

U.S. Nuclear Regulatory Commission  
21<sup>st</sup> Annual Regulatory Information Conference  
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TECHNICAL SESSION QUESTIONS AND ANSWERS

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**Session Number:** T1

**Session Day and Time:** Tuesday, 4:00 p.m. – 5:30 p.m.

**Session Title:** Emergency Preparedness and Incident Response - Update on Significant Emergency Preparedness Issues

**Session Chair:** Christopher Miller, NRC/NSIR

**Session Coordinator:** Walter Lange, NRC/NSIR, tel: (301) 415-8028, E-mail:

[Walter.Lange@nrc.gov](mailto:Walter.Lange@nrc.gov)

**Question 1:** Do Hostile Action Event scenarios consider the loss of primary communications between licensee personnel and off-site responders? Is there a requirement to demonstrate that backup communications capabilities are available?

**Answer 1:** As part of a current 3-year industry initiative, hostile action-based emergency preparedness (EP) drills are being conducted using the guidelines provided in Revision 1 to NEI 06-04 (ADAMS Accession No. ML073100460), which was endorsed by the NRC under Regulatory Issue Summary (RIS) 2008-08. These guidelines do not require the demonstration of backup communications capabilities for licensee or offsite response organizations for this industry initiative, but rather focus on generic communications interoperability means. The specific extent of play during proposed biennial exercises involving a hostile action scenario will be outlined in proposed NRC and FEMA guidance that will be issued for public comment.

**Question 2:** How often will the emergency plan have to be updated? How often will Hostile Action Based table top exercises have to be run?

**Answer 2:** NUREG 0654 states that “each organization shall update its plan and agreements as needed, review and certify it to be current on an annual basis.” The proposed NRC EP rulemaking, being reviewed by the Commission at the time of RIC, addresses the inclusion of a hostile action scenario once per demonstration cycle into a required biennial exercise. The proposed rulemaking language does not specify any requirement for the conduct of tabletops, which are merely intended to be used by licensees and offsite response organizations to validate changes to respect plans and procedures. Revision 1 to NEI 06-04 encourages the use of tabletops during the current industry initiative phase.

**Question 3:** Will Hostile Action Based drills apply to non-power reactors? If so, will there be any type of extra guidance provided?

**Answer 3:** The proposed NRC EP rulemaking, being reviewed by the Commission at the time of RIC, would not require the conduct of hostile action-based EP drills or exercises for non-power reactor licensees.

**Question 4:** Will the guidance documents used to implement the new EP rule be published at the same time the rule is published in the federal register?

**Answer 4:** Yes, the guidance documents will be made available through the Federal Register at the same time as the proposed rule.

**Question 5:** Are the new EP rules getting a back-fit analysis? For example, if the staffing rule requires additional on-shift staff with associated financial impact is this being evaluated?

**Answer 5:** Yes, the back-fit analysis is included in the rule making package.

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**Session Number:** T2

**Session Day and Time:** Tuesday, 4:00 p.m. – 5:30 p.m.

**Session Title:** Emerging Issues - Materials and Mechanical

**Session Chair:** Michele Evans, NRC/NRR

**Session Coordinator:** Carol Nove, NRC/NRR, tel: (301) 415-3814, E-mail:

[Carol.Nove@nrc.gov](mailto:Carol.Nove@nrc.gov)

All questions were answered during the session.

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**Session Number:** T3

**Session Day and Time:** Tuesday, 4:00 p.m. – 5:30 p.m.

**Session Title:** New Reactors - Will There Be a Second Wave?

**Session Chair:** David Matthews, NRC/NRO

**Session Coordinator:** Serita Sanders, NRC/NRO, tel: (301) 415-2956, E-mail:

[Serita.Sanders@nrc.gov](mailto:Serita.Sanders@nrc.gov)

**Question 1:** "What considerations are currently being given to make future life (+60) extensions of the new reactors more feasible while ensuring no degradation in safety goals? i.e. design requirements for aging management and life extension."

**Answer 1:** Based on the Atomic Energy Act, the Nuclear Regulatory Commission issues licenses for commercial power reactors to operate for up to 40 years and could renew these licenses for another 20 years. If licensees choose to pursue operations beyond 60 years, there are no current regulatory prohibitions. However, these licensees would have to demonstrate that such extended plant operations will continue to be conducted in a safe manner. 10 CFR Part 51 and Part 54 regulations require these licensees to address the technical and managerial

aspects of plant aging as well as to evaluate the potential environmental impact of the extended plant operations.

There are no specific regulatory requirements for designing a plant for operations beyond 60 years. However, certain aspects of the designs of new reactors better address certain potential aging concerns. Examples include the following:

1. Reactor vessels are of better materials with low copper, nickel, phosphorus, and sulphur,
2. For the AP1000 and ESBWR standard designs, there are no beltline welds resulting, generally speaking, in less radiation embrittlement,
3. New vessels will use thick shielding materials to protect the vessel from further damage from radiation embrittlement,
4. As a result of material improvements, pressurized thermal shock will not be an issue beyond 60 years,
5. Improved vessel materials will allow for a much better operating window of pressure-temperature limits,
6. As embrittlement increases, the operating window will narrow; however, there will be a sufficient operating margin to heat-up and cool-down plants beyond 60 years, and
7. During the reviews of current design certification applications, the staff ensures that the designers provide sufficient surveillance capsules for a minimum of 60 years.
8. New reactors will be able to better utilize improved equipment monitoring technologies (e.g., on-line partial dissipation test to detect cable insulation degradation) since the plant can be designed with these technologies in mind.

These design aspects have the potential for improving the management of material degradation and will be considered by the staff during the license renewal process for new reactors.

**Question 2:** How can deployment of small reactor designs move forward when the NRC does not have plans to review such designs?

**Answer 2:** The NRC has established and advanced reactor program (ARP) and the staff are having limited pre-applications discussions with several designers of small and medium-sized reactors. However, with the exception of review of the Next Generation Nuclear Plant, the staff has needed to limit these interactions with the prospective applicants for small and medium-sized reactors to occasional meetings or other non-resource-intensive activities. In addition, the NRC has informed designers that agency reviews will consider factors such as the maturity of the design and testing programs and the likelihood of applications for domestic license applications. The NRC is considering these technologies and related reviews in the formulation of budgets for future fiscal years and will allocate resources to review applications for small and medium-sized reactors using established processes and priorities.

**Speaker:** Nanette Gilles (NRC)

**Question 3:** How is the length of renewal of a Design Certification determined? You mentioned it could be 10 – 15 years.

**Question 4:** Is the Design Certification valid for another 10 – 15 years after renewal. What determines the exact duration of validity?

**Answers to 3 and 4:** In determining the length of the term for a design certification renewal, the NRC may consider, among other things:

- The term requested by the applicant;
- Whether more advanced or improved technology had been or was in the process of being developed;
- Available operating experience for the design; and
- The degree of interest for continued use of the design in the U.S.

**Speaker:** Stephanie Coffin (NRC)

**Question 5:** Currently NRC does not allow NRC contractors to directly speak with applicants. This contributes to the sine wave phenomena (delays). Informal Q&A would help considerably why can't we allow this?

**Answer 5:** The NRC continually interfaces with licensees and applicants in licensing and regulatory activities. It is the policy of the NRC to establish procedures and guidance for its staff to ensure that such activities meet the requirements established by legislation and regulation. NRC is committed to establishing and maintaining working relationships with licensees and applicants consistent with NRC's principle of good regulation (being independent, open, efficient, clear, and reliable), NRC's performance goals (safety, security, openness, effectiveness, management, and excellence) and the NRC's mission.

Contractors for the NRC are not excluded or prohibited from participating and engaging in discussions with licensees and applicants. This interface must take place with NRC personnel present to ensure that requirements established by legislation and regulations are met. It is ultimately NRC's responsibility to decide the appropriate information to engage in discussion on or request from the applicant or licensee.

**Question 6:** Can draft SERs (includes open items) be completed on applications that are referencing an uncertified design? What about FSERs?

**Answer 6:** Consistent with 10 CFR Part 52, COL applicants can, at their own risk, reference a reactor plant design that is under review but not certified. However, under such circumstances, the COL may not be issued until the referenced design is certified. The staff's safety evaluation report with open items (SER/OI) for the COL application identifies those issues (i.e., open items) that require resolution prior to finalization of the SER. For this situation, the key open item is completion of the staff's evaluation of the reactor plant design. The staff's final SER (FSER) contains no open items; therefore, the staff cannot complete the FSER for the COL application until the evaluation of the design is completed. It is important to note that it is an NRC requirement that the design must be certified by the final rule prior to the issuance of the reference COL.

**Question 7:** Given the vast amount of work hours that industry has invested in COL applications (COLA), numerous meetings with Design Center Working Groups, and hundreds of NRC staff requests for additional information answered, what would you say are some successes?

**Answer 7:** There have been many successes in the process of reviewing COLAs for new reactors on both the part of the regulator and the industry (applicants). Faced with many challenges in the initial stages of the COLA review, NRC communicated with applicants to resolve issues and re-enforce regulations and expectations. A few notable challenges that have given rise to successes in furthering the process are as follows:

- **Having a large number of applications arriving in a short amount of time.**

The NRC has been successful being efficient and effective in its review by maximizing the standard design certification approach, which allows an applicant to obtain preapproval of a standard nuclear plant design through rulemaking and reduces licensing uncertainty by resolving design issues early in the licensing process. Also, the use of the design center review approach allows one issue to get one review and one decision for the design. The applicant has certainly embraced and maximized the use of standard design certification when selecting new reactors.

- **Developing infrastructure, policies, and procedures established support DCD and COL Reviews.**

In an effort to support successful (timely, efficient, and effective) reviews of combined license applications for a new generation of nuclear reactors, NRC has implemented bold initiatives to improve its regulations and policies. 10CFR Part 52 was revised to ensure that NRC's requirements governing applications for issuance of early site permits, design approvals, design certifications, combined licenses are expressed in clear terms. Limited Work Authorization (LWA) regulations were amended to permit certain preconstruction activities on production and utilization facilities to commence before a construction permit or combined license is issued. The final LWA rule modifies the scope of activities that are considered construction for which a construction permit, COL or LWA is necessary, specifies the scope of construction activities that may be performed under an LWA, and changes the review and approval process for LWA requests. The hearing policy has been revised to provide a fair and efficient framework for litigation of disputed issues arising under the 'Atomic Energy Act of 1954,' as amended and the National Environmental Policy Act of 1969, as amended, that are material to applications. Interim staff guidance was developed to resolve interim issues, as not to delay progress while waiting for major revisions to NRC key guidance documents (i.e. SRP, Reg. Guide 1.206).

