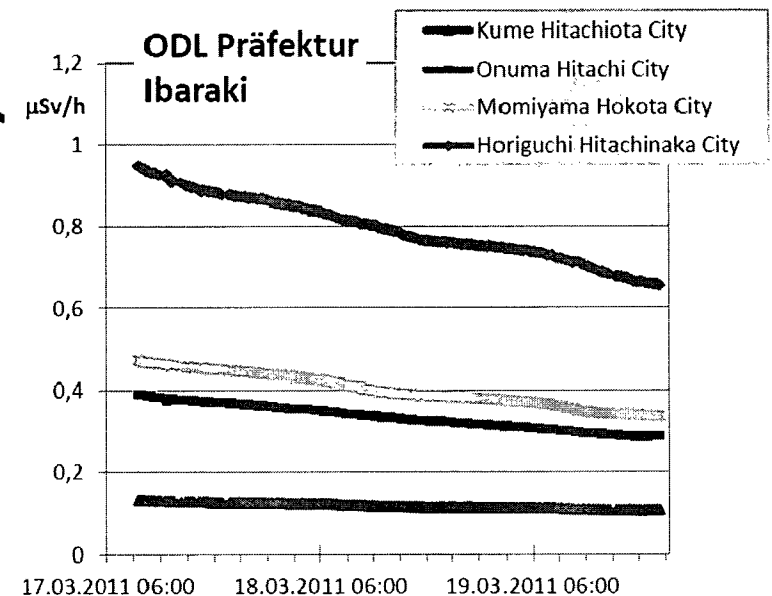
- ▶ ~20km around the plant
 - ◆ Evacuations were adequate
 - ◆ Measured dose up to 0.3mSv/h for short times
 - ◆ Maybe destruction of crops / dairy products this year
 - ◆ Probably no permanent evacuation of land necessary

The Fukushima Daiichi Incident

3. Radiological releases



GRS.de

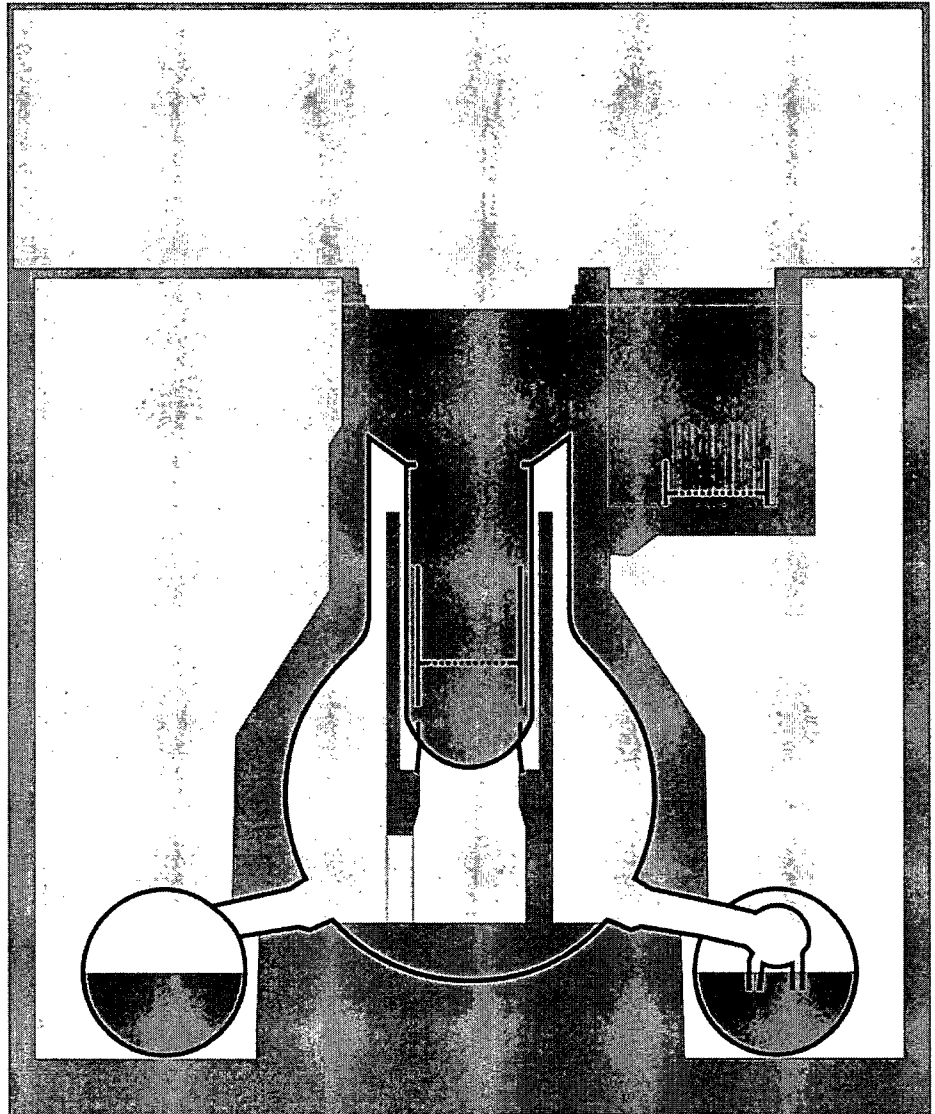


- ▶ ~50km around the plant
 - ◆ Control of Crop / Dairy products
 - ◆ Usage of Iodine pills
(Caution, pills can interfere with heart medicine)

The Fukushima Daiichi Incident

4. Spent fuel pools

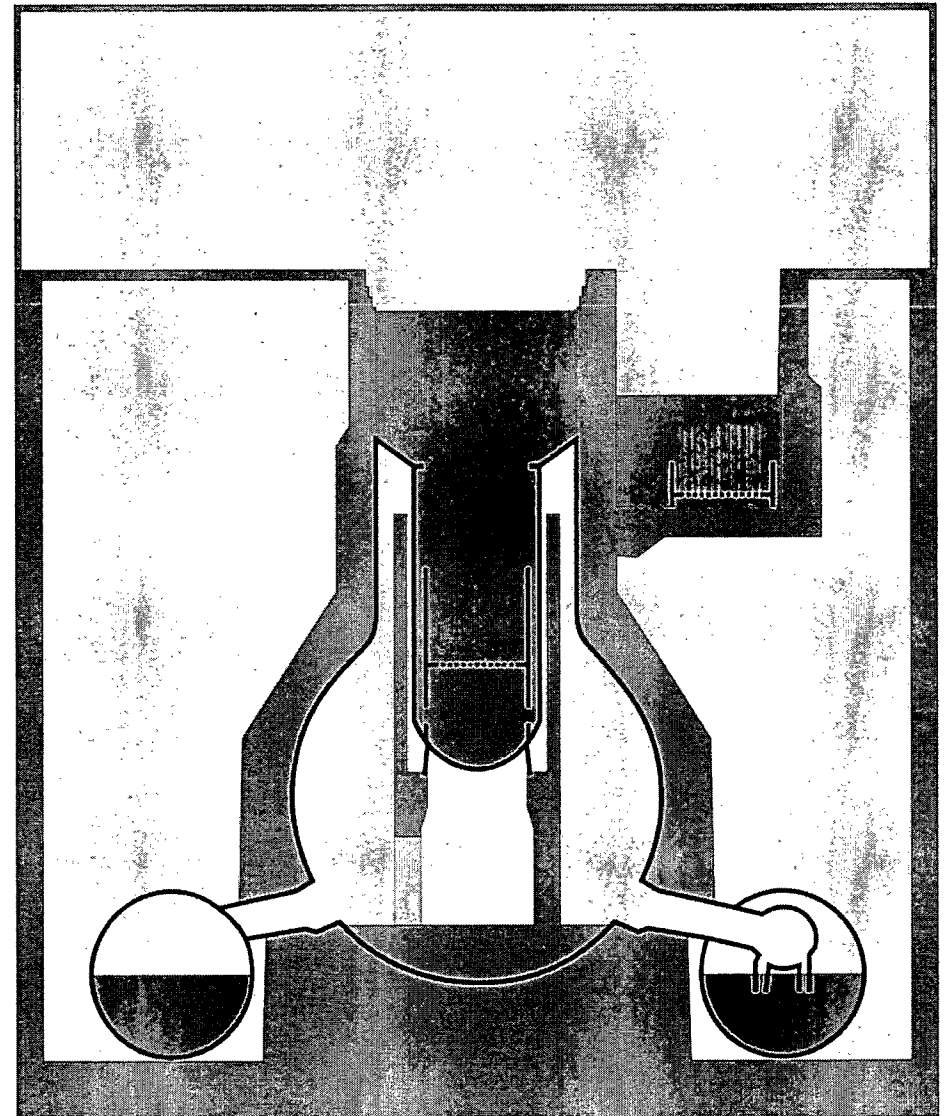
- ▶ Spent fuel stored in Pool on Reactor service floor
 - ◆ Due to maintenance in Unit 4 entire core stored in Fuel pool
 - ◆ Dry-out of the pools
 - Unit 4: in 10 days
 - Unit 1-3,5,6 in few weeks
 - ◆ **Leakage of the pools due to Earthquake?**
- ▶ Consequences
 - ◆ Core melt „on fresh air “
 - ◆ Nearly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



The Fukushima Daiichi Incident

4. Spent fuel pools

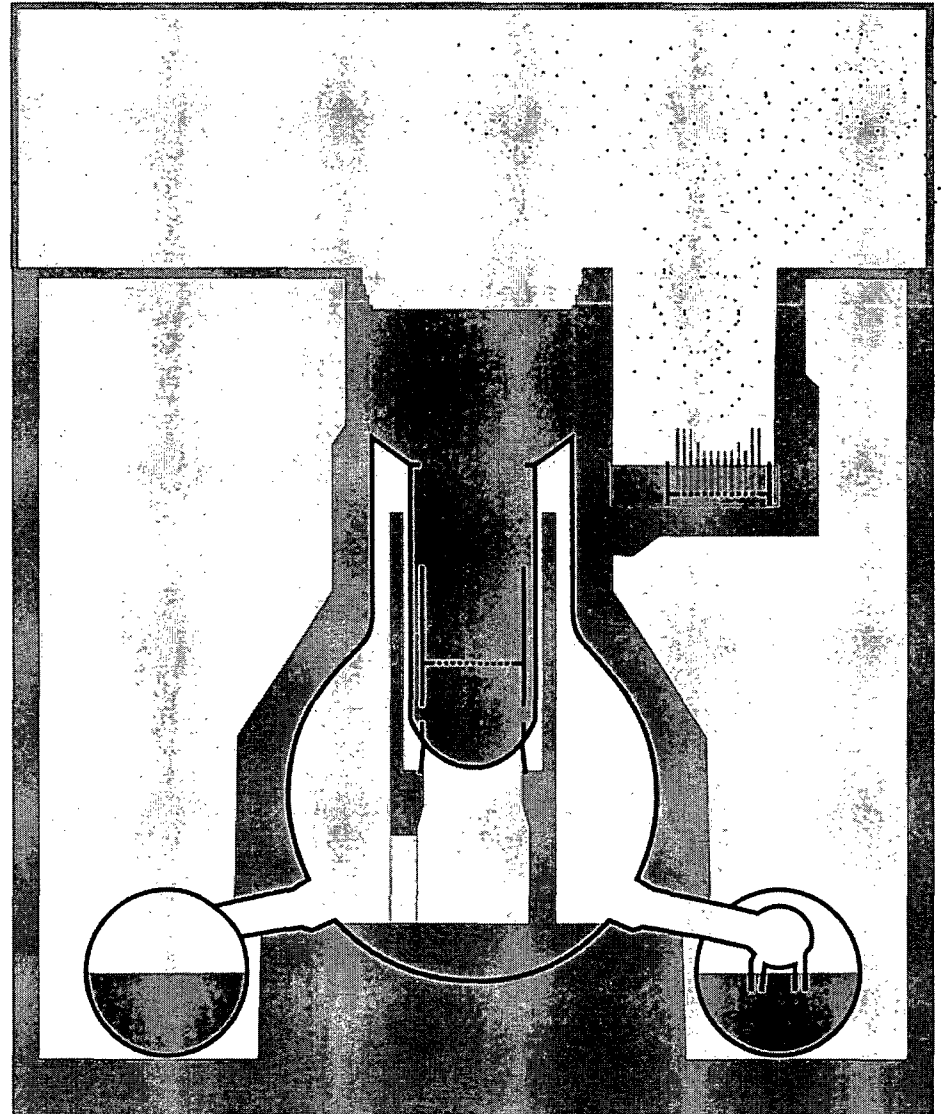
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The Fukushima Daiichi Incident

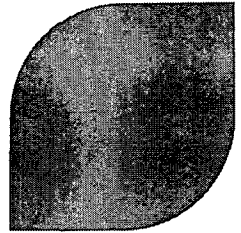
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- ▶ Consequences
 - ◆ Core melt „on fresh air “
 - ◆ Nearly no retention of fission products
 - ◆ Large release
- ▶ **It is currently unclear if release from fuel pool already happened**



The Fukushima Daiichi Incident

5. Sources of Information



► Good sources of Information

◆ Gesellschaft für Reaktorsicherheit [GRS.de]

- Up to date
- Radiological measurements published
- German translation of japanese/englisch web pages

◆ Japan Atomic Industrial Forum [jaif.or.jp/english/]

- Current Status of the plants
- Measurement values of the reactors (pressure liquid level)

◆ Tokyo Electric Power Company [Tepco.co.jp]

- Status of the recovery work
- Casualties

► May too few information are released by TEPCO, the operator of the plant

C10

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| Position | Date | Time | Staff |
|----------------------------|-----------|------------|-------------------|
| Executive Team | | | |
| ET Director | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Jennifer Uhle |
| Sun | 27-Mar | 7am - 3pm | Jim Dyer |
| Sun | 27-Mar | 3pm-11pm | Brian Sheron |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Jim Wiggins |
| Mon | 28-Mar | 7am - 3pm | Mike Weber |
| Mon | 28-Mar | 3pm-11pm | Roy Zimmerman |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Jim Wiggins |
| Tue | 29-Mar | 7am - 3pm | Mike Weber |
| Tue | 29-Mar | 3pm-11pm | Roy Zimmerman |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Jim Wiggins |
| Wed | 30-Mar | 7am - 3pm | |
| Wed | 30-Mar | 3pm-11pm | Roy Zimmerman |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Jim Wiggins |
| Thur | 31-Mar | 7am - 3pm | |
| Thur | 31-Mar | 3pm-11pm | Brian Sheron |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Cynthia Carpenter |
| Fri | 1-Apr | 7am - 3pm | Mike Weber |
| Fri | 1-Apr | 3pm-11pm | |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Cynthia Carpenter |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Cynthia Carpenter |
| ET Response Advisor | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Chris Miller |
| Sun | 27-Mar | 7am - 3pm | Tom Blount |
| Sun | 27-Mar | 3pm-11pm | Brian McDermott |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Scott Morris |
| Mon | 28-Mar | 7am - 3pm | Tom Blount |
| Mon | 28-Mar | 3pm-11pm | Brian McDermott |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Chris Miller |
| Tue | 29-Mar | 7am - 3pm | Tom Blount |
| Tue | 29-Mar | 3pm-11pm | Brian McDermott |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Scott Morris |
| Wed | 30-Mar | 7am - 3pm | Tom Blount |
| Wed | 30-Mar | 3pm-11pm | Brian McDermott |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Scott Morris |
| Thur | 31-Mar | 7am - 3pm | |
| Thur | 31-Mar | 3pm-11pm | Mark Thaggard |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Scott Morris |
| Fri | 1-Apr | 7am - 3pm | |
| Fri | 1-Apr | 3pm-11pm | Mark Thaggard |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Scott Morris |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm-7am | Brian McDermott |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| ET Rx Prot Measures & State Coordinator | | | |
|---|-----------|------------|---------------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | N/A |
| Sun | 27-Mar | 7am - 3pm | N/A |
| Sun | 27-Mar | 3pm-11pm | N/A |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | N/A |
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| Wed-Thur | 3/30-3/31 | 11pm - 7am | N/A |
| Thur | 31-Mar | 7am - 3pm | N/A |
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| Fri | 1-Apr | 7am - 3pm | N/A |
| Fri | 1-Apr | 3pm-11pm | N/A |
| Fri-Sat | 4/1-4/2 | 11pm-7am | N/A |
| Sat | 2-Apr | 7am - 3pm | N/A |
| Sat | 2-Apr | 3pm-11pm | N/A |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | N/A |
| Executive Briefing Team | | | |
| EBT Admin. Assistant | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Jonathan Fiske |
| Sun | 27-Mar | 7am - 3pm | Annette Stang |
| Sun | 27-Mar | 3pm-11pm | Carolyn Kahler |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Christina Merritt |
| Mon | 28-Mar | 7am - 3pm | Louise Lovell |
| Mon | 28-Mar | 3pm-11pm | Annette Stang |
| Mon-Tue | 3/28-3/29 | 11pm - 9am | Jonathan Fiske |
| Tue | 29-Mar | 9am - 3pm | Sapna Hurd |
| Tue | 29-Mar | 3pm-11pm | Tonya Russell |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Christina Merritt |
| Wed | 30-Mar | 7am - 3pm | Carolyn Kahler/Sapna Hurd |
| Wed | 30-Mar | 3pm-11pm | Tonya Russell |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | |
| Thur | 31-Mar | 7am - 3pm | Louise Lovell |
| Thur | 31-Mar | 3pm-11pm | Sapna Hurd |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | |
| Fri | 1-Apr | 7am - 3pm | Annette Stang |
| Fri | 1-Apr | 3pm-11pm | Sapna Hurd |
| Fri-Sat | 4/1-4/2 | 11pm-7am | |
| EBT Coordinator | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Jim Anderson |
| Sun | 27-Mar | 7am - 3pm | Eddie Robinson |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|-----------------|
| Sun | 27-Mar | 3pm-11pm | Nicole Glenn |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Caroline Nguyen |
| Mon | 28-Mar | 7am - 3pm | Yen Chen |
| Mon | 28-Mar | 3pm-11pm | Sara Mroz |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Jim Anderson |
| Tue | 29-Mar | 7am - 3pm | Yen Chen |
| Tue | 29-Mar | 3pm-11pm | Sara Mroz |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Jim Anderson |
| Wed | 30-Mar | 7am - 3pm | Yen Chen |
| Wed | 30-Mar | 3pm-11pm | Sara Mroz |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Jim Anderson |
| Thur | 31-Mar | 7am - 3pm | Yen Chen |
| Thur | 31-Mar | 3pm-11pm | Sara Mroz |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Jim Anderson |
| Fri | 1-Apr | 7am - 3pm | Yen Chen |
| Fri | 1-Apr | 3pm-11pm | Sara Mroz |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Jim Anderson |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |

Executive Support Team**EST Status Officer**

| | | | |
|----------|-----------|------------|-----------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Jeff Grant |
| Sun | 27-Mar | 7am - 3pm | Jane Marshall |
| Sun | 27-Mar | 3pm-11pm | Bill Gott |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Jeff Grant |
| Mon | 28-Mar | 7am - 3pm | Jane Marshall |
| Mon | 28-Mar | 3pm-11pm | Bill Gott |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Jeff Grant |
| Tue | 29-Mar | 7am - 3pm | Jane Marshall |
| Tue | 29-Mar | 3pm-11pm | Bill Gott |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Jeff Grant |
| Wed | 30-Mar | 7am - 3pm | Jane Marshall |
| Wed | 30-Mar | 3pm-11pm | Bill Gott |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Jeff Grant |
| Thur | 31-Mar | 7am - 3pm | Jane Marshall |
| Thur | 31-Mar | 3pm-11pm | Bill Gott |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Jeff Grant |
| Fri | 1-Apr | 7am - 3pm | Jane Marshall ? |
| Fri | 1-Apr | 3pm-11pm | Bill Gott |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Jeff Grant |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |

EST Actions Officer

| | | | |
|---------|-----------|------------|--------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | N/A |
| Sun | 27-Mar | 7am - 3pm | Kelly Grimes |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|----------------|
| Sun | 27-Mar | 3pm-11pm | Melissa Ralph |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | N/A |
| Mon | 28-Mar | 7am - 3pm | Zahira Cruz |
| Mon | 28-Mar | 3pm-11pm | Melissa Ralph |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | N/A |
| Tue | 29-Mar | 7am - 3pm | |
| Tue | 29-Mar | 3pm-11pm | Melissa Ralph |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | N/A |
| Wed | 30-Mar | 7am - 3pm | Wendy Reed |
| Wed | 30-Mar | 3pm-11pm | Melissa Ralph |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | N/A |
| Thur | 31-Mar | 7am - 3pm | Jonathan Fiske |
| Thur | 31-Mar | 3pm-11pm | Melissa Ralph |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | N/A |
| Fri | 1-Apr | 7am - 3pm | Wendy Reed |
| Fri | 1-Apr | 3pm-11pm | Melissa Ralph |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Don Algama |
| Sat | 2-Apr | 7am - 3pm | Anthony Bowers |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | N/A |

EST Coordinator

| | | | |
|----------|-----------|------------|----------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Steve Campbell |
| Sun | 27-Mar | 7am - 3pm | Tonya Russell |
| Sun | 27-Mar | 3pm-11pm | Stella Opara |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Taylor Lichatz |
| Mon | 28-Mar | 7am - 3pm | Tony McMurtray |
| Mon | 28-Mar | 3pm-11pm | Rebecca Stone |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Stacy Smith |
| Tue | 29-Mar | 7am - 3pm | Anthony Bowers |
| Tue | 29-Mar | 3pm-11pm | Tony McMurtray |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Rebecca Stone |
| Wed | 30-Mar | 7am - 3pm | Taylor Lichatz |
| Wed | 30-Mar | 3pm-11pm | Tony McMurtray |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Rebecca Stone |
| Thur | 31-Mar | 7am - 3pm | Anthony Bowers |
| Thur | 31-Mar | 3pm-11pm | Tony McMurtray |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Rebecca Stone |
| Fri | 1-Apr | 7am - 3pm | Steve Campbell |
| Fri | 1-Apr | 3pm-11pm | Tony McMurtray |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Rebecca Stone |
| Sat | 2-Apr | 7am - 3pm | Stacy Smith |
| Sat | 2-Apr | 3pm-11pm | Steve Campbell |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Rebecca Stone |

EST Chronology Officer

| | | | |
|---------|-----------|------------|-------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Thomas Scarbrough |
| Sun | 27-Mar | 7am - 3pm | Hector Rodriguez |
| Sun | 27-Mar | 3pm-11pm | Rebecca Karas |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|-----------------------------|-----------|------------|-------------------|
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Thomas Scarbrough |
| Mon | 28-Mar | 7am - 3pm | Hector Rodriguez |
| Mon | 28-Mar | 3pm-11pm | Rebecca Karas |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | |
| Tue | 29-Mar | 7am - 3pm | Vanice Perin |
| Tue | 29-Mar | 3pm-11pm | Rebecca Karas |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | |
| Wed | 30-Mar | 7am - 3pm | Hector Rodriguez |
| Wed | 30-Mar | 3pm-11pm | Rebecca Karas |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Thomas Scarbrough |
| Thur | 31-Mar | 7am - 3pm | Vanice Perin |
| Thur | 31-Mar | 3pm-11pm | Rebecca Karas |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Nick Ballam |
| Fri | 1-Apr | 7am - 3pm | Sandra Valencia |
| Fri | 1-Apr | 3pm-11pm | Rebecca Karas |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Nick Ballam |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |
| EST Response Ops Mgr | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Roberto Figueroa |
| Sun | 27-Mar | 7am - 3pm | Omar Khan |
| Sun | 27-Mar | 3pm-11pm | Cris Brown |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Roberto Figueroa |
| Mon | 28-Mar | 7am - 3pm | Karen Jackson |
| Mon | 28-Mar | 3pm-11pm | Cris Brown |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Omar Khan |
| Tue | 29-Mar | 7am - 3pm | Bob Stransky |
| Tue | 29-Mar | 3pm-11pm | Cris Brown |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Karen Jackson |
| Wed | 30-Mar | 7am - 3pm | Omar Khan |
| Wed | 30-Mar | 3pm-11pm | Cris Brown |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Bob Stransky |
| Thur | 31-Mar | 7am - 3pm | Karen Jackson |
| Thur | 31-Mar | 3pm-11pm | Omar Khan |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Bob Stransky |
| Fri | 1-Apr | 7am - 3pm | Roberto Figueroa |
| Fri | 1-Apr | 3pm-11pm | Karen Jackson |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Omar Khan |
| Sat | 2-Apr | 7am - 3pm | Roberto Figueroa |
| Sat | 2-Apr | 3pm-11pm | Karen Jackson |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Omar Khan |
| EST Admin. Assistant | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | N/A |
| Sun | 27-Mar | 7am - 3pm | Karen Meyer |
| Sun | 27-Mar | 3pm-11pm | Cynthia Dorsey |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | N/A |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|----------------------|
| Mon | 28-Mar | 7am - 3pm | Michelle Manahan |
| Mon | 28-Mar | 3pm-11pm | Carol Greenwood |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | N/A |
| Tue | 29-Mar | 7am - 3pm | Michelle Manahan |
| Tue | 29-Mar | 3pm-11pm | Mary Glenn Crutchley |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | N/A |
| Wed | 30-Mar | 7am - 3pm | Cynthia Dorsey |
| Wed | 30-Mar | 3pm-11pm | Mary Glenn Crutchley |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | N/A |
| Thur | 31-Mar | 7am - 3pm | Amy Salus |
| Thur | 31-Mar | 3pm-11pm | Tabitha Howard |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | N/A |
| Fri | 1-Apr | 7am - 3pm | Carol Greenwood |
| Fri | 1-Apr | 3pm-11pm | Tabitha Howard |
| Fri-Sat | 4/1-4/2 | 11pm-7am | N/A |
| Sat | 2-Apr | 7am - 3pm | Karen Meyer |
| Sat | 2-Apr | 3pm-11pm | Cynthia Dorsey |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | N/A |

Liaison Team**LT Director**

| | | | |
|----------|-----------|------------|----------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Marissa Bailey |
| Sun | 27-Mar | 7am - 3pm | Mike Tschiltz |
| Sun | 27-Mar | 3pm-11pm | Marrisa Bailey |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Mark Thaggard |
| Mon | 28-Mar | 7am - 3pm | Allen Howe |
| Mon | 28-Mar | 3pm-11pm | Marrisa Bailey |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | |
| Tue | 29-Mar | 7am - 3pm | Allen Howe |
| Tue | 29-Mar | 3pm-11pm | Marrisa Bailey |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | |
| Wed | 30-Mar | 7am - 3pm | Allen Howe |
| Wed | 30-Mar | 3pm-11pm | Marrisa Bailey |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | |
| Thur | 31-Mar | 7am - 3pm | John Adams |
| Thur | 31-Mar | 3pm-11pm | Mark Lombard |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Bob Webber |
| Fri | 1-Apr | 7am - 3pm | John Adams |
| Fri | 1-Apr | 3pm-11pm | Mark Lombard |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Tom Bergman |
| Sat | 2-Apr | 7am - 3pm | John Adams |
| Sat | 2-Apr | 3pm-11pm | Mark Lombard |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Tom Bergman |

LT Coordinator

| | | | |
|---------|-----------|------------|-------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Milt Murray |
| Sun | 27-Mar | 7am - 3pm | Lisa Gibney |
| Sun | 27-Mar | 3pm-11pm | Jeff Temple |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Milt Murray |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|-------------------------------|-----------|------------|---------------------------------|
| Mon | 28-Mar | 7am - 3pm | Jeff Temple |
| Mon | 28-Mar | 3pm-11pm | Rani Franovich |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Janelle Jessie |
| Tue | 29-Mar | 7am - 3pm | Milt Murray |
| Tue | 29-Mar | 3pm-11pm | Rani Franovich |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Janelle Jessie |
| Wed | 30-Mar | 7am - 3pm | Milt Murray |
| Wed | 30-Mar | 3pm-11pm | Jeff Temple |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Janelle Jessie |
| Thur | 31-Mar | 7am - 3pm | Milt Murray |
| Thur | 31-Mar | 3pm-11pm | Jeff Temple |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Rani Franovich |
| Fri | 1-Apr | 7am - 3pm | Jeff Temple |
| Fri | 1-Apr | 3pm-11pm | Janelle Jessie |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Rani Franovich |
| Sat | 2-Apr | 7am - 3pm | Jeff Temple |
| Sat | 2-Apr | 3pm-11pm | Milt Murray |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |
| LT State Liaison | | | |
| Sat-Sun | 3/26-3/27 | 9pm-7am | A. Rivera/A. Noonan (ON CALL) |
| Sun | 27-Mar | 7am-2pm | Alison Rivera (ON CALL) |
| Sun | 27-Mar | 2pm-9pm | Alison Rivera (ON CALL) |
| Sun-Mon | 3/27-3/28 | 9pm-7am | Alison Rivera (ON CALL) |
| Mon | 28-Mar | 7am-2pm | C. Maupin/C. Flannery (ON CALL) |
| Mon | 28-Mar | 2pm-9pm | Stuart Easson |
| Mon-Tue | 3/28-3/29 | 9pm-7am | R. Virgilio (ON CALL) |
| Tue | 29-Mar | 7am-2pm | C. Maupin/C. Flannery (ON CALL) |
| Tue | 29-Mar | 2pm-9pm | Stuart Easson |
| Tue-Wed | 3/29-3/30 | 9pm-7am | Richard Turtill (ON CALL) |
| Wed | 30-Mar | 7am-2pm | Cindy Flannery |
| Wed | 30-Mar | 2pm-9pm | Michelle Ryan |
| Wed-Thur | 3/30-3/31 | 9pm-7am | Richard Turtill (ON CALL) |
| Thur | 31-Mar | 7am-2pm | Amanda Noonan |
| Thur | 31-Mar | 2pm-9pm | Michelle Ryan |
| Thur-Fri | 3/31-4/1 | 9pm-7am | Richard Turtill (ON CALL) |
| Fri | 1-Apr | 7am-2pm | Kim Lukes |
| Fri | 1-Apr | 2pm-9pm | Alison Rivera |
| Fri-Sat | 4/1-4/2 | 9pm-7am | Richard Turtill (ON CALL) |
| Sat | 2-Apr | 7am-2pm | Amanda Noonan (ON CALL) |
| Sat | 2-Apr | 2pm-9pm | Amanda Noonan (ON CALL) |
| Sat-Sun | 2-Apr | 9pm-7am | Amanda Noonan (ON CALL) |
| LT Federal Liaison (2) | | | |
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Scott Sloan |
| Sun | 27-Mar | 7am - 3pm | Susan Salter / Lisa Gibney |
| Sun | 27-Mar | 3pm-11pm | Jerry Hale |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Scott Sloan |
| Mon | 28-Mar | 7am - 3pm | Susan Salter / Lisa Gibney |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|-----------------------------|
| Mon | 28-Mar | 3pm-11pm | Lisa Wright |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Ned Wright |
| Tue | 29-Mar | 7am - 3pm | Susan Salter / Jerry Hale |
| Tue | 29-Mar | 3pm-11pm | Lisa Wright |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Ned Wright |
| Wed | 30-Mar | 7am - 3pm | Bethany Cecere / Jerry Hale |
| Wed | 30-Mar | 3pm-11pm | Lisa Wright |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Ned Wright |
| Thur | 31-Mar | 7am - 3pm | Jeff Temple / Jason Lising |
| Thur | 31-Mar | 3pm-11pm | Ted Smith |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Ned Wright |
| Fri | 1-Apr | 7am - 3pm | Jeff Lynch / Beth Reed |
| Fri | 1-Apr | 3pm-11pm | Jerry Hale |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Jason Lising |
| Sat | 2-Apr | 7am - 3pm | Beth Reed |
| Sat | 2-Apr | 3pm-11pm | Bethany Cecere |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Jason Lising |

LT Congressional Liaison (2)

| | | | |
|----------|-----------|------------|----------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Amy Powell (ON CALL) |
| Sun | 27-Mar | 7am - 3pm | Amy Powell (ON CALL) |
| Sun | 27-Mar | 3pm-11pm | Amy Powell (ON CALL) |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Amy Powell (ON CALL) |
| Mon | 28-Mar | 7am - 3pm | Amy Powell (ON CALL) |
| Mon | 28-Mar | 3pm-11pm | Amy Powell (ON CALL) |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Amy Powell (ON CALL) |
| Tue | 29-Mar | 7am - 3pm | Amy Powell (ON CALL) |
| Tue | 29-Mar | 3pm-11pm | Amy Powell (ON CALL) |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Amy Powell (ON CALL) |
| Wed | 30-Mar | 7am - 3pm | Amy Powell (ON CALL) |
| Wed | 30-Mar | 3pm-11pm | Amy Powell (ON CALL) |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Amy Powell (ON CALL) |
| Thur | 31-Mar | 7am - 3pm | Amy Powell (ON CALL) |
| Thur | 31-Mar | 3pm-11pm | Amy Powell (ON CALL) |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Amy Powell (ON CALL) |
| Fri | 1-Apr | 7am - 2pm | Amy Powell (ON CALL) |
| Fri | 1-Apr | 2pm-9pm | Amy Powell (ON CALL) |
| Sat | 2-Apr | 7am - 2pm | Amy Powell (ON CALL) |
| Sat | 2-Apr | 2pm-9pm | Amy Powell (ON CALL) |
| Sun | 3-Apr | 7am-2pm | Amy Powell (ON CALL) |

LT International Liaison (2)

| | | | |
|---------|-----------|------------|-----------------------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Cindy Rosales/ Elizabeth Smioldo |
| Sun | 27-Mar | 7am - 3pm | Jill Shepard/ Karen Henderson |
| Sun | 27-Mar | 3pm-11pm | Nancy Fragoyannis/ Jenny Tobin |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Steve Baker / Brian Wittick |
| Mon | 28-Mar | 7am - 3pm | Jill Shepard/ Karen Henderson |
| Mon | 28-Mar | 3pm-11pm | Nancy Fragoyannis / Cindy Rosales |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Steve Baker / Brian Wittick |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|--|
| Tue | 29-Mar | 7am - 3pm | Jill Shepard/ Karen Henderson |
| Tue | 29-Mar | 3pm-11pm | Nancy Fragoyannis / Gerri Fehst |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Steve Baker / Brian Wittick |
| Wed | 30-Mar | 7am - 3pm | Eric Stahl / Lauren Mayros (J. Tobin 12-3) |
| Wed | 30-Mar | 3pm-11pm | Danielle Emche / Mugah Afshar-Tous |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Jen Schwartzman / Charlotte Abrams |
| Thur | 31-Mar | 7am - 3pm | Jill Shepard / Lauren Mayros |
| Thur | 31-Mar | 3pm-11pm | Gerri / Mugah Afshar-Tous |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Jen Schwartzman / Charlotte Abrams |
| Fri | 1-Apr | 7am - 3pm | Cindy Rosales/ Lauren Mayros |
| Fri | 1-Apr | 3pm-11pm | Gerri/ Mugah Afshar-Tous |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Jen Schwartzman / Charlotte Abrams |
| Sat | 2-Apr | 7am - 3pm | Steve Bloom/ Karen Henderson |
| Sat | 2-Apr | 3pm-11pm | Janice Owens / Jenny Tobin |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Gerri Fehst / Elizabeth Smirolodo |

Protective Measures Team

PMTR Director

| | | | |
|----------|-----------|------------|-------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Randy Sullivan |
| Sun | 27-Mar | 7am - 3pm | Don Cool |
| Sun | 27-Mar | 3pm-11pm | Vince Holahan |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | John Tappert |
| Mon | 28-Mar | 7am - 3pm | Don Cool |
| Mon | 28-Mar | 3pm-11pm | Vince Holahan |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | John Tappert |
| Tue | 29-Mar | 7am - 3pm | Terry Reis |
| Tue | 29-Mar | 3pm-11pm | Vince Holahan |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Patricia Milligan |
| Wed | 30-Mar | 7am - 3pm | Terry Reis |
| Wed | 30-Mar | 3pm-11pm | Vince Holahan |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Patricia Milligan |
| Thur | 31-Mar | 7am - 3pm | Randy Sullivan |
| Thur | 31-Mar | 3pm-11pm | Terry Reis |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Christiana Lui |
| Fri | 1-Apr | 7am - 3pm | Randy Sullivan |
| Fri | 1-Apr | 3pm-11pm | Don Cool |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Christiana Lui |
| Sat | 2-Apr | 7am - 3pm | Randy Sullivan |
| Sat | 2-Apr | 3pm-11pm | Don Cool |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Christiana Lui |

PMTR Coordinator

| | | | |
|---------|-----------|------------|------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Lou Brandon |
| Sun | 27-Mar | 7am - 3pm | Ryan Craffey |
| Sun | 27-Mar | 3pm-11pm | Jay Patel |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Lou Brandon |
| Mon | 28-Mar | 7am - 3pm | Duane Hardesty |
| Mon | 28-Mar | 3pm-11pm | Nima Ashkeboussi |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Lou Brandon |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|------------------|
| Tue | 29-Mar | 7am - 3pm | Duane Hardesty |
| Tue | 29-Mar | 3pm-11pm | Nima Ashkeboussi |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Lou Brandon |
| Wed | 30-Mar | 7am - 3pm | Michael Raddatz |
| Wed | 30-Mar | 3pm-11pm | Jay Patel |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Ryan Craffey |
| Thur | 31-Mar | 7am - 3pm | Duane Hardesty |
| Thur | 31-Mar | 3pm-11pm | Michael Raddatz |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | |
| Fri | 1-Apr | 7am - 3pm | Duane Hardesty |
| Fri | 1-Apr | 3pm-11pm | Nima Ashkeboussi |
| Fri-Sat | 4/1-4/2 | 11pm-7am | |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |

PMTR Prot Actions Asst Dir

| | | | |
|----------|-----------|------------|----------------------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Greg Casto |
| Sun | 27-Mar | 7am - 3pm | Kevin Williams |
| Sun | 27-Mar | 3pm-11pm | Tim Harris |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Greg Casto/Jessical Kratchman |
| Mon | 28-Mar | 7am - 3pm | Sandra Wastler |
| Mon | 28-Mar | 3pm-11pm | Mike McCoppin |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Greg Casto/Jessical Kratchman |
| Tue | 29-Mar | 7am - 3pm | |
| Tue | 29-Mar | 3pm-11pm | Tim Harris |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Greg Casto |
| Wed | 30-Mar | 7am - 3pm | Alemu Bezakulu |
| Wed | 30-Mar | 3pm-11pm | Sandra Wastler |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Greg Casto |
| Thur | 31-Mar | 7am - 3pm | Jessica Kratchman |
| Thur | 31-Mar | 3pm-11pm | Tim Harris |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | |
| Fri | 1-Apr | 7am - 3pm | Sandra Wastler/Jessica Kratchman |
| Fri | 1-Apr | 3pm-11pm | |
| Fri-Sat | 4/1-4/2 | 11pm-7am | |
| Sat | 2-Apr | 7am - 3pm | Alemu Bezakulu |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |

PMTR RAAD

| | | | |
|---------|-----------|------------|---------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Mike Norris |
| Sun | 27-Mar | 7am - 3pm | Michelle Hart |
| Sun | 27-Mar | 3pm-11pm | |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Mike Norris |
| Mon | 28-Mar | 7am - 3pm | Steve LaVie |
| Mon | 28-Mar | 3pm-11pm | Michelle Hart |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Mike Norris |
| Tue | 29-Mar | 7am - 3pm | |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|---------------|
| Tue | 29-Mar | 3pm-11pm | |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Mike Norris |
| Wed | 30-Mar | 7am - 3pm | |
| Wed | 30-Mar | 3pm-11pm | Steve LaVie |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | |
| Thur | 31-Mar | 7am - 3pm | Michelle Hart |
| Thur | 31-Mar | 3pm-11pm | |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | |
| Fri | 1-Apr | 7am - 3pm | |
| Fri | 1-Apr | 3pm-11pm | Steve LaVie |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Michelle Hart |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |

PMTR Dose Assessment (RASCAL) - Need 2

| | | | |
|----------|-----------|------------|---------------------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | John Parillo/Ron LaVera |
| Sun | 27-Mar | 7am - 3pm | Tony Huffert |
| Sun | 27-Mar | 3pm-11pm | Casper Sun/Ed Roach |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Margaret Cervera/John Parillo |
| Mon | 28-Mar | 7am - 3pm | Rich Clement/Tony Huffert |
| Mon | 28-Mar | 3pm-11pm | Bernie White/Casper Sun |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Margaret Cervera/John Parillo |
| Tue | 29-Mar | 7am - 3pm | Tony Huffert/Rich Clement |
| Tue | 29-Mar | 3pm-11pm | Casper Sun |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Margaret Cervera/Bernie White |
| Wed | 30-Mar | 7am - 3pm | Tony Huffert/Rich Clement |
| Wed | 30-Mar | 3pm-11pm | Casper Sun |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Margaret Cervera/John Parillo |
| Thur | 31-Mar | 7am - 3pm | Rich Clement/Joe DeCicco |
| Thur | 31-Mar | 3pm-11pm | Bernie White (Maybe)/Casper Sun |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | John Parillo |
| Fri | 1-Apr | 7am - 3pm | /Rich Clement |
| Fri | 1-Apr | 3pm-11pm | Casper Sun |
| Fri-Sat | 4/1-4/2 | 11pm-7am | John Parillo |
| Sat | 2-Apr | 7am - 3pm | Tony Huffert |
| Sat | 2-Apr | 3pm-11pm | Casper Sun |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |

PMTR GIS Analyst

| | | | |
|---------|-----------|------------|------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | N/A |
| Sun | 27-Mar | 7am - 3pm | (ON CALL) |
| Sun | 27-Mar | 3pm-11pm | N/A |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | N/A |
| Mon | 28-Mar | 7am - 3pm | (ON CALL) |
| Mon | 28-Mar | 3pm-11pm | N/A |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | N/A |
| Tue | 29-Mar | 7am - 3pm | (ON CALL) |
| Tue | 29-Mar | 3pm-11pm | N/A |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|-----------|
| Tue-Wed | 3/29-3/30 | 11pm - 7am | N/A |
| Wed | 30-Mar | 7am - 3pm | (ON CALL) |
| Wed | 30-Mar | 3pm-11pm | N/A |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | N/A |
| Thur | 31-Mar | 7am - 3pm | (ON CALL) |
| Thur | 31-Mar | 3pm-11pm | N/A |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | N/A |
| Fri | 1-Apr | 7am - 3pm | (ON CALL) |
| Fri | 1-Apr | 3pm-11pm | N/A |
| Fri-Sat | 4/1-4/2 | 11pm-7am | N/A |
| Sat | 2-Apr | 7am - 3pm | (ON CALL) |
| Sat | 2-Apr | 3pm-11pm | N/A |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | N/A |

PMTR Meteorologist

| | | | |
|----------|-----------|------------|-----------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | N/A |
| Sun | 27-Mar | 7am - 3pm | (ON CALL) |
| Sun | 27-Mar | 3pm-11pm | N/A |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | N/A |
| Mon | 28-Mar | 7am - 3pm | (ON CALL) |
| Mon | 28-Mar | 3pm-11pm | N/A |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | N/A |
| Tue | 29-Mar | 7am - 3pm | (ON CALL) |
| Tue | 29-Mar | 3pm-11pm | N/A |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | N/A |
| Wed | 30-Mar | 7am - 3pm | (ON CALL) |
| Wed | 30-Mar | 3pm-11pm | N/A |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | N/A |
| Thur | 31-Mar | 7am - 3pm | (ON CALL) |
| Thur | 31-Mar | 3pm-11pm | N/A |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | N/A |
| Fri | 1-Apr | 7am - 3pm | (ON CALL) |
| Fri | 1-Apr | 3pm-11pm | N/A |
| Fri-Sat | 4/1-4/2 | 11pm-7am | N/A |
| Sat | 2-Apr | 7am - 3pm | (ON CALL) |
| Sat | 2-Apr | 3pm-11pm | N/A |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | N/A |

Reactor Safety Team**RST Director**

| | | | |
|---------|-----------|------------|---------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Dave Skeen |
| Sun | 27-Mar | 7am - 3pm | Pat Hiland |
| Sun | 27-Mar | 3pm-11pm | Fred Brown |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Dave Skeen |
| Mon | 28-Mar | 7am - 3pm | Pat Hiland |
| Mon | 28-Mar | 3pm-11pm | Fred Brown |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Dave Skeen |
| Tue | 29-Mar | 7am - 3pm | Jennifer Uhle |
| Tue | 29-Mar | 3pm-11pm | Fred Brown |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|---------------|
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Dave Skeen |
| Wed | 30-Mar | 7am - 3pm | Jennifer Uhle |
| Wed | 30-Mar | 3pm-11pm | Fred Brown |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Mike Case |
| Thur | 31-Mar | 7am - 3pm | Jennifer Uhle |
| Thur | 31-Mar | 3pm-11pm | Bill Ruland |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Mike Case |
| Fri | 1-Apr | 7am - 3pm | Jennifer Uhle |
| Fri | 1-Apr | 3pm-11pm | Bill Ruland |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Mike Case |
| Sat | 2-Apr | 7am - 3pm | Brian Holian |
| Sat | 2-Apr | 3pm-11pm | Bill Ruland |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Mike Case |

RST Coordinator

| | | | |
|----------|-----------|------------|------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Brett Rini |
| Sun | 27-Mar | 7am - 3pm | Peter Alter |
| Sun | 27-Mar | 3pm-11pm | Rick Hasselberg |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Frank Collins |
| Mon | 28-Mar | 7am - 3pm | Peter Alter |
| Mon | 28-Mar | 3pm-11pm | Rick Hasselberg |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Mike Morlang |
| Tue | 29-Mar | 7am - 3pm | Peter Alter |
| Tue | 29-Mar | 3pm-11pm | Greg Schoenebeck |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Mike Morlang |
| Wed | 30-Mar | 7am - 3pm | Peter Alter |
| Wed | 30-Mar | 3pm-11pm | Greg Schoenebeck |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Frank Collins |
| Thur | 31-Mar | 7am - 3pm | Peter Alter |
| Thur | 31-Mar | 3pm-11pm | Greg Schoenebeck |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Frank Collins |
| Fri | 1-Apr | 7am - 3pm | Brett Rini |
| Fri | 1-Apr | 3pm-11pm | |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Frank Collins |
| Sat | 2-Apr | 7am - 3pm | Peter Alter |
| Sat | 2-Apr | 3pm-11pm | Brett Rini |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Oleg Bukharin |

Severe Accident/PRA

| | | | |
|---------|-----------|------------|-----------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Ray Skarda |
| Sun | 27-Mar | 7am - 3pm | Andy Howe |
| Sun | 27-Mar | 3pm-11pm | Jeff Mitman |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Jim Gilmer |
| Mon | 28-Mar | 7am - 3pm | Jeff Circle |
| Mon | 28-Mar | 3pm-11pm | Len Ward |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Steve Arndt |
| Tue | 29-Mar | 7am - 3pm | Hossein Esmaili |
| Tue | 29-Mar | 3pm-11pm | Ed Fuller |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Steve Arndt |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|-----------------|
| Wed | 30-Mar | 7am - 3pm | Jim Gilmer |
| Wed | 30-Mar | 3pm-11pm | Hossein Esmaili |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Steve Arndt |
| Thur | 31-Mar | 7am - 3pm | Don Chung |
| Thur | 31-Mar | 3pm-11pm | Hossein Esmaili |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Steve Arndt |
| Fri | 1-Apr | 7am - 3pm | Jeff Mitman |
| Fri | 1-Apr | 3pm-11pm | Don Hilton |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Ray Skarda |
| Sat | 2-Apr | 7am - 3pm | |
| Sat | 2-Apr | 3pm-11pm | |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |

BWR Expertise

| | | | |
|----------|-----------|------------|--------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Eva Brown |
| Sun | 27-Mar | 7am - 3pm | Mike Brown |
| Sun | 27-Mar | 3pm-11pm | Chuck Norton |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Eva Brown |
| Mon | 28-Mar | 7am - 3pm | Mike Brown |
| Mon | 28-Mar | 3pm-11pm | Chuck Norton |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Jim Shea |
| Tue | 29-Mar | 7am - 3pm | Mike Brown |
| Tue | 29-Mar | 3pm-11pm | Chuck Norton |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Jim Shea |
| Wed | 30-Mar | 7am - 3pm | Mike Brown |
| Wed | 30-Mar | 3pm-11pm | Chuck Norton |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Jim Shea |
| Thur | 31-Mar | 7am - 3pm | Mike Brown |
| Thur | 31-Mar | 3pm-11pm | Chuck Norton |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Jim Shea |
| Fri | 1-Apr | 7am - 3pm | Mike Brown |
| Fri | 1-Apr | 3pm-11pm | Chuck Norton |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Eva Brown |
| Sat | 2-Apr | 7am - 3pm | Mike Brown |
| Sat | 2-Apr | 3pm-11pm | Chuck Norton |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | Eva Brown |

RST Comm/ERDS Operator

| | | | |
|---------|-----------|------------|------------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Denise McGovern |
| Sun | 27-Mar | 7am - 3pm | Mark Padovan |
| Sun | 27-Mar | 3pm-11pm | Bill Roggenbrodt |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Denise McGovern |
| Mon | 28-Mar | 7am - 3pm | Mark Padovan |
| Mon | 28-Mar | 3pm-11pm | Rick Jervey |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | Brian Horn |
| Tue | 29-Mar | 7am - 3pm | John Thorp |
| Tue | 29-Mar | 3pm-11pm | Andy Kugler |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | Brian Horn |
| Wed | 30-Mar | 7am - 3pm | Steve Bloom |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|------------------|
| Wed | 30-Mar | 3pm-11pm | Bill Roggenbrodt |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | |
| Thur | 31-Mar | 7am - 3pm | Jerry Dozier |
| Thur | 31-Mar | 3pm-11pm | John Thorp |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | |
| Fri | 1-Apr | 7am - 3pm | Andy Kugler |
| Fri | 1-Apr | 3pm-11pm | |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Liliana Ramadan |
| Sat | 2-Apr | 7am - 3pm | John Thorp |
| Sat | 2-Apr | 3pm-11pm | Mark Padovan |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | |
| | | | |

RST Support (Seismology Q&A)

| | | | |
|----------|-----------|------------|-----------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | (ON CALL) |
| Sun | 27-Mar | 7am - 3pm | (ON CALL) |
| Sun | 27-Mar | 3pm-11pm | (ON CALL) |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | (ON CALL) |
| Mon | 28-Mar | 7am - 3pm | (ON CALL) |
| Mon | 28-Mar | 3pm-11pm | (ON CALL) |
| Mon-Tue | 3/28-3/29 | 11pm - 7am | (ON CALL) |
| Tue | 29-Mar | 7am - 3pm | (ON CALL) |
| Tue | 29-Mar | 3pm-11pm | (ON CALL) |
| Tue-Wed | 3/29-3/30 | 11pm - 7am | (ON CALL) |
| Wed | 30-Mar | 7am - 3pm | (ON CALL) |
| Wed | 30-Mar | 3pm-11pm | (ON CALL) |
| Wed-Thur | 3/30-3/31 | 11pm - 7am | (ON CALL) |
| Thur | 31-Mar | 7am - 3pm | (ON CALL) |
| Thur | 31-Mar | 3pm-11pm | (ON CALL) |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | (ON CALL) |
| Fri | 1-Apr | 7am - 3pm | (ON CALL) |
| Fri | 1-Apr | 3pm-11pm | (ON CALL) |
| Fri-Sat | 4/1-4/2 | 11pm-7am | (ON CALL) |
| Sat | 2-Apr | 7am - 3pm | (ON CALL) |
| Sat | 2-Apr | 3pm-11pm | (ON CALL) |
| Sat-Sun | 4/2-4/3 | 11pm - 7am | (ON CALL) |

RST Support (Structural)

| | | | |
|----------|-----------|------------|---------------|
| Sat-Sun | 3/26-3/27 | 11pm - 7am | Off (ON CALL) |
| Sun | 27-Mar | 7am - 3pm | Off (ON CALL) |
| Sun | 27-Mar | 3pm-11pm | Off (ON CALL) |
| Sun-Mon | 3/27-3/28 | 11pm - 7am | Off (ON CALL) |
| Mon | 28-Mar | 7am - 3pm | Off (ON CALL) |
| Mon | 28-Mar | 3pm-11pm | Off (ON CALL) |
| Mon-Tues | 3/28-3/29 | 11pm - 7am | Off (ON CALL) |
| Tues | 29-Mar | 7am - 3pm | Off (ON CALL) |
| Tues | 29-Mar | 3pm-11pm | Off (ON CALL) |
| Tues-Wed | 3/29-3/30 | 11pm - 7am | Off (ON CALL) |
| Wed | 30-Mar | 7am - 3pm | Off (ON CALL) |
| Wed | 30-Mar | 3pm-11pm | Off (ON CALL) |

Japan Earthquake ERO Staffing Roster

Mar 27-Apr 2, 2011

Pay Period 8 - Week 1

| | | | |
|----------|-----------|------------|---------------|
| Wed-Thur | 3/30-3/31 | 11pm - 7am | Off (ON CALL) |
| Thur | 31-Mar | 7am - 3pm | Off (ON CALL) |
| Thur | 31-Mar | 3pm-11pm | Off (ON CALL) |
| Thur-Fri | 3/31-4/1 | 11pm - 7am | Off (ON CALL) |
| Fri | 1-Apr | 7am - 3pm | Off (ON CALL) |
| Fri | 1-Apr | 3pm-11pm | Off (ON CALL) |
| Fri-Sat | 4/1-4/2 | 11pm-7am | Off (ON CALL) |

~~C8~~

C4

Miller, Chris

From: Miller, Chris
Sent: Sunday, March 27, 2011 8:37 PM
To: McDermott, Brian
Cc: Morris, Scott
Subject: FW: Updated: ET Response Advisor Schedule
Attachments: ET Response Schedule.docx; MASTER RESPONDER SCHEDULE FOR JAPAN EARTHQUAKE.pdf

Importance: High

Brian,
I'm not sure Scott is planning to come in tonight. The schedules between Michele's and ET02 have been mixed up. I have slept all day and am planning to come in on mids. Will need to know in the next 30-40 min if you want me to come in or Scott. I talked to ET admin to try and figure this out.
chris

From: Miller, Chris
Sent: Saturday, March 26, 2011 7:25 AM
To: Evans, Michele; OST02 HOC
Cc: McDermott, Brian; Morris, Scott; Miller, Chris
Subject: FW: Updated: ET Response Advisor Schedule

Michele,
Scott has graciously agreed to take the midnight shift starting at 11 pm on March 28. Thanks Scott!!

