Gallagher, Carol

From: Witt, Kevin
Sent: Tuesday, September 06, 2011 11:41 AM
To: Gallagher, Carol
Cc: Dudek, Michael
Subject: Comments on NTTF recommendations

Hi Carol, we should be ok to release the comments to the public as I did a high level review and did not see any sensitive info.
Thanks
Kevin

PUBLIC SUBMISSION

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Comment On: NRC-2011-0196-0003
Notice of Public Meeting to Solicit Comments on Near-Term Task Force Report; Revised Notice

Document: NRC-2011-0196-DRAFT-0004
Comment on FR Doc # N/A

Submitter Information

Name: Casey Pfeiffer
Organization: PROS

General Comment

For Recommendation 2
Would the ten year seismic/flooding report be included in the FSAR (Final Safety Analysis Report) for each facility? Would the report have to be modified everytime a plant made a design change that helped or modified the report.

SUNSI Review Complete
Template = ADM-013

E-RIDS = ADM-03
Add = Michael Dudek (MID)
Michael Levine (MHL)
Kevin Witt (KMW)
Brian Green (BDG1)

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(2)

Document: NRC-2011-0196-DRAFT-0005
Comment on FR Doc # N/A

Submitter Information

Name: Casey Pfeiffer

General Comment

For Recommendation 7
What kind of Tech. Spec./surveilance requirements (ie monthly) would NRC want for SFP instrumentation/AC electrical power? In the opinion of NRC what would be the time requirements for these systems out of service?

How does NRC think that "seismically qualified" spray installed in buildings with large open areas will be built. These systems will also have to be put in as to not interrupt crane travel and SFP fuel movement.
Do these SFP spray systems will they be actuated by MCR actions or have manual actions locally which could have higher than normal radiation readings.

E-RIDS = ADM-03
Add: Michael Dudek (MID)
Michael Levine (MHL)
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(3)

Document: NRC-2011-0196-DRAFT-0006
Comment on FR Doc # N/A

Submitter Information

Name: Casey Pfeiffer
Organization: PROS

General Comment

Recommendation 4
New coping equipment being able to withstand design or beyond design basis events what standard will NRC use to determine if facility's coping equipment is meeting these standards?
Do the standards for coping equipment will they be different for different facilities (i.e Diablo Canyon would be more built for Earthquake/tsunmi as compared to Sequoyah which might be for tornadoes.)

E-RIDS = ADM-03
Add = Michael Dudek (MID)
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Comment on FR Doc # N/A

Submitter Information

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Organization: AREVA NP Inc.

General Comment

AREVA NP Inc. appreciates the opportunity to provide input on the NRC Fukushima Task Force 90-Day Report. First, AREVA NP supports comments submitted by the Nuclear Energy Institute (NEI). Additionally, AREVA NP Inc. two comments related to Recommendation 4.1:
Recommendation 4.1, 1st bullet - This recommendation mandates the use of AC-independent methods to cope with Station Blackout events. At Fukushima, both AC and DC power sources and distribution equipment were lost due to flooding. Reliance on AC-independent coping methods (a) would not have prevented the accident at Fukushima, and (b) could in fact increase plant risk for all types of Station Blackout events. As such, the Commission should accept the use of Alternate AC source-based solutions for mitigation of Station Blackout events, consistent with Regulatory Guide 1.155.

Recommendation 4.1, 2nd bullet - This recommendation mandates physical protection of the 8-hour coping systems and equipment against design basis and beyond design basis external hazards. Enhancements to physical protection against external events should be focused on mitigation of design basis events (i.e., GDC 2, LOOP) vs. beyond design basis events (i.e., Station Blackout). Enhancements, if any, to physical protection for Station Blackout events should be commensurate with the risk of losing the permanently installed Engineered Safeguards during these external events.

E-RIDS = ADM-03
Add = Michael Dudek (MID)
Michael Levine (MHL)
Kevin Witt (KMW)
Brian Green (BDG1)

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Comment on FR Doc # N/A

Submitter Information

Name: Casey Pfeiffer
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Organization: PROS

General Comment

On Recommendation 7, after the meeting I mostly agree with the NEI representative that was saying the SFP instrumentation did not need to be "Tech Spec" or safety-related. However, I did disagree that there needs to be SFP indication in the MCR (temperature and level). These indications need, in my opinion, not only to be in the MCR, but to be able to be seen like core situation by the TSC/OSC support centers. This information could give hours of advanced warning of adverse conditions in the SFPs. I have seen some of the new tables for loss of SFP cooling and some could be only 72 to 100 hours if you have recently been in a refueling outage. I do not however think these need to be "safety-related" equipment as the problem comes with how often you would do surveilances and what "Tech-Spec" actions and times would be for loss of this equipment. I would propose that remote indications of SFP instrumentation be something plants should have both for MCR and support centers, but not make these "safety-related".

E-RIDS = ADM-03

Add = Michael Oudek (MJD)
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Document: NRC-2011-0196-DRAFT-0009
Comment on FR Doc # N/A

Submitter Information

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Submitter's Representative: David Lochbaum, Director - Nuclear Safety Project
Organization: Union of Concerned Scientists

General Comment

See attached file(s)

Attachments

20110902-ucs-nrc-comments-near-term-task-force-recommendations

E-RIDS = ADM-03
Add = Michael Dudek (MJD)
Michael Levine (MHL)
Kevin Witt (KMW)
Brian Green (BDG1)

SUNSI Review Complete
Template = ADM-013

Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

September 2, 2011

Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
Attn: Rulemakings and Adjudications Staff

SUBJECT: **Docket ID NRC-2011-0196: Comments on Near Term Task Force Recommendations 2, 4, 5, 7, 8, and 9**

Comments submitted via www.regulations.gov

Good Day:

In response to the notice of the August 31, 2011, public meeting conducted by the Nuclear Regulatory Commission (NRC), I am submitting the attached comments on behalf of the Union of Concerned Scientists (UCS). These comments include input from Dr. Edwin Lyman, my colleague at UCS.

We have two general comments. The first involves the pace of the proposed rulemaking. If the NRC is still "pursusing" rulemaking on its Fukushima lessons learned 10 years from now, the agency will have let the American public down. All rulemaking initiated to implement the Task Force's recommendations must be completed without undue delay. A decade-plus completion internal has no excuse and is quite simply unacceptable.

Our second general comment is that the process for development and compliance with orders needs to be as transparent as possible. The secrecy surrounding the 2002 Interim Compensatory Measures orders following the 9/11 attacks gave the nuclear industry the cover it needed to delay implementation of the orders for years in private while telling the public that it was rapidly upgrading security to address terrorism concerns. While we agree that it is important that the requirements contained within orders need to be carefully and clearly formulated, this process should take months, not years, to resolve.

Sincerely,

David A. Fuller

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Enclosure: Comments on Near Term Task Force Recommendations 2, 4, 5, 7, 8 and 9

No.	Comments on Near-Term Task Force Recommendations 2, 4, 5, 7, 8 and 9 Comment
2	***The Task Force recommends that the NRC require licensees to reevaluate and upgrade as necessary the design-basis seismic and flooding protection of SSCs for each operating reactor.***
2.1	*Task Force's Recommendation: Order licensees to reevaluate the seismic and flooding hazards at their sites against current NRC requirements and guidance, and if necessary, update the design basis and SSCs important to safety to protect against the updated hazards.* UCS's Comment: This recommendation has limited value until the NRC resolves Generic Issue 199 (GI-199). For example, the last paragraph on page 26 of the task force's report begins with these sentences: *In 1996, the NRC established two new seismic regulations for applications submitted on or after January 10, 1997. These regulations were not applied to existing reactors.* In the first full paragraph on page 27, the task force stated: *In 1996, the staff also established a new requirement in 10 CFR 100.20, "Factors To Be Considered When Evaluating Sites," for the evaluation of the nature and proximity of man-related hazards, such as dams, for applications submitted on or after January 10, 1997. This regulation was not applied to existing reactors.* In the second full paragraph on page 27, the task force stated: *Since the last SRP update in 2007, the staff has established interim staff guidance (ISG) in three areas related to protection from natural phenomena: (1) DC/COL-ISG-1, "Interim Staff Guidance on Seismic Issues of High Frequency Ground Motion," (2) DC/COLISG7, "Assessment of Normal and Extreme Winter Precipitation Loads on the Roofs of Seismic Category I Structures," and (3) DC/COL-ISG-20, "Seismic Margin Analysis for New Reactors Based on Probabilistic Risk Assessment." This interim guidance has been applied only to new reactor reviews.* The recurring theme is that the NRC has taken several steps to protect future reactors from heightened seismic hazards, but has not taken these steps for existing reactors. GI-199 was initiated by the NRC staff more than seven (7) years ago to reconcile the gap between the seismic protection levels required for new reactors and the lower seismic protection levels required for existing reactors. GI-199 remains unresolved, so that gap still exists. Until GI-199 is resolved, the reevaluations would, at best, merely confirm that existing reactors conform to the outdated, obsolete, and inadequate seismic hazard levels. The NRC must resolve GI-199 to define the agency's expectations regarding current seismic hazards that owners of existing reactors can then incorporate into the answer keys for their reevaluations. The NRC must resolve GI-199 in order for this recommendation to realize the intended benefit.

2.2	*Task Force's Recommendation: Initiate rulemaking to require licensees to confirm seismic hazards and flooding hazards every 10 years and address any new and significant information. If necessary, update the design basis for SSCs important to safety to protect against the updated hazards.* UCS's Comment: As explained above for Recommendation 2.1, GI-199 must be resolved for periodic reevaluations to be constructive. Resolution of GI-199 would establish the NRC's expectations that plant owners could then use to inform decisions about when new information warrants updates to the design basis. Resolution would also provide NRC inspectors and reviewers the guidance they need when assessing whether licensees' reevaluations were adequate. Absent resolution of GI-199, any reevaluations would likely become exercises in futility. We agree with the following statements made by NRDC and NEI during the August 31st public meeting. We agree with NRDC that the scope of the periodic revisits must be broader than merely flooding and seismic information to also include other hazards such as tornadoes and fire hazards. We also agree with NEI that a better alternative to the 10-year revisits would be to define thresholds when new information triggers re-evaluations of hazards and associated protections.
2.3	*Task Force's Recommendation: Order licensees to perform seismic and flood protection walkdowns to identify and address plant-specific vulnerabilities and verify the adequacy of monitoring and maintenance for protection features such as watertight barriers and seals in the interim period until longer term actions are completed to update the design basis for external events.* UCS's Comment: The need for walkdowns strongly suggests that the existing inspection and testing regimes used by plant owners for seismic and flood protection measures are inadequate. It also strongly suggests that the NRC's oversight methods are equally defective. Thus, in addition to these one-time walkdowns, the NRC must also address the deficiencies in the licensees' inspection and testing regimes and its own oversight processes that enabled these vulnerabilities to go undetected to date.
4	***The Task Force recommends that the NRC strengthen SBO mitigation capability at all operating and new reactors for design-basis and beyond-design-basis external events.***
4.1	*Task Force's Recommendation: Initiate rulemaking to revise 10 CFR 50.63 to require each operating and new reactor licensee to (1) establish a minimum coping time of 8 hours for a loss of all ac power, (2) establish the equipment, procedures, and training necessary to implement an "extended loss of all ac" coping time of 72 hours for core and spent fuel pool cooling and for reactor coolant system and primary containment integrity as needed, and (3) preplan and prestage offsite resources to support uninterrupted core and spent fuel pool cooling, and reactor coolant system and containment integrity as needed, including the ability to deliver the equipment to the site in the time period allowed for extended coping, under conditions involving significant degradation of offsite transportation infrastructure associated with significant natural disasters.* UCS's Comment: Overall, the 8-hour, 72-hour, and 72-plus-hour approaches to the loss of ac power problem is a sound framework for managing this risk, with the caveats described below.

	The 72-hour extended loss of all ac coping time permits reliance on non-safety-related equipment for reactor core and spent fuel cooling. Unless this equipment is specifically included under the Maintenance Rule (10 CFR 50.65), the availability and reliability of this equipment cannot be assured. For example, if a coping plan relies on a non-safety-related widget not covered by the technical specifications, Updated Final Safety Analysis Report, and maintenance rule program, then a licensee could ship the widget offsite for repairs for an indefinite period without any compensatory measures being taken. The use of non-safety-related equipment increases the likelihood that a single failure or sub-standard part prevents reactor core and/or spent fuel cooling from being successfully achieved during this 72-hour coping period. We also note that a member of the ACRS has disputed the Task Force's assertion regarding the magnitude of the seismic safety margin that can be assumed for SSCs designed to withstand a safe shutdown earthquake (SSE). This is a serious issue because it contradicts the Task Force's confidence in the availability of SBO mitigation equipment following beyond-design-basis seismic events. It may be necessary to add additional seismic protection (in addition to flood protection) to SBO mitigation equipment to maintain the necessary safety level. The provisions for offsite resources assuring reactor core and spent fuel cooling involve some details to be addressed. For example, resources at an offsite location would require periodic testing and inspection to verify their continued functionality. In addition, these resources might be needed to support a site stricken by a severe natural disaster, there may be competing needs for them (e.g., to provide temporary power to a local hospital or to a local emergency response center). One aspect of the Task Force's proposed rule should actually be implemented as an Order: the requirement for reliable provision of power to hydrogen igniters in ice-condenser and Mark III containments during an SBO. Via Generic Issue 189, the NRC determined nearly a decade ago that a rule to require backup power to the igniters was justified; yet it never enacted the rule. Instead, licensees installed the equipment under a voluntary initiative. No more analysis is required on this issue, and it should be a relatively simple effort to upgrade the current voluntary measures to inspectable and enforceable regulatory requirements.
4.2	*Order licensees to provide reasonable protection for equipment currently provided pursuant to 10 CFR 50.54(hh)(2) from the effects of design-basis external events and to add equipment as needed to address multiunit events while other requirements are being revised and implemented.* UCS's Comment: This recommendation, depending on how it is implemented, could address the caveats identified in our comments on Recommendation 4.1. What is "reasonable protection?" How would a plant worker or NRC inspector assess whether non-safety-related equipment added per 10 CFR 50.54(hh)(2) is reasonably protected from design-basis external events? There are decades-old requirements and conventions for assessing whether safety-related components will function during design-basis events. There are decades-old requirements and conventions for assessing whether non-safety-related components will function during licensing-basis fires (e.g, Appendix R). Would applying either of these standards suffice, or is some new standard to be applied? Absent such detail, it is hard to gauge the value of this recommendation. UCS's view is that, absent strong and compelling reasons to the contrary (i.e., not just that it costs too much), this equipment installed to protect the lives of workers and the public should be classified as safety-related. Since that's the role it plays, that's the classification it must be given.