After resolving those challenges in the initial stages, NRC's current challenge is as follows:

- **Large number of applications being reviewed.**

NRC is achieving success with the use of standard design certification. While the volume of work has certainly increased with multiple applications "in house;" however, the staff is able to resolve design issues early in the licensing process. The four-phase review approach for subsequent combined license applications (S-COLs) has also contributed to success. Using a phased approach to process and implement specified tasks with discipline within the phase enables orderly completion of all activities prior to transitioning to the subsequent phase. This ultimately ensures effectiveness of the established review process.

For all of the successes accomplished by both the NRC and industry, there are yet new challenges as we progress in this COL review process that give rise to opportunities to forge a pathway to continued success.

- **Substantial revision of COLAs based on business-environment changes.**

Success can be accomplished with early and frequent communication between the NRC and applicants that experience business-environment changes. This communication can identify needed changes in NRC's COLA review schedule. Further, this will require the industry to prioritize COLAs that can be completed in accordance with the duration outlined in 10 CFR Part 52.

- **Substantial design changes during review.**

Success can be achieved when the applicant settles on a final design. In some instances, there have been substantial design changes during the course of a COLA review. Early and frequent communication is a key factor in arriving at a design. Provide an adequate amount of information to the NRC staff to support the review of a design change.

- **Information required by the regulations either not available or not provided.**

Success can be achieved with the early recognition that a new approach is needed. There are instances when applicants are unable to comply with the regulations due to lack of information. The NRC will take a proactive approach and formulate this new approach that is consistent with our mission and values (independent, open). To view more challenges and successes in the review of COLAs and design certifications go to [www.nrcric.org](http://www.nrcric.org) to view the presentation.

**Speaker:** Marylin Kray (NuStart)

**Question 8:** What is the impact on the NuStart effort of both the AP1000 and ESBWR R-COLAs being affected by delayed build schedule (Bellefont) and suspended review (Grand Gulf)?

**Answer 8:** The construction schedules do not have a direct impact on the COLA reviews. The benefit of the NRC's design centered review approach is that the generic and site-specific content within the COLAs is clearly designated. With the Grand Gulf project, NuStart is working with Entergy and the NRC staff to document the current review in such a form that it can be retrieved later, if needed.

**Question 9:** Given all the risk associated with new plants, how many of the 10 NuStart energy applications do you think will materialize into finished plants by 2020?

**Answer 9:** The answer lies with the economics of the individual projects. The cost of the plants and the market pricing for the electricity produced by the plants will determine whether or not they are viable. The good news, however, is because of the efforts to date between the industry and the NRC, I don't expect regulatory risk to be determining factor in whether or not the proposed plants are ultimately constructed. This was one of the objectives of NuStart.

**Question 10:** What single improvement do you think would add the most value to stream-line the DCD review process?

**Answer 10:** Better understanding between the reactor vendor and the NRC staff regarding the level of detail needed for design certification will improve the efficiency of the process.

**Speaker:** Doug Walters (NEI)

**Question 11:** There is excellent communication among the nuclear industry, but what about communication to the Public? **Comment:** Someone or organization should be responsible for communicating NEI's message to the general Public.

**Answer 11:** NEI uses many outlets to get its messages to the public. The NEI public website ([www.nei.org](http://www.nei.org)) has an area devoted to new plants. Here members of the public can find information about the need for new nuclear plants, the economic benefits of new plants, the different designs, and industry and government programs. The site also contains a number of media resources including fact sheets and brochures.

New plant applicants that plan to build new reactors on an existing site will utilize the site visitor center as opportunity to reach out to the local community. These centers may include interactive displays, hands-on exhibits and educational programs related to new nuclear reactors. Also, the companies that are pursuing new reactors typically have a section of their website devoted to the topic.

In addition, NEI has a New Reactor Communications and Governmental Outreach Task Force that works closely with member company communicators and governmental affairs representatives. The purpose of the task force is to identify, share and apply industry best practices in communicating the role of new nuclear power plants in meeting the nation's need to generate electricity that minimizes greenhouse gases and to foster greater understanding and acceptance of new-reactor licensing processes, safety, design and construction. Numerous conference calls are conducted throughout the year and at least one annual meeting is held in Washington where representatives gather to discuss the latest issues, challenges and opportunities.

Other means that NEI uses to get the message out to the public include the [Clean and Safe Energy Coalition \(CASE\)](#). This is a large grassroots coalition that unites unlikely allies across the business, environmental, academic, consumer and labor community to support nuclear energy. The coalition is co-chaired by Christine Todd Whitman (former New Jersey Governor and EPA Administrator) and Dr. Patrick Moore (Co-Founder of Greenpeace).

NEI also sponsors [Clean Energy America \(CEA\)](#), a national speakers program designed to establish a dialogue with American citizens about the benefits of nuclear energy as a clean, reliable and affordable source of energy. CEA's goal is to encourage a better understanding of future energy needs and to discuss such vital issues as radioactive waste disposal, nuclear plant safety, the cost of electricity, global warming and the future of renewable energy sources.

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**Session Number:** T4

**Session Day and Time:** Tuesday, 4:00 p.m. – 5:30 p.m.

**Session Title:** Probabilistic Risk Assessment Challenges - From Methodology to Decision-making

**Session Chair:** John Monninger, NRC/RES

**Session Coordinator:** Michelle Gonzalez, NRC/RES, tel: (301) 251-7591,  
E-mail: [Michelle.Gonzalez@nrc.gov](mailto:Michelle.Gonzalez@nrc.gov)

All questions were answered during the session.

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**Session Number:** T5  
**Session Day and Time:** Tuesday, 4:00 p.m. – 5:30 p.m.  
**Session Title:** Radiation Protection  
**Session Chair:** Stephanie Bush-Goddard, NRC/RES  
**Session Coordinator:** Stephanie Bush-Goddard, NRC/RES, tel: (301) 251-7528,  
E-mail: [Stephanie.Bush-Goddard@nrc.gov](mailto:Stephanie.Bush-Goddard@nrc.gov)

All questions were answered during the session.

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**Session Number:** T6  
**Session Day and Time:** Tuesday, 4:00 p.m. - 5:30 p.m.  
**Session Title:** Reactor Oversight Process Initiatives  
**Session Chair:** Michael Cheek, NRC/NRR  
**Session Coordinator:** Jeremy Bowen, NRC/NRR, tel: (301) 415-3471, E-mail:  
[Jeremy.Bowen@nrc.gov](mailto:Jeremy.Bowen@nrc.gov)

**Question 1:** Are foreign airlines regulated by the FAA; or is there some sort of scheme of delegation with foreign agencies?

**Answer 1:** Federal Aviation Administration

The scheme of international coordination between the civil aviation authorities is the International Civil Aviation Organization (ICAO). ICAO, established in 1944, is the United Nations technical agency for aviation. Contracting states to ICAO sign the Convention on International Civil Aviation (commonly referred to as the Chicago Convention). The Chicago Convention, along with its annexes, standards and recommended practices, are the minimum standards for international civil aviation. A foreign air carrier of a sovereign state desiring to conduct air transportation operations into the United States, or codeshare with an air carrier from the United States, must be compliant with ICAO standards. This is prescribed in 14 CFR Part 129 and related policy documents.

The FAA determines international aviation compliance through our International Aviation Safety Assessment (IASA) program. The IASA program focuses on a country's ability, not an individual air carrier's ability, to adhere to international standards and recommended practices for aircraft operations and maintenance established by ICAO. More information on the IASA Program may be found on the FAA public web site at:  
[http://www.faa.gov/safety/programs\\_initiatives/oversight/iasa/](http://www.faa.gov/safety/programs_initiatives/oversight/iasa/).

Consistent with international law, and the terms of any existing Air Transport Agreements, certain safety requirements for operations into the United States must be met. Upon US Department of Transportation (DOT) notification of a pending foreign air carrier application, if the FAA has not made a positive assessment of that country's safety oversight capabilities, the FAA Flight Standards Service will schedule an assessment visit to the Civil Aviation Authority

(CAA) of the applicant's country. If a CAA is found to be meeting its minimum safety obligations under the Chicago Convention, the FAA will forward an appropriate recommendation to DOT. When CAAs of countries are found not to meet ICAO standards, the FAA formally requests consultations with the CAA. The purpose of consultations is to discuss our findings in some detail and explore means to quickly rectify shortcomings found with regard to ICAO annexes, to enable the country's air carriers to continue service to the United States. During the consultation phase, and until any findings are corrected, any existing foreign air carrier operations from that country into the United States will be fixed at existing levels. Foreign air carriers are also subject to ramp inspections while in the United States.

**Question 2:** Since many human errors are made during maintenance tasks, what actions are taken by the FAA to ensure that their maintenance required tasks do not actually introduce new failures?

**Answer 2:** Federal Aviation Administration

See attachment ([FAA Human Factors Activity.ppt](#)), and this web site:  
<http://hfskyway.faa.gov/hfskyway/index.aspx>

**Question 3:** How does the airline industry evaluate and collect employee concerns on the safety elements of culture (for example, the willingness to raise concerns).

**Answer 3:** Mont Smith, Air Transport Association of America

This is the biggest challenge for any individual air carrier's Safety Management System. It's the basic "chicken or the egg" question. What comes first or takes priority, organizational culture or safety culture? I believe you have to build on the shared values and beliefs of the organization.

If a company builds credibility with its employees through genuine appreciation for their efforts and concern for their welfare, these values will be reciprocated. I am a big believer in what is called "The Just Culture." This is a culture in which management understands that people occasionally err...to err is human. Mistakes of omission are acceptable; employees can be consoled and receive additional training and encouragement. Processes, procedures, training, design, and environment can be changed. A second type of human behavior is "at risk" behavior – humans "drift" away from following established procedures because they begin to do "work arounds" that they firmly believe are justified under the circumstance. This behavior, although unacceptable, lends itself to correction through coaching, removing incentives for at-risk behaviors, creating incentives for healthy behaviors, and increasing situational awareness.

The final type of behavior is reckless behavior – *"a conscious disregard of substantial and unjustifiable Risk."* This can only be managed through remedial and disciplinary action.