I am going to pick up the day shifts on April 8 and 9.

OST02 please confirm with Michele and then update the Master Responder Schedule as appropriate.

Thx
chris

Chris ... Fine with me ... please have someone re-issue the watchbill to reflect the change. Thanks!

From: Miller, Chris
Sent: Wednesday, March 23, 2011 11:09 PM
To: Morris, Scott
Cc: Thaggard, Mark; McDermott, Brian
Subject: FW: Updated: ET Response Advisor Schedule

Scott,
Can you pick up Mids a day earlier on the 28th, and I will grab day shift on 4-8? It would make me going to the Public Meeting on shift staffing at 1 pm on the 29th a bit easier since I won't have been up through the night, and it will help fill at least one day in the gap that is left. If so I will start my move up to Region I on Sat the 9th.
chris

From: Evans, Michele *NR*
Sent: Wednesday, March 23, 2011 3:09 PM

To: McDermott, Brian; Ross-Lee, MaryJane; Morris, Scott; Miller, Chris; McGinty, Tim; Giitter, Joseph; Blount, Tom; Thaggard, Mark

Subject: Updated: ET Response Advisor Schedule

Attached is the latest schedule. Thanks for your inputs. There are still several open day shifts starting 3/31. Please let me know if you can support. At this point, I don't plan to add anyone else to the rotation.

Please note that the OPS Center Master schedule has not been updated to reflect this, but will be within the next 2 hours.

Michele

Benner, Eric

From: Rahimi, Meraj
Sent: Sunday, March 27, 2011 10:42 PM
To: LIA02 Hoc; Benner, Eric; Weaver, Doug; Ordaz, Vonna; Haney, Catherine
Cc: LIA03 Hoc
Subject: RE: ACTION - Decommissioning Type Information for Ops Center

Yes. The response was coordinated among the three divisions within NMSS last Wednesday.

Thanks,

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

From: LIA02 Hoc
Sent: Saturday, March 26, 2011 8:57 AM
To: Rahimi, Meraj; Benner, Eric; Weaver, Doug; Ordaz, Vonna; Haney, Catherine
Cc: LIA03 Hoc
Subject: FW: ACTION - Decommissioning Type Information for Ops Center

Meraji,

Has this been fully vetted so that we can release to the Japanese. Please see note from Mike Scott.

Steve

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

From: Scott, Michael
Sent: Saturday, March 26, 2011 2:15 AM
To: LIA02 Hoc
Cc: LIA03 Hoc; Casto, Chuck; Monninger, John; Dorman, Dan
Subject: RE: ACTION - Decommissioning Type Information for Ops Center

I think this is more what they were looking for, rather than the licensing discussion previously sent. Please advise me when this is fully vetted and can be released to the Japanese. Thanks.

From: LIA02 Hoc
Sent: Friday, March 25, 2011 12:25 PM
To: Scott, Michael
Cc: LIA03 Hoc
Subject: FW: ACTION - Decommissioning Type Information for Ops Center

Some more information.

Steve

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

From: Richards, Stuart
Sent: Wednesday, March 23, 2011 6:51 PM
To: Camper, Larry; Bowman, Gregory; Rini, Brett
Subject: FW: ACTION - Decommissioning Type Information for Ops Center

fyi - Stu

From: Rahimi, Meraj
Sent: Wednesday, March 23, 2011 5:50 PM
To: Ordaz, Vonna; Benner, Eric; ET05 Hoc; RST01 Hoc; Richards, Stuart
Cc: White, Bernard; Mohseni, Aby; Davis, Jack; Weaver, Doug; Doolittle, Elizabeth; Waters, Michael;
Kinneman, John; Bailey, Marissa; Tschiltz, Michael
Subject: RE: ACTION - Decommissioning Type Information for Ops Center

Here is the proposed SFST/FCCS/HLW coordinated response:

We would not recommend early entombment considerations due to the high thermal loads and associated negative effects on entombment material properties. In fact, we believe it might not be prudent to entomb at all. We believe that Japan should consider waiting until the core or spent fuel debris can be cooled sufficiently and then removed similar to TMI. We would initially recommend pumping continuously borated water into the molten core or spent fuel pool. Longer term, if entombment is considered by Japan, it is our opinion that entombment would be less problematic (with respect to criticality issues) if the entombment is around the molten core or pool, rather than directly onto the fuel and in the primary containment vessel. We believe that heat transfer will be a significant challenge and thus it would be best if the entombment was built with low and high vents that would enable the transfer of heat through air convection. If the entombment is considered by pouring some type of material on the molten core or spent fuel pool the system reactivity and heat transfer capability is highly dependent on the material of use. We believe, the temperature in the reactor core or the dried spent fuel pool is too high for the concrete to cure. Both concrete (especially wet) and sand would be a neutron moderator and could raise criticality concerns. Whatever is used should be carefully evaluated. Due to the unknown configuration in the core, any medium should conservatively be heavily borated. Another option maybe the use of sand with boron frits which would turn into glass when contacted with the molten core. This would immobilize the radionuclides. However, the temperature at which the sand is added must be at the point that the glass can solidified. This may require longer cooling time.

In the interim while options are considered, it might be advisable to confine the core or the pool with filtered flexible enclosure.

Meraj Rahimi
Chief of Criticality, Shielding, and Dose Assessment Branch Division of Spent Fuel Storage and Transportation
Office of Nuclear Materials Safety and Safeguard U.S. Nuclear Regulatory Commission
6003 Executive Blvd., Suite 301
Rockville, MD 20852
Phone: 301-492-3338
Fax: 301-492-3348
e-mail: meraj.rahimi@nrc.gov

From: Ordaz, Vonna
Sent: Wednesday, March 23, 2011 3:21 PM
To: Benner, Eric
Cc: White, Bernard; Mohseni, Aby; Davis, Jack; Weaver, Doug; Rahimi, Meraj; Doolittle, Elizabeth; Waters, Michael; Kinneman, John; Bailey, Marissa; Tschiltz, Michael
Subject: ACTION - Decommissioning Type Information for Ops Center
Importance: High

Eric,

SFST has the lead to coordinate a response with HLW and FCSS, and respond to the Reactor Safety Team, the ET Response Coordinator, and Stu Richards in the Operations Center with a CC to Dan Dorman by 6pm.

Thanks,

Vonna

From: Ordaz, Vonna
Sent: Wednesday, March 23, 2011 3:13 PM
To: Richards, Stuart; Weaver, Doug; Mohseni, Aby; Davis, Jack
Cc: RST01 Hoc; Bowman, Gregory; Hickman, John; Lee, Richard; Rini, Brett; Case, Michael; McConnell, Keith; Watson, Bruce; Camper, Larry; Deegan, George; Waters, Michael
Subject: RE: Decommissioning Type Information

Thanks, Stu. We'll get back to you.

Vonna

From: Richards, Stuart
Sent: Wednesday, March 23, 2011 2:32 PM
To: Weaver, Doug; Mohseni, Aby; Davis, Jack
Cc: RST01 Hoc; Bowman, Gregory; Hickman, John; Lee, Richard; Rini, Brett; Case, Michael; McConnell, Keith; Watson, Bruce; Camper, Larry; Deegan, George; Ordaz, Vonna; Waters, Michael
Subject: RE: Decommissioning Type Information
Importance: High

Dan Dorman has asked the Ops Center to respond to a number of questions related to the Japanese event.

Can NMSS respond to the following?

8. What should they be considering with respect to criticality prevention and decay heat removal during the entombment period?

The goal is to provide the response to the Ops Center by 6 pm tonight.

I will forward you the original request, which may help.

Thanks
Stu

From: Deegan, George
Sent: Wednesday, March 23, 2011 2:05 PM
To: Richards, Stuart; Camper, Larry
Cc: RST01 Hoc; Bowman, Gregory; Hickman, John; Lee, Richard; Rini, Brett; Case, Michael; McConnell, Keith; Watson, Bruce
Subject: RE: Decommissioning Type Information

Stu- As your email came in, Brett Rini and I were speaking with one another. I indicated that FSME will be working on #7 (licensing requirements) and #9 (whatever relevant info we can pull together from the TMI event), but that the best shop for criticality type issues (Question #8) is probably NMSS.

From: Richards, Stuart
Sent: Wednesday, March 23, 2011 1:51 PM
To: Camper, Larry
Cc: Deegan, George; RST01 Hoc; Bowman, Gregory; Hickman, John; Lee, Richard; Rini, Brett; Case, Michael
Subject: RE: Decommissioning Type Information

Larry

RES might be able to help you with Question #8. Richard Lee in DSA is our POC on this one.

We can provide you some thoughts on enclosures, but I agree that a good answer will take a lot of time and a lot more information on the status of the units.

Stu

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

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

Miller, Chris

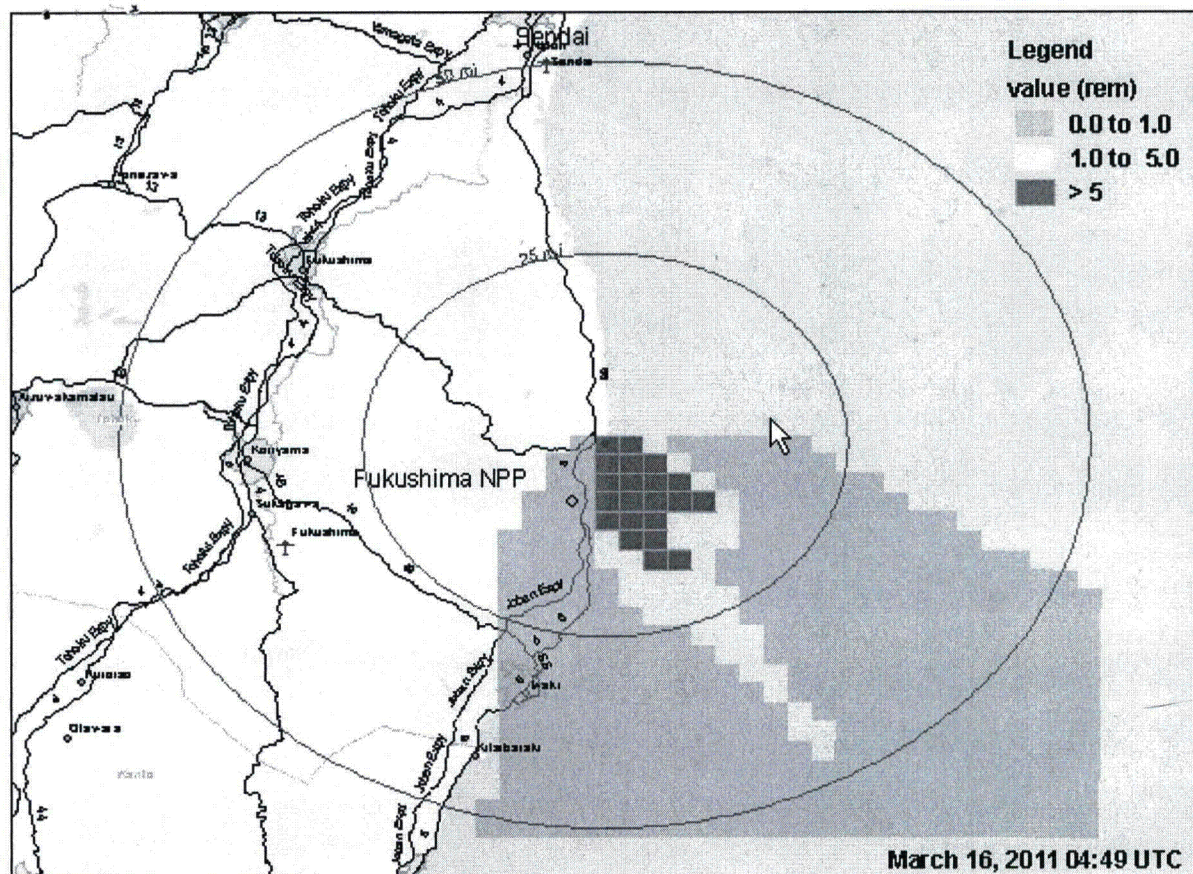
From: Miller, Chris
Sent: Monday, March 28, 2011 1:34 AM
To: FOIAResource.hoc@nrc.gov
Subject: FW: ATTACHED PDF: Fukushima Unit 4 estimate for 50 miles - TEDE - Puff - 03162011 0437UTC withLegend
Attachments: Fukushima Unit 4 estimate for 50 miles - TEDE - Puff - 03162011 0437UTC withLegend.pdf

From: GIS Hoc
Sent: Wednesday, March 16, 2011 12:58 AM
To: Miller, Chris
Subject: ATTACHED PDF: Fukushima Unit 4 estimate for 50 miles - TEDE - Puff - 03162011 0437UTC withLegend

Requested document attached.

stephanie devlin - *NRO*
PMT Team GIS Analyst

Fukushima Unit 4 estimate for 50 miles - TEDE - Puff



~~C9~~

~~C84~~

~~C5~~

Waters, Michael

From: Shaffer, Vered
Sent: Monday, March 28, 2011 11:49 AM
To: Baggett, Steven; Bartlett, Matthew; Bernal, Sara; Brock, Terry; Burrows, Ronald; Burrows, Sheryl; Bush-Goddard, Stephanie; Cecere, Bethany; Clement, Richard; Conatser, Richard; Garry, Steven; Powers, George; Gibson, Kathy; Giebel, Stephen; Gran, Zachary; Hart, Michelle; Hernandez, Pete; Hogan, Rosemary; Holahan, Patricia; Holahan, Vincent; Holiday, Sophie; Kellner, Robert; Killian, Michelle; Klementowicz, Stephen; Kurian, Varughese; Kurian, Varughese; Lai, Sandra; LaVera, Ronald; LaVie, Steve; Lu, Shanlai; Lukes, Robert; Mamish, Nader; Cervera, Margaret; Markley, Michael; McCoppin, Michael; Meighan, Sean; Milligan, Patricia; Naquin, Tyrone; O'Donnell, John; Orendi, Monica; Pedersen, Roger; Saba, Mohammad; Sahle, Solomon; Sakai, Stacie; Hawkins, Sarenee; Schaffer, Steven; Schmitt, Ronald; Schneider, Stewart; Shaffer, Mark; Shaffer, Vered; Sherbini, Sami; Smith, Arthur; Struckmeyer, Richard; Sullivan, Randy; Oxenberg, Tanya; Taylor, Torre; Thaggard, Mark; Virgilio, Rosetta; Waters, Michael; Reed, Wendy; Whaley, Sheena; Williams, Stephen; Yin, Xiaosong; Young, Thomas; Youngblood, Thomas; Zelac, Ronald; Barr, Cynthia; Benton, Laray; Reed, Elizabeth; Bolling, Lloyd; Brandon, Lou; Broadus, Doug; Brock, Kathryn; Brown, David; Camper, Larry; Carrera, Andrew; Chapman, Gregory; Clements, John; Clemons-Webb, Candace; Cockerham, Ashley; Compton, Keith; Cook, John; Cool, Donald; Damon, Dennis; DeCicco, Joseph; Dehmel, Jean-Claude; Dickson, Elijah; Dimmick, Lisa; Flannery, Cindy; Foster, Jack; Gambone, Kimberly; Goldfeiz, Eliezer; Gray, Anita; Hall, Holly; Hayes, John; Hinson, Charles; Howe, Donna-Beth; Hsueh, Kevin; Huffert, Anthony; Kowalczyk, Jeffrey; Jones, Andrea; Jones, Cynthia; Karagiannis, Harriet; Keegan, Elaine; Kock, Andrea; Gibson, Lauren; Lee, Jay; Lewis, Doris; Lohr, Edward; Markley, Anthony; Mattsen, Catherine; Maupin, Cardelia; McCraw, Aaron; McIntosh, Angela; McKenney, Christopher; Mike Boyd; Morell, Gregory; MorganButler, Kimyata; Palmrose, Donald; Persinko, Andrew; Pstrak, David; Purdy, Gary; Quichocho, Jessie; Roach, Edward; Schmidt, Duane; Schneider, Kathleen; Snyder, Amy; Sollenberger, Dennis; Streit, Katherine; Sturz, Fritz; Sun, Casper; Thompson, Elizabeth; Tobin, Jennifer; Tomon, John; Villamar, Glenda; Watson, Bruce; Webb, James; Weber, Michael; White, Duane; White, Duncan; Abogunde, Maryann; Alldredge, Casey; Bermudez, Hector; Bloomer, Tamara; Bonano, Eugenio; Bonser, Brian; Bramnik, Andrew; Cain, Chuck; Campbell, Vivian; Carrico, J Bruce; Carson, Louis; Casey, Colleen; Cassidy, John; Collins, David; Cook, Jackie; Courtemanche, Steven; Diaz, Jose; Dickson, Billy; DNMSIII; Donovan, Larry; Dykes, Carmen; Bonano, Eugenio; Evans, Robert; Everett, Vincent; Foster, Jennifer; Frazier, Cassandra; Furia, Joseph; Gabriel, Sandra; Gaines, Anthony; Gaskins, Farrah; Gattone, Robert; Gepford, Heather; Gersey, Linda; Gibson, Richard; Gloersen, William; Go, Tony; Gordon, Craig; Graves, Chris; Greene, Natasha; Griffis, Jeff; Guerra, Gilbert; Hamilton, Ruben; Hammann, Stephen; Hammond, Michelle; Hanson, Latischa; Hays, Robert; Henson, Jay; Herr, Michael; Jackson, Todd; Katanic, Janine; Kauffman, Laurie; Kulzer, Edward; Kuzo, George; LaFranzo, Michael; Lambert, Kenneth; Lanzisera, Penny; Lawyer, Dennis; Learn, Matthew; Lee, Peter; Lodhi, Sattar; Loo, Wade; Lynn, Henry; Mahlahla, Latonya; McCann, Mike; Mitchell, Mark; Modes, Kathy; Moslak, Thomas; Mulay, Sam; Munoz, Rick; Murnahan, Colleen; Myers, Valerie; Nguyen, Janice; Nicholson, John; Nielsen, Adam; Nimitz, Ronald; Noggle, James; Null, Kevin; Oxenberg, Tanya; Parker, Bryan; Patterson, Jan; Pelchat, John; Phalen, Martin; Piskura, Deborah; Poston-Brown, Martha; Powers, Dale; Pursley, William; Ragland, Randolph; Razo, Jason; Reed, Rodican; Reichard, Michael; Reichhold, William; Ricci, John; Ricketson, Larry; Rivera, Jonathan; Roberts, Mark; Rodriguez, Lionel; Roldan, Lizette; Rolph, Ronald; Schlapper, Gerald; Seeley, Shawn; Simmons, Michelle; Simmons, Toye; Slawinski, Wayne; Stearns, Don; Tapp, Jeremy; Taylor, Cynthia; Thomas, MaryLynne; Thompson, James; Thompson, Thomas; Torres, RobertoJ; Tran, Frank; Tripp; Lester; Ullrich, Elizabeth; Warren, Geoffrey; Weidner, Tara; Werner, Greg; White, John; Whitten, Jack; Wiedeman, Darrel; Wilson, Scott
Subject: NCRP Publications and Current Activities Related to the Fukushima Nuclear Reactor Accident
Attachments: Fukushima.pdf

For general interest to the HP group:

Please find attached a Press Release regarding NCRP Publications and Current Activities Related to the Fukushima Nuclear Reactor Accident.

Additionally, NCRP has made its Commentary No. 10, *Advising the Public About Radiation Emergencies* available for free download. The report can be found here:

<http://www.ncrponline.org/Publications/Commentaries/NCRP%20Comm%20No.%2010.pdf>

Fukushima Nuclear Reactor Accident

The National Council on Radiation Protection and Measurements (NCRP) is actively advising U.S. federal and state agencies as they assist the Japanese government in their response to the Fukushima nuclear reactor accident. NCRP is also working closely with members of the media (*i.e.*, television, radio and print) to provide timely and accurate information related to the potential human and environmental health impacts of releases of radionuclides from the damaged reactors and spent fuel pools.

Once the situation in Japan is stabilized, the focus will shift to late-phase recovery and site restoration. In 2010, NCRP formed a scientific committee to define the process and procedures to be used in optimizing recovery and restoration following a radiological or nuclear incident. This effort is being funded by the U.S. Department of Homeland Security with an emphasis on incidents involving radiological dispersal devices and improvised nuclear devices.

The next meeting of the NCRP Committee on April 11-12, 2011 has been expanded to include a discussion of the Fukushima nuclear reactor accident. Members of the Committee are actively monitoring the situation and assembling relevant information to be discussed at the meeting. The lessons learned section of the report will include this accident.

NCRP has published a number of important reports that provide guidance at each phase of a nuclear or radiological accident.

Human Health

- Report No. 161, Management of Persons Contaminated with Radionuclides
- Report No. 159, Risk to the Thyroid from Ionizing Radiation
- Report No. 116, Limitation of Exposure to Ionizing Radiation

Environmental Health

- Report No. 154, Cesium-137 in the Environment: Radioecology and Approaches to Assessment and Management
- Report No. 109, Effects of Ionizing Radiation on Aquatic Organisms
- Report No. 52, Cesium from the Environment to Man: Metabolism and Dose

Emergency Response

- Commentary No. 19, Key Elements of Preparing Emergency Responders for Nuclear and Radiological Terrorism

Immediately following the Fukushima nuclear reactor accident, NCRP made Commentary No. 10, Advising the Public About Radiation Emergencies, available for free download from its website (<http://NCRPonline.org>).

All NCRP reports and commentaries are available from the NCRP website, <http://NCRPpublications.org>. For additional information contact David A. Schauer, ScD, CHP at schauer@NCRPonline.org, 301.657.2652 (x20) or 301.907.8768 (fax).

Hornseth, Geoffrey

From: Einziger, Robert
Sent: Monday, March 28, 2011 9:17 AM
To: Pstrak, David; Day, Neil; DePaula, Sara; Einziger, Robert; Gordon, Matthew; Hornseth, Geoffrey; Plotter, Jason; Raynaud, Patrick; Tang, David; Tarantino, David; Tripathi, Bhasker; Vera, John
Subject: FW: ANS Technical Brief: MOX Fuel & Fukushima
Attachments: ANS-Technical-Brief-MOX-Fukushima.pdf

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

From: ANS Broadcasts [<mailto:broadcasts@ans.org>]
Sent: Saturday, March 26, 2011 3:18 AM
To: Einziger, Robert
Subject: ANS Technical Brief: MOX Fuel & Fukushima

The ANS Special Committee on Nuclear Non-Proliferation has prepared the attached Technical Brief on The Impact of Mixed Oxide Fuel Use on Accident Consequences at Fukushima Daiichi.

For additional Fukushima resources, visit the "Featured Content" box on the front page of the American Nuclear Society's website:

<http://www.ans.org/>



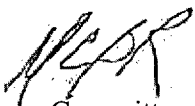
AMERICAN NUCLEAR SOCIETY

555 North Kensington Avenue
La Grange Park, Illinois
60526-5592 USA

Tel: 708 / 352-6611
E-Mail: NUCLEUS@ans.org
<http://www.ans.org>
Fax: 708 / 352-0499

Date: March 25, 2011

To: Joe Colvin
ANS President

From: Michael (Mikey) Brady Raap 
Chair, ANS Professional Divisions Committee

Below please find the Technical Brief on The Impact of Mixed Oxide Fuel Use on Accident Consequences at Fukushima Daiichi. This Technical Brief contains factual information prepared by the ANS Special Committee on Nuclear Non-Proliferation.

The Impact of Mixed Oxide Fuel Use on Accident Consequences at Fukushima Daiichi

American Nuclear Society Technical Brief – March 2011

Conclusion

Mixed Oxide (MOX) fuel has been used safely in nuclear power reactors for decades. The presence of a limited number of MOX fuel assemblies at Fukushima Daiichi Unit 3 has not had a significant impact on the ability to cool the reactor or on any radioactive releases from the site due to damage from the earthquake and tsunami.

Summary

At the time of the magnitude 9.0 earthquake, Fukushima Daiichi Unit 3 was operating with 32 mixed oxide (MOX) fuel assemblies and 516 low enriched uranium (LEU) fuel assemblies in its reactor core. In other words, less than 6% of the fuel in the Unit 3 core was MOX fuel. There were no other MOX fuel assemblies (new, in operation or used) at the Fukushima Daiichi plant at the time of the accident.

MOX fuel assemblies were loaded into Fukushima Daiichi Unit 3 for the first time in the fall of 2010. The MOX fuel had been used for less than five months at the time of the accident. Differences in initial fuel composition between MOX and LEU fuel can lead to differences in consequences (prompt fatalities and latent cancers) following a core damage event with releases to the environment.

There are indications that Fukushima Daiichi Unit 3 suffered damage to some of its core. The core damage resulted from a loss of core cooling due to damage to plant systems from the tsunami that followed the earthquake. The damage was not related to the presence of MOX fuel.

There have been no prompt fatalities as a result of radiation exposure from Fukushima Daiichi. Prompt evacuation has minimized radiation exposure to the public, so long-term public health consequences from radiation exposure are expected to be small. Given the small number of MOX fuel assemblies at Fukushima Daiichi Unit 3 at the time of the event, coupled with the short time of irradiation of the MOX fuel, it can be concluded that MOX fuel has had and will have no perceptible impact on any consequences from the event.

Background

It is important to note that while LEU fuel begins its useful life with no plutonium, as it is used in a light water reactor it builds up plutonium as a result of the nuclear reactions in the core. By the end of its useful life an LEU fuel assembly contains about 1% plutonium actually generates more power from plutonium than from uranium. All reactor cores contain plutonium; those cores loaded with some MOX fuel contain more.

Mixed oxide (MOX) fuel is comprised of a blend of uranium oxide and plutonium oxide. MOX fuel is predominantly uranium, with average concentrations of plutonium that range from 3-10%. The presence of plutonium produces modest changes in some physical characteristics of the fuel material such as thermal conductivity. However, MOX fuel and low-enriched uranium (LEU) fuel are fundamentally similar. Moreover, the physical dimensions and structural material of a MOX fuel assembly are essentially identical to that of a LEU fuel assembly. To the naked eye, a MOX fuel assembly and a LEU fuel assembly are identical.

Nuclear power plants have been generating electricity for use by the public since the 1950s, and over those years the industry has compiled an enviable safety record. Today over 400 reactors worldwide generate substantial amounts of emissions-free electricity. Dozens of those reactors currently generate power using a mixture of conventional LEU fuel assemblies and MOX fuel assemblies in their reactor cores. The majority of the fuel loaded into these reactors is LEU (60-70% or more), while the remainder (30-40% or less) is MOX. The use of MOX fuel allows the re-use of plutonium that was recovered during nuclear fuel recycling operations. The fabrication and use of MOX fuel has been carried out safely and efficiently on an industrial scale since the 1970s. Safety authorities in France, Belgium, Germany, Switzerland and Japan have all approved the use of MOX fuel in light water reactors using the same rigorous standards that are applied for the licensing of LEU fuel.

Safety is the cornerstone of nuclear power plant operations. Nuclear power plant operators perform safety analyses to determine how the plants will respond during various “what if” problem scenarios. Some of those scenarios involve extreme conditions coupled with multiple equipment failures that lead to estimates of damage to the fuel in the reactor core. Scenarios with significant damage to the reactor core are referred to as severe accidents, and such accidents can result in the calculated release of radionuclides to the environment. Severe accident consequences are the adverse public health effects – fatalities and latent cancers – that arise from the offsite release of radionuclides from a damaged reactor core.

When uranium or plutonium atoms split (fission), they release a relatively large amount of energy which is converted into heat and eventually electricity. The smaller atoms left behind after fission are referred to as fission products. In addition, some of the uranium and plutonium atoms in nuclear fuel assemblies absorb neutrons without fissioning, becoming even heavier atoms called actinides. Both fission products and actinides are radioactive, posing a health hazard if they are released to the environment. Using MOX fuel alters somewhat the “source term,” or mix of radionuclides in the core and available for release following a severe accident. The different source term between MOX fuel and LEU fuel leads to different calculated consequences following a postulated severe accident.

In November 1999 the Department of Energy published the Surplus Plutonium Disposition Environmental Impact Statement which documented, among other things, the consequences of four severe accident scenarios at three different reactors using some MOX fuel derived from weapons grade plutonium. Each reactor accident sequence was analyzed with two different reactor core assumptions: a reference case with all LEU fuel, and a second case with a mixed core of approximately 40% MOX fuel and the remainder LEU fuel. For each case the severe accident was assumed to progress in the same manner. Relative to the reference case with all LEU fuel, the offsite consequences to the public with the mixed MOX-LEU core ranged from 4% lower to 22% higher, depending on the reactor studied and the accident sequence. Most cases resulted in consequence increases of 10% or less. The differences between the consequences relate back to differences in the source term. The mixed MOX-LEU core consequences were generally higher because of the presence of more radioactive actinides in the MOX fuel at the time of the postulated accident. However, the differences were modest compared to the uncertainty associated with the consequence calculations for these extremely low probability events.

The type of plutonium used in MOX fuel can also impact severe accident consequences. The aforementioned analysis assumed weapons grade plutonium. If the calculations had been done for MOX fuel containing plutonium from recycled commercial nuclear fuel, as is the practice in Europe and Asia today, the difference between the all uranium cases and the 40% MOX fuel consequences would have been greater than cited above. This is again due primarily to the presence of more radioactive actinides in used “reactor grade” MOX fuel (with plutonium from recycled reactor fuel) than in used weapons grade MOX fuel (with plutonium from retired nuclear weapons).

Turning to the Fukushima Daiichi reactors in Japan, Unit 3 was using some reactor grade MOX fuel at the time of the March 2011 earthquake. Had it been using a 40% MOX fuel core, one could expect an increase in severe accident consequences on the order of 10% for weapons grade MOX. With a 40% reactor grade MOX core, and applying a bounding factor of four increase relative to weapons grade MOX, the overall increase in severe accident consequences would have been on the order of 40% relative to the all LEU fuel case. However, Unit 3 was loaded with only 32 MOX fuel assemblies during refueling operations in the fall of 2010. There are a total of 548 fuel assemblies in the Unit 3 reactor core, so this represents less than 6% of the total fuel in the core. The MOX fuel had been operating in Unit 3 for less than five months; fuel assemblies are typically used for a total of 3-4 years in reactor cores before being replaced by new fuel and discharged to used fuel pools. Therefore, the MOX fuel would have built up relatively few radioactive fission products and actinides at the time of the earthquake and subsequent damage to the reactor core. With these facts in mind – the low percentage of MOX fuel in the core and the short operation time for the MOX fuel – it is evident that the presence of MOX fuel at Fukushima Daiichi Unit 3 has had no significant impact on the offsite releases of radioactivity following the earthquake and tsunami.

Other than the 32 MOX fuel assemblies in the Unit 3 reactor core, at the time of the earthquake there were no other MOX fuel assemblies (new or used) at the Fukushima Daiichi plant. The problems encountered at Fukushima Daiichi reactors stem from plant damage due to the tsunami that followed the earthquake, not the use of MOX fuel in Unit 3.

It is also important to put the public health consequences from the event in perspective. There have been no prompt fatalities as a result of radiation exposure. Moreover, prompt evacuation has minimized the exposure of the population to radiation. At this point, the consequences of the event are expected to be small. MOX fuel effects, if any, would be a small change to an already small number.

In conclusion, MOX fuel has been used safely in nuclear power reactors for decades. The presence of a limited number of MOX fuel assemblies at Fukushima Daiichi Unit 3 has not had a significant impact on the ability to cool the reactor or on any radioactive releases from the site due to damage from the earthquake and tsunami.

From: Nuclear Plant Journal [anu@goinfo.com]
Sent: Tuesday, March 29, 2011 5:07 PM
To: Bajwa, Chris
Subject: NPJ E-News March 29, 2011 Fukushima Update

Having trouble viewing this email? [Click here](#)

Nuclear Plant Journal

An International Publication
Published in the United States

Nuclear Plant Journal E-News

Japan Update
March 29, 2011

Dear CHRIS,

In this issue of NPJ E-News you'll find an update of the Fukushima Nuclear Plants in Japan. Information is current as of March 29, 2011, 15:00 CDT. All items are directly quoted, without any editing.

In this issue

[TEPCO Update](#)

[Status Document](#)

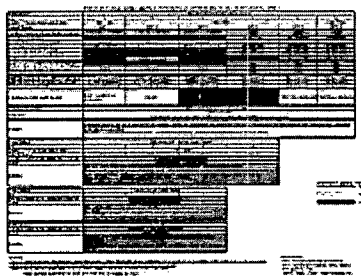
[US NRC FAQs](#)

TEPCO Update

From the [TEPCO website](#):

- From 2:17pm to 6:18pm, March 29th, water was injected into Unit 3 from a concrete pumping vehicle. Until March 28th, we had been injecting sea water, however, from March 29th, we started injecting fresh water.
- At Unit 2, seawater had been injected from the fire fighting pump, but at 4:30pm, March 29th, we started injecting fresh water from a temporary motor driven pump instead. The water was injected until 6:25pm, March 29th.

[Click for more...](#)



JAIF Status Update

Update 46, March 29, 2011

A [PDF document](#) provides a simple summary of each of the units at Fukushima nuclear power plants. This is a multi-page document that also provides a

chronology of events and a map that details the status of each of the Japanese nuclear units.

Earthquake Update 36.

US NRC FAQs related to Fukushima earthquake and subsequent events



NRC frequently asked questions related to the March 11, 2011 Japanese Earthquake and Tsunami. Some sample questions:

- Can an earthquake and tsunami as large as happened in Japan also happen here?
- Did the Japanese underestimate the size of the maximum credible earthquake and tsunami that could affect the plants?
- How high was the tsunami at the Fukushima nuclear plants?
- Was the damage to the Japanese nuclear plants mostly from the earthquake or the tsunami?

Quick Links...

- [NPJ Website](#)
- [Cost-free Subscription](#) (to NPJ)
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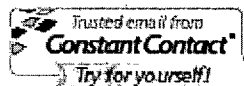
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Release

Marksberry, Don

From: Arndt, Steven *NRR*
Sent: Tuesday, March 29, 2011 9:28 AM
To: Tinkler, Charles; Marksberry, Don; Schaperow, Jason
Subject: FW: Presentation from Japan Nuclear Technology Institute to NRR today
Attachments: 石川先生寄稿（電気新聞 英文）.doc; Accident at Fukushima Daiichi (その1) rev.2 2011.3.24.ppt; Accident at Fukushima Daiichi (その2) rev.2 2011.3.24.ppt

FYI, in case you have not seen these yet.

Steven

From: Hiland, Patrick
Sent: Tuesday, March 29, 2011 9:19 AM
To: NRR_DE Distribution
Subject: FW: Presentation from Japan Nuclear Technology Institute to NRR today

fyi

From: Brown, Frederick *- NRR*
Sent: Friday, March 25, 2011 5:11 PM
To: RST01 Hoc
Cc: Ruland, William; Skeen, David; Hiland, Patrick; Case, Michael; Dudes, Laura; Uhle, Jennifer; Holian, Brian; Hoc, PMT12
Subject: Presentation from Japan Nuclear Technology Institute to NRR today

RST coordinator – please have these files added to the RST chronology for preservation. PMT may be interested in the second power point presentation.

There are some movies that are too large to e-mail, I'll try to figure out how to transfer them (currently on NRR G: drive in folder "Temp").

They note a large U-3 PV/RCS pressure spike on 3/13 and a primary containment pressure spike on 3/14.

They said that U-1 (none of the units) had a concrete roof – our understanding of the rubble on U-1 is apparently incorrect.

They said that TEPCO does not normally use a checkerboard fuel arrangement for the hot fuel in the pool.

U-1 thru 4 EDGs and switch gear located in ocean side of turbine building in rooms below grade. Totally flooded. The Unit 6 EDG that continued to operate is an air cooled unit. They do not know if the Rx Buildings had any actual flooding.

My impression is that they relied on elevation for flood control (no discussion of water-tight boundaries).

The SW pumps were apparently exposed (tsunami was estimated at 14 meters, with a design basis of 10)

U-1 did have an isolation condenser and no RCIC, the other units did have RCIC. Batteries for RCIC lasted 10 hours.

They believe U-4 explosion from H2, and they have a heat-up "plot" for the SFP showing saturation temperature in less than 2 days from loss of power. They also believe that some reflood would have occurred

to refueling gate damage. That said, with this heat-up curve, that water would not have lasted long either. They believe that picture 2-17 shows a flooded pool after the explosion.

They were equivocal on the containment vent path used and the "hardened" nature of the vent. The stack is where the venting should have occurred, but they understand that something does not make sense.

They had B5b-like connections that they used for the temporary fire pump tie-in to the primary systems.

Pulley

Published on Mar.18.2011 : The Denki shinbun(The Electric Daily News)

Dr. Michio Ishikawa
Chief Adviser (Former President & CEO)
Japan Nuclear Technology Institute(JANTI)

Estimation of "Status of reactor cores at Fukushima"

This is my emergency estimation about what could be happening at reactor cores at Fukushima, what could happen next and what actions can be taken, based on the facts and developments at the time of the Three Mile Island nuclear accident.

Please bear in mind that I live in the quake-affected city of Hitachinaka. Three whole days of power blackouts up until March 14 left me incommunicado with the outside world. The only source of information was radio broadcast. I had no idea what was happening in the world until the television came on finally in the evening of March 14. Hence, I am a little short on facts and figures. This article describes a scenario that I have put together based on limited facts. Please excuse me for any minor mistakes.

First of all, the state of reactor cores. Knowledge from the TMI accident indicates that reactor cores behave very differently depending on whether they are under or above the water level. This is a relevant point for Fukushima, so let me go into more detail.

The submerged part of the fuel rods is cooled with water, and can maintain a sound state. There is no argument on this point.

On the other hand, the exposed part of the fuel rods is surrounded by steam, and in a poor condition for heat removal. With the temperature increasing gradually with decay heat, the fuel rods begin reacting with steam at around 900 degrees Celsius, oxidizing claddings. This reaction generates strong heat, causing a localized increase of temperature in the immediate area. At around 1300 degrees Celsius, the reaction becomes more active, and the temperature rise on the claddings becomes unstoppable. The claddings become coated with thin oxide film (zirconium dioxide) on the outside, as well as on the inside due to oxygen removal from fuel pellets (uranium dioxide).

In other words, thin oxide film coats the claddings, made of zircaloy, both inside and out. It should be noted that the oxide film has a higher fusing point than the

cladding material, zircaloy, whose fusing point is approx. 1800 degrees Celsius. When zircaloy melts, it drips down between the films to form a puddle. The oxide films on both sides become fused together and pressed onto fuel pellets with the pressure of the reactor. At this stage, a fuel rod can be likened to fuel pellets wrapped in cling wrap. Oxide film is resilient at high temperature, and seals in radiation even with some disfigurement to the fuel rods, keeping them upright in water. This is why no radiation was released from exposed fuel rods at Fukushima. It was no case of measurement error.

This condition changes at the moment when water is added to the core. Oxide film becomes weaker as the temperature drops, and shrinks when cooled down. Fuel rods disintegrate into individual fuel pellets and collapse (not melting), scattering in the reactor water as if a toy box is tipped over. They can stay scattered in water because the submerged part of fuel rods is still sound. This is what happened at the reactor core in the TMI accident.

Collapsed fuel rods are cooled as long as they are submerged in water, thanks to the cooling effect of water flowing through the debris (communication path). Consequently, fuel pellets stay in the state of debris without melting.

Summing up, the exposed top part of fuel rods generated hydrogen and collapsed, but the debris was kept cool, retaining the pellets' radiation containing effect.

The problem lied with the submerged part of the fuel. Water turns into steam as it cools fuel rods. However, in this case, the flow of steam was blocked with the debris, and could not escape, forming a steam zone immediately below the debris. This created a condition similar to the exposed fuel above water. Under water, heat dissipation performance was substantially worse. Heat from cladding oxidization built up and melted fuel rods, initiating meltdown. However, the meltdown temperature was believed to be around 2300 degrees Celsius, which was the fusing point of the ternary alloy of uranium, zirconium and oxygen, rather than the uranium dioxide's fusing point of 2800 degrees Celsius. This meltdown temperature was not high enough to melt concrete, and therefore could not cause a "China Syndrome" scenario.

Since the underside of the meltdown was touching cooling water, it turned into a hard crust state, much like cast iron. Yet, immediately above that, melted fuel flowed in the side direction, came in contact with the core shroud, made of thin stainless steel, and put holes through it. Fuel that dripped from the holes formed balls measuring 15–20 centimeters in diameter, which were later found at the

bottom of the reactor core.

This is how the core meltdown occurred at TMI. The Fukushima plants are showing similar core behaviors. One of the similarities is the fact that the top 2 meters of fuel rods have become exposed above the reactor water for an extended period of time. Cesium and other fission products were released as a result of fuel rods disintegrating upon the injection of seawater. The formation of hydrogen led to explosions, as has widely been reported. The reactor core at TMI was cooled and stabilized after one week. Fukushima will also be successfully brought under control.

The difference between TMI and Fukushima is the existence of a steam-water separator at the top part of the reactor core, because Fukushima uses the BWR system. This structure serves as resistance to releasing steam from the core to the top part of the pressure vessel. It therefore keeps steam in the core, undermining the injection of seawater. Compared to the example of TMI, BWR has a design that may make it difficult to cool the molten core.

Another difference is the use of channel box in nuclear fuel. This could turn out to be a positive or a negative. Yet, it is not a deciding factor, considering that the core has a similar meltdown behavior. In this article, I assume that the positive offsets the negative.

One more major difference is the fact that TMI's reactor core was stabilized with the use of the primary coolant pump (equivalent to the recirculation pump at Fukushima). With PWR, the primary cooling system is clearly separated and insulated from the turbine system. A turbine condenser, which has a high cooling capacity, would never suffer radiation contamination with the activation of a primary coolant pump. This powerful cooling ability successfully halted the meltdown and stabilized the core.

However, with BWR, simply activating a recirculation pump would do no more than agitating the reactor water unless a condenser is also used. The pump alone does not contribute to lowering the core temperature. However, using the condenser runs the risk of sending highly contaminated reactor cooling water to the turbine building, which has only limited shielding facilities. Whether the authorities can make this decision marks a turning point in the on-going efforts to bring the reactors to stability.

The three functions of nuclear safety are to "shut down", "cool down" and "contain". This also represents the order of importance in these safety actions. At Fukushima, all reactors shut down. The next step is to cool them down. For this

purpose, motor power to send water is needed more than anything else. The installation of temporary power source is the task of utmost urgency.

Let me move on to the issue of hydrogen explosions. Such an explosion also rocked the TMI accident. A massive explosion occurred in the containment vessel some ten hours after the accident started. The amount of hydrogen involved in the explosion, according to the post-accident calculation, was equivalent to the amount generated if about half of the fuel claddings became oxidized. This corresponds to the case at Fukushima Daiichi Unit-1 and Unit-3, where fuel rod exposure was reported to be about 50%. In the case of TMI, there was no damage to the containment vessel. In Fukushima, explosions occurred outside the containment vessels, destroying reactor buildings.

In the TMI accident, approx. 1,000 area residents became exposed to radiation at the rate of up to 100 mrem (1 mSv), and 1 mrem (0.01 mSv) on average. The level of radiation when the ventilation operation was conducted to depressurize the containment vessel, was reported to be approx. 1.2 rem (12 mSv) in the skies above the station site, which is similar to the level recorded at the time of ventilation at Fukushima. The radiation dose recorded in the skies above Fukushima Daiichi Unit-4, is said to be 400 mSv. This is because of the loss of water in the spent fuel storage pool, and is set to decrease once the water level is restored. It is still not impossible to keep radiation leak to a minimum in Fukushima, just as in the case with TMI.

Slightly off the topic, there are some people who call the Fukushima case as another Chernobyl. It is unclear what their arguments are. As far as radiation emergency is concerned, there is no possibility that the Fukushima case could cause contamination of the international scale experienced at Chernobyl. This is because of the absence of a graphite fire, which sent radiation high into the air to reach the jet stream. In addition, the low temperature of cooling water means only the radioactive materials with a low boiling point, such as noble gas and iodine, could be released into the atmosphere. The situation is nothing like what happened at Chernobyl.

This summarizes my estimation of the state of accident at Fukushima Daiichi Nuclear Power Station's Units-1-3. I have nothing but respect for all the personnel who continue to fight the desperate fight to bring the plant under control and alleviate the extent of the emergency under the current condition with all power sources swept away in the Tsunami. It is regrettable that the situation has escalated to explosions and damage of reactor buildings. Another task still

remains to stabilize the reactors. I wish to send my support for those people on the frontline. Situations change in emergencies like this every minute. I am prepared to provide as much cooperation as possible despite my old age.

(wrote on Mar.15.2011)

What happened in the TEPCO Fukushima Daiichi Nuclear Power Station

March 24, 2011

Japan Nuclear Technology Institute



Program

- 0. Opening Remark : 15 min.
- 1. 2011 Tohoku-Pacific Ocean Earthquake and Tsunami : 20 min.
- 2. Current Status of Fukushima Daiichi Nuclear Power Station: 50 min.
- 3. Core Damage Estimation : 20 min.
- 4. Spent Fuel Damage Estimation about Unit-4 SFP : 20 min.
- 5. Radiation Exposure and Monitoring Data : 20 min.
- 6. Discussion : 30 min.