5	***The Task Force recommends requiring reliable hardened vent designs in BWR facilities with Mark I and Mark II containments.***
5.1	*Task Force's Recommendation: Order licensees to include a reliable hardened vent in BWR Mark I and Mark II containments.* UCS's Comment: We agree.
5.2	*Task Force's Recommendation: Reevaluate the need for hardened vents for other containment designs, considering the insights from the Fukushima accident. Depending on the outcome of the reevaluation, appropriate regulatory action should be taken for any containment designs requiring hardened vents.* UCS's Comment: We agree.
7	***The Task Force recommends enhancing spent fuel pool makeup capability and instrumentation for the spent fuel pool.***
7.1	*Task Force's Recommendation: Order licensees to provide sufficient safety-related instrumentation, able to withstand design-basis natural phenomena, to monitor key spent fuel pool parameters (i.e., water level, temperature, and area radiation levels) from the control room.* UCS's Comment: We agree. While the NRC is not currently soliciting comments on Task Force Recommendation 6 regarding hydrogen, we believe that the NRC should require licensees to provide sufficient safety-related instrumentation, able to withstand design-basis natural phenomena, to monitor key hydrogen parameters from the control room on the same pace as for spent fuel pool parameters. While the pathway(s) are currently uncertain, what is certain today is that hydrogen gas got into the reactor buildings on Fukushima Dai-Ichi Units 1, 3, and 4 and ignited, causing secondary containment integrity to be lost at a time when it was needed. By design, hydrogen should not exist in the free space of the reactor building. During normal and post-accident venting of the primary containment, hydrogen might be present in the flow carried through the reactor building within piping and ducting. But it is not supposed to get into the free space of the reactor building. Yet it did. While identification of the pathway(s) through which hydrogen reached the reactor building free spaces should, via Recommendation 6, trigger fixes to lessen recurrence at U.S. reactors, the defense-in-depth philosophy espoused by the Task Force supports the needs for control room operators to be able to detect the unwanted, undesired, and unexpected buildup of hydrogen inside the reactor buildings (secondary containments) of boiling water reactors and the fuel handling buildings of pressurized water reactors. Hopefully, this instrumentation would allow the operators to verify the absence of significant concentrations of hydrogen. But if hydrogen were to collect for

	whatever reasons, the instrumentation would enable the operators to detect this situation and take pro-active steps to mitigate it. At Fukushima, the detection method was the explosion inside the Unit 1 reactor building. To combat recurrence, workers opened a hole in the side of the Unit 2 reactor building and open vents in the roofs of the Unit 5 and 6 reactor buildings to control hydrogen accumulations. Operators at U.S. reactors must not wait for an explosion to alert them to hydrogen collecting in unwanted places. They must be provided the means to monitor hydrogen levels in structures containing safety-related equipment where hydrogen may collect.
7.2	*Task Force's Recommendation: Order licensees to provide safety-related ac electrical power for the spent fuel pool makeup system.* UCS's Comment: This recommendation, along with the rest of the recommendations in the Task Force's report, are not sufficient protection for boiling water reactors (BWRs) with Mark I and Mark II containment designs. If the spent fuel pool at a BWR Mark I/II plant was allowed to boil but its irradiated fuel protected from damage by providing makeup flow to compensate for the water inventory lost via boil-off, the irradiated fuel in the reactor core may be sacrificed. The NRC must not force the operators to make a Faustian choice between catastrophic damage to the spent fuel and catastrophic damage to the reactor core. Both catastrophes should be avoided if possible. The spent fuel pool in a BWR Mark I/II plant is located inside the reactor building, or secondary containment. All the emergency core cooling system pumps (high pressure coolant injection, core spray, and residual heat removal) along with the reactor core isolation cooling system and control rod drive pumps are also located inside the reactor building, typically at its lowest elevation. The water evaporating from a boiling spent fuel pool at a BWR Mark I/Mark II containment eventually condenses back into water. Much of that condensed water drains by gravity down into the lower elevations of the reactor building. The rising water levels eventually disable the emergency core cooling systems for the reactor core due to submergence. Therefore, this recommendation of a panacea for spent fuel pools is a pandemic for reactor cores at BWR Mark I/II plants. The NRC must ensure that BWR Mark I/II plants comply with existing regulations applicable to this situation. As the Task Force stated on page 17 of its report: *... the current NRC regulatory approach includes (1) requirements for design-basis events with features controlled through specific regulations or the general design criteria (GDC) (10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants") ...* General Design Criterion 44 (GDC 44) in Appendix A to 10 CFR Part 50 states: *A system to transfer heat from structures, systems, and components important to safety, to an ultimate heat sink shall be provided. The system safety function shall be to transfer the combined heat load of these structures, systems, and components under normal operating and accident conditions.*

	BWR Mark I/II plants do not comply with this requirement if their GDC 44 cooling water systems cannot transfer the "combined heat load," including the heat load from the spent fuel pool, from the reactor building to the ultimate heat sink. Note that this requirement is for design bases events, not extended design basis, beyond design basis, or other similar moniker. Merely assuring makeup flow to a boiling spent fuel pool at a BWR Mark I/II plant is also inconsistent with the defense-in-depth philosophy expressed on page 25 of the Task Force's report: *The key to a defense-in-depth approach is creating multiple independent and redundant layers of defense to compensate for potential failures and external hazards so that no single layer is exclusively relied on to protect the public and the environment.* The environmental conditions inside the reactor building when its spent fuel pool is boiling are very likely to disable the standby gas treatment system. The standby gas treatment system is a safety system normally in standby. In event of a design basis accident, the reactor building's normal ventilation system is shut down and the standby gas treatment system started. The standby gas treatment system draws air from the refueling floor and lower elevations of the reactor building, passes it through a series of HEPA and charcoal filters, before discharging it from an elevated release point. The filters are designed to reduce the radioactivity levels by a factor of 100. The elevated discharge further protects plant workers and the public by diluting radioactively contaminated air with clean air. A spent fuel pool boiling during a design basis event at a BWR Mark I/II plant can cause the standby gas treatment system to fail. This collapses the desired defense-in-depth layers to a single one – the spent fuel pool <u>not</u> boiling. If the pool boils, reactor core damage is more likely to occur and secondary containment integrity is more likely to be lost.
7.3	*Task Force's Recommendation: Order licensees to revise their technical specifications to address requirements to have one train of onsite emergency electrical power operable for spent fuel pool makeup and spent fuel pool instrumentation when there is irradiated fuel in the spent fuel pool, regardless of the operational mode of the reactor.* UCS's Comment: This recommendation lacks sufficient scope. As stated on page 43 of the Task Force's report: *When the reactor is shut down and defueled for maintenance work and all of the fuel is placed in the spent fuel pool, the LCOs* [limiting conditions for operation specified in the technical specifications, an implicit part of a reactor's operating license] *do not require any electrical power systems to be operable.* This is true. It is also true that when a reactor is defueled, there are no applicable technical specification requirements and associated LCOs for containment integrity and even water level in the spent fuel pool. These shortcomings in the technical specification requirements must also be addressed in addition to the one about onsite emergency electrical power.

7.4	*Task Force's Recommendation: Order licensees to have an installed seismically qualified means to spray water into the spent fuel pools, including an easily accessible connection to supply the water (e.g., using a portable pump or pumper truck) at grade outside the building.* UCS's Comment: For plants other than BWR Mark I/II plants, this recommendation has value with limited downside. For BWR Mark I/II plants, this recommendation has the same potential adverse consequences as articulated in the comments for Recommendation 7.2 above. The Task Force emphasized defense-in-depth provisions frequently in its report, but abandoned that concept with regard to spent fuel pool safety. The Task Force noted on page 44 that "*...the U.S. spent fuel pools are filled with spent fuel pools up to approximately three-quarters of their capacity*" with "*an average storage capacity of approximately 3,000 spent fuel assemblies.*" Spraying water into a spent fuel pool is a desperate measure. Lots of things had to have gone wrong to employ this last-ditch act. If this last-ditch act fails, it is likely that irradiated fuel – and considerable amounts of it – located outside primary containment in both pressurized water reactor and boiling water reactor plants will be damaged. Proper application of the defense-in-depth philosophy would seek to reduce both the probability of such an outcome and its consequences. The recommended water spray provision addresses the probability aspect. Accelerating the transfer of irradiated fuel from spent fuel pools to dry storage would address the consequence aspect of defense-in-depth. The NRC must act to reduce the inventory of irradiated fuel in spent fuel pools to responsibly manage the spent fuel risk.
7.5	*Task Force's Recommendation: Initiate rulemaking or licensing activities or both to require the actions related to the spent fuel pool described in detailed recommendations 7.1–7.4.* UCS's Comment: We agree on one condition – that the rulemaking be completed without undue delay. We watched the NRC take over a decade to plod through the working hours rulemaking. It should not, and must not, take so long to resolve known safety issues.
8	***The Task Force recommends strengthening and integrating onsite emergency response capabilities such as EOPs, SAMGs, and EDMGs.***
8.1	*Task Force's Recommendation: Order licensees to modify the EOP technical guidelines (required by Supplement 1, "Requirements for Emergency Response Capability," to NUREG-0737, issued January 1983 (GL 82-33), to (1) include EOPs, SAMGs, and EDMGs in an integrated manner, (2) specify clear command and control strategies for their implementation, and (3) stipulate appropriate qualification and training for those who make decisions during emergencies.* UCS's Comment: We agree.

8.2	*Task Force's Recommendation: Modify Section 5.0, "Administrative Controls," of the Standard Technical Specifications for each operating reactor design to reference the approved EOP technical guidelines for that plant design.* UCS's Comment: We agree.
8.3	*Task Force's Recommendation: Order licensees to modify each plant's technical specifications to conform to the above changes.* UCS's Comment: We agree.
8.4	*Task Force's Recommendation: Initiate rulemaking to require more realistic, hands-on training and exercises on SAMGs and EDMGs for all staff expected to implement the strategies and those licensee staff expected to make decisions during emergencies, including emergency coordinators and emergency directors.* UCS's Comment: We agree.
9	***The Task Force recommends that the NRC require that facility emergency plans address prolonged SBO and multiunit events.***
9.1	*Task Force's Recommendation: Initiate rulemaking to require EP enhancements for multiunit events in the following areas:* • *personnel and staffing* • *dose assessment capability* • *training and exercises* • *equipment and facilities* UCS's Comment: We agree.
9.2	*Task Force's Recommendation: Initiate rulemaking to require EP enhancements for prolonged SBO in the following areas:* • *communications capability* • *ERDS capability* • *training and exercises* • *equipment and facilities* UCS's Comment: We agree.

9.3	*Task Force's Recommendation: Order licensees to do the following until rulemaking is complete:* • *Determine and implement the required staff to fill all necessary positions for responding to a multiunit event.* • *Add guidance to the emergency plan that documents how to perform a multiunit dose assessment (including releases from spent fuel pools) using the licensee's site-specific dose assessment software and approach.* • *Conduct periodic training and exercises for multiunit and prolonged SBO scenarios. Practice (simulate) the identification and acquisition of offsite resources, to the extent possible.* • *Ensure that EP equipment and facilities are sufficient for dealing with multiunit and prolonged SBO scenarios.* • *Provide a means to power communications equipment needed to communicate onsite (e.g., radios for response teams and between facilities) and offsite (e.g., cellular telephones, satellite telephones) during a prolonged SBO.* • *Maintain ERDS capability throughout the accident.* UCS's Comment: We agree.
9.4	*Task Force's Recommendation: Order licensees to complete the ERDS modernization initiative by June 2012 to ensure multiunit site monitoring capability.* UCS's Comment: We agree about the need to modernize the ERDS without undue delay. We lack information to determine whether the June 2012 deadline is appropriate.

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General Comment

See attached file(s)

Attachments

HOW US BOILING WATER REACTORS WOULD FARE UNDER FUKUSHIMA NUCLEAR CRISIS (Levy)

E-RIDS = ADM-03
Add = Michael Dudek (MJD)
Michael Levine (MHL)
Kevin Witt (KMW)
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SUNSI Review Complete
Template = ADM-013

HOW US BOILING WATER REACTORS (BWRs) WOULD FARE UNDER FUKUSHIMA NUCLEAR CRISIS

Dr. Salomon Levy*, Honorary Member ASME, Member NAE

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SUMMARY

On March 11, 2011, six Boiling Water Reactors (BWRs) at Fukushima Daiichi site were subjected to an earthquake and particularly tsunami attacks well above their design bases. The results were incredible flooding and damage, very poor work conditions, extended station blackout (SBO), loss of normal and emergency cooling systems, reactor core melting, and radioactive releases fromt the operating Units 1, 2, and 3.The principal factors contributing to the Fukushima accident and its very serious consequences are judged to be: **earthquake** and especially **tsunami** which caused most of the damage at Fukushima; **SBO, its duration, and inadequate water addition to the reactor core; hydrogen release and fuel melt**; **venting of BWR suppression containments and ensuing hydrogen explosions and associated fires**; and **severe accident management.** Those contributing factors were applied to US BWRs to determine how they would fare under Fukushima US applicable severe conditions. The findings and underlined conclusions are as follows:

1. **Earthquake and Tsunami.** Due to design margins, Fukushima and US BWRs can sustain earthquakes above their design bases as demonstrated by Fukushima on-site power being available until the arrival of the tsunami about 46 minutes later. No current or future US BWR will face tsunamis at the Fukushima level as discussed in NRC News Release 11-053 of 3/19/11. The conclusion is that US BWRs would have undergone normal shutdown and recovery under US applicable Fukushima conditions.

2. SBO, Duration and Inadequate Water Addition. US SBOs are very rare and of short duration. US Nuclear Regulatory Commission (NRC) requires BWRs to carry out a scoping assessment and to develop a strategy reviewed by NRC to maintain the plants in a safe condition. When the SBO extends beyond the capability of provided systems to remove decay heat, reactor depressurization, other available water sources, piping connections to BWRs, mobile power, and special equipment are used to assure continued water addition. Due to site damages, it was not possible to do so at Fukushima. The recommendation is that available US SBO strategies be revisited to confirm their success by actual training at plant simulators. Site probabilistic estimates of SBO occurrence and its duration may need to be reevaluated.

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*Dr. Levy was the manager responsible for General Electric (GE) BWR heat transfer and fluid flow and the analyses and tests to support their nuclear fuel cooling during normal, transient, and accident analyses from 1959 to 1977.

3. Hydrogen Release and Fuel Melt. Hydrogen is released shortly after BWR reactor water level falls below its midpoint. The amount of hydrogen formed accelerates as more fuel is exposed to steam and as considerable energy is added from the chemical reaction of steam with zircaloy fuel cladding. The conclusion is that formation of hydrogen and its acceleration need to be forecasted and detected to shift top priority to reactor water addition and to assure its success. Rising rates of reactor and containment pressures and containment water temperature would have yielded more reliable information than reactor water level even in the darkened control rooms of Fukushima.

4. Venting of BWR Containments, Hydrogen Explosions, and Associated Fires. All US Mark I containments vent through hardened pipes connected to stack or to another high point outside the reactor building in order to avoid hydrogen explosions and fires within that building. Early venting is preferred when the containment pressure and hydrogen concentration are low and not subject to explosions and fires. Additional periodic venting with addition of inert gas may be necessary until the reactor is recovered with water. At Fukushima, the venting pipes did not terminate at the stack or outside the reactor building and venting was carried out only at high containment pressures when hydrogen concentration is elevated and certain to produce fires and explosions. Because venting strategies may vary at US BWRs, formalizing them and verifying their practice during US BWRs SBO simulator training is urged.