So, ultimately, a safety culture is fostered on the basis of a sound organizational culture and a consistent, reporting culture that supports learning. The voluntary safety programs encourage the exchange of information that is so necessary to managing the first two types of behaviors. The third type of behavior, although admittedly rare, falls into the category of accountability. The vast majority of employees would not tolerate peers who do not take responsibility for their actions and jeopardize the safety of others.

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**Session Number:** W7

**Session Day and Time:** Wednesday, 12:30 p.m. – 2:00 p.m.

**Session Title:** Knowledge Management - NRC and Industry Initiatives

**Session Chair:** Martin Virgilio, NRC/OEDO

**Session Coordinators:** Patricia Eng, NRC/OEDO, tel: (301) 415-7254, E-mail:

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All questions were answered during the session.

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**Session Number:** W8

**Session Day and Time:** Wednesday, 12:30 p.m. - 2:00 p.m.

**Session Title:** New Reactor Design Reviews and Engineering Issues

**Session Chair:** Laura Dudes, NRC/NRO

**Session Coordinator:** Nikki Gilanshahi, NRC/NRO, tel: (301) 415-3801, E-mail:

[Nikki.Gilanshahi@nrc.gov](mailto:Nikki.Gilanshahi@nrc.gov)

**Question 1:** Is there a good overview reference that describes the Part 52 process and defines DAC, ITAAC, etc.?

**Answer 1:** The NRC has provided an overview of the licensing processes in 10 CFR Part 52 in NUREG/BR-0298, Rev. 2, "Nuclear Power Plant Licensing Process." This brochure can be found at the NRC's website at: <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets>. This overview does not define design acceptance criteria (DAC) because DAC was not intended to be a normal part of the NRC's licensing process for nuclear plants.

The NRC's process for verifying that an as-built nuclear plant has been constructed in accordance with the approved design and the applicable NRC regulations is referred to as inspections, tests, analyses, and acceptance criteria (ITAAC). This verification process uses a three-part format consisting of a design commitment, the method of verification (inspection, test, and/or analysis), and the acceptance criteria for each ITAAC. By establishing ITAAC prior to the start of construction, both the licensee and the NRC have a common understanding of what will be verified, the method of verification, and the acceptance criteria, thereby providing more predictability to the nuclear plant licensing process.

Applicants for design certification have requested that the Commission approve the use of design acceptance criteria (DAC) in lieu of final design information for selected areas of the design. DAC are a special type of ITAAC that use prescribed limits, parameters, procedures, and attributes upon which the NRC relies in making a final safety determination to support a design certification. The Commission has allowed the use of DAC for rapidly evolving technologies, such as the digital instrumentation and control system, but wants its use to be limited.

**Question 2:** How can the nuclear industry justify not approving digital controls in nuclear applications considering analog controls are obsolete?

**Answer 2:** The NRC has licensed, and is in the process of reviewing, digital technology for use in nuclear applications. For example, many current operating reactors utilize digital controls for applications such as feedwater and main turbine control and some plants use digital computers in reactor protection systems. The NRC has in place guidance for licensing of digital technology

in safety applications, and it is currently reviewing digital upgrades at operating reactors, as well as digital instrumentation and control designs for new reactors.

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**Session Number:** W9

**Session Day and Time:** Wednesday, 12:30 p.m. - 2:00 p.m.

**Session Title:** Nuclear Fuel Cycle Update

**Session Chair:** Michael Weber, NRC/NMSS

**Session Coordinators:** Albert Wong, NRC/NMSS, tel: (301) 492-3238, E-mail:

[Albert.Wong@nrc.gov](mailto:Albert.Wong@nrc.gov)

**Question 1:** Waste Control Specialists CWCS in West Texas is interested in storage; New Mexico is interested in reprocessing and WIPP could be used to disposal. Who needs Yucca Mountain?

**Answer 1:** Steve Kraft, NEI - Without going into the merits of whether any of the facilities and communities mentioned could or would be a site for a used fuel management facility, the fact remains that disposal will ultimately be required. There has never been a fuel cycle proposed that didn't include disposal.

The Nuclear Waste Policy Act of 1982 and the Joint Resolution of 2002 remain the law of the land directing DOE to pursue Yucca Mountain repository site licensing and development. Unless and until the law is changed, NRC's review of the Yucca Mountain License Application must continue.

Should the Yucca Mountain project be abandoned without enacting new legislation to modify or replace existing law, there will be a significant amount of legal uncertainty in many areas that would be best avoided. In addition, there would be a new wave of lawsuits seeking further damage payments and refunds of at least the \$22 billion Nuclear Water Fund already collected from consumers that has not been spent on the program.

**Question 2:** Administration states Yucca Mountain is "dead," off the table or no longer an option. Why continue the LA/RAI process at all? Waste of Money. Supported by NEI. Should cancel NWPA and pay back remainder of funds.

**Answer 2:** Steve Kraft, NEI - Without going into the merits of whether any of the facilities and communities mentioned could or would be a site for a used fuel management facility, the fact remains that disposal will ultimately be required. There has never been a fuel cycle proposed that didn't include disposal.

The Nuclear Waste Policy Act of 1982 and the Joint Resolution of 2002 remain the law of the land directing DOE to pursue Yucca Mountain repository site licensing and development. Unless and until the law is changed, NRC's review of the Yucca Mountain License Application must continue.

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damage payments and refunds of at least the \$22 billion Nuclear Water Fund already collected from consumers that has not been spent on the program.

**Question 3:** You are opposing fuel recycling. Do you express opposition against other countries' reprocessing? What do you think of other countries' MOX fuel installment? Do you stop it?

**Answer 3:** Ed Lyman, UCS - The Union of Concerned Scientists (UCS) is opposed to reprocessing and MOX fuel use everywhere because of the proliferation and nuclear terrorism risks associated with the separation, transport and processing of weapon-usable materials. We believe that the U.S. should continue to lead by example by demonstrating to the rest of the world that reprocessing is not necessary for nuclear power development, and to use its leverage to discourage reprocessing abroad as much as possible.

**Question 4:** How will the Commission's direction to the staff in the SRM for SECY-08-0059 concerning MC&A requirements for reprocessing facilities address the concerns you raised in this regard?

**Answer 4:** Ed Lyman, UCS - The Commission was right to recognize in its SRM that many of the issues the staff raised in SECY-08-0059 need to be resolved before any reprocessing plants or other fuel cycle facilities processing strategic special nuclear materials are licensed, but we do not agree that changes to Part 74 should be deferred to a later reprocessing rulemaking.

We agree with many of the recommendations of SECY-08-0059, including extending MC&A rules to americium and neptunium and requiring Category I facilities and enrichment plants to conduct diversion path analyses. We also agree with consolidation of MC&A requirements in Part 74, provided that reprocessing plants are properly classified as Category I facilities. But we do not believe that these changes go far enough, and recommend additional requirements, such as a "safeguards by design" rule. We also believe that the introduction of an attractiveness level table similar to that of NNSA will need to be independently justified. The potential effectiveness of intrinsic barriers to deter diversion or theft must be assessed based on conservative assumptions of future adversary capabilities.

**Question 5:** If security, safety and proliferation are such major concerns with reprocessing, how is it that France, Japan and others have been able to manage reprocessing responsibly? And what might we learn from them?

**Answer 5:** Ed Lyman, UCS - UCS does not agree that France, Japan and others have managed reprocessing responsibly. We do not consider it responsible to reprocess spent fuel and generate large stockpiles of separated weapon-usable material, much of which is simply stored without a credible disposition path. The U.S. has accumulated about 100 metric tons of plutonium and has no near-term disposition path. At the current pace of Japan's implementation of MOX, it will take decades to dispose of the plutonium inventory it already possesses, not to mention any additional plutonium that will be separated if Rokkasho-mura ever successfully begins hot operations. And even France has a significant stockpile of excess plutonium. It is our understanding, moreover, that the physical protection applied to plutonium storage and transport in France and Japan falls far short of that which is required under NNSA orders.

The lesson we take from this is that the U.S. (in contrast to France, Europe and Japan), which did not embark on large-scale commercial reprocessing in the 1970s, now has a much smaller stockpile of separated plutonium to deal with than it would otherwise. Even so, it will take many decades and billions of dollars to dispose of the 34 metric tons of excess weapons plutonium that we do have.

**Question 6:** Is the reason for questioning the Yucca mountain option based on availability of new science or evaluation of previous studies as bad science?

**Answer 6:** Buzz Savage, DOE - Those questioning the safety of the proposed Yucca Mountain repository believe that its performance cannot be predicted accurately over the million-year period for which its construction and operating license must extend and that within the uncertainties of performance, unacceptable releases of radioactivity will occur.

Under the Federal law authorizing the construction of a repository for used fuel and high level waste (the Nuclear Waste Policy Act of 1982), as amended or the NWPA), the ultimate decision on repository performance and safety is the responsibility of the Nuclear Regulatory Commission (NRC). A license application to construct the Yucca Mountain repository was filed by the Department of Energy in June 2008. The NRC is currently reviewing that application, including submitting detailed questions on its content. Under the NWPA, the NRC has until September 2011 (with a possible extension to September 2012) to determine whether or not the concerns voiced above are valid. In essence, the question of whether new science or bad science should validate or invalidate the Yucca Mountain site for a repository is being answered through an authorized adjudicatory process.

**Question 7:** You said DOE is now focusing on long-term R&D and leaving near-term work to the industry. But would DOE be able to provide any kind of assistance to companies considering construction of reprocessing plants? For example, some kind of public/private partnership, or other actions to reduce the financial risk, or anything along those lines.

**Answer 7:** Buzz Savage, DOE - If companies have technical issues, they can work with the national laboratories via a Cooperative Research and Development Agreement (CRADA) or the Work for Others program. However, there is currently no Federal government program to form a partnership to share the financial risk associated with constructing a reprocessing plant in the U.S.

**Question 8:** The slide "Uranium Resources" did not seem to recognize that significant Uranium is available through re-enrichment of tails or depleted UF<sub>6</sub>. Is DOE looking at this?

**Answer 8:** Buzz Savage, DOE - Department of Energy's Office of Environmental Management is developing plans for the excess uranium inventory. One option under consideration is the sale of "high assay" (0.35% to 0.711% U-235) depleted uranium hexafluoride (DUF<sub>6</sub>). The high assay DUF<sub>6</sub> contains considerable uranium but the economic attractiveness to re-enrich is sensitive to uranium price.

**Question 9:** What are the chances that a private company like Areva could build a reprocessing/recycling plant in the U.S. without DOE/government assistance? Both legal and financial aspects . . . (sentence left unfinished).