1. 2011 Tohoku-Pacific Ocean Earthquake and Tsunami



2011 Tohoku - Pacific Ocean Earthquake



Asahi Shinbun (14/03/2011)

Magnitude 9.0

Date Friday, March, 11, 2011

Time 02:46 PM at epicenter

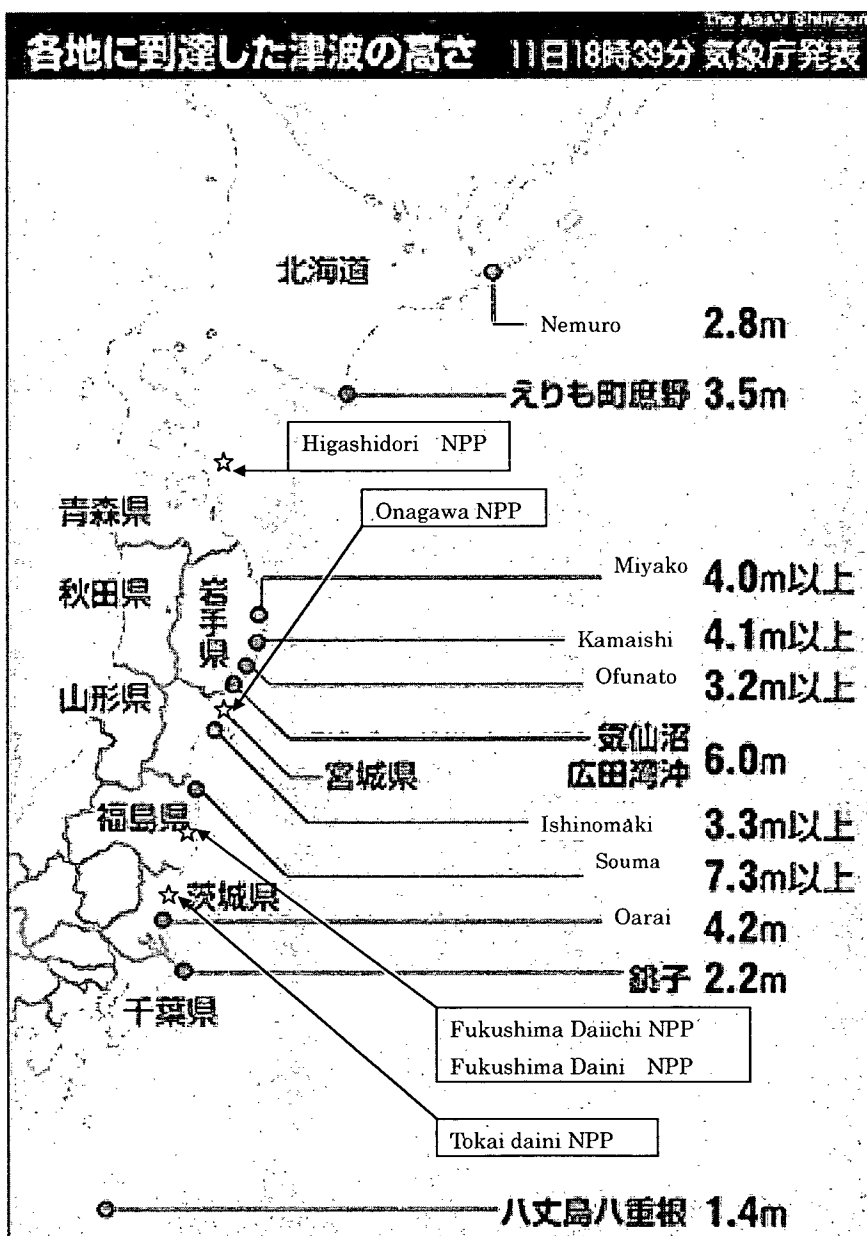
Location 38.3° N, 142.4° E

Depth 24Km

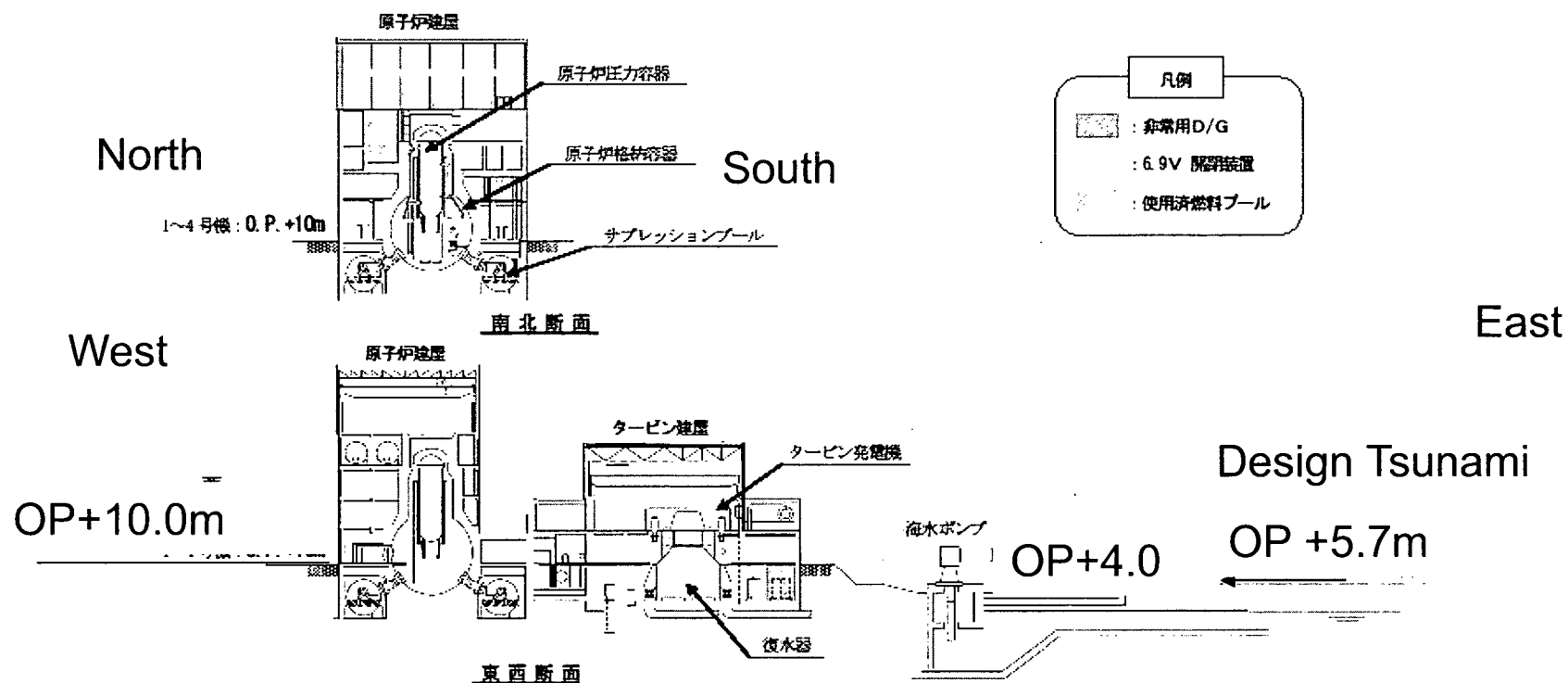
Maximum Intensity 7

(Kurihara City, Miyagi)





Fukushima Daiichi Nuclear Power Plants (schematic drawing)



福島第一原子力発電所 2~4 号機
(※1 号機は非常用D/Gをタービン建屋1 階に設置)

敷地・建屋 概略図



2. Current Status of Fukushima Daiichi Nuclear Power Station

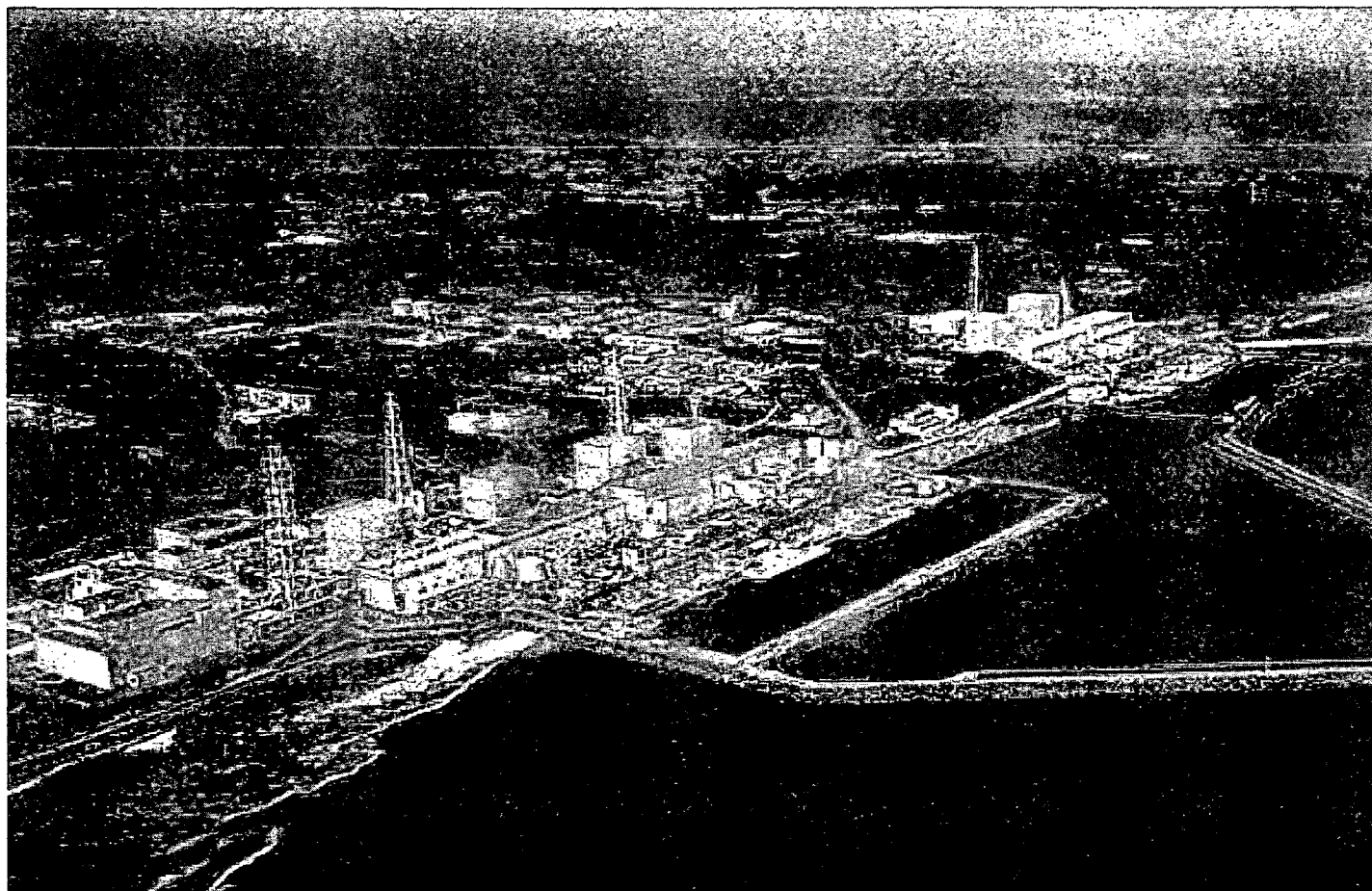


Status of NPPs

| Power Station | Unit | MWe | Condition |
|-------------------|------|-------|---|
| HigashiDori | 1 | 1,100 | Refuel Outage |
| Onagawa | 1 | 524 | Operating→ Scram→ Cold Shutdown |
| | 2 | 825 | Reactor Start→ Scram→ Cold Shutdown |
| | 3 | 825 | Operating→ Scram→ Cold Shutdown |
| Fukushima Daiichi | 1 | 460 | <i>Operating→ Scram→ Damaged</i> |
| | 2 | 784 | <i>Operating→ Scram→ Damaged</i> |
| | 3 | 784 | <i>Operating→ Scram→ Damaged</i> |
| | 4 | 784 | Refuel Outage → <i>Spent Fuel Damaged</i> |
| | 5 | 784 | Refuel Outage → Cold Shutdown |
| | 6 | 1,100 | Refuel Outage → Cold Shutdown |
| Fukushima Daini | 1 | 1,100 | Operating→ Scram→ Cold Shutdown |
| | 2 | 1,100 | Operating→ Scram→ Cold Shutdown |
| | 3 | 1,100 | Operating→ Scram→ Cold Shutdown |
| | 4 | 1,100 | Operating→ Scram→ Cold Shutdown |
| Tokai Daini | — | 1,100 | Operating→ Scram→ Cold Shutdown |



Overview of Fukushima Daiichi Nuclear Power Station



Summary of Fukushima Daiichi NPPs

| Unit | 1 | 2 | 3 | 4 | 5 | 6 |
|--|-----------------|-----------------|-----------------|---------------------|---------------------|---------------------|
| Type | BWR-3 | BWR-4 | BWR-4 | BWR-4 | BWR-4 | BWR-5 |
| PCV Model | Mark-1 | Mark-1 | Mark-1 | Mark-1 | Mark-1 | Mark-2 |
| Electric Output (MWe) | 460 | 784 | 784 | 784 | 784 | 1100 |
| Commercial Operation | Mar. 1971 | Jul. 1974 | Mar. 1976 | Oct. 1978 | Apr. 1978 | Oct. 1979 |
| Emergency DG | 2 | 2 | 2 | 2 | 2 | 3 |
| Electric Grid | 275kV × 4 | | | | 500kV × 2 | |
| Plant Status on 11 th Mar. | In Operation | In Operation | In Operation | Refueling Outage | Refueling Outage | Refueling Outage |



Fukushima Daiichi Unit-1 (BWR-3, Mark-1, 460Mwe, in Operation)

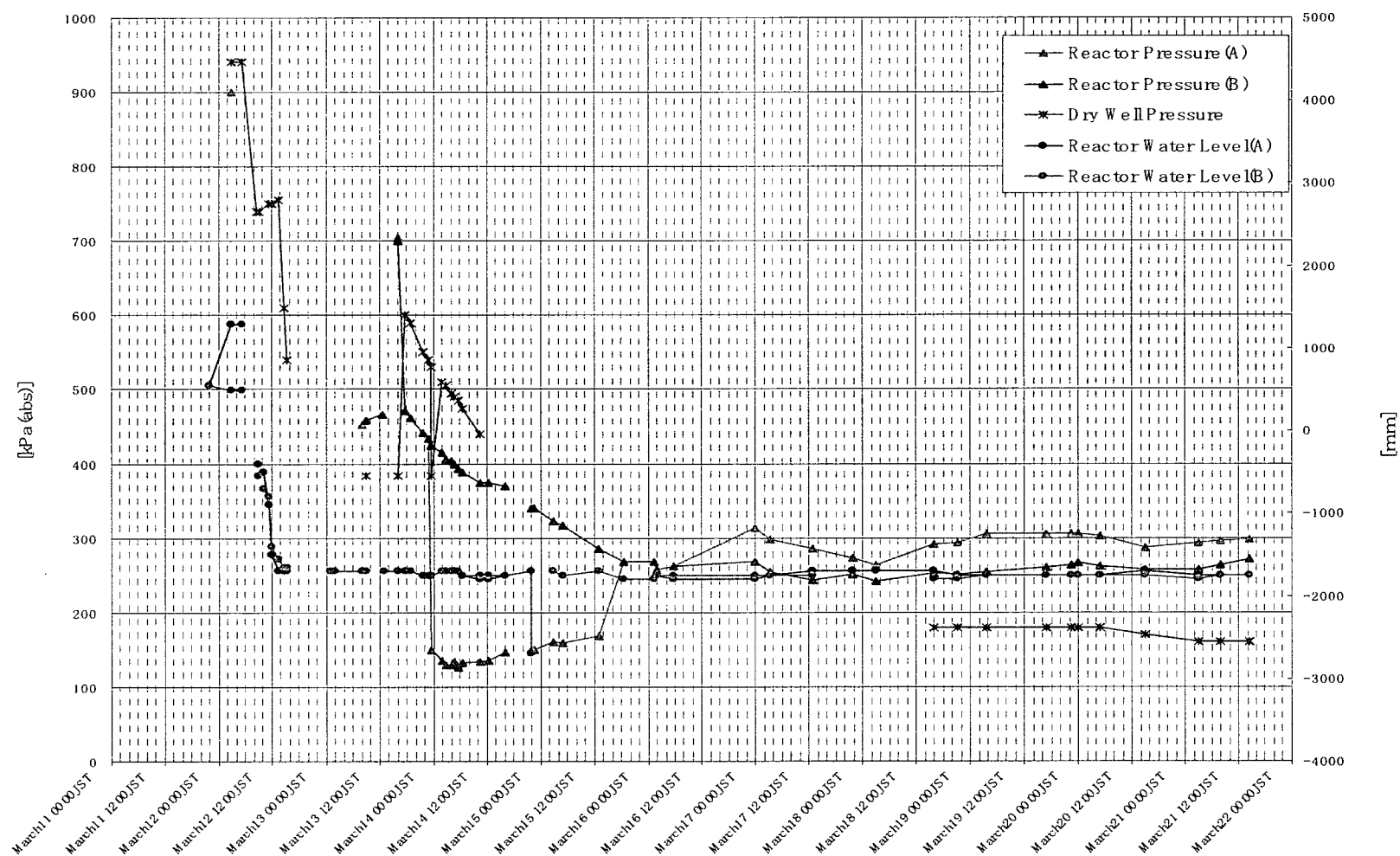
- March 11 • Automatic scram due to the Earthquake
- Loss of offsite power
 - **2 Emergency DGs became inoperable by Tsunami**
 - Rx Core was being cooled by Isolation Condenser
 - Rx water level down
- March 12 • PCV vent
- **A hydrogen explosion** occurred at Rx Building
 - Seawater injection to Rx core was started

[Current Status, as of March 23]

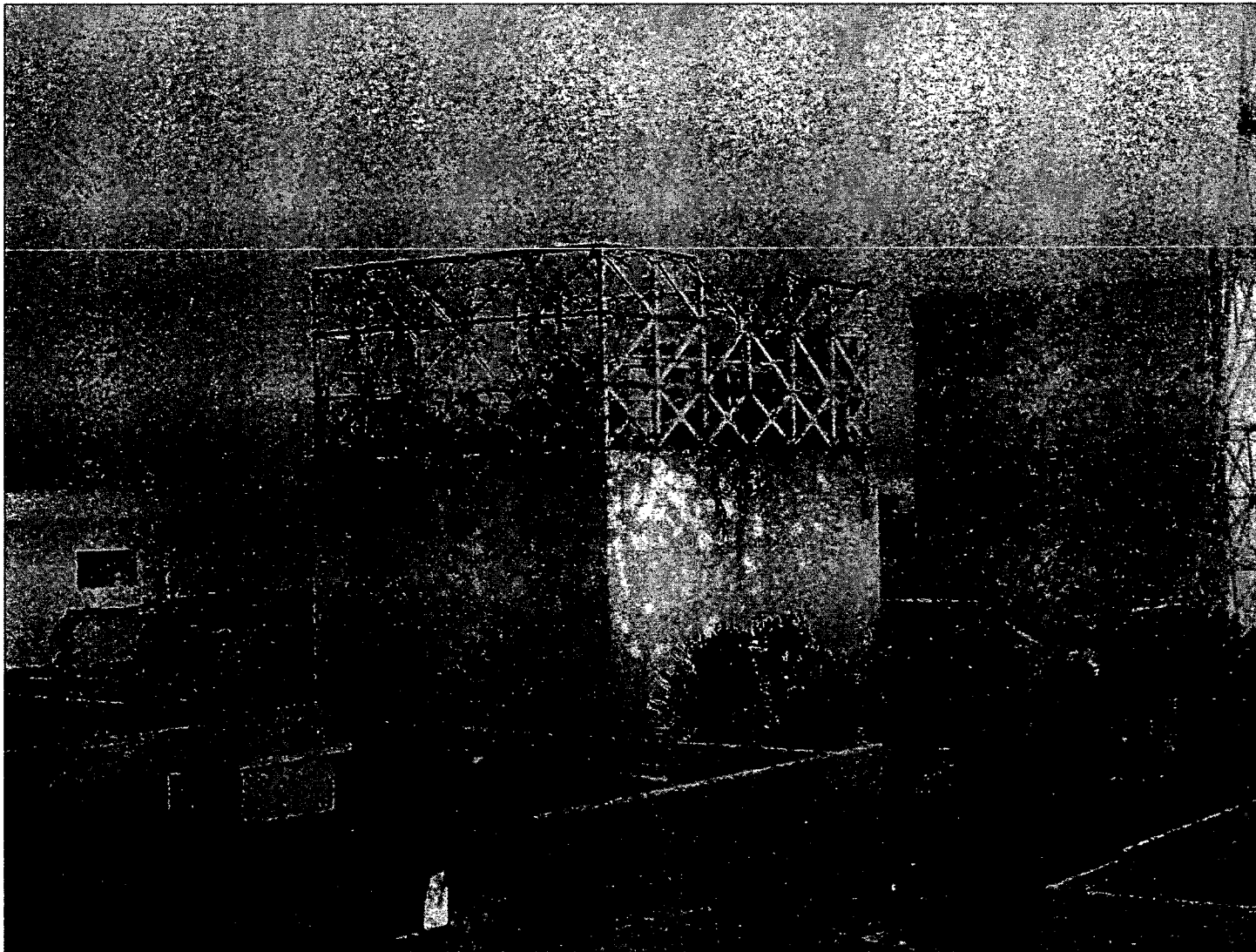
- Rx Water Level : TAF-1,750 mm, -1700 mm
- Rx Pressure : 0.38 MpaG, 0.358 MpaG
- PCV Pressure : 0.36 Mpaabs



Unit-1 Plant Parameters



Rx Building of Unit 1 (March 12)



Fukushima Daiichi Unit-2 (BWR-4, Mark-1, 784Mwe, in Operation)

- March 11 • Automatic scram due to the Earthquake
- Loss of offsite power
 - **2 Emergency DGs became inoperable by Tsunami**
 - Rx Core was being cooled by RCIC
- March 14 • Blowout Panel of Rx Building was opened
- Loss of Rx cooling function
 - Rx water level down
- March 15 • PCV vent
- **A sound of explosion was heard around Supression Chamber**
 - Seawater injection to Rx core
 - White smoke (steam) was first observed
- March 20 • Water spray to Spent Fuel Pool was started



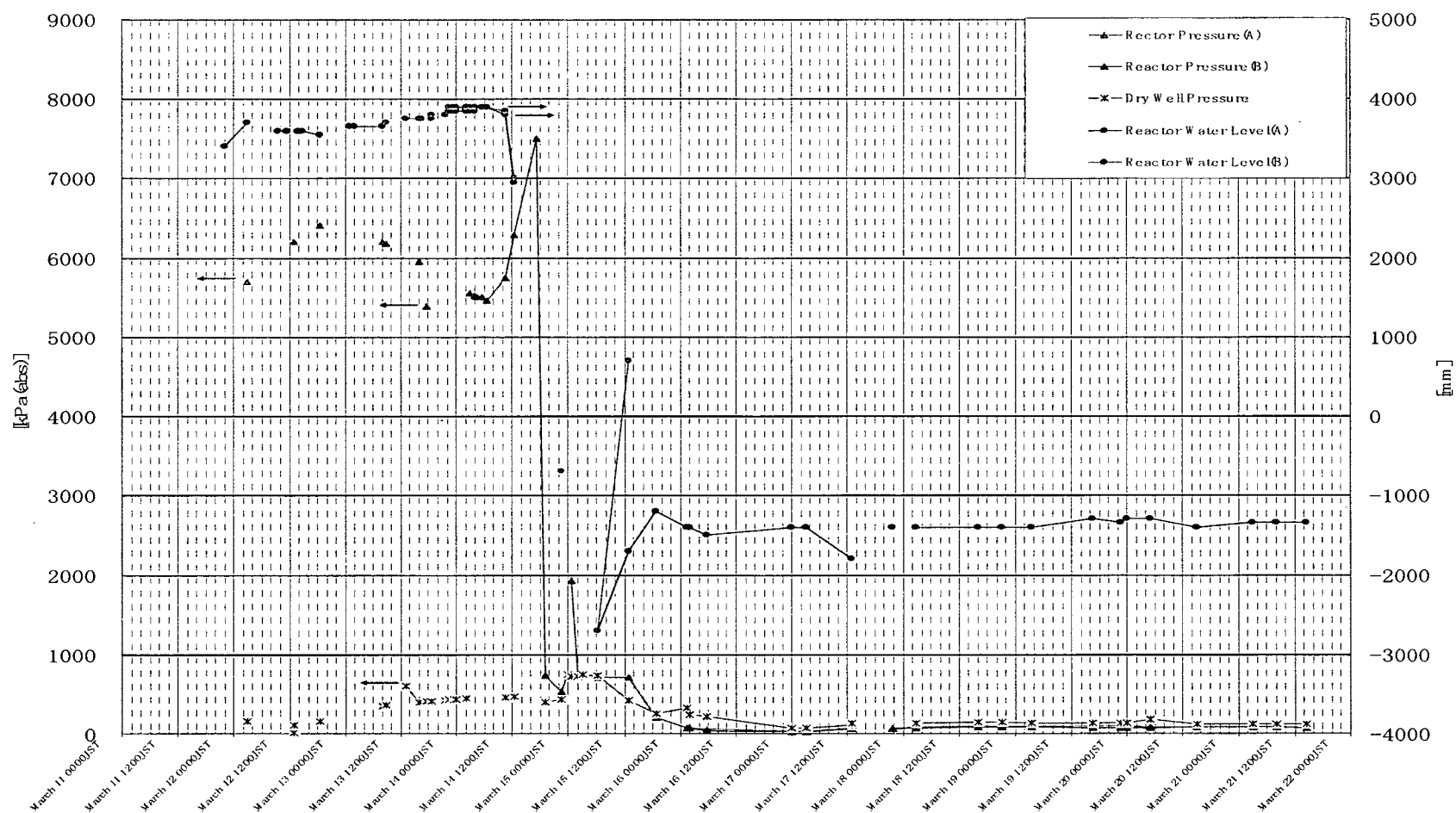
Fukushima Daiichi Unit-2 (BWR-4, Mark-1, 784Mwe, in Operation)

[Current Status, as of March 23]

- Rx Water Level : TAF-1,250 mm
- Rx Pressure : -0.036 MpaG
- PCV Pressure : 0.11 Mpaabs



Unit-2 Plant Parameters



Fukushima Daiichi Unit-3 (BWR-4, Mark-1, 784Mwe, in Operation)

- March 11 • Automatic scram due to the Earthquake
- Loss of offsite power
 - **2 Emergency DGs became inoperable by Tsunami**
 - Rx Core was being cooled by RCIC
- March 13 • Loss of Rx cooling function
- PCV vent
 - Rx water level down
 - Seawater injection was started
- March 14 • PCV pressure rose unusually
- **A hydrogen explosion occurred around Rx Building**
- March 15 • White smoke (steam) was being generated from Rx building
- March 16 • White smoke intensified
- March 17 • Water spray to Spent Fuel Pool was started



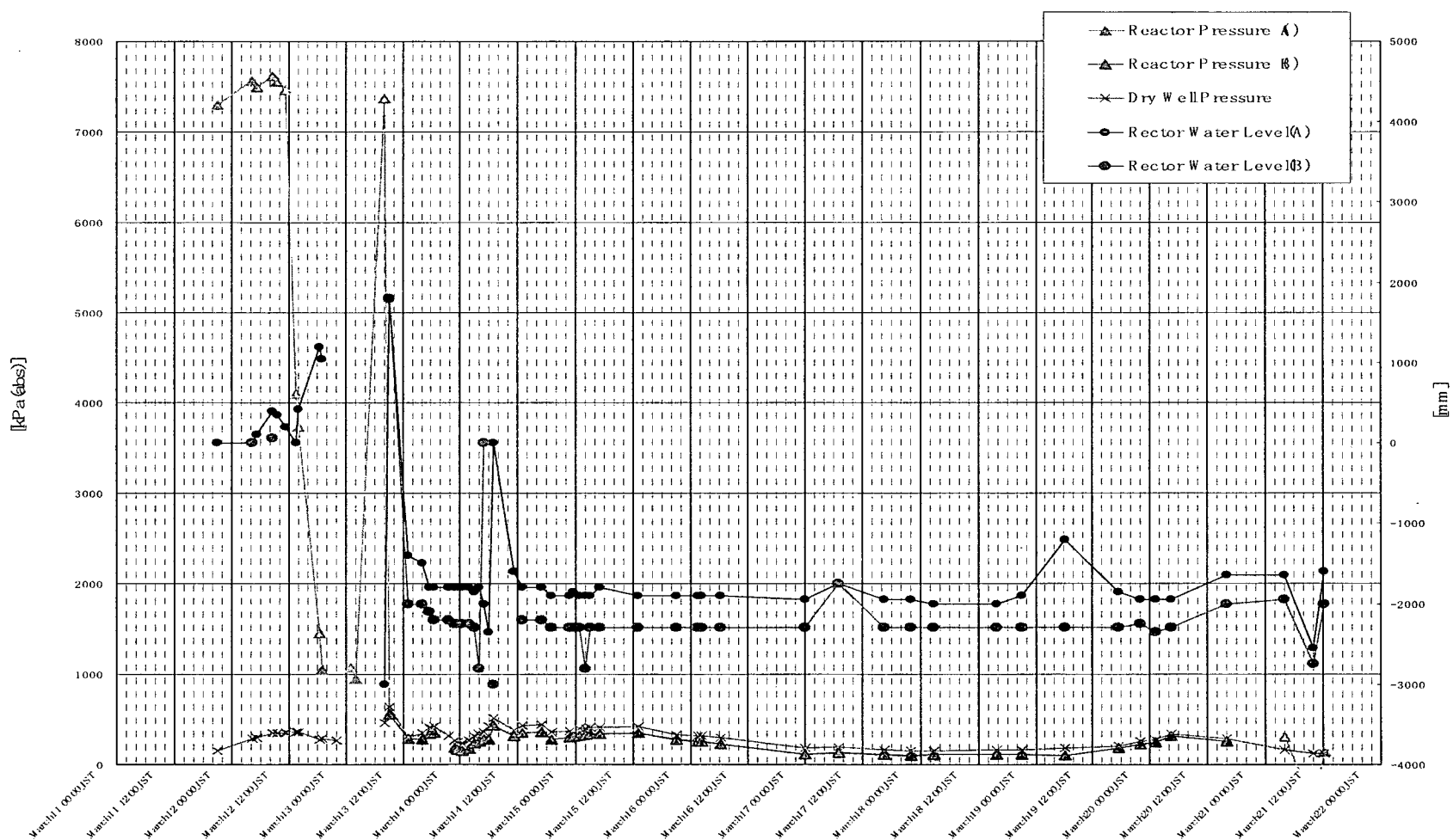
Fukushima Daiichi Unit-3 (BWR-4, Mark-1, 784Mwe, in Operation)

[Current Status, as of March 23]

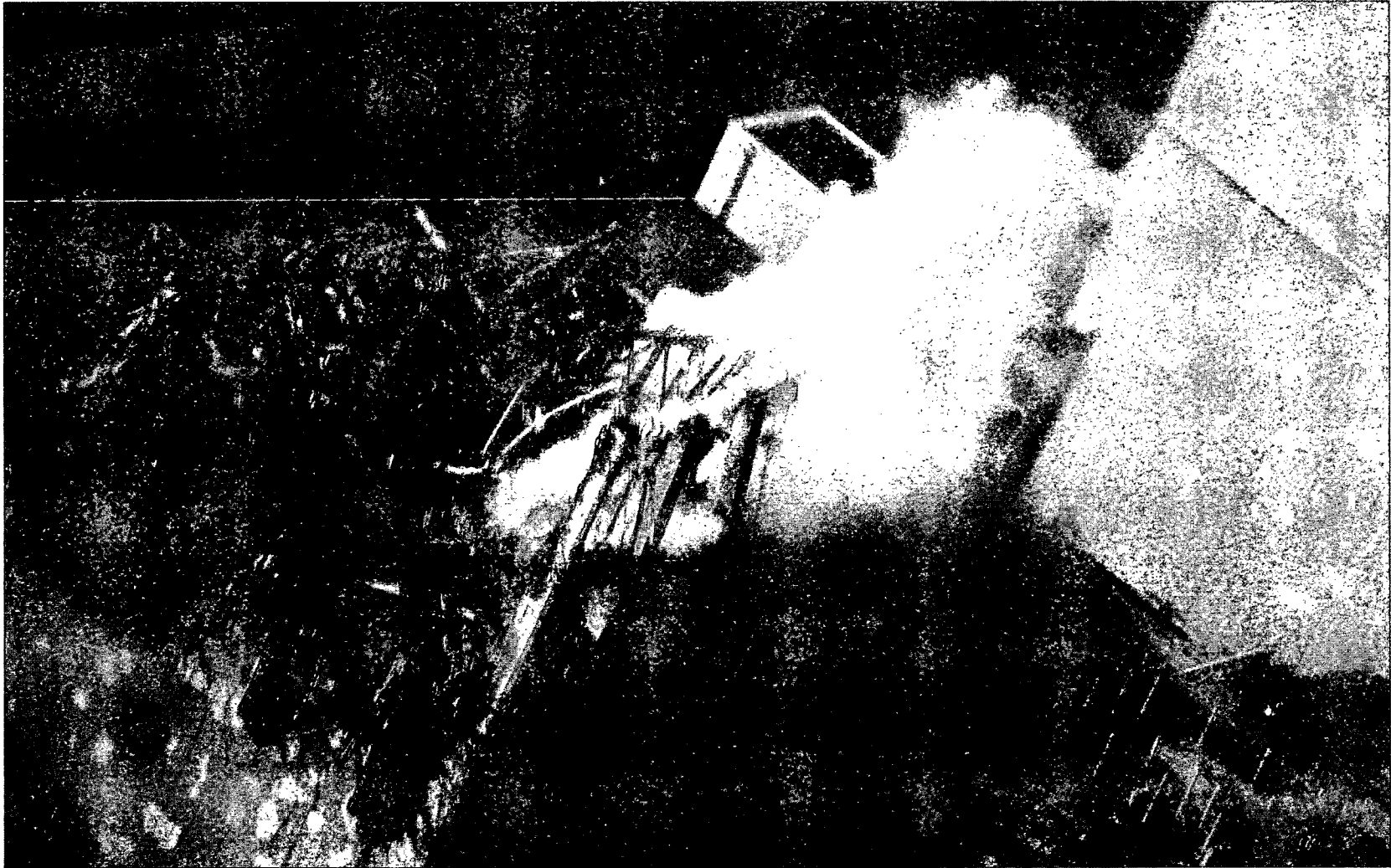
- Rx Water Level : TAF-1,800 mm, -2,300 mm
- Rx Pressure : ~ -0.104 MPaG, 0.034 MPaG
- PCV Pressure : ~ 0.100 MPaabs



Unit-3 Plant Parameters



Rx Building of Unit 3 (March 16)



Fukushima Daiichi Unit-4
(BWR-4, Mark-1, 784Mwe, in periodic refueling outage)

* All Fuels in Core were transferred in Spent Fuel Storage Pool

March 15 • Rx building was damaged
• Fire outbreak

March 16 • Fire outbreak

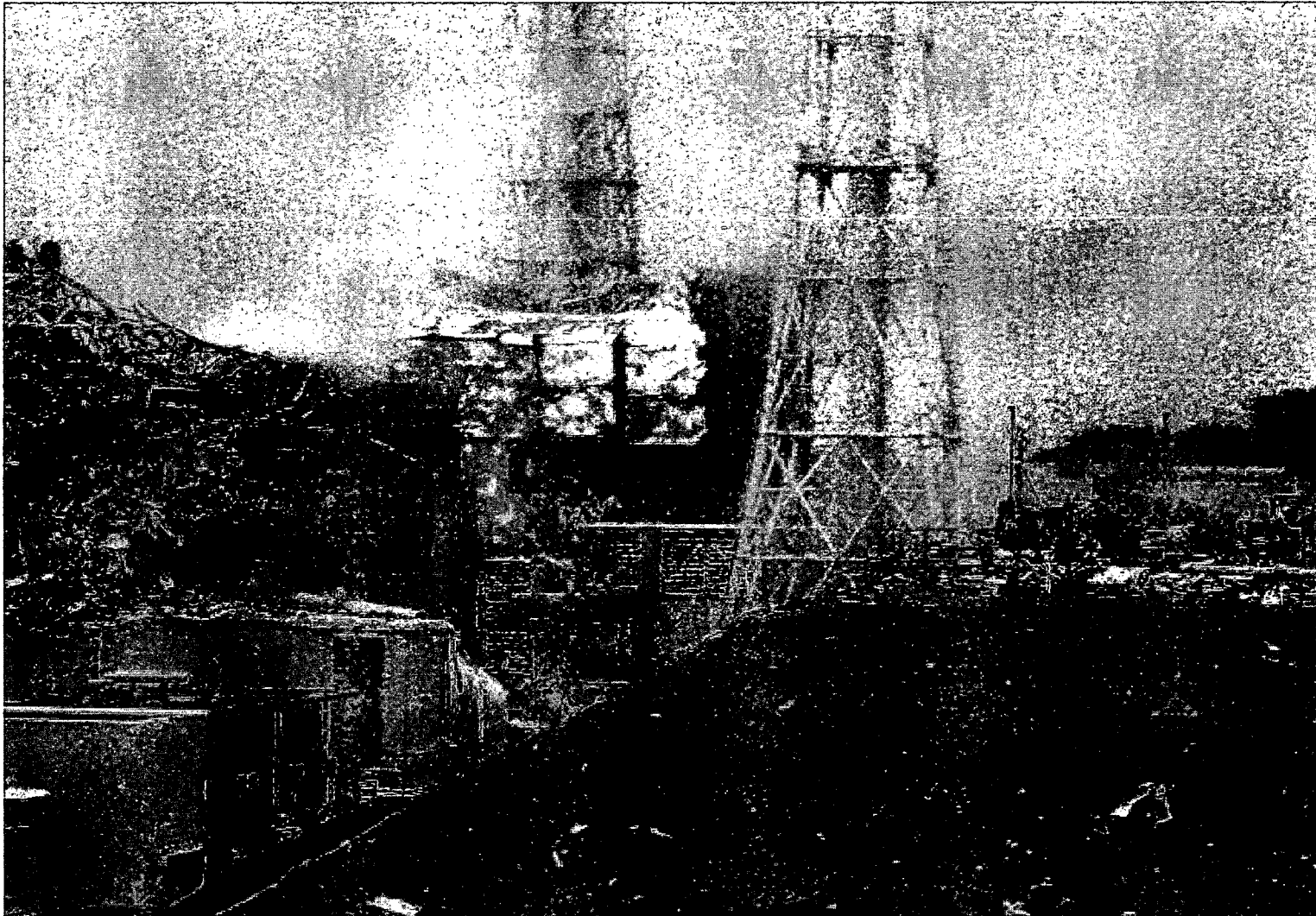
March 20 • Water spray to Spent Fuel Pool was started

[Current Status]

• Water spray to Spent Fuel Pool is being continued



Rx Building of Unit 3 & Unit 4



Rx Building of Unit 4 (March 16)



Spent Fuel Pool of Unit 4 (March 16)



Fukushima Daiichi Unit-5

(BWR-4, Mark-1, 784Mwe, in periodic refueling outage)

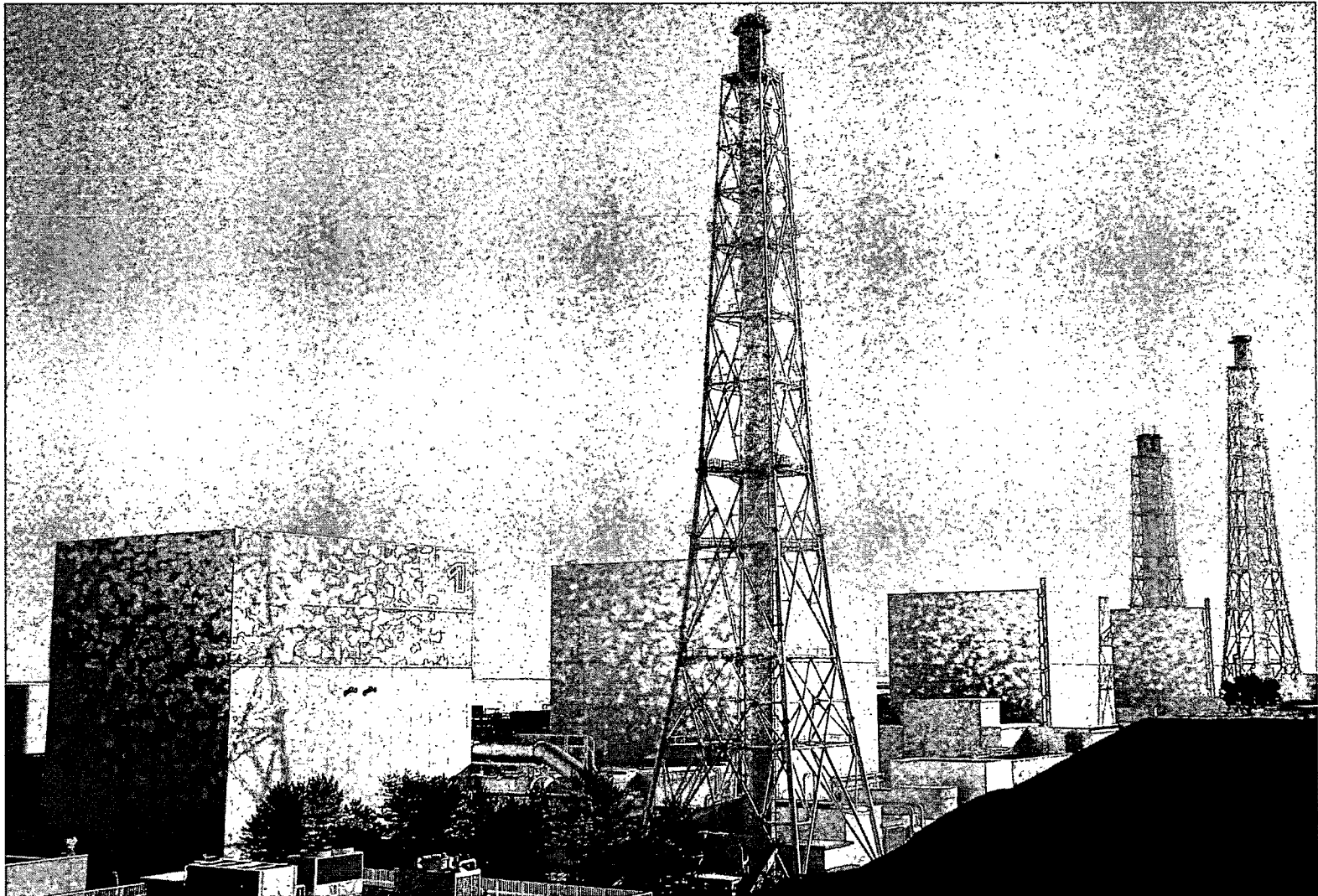
Fukushima Daiichi Unit-6

(BWR-5, Mark-2, 11,00Mwe, in periodic refueling outage)

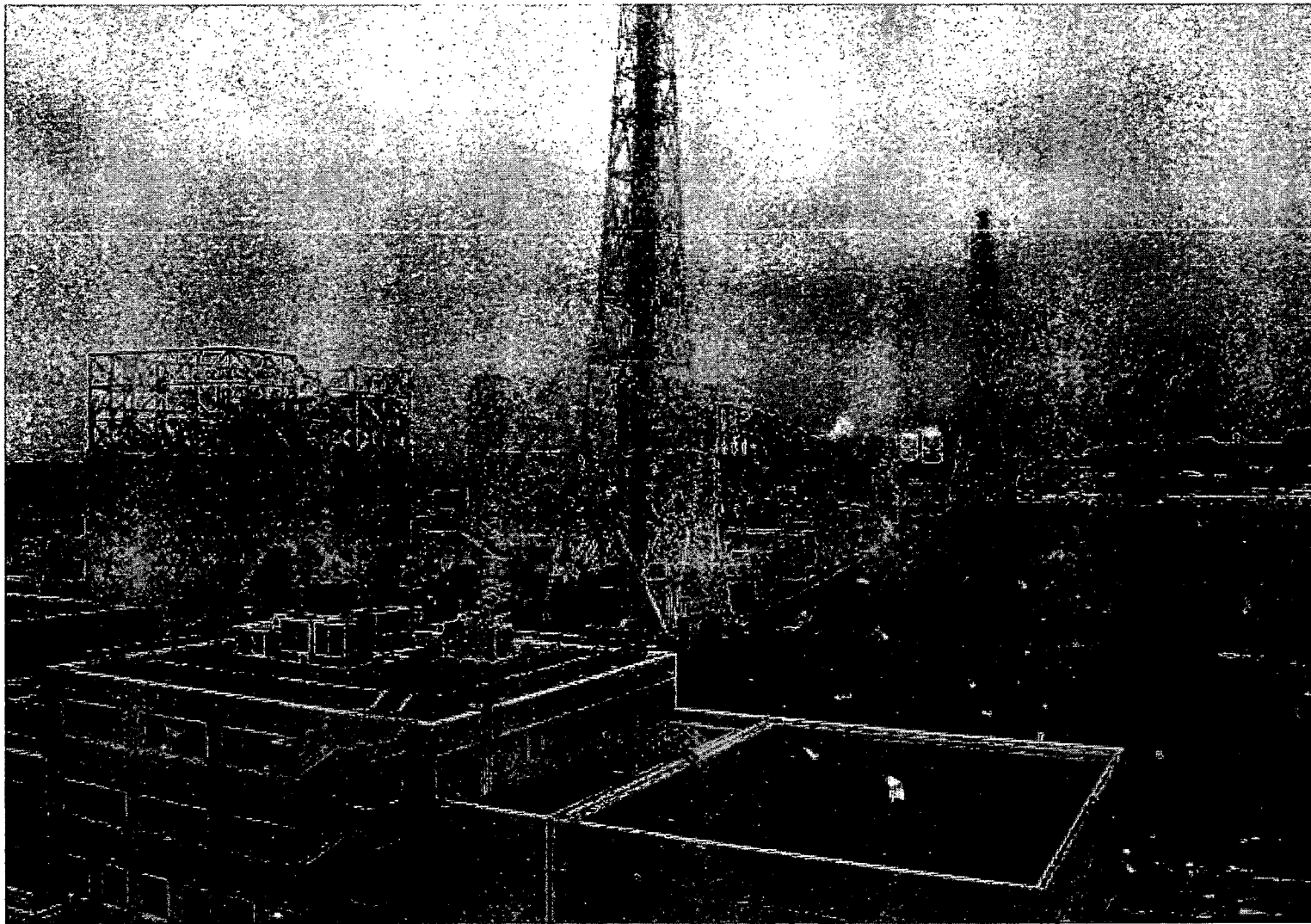
- March 11 • 1 Emergency DG for Unit 6 is operable
- March 19 • 2nd Emergency DG for Unit 6 started operation
 - 1 RHR Pump for Unit 5 started operation
 - 1 RHR Pump for Unit 6 started operation
- March 20 • Unit 5 Cold Shutdown
 - Unit 6 Cold Shutdown



Overview of Unit 1~4 (Before Accident)



Overview of Unit 1～Unit 4 (After Accident)



Video



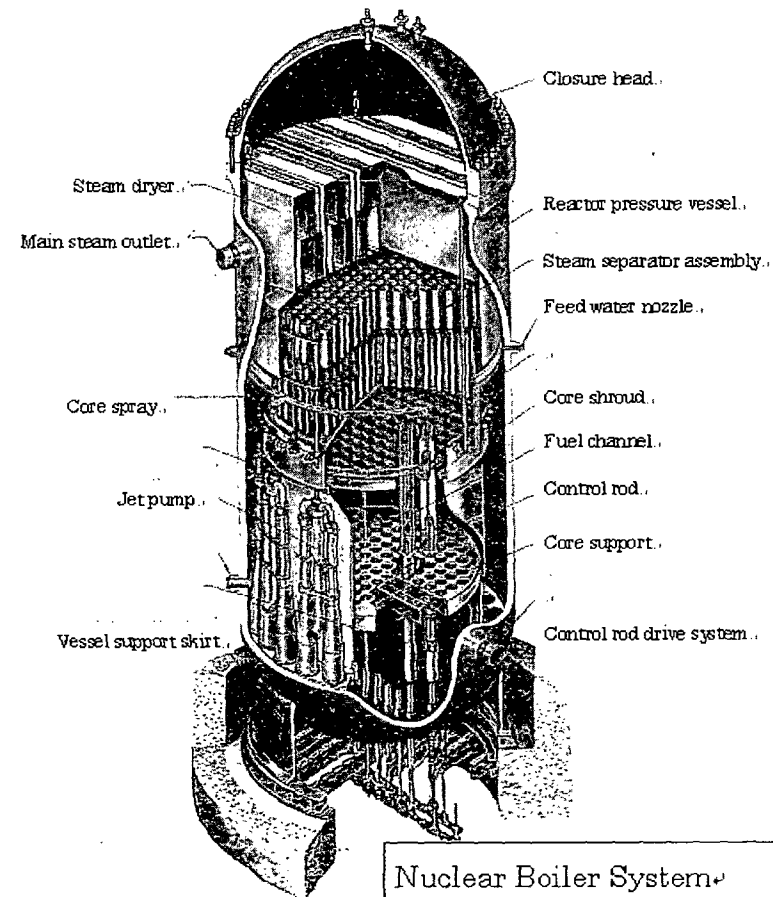
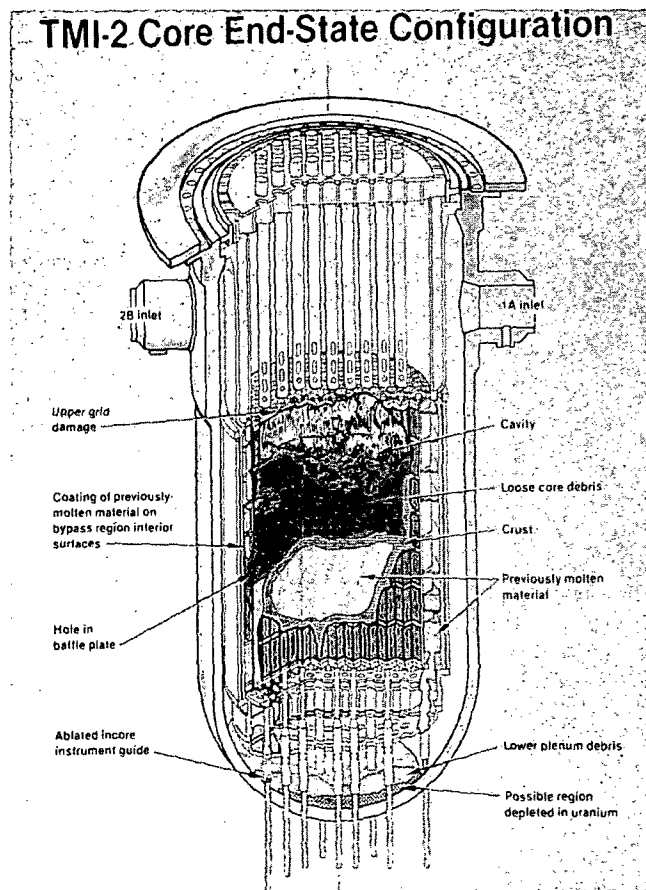
~ Toward the further Nuclear Safety ~

Japan Nuclear Technology Institute



3. Core Damage Estimation

Reactor Core



[Ref.: D.W.Akers, et al : Core Materials Inventory and Behavior : ANS Meeting Full Paper, November 1988]