5. Severe Accident Management. US control and command during a US severe accident rests at the site and Severe Accident Management Guidelines (SAMGs) are available to develop a proper response. At Fukushima, severe accident strategies were mostly improvised due to degraded site and reactor conditions. It is essential that full control and command remains at the sites due to urgency to take action during SBOs. Review of SAMGS at US BWRs is advisable to revalidate them. Consideration of "what ifs" circumstances and lessons learned at Fukushima may be useful.

In summary, US BWRs would have fared much better. Fukushima BWRs faced extremely difficult and unpredicted circumstances. They deserve considerable praise for their performance and for limiting the radiation exposure to the high population density beyond the site.

I INTRODUCTION

The March 11, 2011 events especially impacted Fukushima Daiichi where six BWRs are located. The first three Units 1, 2, and3 were operating and suffered considerable damage and reactor core melt. They will receive most attention. There was a suspected loss of spent fuel cooling at Unit 4 and it will be discussed. Earthquake ground accelerations were within design basis at Units 1, 4, and 6. Units 2, 3, and 5 ground accelerations were up to one order of magnitude higher on the Richter scale. All the plants fared well. The tsunami attacks, which arrived about 46 minutes after the earthquake, impacted all Units and reached 14 meters (45 feet) or about twice the design basis value. They led to extensive flooding of facilities and safety equipment and they caused the loss of all emergency diesel generators (EDGs) except for one EDG at Unit 6. The sea water pumps and motors were destroyed resulting in the loss of the ultimate heat sink. At Units 1 and 2 the 125 DC batteries were flooded so there was no instrumentation and control or lighting available. At Unit 3 they were available for 30 hours but they were lost once the batteries were drained. Work conditions were very poor due to obstacles, darkness, and inability to get equipment and supplies.

While final evaluations of the Fukushima Daiichi crisisis are still on-going, several assessments have been published. The US NRC Near Term Task Force Review (NTTTR) and the IAEA Mission Report (IMR)are especially noteworthy. They have helped establish the five important contributors listed in the Summary. Before considering those factors in details, Section II covers generic BWR behavior during SBO in order to better understand subsequent comments about Fukushima timelines and US BWRs. Section III deals with the principal contributing factors as they are applied to US BWRs and Section IV provides Conclusions.

II.GENERIC BWR BEHAVIOR DURING SBO AND FUKUSHIMA TIMELINES

II.1Generic BWR Behavior:

Due to the absence of steam generators, BWRs use a reduced volume pressure suppression containment which consists of a drywell and a wet well. In the Mark I containment design used in Fukushima Units 1,2, and3 the drywell consists of an inverted lamp shaped steel vessel which houses the reactor vessel. The lower wet well is a steel torus half filled with water. The drywell and wet well are connected by pipes partly submerged in the wet well water. Both chambers are inerted to avoid burning or explosion of hydrogen formed during a loss of coolant accident. BWRs are equipped with an Isolation Condenser (IC) or a Reactor Core Isolation Cooling (RCIC) system to handle decay heat during SBOs. IC relies upon reactor steam to rise and be condensed in a heat exchanger located above the core and immersed in a tank of water. The condensed water is returned by gravity to the reactor. Fukushima Unit 1 had an IC capable of removing decay heat for 8 hours. ***By adding water to IC tank, IC could operate beyond 8 hours and handle SBOs of longer duration.*_RCIC uses reactor steam to drive its turbine and pump water into the reactor from the condensate storage tank or the suppression chamber of the containment where the turbine exhaust is condensed and increases the wet well water temperature. RCIC requires control power from batteries and the batteries have limited lives. Also, the RCIC performance may degrade or fail due to increased suppression pool temperature, lack of suppression pool cooling, and presence of hydrogen. *Extending battery life or having spare batteries would extend RCIC operating time.* During extended SBOs, the wet well water is the primary heat sink available. *Using the containment cooling system to withdraw wet well water and replacing it with cooler water or improvised ways to cool wet well water in place or using containment spray may deserve emergency consideration. RCIC degradation would also be delayed.*

The High Pressure Cooling Injection (HPCI) provided in BWRs can also add water to BWR reactor cores. It operates like RCIC except that it can deliver large flows of water from the condensate storage tank to the core to recover it during a loss of coolant accident. It was used early at Fukushima Unit 1 before the tsunami destroyed the condensate tank. The result was a sharp decrease in reactor pressure and water temperature beyond the allowable rate and HPCI was turned off correctly by the operators. Interestingly, that action provided external water to the reactor and helped delay its core damage. *If HPCI flow had been controlled to stay below the specified limit for water temperature decrease, it would have been able to refill the core until the water level would have tripped it. The impact could be hours delay in need to add external water to the reactor.* HPCI was also used as backup to RCIC at Fukushima. It was operating with wet well water and at a point far away from its design basis and its effectiveness needs validation.

As long as IC and RCIC are working, the reactor conditions will not change noticeably. With IC, the containment pressure and temperature will remain constant while they will rise during RCIC operation. When IC or RCIC degenerate or stop working, the decay heat will continue to produce steam and the

**Italics indicate potential improvements to severe accident management.

reactor vessel pressure will rise and its relief valves will open to allow steam to escape and reach the wet well water where it is condensed. The relief valves will reclose to restore the vessel pressure to its normal level. This process will repeat itself, delivering water from reactor to wet well until the core is uncovered and hydrogen starts forming. With no external water addition, the reactor level cannot rise and will decline continuously. Its measurement becomes less reliable partly due to reduced level, repeated opening and closing of relief valves and the presence of hydrogen. That possibility was not recognized at Fukushima. The reactor and containment pressures and the wet well water temperature would be alternate superior indicators. For example, the early and repeated opening and closing of relief valves indicate degradation and failure of IC and RCIC. The reactor and the containment pressures will rise faster when hydrogen is produced. Increased reactor and containment pressure rates and wet well temperature rises confirm accelerated core melt.

***Simplified heat and water volume balances can be carried out to determine the amount of time for the reactor core to be uncovered. Using the integration of decay heat and the knowledge of water content with height in the reactor vessel, it was found that after 4 hours of RCIC operation, the wet well temperature would rise by about 56C (90F). If the RCIC arbitrarily stops working at that time, the water level would drop to the top of the reactor in less than one hour and to the core midpoint shortly thereafter. That simplified assessment confirms the urgency of adding water to the reactor core after IC or RCIC stop working and the value of carrying such on-site predictions with time.

II.2 Fukushima Timelines

The timelines provide graphic descriptions how lack of lighting, frequent evacuations and suspensions, late arrival of equipment delayed Fukushima management recognized need for early addition of water to reactor cores. They are good accounts of the severe accidents progress versus time, including times for water addition to the reactor cores, venting the containments, and the ensuing explosions.

For example, in the case of Unit 1, IC was actuated and turned off shortly after the earthquake because the reactor water level was steady (which is what it is supposed to do). HPCI was then actuated and turned off due to a sharp drop in reactor pressure and water discussed in Section II.1.**On 3/11 at 17:30PM depressurization and ability to add water were in place and they were not carried out when they should have been.** On 3/11 at 22:00PM reactor water level rose with no water addition. On 3/12, at 0:06AMe high containment pressure was noted and observed to increase, indicating core melt had occurred. Tank water was added at 5:46AM on 3/12, about 27 hours after plant shutdown or too late to avoid core melt. A total of 80 tons or about 80 cubic meters were injected with fire pumps, enough to delay melt progress. The containment was vented at 14:30PM on 3/12 to wait for evacuation and an explosion followed one hour later.

Similar sequences occurred in Units 2 and 3 which used different strategies. Unit2 relied upon RCIC while Unit 3 used RCIC and HPCI. AT Unit 2 Improper water level at TAF+3400mm was reported at 22:00PM on 3/11 with no external water addition. Increased radiation level was reported at 4:55AM on 3/12. Seawater was injected on Unit 2 at 19:14PM on 3/14.Drywell pressure was above maximum design pressure at 22:50PM on 3/14.There was an explosion near the suppression pool at 6:00AM on 3/15.

In the case of Unit 3 RCIC was activated at 16:03 on 3/11 and HPCI was added at 12:35AM on 3/12 when RCIC tripped. Increased radiation was noted at 4:55AM on 3/12. Containment spray was used at 7:39 AM on 3/13 and tank water was injected at 9:25AM on 3/13. Drop of drywell pressure due to venting was reported at 9:36AM on 3/13. Injection of fresh water was terminated at 12:20AM on 3/13. On 3/14 Seawater injection started at 13:12PM .There was an explosion in reactor building at 11:01AM on 3/14.

***Dr. James Healzer carried out those analyses using known water contents as a function of elevation.

Several comments are in order based upon the above Fukushima timelines. They should be recognized not as criticism of Fukushima personnel but as "Monday morning quarterbacking" of a game played on the preceding Saturday. The advice would be:

a) Carry out water addition to reactor as soon as possible as could and should have been the case at Unit 1 at 17:30PM on 3/11.
b) Recognize unreliable water level data and avoid their use to delay urgent actions.
c) Presume that early indication of radioactivity indicates start of core damage.
d) Recognize RCIC deterioration with increased wet well water temperature and consider cooling the containment water.
e) Consider early venting rather than waiting for containment pressure to reach or exceed design pressure.
f) Realize that salt water addition is preferable to core melt progress. While salt water presence is not desirable due to stress corrosion, it can happen only at reduced pressures and temperatures and its impact will be diminished.

There are many lessons yet to be learned from Fukushima, including the apparent poor performance of IC at Unit 1, the inability to open several valves and many others yet to be reported. It is hoped that times for reactor pressure valves opening, pressure and temperature containment values versus time could be available to assess RCIC and HPCI performances during severe accidents.

III. APPLICATION OF IMPORTANT FUKUSHIMA FACTORS TO US BWRs

III.1 Earthquake and Tsunami. According to NTTR, "current NRC regulations and associated regulatory guidance provide a robust regulatory approach for evaluation of site hazards associated with natural phenomena." Furthermore, the NRC requires that "safety significant structures, systems, and components be designed to take into account even rare and extreme seismic and tsunami events". As new information becomes available, the implications of updated natural events are reevaluated at appropriate intervals. According to NRC News Release Number 11-053 of 3/19/2011, the only "subduction zone" similar to the Fukushima site is the Cascadian region off the California , Oregon, and Washington coasts. Only the Columbia BWR is located there but over 200 miles from the coast. This would preclude the tsunami reaching that BWR. Finally, design margins are provided with respect to earthquake designs in all BWRs which were confirmed by the Fukushima plants being able to sustain earthquake level above their design basis. In other words the considerable damages sustained at Fukushima cannot happen at US BWRs and Conclusion 1 of the Summary is justified.

III.2 SBO, Duration, and Inadequate Water Addition. US NRC has rules which require US BWRs to keep the reactor core covered with water and to maintain containment integrity for a prescribed SBO duration. That time relies upon evaluating the redundancy of the on-site emergency power system and its reliability, the anticipated loss of off-site power and the time to react to it. Based upon that assessment and the anticipated availability time of IC or RCIC, an overall strategy is developed and reviewed by NRC to assure that BWRs will be maintained in a safe condition. Since tsunamis of the high Fukushima level were excluded under III.1 above, there is no apparent reason to change the current US SBO duration to an arbitrary 72 hours proposed in NTTR. What is most needed is to confirm that the top current strategy of depressurization and addition of water to the reactor can be carried out to preserve safety. Summary recommendation 2 satisfies that objective. The use of simulator training provides the ability to turn off IC or RCIC and to recognize their failures by observing reactor pressure and wet well water temperature. It also permits operators to switch their focus from water level to those variables

when the level is decreasing. Also, some suggestions in Section II.1 can be tried such as adding water to IC or providing reserve battery power to RCIC, and cooling the wet well water. Recommendation 2 in the Summary is sufficient to assure US BWR safety during SBOs.

III.3 Hydrogen Release and Fuel Melt. It is well known that without water addition, the time to core melt is short as discussed in Section II.1. The use of the Modular Accident Analysis Program (MAAP) at Fukushima Unit 1 was reported in IMR. That prediction showed that TAF was reached about 3 hours after plant trip and core damage started 4 hours after the trip. Unfortunately, that prediction which is likely correct was changed subsequently by relying upon improper water level data. The computer code MELCOR in NUREG/CR 5850, assuming RCIC operation for 5 hours and no depressurization to add water, predicts zircaloy oxidation 76 minutes ahead of core melt. Melt relocation is predicted to happen two hours later. All the preceding analyses confirm the need to have on-site capability to predict hydrogen formation and to compare such predictions with plant data for containment pressure and wet well water temperature as recommended in Recommendation 3 of the Summary.

III.4 Venting, Hydrogen Explosions, and Associated Fires. The differences in vent design between US BWRs and Fukushima were noted under the Summary and need not be repeated here. It is important to note that BWR containment venting is necessary only under the extremely low probability of not being able to add water to the reactor core. Still, it would be desirable to formalize US BWR venting strategies and to practice them as proposed under Recommendation 4 of the Summary, The concept of early venting followed by subsequent periodic vents with adding nitrogen can be checked during the SBO training on plant simulators. Also, it would give the chance to discuss ways to add water to IC, to use containment spray, and to cool the wet well water in order to reduce containment pressure and wet well water temperature and improve RCIC performance.

III.5 Severe Accident Management. Fukushima had SAMGS but they did not anticipate the extensive damages caused by the tsunami. They did not account for darkened control rooms and lack of control and instrumentation information. The site flooding and debris did not help. It was difficult to get needed equipment and support. Too many tasks had to be carried out simultaneously. **Overall, the Fukushima site performance can only be praised.** By contrast US BWRs can apply their SAMGS due to the absence of a Fukushima equivalent tsunami. The command and control would be installed at the site and not have to get the approval of four different ministries before proceeding with water addition and venting. Still, some benefits can be gained from Fukushima experience. First, US BWRs SAMGS should be reviewed as proposed under Summary Recommendation 5. Second, prioritization of potential tasks would be beneficial with top priority given to reactor water addition. Site availability of essential batteries for RCIC and control room lighting, timely delivery of mobile power, fire, and water supply equipment deserve rechecking. The use of on-site models to predict severe accident progress and the recognition of improper water level data are essential. Finally, contingency plans to cool wet well water would be considered.

III.6 Loss of Spent Fuel Pool Cooling. Concern arose about spent fuel pool cooling at Fukushima Unit 4 because of its unloading of the full reactor core during the refueling outage, which significantly increases pool decay heat. It was enhanced by detection of radioactivity leakage from Unit 3. The observation of that pool when the radiation level was low would have avoided the diversion of personnel away from more important tasks. The use of helicopters to drop water was "overkill" because little of that water reached its target and worsened the site flooding and the eventual cleanup. Potential splashing of water has also been mentioned. Splashing at US BWRs will not happen due to their reduced earthquake levels.

Improvised ways to add water to US BWRs spent fuel pools should be adequate and their periodic observations by visits or cameras would avoid false alarms.