**Answer 9:** Buzz Savage, DOE - Industry has suggested that if a new government entity were established with access to the nuclear waste fund to perform integrated used nuclear fuel management (storage, recycling and geologic disposal) that a business case could be made to accomplish these activities for somewhere between \$1 and \$3 per MWhr of nuclear generated electricity. This type of increase would be less than \$5 per year on the average electric bill and less than 5% of the cost of nuclear electricity generation. This would obviously require legislation to set up such an entity and authorize use of the nuclear waste fund. These have been several bills introduced to create such an entity and/or allow use of the nuclear waste fund for recycling; however, none of the proposed legislation has made much progress to date.

**Question 10:** What did the NRC learn from the licensing of the PFS site in Utah? Asking the question because it looks like the Yucca Mountain site, if licensed will remain as empty as the PFS site!!!

**Answer 10:** NRC - PFS was licensed as an independent spent fuel storage installation, a different regulatory scheme than that pertaining to disposal of high-level radioactive waste in a geologic repository at Yucca Mountain. The decision whether to construct or operator PFS or any facility license by the NRC rests with the licensee.

Lesson learned from PFS and other licensing reviews, to the extent applicable to the licensing of disposal of high-level waste in a deep geologic repository, are being applied to the review of the Yucca Mountain license application.

**Question 11:** What effect, if any, does NRC plan on the current LA application schedule from current funding cuts to OCRWM?

**Answer 11:** NRC - NRC is still evaluating how cuts to the DOE program will impact the NRC license application review schedule. As the Chairman and the NRC Executive Director for Operations stated at the conference, NRC needs realistic appropriations to complete its licensing review consistent with the schedule mandated by the Nuclear Waste Policy Act.

**Question 12:** Of the 300+ contentions filed by the interveners, please indicate about how many the NRC staff recommended the ASLB accept as admissible, valid contentions under the regs?

**Answer 12:** NRC - By January 2009, petitioners for leave to intervene in the Yucca Mountain licensing proceeding proposed 319 contentions for litigation before the Atomic Licensing and Safety Board. The NRC staff recommended that all or portions of 21 contentions satisfied the pleading requirements for admissible issues in NRC proceedings. The criteria for admissibility under NRC regulations is not whether a contention has technical merit, but whether the proponent has demonstrated standing to participate in the proceeding and raised an admissible (and adequately supported) issue in the proceeding.

Whether or not a contention is admitted for litigation, the staff will consider any significant safety issues raised by the petitioner during its review of the license application.

**Question 13:** How would the NRC's work interface with other regulatory agencies outside the U.S., should recycling fuel become a commercial option as a result of multilateral efforts or even multinational R&D investment, or ownership? Is there any precedent for such an endeavor?

**Answer 13:** NRC - The NRC maintains strong working relationships with many regulatory agencies outside the U.S. NRC routinely conducts bilateral and multilateral information exchanges with our international regulatory colleagues on items of mutual interest. With regard to reprocessing, the staff has shared information with regulators in the United Kingdom and France and conducted site visits to operating reprocessing facilities. Additional interactions are planned in the next several months, including discussions at the June 2009 Fuel Cycle Information Exchange Conference. To the extent practical, the NRC will continue to seek regulatory insights, consider lessons learned internationally, and share technical information that will help develop an appropriate regulatory framework for commercial reprocessing and promote safety. Currently these interactions are conducted under our bilateral information sharing agreements. As we continue to progress in our framework development, we may consider whether other models for multinational interactions, such as the Multinational Design Evaluation Programs, would be more effective or efficient.

**Question 14:** I have never heard so much spin in my life. Why not just admit that the new administration has essentially given up on moving forward in solving nuclear fuel cycle issues!!

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**Session Number:** W10

**Session Day and Time:** Wednesday, 12:30 p.m. - 2:00 p.m.

**Session Title:** Nuclear Power Plant/Electric Grid Regulatory Coordination and Cooperation

**Session Chair:** Patrick Hiland, NRC/NRR

**Session Coordinators:** Kerby Scales, NRC/NRR, tel: (301) 415-1369, E-mail:

[Kerby.Scales@nrc.gov](mailto:Kerby.Scales@nrc.gov)

Kenn Miller, NRC/NRR, tel: (301) 415-3152, E-mail: [Kenneth.Miller2@nrc.gov](mailto:Kenneth.Miller2@nrc.gov)

**Question 1:** There has been much confusion regarding how 'Off-Site' power requirements are dealt with in the new 'passive safety' designs. Where does this stand?

**Answer 1:** Although passive designs depend heavily on dc systems for accident mitigation, the offsite power system in passive designs must also satisfy the requirements of GDC 17 with respect to its capability and capacity. The AP1000 design did get a partial exemption from GDC 17 (one offsite circuit versus two) but the ESBWR design fully meets it. In addition, NERC Standard NUC-001 also applies to the Nuclear Power Plant/Electric Grid interface for both new and existing nuclear power plants. NERC is the Electric Reliability Organization (ERO) under FERC (Federal Energy Regulatory Commission) as the regulatory authorities of the North American Electric Grid.

**Question 2:** A regional reliability council (RRC) has requested that we change a reactor protection mg-set under-frequency trip setpoint to a value that is less conservative than the tech spec limit and General Electric analyses assumption. The RRC doesn't appear to be too compassionate about the cost-effort involved. Could NRC and NERC/RCC enter into a dialogue concerning competing requirements (reactor protection vs reliability)?

**Answer 2:** Nuclear Power Plant design must always satisfy NRC regulations to ensure nuclear safety with sufficient design margin to ensure adequate maintainability of said design basis. When there is sufficient design margin, setpoint changes and other engineering changes could be acceptable in the interest of grid reliability, especially since offsite power is the preferred source for engineered safety features of a nuclear power plant. In addition, Requirement R9.3.7.

NERC standard NUC-001 requires coordination of the Nuclear Plant Interface Requirements with transmission system Special Protection Systems and underfrequency and undervoltage load shedding programs. Further, NERC standard PRC-008 requires Transmission Owners and Distribution Providers to have UFLS programs that provide last resort system preservation measures by implementing an Under Frequency Load Shedding (UFLS) program. It is important that the underfrequency setpoints within generating plants are well coordinated with system underfrequency load shedding program. NRC and NERC staffs have and will continue to discuss this issue going forward.

**Question 3:** Is there any credibility to the “smart grid” concept to be implemented soon? What studies will be needed to evaluate its impact on loss of power to commercial nuclear power plants or current PRA studies?

**Answer 3:** Smart Grid in some form will certainly be implemented over time however continued compliance with grid reliability and stability requirements will be required. NERC is preparing comments in response to the FERC’s March 19, 2009 *Smart Grid Policy, Proposed Policy Statement and Action Order*.<sup>1</sup> In general, NERC believes that its views with respect to the development of the Smart Grid are particularly important because, in order to maintain bulk power system reliability, infrastructure protection, planning, and operations will need to evolve with the development of a Smart Grid. While a Smart Grid can support bulk power system reliability maintenance, new models and tools will be required to design the bulk power system and operate it reliably. Though not insurmountable, these changes must be studied and technologies developed to ensure that the resulting system achieves greater levels of security and remains reliable. In the end, the impact on offsite power reliability to nuclear power plants should not be affected.

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**Session Number:** W11

**Session Day and Time:** Wednesday, 12:30 p.m. – 2:00 p.m.

**Session Title:** Nuclear Security - Integrated Response

**Session Chair:** Patricia Holahan, NRC/NSIR

**Session Coordinators:** Paul Kelley, NRC/NSIR, tel: (301) 415-6101, E-mail:

[Paul.Kelley@nrc.gov](mailto:Paul.Kelley@nrc.gov)

Patrick Coughlin, NRC/NSIR, tel: (301) 415-4147, E-mail: [Patrick.Coughlin@nrc.gov](mailto:Patrick.Coughlin@nrc.gov)

All questions were answered during the session.

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**Session Number:** W12

**Session Day and Time:** Wednesday, 12:30 p.m. – 2:00 p.m.

**Session Title:** Regulating Applications of International Operating Experience

**Session Chair:** Michael Cullingford, NRC/NRR

**Session Coordinator:** Michael Cullingford, NRC/NRR, tel: (301) 415-1276, E-mail:

[Michael.Cullingford@nrc.gov](mailto:Michael.Cullingford@nrc.gov)

All questions were answered during the session.

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<sup>1</sup> *Smart Grid Policy Proposed Policy Statement and Action Plan*, issued March 19, 2009, Docket No. PL09-4-000, 126 FERC ¶ 61,253 (2009).

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**Session Number:** W13

**Session Day and Time:** Wednesday, 2:15 p.m. – 3:45 p.m.

**Session Title:** Digital Instrumentation and Control Licensing for Power Reactors

**Session Chair:** William Kemper, NRC/NRR

**Session Coordinators:** Kerby Scales, NRC/NRR, tel: (301) 415-1369, E-mail:

[Kerby.Scales@nrc.gov](mailto:Kerby.Scales@nrc.gov)

Samir Darbali, NRC/NRR, Tel: (301) 415-1360, E-mail: [Samir.Darbali@nrc.gov](mailto:Samir.Darbali@nrc.gov)

**Question 1:** How will NRC's continued research affect NRC results on systems the NRC have presently reviewed and approved or about to approve for Oconee, particularly manual action within two minutes of loss of auto ESF actuation?

**Answer 1:** Licensees perform D3 analysis to identify the need for diversity in order to address potential CCFs that could result in an event that exceeds the acceptance criteria of SECY 93-087. Diversity is needed only for those events that exceed those limits. ISG-2 and ISG-5 also address when manual operator actions are to be credited. For issues that require backfitting, a Backfit analysis will be performed to assure the benefit resulting from the backfit is justified by the cost of performing the backfit, per NRC regulations.

**Question 2:** Does the NRC have data of total failure of an RPS/ESF failure during an event or during testing?

**Answer 2:** While a total failure of a Reactor Protection System (RPS) or an Engineered Safety Features Actuation System (ESFAS) has not been observed in currently operating systems, a load sequencer failure and potential common cause failures of Rosemont pressure transducers have been observed. Operating experience in nuclear power plants is collected and evaluated by the U.S. nuclear power industry in an ongoing continuous improvement program. To date, no common cause failures of RPS or ESFAS have been identified.

**Question 3:** The Commission issued an SRM in 1993 identifying acceptance criteria for digital systems. What has changed since then that has given rise to the need for additional research?