4. Spent Fuel Damage Estimation about Unit 4 SFP

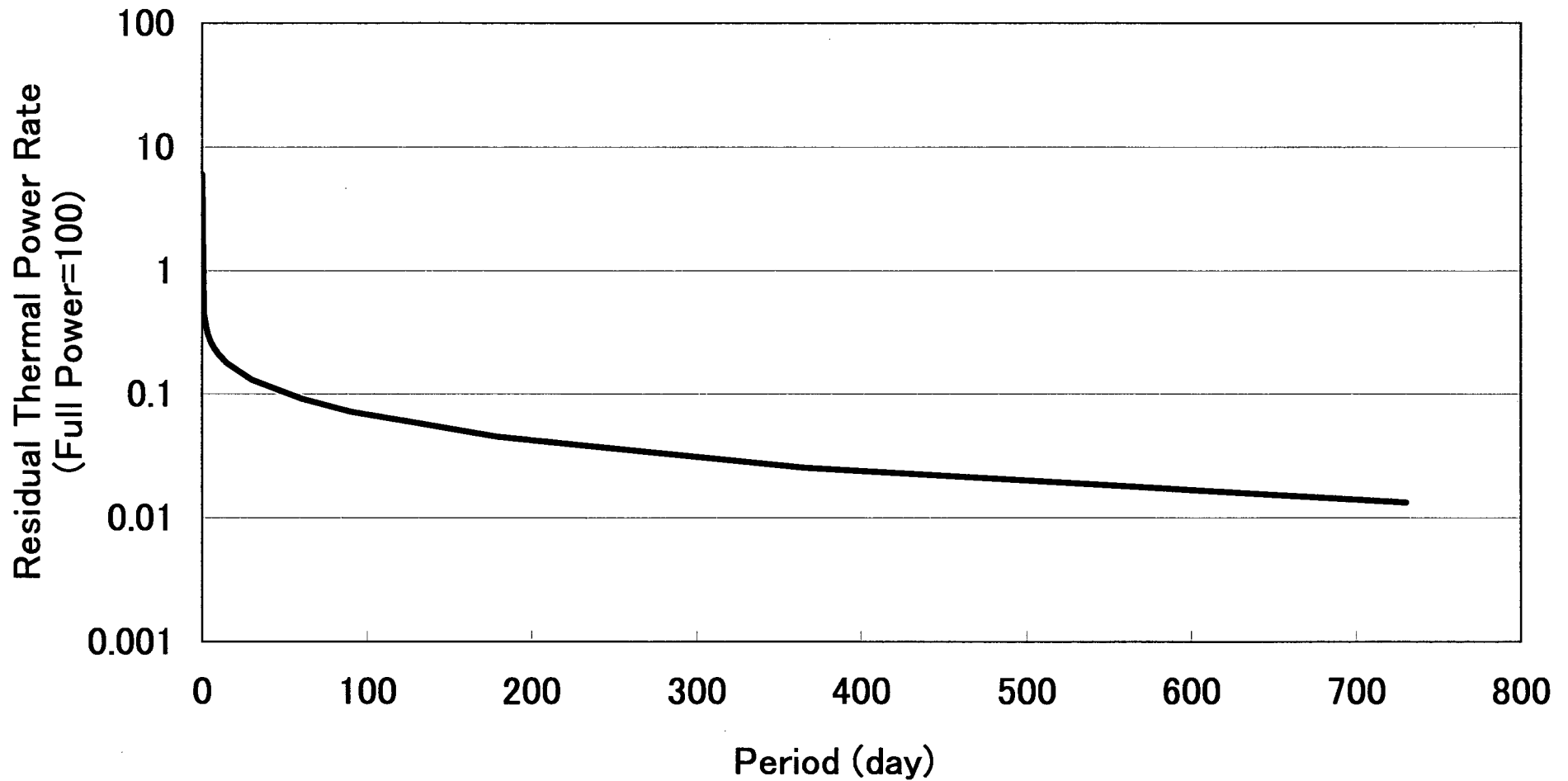
Situation of Spent Fuel Pool

4- 1

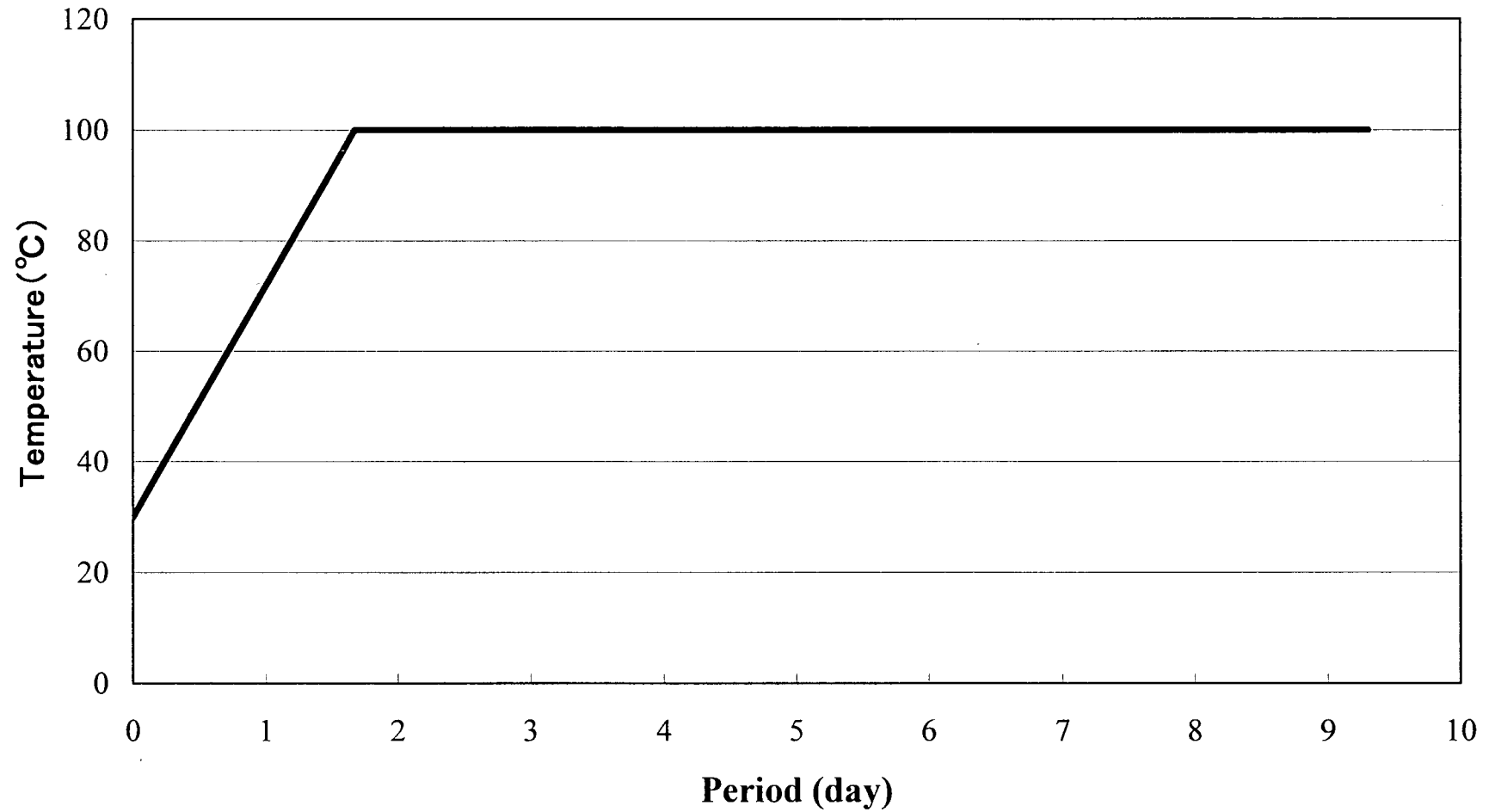
| Unit | 1 | 2 | 3 | 4 | 5 | 6 |
|-----------------------------------|-------|-------|-------|-------|-------|-------|
| Number of Fuel Core SF Pool | 400 | 548 | 548 | - | 548 | 764 |
| | 292 | 587 | 514 | 1,331 | 946 | 876 |
| Thermal Power (kcal) | 6E4 | 4E5 | 2E5 | 2E6 | 7E5 | 6E5 |
| Water Volume (m3) | 1,020 | 1,425 | 1,425 | 1,425 | 1,425 | 1,497 |

[Ref: Asahi Newspaper 2011/3/19]

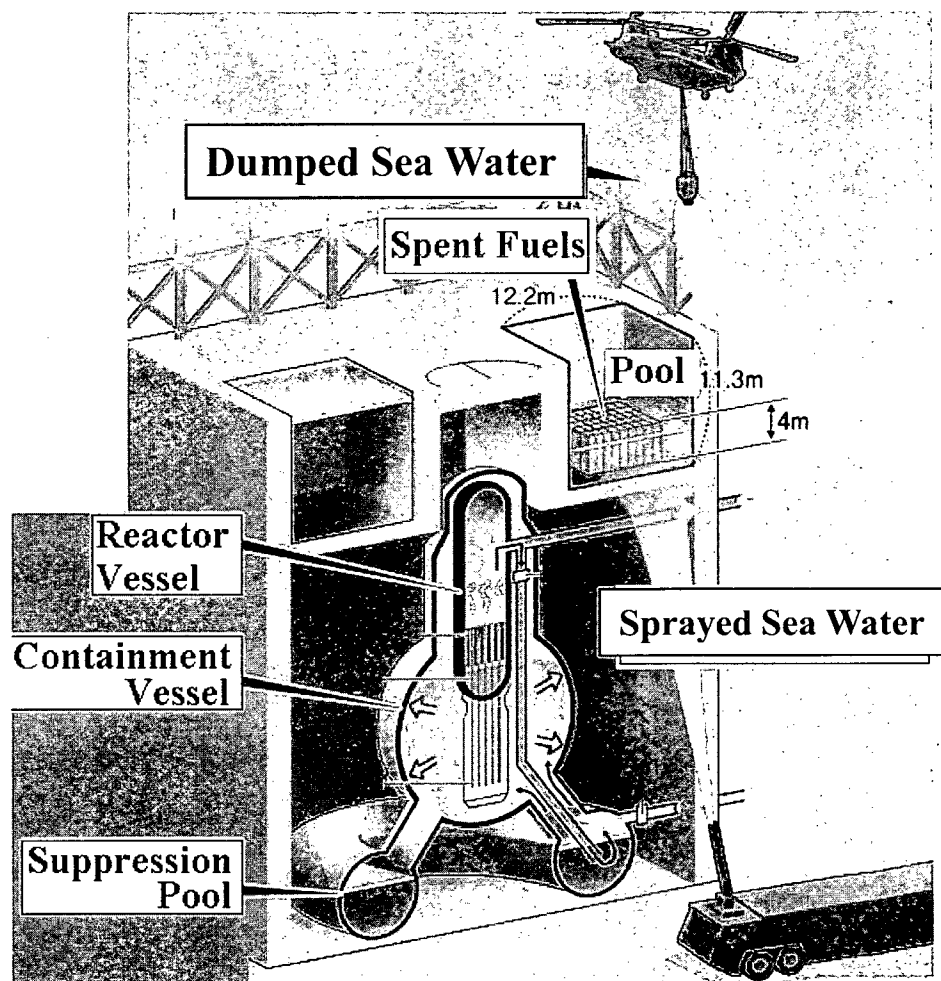
Residual Thermal Power Decrease



Temperature of SP Pool (Unit 4)



Cooling of Spent Fuel Pool



Spray Water on Unit 3.

**17th AM: Dumped Sea Water
from a helicopter (4 times)**

17th PM: Sprayed Sea Water from large-size fire engines

Spray Water on Unit 4.

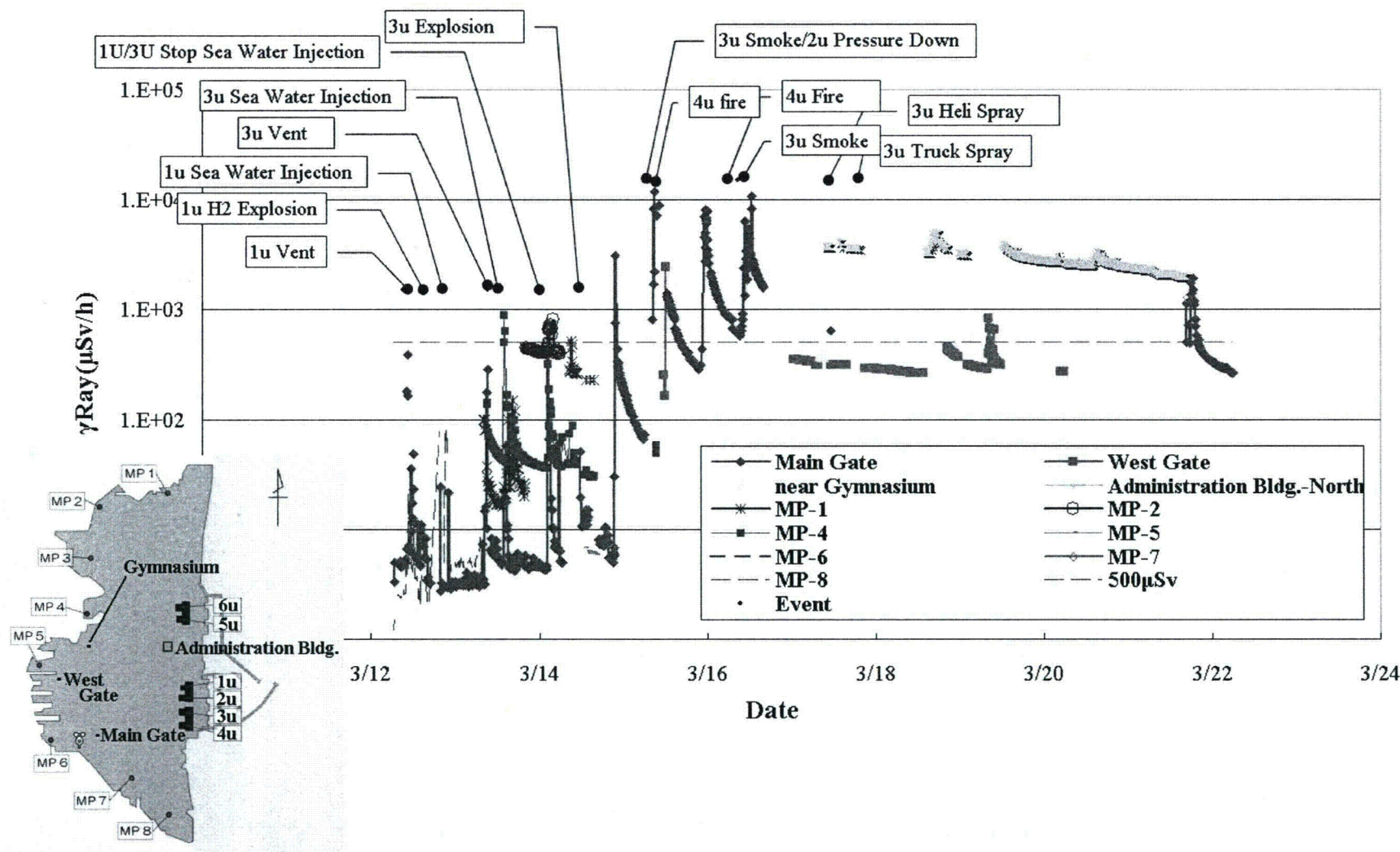
20th AM: Sprayed Sea Water from large-size fire engines

**[Report of Prime Minister of Japan and
his Cabinet 2011/3/20 22:00 P1/32]**

[Ref: Asahi Newspaper 2011/3/18]

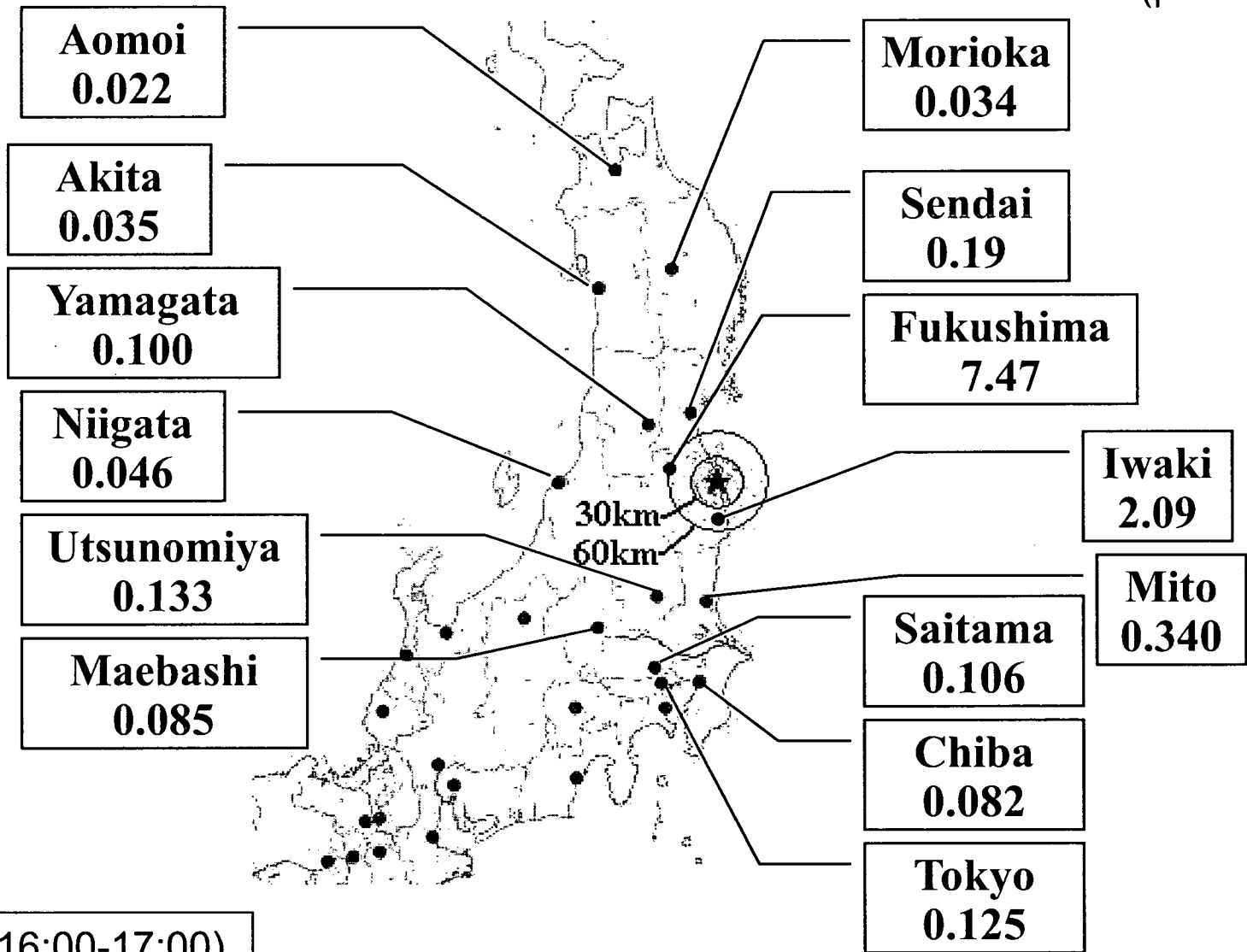
5. Radiation Exposure and Monitoring Data

Radiation Dose at Power Station



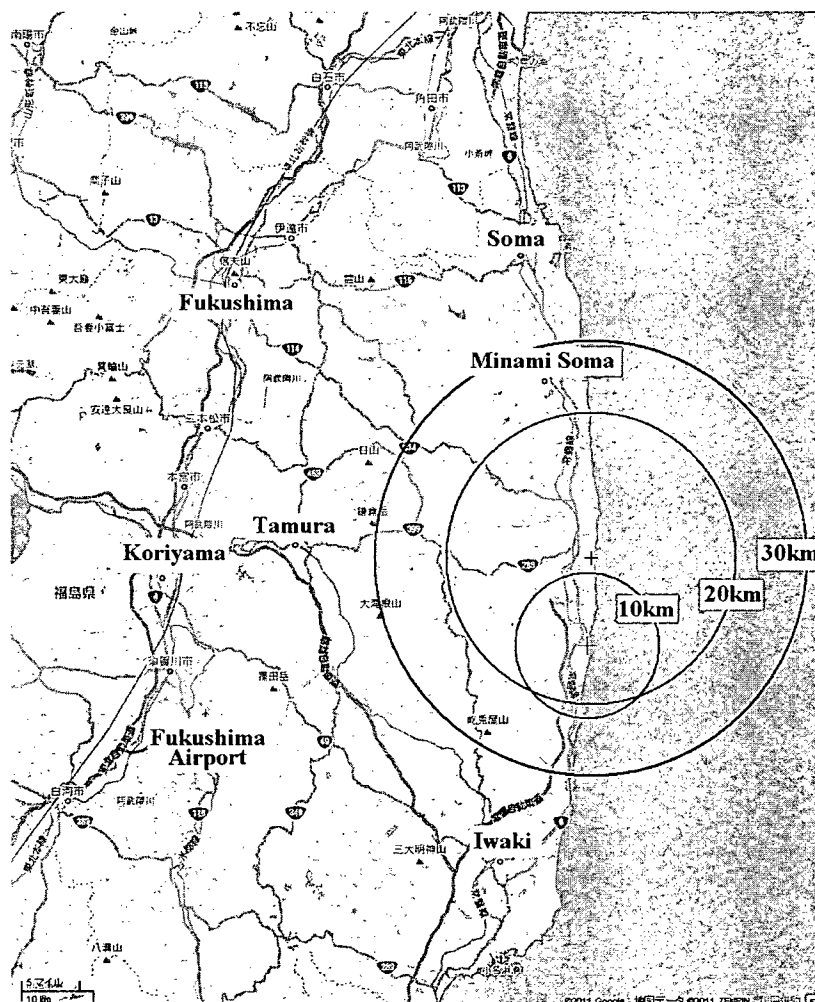
Radiation Dose at East Japan

($\mu\text{Sv/h}$)



21th (16:00-17:00)

Evacuation Advice of Government



11th 20:50: Evacuate from 2km sphere

21:23: Evacuate from 3km sphere

~ 6,000 persons

12th 05:44 : Evacuate from 10 km sphere

> 50,000 persons

18:25: Evacuate from 20 km

>170,000 persons

**[Report of Prime Minister of Japan and his Cabinet
2011/3/20 22:00 P10/32]**

Radiation Contamination

Food Contamination (20th March)

| Element | Food | Prefecture | Radiation (Bq) |
|---------|---------|------------|----------------|
| Iodine | Milk | Fukushima | 932~1,510 |
| | Spinach | Ibaragi | 6,100~15,020 |
| Cesium | Spinach | Ibaragi | 524 |

The government requested that the contaminated food (Spinach, Milk) do not be distributed in the market on 20th March.

The Radioactive Material (Co, Cs) was detected in the sea water near NPP on 22th March.

Victim and Damage



| | Dead | Missing | Evacuated |
|----------------------|--------------|---------------|----------------|
| Total | 6,911 | 19,370 | 403,975 |
| Near NPPs | | | |
| (1) Onagawa | | | |
| Onagawa | - | 4,500 | 5,500 |
| Ishinomaki | ~1,000 | 400 | 40,600 |
| (2) Fukushima | | | |
| Soma | 105 | - | 4,000 |
| Minami Soma | 176 | 100 | 5,700 |
| Iwaki | 145 | - | 6,500 |
| Fukushima | - | - | 8,000 |
| Koriyama | - | - | 5,400 |
| Tamura | - | - | 3,400 |

[Ref: Asahi Newspaper 2011/3/19]

6.Discussion

From: Couret, Ivonne
To: McIntyre, David; Burnell, Scott; Harrington, Holly; Janbergs, Holly; Medina, Veronika; Chandrathil, Prema; Mitleyng, Viktoria; Dricks, Victor; Uselding, Lara; Screnci, Diane; Sheehan, Neil; Hannah, Roger; Ledford, Joev
Cc: Hayden, Elizabeth
Subject: FYI - written testimony for today's Senate Approps Energy and Water hearing
Date: Wednesday, March 30, 2011 10:24:00 AM
Attachments: Final - Written Testimony for SAC Energy and Water 3 30 11.docx

We aren't releasing until after he speaks. He is currently speaking will send email when he is done. Ivonne

From: Powell, Amy
Sent: Wednesday, March 30, 2011 10:18 AM
To: Couret, Ivonne
Cc: Decker, David
Subject: Per your request - written testimony for today's Senate Approps Energy and Water hearing

David is working on testimony for tomorrow, so I am sending you the attached. FYI, the Chairman has not yet delivered his opening statement at this hearing (Senators are making their opening statements now).

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

WRITTEN STATEMENT
BY GREGORY B. JACZKO, CHAIRMAN
UNITED STATES NUCLEAR REGULATORY COMMISSION
TO THE
APPROPRIATIONS COMMITTEE
SUBCOMMITTEE ON ENERGY AND WATER
UNITED STATES SENATE
MARCH 30, 2011

Chairman Feinstein, Ranking Member Alexander, and Members of the Subcommittee, I appreciate the opportunity to appear before you to address the response of the United States Nuclear Regulatory Commission (NRC) to the recent tragic events in Japan. People across the country and around the world who have been touched by the magnitude and scale of this disaster are closely following the events in Japan and the repercussions in this country and in other countries.

I traveled to Japan over the past weekend, and just returned yesterday. I wanted to convey a message of support and cooperation to our Japanese counterparts there and to assess the current situation. I also met with senior Japanese government and TEPCO officials, and consulted with our NRC team of experts who are in Japan as part of our assistance effort.

I would first like to reiterate my condolences to all those who have been affected by the earthquake and tsunami in Japan. Our hearts go out to all who have been dealing with the aftermath of these natural disasters, and we are mindful of the long and difficult road they will face in recovering. We know that the people of Japan are resilient and strong, and we have every confidence that they will come through this horrific time and move forward, with resolve, to

rebuild their vibrant country. Our agency stands together with the people of Japan at this most difficult and challenging time.

The NRC is an independent agency, with approximately 4000 staff. We play a critically important role in protecting the American people and the environment. Our agency sets the rules by which commercial nuclear power plants operate, and nuclear materials are used in thousands of academic, medical and industrial settings in the United States. We have at least two resident inspectors who work full-time at every nuclear plant in the country, and we are proud to have world-class scientists, engineers and professionals representing nearly every discipline.

Since Friday, March 11, when the earthquake and tsunami struck, the NRC's headquarters 24-hour Emergency Operations Center has been fully activated, with staffing augmented to monitor and analyze events at nuclear power plants in Japan. At the request of the Japanese government, and through the United States Agency for International Development (USAID), the NRC sent a team of its technical experts to provide on-the-ground support, and we have been in continual contact with them. Within the United States, the NRC has been working closely with other Federal agencies as part of our government's response to the situation.

During these past several weeks, our staff has remained focused on our essential safety and security mission. I want to recognize their tireless efforts and their critical contributions to the U.S. response to assist Japan. In spite of the evolving situation, the long hours, and the intensity of efforts over the past week, NRC staff has approached their responsibilities with dedication, determination and professionalism, and I am incredibly proud of their efforts. The American people also can be proud of the commitment and dedication within the Federal workforce, which is exemplified by our staff every day.

The NRC's primary responsibility is to ensure the adequate protection of the public health and safety of the American people. Toward that end, we have been very closely monitoring the activities in Japan and reviewing all currently available information. Review of this information, combined with our ongoing inspection and licensing oversight, gives us confidence that the U.S. plants continue to operate safely. To date, there has been no reduction in the licensing or oversight function of the NRC as it relates to any of the U.S. licensees.

Our agency has a long history of conservative regulatory decision-making. We have been intelligently using risk insights to help inform our regulatory process, and, for more than 35 years of civilian nuclear power in this country, we have never stopped requiring improvements to plant designs, and modifying our regulatory framework as we learn from operating experience.

Despite the very high level of support being provided by the NRC in response to the events in Japan, we continue to remain focused on our domestic responsibilities.

I'd like to begin with a brief overview of our immediate and continuing response to the events in Japan. I then want to further discuss the reasons for our continuing confidence in the safety of the U. S. commercial nuclear reactor fleet, and the path forward for the NRC in order to learn all the lessons we can, in light of these events.

On Friday, March 11th, an earthquake hit Japan, resulting in the shutdown of more than 10 reactors. The ensuing tsunami appears to have caused the loss of normal and emergency alternating current power to the six unit Fukushima Daiichi site. It is those six units that have received the majority of our attention since that time. Units One, Two, and

Three were in operation at the time of the earthquake. Units Four, Five, and Six were in previously scheduled outages.

Shortly after 4:00 AM EDT on Friday, March 11th, the NRC Emergency Operations Center made the first call, informing NRC management of the earthquake and the potential impact on U.S. plants. We went into the monitoring mode at our Emergency Operations Center, and the NRC's first concern was possible impacts of the tsunami on U.S. plants and radioactive materials on the West Coast, and in Hawaii, Alaska, and U. S. Territories in the Pacific. We were in communication with licensees and NRC resident inspectors at Diablo Canyon Power Plant and San Onofre Nuclear Generating Station in California, and the Radiation Control Program Directors for California, Washington, Oregon and Hawaii.

On that same day, we began interactions with our Japanese regulatory counterparts and dispatched two experts to Japan to help at the U.S. embassy in Tokyo. By Monday, March 14, we had dispatched a total of 11 NRC staff to provide technical support to the American embassy and the Japanese government. We have subsequently rotated in additional staff to continue our on-the-ground assistance in Japan. The areas of focus for this team are: 1) to assist the Japanese government and respond to requests from our Japanese regulatory counterparts; and 2) to support the U. S. ambassador and the U.S. government assistance effort.

On Wednesday, March 16, we collaborated with other U. S. government agencies and decided to advise American citizens to evacuate within a 50-mile range around the plant. This decision was a prudent course of action and would be consistent with what we would do under similar circumstances in the United States. This evacuation range was predicated on a combination of the information that we had available at the time, which indicated the possibility that reactor cores and spent fuel pools may have been compromised, and hypothetical

calculations of the approximate activity available for release from one reactor and two spent-fuel pools at a four-reactor site.

We have an extensive range of stakeholders with whom we have ongoing interaction regarding the Japan situation, including the White House, Congressional staff, our state regulatory counterparts, a number of other federal agencies, and international regulatory bodies around the world.

The NRC response in Japan and our Emergency Operations Center continue with the dedicated efforts of over 250 NRC staff on a rotating basis. The entire agency is coordinating and working together in response to this event so that we can provide assistance to Japan while continuing the vital activities necessary to fulfill our domestic responsibilities.

It is important to note that the U. S. government has an extensive network of radiation monitors across this country. Monitoring at nuclear power plants and the U. S. Environmental Protection Agency's (EPA) system has not identified any radiation levels that effect public health and safety in this country. In fact, natural background radiation from sources such as rocks, the sun, and buildings, is 100,000 times more than doses attributed to any level that has been detected in the U.S. to date. Therefore, based on current data, we feel confident that there is no reason for concern in the United States regarding radioactive releases from Japan.

There are many factors that assure us of ongoing domestic reactor safety. We have, since the beginning of the regulatory program in the United States, used a philosophy of Defense-in-Depth, which recognizes that nuclear reactors require the highest standards of design, construction, oversight, and operation, and does not rely on any single layer of protection for public health and safety. Designs for every individual reactor in this country take into account site-specific factors and include a detailed evaluation for natural events, such as

earthquakes, tornadoes, hurricanes, floods, and tsunamis, as they relate to that site.

There are multiple physical barriers to radiation in every reactor design. Additionally, there are both diverse and redundant safety systems that are required to be maintained in operable condition and frequently tested to ensure that the plant is in a high condition of readiness to respond to any situation.

We have taken advantage of the lessons learned from previous operating experience to implement a program of continuous improvement for the U. S. reactor fleet. We have learned from experience across a wide range of situations, including most significantly, the Three Mile Island accident in 1979. As a result of those lessons learned, we have significantly revised emergency planning requirements and emergency operating procedures. We have addressed many human factors issues regarding how control room employees operate the plant, added new requirements for hydrogen control to help prevent explosions inside of containment, and created requirements for enhanced control room displays of the status of pumps and valves.

The NRC has a post-accident sampling system that enables the monitoring of radioactive material release and possible fuel degradation. One of the most significant changes after Three Mile Island was an expansion of the Resident Inspector Program, which now has at least two full-time NRC inspectors on site at each nuclear power plant. These inspectors have unfettered access to all licensees' activities related to nuclear safety and security.

As a result of operating experience and ongoing research programs, we have developed requirements for severe accident management guidelines. These are components and procedures developed to ensure that, in the event all of the above-described precautions failed and a severe accident occurred, the plant would still protect

public health and safety. The requirements for severe accident management have been in effect for many years and are frequently evaluated by the NRC inspection program.

As a result of the events of September 11, 2001, we identified important pieces of equipment that, regardless of the cause of a significant fire or explosion at a plant, the NRC requires licensees to have available and staged in advance, as well as new procedures and policies to help deal with a severe situation.

Our program of continuous improvement, based on operating experience, will now include evaluation of the significant events in Japan and what we can learn from them. We already have begun enhancing inspection activities through temporary instructions to our inspection staff, including the resident inspectors and the region-based inspectors in our four Regional offices, to look at licensees' readiness to deal with both design-basis accidents and beyond-design-basis accidents.

We have also issued an information notice to licensees to make them aware of the events in Japan, and the kinds of activities we believe they should be engaged in to verify their readiness. It is expected that licensees review the information related to their capabilities to mitigate conditions that result from severe accidents, including the loss of significant operational and safety systems, to ensure that they are in effect and operational.

During the past 20 years, there have been a number of new rulemakings that have enhanced the domestic fleet's preparedness against some of the problems we are seeing in Japan. The "station blackout" rule requires every plant in this country to analyze what the plant response would be if it were to lose all alternating current so that it could respond using batteries for a period of time, and then have procedures in place to restore alternating current to the site and provide cooling to the core.

The hydrogen rule requires modifications to reduce the impacts of hydrogen generated for beyond-design-basis events and core damage. There are equipment qualification rules that require equipment, including pumps and valves, to remain operable under the kinds of environmental temperature and radiation conditions that you would see under a design-basis accident.

With regard to the type of containment design used by the most heavily damaged plants in Japan, the NRC has had a Boiling Water Reactor Mark I Containment Improvement Program since the late 1980s. This program required installation of hardened vent systems for containment pressure relief, as well as enhanced reliability of the automatic depressurization system.

A final factor that underpins our belief in the ongoing safety of the U. S. fleet is the emergency preparedness and planning requirements in place that provide ongoing training, testing, and evaluations of licensees' emergency preparedness programs. In coordination with our federal partner, the Federal Emergency Management Administration (FEMA), these activities include extensive interaction with state and local governments, as those programs are evaluated and tested on a periodic basis.

Along with our confidence in the safety of U.S. nuclear power plants, our agency has a responsibility to the American people to undertake a systematic and methodical review of the safety of our domestic facilities, in light of the natural disaster and the resulting nuclear situation in Japan.

Examining all available information is an essential part of the effort to analyze the event and understand its impact on Japan and its implications for the United States. Our focus is always on keeping nuclear plants and radioactive materials in this country safe and secure.

On Monday, March 21, my colleagues on the Commission and I met to review the status of the situation in Japan and identify the steps needed to conduct that review. We consequently decided to establish a senior level agency task force to conduct a comprehensive review of our processes and regulations to determine whether the agency should make additional improvements to our regulatory system, and to make recommendations to the Commission for its policy direction.

The review will be conducted in both a short-term and a longer-term timeframe. The short-term review has already begun, and the task force will brief the Commission at 30, 60 and 90 day intervals, to identify potential or preliminary near-term operational or regulatory issues. The task force then will undertake a longer-term review as soon as NRC has sufficient information from the events in Japan. That longer-term review will be completed in six months from the beginning of the evaluation.

The task force will evaluate all technical and policy issues related to the event to identify additional potential research, generic issues, changes to the reactor oversight process, rulemakings, and adjustments to the regulatory framework that may warrant action by the NRC. We also expect to evaluate potential interagency issues, such as emergency preparedness, and examine the applicability of any lessons learned to non-operating reactors and materials licensees. We expect to seek input from all key stakeholders during this process. A report with appropriate recommendations will be provided to the Commission within six months of the start of this evaluation. Both the 90-day and final reports will be made

publicly available.

In conclusion, I want to reiterate that we continue to make our domestic responsibilities for licensing and oversight of the U.S. licensees our top priority and that the U.S. plants continue to operate safely. In light of the events in Japan, there will be a near-term evaluation of their relevance to the U.S. fleet, and we are continuing to gather the information necessary to take a longer, more comprehensive and thorough look at the events in Japan and their lessons for us. Based on these efforts, we will take all appropriate actions necessary to ensure the continuing safety of the American people.

Chairman Feinstein, Ranking Member Alexander, and Members of the Subcommittee, on behalf of the Commission, thank you for the opportunity to appear before you. I look forward to continuing to work with you to advance the NRC's important safety mission.

From: Istar, Ata
To: Regan, Christopher; Bjorkman, Gordon; Day, Neil; Plotter, Jason; Vera, John; Tang, David; Tripathi, Bhasker; Gordon, Matthew; Einziger, Robert
Subject: Website of the Japanese Nuclear and Industrial Safety Agency -- the latest Japanese press releases for the Fukushima Daiichi NPP
Date: Wednesday, March 30, 2011 7:41:58 AM

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

Ata ISTAR

(301) 415-4049

ata.istar@nrc.gov

Reduce waste - print when necessary!

From: Franovich, Mike
Sent: Friday, April 01, 2011 5:16 PM
To: Ostendorff, William
Cc: Nieh, Ho; Kock, Andrea; Zorn, Jason
Subject: Brookings article - an off the mark analysis of NRC programs/oversight and the central issues
Attachments: image001.gif; image002.gif; image003.gif; image004.gif; image005.gif; image006.gif; image007.gif; image008.gif; image009.gif; image010.gif; image011.gif; image012.gif; image013.gif; image014.gif; image015.gif; image016.gif; image017.gif; image018.gif; image019.gif; image020.gif; image021.gif; image022.jpg

BROOKINGS

Preventing Nuclear Meltdown: Assessing Regulatory Failure in Japan and the United States

Japan in Crisis, Japan, Natural Disasters, Global Environment, Energy and Climate

Daniel Kaufmann, Senior Fellow, Global Economy and Development

Veronika Penciakova, Research Assistant, Global Economy and Development

The Brookings Institution

APRIL 01, 2011 —

Many wonder whether Japan's nuclear disaster could have been averted. The embattled operator of the Fukushima nuclear plant, Tokyo Electric Power Company (TEPCO), has borne the brunt of criticism; its numerous failures over the years are certainly well known. However, Japan's Nuclear and Industrial Safety Agency (NISA), responsible for regulating the nuclear industry, also ought to be subject to particular scrutiny for allowing TEPCO to operate despite its past safety and disclosure violations. We thus ask what types of regulatory failure may have contributed to Japan's nuclear crisis and assess whether the U.S. Nuclear Regulatory Commission (NRC) is at risk of committing similar errors.

Tokyo Electric Power Company, Inc. (TEPCO) Chairman Tsunehisa Katsumata (C) and Executive Vice-Presidents Sakae Muto (R) and Takashi Fujimoto



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Regulatory failure occurs when the regulatory system is deeply flawed – such as when it over- or under-regulates or when the regulatory design is based on “old science”. Regulatory failure also happens when agencies inadequately fulfill their oversight, supervisory and enforcement functions. Failures by regulatory agencies can go undetected for some time until they are exposed by a crisis, such as the BP oil spill

in 2010 and the financial crisis that originated in Wall Street in 2008. When assessing regulatory failure, it is important to distinguish between at least three different types of failure: lack of resources, mismanagement and poor technical expertise, and capture of the regulator by the regulated. Episodes of regulatory failure result from different combinations of subpar performance in some or all of these components.

Which dimensions were associated with the failures at Japan's regulatory agency? Does the U.S. nuclear energy regulator face similar challenges? Let us review each of the three types of failures in the context of Japan's NISA and the U.S.'s NRC.

Lack of Resources: When regulators lack the resources to hire staff, provide adequate training and expend the money necessary to monitor industries, regulatory concerns may go undetected and failure may result. The evidence does not suggest that Japan's NISA or the U.S.'s NRC lacked sufficient resources to effectively implement regulations.

Mismanagement and "Old Science": The regulatory system may sometimes over-regulate (business start-ups) or under-regulate (in finance, oil and nuclear power) due to ideological reasons or inadequate use of the latest knowledge and techniques. Even when regulators have a sufficient mandate to regulate and are provided adequate resources, they may still be ineffective at implementing and enforcing regulations and overseeing the operations and preparedness of the plants. The lax application of regulations and resistance to adoption of the latest scientific know-how and technical expertise regarding risk assessments can cause regulatory failure. Also, regulation and knowledge mismanagement can distort the incentives for industries to meet safety standards.

Japan: The Fukushima nuclear crisis has exposed NISA's failure to respond to the evolving scientific data and technology and to enforce regulations stringently. Since the 1980s, NISA has failed to act on warnings it received regarding the resilience of reactor containment structures to core meltdowns and the ability of plants to withstand earthquakes and tsunamis. This is particularly worrying since Japan has historically been prone to both earthquakes and tsunamis. For instance, in 2007 a 6.8-magnitude earthquake resulted in 1,200 liters of radioactive water leaking into the Japan Sea. The plant operator, TEPCO acknowledged that the reactors had not been designed to withstand an earthquake of that size.

Japan's nuclear power safety regulations appear to be based on assessments of maximum earthquake and tsunami events derived from the modern historical record. However, these methods do not take into consideration uncertainties that account for a non-zero likelihood of a more devastating future earthquake and tsunami, even though risk assessment models that do so currently exist. Moreover, NISA has largely left the task of risk assessments and emergency response planning to plant operators and has merely published voluntary guidelines on advances in regulations rather than

issuing concrete binding regulations. NISA is only now starting to order nuclear power plants in Japan to inspect devices and equipment and formulate emergency plans.

NISA has been lax in ensuring the adherence to safety regulations of Japan's nuclear power plants. In 1999, 20 tons of radioactive water leaked into the Tsuruga plant from a cracked pipe. Even though a similar pipe had sprung a leak in 1996, these pipes were not inspected in subsequent years. In 2004, five workers were killed when super-heated steam burst from a pipe at a reactor run by Kansai Electric. It was later discovered that the pipe had not been inspected in five years.

NISA has also remained passive in addressing the nuclear industry's long history of deception and cover-ups by different private operators, including but not limited to TEPCO. In 2002, five top executives from TEPCO resigned over a string of safety record cover-ups, including the falsification of containment vessel tests and shroud safety records. In fact, in 2002 four major nuclear companies admitted to concealing evidence of cracked containment structures from NISA. In 2007, seven of the 12 public utilities admitted to having falsified past safety records. And at a basic level, it is now emerging that TEPCO's disaster response plans that had been drawn in case of an accident at the Fukushima plant were totally inadequate: they merely called for one stretcher, a satellite phone, and 50 protective suits. Again, this raises serious questions not only about TEPCO, but about NISA's oversight.

United States: While a degree of regulatory laxity plagues the NRC, it results more from lax enforcement of regulations than from failure to heed warnings or private sector deception. The NRC's Office of the Inspector General uncovered 24 instances in which nuclear plants failed to report defects in equipment that could pose safety risks. In the last eight years, the regulator has not imposed any penalties on plant operators for such infractions.

For 15 years, the NRC allowed a water containment system to leak in New York despite the problem being documented. In South Carolina, a plant operator had to shut down reactors twice in six months. One of the shutdowns was caused by a power shortage in an electrical cable that had been installed in 1986 and was not up to standard. In New Jersey, a nuclear plant was relicensed in 2009 even though it lacked a reactor containment shell that could withstand a jet crash. Within seven days of its relicensing, an ongoing leak of radioactive tritium-polluted water was uncovered. These regulatory oversights in the U.S. likely contributed to several accidents, but none are as severe as those in Japan.

The US regulatory system faces a particular challenge regarding the handling of the vast amounts of spent fuel. At the beginning of 2010, nearly 65,000 metric tons of spent fuel was being stored at U.S. nuclear power plants. The NRC does not have limits on the amount of time fuel can remain in spent fuel pools and has not mandated, for instance, the transfer of spent fuel to dry casks, which are located away

from reactors. Currently, nearly 10 times as much fuel is located in spent fuel pools than in the reactors. This is worrying as the pools are not protected by containment shells as the reactor cores are.

However, whereas Japan has tended to use outdated risk-assessment methodologies, the NRC has been more proactive in utilizing the latest technology to address potential safety risks. Although in the U.S., the types of risks nuclear plants face are different (such as lower risks of tsunamis afflicting power plants), risk assessments carried out in the U.S. do consider each plant's geographical location and all plants have to take into account the risk of potential terrorist attacks. In recent years, the regulator has adopted some new risk assessment techniques in their plant-by-plant reviews. Some of the modeling techniques used in the U.S. also takes into account the risks of potentially devastating future natural disasters.

In Japan, mismanagement results from the regulator's failure to adopt the latest technology and to punish private sector deception. In the U.S., the problem seems to center around general weaknesses in regulatory oversight and lack of a spent fuel strategy. While the U.S. NRC's mismanagement and challenges in technical expertise appear to be less severe than those of Japan's NISA, improved regulatory enforcement by the U.S. NRC may still be warranted.

Capture: The incentives for regulators to effectively implement regulations can also become distorted when industry actors exert undue influence over the regulatory process.

Japan: The influence of the nuclear industry over NISA occurs through various channels. NISA is not an independent regulator and is therefore even more susceptible to outside influence. NISA is housed under the Japan's Ministry of Economy, Trade and Industry (METI), which promotes the nuclear sector domestically and abroad. METI has very close connections to the nuclear industry and has been charged with distorting information presented to public officials on nuclear energy and orchestrating the defeat of alternative energy development legislation. The METI has made it clear that expanding Japan's nuclear power industry is of central importance to the government's growth strategy. As such, it has been instrumental in the launching of the International Nuclear Energy Development of Japan Co. (JINED), a public-private partnership headed by TEPCO to sell nuclear reactor contracts to developing countries. In the fallout from disaster, it seems the government has recognized the danger of this conflict of interest and there are now reports that the Japanese government is considering splitting NISA from METI.

Japanese officials also have an incentive to be deferential to private sector counterparts since retiring public officials often obtain prominent private sector jobs in a practice called *amakudari*, or "descent from heaven" (a practice in the U.S. known as the "revolving door"). It is not uncommon for individuals involved in the nuclear

sector to act at different times in the licensing, rulemaking and inspections process. For instance, a director general of the Ministry of Economy, Trade and Industry (METI) obtained a job with TEPCO after leaving his regulatory post. Private nuclear power industry companies may also have a direct role in shaping regulations. When the government convened a panel to revise nuclear regulatory standards in 2005, 11 of the 19 members on the panel were from the nuclear industry.

United States: The NRC faces similar types of regulatory capture challenges, but the agency is an independent regulatory agency and therefore not involved in the promotion of the nuclear industry. Yet it receives 90 percent of its funding from industry fees, which potentially compromises its independence.

One report suggests that the NRC has acted in some cases more to safeguard the interest of the nuclear power industry than the public. Nearly half of NRC employees surveyed by the agency in 2002 said they feared raising safety concerns might undermine their career. Also, as is common in other regulatory agencies in the United States, NRC employees often pass through the revolving door. There have been some isolated cases when regulators have accepted gifts from and made decisions in favor of future employees prior to leaving the NRC. In one recent case, a commissioner voted on a matter that benefitted three nuclear companies, two of which he was negotiating an employment contract with at the time.

In the United States, the NRC is connected to the nuclear sector through industry efforts to influence the legislative process. Last year, the U.S. nuclear industry spent nearly \$54 million to lobby Congress and employed 12 former members of Congress as lobbyists. Some of the top supporters of the nuclear power sector have also been some of the largest recipients of campaign contributions from this sector. There are many examples of this type of lobbying. For example, Exelon, one of the U.S.'s largest nuclear operators, contributed to the campaigns of the House minority whip and the Energy and Commerce Committee chairman and contributed to 14 of the 19 members in the House of Representatives from states where Exelon owns reactors.

Conclusion

The manifestations and extent of regulatory capture in Japan and the U.S. differ, with the problem seemingly more acute in Japan. However in both countries, regulators have had their incentive to regulate effectively distorted by the influence of the nuclear industry. In the fallout from the Fukushima crisis, the role of numerous actors will be scrutinized, including TEPCO and the Japanese government. But, the role of Japan's nuclear regulator should not be underestimated. By failing to sanction plant operators for safety infringements and to heed safety warnings, NISA allowed the private sector to continually skirt regulations. NISA may not have been properly empowered to mandate changes in the private sector. In addition, whatever de jure mandates they may have had, they did not forcefully implement in practice. To a significant extent, it

appears that regulatory capture of NISA by Japan's nuclear industry turned the regulator into a caretaker of industry rather than one for public safety.

The U.S.'s nuclear and regulatory situation differs from Japan's. The evidence suggests that the NRC is not effectively enforcing regulations. The NRC's regulatory struggles do not stem from private sector deception, but from a degree of regulatory capture (there are some instances of undue influence) and particularly from the weak enforcement of existing rules.

In the United States, the NRC will imminently be undertaking a 90-day review of the country's 104 reactors. But in addition an in-depth review should also be conducted by a fully independent commission (akin to the Kemeny Commission established in the aftermath of the Three-Mile nuclear power accident), which would review how the NRC could more effectively implement existing regulations and conduct plant-specific "stress tests" of seismic risks with the purpose of revoking licenses in cases where standards do not conform to the risks exposed by the latest technology. The independent study should also look into an industry-wide strategic approach to safely managing the storage of spent nuclear fuel, which poses a particular risk in the United States.

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Forsyth, Daniel

From: Keefe, Molly
Sent: Friday, April 01, 2011 2:15 PM
To: Forsyth, Daniel
Subject: FW: Areva Power Point on Fukushima
Attachments: Fukuchima_eng_20110324_V1.ppt

Molly J. Keefe
Human Factors Specialist
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
(301) 415-5717
Molly.Keefe@nrc.gov

From: Boggi, Michael
Sent: Friday, April 01, 2011 2:11 PM
To: Clemons-Webb, Candace; Conatser, Richard; Franklin, Carmen; Garry, Steven; Jimenez, Manuel; Keefe, Molly; Lapinsky, George; Martin, Kamishan; Pedersen, Roger; Shoop, Undine
Subject: FW: Areva Power Point on Fukushima

From:
fyi

From: Criscione, Lawrence
Sent: Friday, April 01, 2011 12:32 PM
To: Beasley, Benjamin; Kauffman, John; Lane, John; Reisifard, Mehdi; Bensi, Michelle; Perkins, Richard; Wegner, Mary; Ibarra, Jose; Smith, April; Killian, Lauren; Salomon, Arthur; Thomas E Wierman; Shawn W St Germain; Desaulniers, David; Barnes, Valerie; Boggi, Michael; King, Mark; Thorp, John
Subject: Areva Power Point on Fukushima

I came across the attached power point on one of Bill Corcoran's discussion groups. I haven't had a chance to look at it yet in any detail, but it looks pretty interesting.

It might not contain any information we don't already know, but it has some slides that graphically explain what is suspected to have occurred so far.