IV. CONCLUSIONS

With respect to Fukushima crisis:

1. The tsunami is responsible for the severe accidents, reactor melts, releases of radioactivity, and the inability to reduce their consequences due to the incredible tsunami damages at Fukushima Daiichi site.
2. Top priority should have been given to reactor water addition and less emphasis put on unreliable reactor water level data. Increased focus should have been given to containment pressure and especially its water temperature.
2. There is great urgency to upgrade Japan tsunami model and to apply it to other "subduction zones" along Japan coastlines in order to reduce the risks and to protect the population in those areas. It deserves top priority not emphasized enough in IMR.

With respect to US BWRs:

1. Their high safety level is preserved because they are not subject to Fukushima tsunamis levels.
2. Review of their SBO, SAMGS, and containment venting strategies are recommended.
3. Other suggestions are offered about confirming reactor water level accuracy, using early venting, emergency availability of equipment, and cooling containment water.

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Comment on FR Doc # N/A

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General Comment

September 2, 2011

Ms. Cindy K. Bladey
Chief, Rules, Announcements and Directives Branch
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Industry Comments on Proposed Near-Term NRC Actions Associated With the Fukushima Dai-Ichi Accident; Docket Number NRC-2011-0196

Project Number: 689

Dear Ms. Bladey,

The Nuclear Energy Institute appreciates the opportunity to provide comments and input on the set of proposed near-term U.S. Nuclear Regulatory Commission (NRC) actions associated with the NRC report, Recommendations for Enhancing Reactor Safety in the 21st Century, The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident. This letter supplements the industry comments made in the NRC August 31, 2011 public meeting and reflects input provided by several industry working groups and the

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chief nuclear officers of all U.S. nuclear operating companies.

Detailed comments on each of the six main recommendations are provided in the attachment to this letter.

In addressing the NRC task force recommendations, we encourage the Commission to adopt a flexible, performance-based approach, especially in the area of beyond design bases activities, to allow for the variations in siting, geographical and geological locations, and plant designs.

The industry agrees that there are important lessons to be learned and implemented from the Fukushima accident. The industry has developed a strategic plan, The Way Forward, to coordinate and manage its response to the Fukushima crisis. The plan emphasizes the importance of maintaining high safety performance at the 104 operating reactors and covers the development and implementation of lessons learned from Fukushima, R&D and technical support, international cooperation and support, communications, emergency planning and preparedness, training, and regulatory interactions and response.

The industry will soon complete a provisional timeline that reconstructs the progression of events and a

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Attachments

09-02-11_NRC_Industry Comments on Proposed Near-Term NRC Actions Associated with the Fukushima Dai-Ichi Accident; Docket ID NRC-2011-0196_Attachment

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NUCLEAR ENERGY INSTITUTE

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September 2, 2011

Ms. Cindy K. Bladey
Chief, Rules, Announcements and Directives Branch
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

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Detailed comments on each of the six main recommendations are provided in the attachment to this letter.

In addressing the NRC task force recommendations, we encourage the Commission to adopt a flexible, performance-based approach, especially in the area of beyond design bases activities, to allow for the variations in siting, geographical and geological locations, and plant designs.

The industry agrees that there are important lessons to be learned and implemented from the Fukushima accident. The industry has developed a strategic plan, *The Way Forward,* to coordinate and manage its response to the Fukushima crisis. The plan emphasizes the importance of maintaining high safety

[1] NEI is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all utilities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

performance at the 104 operating reactors and covers the development and implementation of lessons learned from Fukushima, R&D and technical support, international cooperation and support, communications, emergency planning and preparedness, training, and regulatory interactions and response.

The industry will soon complete a provisional timeline that reconstructs the progression of events and accident conditions at Fukushima. Once the provisional timeline is completed, discussions with Tokyo Electric Power Company are necessary to resolve a number of open issues and questions before the industry completes its evaluations. Also, that information will be critical in determining the extent to which insights related to the events and conditions pertain to U.S. plants and the potential plant enhancements that should flow therefrom. There must be a reasoned determination that the correct lessons have been learned and that those lessons are appropriately linked to the causal factors of the Fukushima accidents.

The industry, the public and the NRC must have a common understanding of the events and rationale for the actions taken at Fukushima before the industry—as required by the NRC and on its own initiative—implements plant enhancements. To attain this objective, the industry is willing to discuss the timeline with NRC staff. This will provide additional confidence in the development and understanding of the bases for regulatory actions being required in response to the Fukushima accidents as well as the manner in which new requirements are to be satisfied.

The NRC task force concluded that a sequence of events like the Fukushima accident is unlikely to occur in the United States and that continued operation and continued licensing activities do not pose an imminent risk to public health and safety. A preliminary industry qualitative, risk-informed assessment of the six NRC recommendations under consideration reaches the same conclusion. As a result, we do not believe that orders are necessary at this time. To the extent the NRC seeks information from all licensees or seeks to elicit a response from all licensees on a significant issue, there are regulatory tools such as generic letters and bulletins that can achieve those objectives.

If the NRC determines that it is necessary to impose new requirements on a generic, industry-wide basis, the appropriate regulatory process is rulemaking. If necessary, such rulemakings could be expedited. In summary, we believe that the NRC and all stakeholders would benefit from the transparent and deliberative process mandated by the Administrative Procedure Act.

The near-term actions should be focused on those enhancements that generally may be attainable within 12 to 18 months and where additional clarifying information forthcoming from Fukushima will not negate earlier decisions.

To effectively implement the multi-unit staffing proposal in the NRC task force recommendation 9 concurrent with the existing EP rule change, the implementation schedule for the emergency response organization needs to be extended by one year to accommodate the staffing criteria.

The industry is committed to ensuring that the U.S. nuclear industry learns from and incorporates the lessons from the Fukushima accidents in a manner that will improve safety and plant performance so that the nuclear industry will continue provide additional benefit to the nation's environment and economy.

Sincerely,

Adrian Heymer

Attachment

c: The Honorable Gregory B. Jaczko, Chairman, U.S. Nuclear Regulatory Commission
The Honorable Kristine L. Svinicki, Commissioner, U.S. Nuclear Regulatory Commission
The Honorable William D. Magwood, IV, Commissioner, U.S. Nuclear Regulatory Commission
The Honorable George Apostolakis, Commissioner, U.S. Nuclear Regulatory Commission
The Honorable William C. Ostendorff, Commissioner, U.S. Nuclear Regulatory Commission
Mr. R. William Borchardt, Executive Director for Operations, U.S. Nuclear Regulatory Commission

Attachment

Comments on NRC Proposed Near-Term Recommendations from the Fukushima Dai-ichi Accident

NRC Task Force Recommendation 2

The Task Force recommends that the NRC require licensees to reevaluate and upgrade as necessary the design-basis seismic and flooding protection of SSCs for each operating reactor.

The Task Force recommends that the Commission direct the following actions to ensure adequate protection from natural phenomena, consistent with the current state of knowledge and analytical methods. These should be undertaken to prevent fuel damage and to ensure containment and spent fuel pool integrity:

> *2.1 Order licensees to reevaluate the seismic and flooding hazards at their sites against current NRC requirements and guidance, and if necessary, update the design basis and SSCs important to safety to protect against the updated hazards.*
>
> *2.2 Initiate rulemaking to require licensees to confirm seismic hazards and flooding hazards every 10 years and address any new and significant information. If necessary, update the design basis for SSCs important to safety to protect against the updated hazards.*
>
> *2.3. Order licensees to perform seismic and flood protection walk-downs to identify and address plant-specific vulnerabilities and verify the adequacy of monitoring and maintenance for protection features such as watertight barriers and seals in the interim period until longer term actions are completed to update the design basis for external events.*

NEI Comments and Input

The industry believes the initial focus should be on conducting walk-downs (Recommendation 2.3) to confirm that the plant is protected against the design bases flood and seismic events. The other recommendations are longer-term actions.

Walk-downs

Seismic: The industry proposes that a sample set of walk-downs should be conducted in accordance with procedures covering the walk-down criteria and validation against the design bases. In addition, a process for selecting the sample set of systems, structures and components should be developed together with criteria for determining when the sample should be expanded, if circumstances dictate. Regulatory interactions and endorsement of the walk-down criteria should occur prior to conducting the walk-downs to ensure that there is a common understanding on the approach and criteria. It should be recognized that additional

time should be allowed for completing the seismic walk-downs because some safety-related structures, systems and components may be accessible only during shutdown conditions.

External flooding: A similar approach to the seismic walk-downs would be employed except there would be no need to use a sampling methodology. As with the seismic walk-downs, regulatory interactions should occur in advance to reach a common understanding on the approach and acceptance criteria prior to commencing the activity.

Ten-Year Update of Seismic and Flooding Hazards

NEI believes that a process should be developed for identifying and assessing new and significant information as it emerges rather than wait 10 years. Such an approach would be consistent with how the NRC and the industry manage other new information. The industry recommends a three-phase process approach:

1. Identification of pertinent information that is of sufficient significance to warrant assessment.

2. Assessment to determine whether the information would impact the hazard.

3. A process for updating the hazard and determining whether changes are needed. The update would be performed against current regulatory requirements and standards based on the new assumptions and information. For example, if the original design bases standard was a 500-year flood, the update would be based on the 500-year flood, but the impact of an increased downstream levy height would be evaluated. Similarly, if the Corps of Engineers changed the height of the 500-year flood standard based on updated or new meteorology information, the impact on the plant would be evaluated against the new 500-year flood, even though a new plant may be evaluated against a 750-year flood.

Re-evaluation of Seismic and Flooding Hazard

Re-evaluations of the seismic and flooding hazard are longer-term activities and should be considered as part of the NRC long-term activities.

For seismic, we believe GI-199 and any follow-on activities and changes would address this aspect of recommendation 2.1.

For flooding, once a process for assessing new and significant pertinent information has been developed and the walk-downs have been completed, along with actions to fix any identified deficiencies, an evaluation on whether the flooding hazard has changed and its impact on the plant can be evaluated.

Industry Near-term Recommendation

External Flooding Walk-downs

- *In response to a §50.54(f) letter, a licensee would develop procedures, including acceptance criteria for conducting external flood protection walk-downs and obtain NRC concurrence regarding the acceptability of the walk-down criteria.*

  Conduct the walk-downs and validate the results against the existing design basis and report the results to the NRC within 120 days of NRC approval of the walk-down criteria.

Seismic Walk-downs

- *In response to a §50.54(f) letter a licensee would develop procedures, including acceptance criteria for conducting a sample set of seismic walk-downs on safety-related systems, structures and components. Obtain a NRC concurrence regarding the approach, including the acceptability of the walk-down criteria and mechanism for expanding the scope of the structures, systems and components to be walked down if deficiencies are identified.*

  Conduct seismic walk-downs for a sample set of critical safety-related systems, structures and components and verify against the seismic design bases. For areas that are inaccessible because of power operations, the walk-downs will be conducted at the first opportunity. Results will be reported to the NRC within 90 days of the end refueling outage of the first complete operating cycle following the issuance of the regulatory vehicle.

External Flooding and Seismic Hazard Update (Long-Term Activity)

- *Initiate rulemaking to require licensees to confirm seismic hazards and flooding hazards as new and significant information is identified. If necessary, update the design basis to protect safety-related structures, systems and components against the updated hazards.*

NOTE: We do not believe there is sufficient information or understanding to be able to establish acceptance and implementation criteria for an order or proceed with implementation to enable completion within a period of time normally associated with an order.

NRC Task Force Recommendation 4

4.1 Initiate rulemaking to revise 10 CFR 50.63 to require each operating and new reactor licensee to:

(1) *establish a minimum coping time of 8 hours for a loss of all ac power,*

(2) *establish the equipment, procedures, and training necessary to implement an "extended loss of all ac" coping time of 72 hours for core and spent fuel pool*

cooling and for reactor coolant system and primary containment integrity as needed, and

(3) *preplan and pre-stage offsite resources to support uninterrupted core and spent fuel pool cooling, and reactor coolant system and containment integrity as needed, including the ability to deliver the equipment to the site in the time period allowed for extended coping, under conditions involving significant degradation of offsite transportation infrastructure associated with significant natural disasters.*

4.2 Order licensees to provide reasonable protection for equipment currently provided pursuant to 10 CFR 50.54(hh)(2) from the effects of design-basis external events and to add equipment as needed to address multiunit events while other requirements are being revised and implemented.

NEI Comments and Input

Revision to 50.63

The industry agrees that rulemaking is the correct process for implementing enhancements that would enable plants to better mitigate and manage an extended and complete loss of AC power event. There would be benefit in an advanced notice of proposed rulemaking to frame the scope and objectives of the rule. In addition, key aspects of coping time and access to offsite resources should be considered. We believe that such an initial step would help to focus stakeholder comments and provide for a more efficient overall implementation of recommendation 4.1.

The nature of challenges to AC power supplies by natural phenomena are plant- and site-specific. For example, external flooding progresses very differently at a river or lake site versus a site that has a significant tsunami hazard. Therefore, the identification of appropriate short- and long-term coping strategies can vary from site to site. The approach must assure a degree of flexibility to accommodate the variations in site configuration, features and hazards.

The basis for the proposed 72-hour additional coping is unclear. The barriers to logistic offsite support during an emergency vary depending on location, local geography and transportation infrastructure, the hazard and the extent of the natural phenomena impact on the local and surrounding counties. For some plants assistance and reliable AC generation may be able to be supplied within 24 or 48 hours, at other sites, under different circumstances it may be longer. Thus, the approach must assure a degree of flexibility in the implementation to accommodate varying extended coping time durations for a complete loss of AC power.

Rulemaking is a long-term activity and should be included under the NRC long-term Fukushima activities.

Multi-Unit §50.54(hh) Requirements

We agree that pre-staging additional contingency equipment to meet §50.54(hh)(2) requirements for multi-unit sites would be appropriate. The exact composition of the extra equipment at or near the site complemented by additional offsite equipment at pre-staged areas needs to be determined. It is important to note that the wide diversity of unit configurations, geographic locations, varying risks of natural hazards of different types, etc. make this analysis complex. A series of regional public meetings in preparation of the advanced notice of proposed rulemaking could be beneficial and would assure that the rulemaking is correctly framed.

The industry is evaluating the role that regional support centers could play in these situations. Such centers would house contingency equipment, especially for slow, evolving events. Prior to requiring a definitive site-specific solution to the 50.54(hh)(2) equipment, the strategies for use of pre-staged equipment at regional support centers should be established in the implementing guidance for the final rule. Distance from the site, accessibility under external events, and site-mitigation strategies that are, in part, dependent on location and proximity of amenities. Other support infrastructure are variables that need to be addressed before reaching a final conclusion on the additional equipment to be procured and the location of such equipment. We note that other countries are evaluating this approach.

Any requirement to require protection of the contingency equipment against natural phenomena events should allow for flexibility in implementation to achieve the objective. In view of the beyond design bases scenarios that are central to the events under consideration, the specifications for the protection criteria should be based on commercial standards and not the traditional nuclear special treatment specifications. In addition, depending on the site geography, natural phenomena hazards and transportation infrastructure, protection could be afforded by locating more than the minimal set of equipment at various locations on or offsite at a location where it would still be possible to commission the equipment in the timeframe required by the §50.54(hh) requirements. Diversity of location and possibly redundancy could be just as effective as housing the equipment in Category 1 structures to ensure the availability of equipment.