**Answer 3:** The "acceptance criteria" in the Staff Requirements Memorandum (SRM) for SECY 93-087 identify the need for diversity, but not what constitutes adequate diversity. This has resulted in licensing uncertainty related to digital safety system upgrade license amendments submitted to the staff. Interim staff guidance (ISG #2, Diversity, and Defense-in-Depth, has developed guidance to the staff (and industry) to clarify the staff's expectations for a diverse digital safety system. Additional research has been initiated to provide further clarification in terms of what constitutes adequate diversity in digital safety system designs.

**Question 4:** The NRC Office of Research has a 5 year Research Plan that has been in place for at least 15 years. What specific results have been obtained that has affected the criteria established by the commission SRM of 1993?

**Answer 4:** The Office of Nuclear Regulatory Research develops regulatory guidance in many areas of nuclear safety, including materials, seismic, thermal-hydraulics, and instrumentation and controls. These plans are updated every five years to address new issues and to carry

forward work on existing issues. The Digital System Research Plan, for example, has been addressing incorporation of digital systems in probabilities risk analyses for several years. Other areas of research include developing guidance on diversity and defense-in-depth, software dependability (ongoing), Software reliability via metrics (nearing completion), environmental guidance (EMI, etc), and field programmable gate array (FPGA) use in safety systems. The purpose of this research is not to change the general criteria discussed in SECY 93-087, but to better amplify the criteria. For example, in the area of diversity and defense-in-depth, the SRM for SECY 93-087 identified a process to be followed for addressing common mode failures in digital system implementations. This process resulted in the development of research to develop objective acceptance criteria for digital safety system diverse implementations. The objective acceptance criteria proposed by the results of the diversity research project will be incorporated into NRC licensing processes.

**Question 5:** Were there any “software failures” of significant safety implication in nuclear or non-nuclear applications?

**Answer 5:** Some software failures that have been reported by the industry through its 10CFR Part 21 notification process, which includes; a microprocessor priority baton passing error that caused potential common cause failure issues when used in a specific system architecture; a self-testing feature in a load sequencer system that, in special circumstances, could have delayed startup of emergency core cooling systems; and a potential common cause failure in a core protection calculator system design. Software-related failures in non-nuclear applications in aviation, aerospace applications, telephone switching systems, and other industries have also been identified and are documented in the public domain on the internet.

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**Session Number:** W14

**Session Day and Time:** Wednesday, 2:15 p.m. – 3:45 p.m.

**Session Title:** International Activities on New Reactors - New Regulatory Programs

**Session Chairs:** Gary Holahan, NRC/NRO, and Margaret Doane, NRC/OIP

**Session Coordinators:** Donna Williams, NRC/NRO, tel: (301) 415-1322, E-mail:

[Donna.Williams@nrc.gov](mailto:Donna.Williams@nrc.gov)

Kirk Foggie, NRC/OIP, tel: (301) 415-2238, E-mail: [Kirk.Foggie@nrc.gov](mailto:Kirk.Foggie@nrc.gov)

For questions and answers from the RIC as well as additional information on this topic, please contact the Session Coordinators listed above.

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**Session Number:** W15

**Session Day and Time:** Wednesday, 2:15 p.m. – 3:45 p.m.

**Session Title:** Lessons Learned in Implementing the NRC’s New Adjudicatory Hearing Procedures

**Session Chair:** Alex Karlin, NRC/ASLBP

**Session Coordinator:** SherVerne Cloyd, NRC/ASLBP, tel: (301) 415-6504

All questions were answered during the session.

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**Session Number:** W16

**Session Day and Time:** Wednesday, 2:15 p.m. – 3:45 p.m.  
**Session Title:** New Developments in Seismic Hazard Assessment  
**Session Chair:** Rosemary Hogan, NRC/RES  
**Session Coordinator:** Richard Rivera-Lugo, NRC/RES, tel: (301) 251-7652, E-mail:  
[Richard.Rivera-Lugo@nrc.gov](mailto:Richard.Rivera-Lugo@nrc.gov)

All questions were answered during the session.

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**Session Number:** W17  
**Session Day and Time:** Wednesday, 2:15 p.m. – 3:45 p.m.  
**Session Title:** Nuclear Security - Rulemaking, New Reactor, and Cyber Security Updates  
**Session Chair:** Richard Correia, NRC/NSIR  
**Session Coordinators:** Paul Kelley, NRC/NSIR, tel: (301) 415-6101, E-mail:  
[Paul.Kelley@nrc.gov](mailto:Paul.Kelley@nrc.gov)  
Gerard Jackson, NRC/NSIR, tel: (301) 415-7644, E-mail: [Gerard.Jackson@nrc.gov](mailto:Gerard.Jackson@nrc.gov)

All questions were answered during the session.

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**Session Number:** W18  
**Session Day and Time:** Wednesday, 2:15 p.m. - 3:45 p.m.  
**Session Title:** Regional Session – A Dialogue to Raise Awareness of Operating Nuclear Power Plant Issues  
**Session Chair:** Elmo Collins, NRC/RIV  
**Session Coordinator:** Geoffrey Miller, NRC/RIV, tel: (817) 860-8144, E-Mail:  
[Geoffrey.Miller@nrc.gov](mailto:Geoffrey.Miller@nrc.gov)

**Question 1:** I recognize that Part 26 has been coming for a while, but the increased staffing requirements in conjunction with increased attrition create a perfect storm. Is staff open to relaxing implementation timing?

**Answer 1:** Individual licensees, on a case-by-case basis, may request an exemption, including an exemption to allow more time to hire and train the staff necessary to fully implement the revised fatigue management requirements. Such a request must provide adequate justification. Please refer to ADAMS Accession No. ML090340305 for additional information concerning a recent request for NRC enforcement discretion for implementation of Subpart I to Part 26.

**Question 2:** With recent emphasis on individual's FFD, could one integrate Part 26 Fitness under the umbrella of a SCWE at a facility?

**Answer 2:** Yes, raising an FFD concern is considered a safety concern under SCWE. Please refer to NRC Regulatory Issue Summary (RIS) 2002-07, "Clarification of NRC Requirements Applicable to Worker Fatigue and Self-Declarations of Fitness-for-Duty," for additional information. RIS 2002-07 states:

Section 50.7 prohibits discrimination by a licensee, or a licensee contractor or subcontractor, against an employee for engaging in protected activities. Protected activities include refusing to engage in any practice made unlawful under Section 211 of the Energy Reorganization Act, as amended, and in general are related to the

administration or enforcement of a requirement imposed under the Atomic Energy Act or the Energy Reorganization Act. It is the NRC's view that an individual's assertion that he or she is not fit for duty or an individual's refusal to work are protected activities when there is a good faith effort to comply with Part 26, and when such actions are based upon a reasonable concern regarding one's fitness for duty.

**Question 3:** Are there plans to have "centralized" verification and validation of software programs used [for] plan, schedule and manage work hours?

**Answer 3:** There is no plan for the NRC to implement a program to validate various work hour software programs. An individual plant inspection may result in the review of the licensee's software program at that time.

**Question 4:** Have all the regions reached a consensus for consistent administration of cross-cutting issues, especially a documented process for licensees to follow in closing substantive cross-cutting issues?

**Answer 4:** NRC formed a task group to review the administration of cross-cutting issues between the regions. The group concluded that cross-cutting issues were generally administered consistently across the regions, though some minor issues and inconsistencies were identified. The inconsistencies were discussed and understood between the regions, and some changes have been made to address this issue, including the issuance of a revision to Inspection Manual Chapter 0305 (available at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/manual-chapter/index.html>) which added more guidance on information to be included in assessment letters regarding criteria for closure of substantive cross-cutting issues.

**Question 5:** Knowledge transfer challenges - magnified by budget pressures and possibly current administration lack of outward enthusiasm for nuclear power. Do you see need for us to increase our effort to capture our "grey beards" wisdom?

**Answer 5:** Absolutely. NRC established its knowledge management program in 2005 and has steadily worked towards creating a user friendly system for capturing the lessons learned and best practices from agency subject matter experts. We have had a number of efforts to capture this information from employees both in HQ and in the Regions. For example, the NRC recently held an event commemorating the 30th anniversary of the accident at Three Mile Island. That event and video interviews from other current and former agency experts have been added to our agency document management system and made available to NRC staff through our on-line NRC Knowledge Center.

While the Continuing Resolution did constrain some of our training efforts, those constraints have since been lifted. Moreover, we don't see any visible impact from the new administration versus the last administration that would impact on our knowledge transfer efforts, NRC staffing, or current industry interest in new nuclear power.

Going forward, the agency will continue to evaluate the need for additional knowledge transfer efforts above and beyond those currently ongoing across the agency. However, the recent economic setback has prompted a number of our senior staff to delay their retirement, permitting more time for these staff to transfer knowledge to our newer employees in their areas of subject matter expertise.

As for the industry, knowledge management will be very important given the aging demographics at most of our licensees. The majority of our reactor licensees now have 20 year life extensions, and thus need to consider staffing out far beyond what was originally planned. Moreover, new reactor design, construction and operation will also require considerable new and experienced staff.

**Question 6:** (a) To what extent do you expect NRC OI to handle allegations, instead of forwarding them to licensees? (b) Do you expect additional NRC in-house investigations to significantly affect resources and extend time to close out investigations? (c) How do you view non-nuclear safety allegations by contractors (e.g., personnel issues) with respect to SCWE?

**Answer 6:** (a) The NRC Office of Investigations will investigate those allegations received by the NRC that involve potential deliberate misconduct or wrongdoing; the NRC does not forward any such concerns to licensees (b) While the time to close out investigations is dependent on investigator workload, the NRC does not anticipate an increase in NRC investigations in the near future. (c) The NRC encourages the facilities it licenses to establish a work environment in which employees are encouraged and feel free to raise safety concerns without fear of retaliation. By definition, concerns that are not related to nuclear safety are not considered allegations by the NRC. Concerns outside the NRC's jurisdiction will be transferred to the appropriate Federal or State agency or communicated to the licensee for their action, as appropriate.

**Question 7:** With the changes in Design Reviews - basically doing design reviews in ITAAC, how are regional inspectors being prepared to perform inspections of design?

**Answer 7:** The reactor designs are evaluated by Headquarters licensing personnel located in Rockville, MD. The field personnel will participate as team members on Engineering Design Verification inspections which will be inspecting design elements to ensure the approved design is accurately translated to field construction. Additionally, it is anticipated that during construction, if a field change has the potential to impact the approved design, the field inspectors will interact with the NRO reviewers to confirm the changes are addressed within the allowed change processes.