Larry

Lawrence S. Criscione
Reliability & Risk Engineer
RES/DRA/OEGIB
Church Street Building
Mail Stop 2A07
(301) 251-7603



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The Fukushima Daiichi Incident

1. Plant Design
2. Accident Progression
3. Radiological releases
4. Spent fuel pools
5. Sources of Information

Matthias Braun
PEPA4-G, AREVA-NP GmbH
matthias.braun@areva.com

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0-2



The Fukushima Daiichi Incident 1. Plant Design of Unit 1-4

► Fukushima Daiichi (Plant I)

- ◆ Unit I
 - General Electric BWR3 (439 MW)
 - Containment MARK I
 - Operating since 1971
- ◆ Unit II-III
 - General Electric BWR4 (760 MW)
 - Containment MARK I
 - Operating since 1974
- ◆ Unit IV
 - Outage for regular inspection
- ◆ Unit V-VI
 - Outage for regular inspection

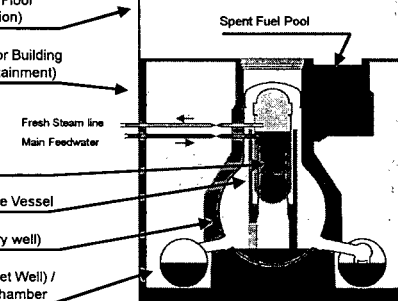
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0-3



The Fukushima Daiichi Incident 1. Plant Design of Unit 1-4

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



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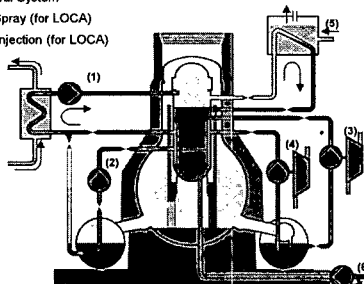
0-4



The Fukushima Daiichi Incident 1. Plant Design of Unit 1-4

► Emergency Core Cooling Systems

- 1) Residual Heat Removal System
- 2) Low-Pressure Core Spray (for LOCA)
- 3) High-Pressure Core Injection (for LOCA)
- 4) Reactor Core Isolation cooling (Unit 2,3 [BWR4])
- 5) Isolation Condenser (Unit 1 [BWR3])
- 6) Borating System



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0-5



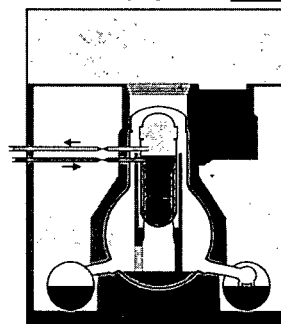
The Fukushima Daiichi Incident 2. Accident progression

► 11.3.2011 14:46 - Earthquake

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

► SCRAM

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



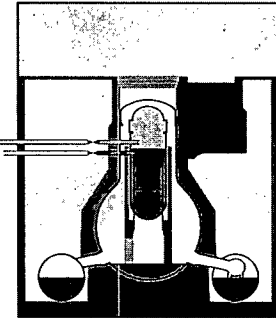
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0-6



The Fukushima Daiichi Incident
2. Accident progression

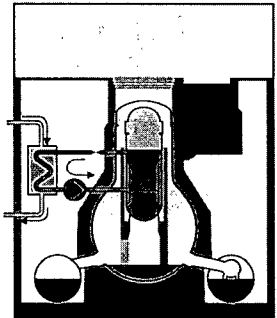
- Containment Isolation
 - ◆ Closing of all non-safety related Penetrations of the containment
 - ◆ Cuts off Machine hall
 - ◆ Due to successful containment isolation, a large early release of fission products is highly unlikely
- Diesel generators start
 - ◆ Emergency Core cooling systems are supplied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



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The Fukushima Daiichi Incident
2. Accident progression

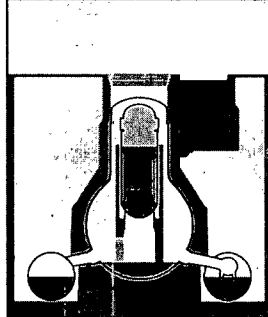
- Usual course of action:
 - ◆ Cooling reactor by Residual Heat Removal Systems
 - ◆ Active spend fuel pool cooling
 - ◆ Active containment heat removal
- Necessary
 - ◆ Electricity for pumps
 - ◆ Heat sink outside Reactor building (Service Water)



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The Fukushima Daiichi Incident
2. Accident progression

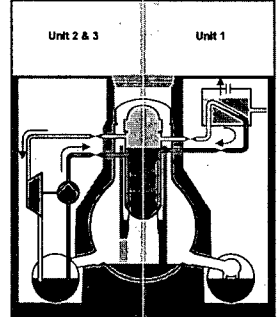
- 11.3. 15:01(?) Tsunami hits plant
 - ◆ Plant Design for Tsunami height of up to 5.7-6.5m
 - ◆ Actual Tsunami height 7-11m
 - ◆ Flooding of
 - Diesel and/or
 - Switchgear building and/or
 - Fuel Tanks and/or
 - Essential service water buildings
- 11.3. 15:41 Station Blackout
 - ◆ Common cause failure of the power supply
 - ◆ Only Batteries are still available
 - ◆ Failure of all but one Emergency core cooling system



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The Fukushima Daiichi Incident
2. Accident progression

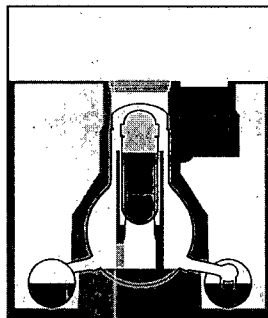
- Fukushima I -Unit 1
 - ◆ Isolation Condenser
 - Steam enters heat exchanger
 - Condensate drains back to RPV
 - Secondary steam released from plant
 - ◆ Need Pumps for Water supply
 - ◆ Can't replace water in Reactor
- Fukushima I Unit 2 & 3
 - ◆ Reactor Core Isolation Pump
 - Steam from Reactor drives Turbine
 - Steam gets condensed in Wet-Well
 - Turbine drives a Pump, pumping Water from the Wet-Well in reactor
 - ◆ Necessary:
 - Battery power
 - Wet-Well Temperature < 100°C
 - ◆ No heat removal from the buildings



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The Fukushima Daiichi Incident
2. Accident progression

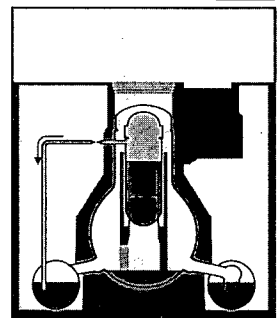
- 11.3. 16:36 in Unit 1
 - ◆ Isolation condenser stops
 - ◆ Tank empty(?)
- 13.3. 2:44 in Unit 3
 - ◆ Reactor Isolation pump stops
 - ◆ Batteries empty
- 14.3. 13:25 in Unit 2
 - ◆ Reactor Isolation pump stops
 - ◆ Pump failure
- Consecutively, all reactors are cut off from any kind of heat removal



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The Fukushima Daiichi Incident
2. Accident progression

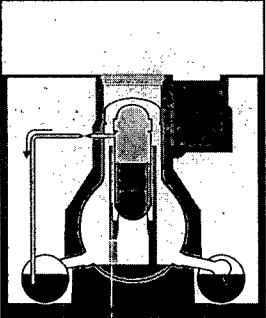
- Decay Heat produces still steam in Reactor pressure Vessel
 - ◆ Pressure rising
- Opening the steam relieve valves
 - ◆ Discharge Steam into the Wet-Well
- Descending of the Liquid Level in the Reactor pressure vessel



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The Fukushima Daiichi Incident
2. Accident progression

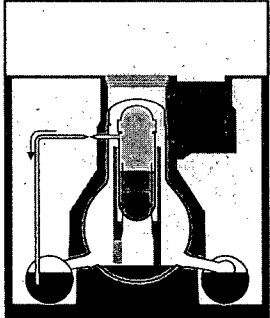
- ▶ Decay Heat produces still steam in Reactor pressure Vessel
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The Fukushima Daiichi Incident
2. Accident progression

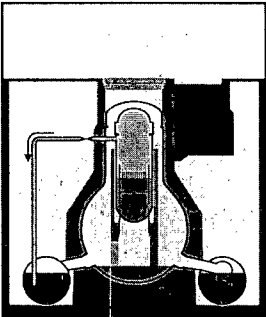
- ▶ Decay Heat produces still steam in Reactor pressure Vessel
 - ◆ Pressure rising
- ▶ Opening the steam relieve valves
 - ◆ Discharge Steam into the Wet-Well
- ▶ Descending of the Liquid Level in the Reactor pressure vessel



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The Fukushima Daiichi Incident
2. Accident progression

- ▶ Decay Heat produces still steam in Reactor pressure Vessel
 - ◆ Pressure rising
- ▶ Opening the steam relieve valves
 - ◆ Discharge Steam into the Wet-Well
- ▶ Descending of the Liquid Level in the Reactor pressure vessel

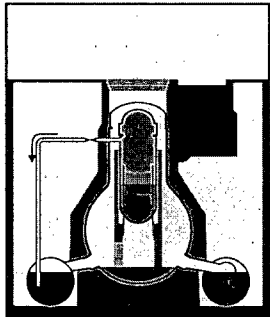


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The Fukushima Daiichi Incident
2. Accident progression

- ▶ ~50% of the core exposed
 - ◆ Cladding temperatures rise, but still no significant core damage
- ▶ ~2/3 of the core exposed
 - ◆ Cladding temperature exceeds ~900°C
 - ◆ Ballooning / Breaking of the cladding
 - ◆ Release of fission products from the fuel rod gaps

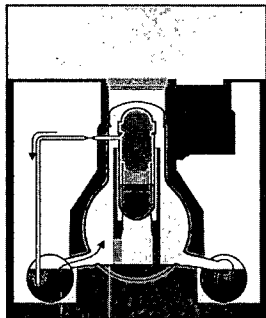
(Measured levels are collapsed level. The actual liquid level lies higher due to the steam bubbles in the liquid)



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The Fukushima Daiichi Incident
2. Accident progression

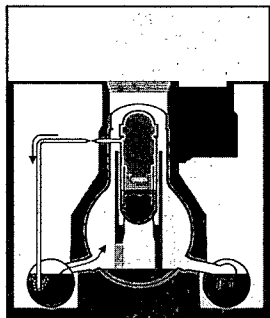
- ▶ ~3/4 of the core exposed
 - ◆ Cladding exceeds ~1200°C
 - ◆ Zirconium in the cladding starts to burn under steam atmosphere
 - ◆ $Zr + 2H_2O \rightarrow ZrO_2 + 2H_2$
 - ◆ Exothermal reaction further heats the core
 - ◆ Estimated masses hydrogen
 - + Unit 1: 300-600kg
 - + Unit 2/3: 300-1000kg
 - ◆ Hydrogen gets pushed via the wet-well and the wet-well vacuum breakers into the dry-well



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The Fukushima Daiichi Incident
2. Accident progression

- ▶ at ~1800°C [expected Unit 1,2,3]
 - ◆ Melting of the Cladding
 - ◆ Melting of the steel structures
- ▶ at ~2500°C [expected Unit 1,2]
 - ◆ Breaking of the fuel rods
 - ◆ debris bed inside the core
- ▶ at ~2700°C [maybe Unit 1]
 - ◆ Significant melting of Uranium-Zirconium-oxides
- ▶ Restoration of the water supply stops accident in all 3 Units
 - ◆ Unit 1: 12.3. 20:20 (27h w.o. water)
 - ◆ Unit 2: 14.3. 20:33 (7h w.o. water)
 - ◆ Unit 3: 13.3. 9:38 (7h w.o. water)

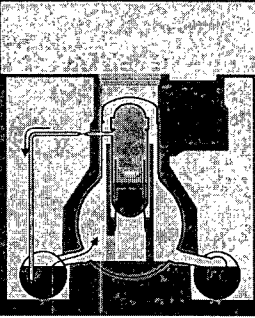


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The Fukushima Daiichi Incident

2. Accident progression

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



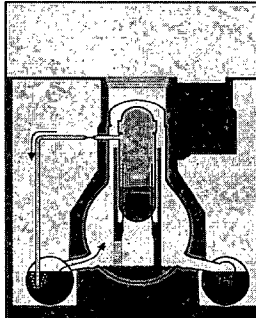
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The Fukushima Daiichi Incident

2. Accident progression

- ▶ Containment
 - ◆ Last barrier between Fission Products and Environment
 - ◆ Wall thickness ~3cm
 - ◆ Design Pressure 4-5bar
- ▶ Actual pressure up to 8 bars
 - ◆ Normal inert gas filling (Nitrogen)
 - ◆ Hydrogen from core oxidation
 - ◆ Boiling condensation chamber (like a pressure cooker)
- ▶ First depressurization of the containment
 - ◆ Unit 1: 12.3. 4:00
 - ◆ Unit 2: 13.3 00:00
 - ◆ Unit 3: 13.3. 8:41



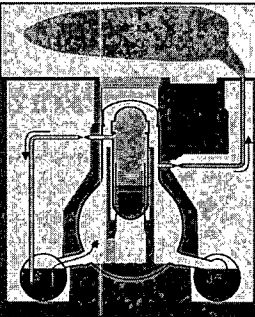
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The Fukushima Daiichi Incident

2. Accident progression

- ▶ Positive und negative Aspects of depressurizing the containment
 - ◆ Removes Energy from the Reactor building (only way left)
 - ◆ Reducing the pressure to ~4 bar
 - ◆ Release of small amounts of Aerosols (Iodine, Cesium...)
 - ◆ Release of all noble gases
 - ◆ Release of Hydrogen
- ▶ Release of unfiltered venting?
- ▶ Gas is released into the reactor service floor
 - ◆ Hydrogen is flammable



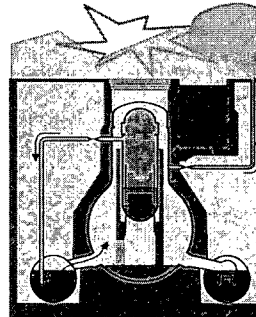
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The Fukushima Daiichi Incident

2. Accident progression

- ▶ Unit 1 and 3
 - ◆ Hydrogen burn inside the reactor service floor
 - ◆ Destruction of the steel-frame roof
 - ◆ Reinforced concrete reactor building seems undamaged
 - ◆ Spectacular but minor safety relevant



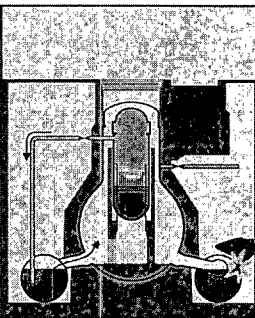
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The Fukushima Daiichi Incident

2. Accident progression

- ▶ Unit 2
 - ◆ Probably Hydrogen leakage of the condensation chamber (actual pressure exceeds design pressure)
 - ◆ Burn inside the reactor building in proximity to the wet-well
 - ◆ Damage to the condensation chamber
 - ◆ Uncontrolled release of
 - Gas
 - highly contaminated water
 - Aerosols of fission products
 - ◆ Temporal evacuation of the plant
 - ◆ High local dose rates on the plant site due to wreckage hinder further recovery work



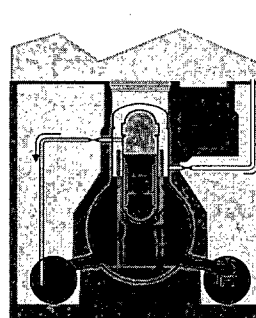
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The Fukushima Daiichi Incident

2. Accident progression

- ▶ Current status of the Reactors
 - ◆ Core Damage in Unit 1, 2, 3
 - ◆ Building damage due to various burns Unit 1-4
 - ◆ Reactor pressure vessels flooded in all Units with mobile pumps
 - ◆ At least containment in Unit 1 flooded
- ▶ Further cooling of the Reactors
 - ◆ Unit 1: by Isolation Condensers
 - ◆ Unit 2&3: by releasing steam
- ▶ Only small further releases of fission products can be expected from Unit 2 and 3



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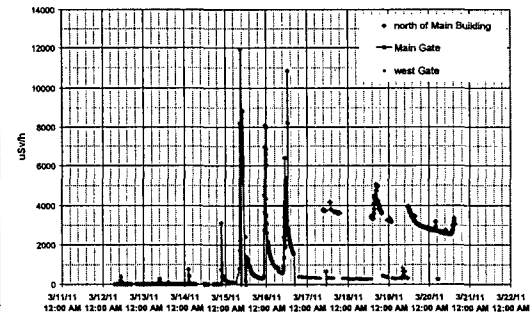
The Fukushima Daiichi Incident 3. Radiological releases

- Its not Chernobyl-like
- Directly on the plant site
 - ◆ Before Explosion in Unit 2
 - Below 2mSv/h
 - Mainly due to released radioactive noble gases
 - Measuring posts on west side. Maybe too small values measured due to wind
 - ◆ After Explosion in Unit 2 (Damage of the Containment)
 - Temporal peak values 12mSv/h (Origine not entirely clear)
 - Local peak values on site up to 400mSv/h (wreckage / Wet-Well inventory)
 - Currently stable dose on site at 5mSv/h
 - Inside the buildings a lot more
 - ◆ Limiting time of exposure of the workers necessary

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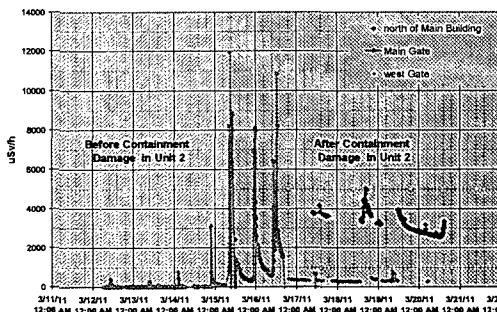
The Fukushima Daiichi Incident 3. Radiological releases



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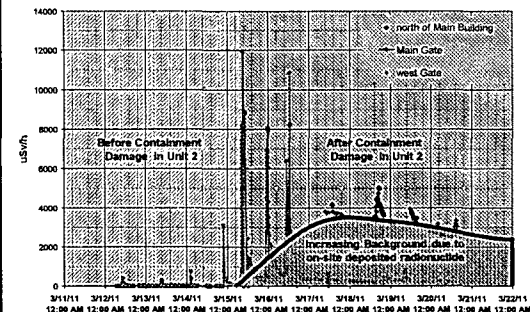
The Fukushima Daiichi Incident 3. Radiological releases



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The Fukushima Daiichi Incident 3. Radiological releases



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The Fukushima Daiichi Incident 3. Radiological releases

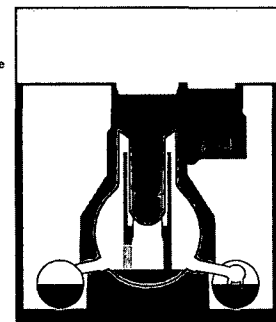
- Outside the Plant site
 - ◆ Reactor building mostly intact => reduced release of Aerosols
 - ◆ Fission product release in steam => fast Aerosol growth
 - ◆ Large fraction of Aerosols deposited in close proximity of plant
 - ◆ Main contribution to dose outside plant are the radioactive noble gases
=> No „Fall-out“ of the noble gases, so no local high contamination of soil
- ~20km around the plant
 - ◆ Evacuations were adequate
 - ◆ Measured dose up to 0.3mSv/h for short times
 - ◆ Maybe destruction of crops / dairy products this year
 - ◆ Probably no permanent evacuation of land necessary
- ~50km around the plant
 - ◆ Control of Crop / Dairy products
 - ◆ Distribution of Iodine pills, no usage recommended yet (Pills can interfere with heart medicine)

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The Fukushima Daiichi Incident 4. Spend fuel pools

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

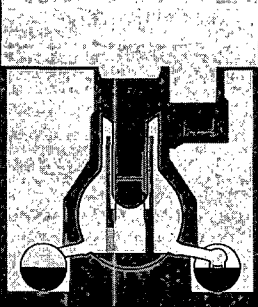


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The Fukushima Daiichi Incident
4. Spend fuel pools

- Spend fuel stored in Pool on Reactor service floor
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- Consequences
 - ◆ Core melt „on fresh air “
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 - ◆ Large release



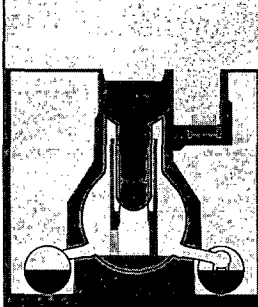
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The Fukushima Daiichi Incident
4. Spend fuel pools

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



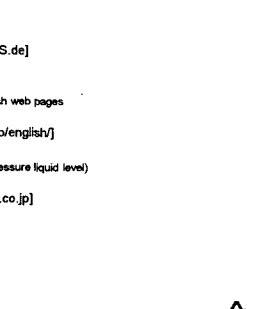
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The Fukushima Daiichi Incident
5. Sources of Information

- Good sources of Information
 - ◆ Gesellschaft für Reaktorsicherheit [GRS.de]
 - Up to date
 - Radiological measurements presented
 - German translation of Japanese / English web pages
 - ◆ Japan Atomic Industrial Forum [jaif.or.jp/english/]
 - Current Status of the plants
 - Measurement values of the reactors (pressure liquid level)
 - ◆ Tokyo Electric Power Company [Tepco.co.jp]
 - Radiological measurements published
 - Status of the recovery work
 - Casualties



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Banovac, Kristina

From: Shepherd, James
Sent: Friday, April 01, 2011 12:44 PM
To: FSME_DWMEP_DURLD_RDB
Subject: Emailing: Iodine-131 found in groundwater The Japan Times Online.htm

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Saturday, April 2, 2011

Iodine-131 found in groundwater

Tepco hit for failing to supply dosimeters

By **MASAMI ITO**

Staff writer

Tokyo Electric Co. came under further fire Friday after it was revealed that many of its employees at the damaged Fukushima No. 1 power plant have been working without the protection of dosimeters. It also said radioactivity in groundwater under the compound spiked.

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Tepco said the groundwater sample, which contains 10,000 times the legal limit of radioactive iodine-131, was taken from one of 15 water tanks buried 15 meters below the compound near the No. 1 reactor. The tanks are designed to collect much of the runoff from rainwater and other sources that sinks into the ground.

The water is usually pumped from the tanks into the sea, but the pumps have been halted to prevent seawater pollution, the Nuclear and Industrial Safety Agency said.

NISA earlier cast doubt on details of the analysis, which was announced Thursday, causing Tepco to scramble to verify the information. But on Friday, Tepco confirmed that its previous statement was accurate.

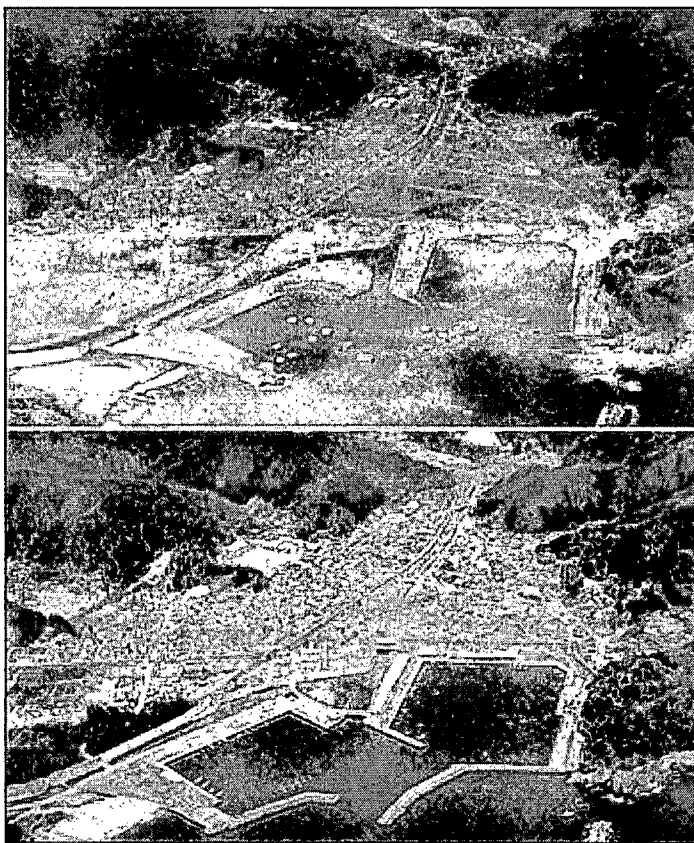
"People are extremely worried right now and the data must be trustworthy. It is a problem that (Tepco) is not answering people's expectations," senior NISA official Hidehiko Nishiyama said the same day.

Tepco officials said they believe the possibility is high that iodine-131, earlier released on the ground from some of the three crippled reactors, seeped underground along with rainwater.

This is the second time in less than a week Tepco has had to amend radiation readings from the plant.

On Sunday, it said the level of radioactive material in the water in the turbine building of the No. 2 reactor was "10 million" times the normal level, only to correct it later and say the number was actually 100,000 times higher than normal.

The quake and killer tsunami that shattered the northeastern coastline also destroyed thousands of the nuclear plant's supply of dosimeters, which each



Wiped off the map: These twin images show the city of Miyako, Iwate Prefecture, on Monday, following the devastating tsunami, and in March last year. KYODO PHOTO

employee should carry to warn of excessive radiation.

This means workers were forced to share dosimeters, the Nuclear and Industrial Safety Agency said Thursday. Since dosimeter readings vary greatly by position, it is difficult for a single dosimeter to protect everyone in a group if anyone strays. How many workers were forced to share dosimeters was not immediately known.

Tepco had 5,000 dosimeters but only 320 survived the quake and tsunami.


NISA issued Tepco a strong warning, prompting the utility to immediately send another 100 dosimeters to the workers at Fukushima No. 1. Tepco said 420 dosimeters is enough to protect everyone there.

Echoing an incident last week in which three workers stepped into dangerously radioactive floods they weren't warned about, NISA "warned Tepco to take all possible measures to manage the level of radiation exposure on the workers," Nishiyama said, adding from now on, "those who do not have dosimeters on will not be allowed to continue working."

Separately, NISA also announced Thursday the number of workers who had been exposed to more than 100 millisieverts of radiation at the plant had risen to 21.

In another flip-flop, the health ministry announced Friday that beef from a cow from Tenei, Fukushima Prefecture, that it initially reported contained 510 becquerels of radioactive cesium, upon a second test came up devoid of radiation, indicating the meat may not be contaminated. The legal limit for cesium is 500 becquerels.

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Article 1 of 13 in National news



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Barto, Andrew

From: Sigmon, Rebecca
Sent: Friday, April 01, 2011 11:59 AM
To: Sigmon, Rebecca
Subject: New OpE COMM: International - Tsunami Causes Complete Loss of Ultimate Heat Sink and Near Miss Incidents at Three Units at Fukushima DAINI Site

This email is being sent to notify recipients of a new posting on the @Operating Experience Community Forum.

Recipients are expected to review the posting for applicability to their areas of regulatory responsibility and consider appropriate actions. However, information contained in the posting is not tasking; therefore, no specific action or written response is required.

Summary

Following the magnitude 9.0 Tohoku-Taiheiyoku-Oki Earthquake and ensuing tsunami on March 11, 2011 off the eastern coast of Japan, three of four units at the Fukushima Daini (or Fukushima II) reactor site experienced a complete loss of ultimate heat sink due to a loss of all seawater pumps. After suppression pool temperatures reached the saturation point at each of the three units, containment pressure started to increase. Unlike at the Fukushima Dai'ichi site though, offsite power was never lost. Operators were able to restore sufficient seawater cooling to RHR heat exchangers before core damage occurred. The Japanese regulator (NISA) assigned an International Nuclear and Radiological Event Scale (INES) rating of level 3 to the events at each of these three plants.

Information Security Reminder: OpE COMMs contain preliminary information in the interest of timely internal communication of operating experience. OpE COMMs may be pre-decisional and may contain sensitive/proprietary information. They are not intended for distribution outside the agency

The posting may be reviewed at: **International - Tsunami Causes Complete Loss of Ultimate Heat Sink and Near Miss Incidents at Three Units at Fukushima DAINI Site**

or at

<http://nrr10.nrc.gov/forum/forumtopic.cfm?selectedForum=03&forumId=AllComm&topicId=3299>

This COMM is being posted to the following groups: ***All Communications, Containment (leakage, degradation, cooling system performance), ECCS, Electrical Power Systems, Emergency Diesel Generators, Emergency Preparedness, Flood Protection & Missiles, Fuels, Natural Phenomena, New Reactors, Pump and Valve Performance, Station Service Water Systems & Ultimate Heat Sink***

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For more information on the Reactor OpE Program, please visit our **Reactor OpE Gateway**.

Thank you for reviewing and using Operating Experience.

Rebecca Sigmon
Reactor Systems Engineer
NRR/DIRS/IOEB

4/200

Operating Experience Branch
(301) 415-4018
Rebecca.Sigmon@nrc.gov

From: Nuclear Plant Journal [anu@goinfo.com]
Sent: Monday, April 04, 2011 6:27 PM
To: Bajwa, Chris
Subject: NPJ E-News April 4, 2011 Fukushima Update

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Nuclear Plant Journal

An International Publication
Published in the United States

Nuclear Plant Journal E-News

Japan Update
April 4, 2011

Dear CHRIS,

In this issue of NPJ E-News you'll find an update of the Fukushima Nuclear Plants in Japan. Information is current as of April 4, 2011, 17:00 CDT. All items are directly quoted, without any editing.

In this issue

[TEPCO Update](#)

[Status Document](#)

[US NRC FAQs](#)

TEPCO Update

From the [TEPCO website](#):

- **Improvement Plan for Nuclide Analysis**

At the site of Fukushima Daiichi Nuclear Power Station, as part of our investigation for the pathway and the volume of emission, which contains radioactive material, we have been conducting nuclide analysis for air inside the plant, seawater near the plant and water puddle in the turbine building. We have been informing you the result of the nuclide analysis. It is ascertained that the result of nuclide analysis of tellurium 129 (half life : about 70 minutes) conducted on March 30th, for water puddle collected near the trench and ground water collected near the turbine building are doubtful. [Click for more.](#)

- Plant status update: [Click for more](#)

JAIF Status Update

Update 62, April 4, 2011

A PDF document provides a simple summary of each of the units at Fukushima nuclear power plants. This is a multi-page document that also provides a

chronology of events and a map that details the status of each of the Japanese nuclear units.

Earthquake Update 42.

US NRC FAQs related to Fukushima earthquake and subsequent events



NRC frequently asked questions related to the March 11, 2011 Japanese Earthquake and Tsunami. Some sample questions:

- Can an earthquake and tsunami as large as happened in Japan also happen here?
- Did the Japanese underestimate the size of the maximum credible earthquake and tsunami that could affect the plants?
- How high was the tsunami at the Fukushima nuclear plants?
- Was the damage to the Japanese nuclear plants mostly from the earthquake or the tsunami?

Quick Links...

- [NPJ Website](#)
- [Cost-free Subscription](#) (to NPJ)
- [JAIF](#)
- [TEPCO](#)
- [NISA](#)
- [U.S. NRC Actions on Japan](#)

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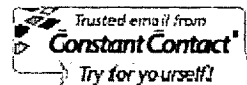
Contact Information

phone: 630-313-6739

email: NPJ@goinfo.com

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 Nuclear Plant Journal | 1400 Opus Place, Suite 904 | Downers Grove | IL | 60515

White, Bernard

From: Allen, William
Sent: Tuesday, April 05, 2011 4:31 PM
To: White, Bernard
Subject: Responses to Public Inquiries Re: Maine Yankee
Attachments: ME Response.docx

A lady who lives near the Maine Yankee site sent Mr. Borchard a letter with some questions. The responsibility of addressing her questions fell to me. My draft responses to her questions are attached. Could you please call me or stop by as soon as possible to briefly discuss them?

Thanks, Chris

- Are there security measures in place to protect Maine residents from natural or man-made disasters?

In addition to the fact that the dry cask storage system employed at Maine Yankee is designed to prevent the release of the radioactive material in the fuel during natural disasters, the Maine Yankee facility is required to have a security plan for the area where the spent fuel is stored. Security measures for the storage area are designed to prevent sabotage or removal of the spent fuel.

- Are there any pre-staged responses in place to protect Maine residents?

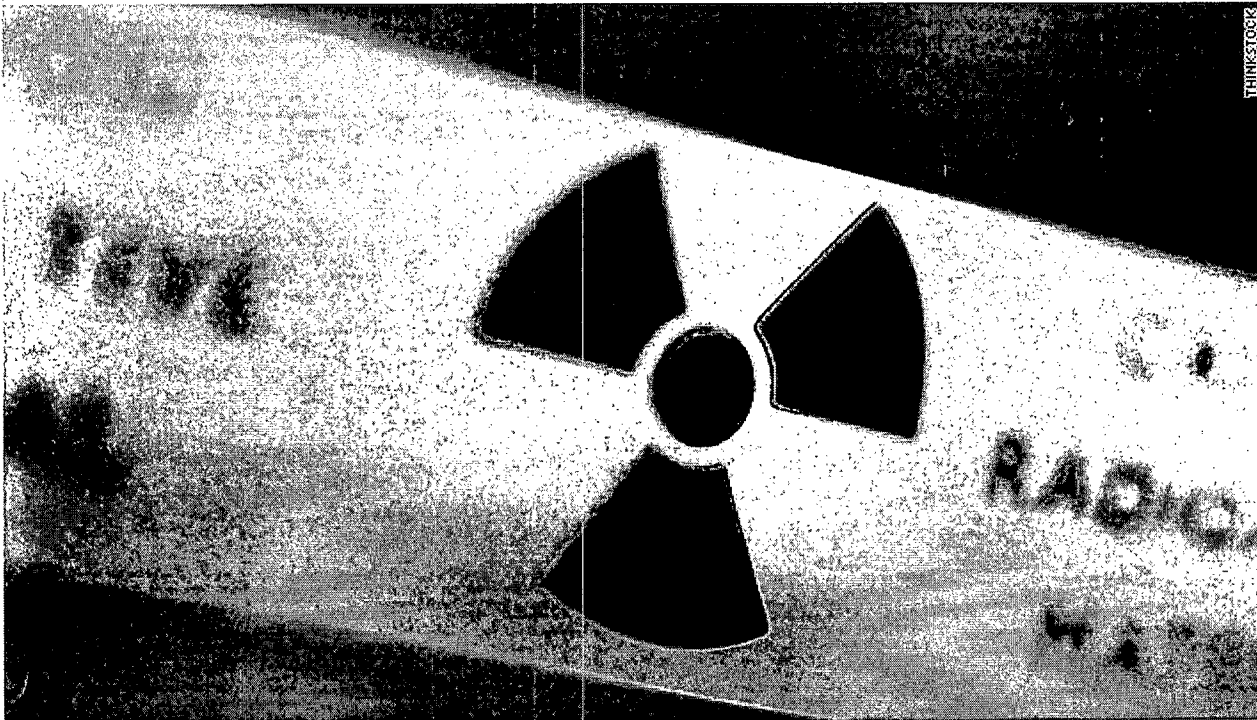
Because of the amount of time which has passed since the Maine Yankee plant ceased operations, the offsite consequences of potential accidents are very small and do not require offsite emergency response.

- What are the containment issues at such an old plant such as Maine Yankee in view of the meltdowns at Japanese nuclear plants?

The containment issues at Maine Yankee are significantly different from those associated with the Japanese plants. First, the heat generated by the fuel at Maine Yankee is much less than that at the Japanese plants because, as you mentioned in your letter, Maine Yankee has not generated electricity since 1996. Second, as of April 29, 2003, all fuel had been removed from both the reactor and the spent fuel pool and placed into a dry storage system. The dry storage system at Maine Yankee uses steel containers which are stored above ground in a vertical orientation inside concrete. The containers used to store the Maine Yankee fuel were fabricated with high standards of quality. The containers were welded shut after the fuel was placed inside, and the containers were filled with an inert gas to insure the fuel rods, which provide an additional layer of containment, retain both their shape and their strength during storage. The dry storage system at Maine Yankee was evaluated as a whole to insure it could withstand a variety of disasters, such as floods, projectiles originating from a tornado, temperature extremes, and lightning strikes. It was designed to provide not only adequate confinement, but also adequate shielding and heat removal under normal and accident conditions.

Bozin, Sunny

From: Franovich, Mike
Sent: Wednesday, April 06, 2011 2:10 PM
To: Ostendorff, William
Cc: Nieh, Ho; Kock, Andrea; Zorn, Jason
Subject: FYI: Communication on Health Risks from Health Professionals at CDC
Attachments: image001.gif; image002.gif; image003.png; image004.jpg; image005.jpg; image006.jpg; image007.jpg; image008.jpg; image009.jpg; image010.jpg; image011.jpg; image012.jpg; image013.jpg; image014.gif; image015.jpg; image016.gif; image017.gif; image018.gif



April 5th, 2011
3:25 PM ET

CDC chief: Americans not at risk from radiation

Linuscole amounts of radiation detected in the United States do not pose any risk to Americans' health, Centers for Disease Control and Prevention Director Dr. Thomas Frieden reiterated Tuesday.

"We do not expect radiation to reach problematic levels," he said on a conference call with

V/203

I actively monitoring the air, the food and the water supplies in the U.S. for any evidence of contamination.

r. William Jones, acting director for the FDA's division of food safety, echoed Frieden's sentiments.

There is a great deal of monitoring going on for any product that comes into this country," said Jones. "Anything contaminated to level where it could pose a concern would be detected."

Also at issue on Tuesday's call: Whether Americans should be taking or stockpiling potassium iodide pills.

I understand that there are a lot of people who want to have [the pills]," Frieden said, "But I want to say unequivocally that there is no reason for anyone in the U.S. to take potassium iodide pills at this time."

Potassium iodide pills (also known as KI pills) can be helpful for people in the immediate vicinity of a nuclear accident, by preventing the thyroid gland from taking in radioactive iodine. However, KI pills only protect the thyroid and are not recommended for wider consumption, Frieden said, due to the inherent health risks associated with taking the pills, such as allergic reactions, stomach upset, inflammation of the salivary glands and certain thyroid conditions.

Potassium iodide is part of the broader strategy on how we would prepare for exposure in the event of a significant incident," he said, "but we don't anticipate any scenario where we would need potassium iodide in the U.S. from the incident in Japan."

Frieden and his colleagues at the FDA went on to say that there are no devices or pills that can protect the entire body from radiation, despite claims made by some online retailers.

There is nothing that is currently approved as a silver bullet," said Patricia Hansen, a senior scientist at the FDA. "Those claims are fraudulent."

Host by: Matt Sloane - CNN Medical Producer

Filed under: Crisis in Japan • Food Safety • Radiation

Cronk, Kevin

From: Ulses, Anthony
Sent: Wednesday, April 06, 2011 9:42 AM
To: Trapp, James
Subject: Some Slides
Attachments: Our time in Japan.pptx; Fukuchima PP Areva.pdf

Jim,

My boss suggested some slides. Any comments. Also, should we show the progression slides from the AREVA pdf?

Thanks,

Anthony Ulses, Chief
Reactor Systems Branch
Division of Safety Systems
Office of Nuclear Reactor Regulation
Work: (301) 415-8539
Mobile: (301) 452-7404
FAX: (301) 415-3577

Our time in Japan

The Early Days

- Instructions were to “GET TO JAPAN!”
- En-route, it was decided that Jim and I would work from the US Embassy
- On the ground early morning Monday, March 14th JST
- Relief team arrived Wednesday afternoon

Brief Chronology Units 1 and 2

- Unit 1
 - IC worked until dry
 - Roughly 24 hours with injection
 - Reactor Building explosion 1536 March 12th ,JST
 - Seawater followed by freshwater injection at MDRIR
- Unit 2
 - RCIC initially worked until 1318 March 14th JST
 - Intermittent problems with SRV leading to periods of no injection
 - Switched to seawater followed by freshwater injection at MDRIR

Brief Chronology for Unit 3

- Unit 3
 - Unclear if RCIC worked
 - Possibly up to 24 hours without injection
 - Reactor building explosion 1101 March 14th JST
 - Switched to seawater followed by freshwater injection at MDRIR
 - Injecting water from concrete pumper into SFP

Brief Chronology for Unit 4

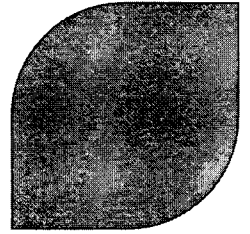
- Unit 4
 - Probable damage to SFP due to earthquake
 - Boiloff rates do not allow for fuel uncover
 - Reactor building exploded late night 15 March JST
 - Currently injection water into SFP via concrete pumper truck

Our Role

- Advise the Ambassador
- Offer US assistance (and some assessment) to Japanese Government



The Fukushima Daiichi Incident

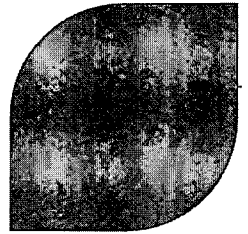


1. Plant Design
2. Accident Progression
3. Radiological releases
4. Spent fuel pools
5. Sources of Information

Matthias Braun
PEPA4-G, AREVA-NP GmbH
Matthias.Braun@AREVA.com

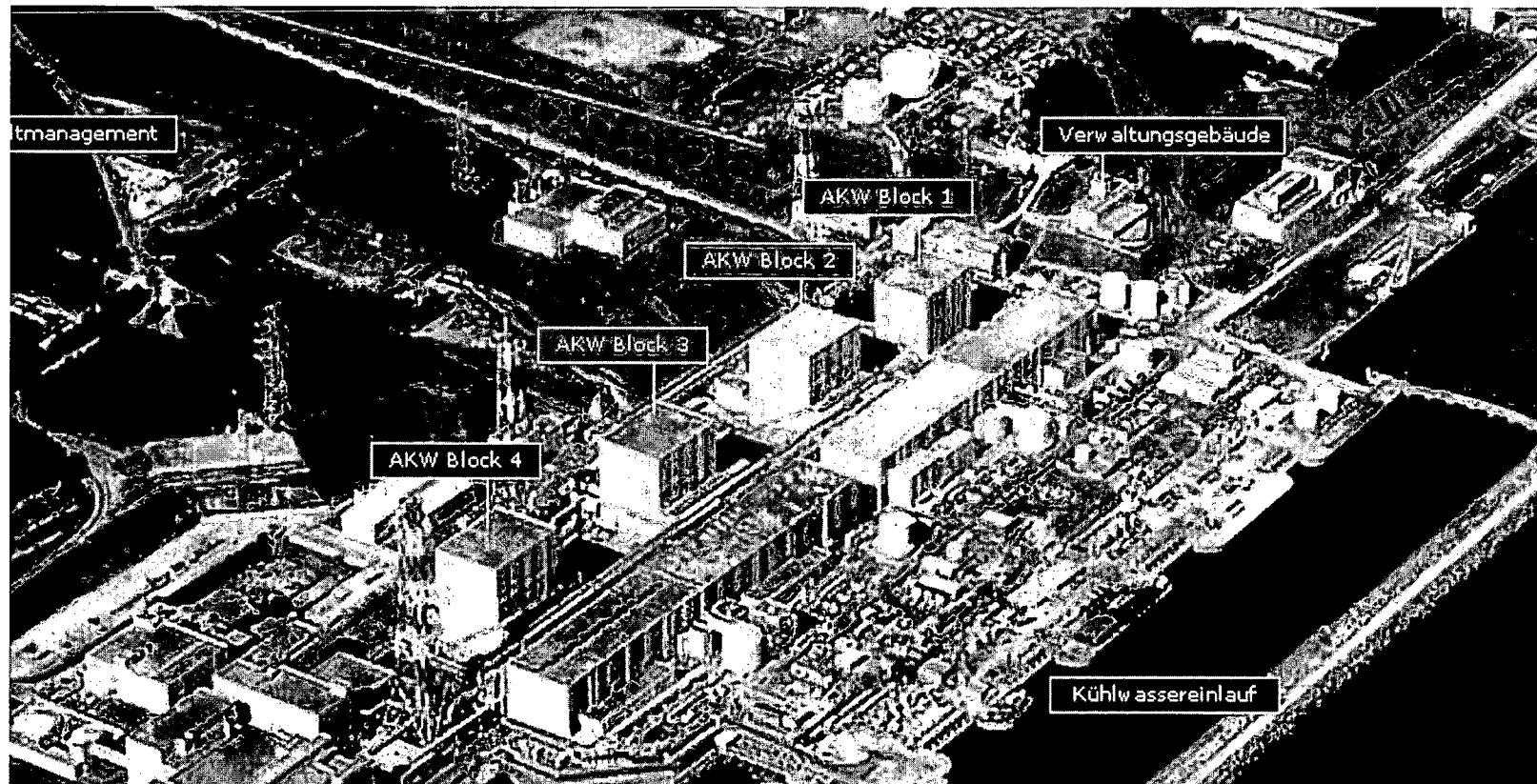
The Fukushima Daiichi Incident

1. Plant Design



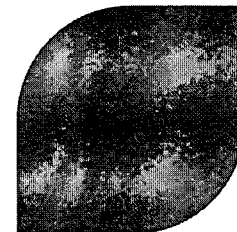
► Fukushima Daiichi (Plant I)

- ◆ Unit I - GE Mark I BWR (439 MW), Operating since 1971
- ◆ Unit II-IV - GE Mark I BWR (760 MW), Operating since 1974