In the interim, until the issues described above are resolved and the equipment is in place, the industry believes that short-term actions could be taken to ensure that adequate equipment is in place to support the contingency needs for each unit, and that the equipment has adequate protection and accessibility.

At this time, we do not believe that there is sufficient knowledge to define the implementation criteria that would be required to accompany an order for the additional §50.54(hh) equipment and protection requirements. We believe a bulletin requesting information on how sites would address the multi-unit contingency equipment issue would be more appropriate. The industry is

willing to work on implementing guidance in parallel with a rulemaking amendment to achieve the objective of recommendation 4.2 in the optimum time.

New Plants

The NRC task force recommendations recognize the advances of new plant designs. Yet the task force report states that COL applicants would have to address prestaging of any needed equipment for beyond 72 hours, and ITAAC should be established to confirm effective implementation of minimum and extended coping, as described in the recommendation. It is not necessary for prestaging to be addressed in COLs, including those for Vogtle 3/4 and Summer 2/3, for which the NRC staff has completed its technical review. There is no basis for requiring ESBWR or AP1000 COL applicants to adhere to a different coping strategy than existing plants.

Part 52 change processes and other regulatory vehicles exist and should be used for ensuring that new plant licensees comply with coping, prestaging or other new requirements. These matters may be addressed after design certifications or COLs are issued. ITAAC should not be the regulatory vehicle for adjusting the licensing basis.

Industry Near-Term Recommendations

- *In response to a NRC bulletin, procure additional equipment, as determined from site specific evaluations, sufficient to meet §50.54 (hh)(2) requirements for each unit at a nuclear power plant and protect it from natural hazards using commercial standards and taking into account the use of regional or offsite support locations, as circumstances allow and justify.*

Long-Term Activities

- *Pursue an advanced notice of proposed rulemaking (ANPR) to revise §50.63 as a first step to define the scope and key objectives of the revision and to obtain stakeholder input on considerations necessary to address coping time, and offsite resources access before crafting a proposed rule and developing its implementing guidance.*

- *If necessary, amend, through rulemaking, the regulatory §50.54(hh) requirement based on the final implementation plans.*

NRC Task Force Recommendation 5

The Task Force recommends requiring reliable hardened vent designs in BWR facilities with Mark I and Mark II containments.

The Task Force recommends that the Commission direct the staff to take the following actions to ensure the effectiveness of hardened vents:

5.1 Order licensees to include a reliable hardened vent in BWR Mark I and Mark II containments.

- *This order should include performance objectives for the design of hardened vents to ensure reliable operation and ease of use (both opening and closing) during a prolonged SBO.*

5.2 Reevaluate the need for hardened vents for other containment designs, considering the insights from the Fukushima accident. Depending on the outcome of the reevaluation, appropriate regulatory action should be taken for any containment designs requiring hardened vents."

NEI Comments and Input

The industry agrees that accessibility of BWR containment hardened vent valves and the ability to manually operate these valves under a loss of AC power condition need to be assessed.

BWR Mark I Plants

One of the conclusions from the industry reconstruction activities of the Fukushima events is that there are a number of open issues and questions surrounding the containment venting operation at Fukushima Dai-ichi. At this time, action and evaluation of hardened containment vent valve operation beyond a determination of accessibility and ability to operate hardened containment vent valves under loss of AC power conditions should be reserved until more information is known and confirmed about the venting operations at Fukushima.

BWR Mark II Plants

Under NRC Generic Letter 88-20, Supplement 3, BWR Mark II licensees were requested to consider the use of hardened vents in assessing heat-removal capabilities during severe accidents. As a result of these evaluations, BWR Mark II plants should not be required to re-evaluate containment heat removal capabilities until there is more confidence and knowledge of the venting operations at Fukushima Dai-ichi. At that time, the industry and NRC staff will be better positioned to reach a determination on whether additional BWR Mark II heat-removal evaluations are necessary.

Other Containment Structures

For other nuclear power plant containment structures, no additional evaluations should be performed until there is more definitive information on the Fukushima events that is applicable and relevant to these other containment structures. Once this information is available, probably towards the end of the year, a determination can be made on whether evaluations and modifications are necessary.

Industry Near-Term Recommendations

- *Issue a §50.54(f) letter to require licensees to review plant procedures and guidelines for operating existing BWR Mk I hardened vent valves and evaluate the accessibility for operation of these valves in accordance with existing design commitments assuming no AC power is available and to report the results to the NRC within 90 days of completion of the next refueling outage that starts after 1 January 2012.*

  If improvements to assure accessibility are determined to be necessary they would be implemented consistent with operational schedules and as a separate activity.

NRC Near-Term Task Force Recommendation 7

NRC Task Force Recommendation

The Task Force recommends enhancing spent fuel pool makeup capability and instrumentation for the spent fuel pool.

The Task Force recommends that the Commission direct the staff to do the following:

> *7.1 Order licensees to provide sufficient safety-related instrumentation, able to withstand design-basis natural phenomena, to monitor key spent fuel pool parameters (i.e., water level, temperature, and area radiation levels) from the control room.*
>
> *7.2 Order licensees to provide safety-related ac electrical power for the spent fuel pool makeup system.*
>
> *7.3 Order licensees to revise their technical specifications to address requirements to have one train of onsite emergency electrical power operable for spent fuel pool makeup and spent fuel pool instrumentation when there is irradiated fuel in the spent fuel pool, regardless of the operational mode of the reactor.*
>
> *7.4 Order licensees to have an installed seismically qualified means to spray water into the spent fuel pools, including an easily accessible connection to supply the water (e.g., using a portable pump or pumper truck) at grade outside the building.*
>
> *7.5 Initiate rulemaking or licensing activities or both to require the actions related to the spent fuel pool described in detailed recommendations 7.1–7.4."*

NEI Comments and Input

The events surrounding the Fukushima Dai-ichi spent fuel pools are a good example of where facts discovered later have invalidated earlier conclusions. There was early speculation that there had been a spent fuel pool accident. Now, with the benefit of visual inspections and

samples from the four affected spent fuel pools, it is evident that the spent fuel rods did not experience significant failure.

The accidents at Fukushima demonstrated that spent fuel pools are robust, with a thermal inertia that provides time to plan and execute appropriate mitigation measures, allowing the early operator focus to be on stabilizing the reactor and achieving a safe reactor condition. Even so, the industry is taking proactive actions that include assuring that operators and the site emergency response team are aware of the estimated time for the spent fuel pools to reach 200F, following a loss of spent fuel pool cooling with a starting temperature that is normally around 90F.

The industry recognizes that there is a benefit to remote monitoring of the spent fuel pool during the accident conditions to assure that operator attention and plant resources are not diverted from higher priority and more safety-significant activities. The industry agrees that there should be a process for remotely monitoring the temperature and water level in the spent fuel pools. The power supplies for the monitoring equipment do not need to be safety related based on the thermal inertia and the time taken to reach a point of extensive evaporation.

We note that the events at Fukushima would not have benefited from safety-related power supplies. Safety-related requirements would not have changed the situation. We believe that diversity would appear to be a more important attribute. The proposal for a hardened seismically-qualified fuel pool spray line capable of being supplied from portable pumps outside of the reactor or fuel pool building would add diversity to spent fuel pool cooling capability. Such a requirement would support the use of non-safety-related power supplies for fuel pool cooling and instrumentation considering the slow evolution of a spent fuel cooling event.

There are numerous spent fuel pool configurations. As a result, we believe that the commission should allow for a flexible, performance-based approach for spent fuel pool monitoring. The requirements should define what is to be achieved, leaving the industry to define in general guidance the implementation options based on plant configuration and needs.

The low probability of a fuel pool severe accident and the slow progression of an event that would lead to a severe spent fuel pool accident do not warrant the imposition of an order. There is significant time to adjust, plan and implement mitigation measures based on the events at Fukushima and recent and unusual loss of spent fuel pool cooling events in U.S. plants.

Industry Near-Term Recommendations

Issue a Generic Letter Identify and evaluate the instrumentation and equipment needed to monitor spent fuel level and temperature throughout an extended loss of AC power event that includes depletion of DC battery power.

Attain a common understanding with the NRC staff on the methodologies and guidelines for

performing the monitoring evaluation. Inform the NRC staff of:
(1) The methods and equipment that are used to monitor the condition of the spent fuel pools during an extended loss of AC power, and, if necessary,
(2) The action plan for assuring operators have the capability for monitoring the spent fuel pool during an extended loss of AC power event.
(3) Report the results of the evaluations and the action plan to the NRC within 180 days of reaching a common understanding on the methodologies and guideline for implementing the generic letter.

NRC Near-Term Task Force Recommendation 8

NRC Task Force Recommendation

The Task Force recommends strengthening and integrating onsite emergency response capabilities such as EOPs, SAMGs, and EDMGs.

The Task Force recommends that the Commission direct the staff to further enhance the current capabilities for onsite emergency actions in the following ways:

8.1 Order licensees to modify the EOP technical guidelines (required by Supplement 1, "Requirements for Emergency Response Capability," to NUREG-0737, issued January 1983 (GL 82-33), to (1) include EOPs, SAMGs, and EDMGs in an integrated manner, (2) specify clear command and control strategies for their implementation, and (3) stipulate appropriate qualification and training for those who make decisions during emergencies.

8.2 Modify Section 5.0, "Administrative Controls," of the Standard Technical Specifications for each operating reactor design to reference the approved EOP technical guidelines for that plant design.

8.3 Order licensees to modify each plant's technical specifications to conform to the above changes.

8.4 Initiate rulemaking to require more realistic, hands-on training and exercises on SAMGs and EDMGs for all staff expected to implement the strategies and those licensee staff expected to make decisions during emergencies, including emergency coordinators and emergency directors."

NEI Comments and Input

We agree that enhancements can be made to the process of migrating from EOPs to SAMGs and EDMGs to incorporate lessons learned from Fukushima. The integration of the EDMGs and SAMGs will be a complex and large endeavor. Such an activity needs to be split into manageable sections to ensure a coordinated, efficient and effective implementation. The industry has already started work on this activity and enhancements are being pursued.

Near-term actions should focus on improving the training and implementation of EDMGs, SAMGs and §50.54(hh)(2) mitigation procedures and measures. Training programs should be reviewed and, if necessary, enhanced to assure that operators and the emergency response organizations are capable of making correct decisions and implementing procedures. In the development and implementation of these enhanced training programs, it is critical for operators to be more knowledgeable of mitigation measures for more likely events (abnormal and EOP type events) than the mitigation of extremely low probability events such as an extreme beyond design basis seismic event that would result in a severe accident. We suggest that for SAMGs, EDMGs and B5b events, the training standard should be one of familiarization.

It is important that the industry and the NRC reach a common understanding on the standards and scope of training with an emphasis on emergency response organizations, while assuring that the training focus for operators remains on the more probable events and operations. As with other industry training programs, the National Academy for Nuclear Training in Atlanta would provide oversight of the training programs referenced in this section.

There needs to be further regulatory discussions on the implications of requiring Technical Specifications on the SAMG and EDMG training and what it means for operator exams.

New Plants

ITAAC should not be the regulatory vehicle for adjusting the licensing basis. The Part 52 change processes and other regulatory vehicles exist and should be used for ensuring that new plant licensees comply with of EOP/SAMG/EDMG implementation or other new requirements. These matters may be addressed after design certifications or as COLs are issued.

Industry Near-Term Recommendations

Enhance implementation of EOPs, SAMGs and B5b strategies.

Issue a Bulletin to review and, if necessary, enhance training programs to assure that plant personnel are able to transition from EOPs to SAMGs and implement SAMG strategies. Personnel should be aware of the intent and scope of SAMG and B5b strategies so that they can be implemented in accordance with the stations emergency preparedness activities. The level and depth of knowledge should be commensurate with the safety significance and probability of the events.

NRC Near-Term Task Force Recommendation 9

NRC Task Force Recommendation

The Task Force recommends that the NRC require that facility emergency plans address prolonged SBO and multiunit events.

9.1 Initiate rulemaking to require EP enhancements for multiunit events in the following areas:

- *Personnel and staffing,*
- *Dose assessment capability,*
- *Training and exercises,*
- *Equipment and facilities*

9.2 Initiate rulemaking to require EP enhancements for prolonged SBO in the following areas:

- *Communications capability,*
- *ERDS capability,*
- *Training and exercises,*
- *Equipment and facilities*

9.3 Order licensees to do the following until rulemaking is complete:

- *Determine and implement the required staff to fill all necessary positions for responding to a multiunit event.*
- *Add guidance to the emergency plan that documents how to perform a multiunit dose assessment (including releases from spent fuel pools) using the licensee's site-specific dose assessment software and approach.*
- *Conduct periodic training and exercises for multiunit and prolonged SBO scenarios. Practice (simulate) the identification and acquisition of offsite resources, to the extent possible.*
- *Ensure that EP equipment and facilities are sufficient for dealing with multiunit and prolonged SBO scenarios.*
- *Provide a means to power communications equipment needed to communicate onsite (e.g., radios for response teams and between facilities) and offsite (e.g., cellular telephones, satellite telephones) during a prolonged SBO.*
- *Maintain ERDS capability throughout the accident.*

9.4 Order licensees to complete the ERDS modernization initiative by June 2012 to ensure multiunit site monitoring capability"

NEI Comments and Input

From discussions with some Japanese utilities, it is clear that U.S. industry emergency preparedness and the government (state, local and federal) emergency response infrastructure is more mature and is better positioned to manage an emergency on the scale of the Fukushima natural disasters and a nuclear emergency. U.S. company and government

organizational structures, training, drills and the strong working relationships between the plants and state and local response centers are significant differences.

Nevertheless, the industry acknowledges that there are lessons to be learned and enhancements that can be made to the industry's emergency preparedness activities. Pre-Fukushima enhancements to EP programs have already been identified and are about to be implemented via the imminent NRC EP rulemaking and the completion of the revision to Radiological Emergency Preparedness Manual, soon to be issued by FEMA.

As the rule changes are being implemented, and as we learn more about the ongoing events at Fukushima, the NRC and industry can identify the prioritization and performance criteria for further enhancements, as recommended in the NRC task force report.

The revised rule that is about to become effective requires a comprehensive analysis of on-shift staffing to validate that the emergency plan can be implemented for five categories of scenarios. For multi-unit event Emergency Response Organization (ERO) staffing, new criteria need to be defined. This includes defining the events' characteristics, simultaneous occurrences, response time requirements and coping strategies. The new criteria would be appended to the staffing methodology prescribed in NEI 10-05. Analysis would follow the implementation of the initial staffing analysis requirement.

In order for the industry to implement the multi-unit staffing analysis concurrent with existing EP rule change, the implementation period for this rule change should be extended by one year in order to accommodate the development of new staffing criteria.

In the interim, as recommended in the NRC task force report, licensees could take voluntary action to develop a viable notification and transportation strategy to ensure staff needed to augment the site response would be available.