**Question 8:** Should the force-on-force inspection program include testing beyond the Design Basis Threat?

**Answer 8:** Force-on-force exercises provide a realistic evaluation of the proficiency of licensee security forces against a threat consistent with the design basis threat (DBT). The purpose of these exercises is to identify deficiencies in either the protective strategy, the licensee's security plan, or in its implementation that need correcting. Any such deficiencies are promptly reviewed and properly addressed. The DBT characterizes the adversary against which plant owners must design physical protection systems and response strategies. Scenarios developed from these adversary characteristics by NRC staff are realistic, challenging, and representative of an enhanced threat consistent with the Commission's February 25, 2002, Order to power reactor licensees and the April 29, 2004, Orders for Training and Qualification and the revised DBT. The NRC periodically assesses the adequacy of the DBT and makes revisions as necessary.

**Question 9:** How is safety culture addressed in the dialogue on roles and responsibilities during construction?

**Answer 9:** The evaluation of Safety Culture during the construction lifecycle is currently under development. The developmental work will use lessons learned from the reactor oversight program, where appropriate, and is being developed through an ongoing interaction with new construction stakeholders during regularly scheduled public meetings where we actively solicit input and feedback. As we continue, our development of safety culture for new construction we will continue to take advantage of this interactive forum on the subject. Our preliminary thoughts are that Safety Culture issues in the construction inspection program will be called "construction safety focus issues (CSFI)" and we are reviewing the ROP framework and its current revisions for application to new construction. However, the attributes will be more reflective of a construction work environment rather than an operating reactor oversight program. The NRC and affected stakeholders are in agreement that safety culture is important during new reactor construction but the specific roles and responsibilities are still being developed and will be informed by the ongoing agency wide and industry efforts in this area. The NRC safety culture link is: <http://www.nrc.gov/about-nrc/regulatory/enforcement/safety-culture.html>

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**Session Number:** W19

**Session Day and Time:** Wednesday, 2:15 p.m. - 3:35 p.m.

**Session Title:** Rulemaking Process - NRC and Industry Perspectives on Improving Quality, Timeliness, and Consistency in Title 10 of the Code of Federal Regulations 50.55a Codes and Standards

**Session Chair:** Timothy McGinty, NRC/NRR

**Session Coordinator:** Mark Padovan, NRC/NRR, tel: (301) 415-1423, E-mail:

[Mark.Padovan@nrc.gov](mailto:Mark.Padovan@nrc.gov)

All questions were answered during the session.

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**Session Number:** W20

**Session Day and Time:** Wednesday, 4:00 p.m. – 5:30 p.m.

**Session Title:** Construction Inspection Program

**Session Chairs:** Glenn Tracy, NRC/NRO, and Loren Plisco, NRC/RII

**Session Coordinator:** Roger Rihm, NRC/NRO, tel: (301) 415-7807, E-mail:

[Roger.Rihm@nrc.gov](mailto:Roger.Rihm@nrc.gov)

**Question 1:** Can you [Shaw] please provide an update on the status of detailed AP1000 design? Are you designing as you are building?

**Answer 1:** Shaw and Westinghouse continue to work towards completion of the design of the AP1000. Design completion is within 1% of planned progress. Completion of the Domestic AP 1000 design will be well in advance of the placement of first nuclear concrete.

**Question 2:** Has Shaw investigated the use of the Galaxy software with respect to the domestic AP1000 construction process? If not, what do you plan to use to maintain ITAAC records?

**Answer 2:** The AP1000 Shaw/Westinghouse Consortium plan is to use a customized tool which will list and provide links for all ITAAC documents for all phases of ITAAC planning, performance, and documentation.

**Question 3:** Will Shaw direct hire construction or use subcontractors, and what are your plans for union or merit shop labor?

**Answer 3:** Shaw will direct hire and self perform work to the extent practical based on our areas of expertise. There will be various scopes of work that will be subcontracted to interested and qualified contractors regardless of union or merit shop approaches.

**Question 4:** Can the current construction workforce adapt to necessary training for new technologies and modularization? Is there a [Shaw] plan to accommodate this?

**Answer 4:** The current construction workforce is capable of adapting to the requirements to perform the AP1000 scope of work, including training. Shaw is actively developing training programs in concert with industry resources; Shaw's training departments; and local training providers to develop robust training programs. We feel confident that not only will the workforce adapt to the training but actively apply the training to support the AP1000 technology and modularization programs.

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**Session Number:** W21

**Session Day and Time:** Wednesday, 4:00 p.m. – 5:30 p.m.

**Session Title:** International Activities and Cooperation

**Session Chair:** Brian Sheron, NRC/RES

**Session Coordinator:** Donna-Marie Perez, NRC/RES, tel: (301) 251-7673, E-mail: [Donna-Marie.Perez@nrc.gov](mailto:Donna-Marie.Perez@nrc.gov)

All questions were answered during the session.

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**Session Number:** W22

**Session Day and Time:** Wednesday, 4:00 p.m. – 5:30 p.m.

**Session Title:** Licensing Process Initiatives

**Session Chair:** Joseph Giitter, NRC/NRR

**Session Coordinator:** John Hughey, NRC/NRR, tel: (301) 415-3204, E-mail: [John.Hughey@nrc.gov](mailto:John.Hughey@nrc.gov)

All questions were answered during the session.

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**Session Number:** W23

**Session Day and Time:** Wednesday, 4:00 p.m. - 5:30 p.m.

**Session Title:** NRC/Industry Response to Security Inattentiveness Concerns

**Session Chair:** Cynthia Carpenter, NRC/OE

**Session Coordinator:** David Vito, NRC/OE, tel: (301) 415-2319, E-mail: [David.Vito@nrc.gov](mailto:David.Vito@nrc.gov)

**Question 1:** Is this the first time U.S. Nuclear Regulatory Commission (NRC) has addressed the security officer inattentiveness issue? If not, when was it addressed previously?

**Answer 1:** In 1991, the NRC issued Generic Letter (GL) 91-03, "Reporting of Safeguards Events," informing licensees of reportable security events. This GL mentioned security officer inattentiveness, but only in the context of reporting requirements. After becoming aware of inattentive security officers at the Peach Bottom Atomic Power Station in September 2007, the NRC issued a Security Advisory (SA) 2007-06 to NRC licensees to emphasize the importance of security officer attentiveness. In December 2007, the NRC issued Security Bulletin 2007-01, "Security Officer Attentiveness," to the same licensees in order to gather information on administrative and management controls and any other actions taken to address inattentiveness. The latter two generic communications specifically addressed security officer inattentiveness.

In addition to the above generic communications, the NRC addresses the issue of inattentiveness on a continuous basis through inspection and its annual assessment of licensee performance. Specifically, the NRC inspects licensee security programs and procedures to identify findings associated with security officer inattentiveness and takes enforcement actions when appropriate to ensure compliance with the Commission's regulations. Furthermore, the NRC continues to enhance its inspection program to help ensure that NRC-licensed facilities remain effectively protected by the licensee's onsite security officers. NRC resident inspectors have increased their awareness in the area of physical security and have been provided training to be more sensitive to security issues and more involved in security inspections at the site.

**Question 2:** Why does the inattentiveness issue focus only on security officers? Who is looking at other sections of the plant?

**Question 3:** The speakers all focused on security guards, but can't there be a broader lesson for all workers? Are efforts to address inattentiveness being applied to all workers, not just security?

**Answers 2 and 3:** The NRC has addressed the attentiveness of other site personnel historically through NRC generic communications and recently through the amendment to Title 10 of the *Code of Federal Regulations*, Part 26 (10 CFR 26), "Fitness for Duty Programs." In 1982, the NRC issued Generic Letter (GL) 82-02, "Nuclear Power Plant Staff Working Hours," which described factors that may lead to the fatigue of operating personnel working at commercial power reactors. Later in 1982, the NRC issued GL 82-12, "Nuclear Power Plant Staff Working Hours," to amplify the statements in GL 82-02 related to factors causing fatigue of operating personnel at nuclear reactors. In 1987, the NRC issued Information Notice (IN) 87-21 to inform all nuclear power reactor facilities about certain licensed operators observed to be apparently sleeping while on duty at the Peach Bottom Atomic Power Station. As a result of the Peach Bottom sleeping operator's issue, in 1989, the NRC issued a Commission policy statement (Federal Register 54 FR 3424) to make clear the Commission's expectations of utility management and licensed operators with respect to the conduct of operations. The policy statement indicated the need to establish policies to ensure correct operating practices, recognizing that not only are the practices important, but the nature of the work environment within which they are implemented. In 1991, the NRC issued IN 91-36, which again alerted NRC licensees of potential problems resulting from inadequate controls to prevent excessive plant staff working hours. In 2002, the NRC issued Regulatory Issue Summary (RIS) 2002-07, "Clarification of NRC Requirements Applicable to Worker Fatigue and Self-Declarations of

Fitness-for-Duty” to highlight concerns about worker self-declarations of fitness-for-duty (FFD) and to clarify the applicable regulatory requirements.

The recent amendment to 10 CFR 26, in part, established clear and enforceable requirements for the management of worker fatigue by establishing limitations on work hours and time off between work periods. The amended 10 CFR 26 applies to all personnel onsite who have unescorted access and perform safety- and security-related activities. Furthermore, this amendment considered and codified, as necessary, key aspects of GL 82-02 and GL 82-12 related to factors causing fatigue of operating personnel at nuclear reactors. The amended 10 CFR 26 also includes the requirement that plant workers self report if they are in a fatigued state and believe they cannot safely carry out their assigned tasks. Finally, NRC site resident inspectors perform plant tours that include observing the attentiveness of licensee personnel during weekdays, backshifts, and weekends.

**Question 4:** After this event, some licensee's have implemented policies to stop other (non-security) workers from relaxation or short rest opportunities during their unpaid (lunch) break periods. NRC has been cited as the reason for the change. Is this true or false?