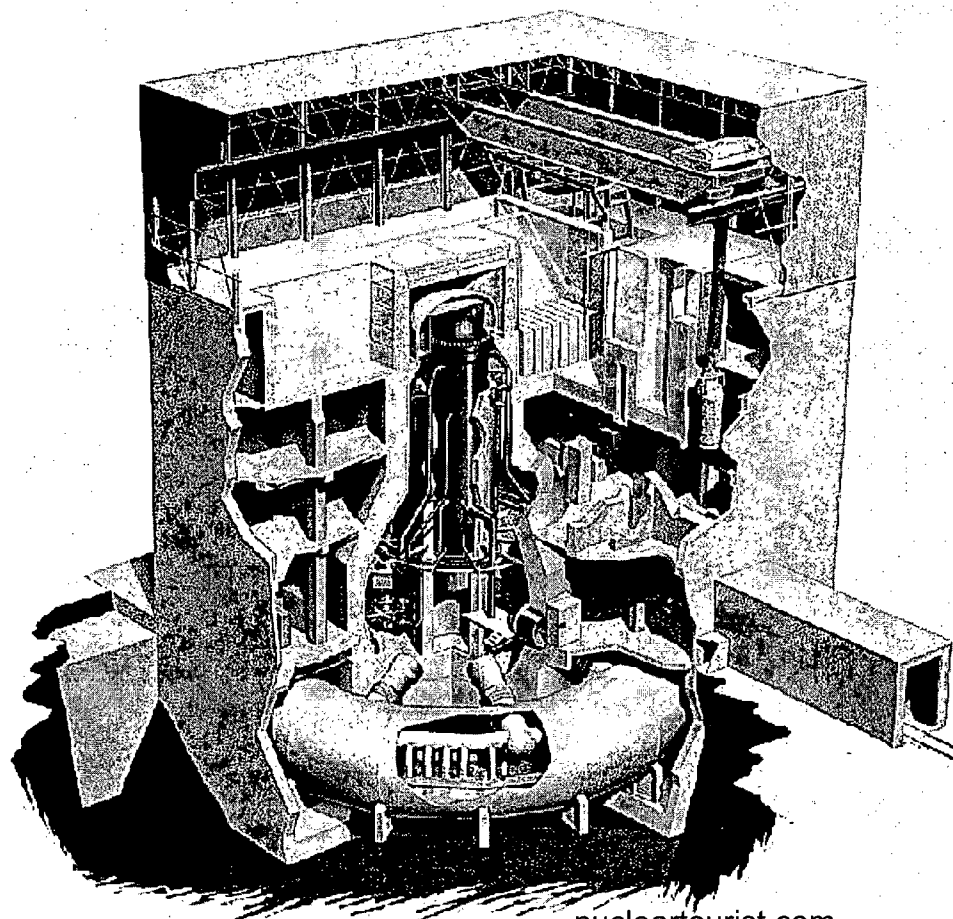
The Fukushima Daiichi Incident

1. Plant Design



► Building structure

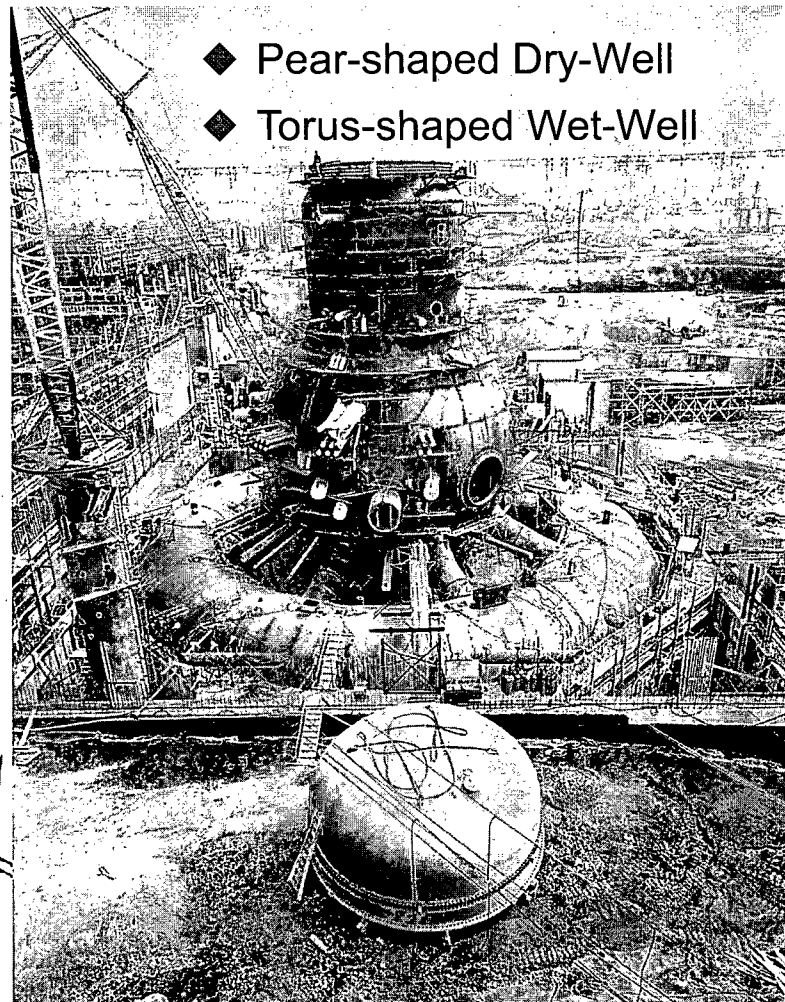
- ◆ Concrete Building
- ◆ Steel-framed Service Floor



nucleartourist.com

► Containment

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

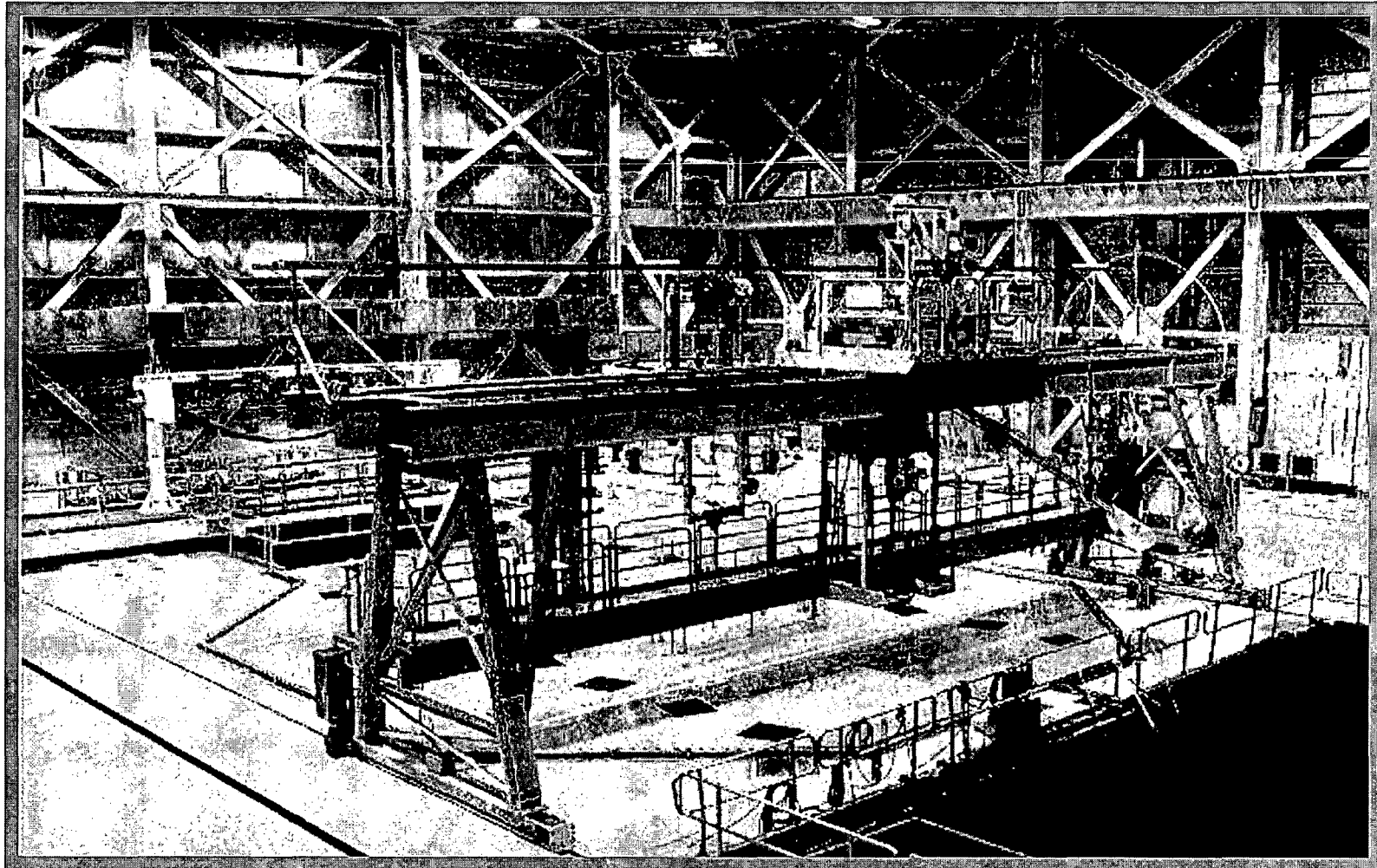


en.wikipedia.org/wiki/Browns_Ferry_Nuclear_Power_Plant

The Fukushima Daiichi Incident

1. Plant Design

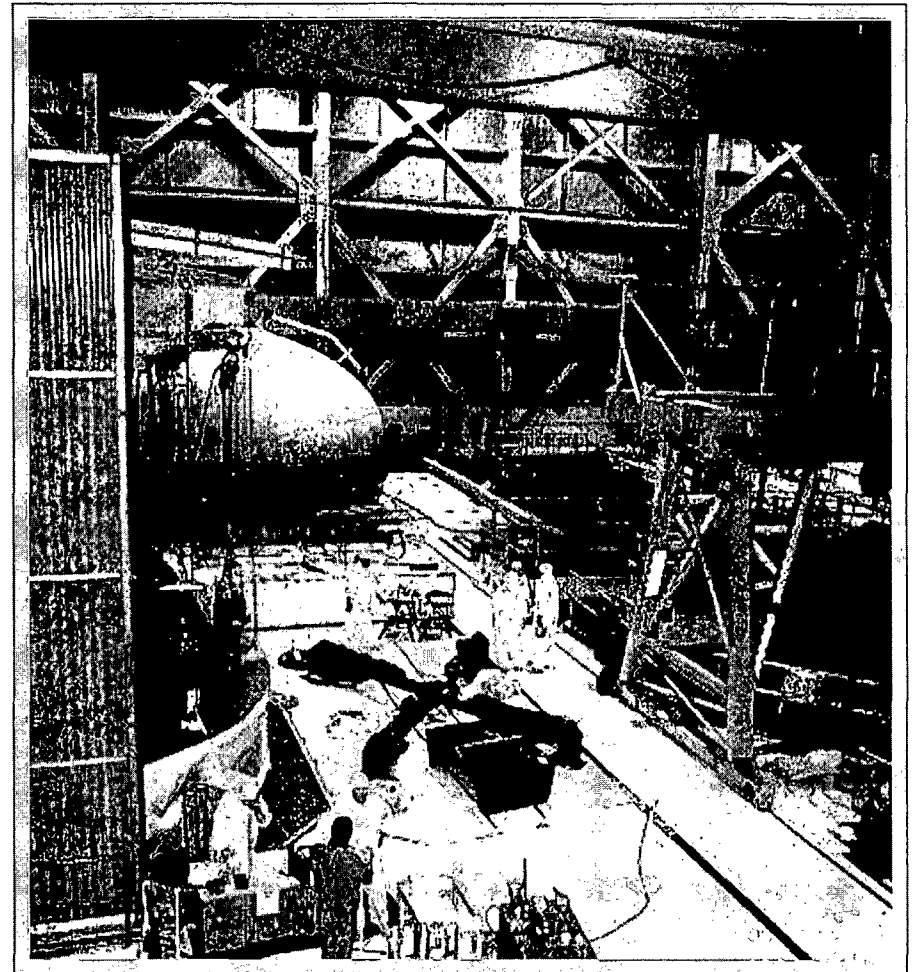
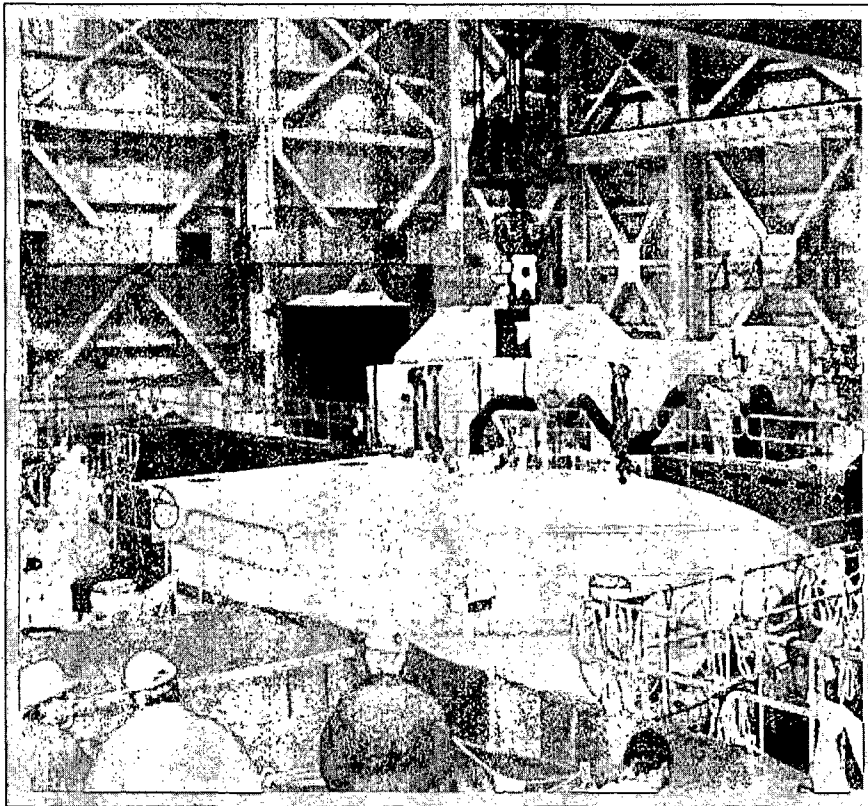
► Service Floor



The Fukushima Daiichi Incident

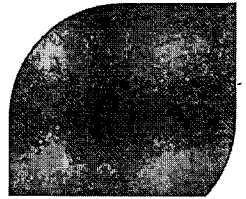
1. Plant Design

- Lifting the Containment closure head



The Fukushima Daiichi Incident

1. Plant Design



► Reactor Service Floor
(Steel Construction)

► Concrete Reactor Building
(secondary Containment)

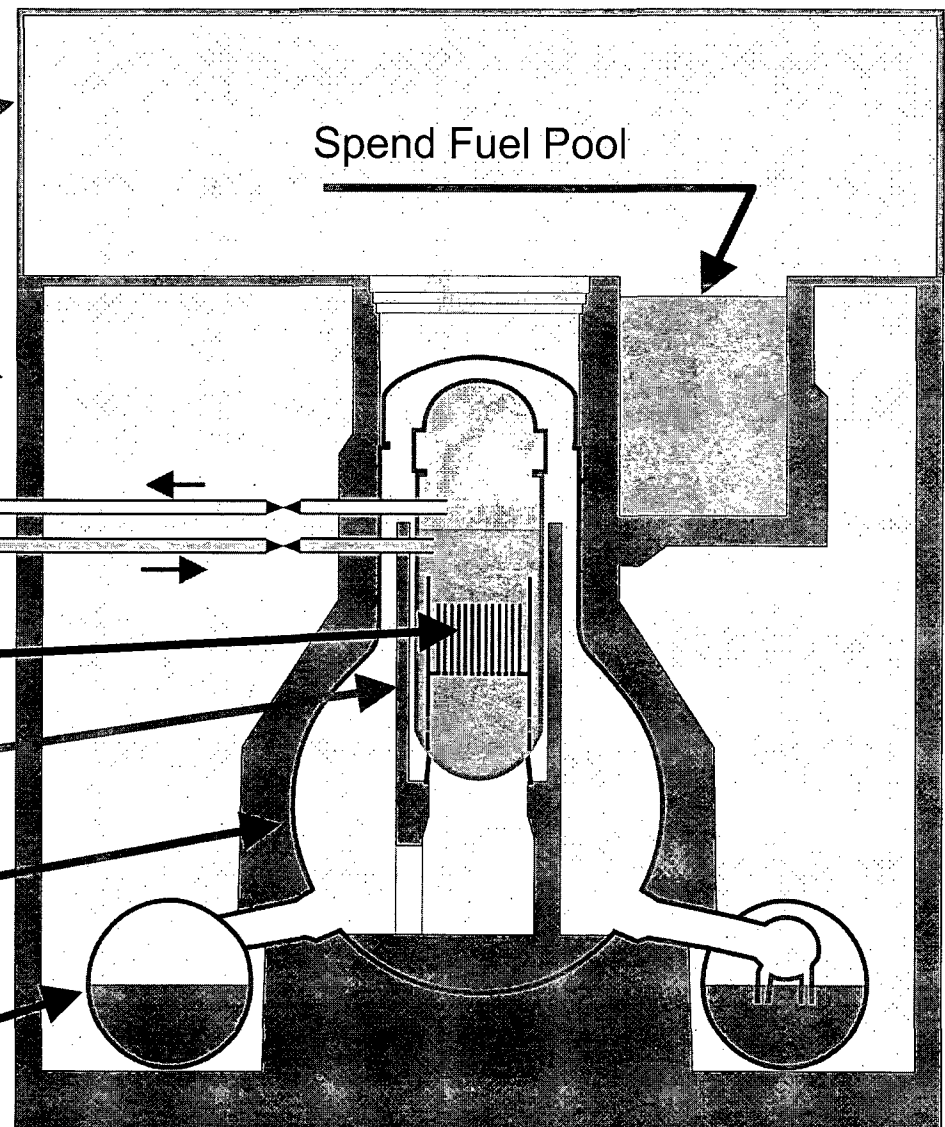
Fresh Steam line
Main Feedwater

► Reactor Core

► Reactor Pressure Vessel

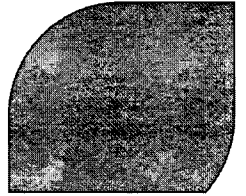
► Containment (Dry well)

► Containment (Wet Well) /
Condensation Chamber



The Fukushima Daiichi Incident

2. Accident progression

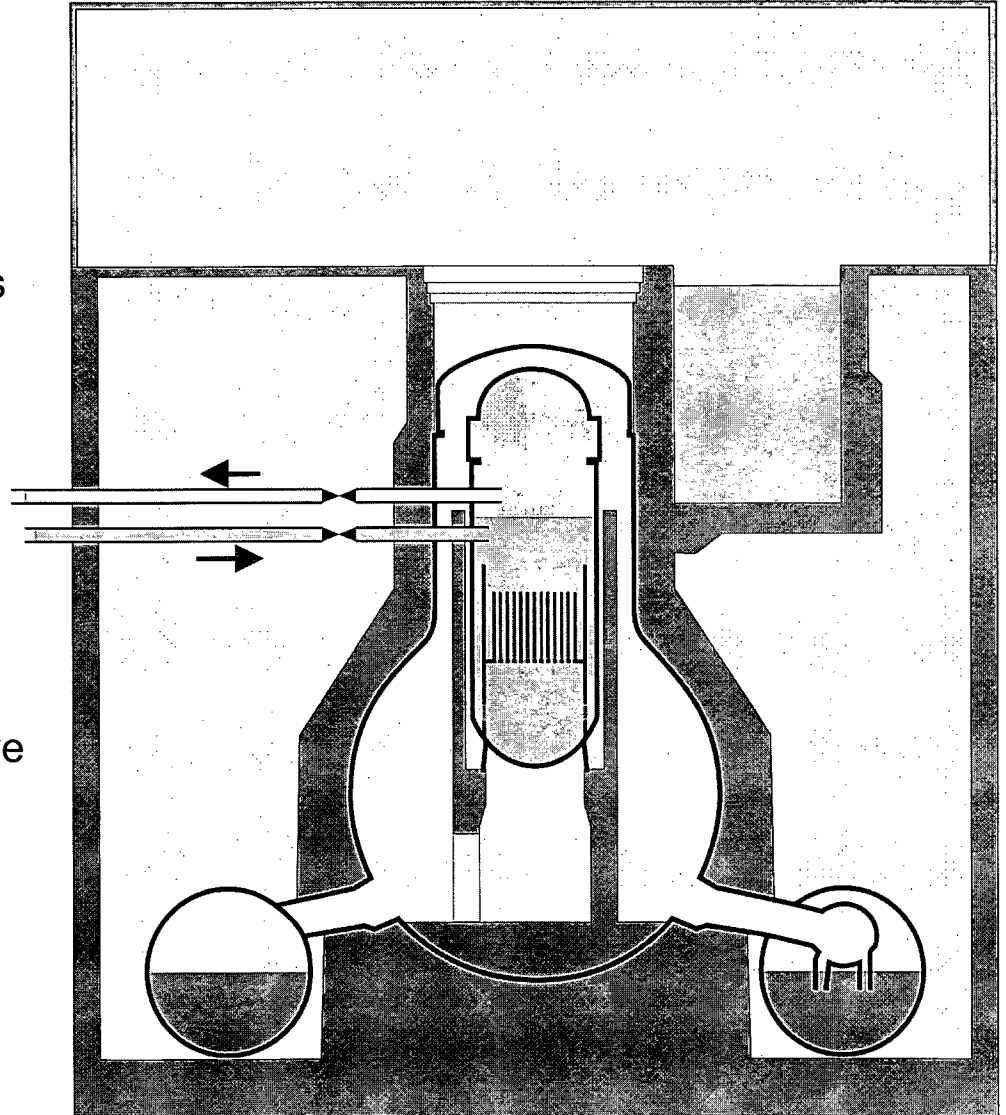


► 11.3.2011 14:46 - Earthquake

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

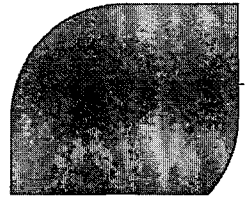
► SCRAM

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

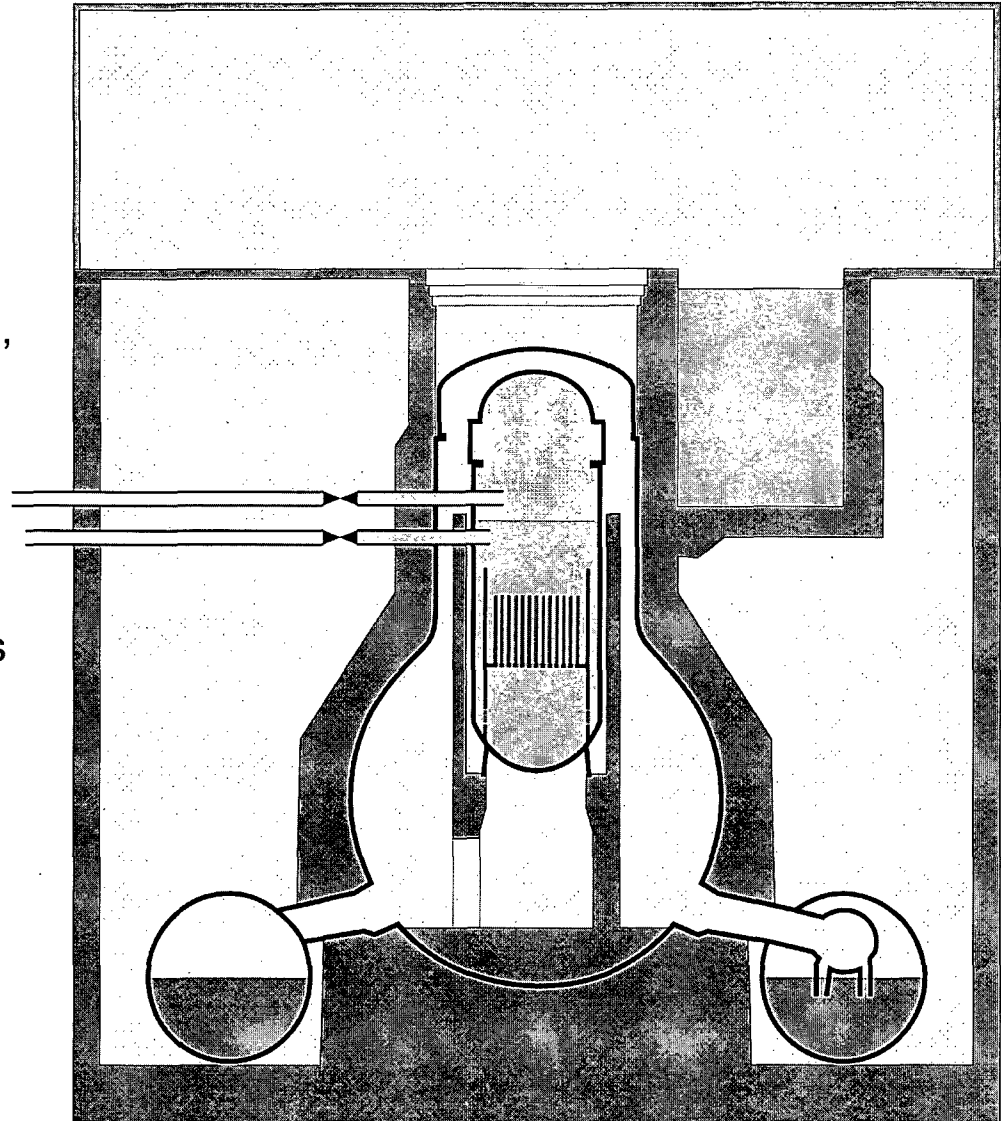


The Fukushima Daiichi Incident

2. Accident progression



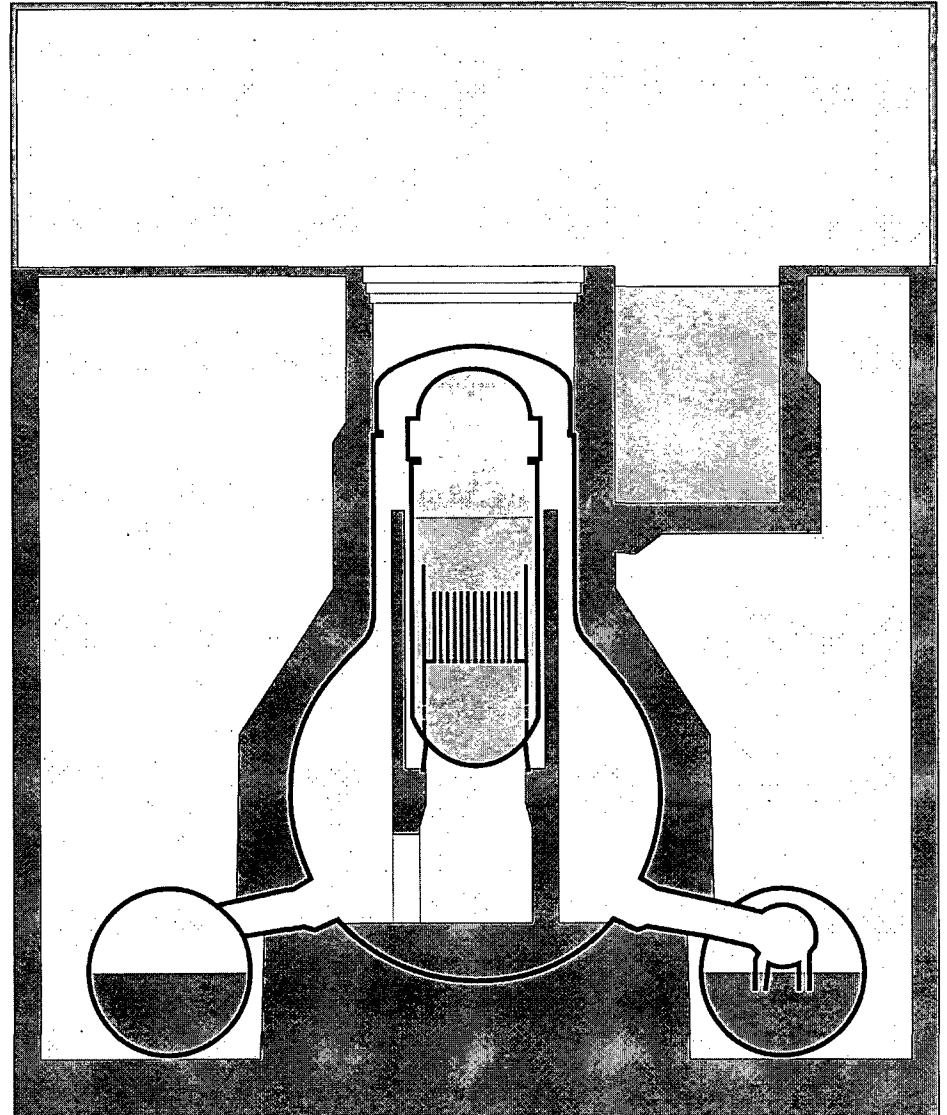
- ▶ Containment Isolation
 - ◆ Closing of all non-safety related Penetrations of the containment
 - ◆ Cuts off Machine hall
 - ◆ If containment isolation succeeds, a large early release of fission products is highly unlikely
- ▶ Diesel generators start
 - ◆ Emergency Core cooling systems are supplied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



The Fukushima Daiichi Incident

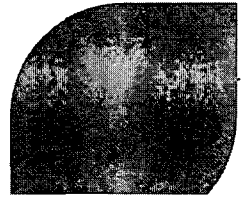
2. Accident progression

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

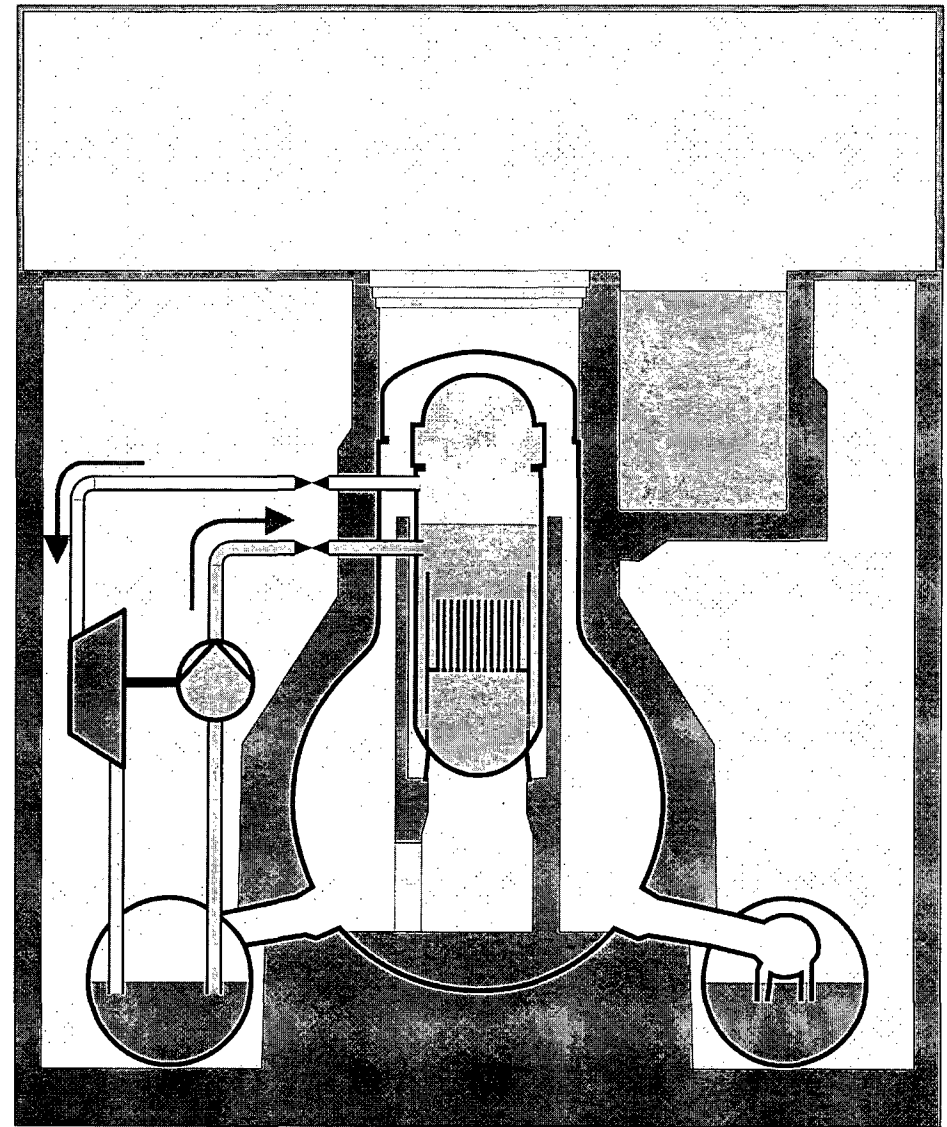


The Fukushima Daiichi Incident

2. Accident progression

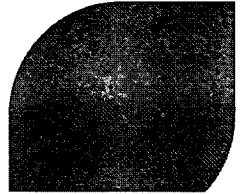


- ▶ Reactor Core Isolation Pump still available
 - ◆ Steam from the Reactor drives a Turbine
 - ◆ Steam gets condensed in the Wet-Well
 - ◆ Turbine drives a Pump
 - ◆ Water from the Wet-Well gets pumped in Reactor
 - ◆ Necessary:
 - Battery power
 - Temperature in the wet-well must be below 100°C
- ▶ As there is no heat removal from the building, the Core isolation pump can't work infinitely

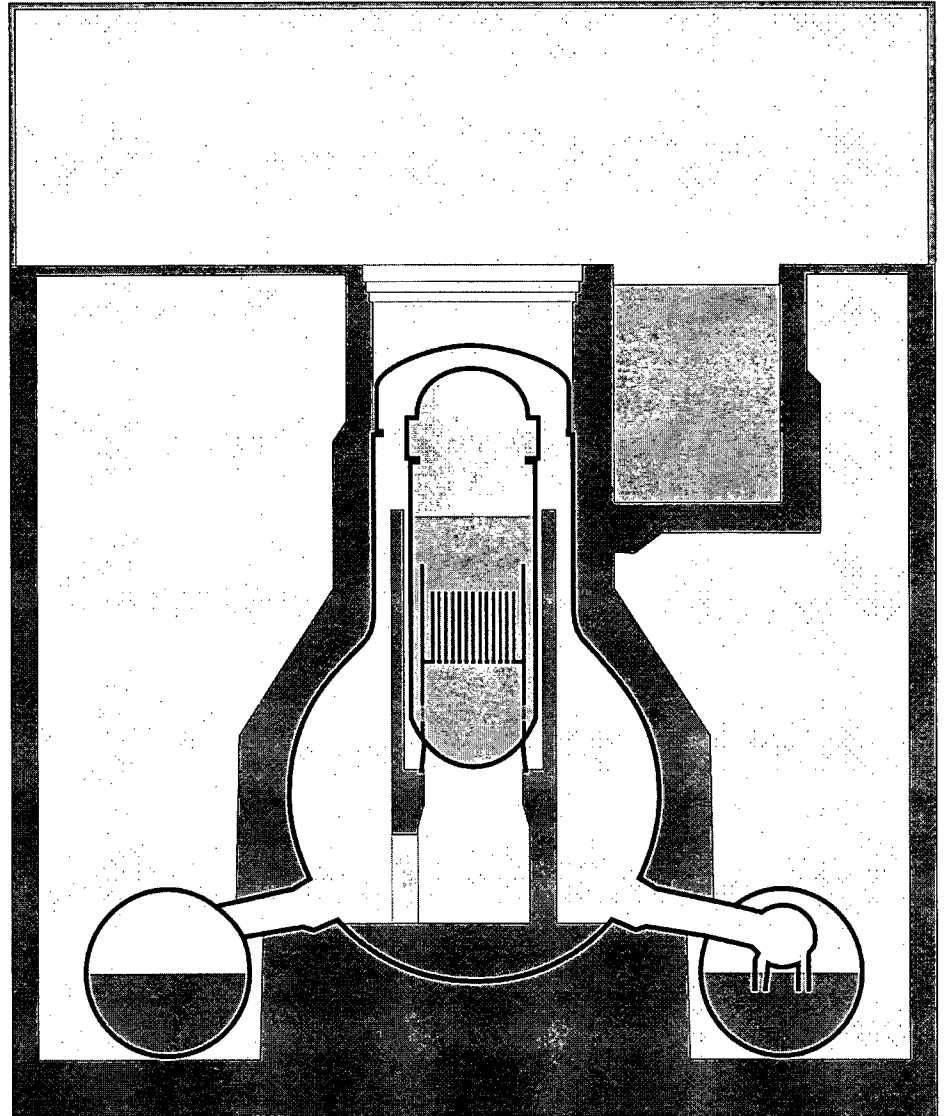


The Fukushima Daiichi Incident

2. Accident progression

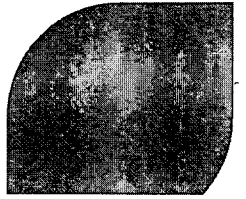


- ▶ Reactor Isolation pump stops
 - ◆ 11.3. 16:36 in Unit 1 (Batteries empty)
 - ◆ 14.3. 13:25 in Unit 2 (Pump failure)
 - ◆ 13.3. 2:44 in Unit 3 (Batteries empty)
- ▶ Decay Heat produces still steam in Reactor pressure Vessel
 - ◆ Pressure rising
- ▶ Opening the steam relief valves
 - ◆ Discharge Steam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

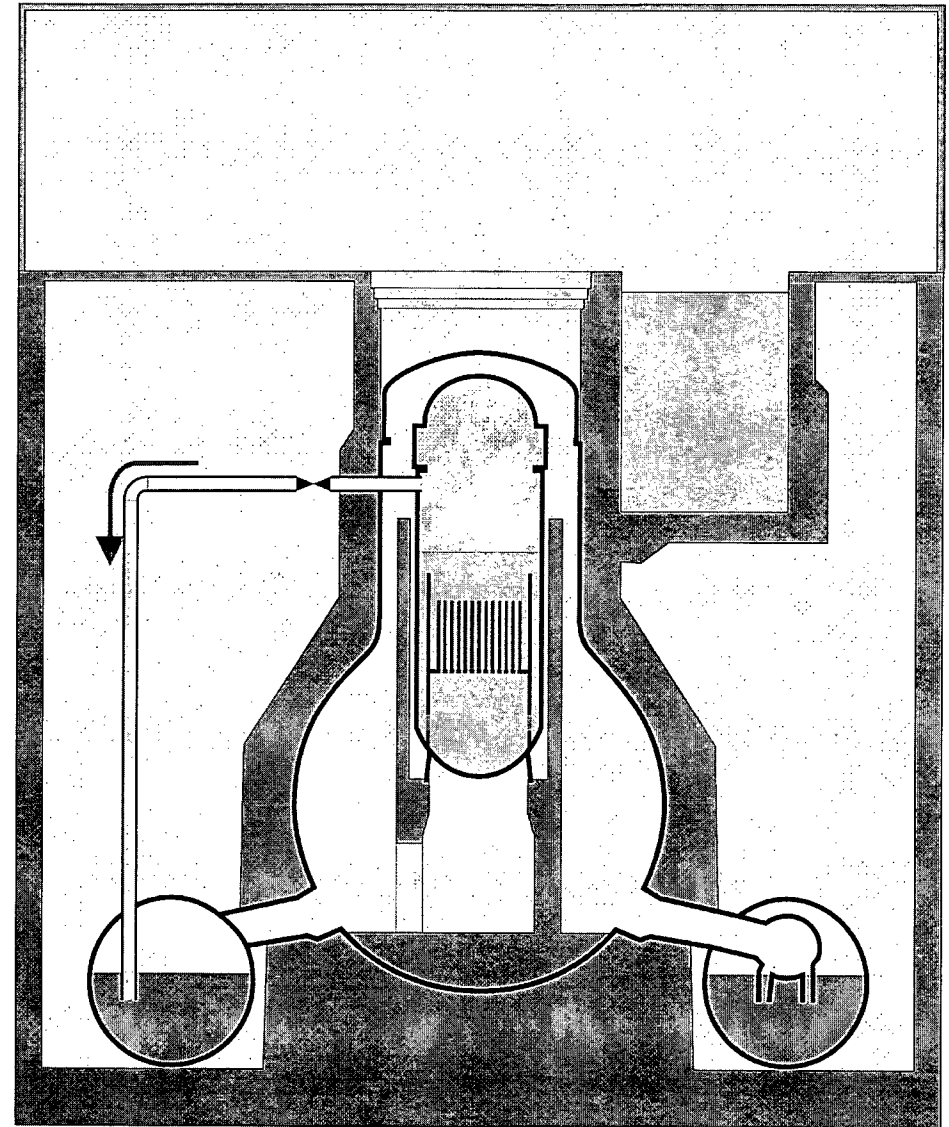


The Fukushima Daiichi Incident

2. Accident progression



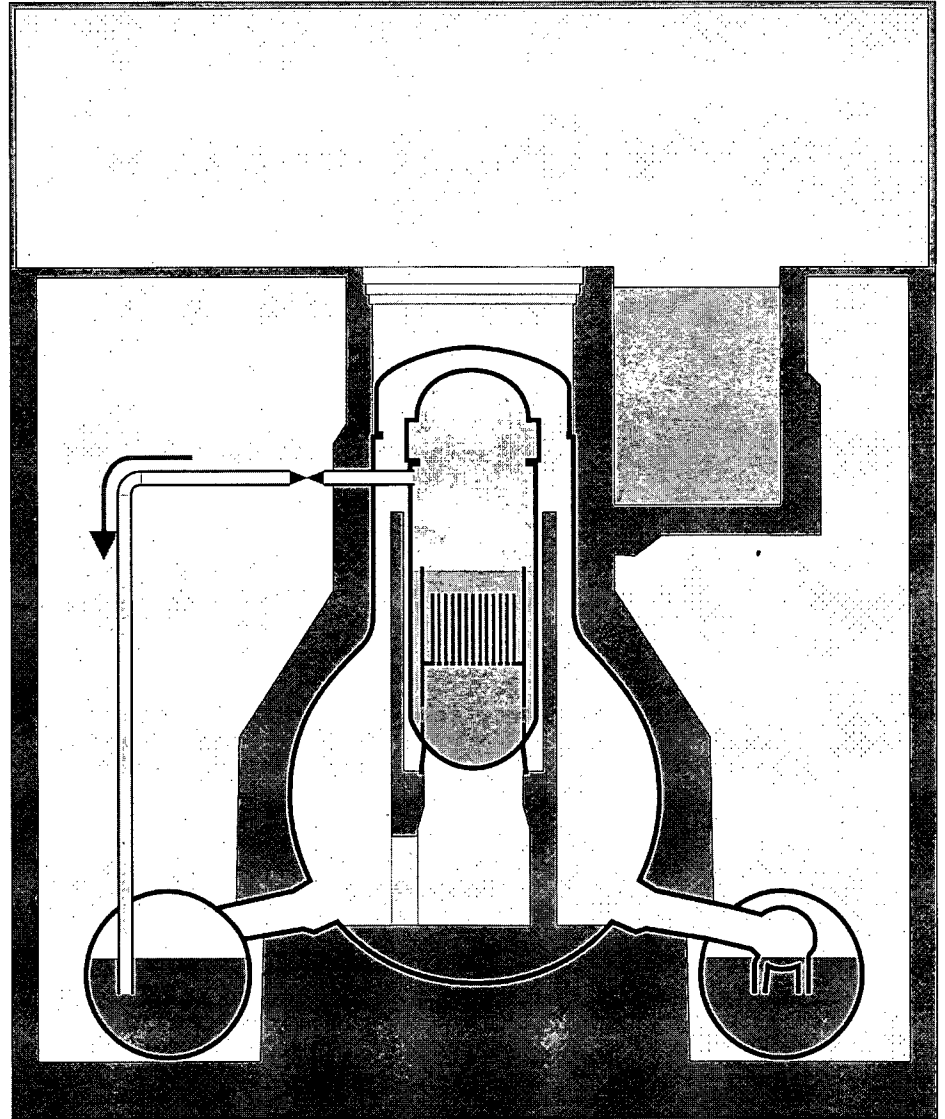
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The Fukushima Daiichi Incident

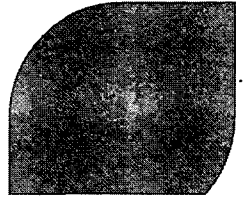
2. Accident progression

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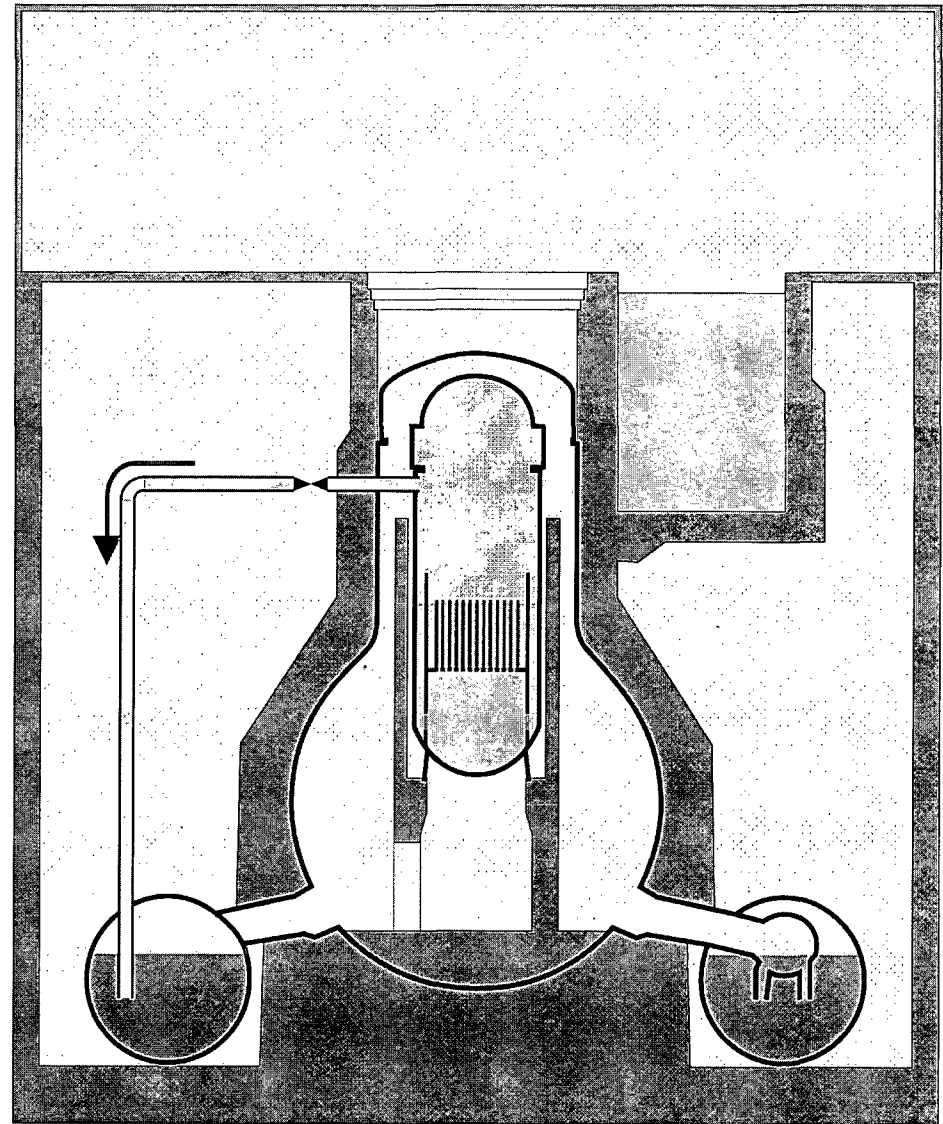


The Fukushima Daiichi Incident

2. Accident progression

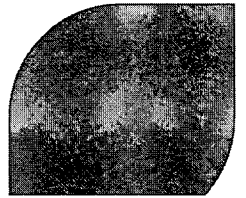


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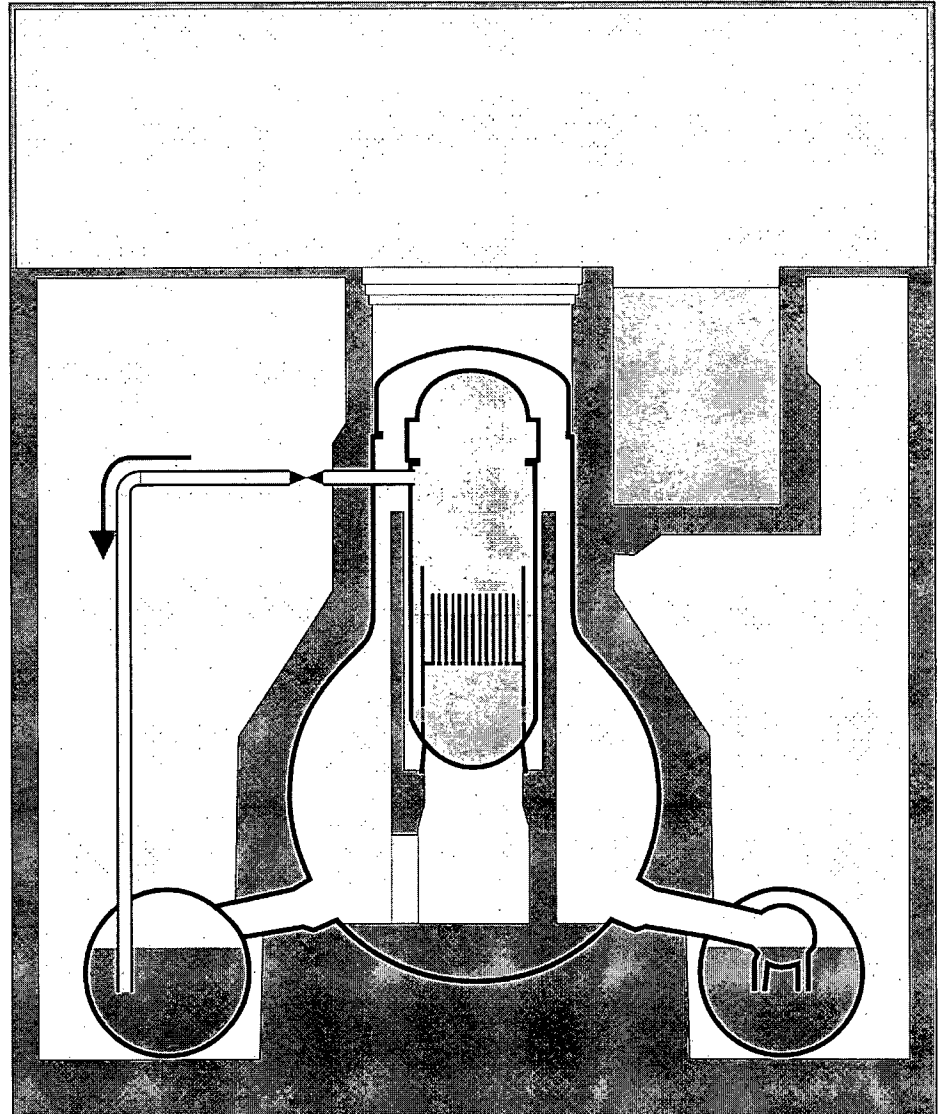


The Fukushima Daiichi Incident

2. Accident progression

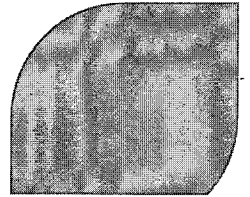


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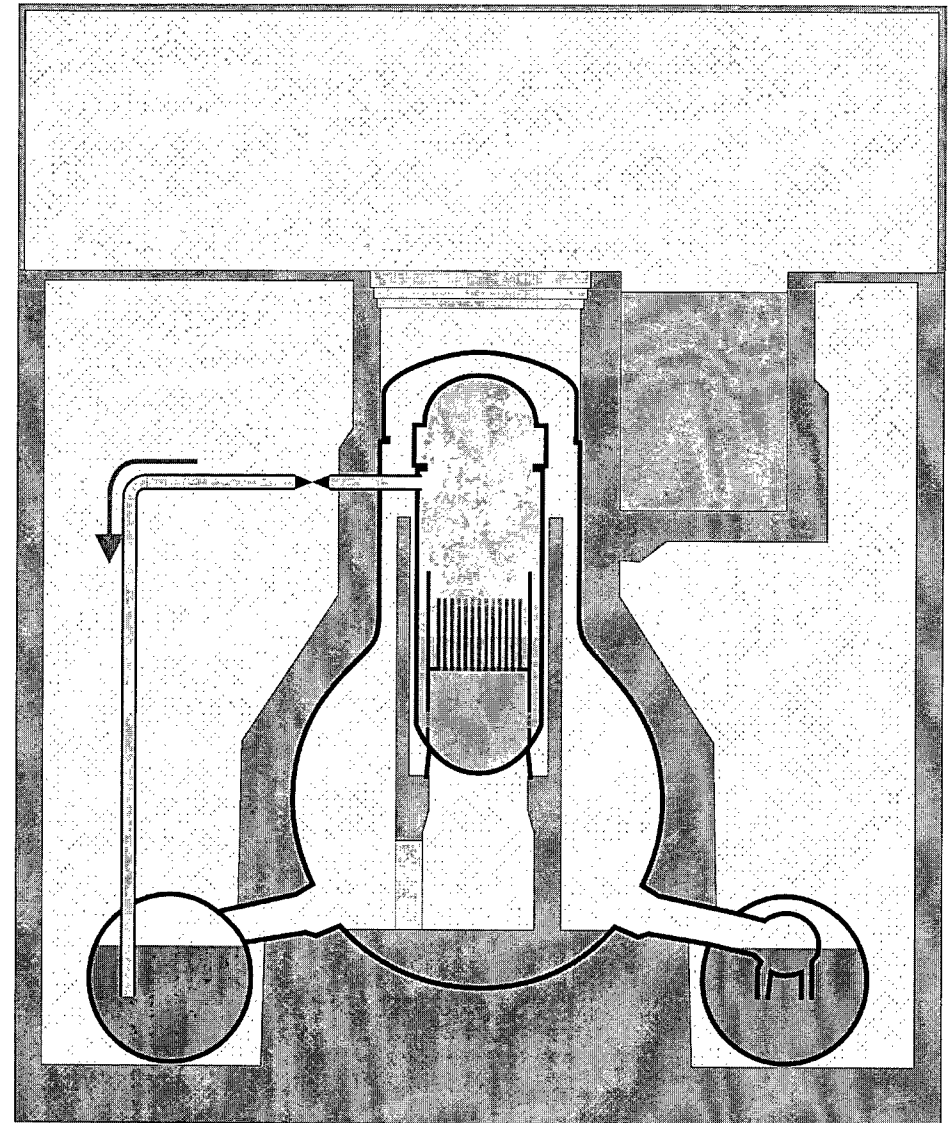


The Fukushima Daiichi Incident

2. Accident progression

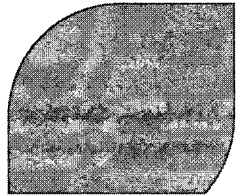


- ▶ Measured, and here referenced Liquid level is the collapsed level. The actual liquid level lies higher due to the steam bubbles in the liquid
- ▶ ~50% of the core exposed
 - ◆ Cladding temperatures rise, but still no significant core damage
- ▶ ~2/3 of the core exposed
 - ◆ Cladding temperature exceeds $\sim 900^{\circ}\text{C}$
 - ◆ Ballooning / Breaking of the cladding
 - ◆ Release of fission products from the fuel rod gaps