Revised guidance can be developed and implemented within the existing rule structure to encompass three of the recommendations:

- Multiple release point and spent fuel pool dose assessment
- Onsite protective equipment
- Backup ERO communication

The balance of the NRC task force recommendations warrant rulemaking. Based on industry-NRC staff interactions, consideration should be given to a parallel implementation-rulemaking approach. Such an approach would cover:

- Requiring licensed operators in the ERO outside the control room
- Drills and exercise changes
- Emergency facilities for multi-unit events (changing design basis and accident analysis requirements)

Rulemaking in these areas would provide the necessary regulatory predictability and the basis for consistent implementation and inspection.

New Plants

Part 52 change processes and other regulatory vehicles exist and should be used for ensuring that new plant licensees comply with of spent fuel cooling or other new requirements. These matters may be addressed after design certifications or COLs are issued, and ITAAC should not be the regulatory vehicle for adjusting the licensing basis.

Industry Near-Term Recommendations

(1) Implement the revised EP rule that is about to become effective.
(2) Engage NRC staff and other stakeholders in developing guidance for EP recommendations that do not require rulemaking.
(3) For those recommendations that do require an additional rulemaking, guidance can be developed in parallel with the rulemaking and implementation could commence once the content of the final rule is known. (This is a long-term activity)

An action plan will be developed for implementation of the Fukushima-related recommendations beginning in 2012.

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General Comment

As broached in the public proceedings, DOD Civilian Support Teams should be aware of the emergency power generation needs (including fuel) of the NPPs in their states, identify equipment that might be needed, prioritize that equipment for support of the NPPs and stage such equipment in the vicinity of the plants in the event natural disasters threaten plant security. Call the activity an exercise to abate public concern.

E-RIDS = AOM-03
Add = Michael Dudek (MJD)
Michael Levine (MHL)
Kevin With (KMW)
Brian Green (BDG1)

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General Comment

Re: Docket No. NRC-2011-0196

Dear Dr. Miller and members of the Task Force:

On behalf of the Blue Ridge Environmental Defense League, I submit the following comments. These comments will supplement the oral remarks I made at the August 31st Category 2 Public Meeting to Solicit Comments on Near-Term Task Force Report.

Respectfully,
Louis A. Zeller

Attachments

110831 comments to Near-term Task Force_LZ

E-RIDS = ADM-03
Add = Michael Dudek (MJD)
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September 2, 2011

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Re: Docket No. NRC-2011-0196

Dear Dr. Miller and members of the Task Force:

On behalf of the Blue Ridge Environmental Defense League, I submit the following comments. These comments will supplement the oral remarks I made at the August 31st Category 2 Public Meeting to Solicit Comments on Near-Term Task Force Report.

First, I bring to the attention of the Task Force statements made by people in Fukushima who experienced the disaster in ways which you cannot otherwise comprehend. But the meltdown and ongoing radioactive contamination have devastating human consequences which you must recognize.

A Man-Made Disaster

Hiroshi Senju is a painter in the more than thousand-year-old Nihonga tradition. Regarding events at Fukushima, he writes:

> When the earthquake struck, I had just returned from Tokyo to New York. At first, I watched the shocking images on the news as if what was happening was a natural disaster, but once the grave problems at the Fukushima Daiichi nuclear power plant were revealed, I began to think the disaster was actually man-made. Tokyo Electric Power Company, which operates the plant, made one strained attempt after another to conceal the danger while the public's anxiety reached its peak. As people learned of the increasing severity of the nuclear accident, former Prime Minister Morihiro Hosokawa declared, "This is not a man-made disaster... it's a crime."
>
> While the nuclear experts on television were repeating that the radiation readings were "only a little higher" and that there were "no immediate health effects," it was announced that the severity of the disaster on the International Nuclear and Radiological Event Scale had been raised to Level 7, the same as Chernobyl. We were shocked at the

gap between what we were being told and what we had just learned. In that moment we lost our faith in the media. Those Japanese living in Japan seemed the calmest and the furthest from objective information.

3/11 will go down in history as a day that fundamentally changed the environment of modern Japan. The overwhelming majority of people in Japan now believe we must move away from nuclear energy.

Restoring the Time Capsule

Hideo Furukawa, a novelist born in Fukushima, writes:

I grew up in a city in the middle of Fukushima prefecture, mostly unaware of the fact that there were nuclear power plants near the coast. People closer to the power plants, however, lived with the fear that someday something like this would happen. When a hydrogen explosion occurred in the No. 1 reactor on March 12, and the terrible news was broadcast live, the situation was almost like the Cuban missile crisis. We were afraid there would be a full meltdown. Like those living under threat of a nuclear war between the United States and the Soviet Union, we had the awful feeling that the world was about to end.

During the scheduled power outages, when the city was so dark at night, it was like a city at war, hiding from air raids....Only Fukushima is still at war. People don't go outside without wearing masks. Their children can't play outside. And no one knows when this war will be over. If they lose, the radiation problem will only get worse. We hope they can stop the radiation, but no one knows when the war will end.

The people of Fukushima are facing a second problem: discrimination. For example, when someone from Fukushima tries to make a reservation at a hotel in a different prefecture, they're told they can't stay there. When they try to go to a gas station in another prefecture, they're told that cars with Fukushima plates can't fill up there. I've heard people say that women from Fukushima will have trouble getting married because of the belief that the radiation might affect their future children. The people who think this way might represent a minuscule minority of the whole country, but for me the saddest part is that because of the radiation leak we have lost that sense of unity that we had after the earthquake. As the victims of the earthquake and the tsunami, the people of Japan had the world's sympathy. I still believed that if we joined together we could bring things back to the way they used to be.

However, with the radiation leak and the release of contaminated water into the ocean, the country, in a sense, went from being a victim to being a perpetrator.

One of the rituals of grade school in Japan is for the students to fill up a time capsule at graduation and bury it in the ground at school. They are supposed to dig it up in twenty years, but in my school the ground that held our memories was contaminated by radiation. The bulldozers carted it all away.

Earthquakes and Radiation

As you know, three of the five Fukushima Daiichi nuclear reactors overheated, causing meltdowns, hydrogen explosions and the release of radioactive gas into the air. The earthquake and tsunami were the results of natural causes; but the nuclear power plant explosions and other failures were caused by human folly. This was not a natural disaster, it was a man-made disaster. This is the first question I pose to the Task Force: There are many sources of electric power in Japan. Which of them—coal, oil, natural gas, hydro, wind or nuclear—escalated a natural disaster into an environmental catastrophe? Nuclear. Regarding this power source, "No acts of God can be permitted," said the Nobel Prize winning physicist Hannes Alfvén.[1] No other source of electric power needs auxiliary power to remain under control.

New TEPCO data measured on August 19 & 20 show severe damage to the irradiated used fuel in Fukushima Units 1, 2, and 3, with high levels of Cesium 137 and Cesium 134 in all three fuel pools. This data contradicts NRC's assertion that Fukushima fuel pools were not damaged in this accident.[2]

Following the devastating events in Japan, the Task Force Report[3] explained the importance of protecting structures, systems and components (SSC) of nuclear reactors from natural phenomena, including seismic and flooding hazards:

> Protection from natural phenomena such seismic and flooding is critical for safe operation of nuclear power plants due to potential common-cause failures and significant contribution to core damage frequency from external events. Failure to adequately protect SSC's important to safety from appropriate design-basis natural phenomena with appropriate safety margins has the potential for common-cause failures and significant consequences as demonstrated at Fukushima. *Id.*

While tsunami hazards have been considered in the design basis for operating plants sited on the Pacific Ocean, the same cannot be said for those sited on the Atlantic Ocean and Gulf of Mexico. Further, seismic seiches—standing waves on rivers, reservoirs and lakes caused by disturbances from tectonic activity and earthquakes—may occur at great distances from the epicenter of the initiating seismic event; they are continental and even global in their effect on bodies of water. For example, the Alaska earthquake of March 1964 caused seismic seiches in water bodies across North America. The locus of the greatest density of seiches caused by the Alaska Earthquake was the southeastern United States, with the greatest number in the states bordering the Gulf of Mexico. According to a US Geological Survey report, seiches as high as 1.8 meters were registered on the Gulf Coast, and hundreds of smaller seiches were recorded in the coterminous states.

The Task Force recommended that nuclear power plant licensees reevaluate the seismic and flooding hazards at their sites. The Task Force's findings point to the need for a reevaluation of the seismic and flooding hazards at all nuclear plant sites, taking a hard look at the

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[1] "With Nuclear Power, No Acts of God Can Be Permitted," by Amory Lovins, *Huffington Post,* March 18, 2011 http://www.huffingtonpost.com/amory-lovins/nuclear-power-fukushima-_b_837643.html

[2] Fairewinds Associates, http://fairewinds.com/

[3] *Recommendations for Enhancing Reactor Safety in the 21st Century: The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident* (July 12, 2011)

environmental consequences such hazards could pose, and an examination of what design measures could be implemented through the National Environmental Policy Act's requisite alternatives analysis to ensure that the public is adequately protected.

Environmental Injustice

Task Force Recommendation number 11 states that "the NRC should pursue emergency preparedness topics related to decisionmaking, radiation monitoring, and public education. (Section 4.3.2)" After the Fukushima accident, President Obama recommended that residents within 50 miles evacuate the area or "shelter in place." What does shelter in place mean if you have no shelter? How many residents are ready to evacuate or shelter in place? The NRC must take steps to avoid disproportionate, adverse environmental impacts on low income and minority populations.

The Obama Administration August 4 Memorandum of Understanding[4] advanced federal agency responsibilities first outlined in President Clinton's 1994 Executive Order 12898. The Executive Order makes environmental justice integral to the mission of each agency. The MOU broadens the reach of the Interagency Working Group on Environmental Justice and provides for the addition of more. At present, the White House Council on Environmental Quality, the General Services Administration, the Small Business Administration and thirteen cabinet departments[5] have signed the MOU.

However, the Nuclear Regulatory Commission has side-stepped Clinton's Executive Order and ignored Obama's Memorandum of Understanding. The Commission has subverted the Executive Order by downplaying its purpose and scope. For example, the NRC published the following statement:

> The E.O. simply serves as a reminder to agencies to become aware of the various demographic and economic circumstances of local communities as part of any socioeconomic analysis that might be required by NEPA.[6]

However, the President's Executive Order was a policy directive that implements federal statutes. It was not a simple "reminder." Executive Order 12898 states:

> To the greatest extent practicable and permitted by law, and consistent with the principles set forth In the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States.[7]

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[4] "Memorandum of Understanding on Environmental Justice and Executive Order 12898," August 4, 2011

[5] Department of Health and Human Services; Department of Justice; Department of Agriculture; Department of Commerce; Department of Defense; Department of Education; Department of Energy; Department of Homeland Security; Department of Housing and Urban Development; Department of Interior; Department of Labor; Department of Transportation; Department of Veterans Affairs

[6] Federal Register /Vol. 68, No. 214 /Wednesday, November 5, 2003 /Notices, page 62643

[7] Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, February 11, 1994

The NRC must take steps to avoid disproportionate, adverse environmental impacts on low income and minority populations and impacts on important religious, subsistence, or social practices. The Task Force should recommend that the NRC sign the August 4th MOU.

Finally, an economical and practicable means of advancing emergency preparedness is the distribution of potassium iodide to residents living near nuclear power plants. The key to its effectiveness is early and widespread distribution and education so that in the event of a nuclear accident such as Fukushima people living ten or twenty miles from the plant may protect themselves. Experts within and without the NRC have called for its use:

> KI distribution should be included in planning for comprehensive radiological incident response programs for nuclear power plants. KI distribution programs should consider predistribution, local stockpiling outside the emergency planning zone (EPZ), and national stockpiles and distribution capacity.[8]

In fulfillment of the Task Force recommendation, KI should be distributed at all nuclear sites in the United States and an educational program established by the NRC.

Respectfully,

Louis A. Zeller

[8] Letter to Sen. Joseph Lieberman from Peter Crane, Counsel for Special Projects, US Nuclear Regulatory Commission (retired) and Frank von Hippel, Professor of Public Affairs, Princeton University citing a report by the National Academies of Science, September 26, 2007, ADAMS Accession No. ML072831363

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General Comment

Please see attached files.

Attachments

NRDC Written Comments on NRC Near-Term Task Force Recommendations Selected for Potential Implementation Without Unnecessary Delay

E-RIDS = ADM-03
Add = Michael Dudek (MID)
Michael Levine (MHL)
Kevin With (KMW)
Brian Green (BDG1)

SUNSI Review Complete
Template = ADM-013

Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
Attn: Rulemakings and Adjudications Staff

SUBJECT: Docket ID NRC-2011-0196: Comments on Near Term Task Force Recommendations 2, 4, 5, 7, 8, and 9

Written Comments of the Natural Resources Defense Council (NRDC) on the NRC Near-Term Task Recommendations Being Considered For Implementation "Without Unnecessary Delay"

Submitted by Christopher Paine
Director, Nuclear Program

(Please Note): NRDC Nuclear Program Director Christopher Paine provided extended oral comments on this same subject matter at a Commission staff dialogue conducted with external stakeholders at NRC headquarters on August 31, 2011)

I. Comments on the Public Involvement Process to Date. Before providing these short-notice written comments on certain of the Near-Term Task Force Recommendations, it is highly relevant to note that NRDC and six other organizations wrote the Commissioners on May 9, 2011, regarding the need to promptly initiate a public involvement process for establishing the scope of and commenting upon the results of the NRC's review of the Fukushima disaster and its implications for ensuring the safety of US nuclear plants. This request was ignored. Now, three months later, the Commission has abruptly directed the staff to obtain "public input" during the prime summer holiday month of August, within a narrow 10-day window ending September 2nd.

It is now more almost six months since the inception of the Fukushima accident. We are more than a month past the release of the *Near-Term Task Force Report*. But now, in the space of a less than two weeks and with no opportunity for meaningful public review, the Staff is taking up the issue of regulatory requirements with ostensible "public" input. The NRC announced only August 23 that it would have an August 31 public meeting, with comments due on September 2nd, in preparation for a final recommendation to the Commission on September 9. Moreover, in preparation for this meeting, the Staff has not disclosed its own thinking on how and when the Commission should proceed on the various Task Force recommendations for near-term actions, but merely solicited public comment on these prospective actions.

By contrast, when NRDC filed its eighteen 2.206 and rulemaking petitions in mid July, 2011, based entirely on the Near-Term Task Force report, we sought thereby to ensure that that there would at least be some meaningful vehicle for public involvement and comment. We cannot imagine that this week's truncated public process is what the Chairman had in mind when he suggested prompt, transparent action on the meaningful recommendations submitted by the Near-Term Task Force.

The Commissioners could and should have taken these matters up themselves, held public hearings and solicited public comments, and formulated a course of action on each of the proposed recommendations the Task Force Report. Indeed, the scope of that report, or at least the Commission's current review of that report, could also have been informed by a public involvement process begun months ago. But the Commission chose (by majority vote), to do neither of these things. While it represents a commendable effort with which we largely agree, the reality is that the Near-Term Task Force was prepared without any outside stakeholder input, and in certain areas it suffers from that deficit. The Commission's hasty delegation of its own public involvement responsibility to the staff, after having had months to contemplate the issue, is regrettable and even dysfunctional. Even at this late date, the public involvement responsibility should be exercised in a thoughtful, transparent manner, with due regard for involvement of all interested parties and the public.