**Answer 4:** The Commission’s regulations described in 10 CFR 26, Subpart I, “Managing Fatigue,” establish controls on the work hours of select individuals who are subject to a licensee’s fitness-for-duty program. These regulations enable licensees to establish programs that facilitate restorative sleep (i.e., strategic napping), and thereby permit the exclusion of within-shift breaks and rest periods from work hour calculations if the individual has both a reasonable opportunity and accommodations for restorative sleep. Licensee procedures for restorative sleep are to provide assurance that a person undergoing restorative sleep is able to be awoken and effectively respond, if necessary, to emergency announcements or security communications. Since restorative sleep generally involves a minimum of 30 minutes of sleep on a sleeping surface (e.g., a bed or recliner) in a darkened and quiet room, some licensees may not allow personnel to informally “nap” onsite, even on unpaid break periods, because such an activity is inconsistent with the concept of restorative sleep.

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**Session Number:** W24

**Session Day and Time:** Wednesday, 4:00 p.m. - 5:30 p.m.

**Session Title:** State of the Art Reactor Consequence Analysis

**Session Chair:** Charles Tinkler, NRC/RES

**Session Coordinator:** Andrew Nosek, NRC/RES, tel: (301) 251-7476, E-mail:

[Andrew.Nosek@nrc.gov](mailto:Andrew.Nosek@nrc.gov)

For questions and answers from the RIC as well as additional information on this topic, please visit the State-of-the-Art Reactor Consequence Analysis (SOARCA) website at:

<http://www.nrc.gov/about-nrc/regulatory/research/soar.html>

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**Session Number:** W25

**Session Day and Time:** Wednesday, 4:00 p.m. - 5:30 p.m.

**Session Title:** Subsurface Environmental Characterization, Modeling, Monitoring, and Remediation

**Session Chair:** Thomas Nicholson, NRC/RES

**Session Coordinator:** George Powers, NRC/RES, tel: (301) 251-7449, E-mail: [George.Powers@nrc.gov](mailto:George.Powers@nrc.gov)

**Question 1:** What are the recommended computer codes for use by EPA to analyze the combined speciation and contaminant transport? Have you (EPA) benchmarked those codes or models?

**Answer 1:** EPA does not make recommendations on the use of specific computer codes. EPA does provide information on suggested model sources which are provided in EPA reports; EPA/600/R-02/082 and EPA/600/R-07/139.

The documentation enumerated below provides technical information on existing recommendations for appropriate use and selection of models for contaminant transport through unsaturated and saturated zones in the subsurface. It is assumed that the phrase “combined speciation and contaminant transport” in the question refers to use of a reactive transport model. It is also assumed that “benchmarked” as used in the question, refers to the process of comparing model results to an analytic solution or field study that involves calibrating and validating model performance. This activity is typically applied on a site-specific basis where characterization data have been acquired to assess the hydrogeologic and geochemical characteristics of the subsurface.

Selection and implementation of a model in the absence of these data should be viewed with uncertainty without the determination that the model is constructed to mathematically represent the hydrologic and chemical reaction processes active at a given site. For sites subject to investigations supporting remediation, the use of contaminant transport models is treated in a fashion similar to chemical analytical methods, in that a performance demonstration is undertaken with stakeholder evaluation and concurrence. A specific example for benchmarking the general analytical capabilities of a model is illustrated in a publicly-accessible document available at the following URL address:

<http://ar.inel.gov/images/pdf/200701/2007012600125TUA.pdf>

In general, the performance demonstration and application of a model(s) at a given site are facilitated through use of open-source codes that allow use and testing by all stakeholders. It should be noted that the referenced benchmarking demonstration was limited only to a general assessment of the analytical capabilities of the proprietary model, not to the accuracy of the tested model to simulate measured, site-specific conditions.

- 1) <http://www.epa.gov/radiation/cleanup/pubs.html> (Please see document list under “Use and Selection of Models”)
- 2) EPA/540/R-95/128 July 1996  
(Part 3: Models for Detailed Assessment)  
<http://www.epa.gov/superfund/health/conmedia/soil/toc.htm>
- 3) Estimation of Infiltration Rate in the Vadose Zone: Compilation of Simple Mathematical Models (Volume I)  
EPA/600/R-97/128a February 1998  
<http://www.epa.gov/ada/download/reports/infiltvo1.pdf>

- 4) Estimation of Infiltration Rate in the Vadose Zone: Application of Selected Mathematical Models (Volume II)  
EPA/600/R-97/128b February 1998  
<http://www.epa.gov/ada/download/reports/infiltvo2.pdf>
- 5) Simulating Radionuclide Fate and Transport in the Unsaturated Zone: Evaluation and Sensitivity Analyses of Select Computer Models  
EPA/600/R-02/082 July 2002  
<http://www.epa.gov/ada/download/reports/600R02082/600R02082-full.pdf>
- 6) Monitored Natural Attenuation of Inorganic Contaminants in Ground Water  
Volume 1 - Technical Basis for Assessment  
EPA/600/R-07/139 October 2007  
(Section ID. Role of Modeling in the Tiered Analysis Approach)  
<http://www.epa.gov/ada/download/reports/600R07139/600R07139.pdf>

**Question 2:** What is EPA doing to improve performance assessment modeling, especially with regard to cementitious barrier materials?

EPA does not conduct performance assessments of “cementitious barriers” or their materials. The responder is not aware of any specific applications of this technology for ground-water remediation at CERCLA or RCRA sites, or the use of models to assess “cementitious barrier” performance.

However, EPA has done significant research and has documented information on the performance of permeable reactive barriers in the subsurface to sequester contaminants transported in ground water. The following document provides a technical evaluation of the performance of permeable reactive barriers constructed using zero-valent iron:

EPA/600/R-03/045a August 2003  
Capstone Report on the Application, Monitoring, and Performance of Permeable Reactive Barriers for Ground-Water Remediation: Volume 1 - Performance Evaluations at Two Sites  
<http://www.epa.gov/ada/download/reports/600R03045A/600R03045a-full.pdf>

As indicated in the referenced document, the primary line of evidence to support the performance assessment is the acquisition of subsurface monitoring data. Modeling performance of a permeable reactive barrier is predicated on knowledge of the system hydrologic and chemical characteristics *following* placement in the subsurface. Since the physicochemical conditions that develop within the barrier will be governed by the method of material placement and the site-specific dynamics of fluid flow and chemistry in the subsurface installation, the reliability of model projections will depend on verification of the model capability to simulate measured, site-specific conditions during barrier operation.

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**Session Number:** W26

**Session Day and Time:** Wednesday, 4:00 p.m. - 5:30 p.m.

**Session Title:** Technical Specifications Workshop Overview - Reducing Regulatory Uncertainty

**Session Chair:** Robert Elliott, NRC/NRR

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**Session Coordinator:** Abraham Marrero, NRC/NRR, tel: (301) 415-8531, E-mail: [Abraham.Marrero@nrc.gov](mailto:Abraham.Marrero@nrc.gov)

All questions were answered during the session.

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**Session Number:** TH27

**Session Day and Time:** Thursday, 8:30 a.m. - 10:00 a.m.

**Session Title:** Fire Safety - Transitioning to Section 50.48(c) of Title 10 of the Code of Federal Regulations (10 CFR 50.48(c))

**Session Chair:** Sunil Weerakkody, NRC/NRR

**Session Coordinator:** Donald Chung, NRC/NRR, tel: (301) 415-1181, E-mail: [Donald.Chung@nrc.gov](mailto:Donald.Chung@nrc.gov)

**Question 1:** What level of confidence does NRC offer for exempting operating plants from aircraft impact hazard analysis for fire and explosion given enforcement discretion and risk analysis that dismisses or diminishes transient combustibles?

**Answer 1:** NRC is confident that its fire protection regulations on operating plants, in combination with requirements related to nuclear security is sufficient to provide adequate protection for the public. The risk analyses that are performed do consider the impact of transient combustibles.

**Question 2:** Commissioner Jaczko said NFPA-805 should be required for new plants. If new plants meet regulatory requirements and guidance for separation, why would it be a good idea to adopt NFPA 805? Even if it were a good idea, isn't it more appropriate to adopt it after a plant becomes operational?

**Answer 2:** The safety benefits that can be gleaned from transitioning to NFPA 805 is less for plants which meet regulatory requirements for separation compared to those that do not.

The deterministic fire regulations that are in place today is sufficient to maintain fire safety at plants. NFPA 805 and the associated risk analyses inform the licensee and the regulator about the risks associated with fire and enables the licensees to operate the plant in a risk-informed manner. In some cases, depending upon the specific features of the plant, NFPA 805 enables licensees to reduce risks attributed to areas with relatively high risks.

**Question 3:** The new design basis threat (DBT) rule presently separates large fire and explosions from the rule. Energy policy Act 2005 called for 12 factor included #9, fires (insider initiated) large explosion. Do 805 do any thing in risk analysis to consider this?

**Answer 3:** No. The NRC relies on the security regulatory requirements to analyze and provide adequate protection from such events.

**Question 4:** Can Fire Protection Branch make greater use of video conferencing or achieve better audio conferencing? Too much time is spent flying back and forth to Washington. The manpower cost is enormous to the industry.

**Answer 4:** We agree video and audio conferencing are options that may reduce cost. However, the advance video conferencing technology that is necessary for a successful large group, multi-location conference is not available within the NRC at this time. The NRC's Fire Protection Branch is aware of the audio conferencing problems and will continue to try and provide the best equipment available for conference calls.

**Question 5:** What's the old/new regulatory positions for an associated circuit assumptions of coincidence failures before/after EPRI experiment results have contradicted the previous postulated faults mode (once at a time versus in series)? What's the NRC process with such a case?

**Question 5:** NRC recently issued an update to Regulatory Guide 1.189 (DG-1214) for public comment. That updated Regulatory Guide provides NRC positions and processes regarding the circuit issue resolution. (ADAMs Accession Number ([ML090070453](#))).

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**Session Number:** TH28

**Session Day and Time:** Thursday, 8:30 a.m. - 10:00 a.m.

**Session Title:** Insights and Topics from Siting Safety and Environmental Reviews

**Session Chairs:** Scott Flanders, NRC/NRO; and Nilesh Chokshi, NRC/NRO

**Session Coordinator:** Carolyn Lauren, NRC/NRO, tel: (301) 415-2736, E-mail:

[Carolyn.Lauren@nrc.gov](mailto:Carolyn.Lauren@nrc.gov)

**Question 1:** If the inland site is not near water (i.e., > 5 miles from a river or lake) and outside the 100 yard flood zone, does the Army Corps get involved?

**Answer 1: (McLaughlin)** A Department of the Army permit is required for the discharge of dredged or fill material in waters of the United States, including certain wetlands, and/or work in navigable waters of the US. If there will be no impacts to waters of the US, the Corps is not involved.