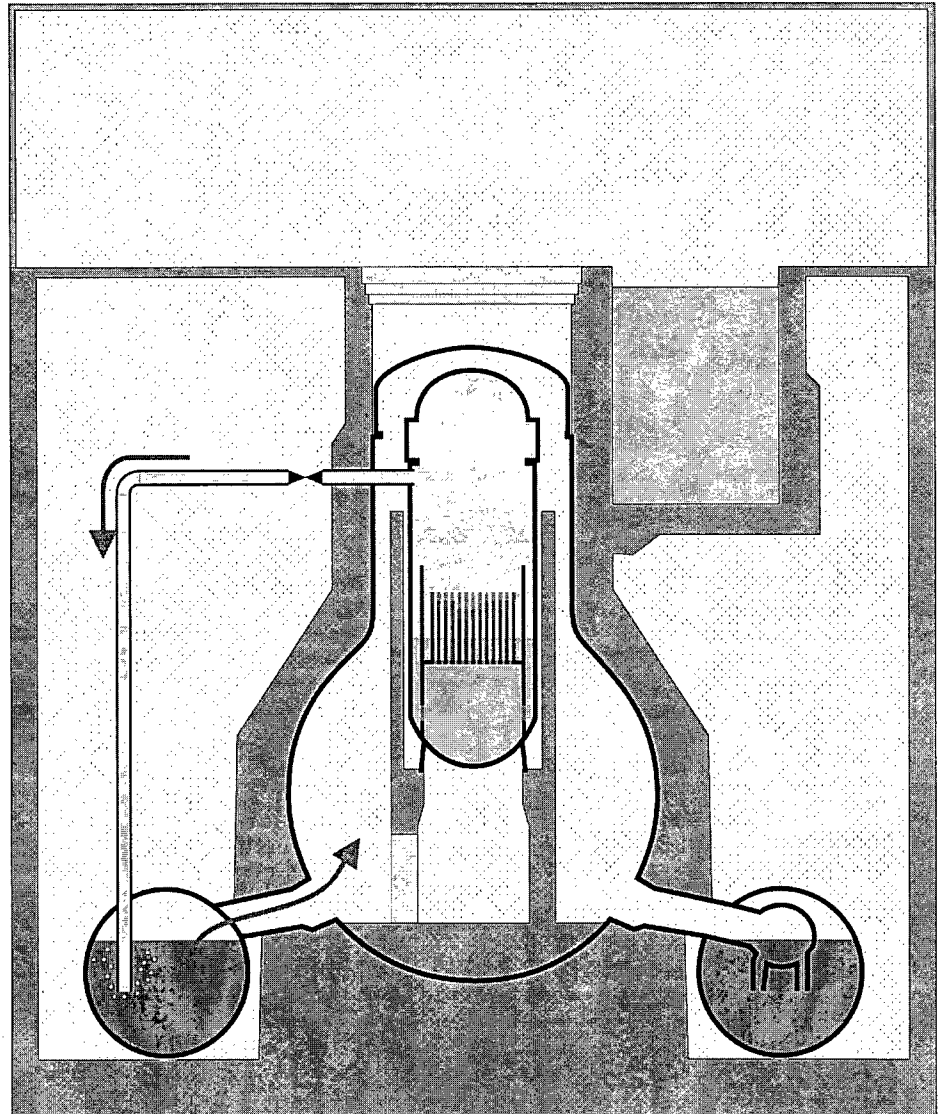


The Fukushima Daiichi Incident

2. Accident progression

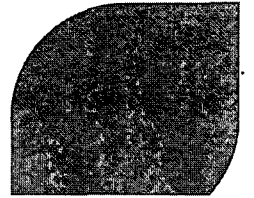


- ▶ ~3/4 of the core exposed
 - ◆ Cladding exceeds ~1200°C
 - ◆ Zirconium in the cladding starts to burn under Steam atmosphere
 - ◆ $\text{Zr} + 2\text{H}_2\text{O} \rightarrow \text{ZrO}_2 + 2\text{H}_2$
 - ◆ Exothermal reaction further heats the core
 - ◆ Generation of hydrogen
 - Unit 1: 300-600kg
 - Unit 2/3: 300-1000kg
 - ◆ Hydrogen gets pushed via the wet-well and wet-well vacuum breakers into the dry-well

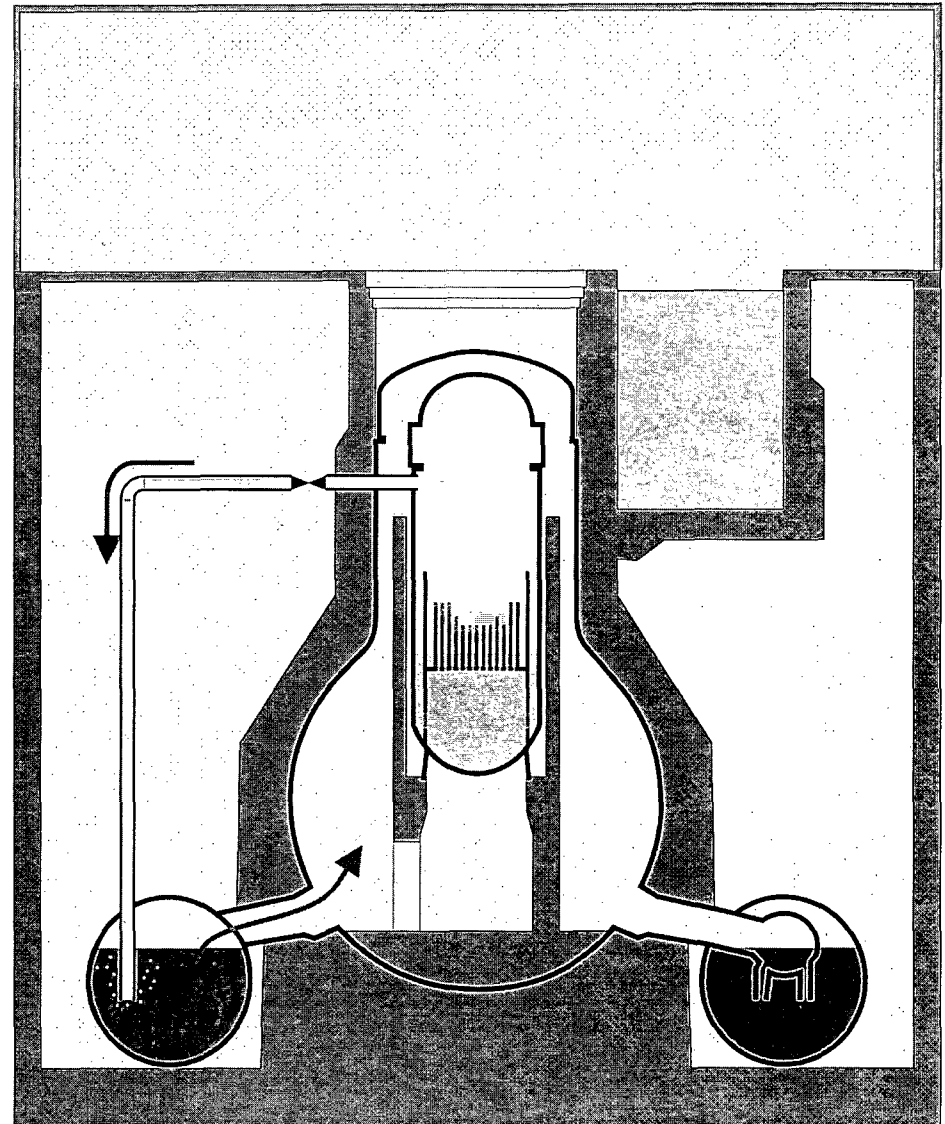


The Fukushima Daiichi Incident

2. Accident progression



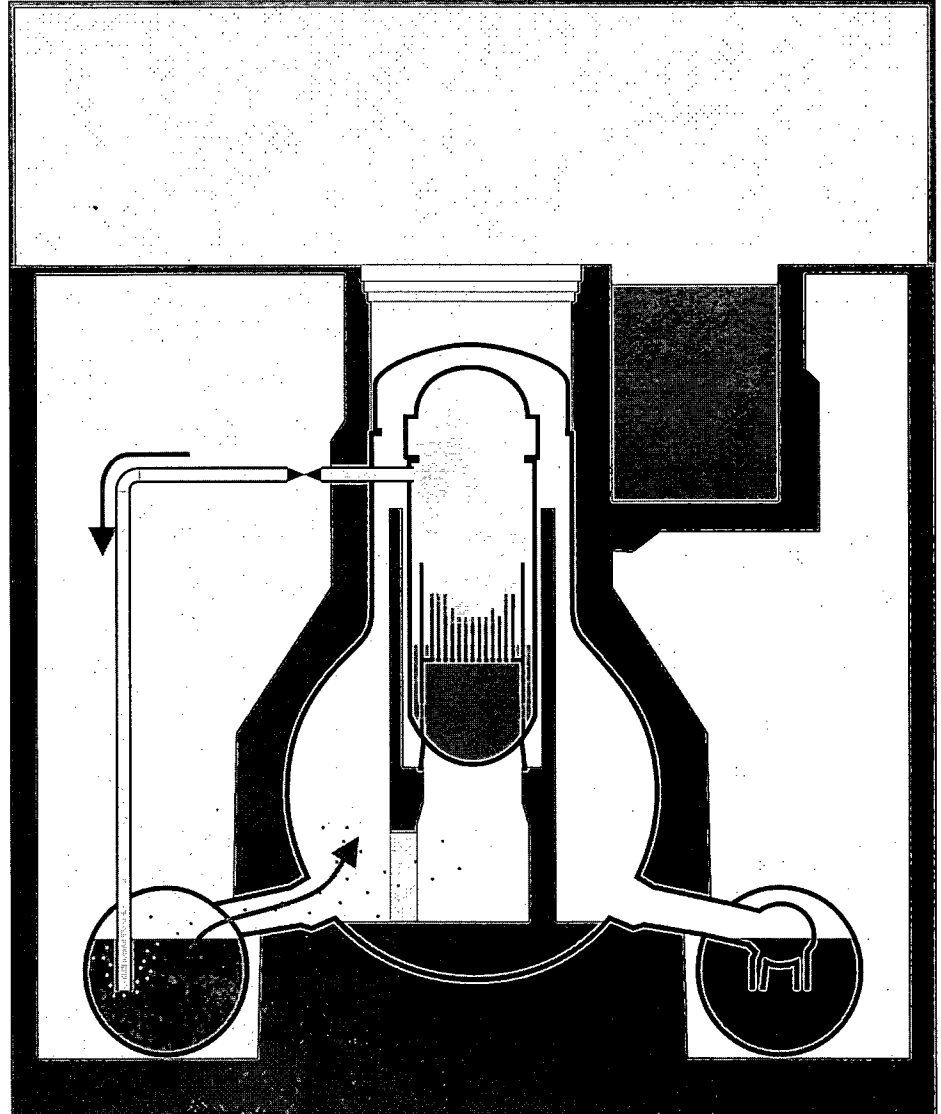
- ▶ at ~1800°C [Unit 1,2,3]
 - ◆ Melting of the Cladding
 - ◆ Melting of the steel structures
- ▶ at ~2500°C [Block 1,2]
 - ◆ Breaking of the fuel rods
 - ◆ debris bed inside the core
- ▶ at ~2700°C [Block 1]
 - ◆ Melting of Uranium-Zirconium eutectics
- ▶ Restoration of the water supply stops accident in all 3 Units
 - ◆ Unit 1: 12.3. 20:20 (27h w.o. water)
 - ◆ Unit 2: 14.3. 20:33 (7h w.o. water)
 - ◆ Unit 3: 13.3. 9:38 (7h w.o. water)



The Fukushima Daiichi Incident

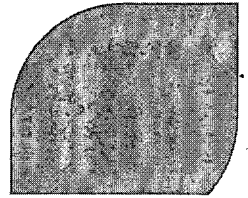
2. Accident progression

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

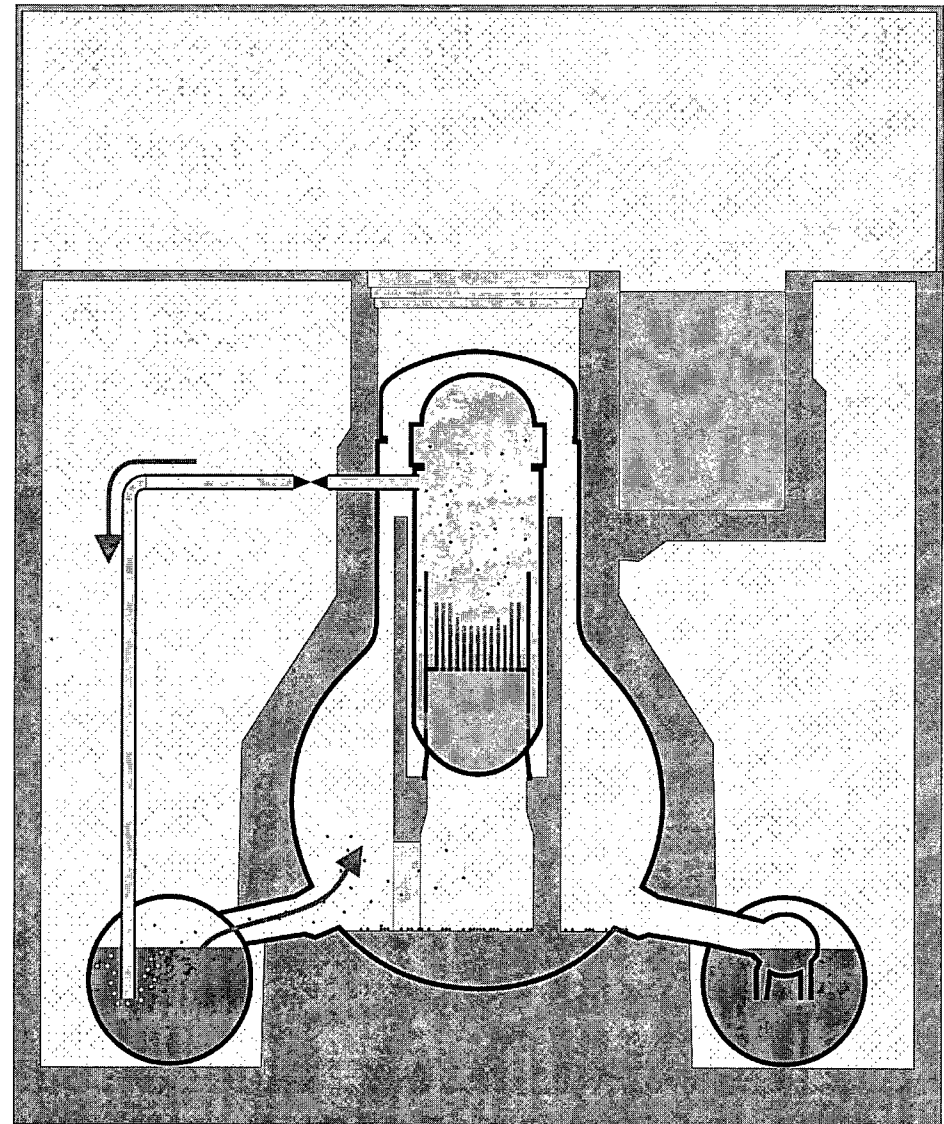


The Fukushima Daiichi Incident

2. Accident progression

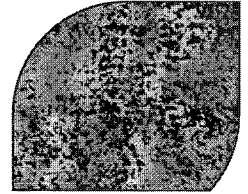


- ▶ Containment
 - ◆ Last barrier between Fission Products and Environment
 - ◆ Wall thickness ~3cm
 - ◆ Design Pressure 4-5bar
- ▶ Actual pressure up to 8 bars
 - ◆ Normal inert gas filling (Nitrogen)
 - ◆ Hydrogen from core oxidation
 - ◆ Boiling condensation chamber (like a pressure cooker)
- ▶ Depressurization of the containment
 - ◆ Unit 1: 12.3. 4:00
 - ◆ Unit 2: 13.3 00:00
 - ◆ Unit 3: 13.3. 8.41

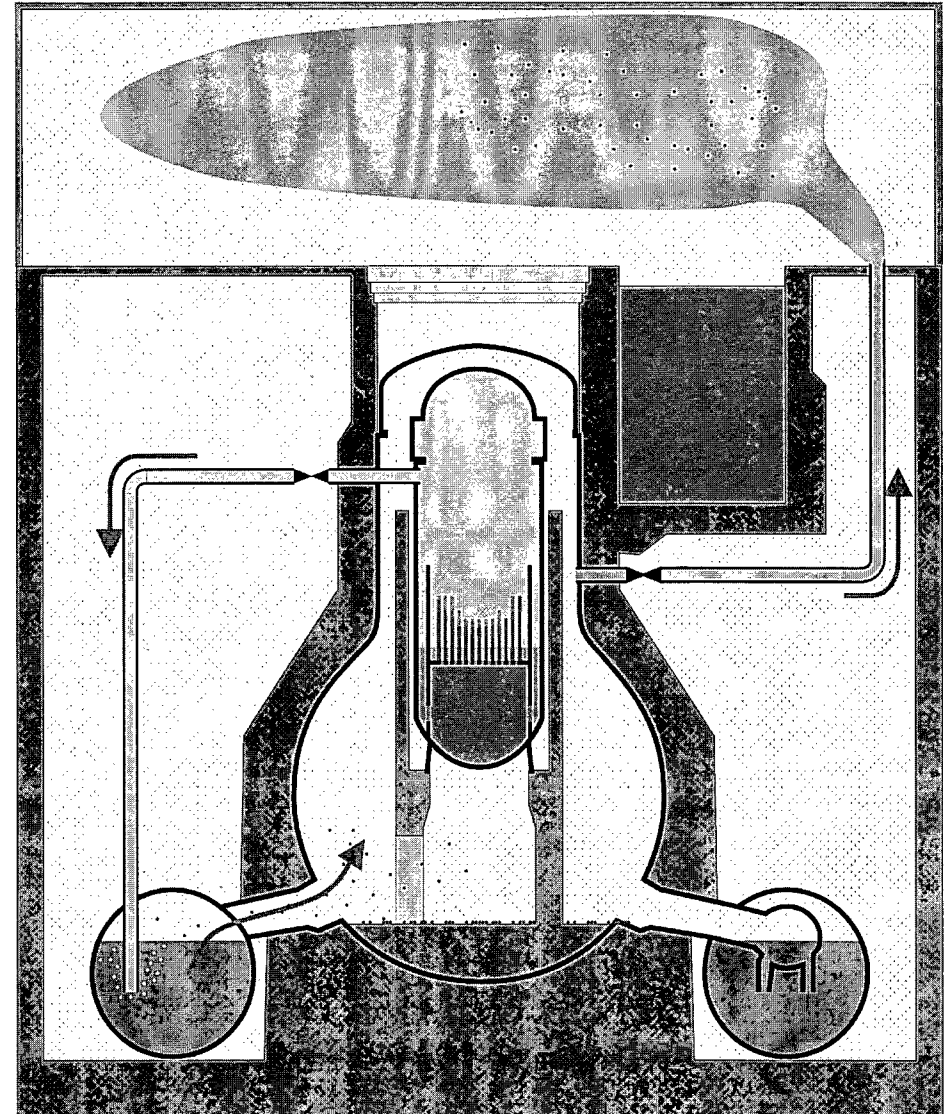


The Fukushima Daiichi Incident

2. Accident progression



- ▶ Positive and negative Aspects of depressurizing the containment
 - ◆ Removes Energy from the Reactor building (only way left)
 - ◆ Reducing the pressure to ~4 bar
 - ◆ Release of small amounts of Aerosols (Iodine, Cesium ~0.1%)
 - ◆ Release of all noble gases
 - ◆ Release of Hydrogen
- ▶ Gas is released into the reactor service floor
 - ◆ Hydrogen is flammable



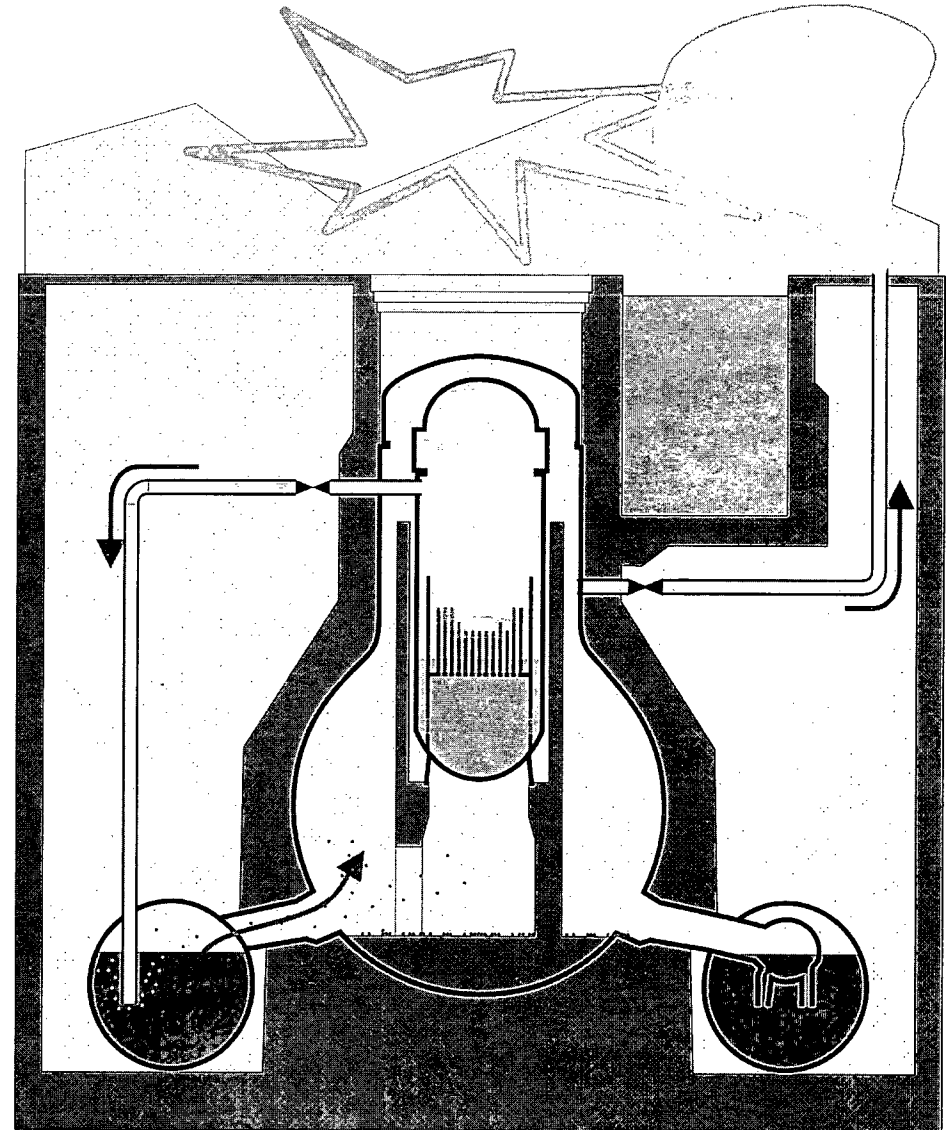
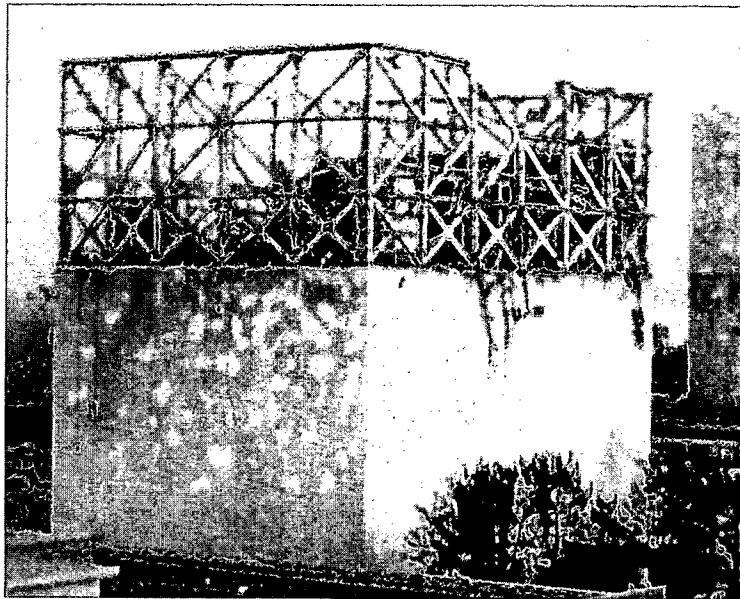
The Fukushima Daiichi Incident

2. Accident progression



► Unit 1 und 3

- ◆ Hydrogen burn inside the reactor service floor
- ◆ Destruction of the steel-frame roof
- ◆ Reinforced concrete reactor building seems undamaged
- ◆ Spectacular but minor safety relevant



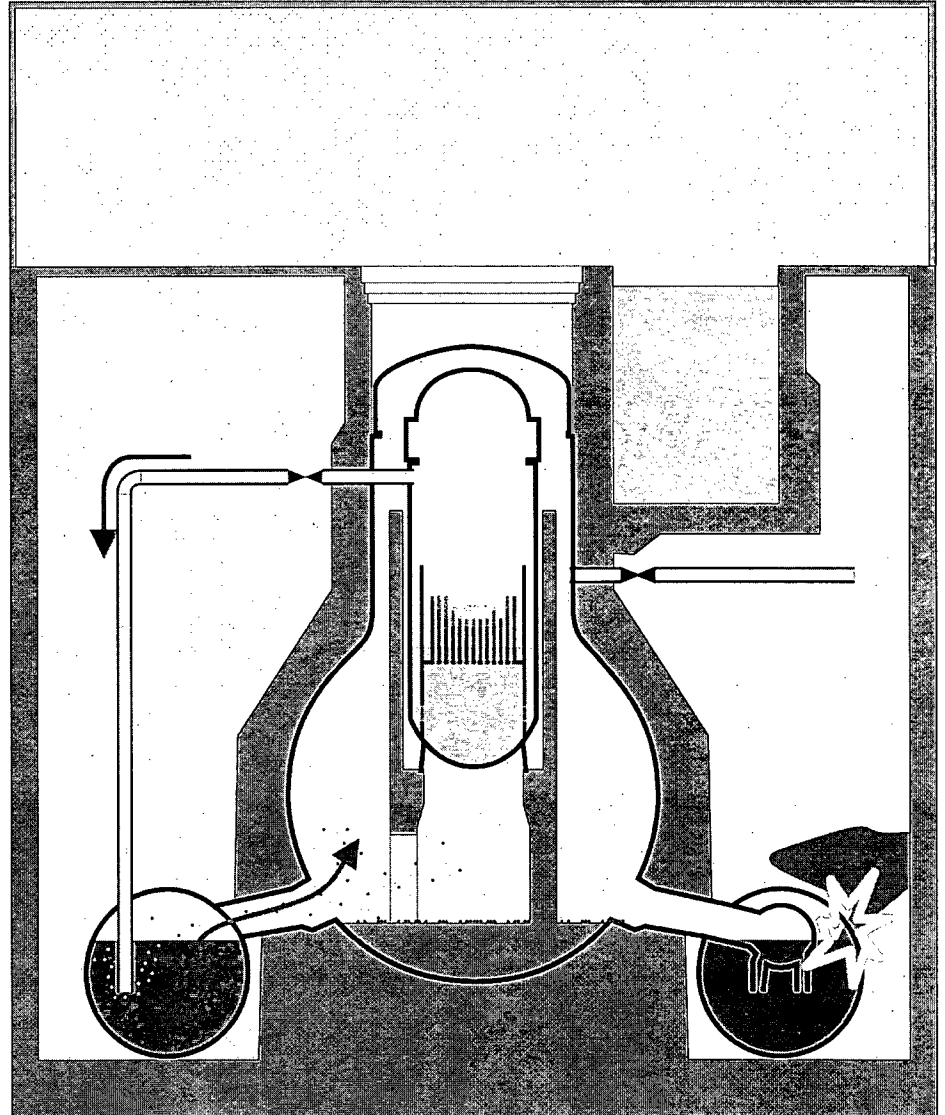
The Fukushima Daiichi Incident

2. Accident progression

► Unit 2

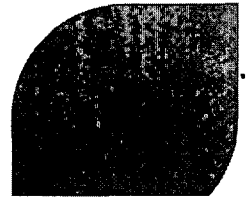
- ◆ Hydrogen burn inside the reactor building
- ◆ Probably damage to the condensation chamber (highly contaminated water)
- ◆ Uncontrolled release of gas from the containment
- ◆ **Release of fission products**
- ◆ Temporal evacuation of the plant
- ◆ High local dose rates on the plant site due to wreckage hinder further recovery work

- No clear information on why Unit 2 behaved differently

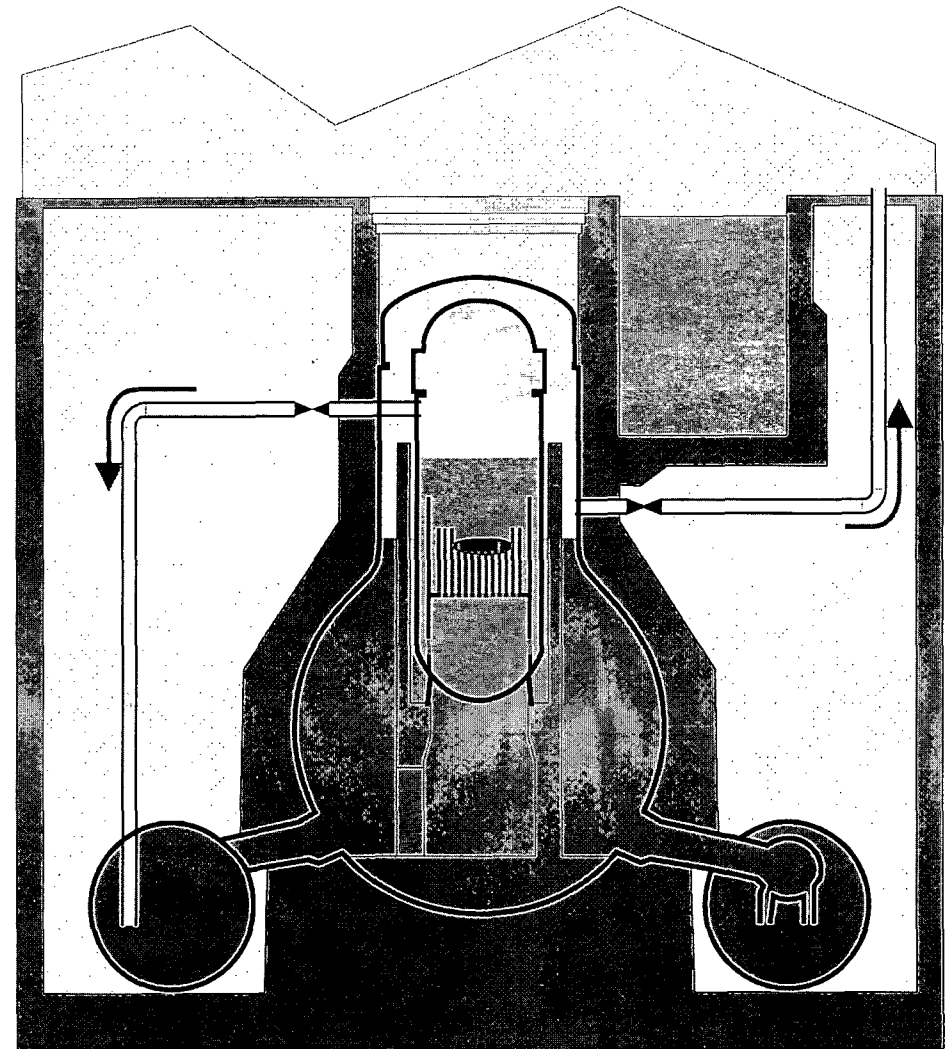


The Fukushima Daiichi Incident

2. Accident progression

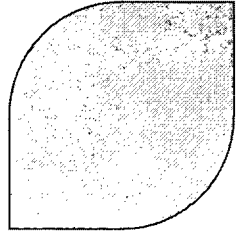


- ▶ Current status of the Reactors
 - ◆ Core Damage in Unit 1,2, 3
 - ◆ Building damage due to various burns Unit 1-4
 - ◆ Reactor pressure vessels flooded in all Units with mobile pumps
 - ◆ At least containment in Unit 1 flooded
- ▶ Further cooling of the Reactors by releasing steam to the atmosphere
- ▶ Only small further releases of fission products can be expected



The Fukushima Daiichi Incident

3. Radiological releases



► Directly on the plant site

◇ Before Explosion in Unit Block 2

- Below 2mSv / h
- Mainly due to released radioactive noble gases
- Measuring posts on west side. Maybe too small values measured due to wind

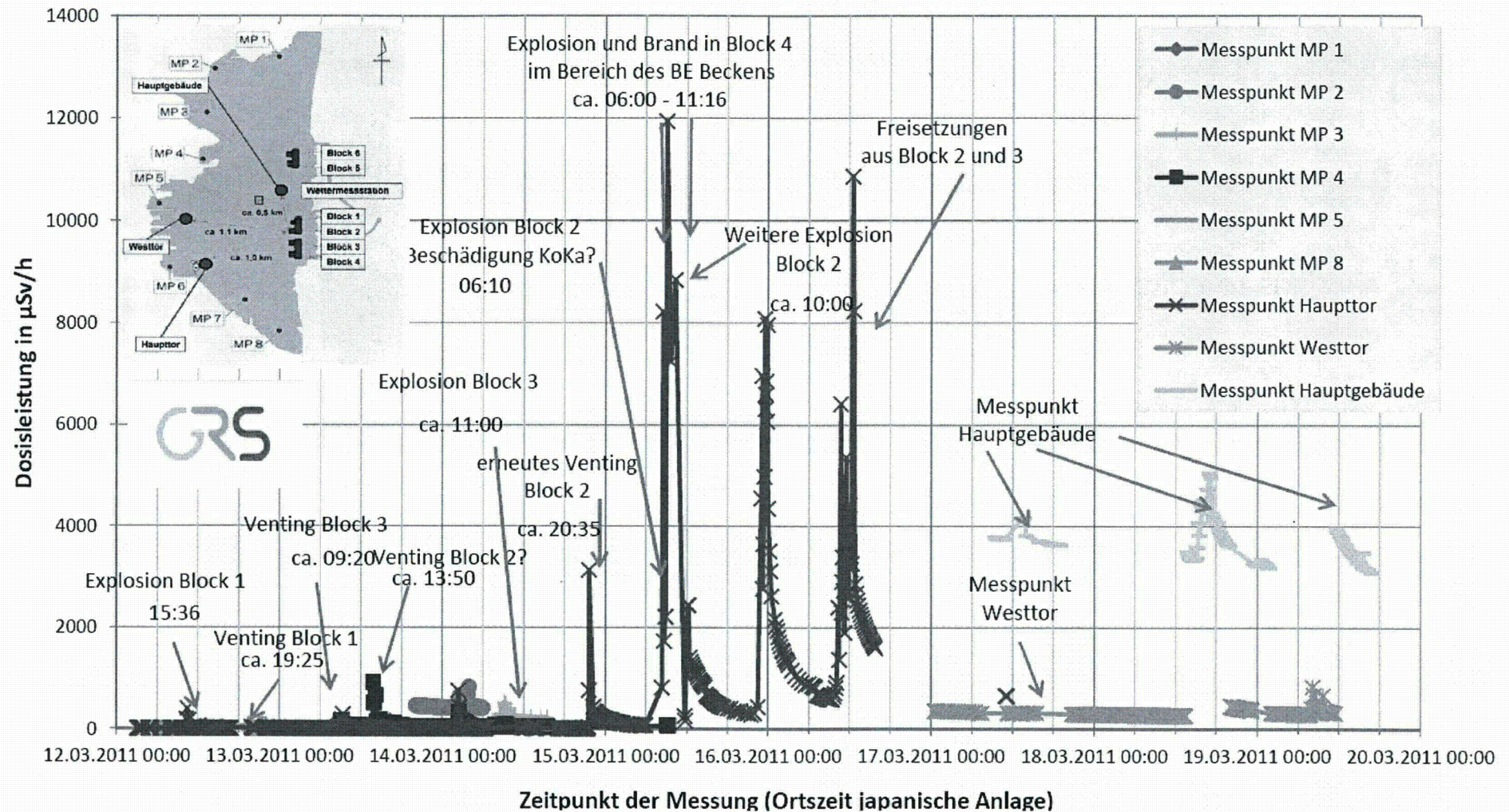
◇ After Explosion in Unit 2 (Damage of the Containment)

- Temporal peak values 12mSv / h
- (Origin not entirely clear)
- Local peak values on site up to 400mSv /h (wreckage / fragments?)
- Currently stable dose on site at 5mSv /h
- Inside the buildings a lot more

◇ Limiting time of exposure of the workers necessary

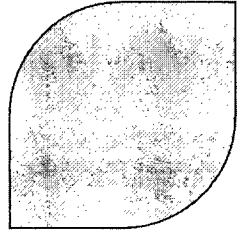
The Fukushima Daiichi Incident

3. Radiological releases



The Fukushima Daiichi Incident

3. Radiological releases



► Outside the Plant site

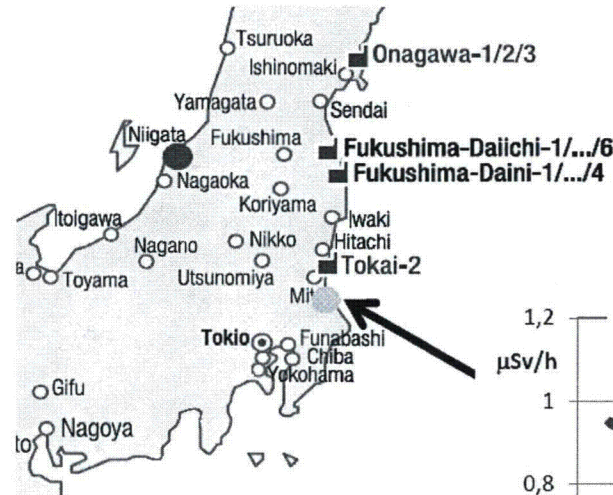
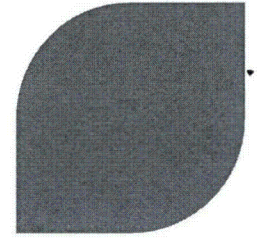
- ◇ As reactor building mostly intact
=> reduced release of Aerosols (not Chernobyl-like)
- ◇ Fission product release in steam
=> fast Aerosol grows, large fraction falls down in the proximity of the plant
- ◇ Main contribution to the radioactive dose outside plant are the radioactive noble gases
- ◇ Carried / distributed by the wind, decreasing dose with time
- ◇ No "Fall-out" of the noble gases, so no local high contamination of soil

► ~20km around the plant

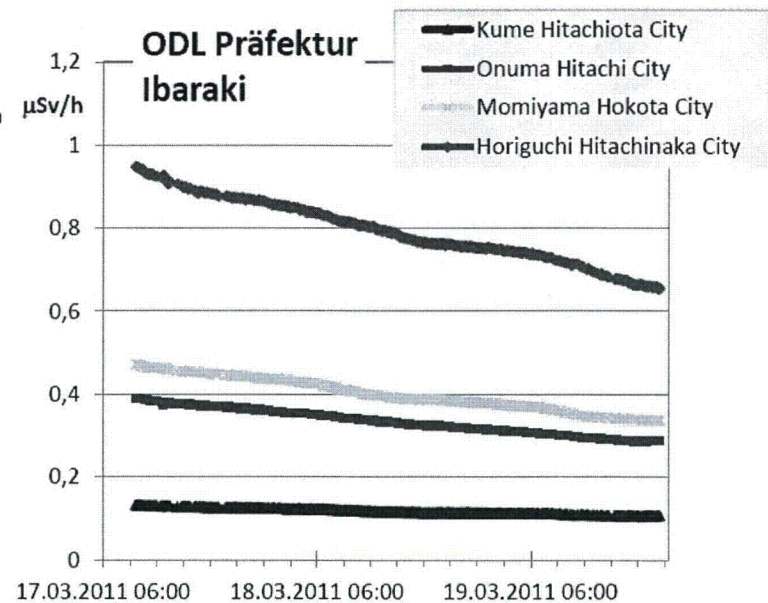
- ◇ Evacuations were adequate
- ◇ Measured dose up to 0.3mSv/h for short times
- ◇ Maybe destruction of crops / dairy products this year
- ◇ Probably no permanent evacuation of land necessary

The Fukushima Daiichi Incident

3. Radiological releases



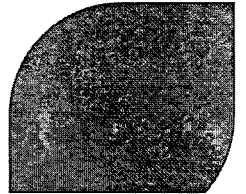
GRS.de



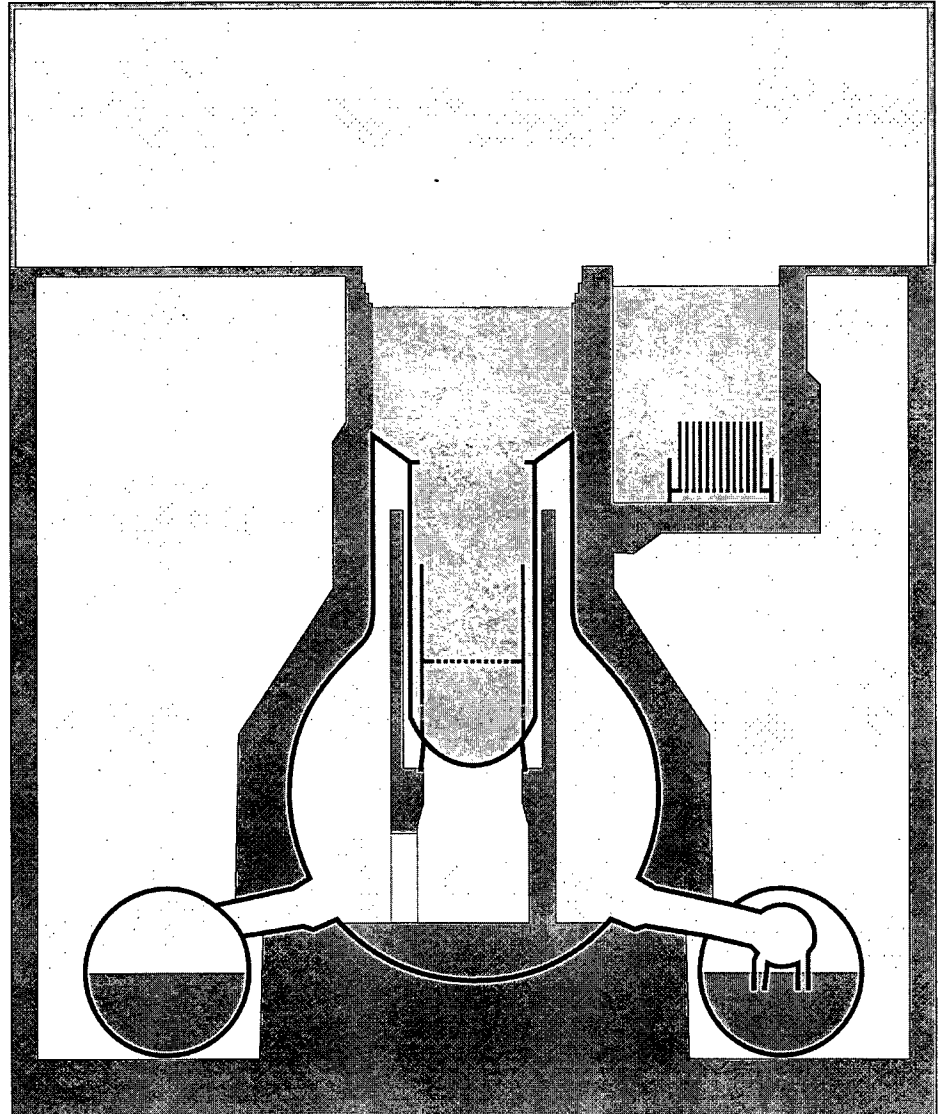
- ~50km around the plant
 - ◆ Control of Crop / Dairy products
 - ◆ Usage of Iodine pills
(Caution, pills can interfere with heart medicine)

The Fukushima Daiichi Incident

4. Spent fuel pools

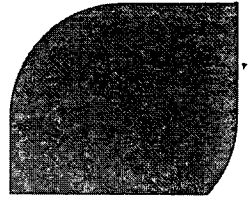


- ▶ Spent fuel stored in Pool on Reactor service floor
 - ◆ Due to maintenance in Unit 4 entire core stored in Fuel pool
 - ◆ Dry-out of the pools
 - Unit 4: in 10 days
 - Unit 1-3,5,6 in few weeks
 - ◆ **Leakage of the pools due to Earthquake?**
- ▶ Consequences
 - ◆ Core melt "in fresh air"
 - ◆ Nearly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

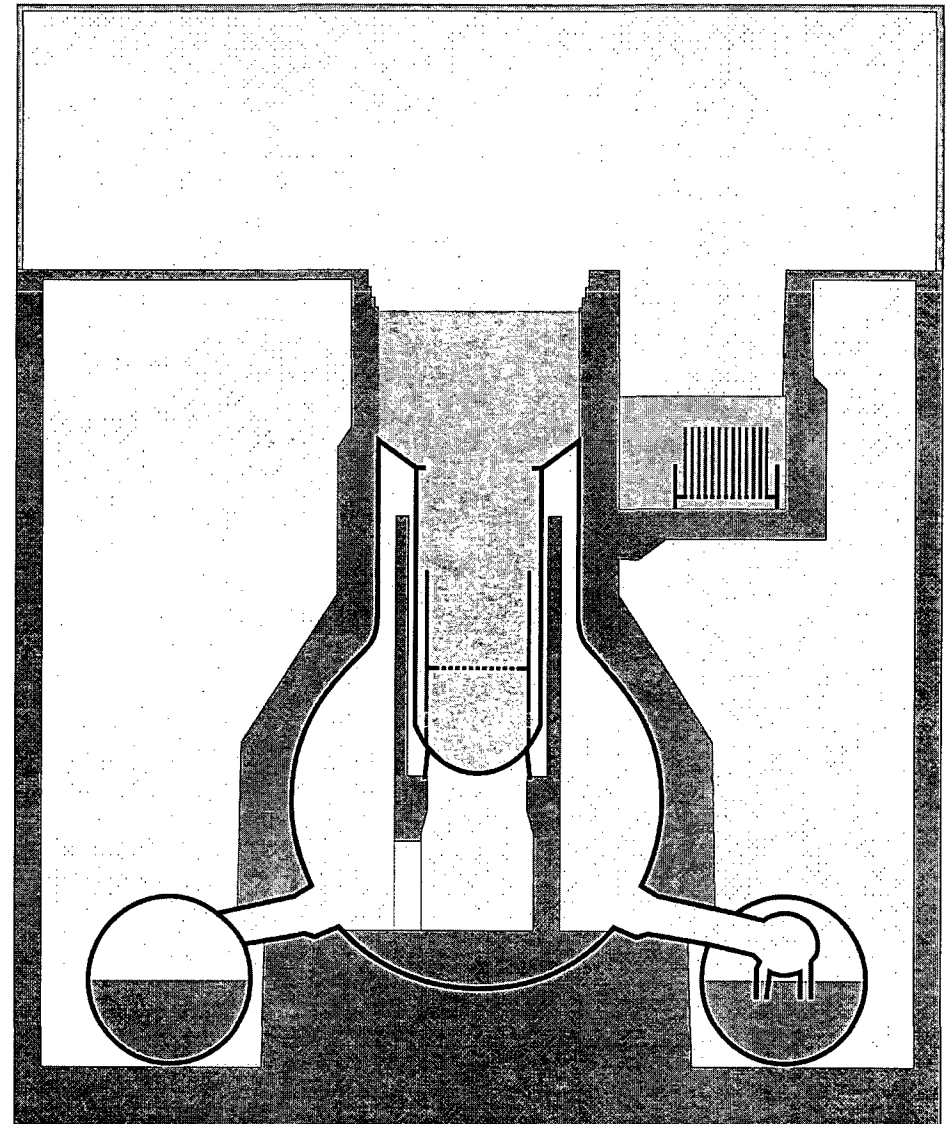


The Fukushima Daiichi Incident

4. Spent fuel pools



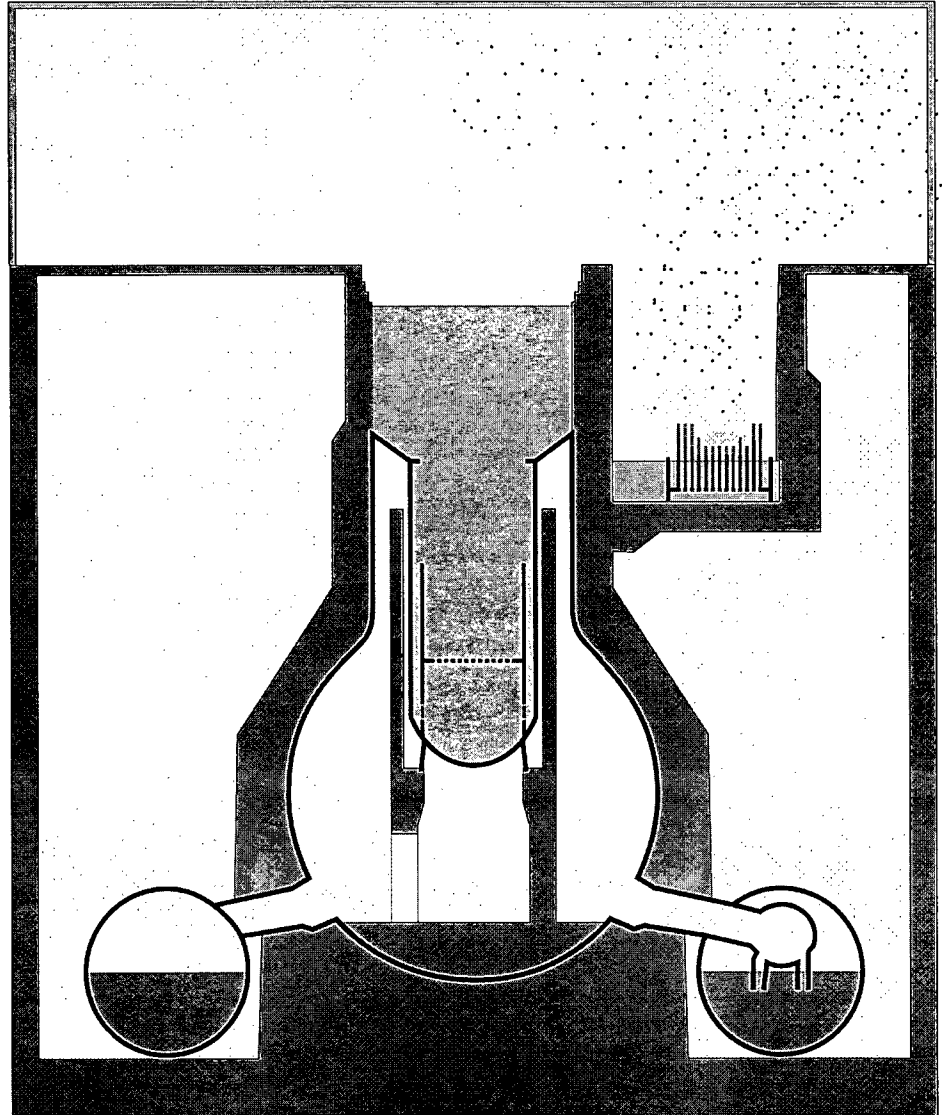
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The Fukushima Daiichi Incident

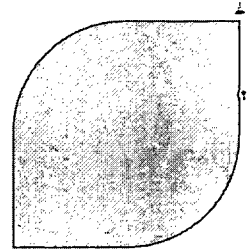
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 - ◆ **Leakage of the pools due to Earthquake?**
- ▶ Consequences
 - ◆ Core melt "in fresh air"
 - ◆ Nearly no retention of fission products
 - ◆ Large release
- ▶ **It is currently unclear if release from fuel pool already happened**



The Fukushima Daiichi Incident

5. Sources of Information



► Good sources of Information

◆ Gesellschaft für Reaktorsicherheit [GRS.de]

- Up to date
- Radiological measurements published
- German translation of japanese/englisch web pages

◆ Japan Atomic Industrial Forum [jaif.or.jp/english/]

- Current Status of the plants
- Measurement values of the reactors (pressure liquid level)

◆ Tokyo Electric Power Company [Tepco.co.jp]

- Status of the recovery work
- Casualties

► May too few information are released by TEPCO, the operator of the plant

C11

Cronk, Kevin

From: Cline, Leonard
Sent: Wednesday, April 06, 2011 11:19 PM
To: Meighan, Sean
Cc: Patel, Amar; Dodson, Douglas; Gray, Mel; Krohn, Paul; Burritt, Arthur; Clifford, James
Subject: RE: NGA presentation
Attachments: Leedspresentation ppt.pdf; Region I 2011 Annual Assessment Meeting Slides_rev3.pptx

Attached are Region I's consolidated comments on the NGA center presentation. The comments are provided electronically in the attached PDF file.