But at the staff-stakeholder dialogue on Aug. 31, only three "stakeholder" representatives were seated at the table, and one of them was from another government agency (FEMA). The other was from industry, and I was the third. Despite having a seat at this hastily organized table, NRDC wishes to register its strong objection to the way the Commission has organized public involvement in this process to date. Doing nothing on this front for five months, and then suddenly purporting to solicit "public" comments within 10 days at the height of the summer vacation season, represents erratic, arbitrary, and capricious behavior. In this instance, we do not fault the Staff, which was directed to conduct the commission's business on this compressed schedule, but the Commission itself. But the NRC Staff accentuated the lack of equitable stakeholder representation by first establishing ground rules restricting a more than two hour systematic review of the Task Force recommendations to those few seated at the table, and then randomly violating these ground rules by calling on nuclear industry representatives seated in the audience to add their two cents without allowing a similar opportunity to the dozens of others in the room who may have held a different view. We regard this casually capricious and obviously one-sided and prejudicial behavior as symptomatic of an agency that after more than 35 years on still doesn't take its public consultation responsibilities seriously.

Having previously declined to discuss and act publicly and transparently on the Near-Term Task Force's recommendations within 90 days, as proposed by the Chairman, on August 19 the Commission suddenly directed the staff to propose a "prioritization" of the recommendations and provide a paper by September 9th that identifies recommendations that, "in the staff's judgment, should be implemented, in whole or in part, without unnecessary delay." We note that even before soliciting public input, the staff decided to defer public discussion of Task Force recommendations 1, 3, 6, 10, 11 and 12.

According to the meeting notice, the recommendations to be discussed in connection with submission of the Sept 9th Staff paper were recommendations 2, 4, 5, 7, 8, & 9. We observe that selecting these particular recommendations is easily interpreted as including those that the Task Force specifically stated needed to be addressed as soon as possible. We note, however, that members of the public and independent experts may have a different view regarding which priorities are the most fundamental for nuclear safety and therefore most urgent to address. Just because an issue *can be* readily addressed within the existing bureaucratic framework does not mean necessarily that it is more important than *other issues the existing regulatory framework has long failed to address*. The Staff's initial triage of these issues appears to preempt near-term public discussion and Commission consideration of some very important issues, which we discuss briefly below.

The Task Force Recommendations have a certain structure that includes subparts that address various aspects of the overall goal of a recommendation. These subparts also follow a repeated 2-stage scheme that has implications for their timeframe: (1) initiate a rulemaking that addresses the issue and (2) issue orders that in some capacity deals with the issue in the meantime.

We note in passing that NRDC has previously filed petitions for orders and rulemakings that closely track all the safety recommendations raised in the Near-Term Task Force report, so we are left wondering why this sudden *ad-hoc* process for considering the Near-Term Task Force recommendations appears to have sidelined or possibly supplanted the NRC's long-established procedural means for publicly vetting and implementing proposed nuclear safety improvements. We note for the record that since this new process was suddenly announced in the middle of the August summer holiday period, we have made repeated inquiries, as recently as yesterday, September 1, and at the staff-stakeholder dialogue on August 31, regarding how the NRC process pursuant to the August 19 *Staff Requirement Memorandum* (SRM 11-0093) relates to the long-established NRC petition processes and our pending petitions, but to date we have not received a response.

ACRONYMS

EDMG	Extensive Damage Mitigation Guideline
EOP	Emergency Operating Procedure
EPZ	Emergency Planning Zone
IPEEE	Individual Plant Examination of External Events (1991)
LOCA	Loss-of-Coolant Accident
NTTF	Near-Term Task Force
PMF	Probable Maximum Flood
SAMG	Severe Accident Mitigation Guideline
SBO	Station Blackout
SEP	Systematic Evaluation Program (1977)
SSE	Safe Shutdown Earthquake
SSC	Systems, Structures, and Components

II. General Observations on the Near – Term Task Force Report

As good as this Task Force Report is, we nonetheless have some serious concerns with several of its broad conclusions, and with its omissions. So before commenting specifically on the Task Force recommendations of immediate interest to the staff, let me briefly state what those concerns are:

- The Task Force's over-arching conclusion that a Fukushima-like sequence of events "is unlikely to occur in the United States -- and therefore "continued operation and continued licensing activities ... do not pose an imminent risk to public health and safety," is actually not supported by the evidence and analysis in the main body of the report, including the statement *in the very next phrase* that only "some appropriate" (rather than "all necessary") mitigation measures have been implemented to reduce the likelihood of core damage and radiological releases.

- There appears to be some conceptual confusion about the meaning of "imminent risk" when applied to what are believed to be low-probability, high consequence events, such as severe flooding, powerful earthquakes, or large terrorist induced explosions and fires. By definition, such triggering events for a severe nuclear accident are always "imminent" – they can occur tomorrow, or 20, 60, or 100 years from tomorrow – and therefore if the Commission cannot conclusively demonstrate that every US nuclear

power plant is fully prepared to withstand such events without a core melt or radiological release, then it cannot legitimately extend the reassurance that "continued operation and continued licensing activities do not pose an imminent risk to public health and safety."

- The flawed performance of BWR Mark I hydrogen venting systems in the Fukushima accident, the absence of these systems on functionally similar U.S. BWR Mark II containments, and the Commission's decision not to inspect and enforce the continued operability of such systems, alone gives the lie to this overarching reassurance of "no imminent risk," to say nothing of the initial post-Fukushima plant walk-down inspection results, which were disturbing, the 36-year failure to implement adequate fire protection, and the continuing number of unusual events that are traceable to operator errors and/or failures to properly maintain aging safety-related systems and components.

- We side with Commissioner Apostolakis in believing that predicating the efficacy of a nuclear safety system on what was correctly anticipated within a nuclear plant's historical "design basis," while consigning the response to "beyond design basis events" primarily to voluntary licensee initiatives -- is not an effective way to achieve the Commission's statutory mandate of statutory requirement of "adequate protection of public health and safety." The Task Force Report also adopts this view, and calls for the creation of a "more coherent and transparent" enhanced regulatory framework to cover "extended design-basis" requirements. NRDC strongly supports this approach, but at the same time we doubt the Task Force's conclusion that "voluntary industry initiatives should serve "as a mechanism for facilitating and standardizing implementation of such requirements." This sounds to us like a formula for multiplying complexities and delays rather than a clear and prompt path to industry-wide standardization of requirements. And indeed, some of the Task Force's specific short-term recommendations reflect the ambiguities and confusion that this licensee-driven approach to the problem necessarily entails.

- The Task Force Report omits careful consideration of some very key issues. One of these is *the obvious relationship of its recommended orders and rulemakings to the ongoing Commission processes for granting power uprates and license extensions* to operating reactors. Instead, it offers the bland assurance that "continued licensing activities" will not adversely affect the maintenance of reasonable assurance that public health and safety will be continue to be protected. NRDC strongly dissents from this conclusion, which is purely *ex cathedra* and wholly unsupported by the analysis in the main body of

the report.

- To take but one specific example, the absence of proven reliable SBO-operable hydrogen venting systems, combined with what we believe is the Commission's flawed technical understanding of the onset and rate of hydrogen production in a LOCA, obviously points to a suspension of both power uprates and relicensing for, at a minimum, the BRW Mark 1 and 2 reactors, and probably other reactor types as well. Indeed, in these circumstances maintenance of public health and safety points in exactly the opposite direction, to the *de-rating* rather than up-rating of the Mark 1's and 2's.

- The same could be said of all the other so-called "beyond design basis" shortfalls identified in the report. Why should old reactors with known design weaknesses and uncertain capacities for safely enduring severe events be cleared willy-nilly for license extensions and/or power uprates, *without* considering the cumulative impact of these safety shortfalls on the assessment of a unit's overall viability, which assessment necessarily includes required upgrades to mitigate environmental impacts, and the cumulative economic impacts on ratepayers from all the necessary improvements. The simple, common sense rational answer is that these issues should *not* be excluded from these proceedings. NRDC strongly endorses the call on the Commission by dozens of national and regional environmental and other public interest organizations to suspend these proceedings until post-Fukushima safety requirements can be fully integrated into the calculus for making uprate and license extension decisions.

- The Task Force report unfortunately omits any discussion of changes to future reactor siting criteria, or the establishment of reactor closure criteria, based on *objective changes in the external environment that could make "defense in depth" strategies untenable*, such as increases in population density, the present and projected future capacity of transportation infrastructure, time dependent traffic flows and bottlenecks, the value of economic activity and property in the affected emergency planning and contiguous zones, the available cooling capacity of already thermally-loaded lakes and waterways, rising sea levels, land subsidence, protracted drought risk, and the plausible availability of an ultimate heat sink under post-earthquake or other disaster conditions. The extent of damage inflicted on the seaside Fukushima Daiichi power station, and the extent of the resulting plume of radioactivity, which could have been far worse had the winds in the early days of the accident been blowing consistently onshore, raise all these questions and more in connection with US nuclear power plants in far more populated areas that are also subjected to severe flooding, tornado or seismic risks.

III. Specific Comments on the Staff-Selected Recommendations

Recommendation 2 (p. 30)

- *2.1 Order licensees to reevaluate the seismic and flooding hazards at their sites against current NRC requirements and guidance, and if necessary, update the design basis and SSCs important to safety to protect against the updated hazards.*

- *2.2 Initiate rulemaking to require licensees to confirm seismic hazards and flooding hazards every 10 years and address any new and significant information. If necessary, update the design basis for SSCs important to safety to protect against the updated hazards.*

- *2.3 Order licensees to perform seismic and flood protection walk-downs to identify and address plant-specific vulnerabilities and verify the adequacy of monitoring and maintenance for protection features such as watertight barriers and seals in the interim period until longer term actions are completed to update the design basis for external events.*

We support both the general intent and prompt implementation of the measures called for in Recommendation 2, but we have a number of concerns regarding its potential effectiveness if certain regulatory clarifications and enhanced NRC staff involvement are not accomplished beforehand. We note that:

- Previous attempts to reevaluate these hazards were far less than comprehensive with little to no requirements on previously licensed reactor sites
- Either the methods and scope of the review were limited by available data and models (as in the 1997 Systematic Evaluation Program (SEP)) or the proposed vulnerabilities and improvements offered by the industry were met with limited review by the NRC (as in 1991 Individual Plant Examination of External Events (IPEEE))
    - In the case of the IPEEE, the NRC did not validate or verify the results offered by licensees nor did they require that plants report to the NRC on the completion of proposed improvements
- The current set of regulations and requirements placed on existing and future reactor sites can be seen as a complicated collage of reviews, industry initiatives, and varied response from both licensees and the NRC
    - In some cases, the design basis does not cover the probable maximum flood (PMF) for a given site and in other cases, the PMF is calculated differently for co-located units due to different licensing times (NTTF Report, p. 29)
- A comprehensive reestablishment of the design basis for existing plants should be conducted that reflects the current state of knowledge regarding seismic and other

severe natural phenomena. The current lack of seismically-hardened and flood-proof structures to protect critical safety equipment and emergency response capabilities at many sites should be a particular focus of attention.

- *From a May 2011 NRC Report on Indian Point Unit 2 - "The licensee identified a number of potential vulnerabilities regarding firefighting following a safe shutdown earthquake (SSE). The potential vulnerabilities stem from the fact that the fire protection system in non-safety related buildings, buried / underground fire headers, fire pumps, and the city water makeup supply are not seismically designed which could result in a loss of portions of the fire protection system following a SSE. The licensee documented these vulnerabilities in CR-IP2-2011-1681."*
- *From* NUREG-1742, *"Almost all licensees reported in their IPEEE submittals that no plant vulnerabilities were identified with respect to seismic risk (**the use of the term "vulnerability" varied widely among the IPEEE submittals**). However, most licensees did report at least some seismic "anomalies,.... outliers," and/or other concerns. **In the few submittals which identified a seismic vulnerability, the concerns were comparable to concerns identified as outliers or anomalies in other submittals**." [emphasis added]*

We have a number of concerns about Recommendation 2:

- Why is the near-term "reevaluation" in 2.1 limited to seismic and flooding hazards? What about tornadoes? What about increased fire risk stemming from such events? Will existing *siting criteria* be reviewed in this reevaluation? For example, the wisdom of continuing to locate a nuclear power plant -- Fort Calhoun comes to mind – in the floodplain of the Missouri River?
- 2.1 appears to assign primary responsibility for these near term assessments to the licensees. But a major problem identified in the Task Force Report is that licensees are using inconsistent and dated design basis criteria and other more informal criteria to evaluate these threats, even within the same multi-unit plants. So why is this review pegged to a licensee *self-assessment* of its *existing* licensing basis, when the immediate problem seems to be known and egregious lack of plant readiness to withstand severe events outside of or beyond the current licensing basis?
- It seems obvious that the seismic reviews will have limited value until the prevailing gap in seismic protection levels required for new versus existing reactors is resolved via commission action to resolve Generic Issue 199 (GI-199).
- What role will NRC inspectors and independent scientific experts, including the ACRS, play in this inspection process and in formulating the technical criteria that will guide it? The current Task Force recommendations are too weighted toward a licensee-initiated and

licensee-directed process. We believe NRC special inspection teams as well as resident inspectors should be directly involved in the 2.3 walk downs and the resulting seismic, flooding, and other hazard preparedness assessments.

- Are 2.1 and 2.3 supposed to be conducted concurrently? Or is one necessarily informed by the other, i.e. Doesn't the licensee walkdown process in 2.3 logically precede the licensee self-assessment in 2.1)?
- What does the need for this additional walkdown process say about the effectiveness of the NRC's current inspection system for protecting reactors against such severe natural events? How and why did the NRC lost track of these threats and the capacities its licensees to meet them? The public is owned an explanation.
- What level of NRC oversight will there be in this whole process? Who makes the judgment on adequacy of inspection/evaluation criteria and methods?
- Recommendations 2.3 and 2.1 should include fire protections in their compliance updates. It seems grossly inefficient to address these seismic/flooding vulnerabilities independent of the need to abate the ensuing fire risks, considering that these are still largely unresolved even within the current regulatory framework.

Recommendation 4 (p. 37)

- *4.1 Initiate rulemaking to revise 10 CFR 50.63 to require each operating and new reactor licensee to (1) establish a minimum coping time of 8 hours for a loss of all ac power, (2) establish the equipment, procedures, and training necessary to implement an "extended loss of all ac" coping time of 72 hours for core and spent fuel pool cooling and for reactor coolant system and primary containment integrity as needed, and (3) preplan and pre-stage offsite resources to support uninterrupted core and spent fuel pool cooling, and reactor coolant system and containment integrity as needed, including the ability to deliver the equipment to the site in the time period allowed for extended coping, under conditions involving significant degradation of offsite transportation infrastructure associated with significant natural disasters.*

- *4.2 Order licensees to provide reasonable protection for equipment currently provided pursuant to 10 CFR 50.54(hh)(2) from the effects of design-basis external events and to add equipment as needed to address multiunit events while other requirements are being revised and implemented.*

NRDC supports the initiation of a rulemaking to revise 10 CFR 50.63 through the suggested expansion in the scope of mitigation efforts during a newly established system of coping times.

While we generally support the SBO measures in Recommendation 4 as far they go, why leave all of these very important issues to subsequent attention via rulemaking?

- Why not require an immediate extension of SBO coping capability to 8 hours given the rulemaking will eventually require it? The current regulations leave a gap in that some reactors only consider a 4-hour window (with the regulations possibly allowing anything from a 2- to 16-hr. coping time). This situation should be cleaned up immediately by means of a commission order to all licensees to extend battery backup or equally reliable on-site coping capability to a minimum 8 hours.
- Commission action on the SBO issue, whether by orders or by rulemaking, should also ensure that both emergency on-site and off-site equipment to be used within and beyond the 72 hour coping period be subject to the same maintenance, availability, training and inspection rules as apply to SSC's. Mere proof-of-purchase and stashing of equipment in some seldom-visited warehouse should not be accepted as evidence of meeting SBO requirements.

Recommendation 5 (p. 41)

- *5.1 Order licensees to include a reliable hardened vent in BWR Mark I and Mark II containments.*

- *5.2 Reevaluate the need for hardened vents for other containment designs, considering the insights from the Fukushima accident. Depending on the outcome of the reevaluation, appropriate regulatory action should be taken for any containment designs requiring hardened vents.*

NRDC supports this recommendation, with the clear caveat that we do not believe that inclusion of "reliable" hardened venting of older BWR Mark I and II reactors *alone* is sufficient to render these obsolete designs adequately safe given the risk they pose to dense surrounding urban populations numbering, in some cases, in the several millions.

- We realize that the information concerning the execution of containment venting (and its effectiveness in various scenarios) at Fukushima is still forthcoming and will hopefully shed further light on how to improve these systems
- However, there is enough information to determine that the vent systems as a whole were not robust enough to provide operators with information regarding their successful actuation, or failure to do so.
- The suggested improvements do not make any claims that dispute the fundamental validity of a venting system:

  - Contrary to assertions by electric utility industry representative, previous NRC reports and recommendations have already established that installing these hardened vents improve the safety and reliability of these reactors
  - NUREG CR-5225, *"Despite possible negative effects and qualifications, there appears to be significant benefit in the proper utilization of containment venting. Besides turning an uncontrolled and possibly unfiltered release into a controlled and filtered one, a quantifiable benefit in terms of reducing core melt frequency is also attainable. By reducing the probability of inadvertent or unnecessary releases (by establishing the containment vent pressure as high as possible, installation of a hard pipe with a rupture disk, and incorporation of venting strategy into an overall accident management strategy), the downsides of venting should be minimized."*
- The Task Force concludes that "because Mark II containment designs are only slightly larger in volume..., it can reasonably be concluded that a Mark II under similar circumstances would have suffered similar consequences." *We agree.*
- The Task Force notes that great effort should be made in prescribing what constitutes a reliable vent:
  - These efforts should stress the reliability in the context of control room monitoring and operation in any situation, with redundancy being provided through the implementation of passive venting methods in the event operator control cannot be provided
  - Previous industry initiatives have resulted in varied approaches to supplying containment venting of uncertain operational effectiveness.
  - These methods should be assessed for common best practices and a standardized approach should be adopted based on these findings. *We agree.*

Our concern with Recommendation 5 is mainly to note that it is <u>not</u> a one-stop cure-all for the safety concerns posed by continuing to operate aging GE BWR Mark 1 and 2 reactors with seismically weak undersized containments near large centers of population.

A related concern is the deferral of Task Force Recommendation 6 (Hydrogen control and mitigation inside containment). There are several petitions already pending for rulemaking and enforcement actions with respect to this issue (PRM 50-93 and PRM 50-95). The ACRS should immediately be tasked to examine the technical issues raised in these petitions and asked to formulate recommendations regarding the conduct of further cladding oxidation experiments to resolve these issues, which appear serious to us, *and* any necessary conservative operating protocols that should be implemented at existing reactors *while these technical issues are*

under review. As we noted, this is a critical issue for safety analysis of loss of coolant accidents and the safety of power uprates, especially those involving BWR Mark 1 and Mark 2 designs.

Recommendation 7 (p. 46)

- *7.1 Order licensees to provide sufficient safety-related instrumentation, able to withstand design-basis natural phenomena, to monitor key spent fuel pool parameters (i.e., water level, temperature, and area radiation levels) from the control room.*
- *7.2 Order licensees to provide safety-related ac electrical power for the spent fuel pool makeup system.*
- *7.3 Order licensees to revise their technical specifications to address requirements to have one train of onsite emergency electrical power operable for spent fuel pool makeup and spent fuel pool instrumentation when there is irradiated fuel in the spent fuel pool, regardless of the operational mode of the reactor.*
- *7.4 Order licensees to have an installed seismically qualified means to spray water into the spent fuel pools, including an easily accessible connection to supply the water (e.g., using a portable pump or pumper truck) at grade outside the building.*
- *7.5 Initiate rulemaking or licensing activities or both to require the actions related to the spent fuel pool described in detailed recommendations 7.1–7.4.*

NRDC believes the actions to implement Recommendation 7 are fairly self explanatory and their usefulness is apparent in most, but not all instances:

- Provide sufficient instrumentation to monitor key spent fuel pool parameters
- Provide safety-related AC power for spent fuel pool makeup system
- Revise technical specifications to remove a rather ridiculous exception that currently does require a separate train of onsite emergency power for spent fuel pool makeup/instrumentation when the associated reactor is not operating.
- Require seismically qualified means to spray water into the pools with easily accessible connections to supply water at grade outside of the building.
- Initiate rulemaking/licensing activities to require these actions
- Numerous problems were seen at Fukushima concerning the monitoring of spent fuel pools and what the response should be
    - Coolant levels
    - Radiation levels
    - These monitoring efforts should be accessible from the control room
- Not only should these equipment requirements be mandated but all instrumentation should be designated as safety-related and be seismically robust

Our primary concern about this recommendation, which in general we support, is that we would like to see *a more balanced approach to reducing the risk of spent fuel stored in vulnerable pools*, one that reduces both the risk of fuel damage through assured cooling in an emergency *and* the radiological consequences should loss of cooling nonetheless occur:

- While the heat load emanating from recently irradiated fuel placed in a pool is obviously a key factor, we disagree with the Task Force's technical claim that increased pool loads do not contribute to pool cooling issues. The ability of the water in the pool to dissipate heat and resist boiling is proportional to its volume relative to the volume of spent fuel, and its ability to flow through the pool. Both are adversely affected by the amount of spent fuel packed into the pool.
- Additionally, in the event of an accident the source term for the spread of radioactive material is directly related to the amount of material in the pool. In parallel with ensuring adequate pool cooling under emergency conditions, further attention needs to be given to pool unloading and ways to reduce the hazards associated with spent fuel pools through accelerated dry cask storage.
- A further concern is that in the case of spent fuel pools co-located inside the secondary containment with key safety systems that may be at a lower elevation, spraying make up water into a boiling pool in an accident scenario could increase condensation inside the containment and result in flooding and disabling critical safety equipment.

Recommendation 8 (p. 49)

- *8.1 Order licensees to modify the EOP technical guidelines (required by Supplement 1, "Requirements for Emergency Response Capability," to NUREG-0737, issued January 1983 (GL 82-33), to (1) include EOPs, SAMGs, and EDMGs in an integrated manner, (2) specify clear command and control strategies for their implementation, and (3) stipulate appropriate qualification and training for those who make decisions during emergencies.*

- *8.2 Modify Section 5.0, "Administrative Controls," of the Standard Technical Specifications for each operating reactor design to reference the approved EOP technical guidelines for that plant design.*

- *8.3 Order licensees to modify each plant's technical specifications to conform to the above changes.*

- *8.4 Initiate rulemaking to require more realistic, hands-on training and exercises on SAMGs and EDMGs for all staff expected to implement the strategies and those licensee staff expected to make decisions during emergencies, including emergency coordinators and emergency directors.*

The proposed recommendation aims to align the various strategies for emergency response (emergency operating procedures (EOPs), Severe Accident Mitigation Guidelines (SAMGs), EDMGs) in an integrated manner.

- While each program contributes, the various programs were created for different reasons at different times so they are often inconsistent with one another in how they are handled under regulations, inspections, etc.
- SAMGs in particular are a voluntary initiative and, after inspections, were found to be inconsistently implemented among licensees
- Another concerning aspect is the level of training that exists for each of these programs
- Some licensees include extensive classroom training, simulators, and testing on SAMGs while others do not
- Task Force claims "all US plants have addressed all of the elements of onsite emergency actions that need to be accomplished by reactor operators" which may be true considering how limited their enforcement is on voluntary industry initiatives
- NRC Report, Summary of Observations – Temporary Instruction 2515/183, *"some equipment (mainly pumps) would not operate when tested or lacked test acceptance criteria", "in some cases plant modifications had rendered strategies unworkable", "fuel for pumps was not always readily available"*

- The wording of the Task Force throughout their evaluation of this issue is that they think this is a rather important issue of good housekeeping (providing support functions in a logical and coherent manner) while noting that they have little to no regulatory control over how these protections are implemented.

While agreeing with this recommendation, NRDC believes that its primary orientation toward rationalizing paperwork and "guidance" does not go nearly far enough in ensuring that the NRC actually *accomplishes* its mission of *ensuring* that on-site emergency response capabilities *are adequate* to the task of protecting plant staff and the public and remain so on any given day decades into the future. We would prefer to see a much more hands on role by the NRC in establishing hard and fast performance criteria for emergency response capabilities and realistic methods for verifying on a recurring basis that licensees are able to meet them.

Recommendation 9 (p. 56). ***NRDC supports this recommendation***

- *9.1 Initiate rulemaking to require EP enhancements for multiunit events in the following areas:*
  - *personnel and staffing*

- *dose assessment capability*
- *training and exercises*
- *equipment and facilities*

- *9.2 Initiate rulemaking to require EP enhancements for prolonged SBO in the following areas:*
  - *communications capability*
  - *ERDS capability*
  - *training and exercises*
  - *equipment and facilities*

- *9.3 Order licensees to do the following until rulemaking is complete:*
  - *Determine and implement the required staff to fill all necessary positions for responding to a multiunit event.*
  - *Add guidance to the emergency plan that documents how to perform a multiunit dose assessment (including releases from spent fuel pools) using the licensee's site-specific dose assessment software and approach.*
  - *Conduct periodic training and exercises for multiunit and prolonged SBO scenarios. Practice (simulate) the identification and acquisition of offsite resources, to the extent possible.*
  - *Ensure that EP equipment and facilities are sufficient for dealing with multiunit and prolonged SBO scenarios.*
  - *Provide a means to power communications equipment needed to communicate onsite (e.g., radios for response teams and between facilities) and offsite (e.g., cellular telephones, satellite telephones) during a prolonged SBO.*
  - *Maintain ERDS capability throughout the accident.*

- *9.4 Order licensees to complete the ERDS modernization initiative by June 2012 to ensure multiunit site monitoring capability.*

The above recommendations address concerns that during a Fukushima-scale event the existing framework would present challenges to personnel and their safety

  - The Task Force points out that regulations currently require adequate on-shift staffing levels but gives no clear definition of "adequate"
  - The overlapping responsibilities of on-shift emergency response personnel could limit their effectiveness in an emergency situation
  - Multi-unit events create a "nuance" in command and control structure that is "not yet fully developed"
- Providing a backup method for alerting the public within the plume exposure pathway emergency planning zone (EPZ)

  - Reliable and timely notification of an emergency event is crucial to reduce public exposure risks through efficient, focused, and expedient evacuation
  - Any lost time due to communications failures could result in unnecessary contamination
- Emergency Response Data System (ERDS) should be enhanced to handle prolonged SBO scenarios
  - Ensuring this capability during an event similar to Fukushima would allow accurate and much needed reconstruction of the events
  - Provides a valuable resource to responders in monitoring multiple sites and remaining efficient in prioritizing the aspects of the response effort
- ERDS modernization initiative has already seen an extension
  - Needs to be updated soon
  - Licensees have been afforded enough time and resources to achieve modernization
  - Installation of new Virtual Private Network (VPN) devices to replace obsolete analog modems
  - Older modems are becomingly increasingly difficult to replace and do not provide the current technological protection required by Federal networks against cyber threats
  - Having accurate real-time data is a must for a coordinated response and making the transmissions automatic relieves the burden from personnel that are needed during an event
    - Also increases transparency of the event to government authorities and public so that we can be confident that the response being taken is commensurate
- Current EP drills/exercises do not currently consider prolonged SBO or multi-unit accident scenarios

The only objectionable aspect to the suggested orders needed to implement this recommendation is that the Task Force has to ask for them in the first place:

"Determine and implement the required staff to fill necessary positions or responding to a multi-unit event", "Provide a means to power communications equipment needed to communicate onsite and offsite during a prolonged SBO"-- these gaps are wildly obvious in their importance following Fukushima and should never have been allowed to evolve in the first place. The Commission's dereliction in never requiring them is never explained.

Needles to say, having several layers of redundant communication does not preclude the necessity for keeping these communications operable during a prolonged SBO.

Our concern from the treatment of emergency planning issues in the Task Force Report, and by NRC generally, is that it ignores large changes in a power plant's external environment over time that affect the plausibility and effectiveness of reliance on emergency planning as a last ditch defense to prevent unacceptable damage to surrounding areas. Such factors include:

- Population density of surrounding areas; capacity of transportation infrastructure; time dependent traffic flows and bottlenecks
- Value of economic activity and real estate in the affected emergency planning zones
- There is no discussion is this recommendation of what would be considered intolerable or unacceptable consequences if the worst case happens. In other words, the problem is much broader than keeping the dose to the maximally exposed individual below a certain level by a combination of expedient accident mitigation and timely evacuation measures. *What the Commission must now consider is the sum total of economic damage and social disruption that might be inflicted by a Fukushima scale accident occurring in a much more densely populated area.* This is a critical near-term question, for example, for communities in the New York City (Indian Point) and Philadelphia, and Los Angeles areas (the Indian Point, Limerick, and SONGS reactors, respectively). The Task Force Report does not touch upon or consider recommendations relating to this fundamental issue, and this represents a yawning gap in the Commission's response to date to the Fukushima disaster.

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General Comment

It does not matter it you write an Order if you maintain the current performance from your US NRC Enforcement function.

Specifically, if you want some changed performance from the US commercial nuclear industry (to follow Orders, for example), it is my opinion that you need to seriously strengthen your Enforcement function and issue some fines.

E-RIDS = AOM-03
Add = Michael Oudek (MID)
Michael Levine (MHL)
Kevin Witt (KMW)
Brian Green (BDG1)

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General Comment

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Re: Docket No. NRC-2011-0196

In the comments submitted earlier today a citation was omitted. The works of Hiroshi Senju and Hideo Furukawa were published in "The Nation" August 29/September 5, 2011.

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E-RIDS = AOM-03
Add = Michael Oudek (MID)
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