Comments on the slide content are shown directly on the slide (click on the blue insert carets to view the proposed inserted text, deletions are shown with strikeout).

Comments on the speaker notes are included in the balloon located at the top left corner of the slide (to view the notes right-click on the balloon and Open Pop-up in the drop down menu – if there is no balloon in the upper left corner there were no speaker notes for that slide). Proposed revisions to speaker notes will be shown in bold italics,

I have also attached a copy of the rough draft Annual Assessment Meeting presentation that we are working on in Region I. Due to the expected audience for these presentations we have tailored the slides to communicate our messages in response to events in Japan – essentially, why US plants remain safe – and what the NRC's actions in response to this event will be going forward. If you have any questions let me know and we can discuss. Note this presentation is still draft. It has been approved up through the branch chiefs. We provided it to the RI DRP Division Directors and the HQ communication team for review this evening 4/6.

From: Meighan, Sean
Sent: Wednesday, April 06, 2011 2:20 PM
To: Cline, Leonard
Subject: RE: NGA presentation

Good afternoon Leonard... any format beyond carrier pigeon or tin cans and string is fine. And no need to apologize on getting comments to me now..

s

From: Cline, Leonard
Sent: Wednesday, April 06, 2011 1:07 PM
To: Meighan, Sean
Subject: NGA presentation

I was assigned responsibility for coordinating Region I's comments on the attached presentation. I have both hard copy and electronic comments. Are you the point of contact that I should be sending these comments too. Do you care what format they are in? Can I scan the hardcopy comments and send them to you? Sorry, that you did not have these earlier, we are in the process of putting together our slides for our annual assessment meetings and it slowed my response.

Leonard M. Cline
leonard.cline@nrc.gov
610-337-5375
Region I/PB3
SPE



United States Nuclear Regulatory Commission

Protecting People and the Environment

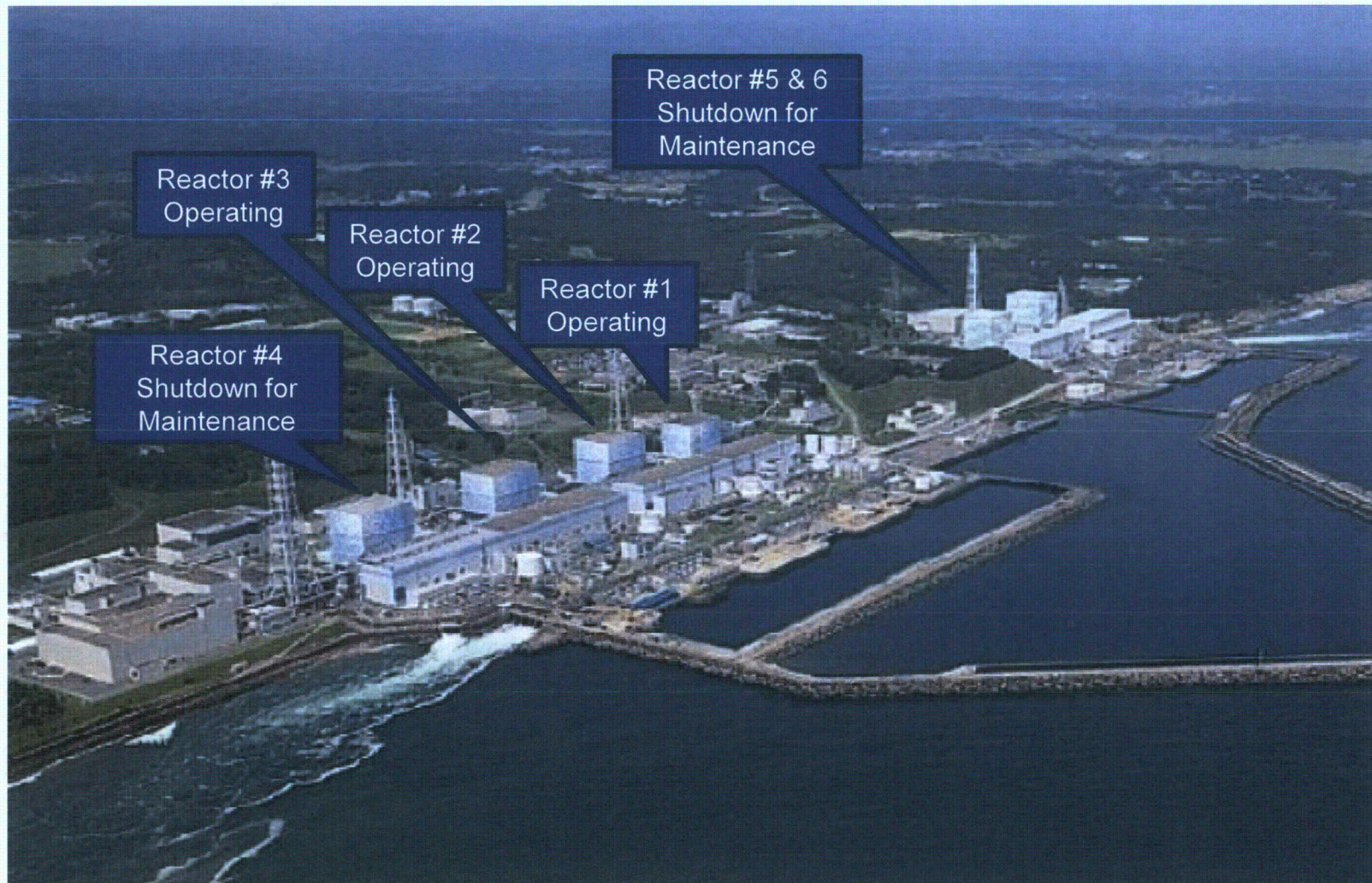
Presentation on Fukushima to NGA Center for Best Practices

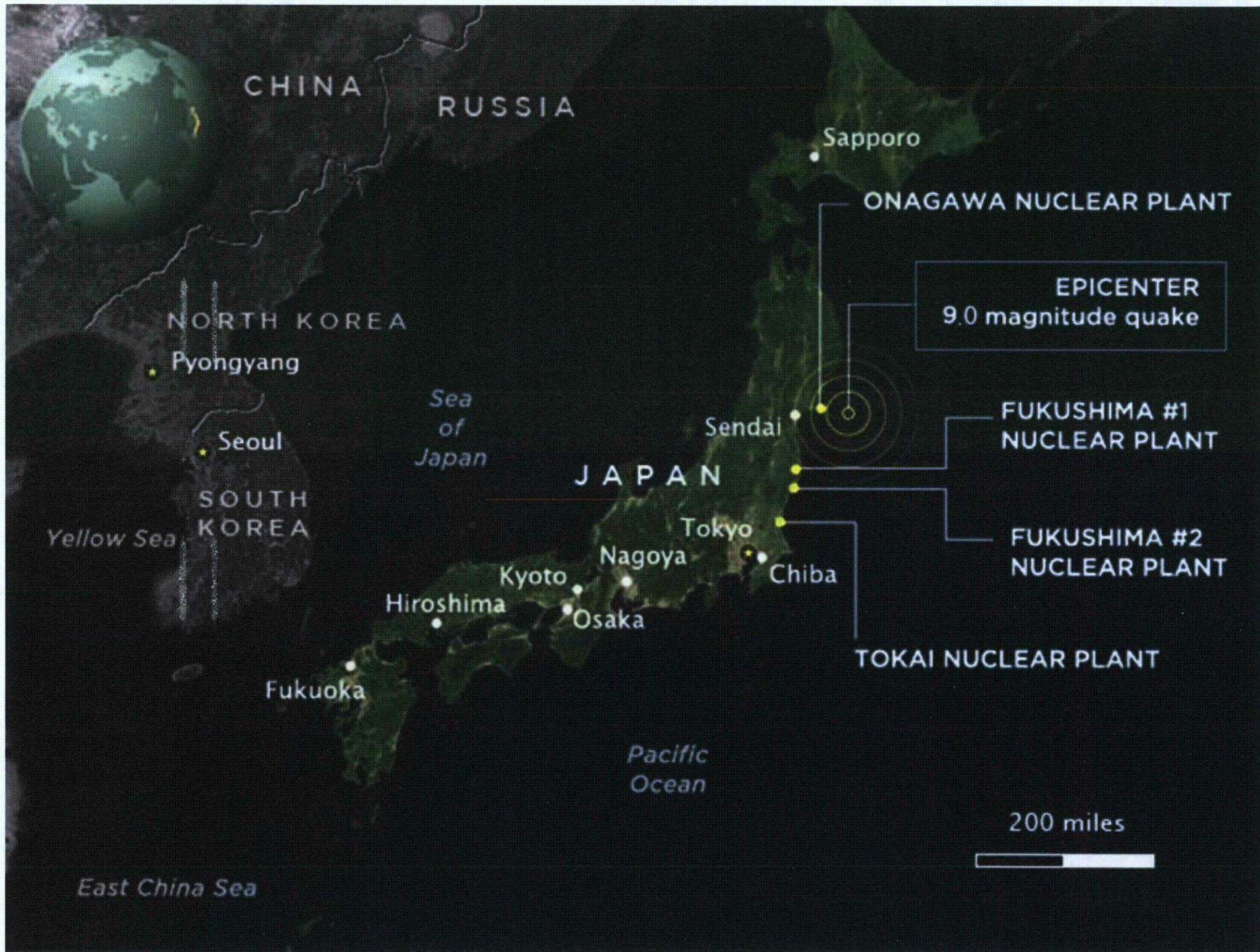
Eric Leeds, Director
Office of Nuclear Reactor Regulation
(NRR)

NRC Mission – What Do We Do?

- The mission of the NRC is to license and regulate the Nation's civilian use of ~~byproduct, source, and special nuclear materials~~ in order to **protect public health and safety, promote the common defense and security, and protect the environment.**

Overview of Fukushima Daiichi Nuclear Power Station





Earthquake & tsunami sequence of events

Friday March 11th @ 2:36 pm local

- Magnitude 9.0 earthquake 231 miles northeast of Tokyo.
- Quake is fifth largest in the world (since 1900).
- Earthquake generated a ~~14m~~ Tsunami

Plant Response

Earthquake

- Earthquake Caused Automatic Shutdown of 3 Operating Units
- Offsite Power Lost
- Initial indications were that Emergency Diesels operated

~~14m~~ Tsunami (less than 1 hour later)

- All Emergency Back-up Power Lost
- 8-10 hours later Station Batteries Depleted



- Current status of the Reactors

- Core Damage in Unit 1,2, 3
- Electrical Power Restored
- Fresh ~~Cooling Water~~ supplied to
All Units

- Spent Fuel Pool Status

- Suspect Fuel Damage in
Pools 3 & 4
- Providing periodic make up water

NRC Response

- Ops Center 24/7
- Team of experts to Tokyo
- Support to U.S. Ambassador and Japanese
- ~~Coordinating~~ Environmental Monitoring with DOE & EPA

Domestic Considerations

- No anticipated U.S. Health Effects from Fukushima
- U.S. Plants Designed for External Events
- NRC has initiated additional inspections at all U.S. Plants
- NRC conducting Near-Term and Long-Term Reviews.

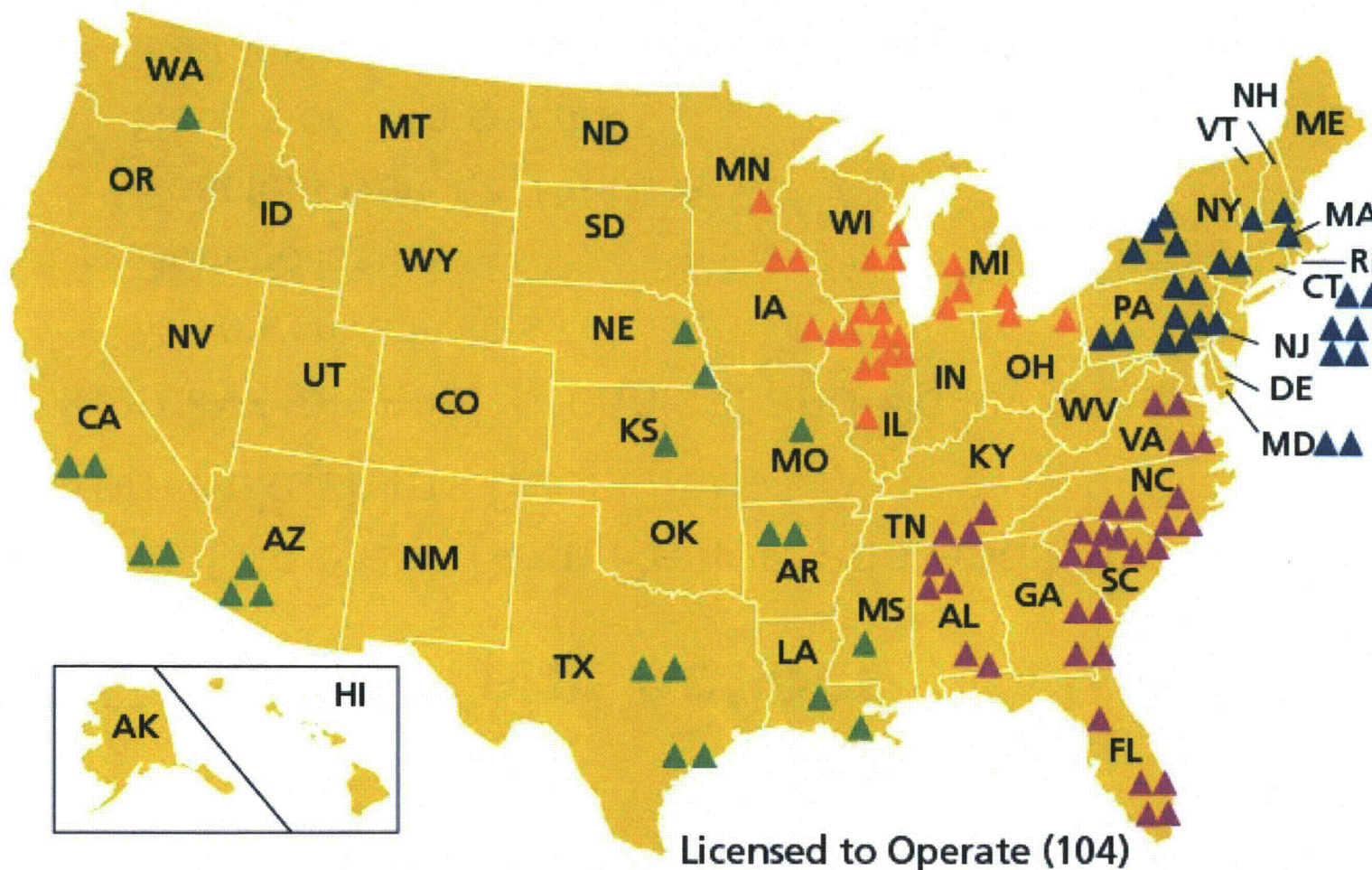
NRC Near Term Actions

- Evaluate Fukushima Daiichi Events
- Domestic Operating Reactors and Spent Fuel Pools
 - External Events
 - Station Blackout
 - Severe Accident Mitigation
 - Emergency Preparedness
 - Combustible Gas Control
- Near Term Review due in 90 days (mid June)

NRC Longer Term Actions

- Based on Near Term Review and Additional Insights from Fukushima Event
- ~~Identify Potential~~ Technical and Policy ~~Issues~~
 - Research Activities
 - Generic Issues
 - Reactor Oversight Process
 - Regulatory Framework
 - Interagency Emergency Preparedness

Operating Commercial Power Reactors

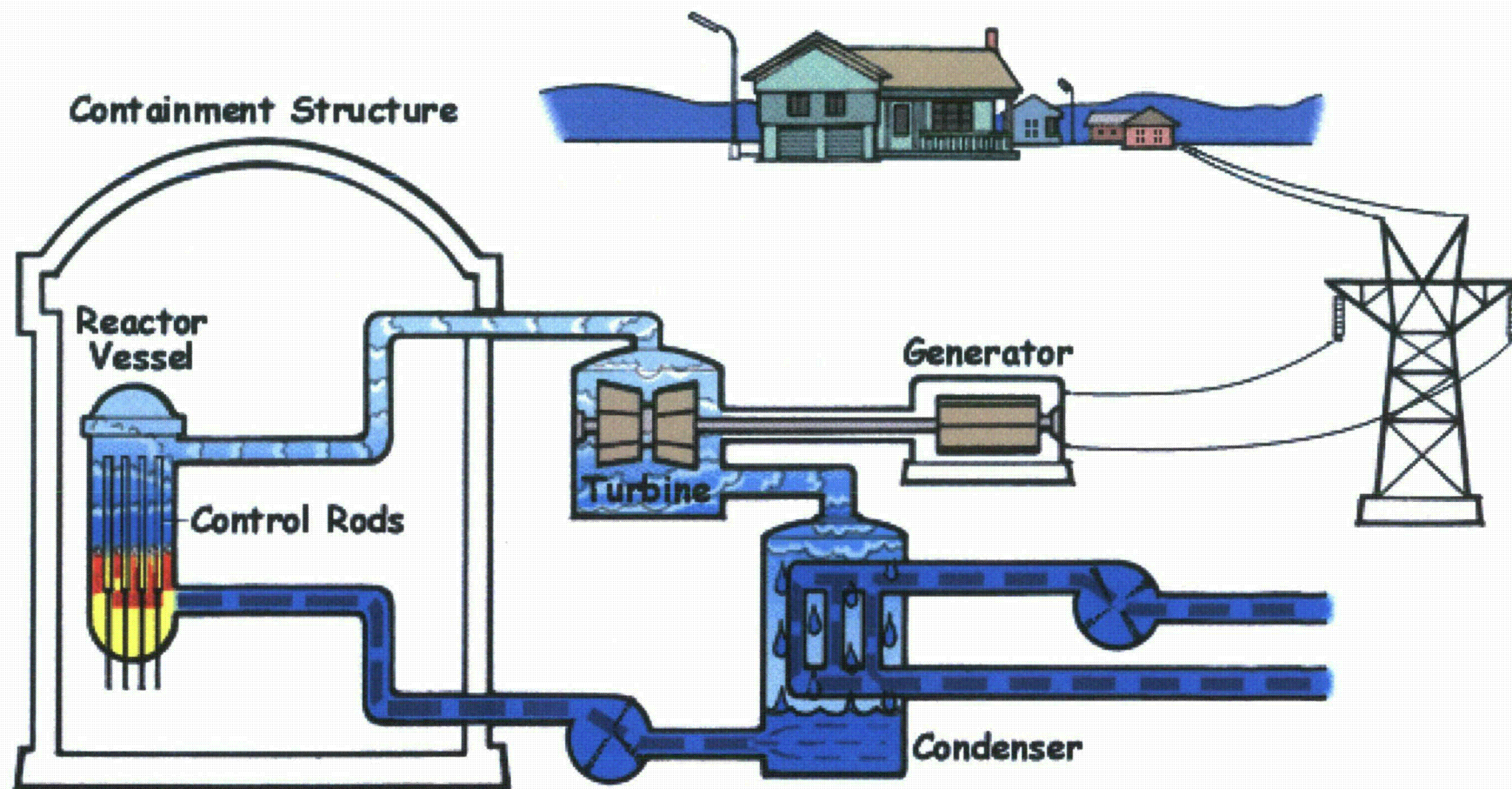


Questions?

PARS

- NRC Regulations have 2 Emergency Planning Zones (EPZs) 10/50 miles
- EPZs are not limits, but frameworks that allow for expansion as needed
- 50 miles in Japan due to extraordinary situation
 - 4 units severely challenged
 - Unclear information as to state of reactors, mitigative strategies, radiological releases
 - Decision to evacuate conservative, better to err on conservative
- ~~Precautionary evacuation occurred days before fuel melt.~~

Generic BWR



▶ Reactor Service Floor
(Steel Construction)

▶ Concrete Reactor Building
(secondary Containment)

▶ Reactor Core

▶ Reactor Pressure Vessel

▶ Containment (Dry well)

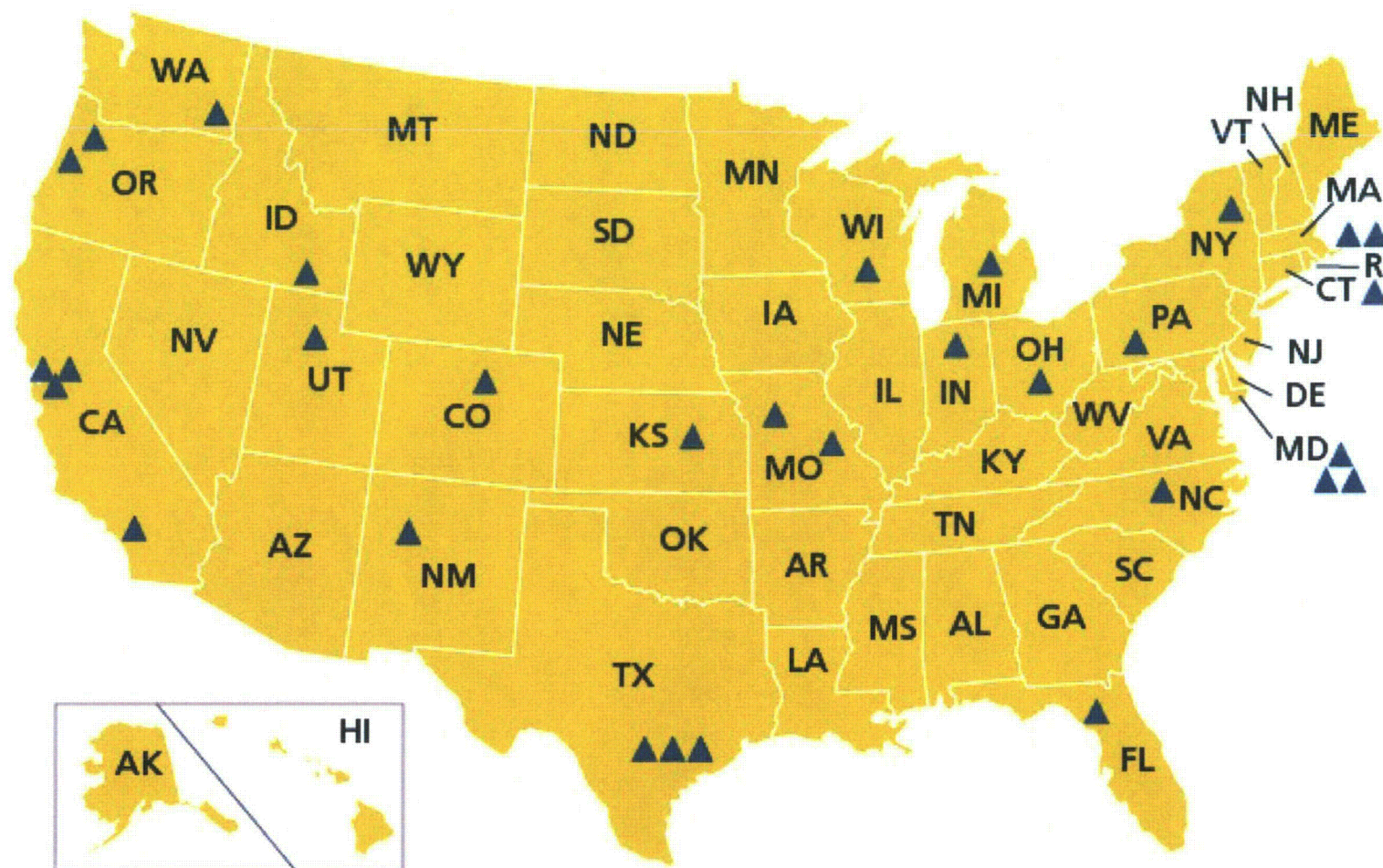
▶ Containment (Wet Well)

Spent Fuel Pool

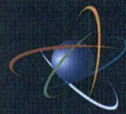


The diagram illustrates the various containment barriers in a nuclear reactor. It features a list of components on the left, each with a colored arrow pointing to a corresponding layer in a cross-section on the right. The layers, from top to bottom, are: Spent Fuel Pool (blue line), Concrete Reactor Building (green line), Reactor Core (brown line), Reactor Pressure Vessel (red line), Containment (Dry well) (red line), and Containment (Wet Well) (blue line). The arrows indicate the relative positions and thicknesses of these barriers.

Research and Test Reactors



▲ Licensed/Currently Operating (31)



U.S. Nuclear Plants Remain Safe

- **NRC requires plants to be designed to withstand natural events**
- **NRC requires a defense-in-depth approach to safety**
- **NRC performs independent safety inspections**
- **NRC assesses new safety information and requires enhancements**

1

Protecting People and the Environment

Title: NRC is following the events of Japan closely.

This slide lists some of the reasons for our continuing confidence in the safety of the U.S. nuclear power plants.

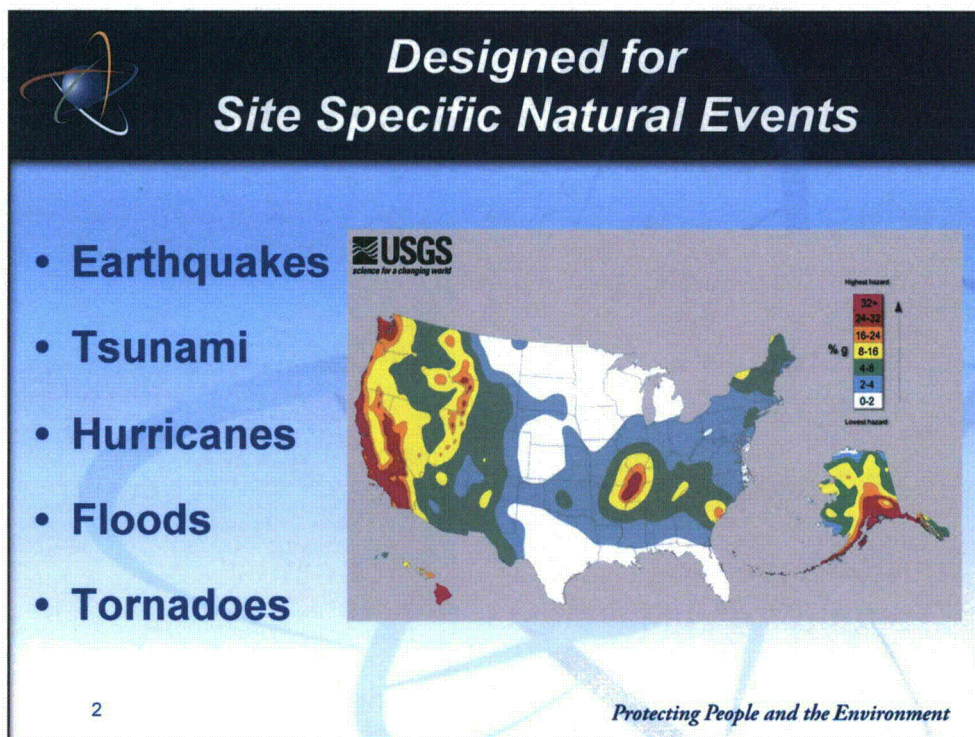
Bullet 1: The designs for each reactor in this country takes into account the specific location of each reactor site and include detailed evaluations of natural events like earthquakes, tornadoes, hurricanes, floods, tsunamis, and many others.

Bullet 2: The NRC uses a philosophy of Defense-in-Depth, that require the highest standards of design, construction, oversight, and operation, and does not rely on any single layer of protection.

Bullet 3: The NRC is an independent federal government agency who's mission it is to ensure the adequate public health and safety and the environment regarding nuclear power plants. As part of our oversight, we conduct several thousand hours of inspection activities at each nuclear power plant.

Bullet 4: The NRC continues to assess safety at all nuclear plants. As part of our oversight, the NRC collects and evaluates operating experience, performs research into technical issues, and requires improvements to be made when warranted to ensure adequate protection of public health and safety. The NRC uses the best and latest information.

Consistent with this philosophy, the NRC has undertaken a systematic and methodical review of safety of U.S. nuclear plants following the events in Japan.



Each nuclear plant is designed for the specific location of each reactor site. We also include detailed evaluations of natural events like earthquakes, Tsunamis, hurricanes, floods, and tornadoes for that given location.

Earthquakes:

The existing nuclear plants were designed on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquakes expected in the area.

The seismic ground motion used for the design basis was determined from the evaluation of the maximum historic earthquake within 200 miles of the site. Safety margin was then added beyond this maximum historic earthquake. Technically speaking, this is the hypothetical design basis earthquake with an annual frequency of occurrence of 1×10^{-4} /year. This can be thought of as the ground motion that occurs every 10,000 years on average.

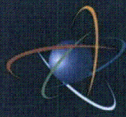
This picture from the USGS shows the various earthquake ground motion in the U.S. and shows why the NRC requires its specific design of each nuclear plant.

Tsunami, hurricanes, and floods:

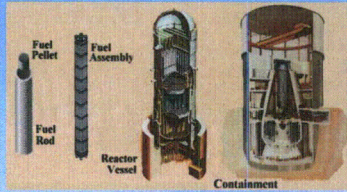
•Two nuclear plants, Diablo Canyon and San Onofre (Pacific Coast) and two nuclear plants on the South Texas and Crystal River (Gulf Coast) could be affected by tsunami.

•Nuclear plants on the Atlantic Coast or on rivers that may be affected by a tidal bore resulting from a tsunami include St. Lucie, Turkey Point, Brunswick, Oyster Creek, Millstone, Pilgrim, Seabrook, Calvert Cliffs, Salem/Hope Creek, and Surry.

•Tsunami on the east coasts are very rare. On the east coast, the flooding concern comes from storm surges related to hurricanes not tsunamis.



The NRC Requires Defense-In-Depth



- Redundant and diverse safety systems to mitigate consequences
- Multiple physical barriers to contain radioactive material
- Emergency plans to protect the public in the event of a plant emergency

3

Protecting People and the Environment

The NRC ensures plants are safe by requiring a defense-in-depth philosophy in the design and operation of nuclear power plants. Defense-in-depth means that public safety is ensured by having multiple layers of equipment, processes, and procedures in place to ensure public safety.

Plants are designed with redundant safety systems to ensure safety functions can be carried out even if equipment failures occur. Those systems also are powered by diverse electrical power to maximize their availability. For example, some systems have pumps run by electrical motors while others are steam driven.

Plants also have multiple physical barriers to contain radioactive material, such as the fuel cladding, reactor coolant system, primary containment and secondary containment.

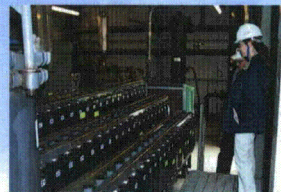
Plans for even the most unlikely scenarios are in place to ensure that nuclear power plant operators are capable of implementing adequate measures to protect public health and safety in the event of a radiological emergency; this is known as emergency preparedness. The NRC assesses these capabilities by requiring the performance of a full-scale exercise at least once every two years that includes the participation of other government agencies. These exercises are performed in order to maintain the skills of the emergency responders and to identify and correct weaknesses. They are evaluated by NRC inspectors and FEMA evaluators and the results are made public.



NRC Independent Safety Inspections

Reactor Oversight Program

- **Two full time NRC resident inspectors at each nuclear plant**
- **NRC specialists conduct additional inspections at each nuclear plant**
- **NRC inspectors have unfettered access to all plant activities related to nuclear safety and security**

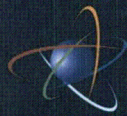


4

Protecting People and the Environment

ROP Introduction

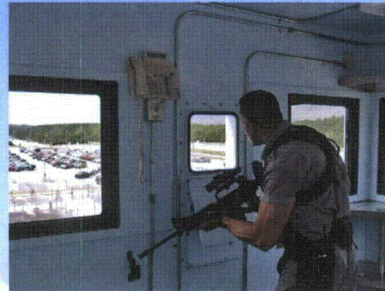
- The Reactor Oversight Process (ROP) is a systematic program that looks at reactor safety, radiation safety, and plant security.
- The NRC utilizes its operating ROP to collect information about licensee performance, to assess the information for its safety significance, to provide for appropriate licensee and NRC response, and to communicate the results of its assessment to licensee management, other government agencies, and members of the public. Performance summaries are issued to each nuclear plant and to the public twice a year.
- One of the most significant aspects of the ROP is the Resident Inspector Program, which has at least two full time NRC inspectors on site with unfettered access to all licensees' activities 24 hours a day, seven days a week. We also have specialized inspectors from each regional office conducting various inspections at each facility. Resident and specialists inspectors are conducting baseline inspections on a continuous basis that review items such as flood and fire protection, and equipment readiness.



NRC Requires Safety Enhancements

NRC assesses new safety information, develops lessons learned, and requires safety enhancements:

- **NRC operating experience program**
- **Rulemaking (Station Blackout, Hydrogen Control)**
- **Generic Safety Issues (GI-199)**
- **Post TMI Actions**
- **Post 9/11 Orders**



5

Protecting People and the Environment

The NRC continuously assesses new safety information, develops lessons learned and requires safety enhancements.

The NRC's operating experience program assesses events and issues across the Nuclear industry in order to learn from them and potentially require modifications to systems to increase safety.

The NRC requires plants to make improvements as warranted by the rulemaking process. For example, our evaluation of operating experience indicated additional requirements were required to address a station blackout condition at a nuclear plant. The NRC required plants to develop coping measures and make modifications as necessary to deal with a loss of all offsite power and onsite power (EDGs).


In addition the NRC assesses new or changing information with implications for safety via our ongoing generic safety issues process. For example, under Generic Issue 199 the NRC is reviewing the adequacy of the earthquake design of U.S. Nuclear Plants in central & eastern North America based on latest and most comprehensive data from the USGS. While our review continues we have concluded that our nuclear plants are safe, with no need for immediate action. Our review indicates some seismic hazards have increased. However existing plants were designed to withstand earthquakes with substantial design margins. The NRC continues to evaluate whether plant improvements may be imposed.

As a result of the Three Mile Island accident the NRC imposed a number of new requirements. For example, the NRC required plants revise Emergency Operating Procedures and develop Severe Accident

C 12

NRC Response to Events in Japan

- **NRC conducting a methodical and systematic review**
- **Near term actions (<90 days)**
 - conducting additional inspections
 - identifying near term operational issues
- **Longer term actions**



6

Protecting People and the Environment

The NRC has established a task force to conduct a methodical and systematic review following the events in Japan.

Within 90 days the NRC is conducting additional inspections (TI-183) and will identify near term operational issues.

I. Near Term

The additional inspection (TI-183) will:

- Independently assess the adequacy of the actions taken by licensees in response to the Japanese event.
- Evaluate industry readiness for similar events and determines if additional regulatory action is needed.
- Take a high level look at industry preparedness.

A public report will be issued by the middle of May 2011.

The task force will conduct a review of relevant NRC regulatory requirements, programs, and processes, and their implementation, to recommend whether the agency should make near-term improvements to our regulatory system.

The task force will also recommend a framework for a longer-term review as a part of the near-term report. The longer-term review will begin as soon as the NRC has sufficient technical information from the events in Japan (with a goal of beginning by the end of the near-term review).

On the longer term, the NRC will be developing lessons learned that are somewhat dependent on when we begin to get a better understanding of the events and the results of the earthquake and tsunami in Japan.

From: EUCI Events [events@eucievents.com]
Sent: Thursday, April 07, 2011 11:19 AM
To: Garcia-Santos, Norma
Subject: The Lessons of Fukushima Daiichi: An In-Depth Technical Analysis Webinar



The Lessons of Fukushima Daiichi: An In-Depth Technical Analysis

April 26, 2011 :: 12:00 - 1:30 PM Eastern Time

As the events at the Fukushima Daiichi Nuclear Power Plant continue to unfold, this webinar will address:

- The design of the plant, including its safety systems
- Damage to the plant caused by the earthquake and tsunami
- What it means to safely shut down a nuclear reactor
- How hydrogen gas is generated and the resulting explosions
- A timeline of events that occurred at Fukushima
- How different countries and agencies have responded to these events, including the U.S. NRC
- How the Fukushima event will impact the nuclear power industry in the U.S. and worldwide

As this is an ongoing event, the latest information and detail available will be incorporated into the webinar.

[PDF Brochure](#) | [Pricing and Registration](#)

Topics Include

- The water-steam relation inside the BWR reactor
- What it means when the heat sink is lost by a combination of tripping the turbine and the loss of both normal and emergency core cooling capability
- The steam-pressure build-up inside the reactor vessel, resulting in uncovering the nuclear fuel
- The subsequent oxidation of the zircalloy fuel cladding
- The attempts to relieve the pressure, which also released explosive hydrogen gas
- Release of volatile radioactive fission products
- The design of the spent fuel pool and why it became another challenge to maintain it within its design basis

[Full Agenda](#)

Instructed By

Howard L. Sobel, PE, Nuclear Consultant

[Instructor Bio](#)

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White, Bernard

From: White, Bernard
Sent: Thursday, April 07, 2011 7:48 AM
To: Allen, William
Subject: RE: Responses to Public Inquiries Re: Maine Yankee
Attachments: ME Response.docx

A few thoughts and suggestions.

From: Allen, William
Sent: Tuesday, April 05, 2011 4:31 PM
To: White, Bernard
Subject: Responses to Public Inquiries Re: Maine Yankee

A lady who lives near the Maine Yankee site sent Mr. Borchard a letter with some questions. The responsibility of addressing her questions fell to me. My draft responses to her questions are attached. Could you please call me or stop by as soon as possible to briefly discuss them?

Thanks, Chris

- Are there security measures in place to protect Maine residents from natural or man-made disasters?

In addition to the fact that the dry cask storage system employed at Maine Yankee is designed to prevent the release of the radioactive material in the fuel during natural disasters, the Maine Yankee facility is required to have a security plan for the area where the spent fuel is stored. Security measures for the storage area are designed to prevent sabotage or removal of the spent fuel.

Comment [BHW1]: Start off with answering her question in with "Yes there is a security plant to protect against...." Then follow-up with the fact that these are designed to withstand natural disasters.

- Are there any pre-staged responses in place to protect Maine residents?

Because of the amount of time which has passed since the Maine Yankee plant ceased operations, the offsite consequences of potential accidents are very small and do not require offsite emergency response.

Comment [BHW2]: Again start off with something like. "No, there are not because....."

- What are the containment issues at such an old plant such as Maine Yankee in view of the meltdowns at Japanese nuclear plants?

The containment issues at Maine Yankee are significantly different from those associated with the Japanese plants. First, the heat generated by the fuel at Maine Yankee is ~~much less~~ significantly lower than that at the Japanese plants because, as you mentioned in your letter, Maine Yankee has not generated electricity since 1996. Second, as of April 29, 2003, all fuel had been removed from both the reactor and the spent fuel pool and placed into a dry storage system. The dry storage system at Maine Yankee uses steel ~~canisters~~ ~~containers~~ which are stored above ground in a vertical orientation inside concrete. The containers used to store the Maine Yankee fuel were fabricated ~~with to~~ high standards of quality. The containers were welded shut after the fuel was placed inside, and the ~~canisters~~ ~~containers~~ were filled with an inert gas to ~~insure~~ the fuel rods ~~do not degrade during storage and, which provide an additional layer of containment,~~ retain both their shape and ~~their~~ strength during storage. The dry storage system at Maine Yankee was evaluated as a whole to ~~insure~~ it could withstand a variety of disasters, such as ~~earthquakes~~, floods, projectiles originating from a tornado, temperature extremes, and lightning strikes. ~~It was designed to provide not only adequate confinement, but also adequate shielding and heat removal under normal and accident conditions.~~

White, Bernard

From: NEWS Administration [NEWS_Administrator@iaea.org]
Sent: Monday, April 11, 2011 11:35 PM
To: NEWS.Contact-Point@iaea.org
Subject: New ERF on NEWS, INES Rating: 5, Japan, Power Reactor

Dear NEWS User,

This is to notify you as a registered user of the NEWS Web site that an Event Rating Form (ERF) for the Event titled:

"The core damage by loss of all cooling function due to the big tsunami."

has as of today, Tuesday, 12 April 2011, 05:32:39 UTC, been added to the NEWS Web site. Additional information regarding the ERF is as follows:

Country: Japan
Location/Facility: FUKUSHIMA-DAIICHI-3
Event Type: Power Reactor
Event Date: 2011.03.11

Rating Date: 2011.03.18
ERF Version: Provisional
INES Rating Level: 5

For more detailed information about the ERF, including the related Event and press releases as well as on-site participation in forum discussions, please visit the NEWS Web site at:

<http://www-news.iaea.org/news/>

NEWS Administration

White, Bernard

From: The Washington Post [newsletters@email.washingtonpost.com]
Sent: Monday, April 11, 2011 9:41 PM
To: White, Bernard
Subject: Breaking News: Japan to raise nuclear crisis rating to Chernobyl level

Breaking News Alert: Japan to raise nuclear crisis rating to Chernobyl level
April 11, 2011 9:40:24 PM

Japanese authorities planned Tuesday to raise their rating of the severity of the Fukushima Daiichi nuclear crisis to the highest level on an international scale, equal to that of the 1986 Chernobyl disaster, according to the Kyodo news agency.

A level 7 accident, according to the International Nuclear and Radiological Event Scale, is typified by a "major release of radioactive material with widespread health and environmental effects."

<http://link.email.washingtonpost.com/r/YLCS8G/9ZX5RA/JJOFTT/DTVNXI/1QSEX/OS/h>

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White, Bernard

From: White, Bernard
Sent: Wednesday, April 13, 2011 4:30 PM
To: Hrabal, Craig
Subject: RE: Ops Center Action Item for Ticketing

Absolutely, it has to do with the event, except that I am having all of our email boxes scanned by OIS to look for these items.

From: Hrabal, Craig
Sent: Wednesday, April 13, 2011 4:28 PM
To: White, Bernard
Subject: FW: Ops Center Action Item for Ticketing

Are you looking for stuff like the below?

Craig Hrabal, Nuclear Engineer
Criticality, Shielding and Dose Assessment Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards
Nuclear Regulatory Commission
Mail Stop EBB-3D-02M
Washington, DC, 20555
301-492-3257

From: Tripp, Christopher
Sent: Wednesday, March 23, 2011 5:02 PM
To: Silva, Patricia; Marenchin, Thomas; Morey, Dennis; Fisher, Christian; Hrabal, Craig
Subject: RE: Ops Center Action Item for Ticketing

We had a phone call and will be reviewing Meraj's response back to the OpCenter in a few minutes.

The consensus of the group was that they should wait for the core to cool, as it may be too soon to engage in any kind of entombment. The decay heat might fuse sand into glass or prevent concrete from curing. If the containment is intact, surrounding it with some kind of engineered structure would not significantly impact criticality safety, but it might impact heat removal. If, however, you're entombing directly onto the partially melted core, that's a different story. Wet concrete would be a criticality concern; dry sand could be a concern, but would be less of a concern. Both could possibly provide sufficient moderator to achieve criticality. Given the unknown configuration of material within the core, we thought the best thing to do was start pumping in borated water, and, if they ultimately decide to entomb it, first wait until it is sufficiently cooled, then use a material such as borated sand. Either way, heat removal is probably the bounding concern.

I will be commenting on Meraj's write-up. He has the lead for getting back to the OpCenter.

Chris

From: Silva, Patricia
Sent: Wednesday, March 23, 2011 4:41 PM
To: Marenchin, Thomas; Tripp, Christopher; Morey, Dennis; Fisher, Christian; Hrabal, Craig
Subject: FW: Ops Center Action Item for Ticketing
Importance: High

FYI – below is the original request.

From: Bailey, Marissa
Sent: Wednesday, March 23, 2011 3:24 PM
To: Silva, Patricia
Subject: FW: Ops Center Action Item for Ticketing
Importance: High

From: Ordaz, Vonna
Sent: Wednesday, March 23, 2011 3:22 PM
To: Benner, Eric
Cc: White, Bernard; Mohseni, Aby; Davis, Jack; Weaver, Doug; Rahimi, Meraj; Doolittle, Elizabeth; Waters, Michael; Kinneman, John; Bailey, Marissa; Tschiltz, Michael
Subject: FW: Ops Center Action Item for Ticketing
Importance: High

Related to the action email that I just sent...

From: Richards, Stuart
Sent: Wednesday, March 23, 2011 2:33 PM
To: Mohseni, Aby; Davis, Jack; Weaver, Doug; Waters, Michael
Cc: Rini, Brett; Case, Michael; Ordaz, Vonna
Subject: FW: Ops Center Action Item for Ticketing
Importance: High

The original request.

Stu

From: Bowman, Gregory
Sent: Wednesday, March 23, 2011 12:08 PM
To: Case, Michael; Richards, Stuart; Gibson, Kathy; Scott, Michael
Subject: FW: Ops Center Action Item for Ticketing
Importance: High

FYI – I just sent this information request from the Ops Center to Brett. I sent it to him because I wasn't sure which division in RES would be the right one to help with this, but I figured I'd pass it along to you, as well, given that the Ops Center is looking for a response by the end of the day.

From: Bowman, Gregory
Sent: Wednesday, March 23, 2011 11:51 AM
To: Rini, Brett; Deegan, George
Cc: Frazier, Alan; Brock, Kathryn
Subject: FW: Ops Center Action Item for Ticketing
Importance: High

Brett and George,

We got the request below from the Ops Center. We think there should be one coordinated response back to the Ops Center from RES and FSME, but none of us are sure which division would be best able

to respond. Can you help with this? Note that the Ops Center has asked for a response by 18:00 tonight.

Greg

From: RST01 Hoc
Sent: Wednesday, March 23, 2011 11:23 AM
To: Andersen, James; Muessle, Mary
Cc: Brown, Frederick
Subject: Ops Center Action Item for Ticketing

Jim and Mary,

Per Fred Brown, RST Director here in the Ops Center, Please ticket the following item to RES and FSME:

"Respond to Dan Dorman's email on long-term issue questions from Japan. Provide responses or estimates of when the responses can be expected to Dan by 18:00 EDT. If additional information is needed, let the site team know of any questions that can be brought back to NISA.

-Regarding the best type of enclosure for the plant, does NRC have any thoughts? Do we have any regulations applicable to this condition or thoughts on the role of the regulatory authority in this decision?

-What licensing requirements apply to decommissioning and regulatory review of the decommissioning plan?

-What should the Japanese be considering with respect to criticality prevention and decay heat removal during the entombment period?

-The NRC's TMI fact sheet notes that the first manned entry into the Unit 2 reactor building occurred after a venting of Krypton in July 1980 (16 months after the accident). What actions occurred during those 16 months that could inform their planning?"

Dan Dorman's email pasted below:

From: Dorman, Dan
Sent: Tuesday, March 22, 2011 3:05 AM
To: OST01 HOC; Casto, Greg; Monninger, John; ET07 Hoc
Subject: RE:

Additional tasks from meeting with NISA et al this morning. Lower priority than the Cabinet level issues we just discussed on the phone, but any responses available by 1800 EDT on 3/22 would be greatly appreciated along with an estimate of when the remainder may be expected. If you need additional info, please identify any questions we can bring back to NISA (keeping in mind please that their plant data is also very limited, i.e., keep your data expectations modest).

1. Sea water injection continues to reactors 1-3. NISA is concerned about the radiolytic disassociation of H₂ and O₂. NISA would like NRC's perspective on the significance of this concern and how to treat this concern as they transition to freshwater injection.
2. At what point does salt deposits become a problem for flow during pending freshwater injection?
3. NISA is conducting simulations to project the extent of damage to fuel in the reactors. Has NRC developed any views on the extent of fuel damage?
4. NISA is interested to obtain any reference material regarding core-concrete interaction (not because they think they have a current issue but against that eventuality) including the conditions under which that occurs and any associated data.
5. In addition to the H₂/O₂ disassociation in item 1 above, they are concerned that there may be residual H₂ in the containments and welcome NRC's thoughts on how to treat such a condition.

NISA is beginning to look at long term issues and has the following Qs in this area (note some of these may only apply to Japan's regulatory framework, but if we have insights from our post-TMI actions they would be greatly appreciated):

6. Regarding the best type of enclosure for the plant, does NRC have any thoughts? Do we have any regulations applicable to this condition or thoughts on the role of the regulatory authority in this decision?
7. What licensing requirements apply to decommissioning and regulatory review of the decommissioning plan?
8. What should they be considering with respect to criticality prevention and decay heat removal during the entombment period?
9. The NRC's TMI Fact Sheet notes that the first manned entry into the Unit 2 reactor building occurred after a venting of Krypton in July 1980 (16 months after the accident). What actions occurred during those 16 months that could inform their planning?

Regarding the spent fuel pools, NISA asserted that the Unit 1 SFP is above TAF with over 20 days margin due to low decay heat. They are not injecting to the Unit 1 SFP. For Unit 2, they are injecting seawater to the SFP via installed piping. For Units 3 and 4, they are spraying from pumper trucks within the RBs to put water on the top of the pools (In response to a question, they indicated that these sprays were put in place after the explosive events in those buildings.) Based on this information, NISA is assuming that the SFPs are all below 100C. The team here has questions relative to the latter buildings and other information available, for example, lack of visual evidence of steaming on Unit 4. We would appreciate HQ's thoughts on the SFPs and apparent inconsistencies with the status provided by NISA.

Dan Dorman

Thanks,
Eric Thomas
RST Coordinator