**Question 2:** Does the USACE foresee any issues with 404 permitting for expansion of existing reactor units? Do alternative sites have to be considered for an applicant proposing to expand existing reactor sites?

**Answer 2: (McLaughlin)** Generally for expansions, the Least Environmentally Damaging Practicable Alternative is to expand an existing site, particularly if the area is already disturbed. In the case of an expansion we would look more closely at onsite alternatives to avoid, minimize and mitigate.

**Question 3:** EPA has requirements under the Clean Water Act 316 (a) and (b). Most new facilities may have closed-cycle cooling but there may still be a requirement to meet 316 (a) and (b) guidelines. How does USACE interface with NRC and EPA for these NEPA requirements?

**Answer 3: (McLaughlin)** The only part of EPA regulations we implement is Section 404 of the Clean Water Act (CWA). NRC has the lead and coordinates with EPA for other CWA requirements. In addition, the Corps authorization does not obviate the need to obtain other local or state authorizations.

**Question 4:** Have the NRC siting reviews in the area of near site hazards been impacted at all by the Department of Homeland Security regulations concerning chemical security?

**Answer 4: (Hart)** Not yet, however the Energy Policy Act of 2005 requires Homeland Security to assess new reactor sites and consult with the NRC.

**Question 5:** What are the NRC plans to update Regulatory Guide 4.7 regarding site selection?

**Answer 5: (Hart)** Regulatory Guide 4.7, "General Site Suitability Criteria for Nuclear Power Stations" is being reviewed internally to make a determination whether or not to update the regulatory guide and if so, identify the resources and schedule.

**Question 6:** If the NRC's preferred alternative has wetlands impacts but is overall environmentally preferable, how would the Army Corps address another alternative with no impact to wetlands but overall far worse impacts to the environment, as compared to NRC's preferred alternative?

**Answer 6: (McLaughlin)** 40 CFR Part 230 Section 404(b)(1) Guidelines state: "Except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." The 404(b)(1) Guidelines are based on the rebuttable presumption that a less environmentally damaging practicable alternative exists for projects that are not water dependent. The applicant must demonstrate that there are no other practicable alternatives available. The 404(b)(1) LEDPA cannot result in egregious environmental impacts; i.e., human safety, impacts into ESA, etc., beyond aquatic impacts. This is one practical test. Rebuttable presumption. Project purpose guides alternative analysis.

**Question 7:** What is the scope of an Army Corps EIS – part of project requiring Army Corps' permit (e.g., water intake) or entire project (e.g., nuclear power plant)?

**Answer 7: (McLaughlin)** Corps cannot segment. Based on the Corps' NEPA implementing requirements, the Corps has to know the project purpose using a "but for" test. In other words, if the impacts to aquatic resources would not occur "but for" the construction of the nuclear reactor, the entire project area would be included in our scope of analysis and NEPA review. This was an issue that led to the development of the MOU.

**Question 8:** Please describe what areas and when the state would have jurisdiction instead of the Corps. What is the expected duration of the Corps' review?

**Answer 8: (McLaughlin)** Sections 404 and 10 are Corps only - not delegated in most cases – (NH and MI have assumed the 404 program but Section 10 of the Rivers and Harbors Act is a Corps-only statute). State requirements also must be obtained. Usually Corps coordinates there through permit reviews (i.e., water quality certification and coastal zone). The NRC EIS should cover these since NRC is the lead.

As a cooperating agency for NEPA, the Corps will work closely with the NRC to ensure that our concerns and areas of expertise are covered in the environmental review document. Ideally, this will result in a single EIS and a Corps Finding of No Significant Impact. However, if the EIS

prepared by the NRC does not consider the Corps' jurisdiction and impacts to aquatic resources, the Corps may be required to prepare its own EIS or supplemental EIS, thereby adding redundancy and significant time to the review process.

**Question 9:** I understand that the purpose and need statement shapes the Corps review. Does this statement need to come from the applicant or can the Corps craft one for their purposes in participating in the NRC EIS? The 404 permit application on most of these projects may not be submitted until after the Draft EIS is written.

**Answer 9: (McLaughlin)** Per Corps regulations, the Corps must establish the basic and overall project purpose and need. This determination is based upon the applicant's stated purpose and need. However, CEQ guidance/letter gives substantial deference to the lead agency. We ask that the project proponent work closely with the Corps and the NRC to develop the P&N.

**Question 10:** If USACE and NRC requirements do not quite mesh, like LEDPA and obviously superior requirements, is it not NRC as lead that must provide resolution and one requirement to applicants?

**Answer 10: (Flanders)** Applicants will have to satisfy NRC regulatory requirements as well as the USACE requirements. In doing so, part of the process for both agencies is to complete the NEPA process, and that is the portion on which we are cooperating. As part of the Memorandum of Understanding between the two agencies, and in further discussions, both agencies have discussed how to resolve difference of opinions on particular issues in order to issue a complete environmental impact statement. In order for an applicant to receive a permit from USACE, the USACE requirements have to be satisfied. In the USACE presentation, the decision making requirements, factors and permitting process includes consideration of LEDPA.

**Question 11:** Could you provide lessons learned of siting and new nuclear plants in the past 3 years. Lessons learned associated with the 4 ESPs or 17 COL applications; more specifically, 3 ESPs are complete, what were your lessons learned from these? What was successful that we should do again and not successful we should not do?

**Answer 11: (Flanders)** From the environmental perspective, the NRC has learned the need for early interactions. There has been a marked difference in some of the applications for which the staff has had early interactions especially through the three-phrase pre-application process. In all cases, there has been benefit on the part of the applicant in terms of the completeness of the application to satisfy the information needs. During the December 10, 2008, environmental meeting, there were a number of areas that the staff saw as a consistent challenge. One area is the alternative site analysis; i.e., the level of information needed for the review and the description of the process used in the analysis to determine the final set of sites for the evaluation and the environmental impact statement. The staff has seen a number of applications where the information had not been collected early and the impact on the schedule is attributed to the need to wait for that information or a need to provide an additional RAI to obtain that information.

In the siting area, the staff's presentation covered some of the insights and lessons learned as well as the need for early interactions.

**Question 12:** What are the agencies' expectations regarding access to alternate site visits? Some alternate sites are not owned by the applicant.

**Answer 12: (Flanders)** It is important to interface with the staff as it works through the NEPA process and prepares for the alternate site visits. Although the sites are not owned by the applicant, the staff has been able to gather information needed during the site visits.

**(McLaughlin)** One purpose of visiting the alternate sites is to evaluate the quality of an applicant's site selection process. The staff prefers to go onto the alternate sites for firsthand observation; however, site access is not absolutely necessary if reconnaissance level information is complete enough and of sufficient depth commensurate with the level of screening to support the decisions that were made in the site selection process.

To date, we've been able to gather the information we need as a part of our alternate site visits, even in those situations where the sites are not owned by the applicant. It's important to interface with our staff early as we prepare to do the alternate site visits.

**Question 13:** If PSEG or other company submits a COLA that: 1) refers to a completed ESP, 2) refers to completed DC, 3) incorporated standard content from completed COLs, how much faster than the first wave of COLAs would NRC complete a) the environmental review (EIS), and b) issue the COL?

**Answer 13: (Flanders)** It is difficult to put a specific number and amount of time that would be saved on an application for these scenarios. For the site-specific aspects of an application, these need to be reviewed when referencing a DC. An ESP addresses many site-specific aspects so it benefits in the overall time to complete the COL review process. It should be noted that this would depend of the particular circumstances of the submitted application.

**Question 14:** How does the NEPA alternatives analysis level of detail compare with the information provided in COLA ERs? Will NRC provide new guidance on alternative analysis for the NRC EIS?

**Answer 14: (Flanders)** There have been two fairly common issues with the depth of the alternatives analyses in applicants' ERs. The first has been a lack of a clear connection between the purpose and need statement and the alternatives analysis. The purpose and need statement must be consistent with the region of interest used for alternative sites and the set of feasible alternative energy sources that are analyzed in detail. The second issue is that frequently the ER does not provide a clear explanation of the site selection process used by the applicant, from defining the region of interest, to identifying candidate areas and potential sites, to narrowing the field to candidate sites, and finally, to selecting the proposed site. This guidance already exists in the Environmental Standard Review Plan (ESRP, NUREG-1555), Section 9.3, although there will be further improvements to this section in a draft revision expected to be issued for use and comment later this year.

**Question 15:** How could carbon cap and trade (or tax) legislation impact the NEPA EIS evaluation of alternatives for new reactors? Would carbon dioxide releases (or lack of) be considered an impact?

**Answer 15: (Flanders)** NRC evaluates alternatives to the proposed action, including alternative generating technologies. This review focuses on alternatives that can satisfy the

purpose and need identified for the action. If the need is for baseload electrical generation, the feasible alternatives commonly come down to coal and natural gas. Any legislation that would change the environmental impacts of these alternatives would be considered in the staff's evaluation. Cost would only become an issue if the staff determined that a feasible alternative is environmentally preferable to the proposed action.

**Question 16:** Does the NRC feel the ESP is beneficial to licensing a new plant? Is PPE viable as an ESP project? Does it not benefit a project that has long term vision with no technology selected?

**Answer 16: (Flanders)** If an applicant plans to submit a COL application in the near term, then the potential benefits of an ESP might be outweighed by the cost of two reviews and two hearings. In other situations (for example, where an applicant hasn't yet decided whether to apply for a COL), the staff believes that substantial benefits can be derived from an ESP. Primary benefits include early resolution of issues and a reduction in risk and uncertainty at the COL stage. The level of the benefit depends upon the approach taken in the ESP application and is affected by several factors, the most significant of which are: (1) the level of design detail that can be provided in the ESP; (2) the stability of decisions and bases used in the ESP; (3) and the time lapse between the ESP and the COL. So, for example, the use of a PPE with very little design detail means that the staff will have to determine whether various COL design characteristics fall within the ESP design parameters. Also, if key information (e.g., the need for new transmission lines) changes from the ESP to the COL, finality for associated impacts is adversely affected.

**Question 17:** Will the same siting requirements apply to smaller reactors? Is there potential for a simpler, shorter siting criterion for small reactors?

**Answer 17: (Flanders)** As part of the activities related to the Next Generation Nuclear Plant (NGNP) program and development of the advanced reactor program, the NRC staff is currently assessing regulations and guidance for possible changes to address small and medium-sized reactors. The NRC is engaged in pre-application discussions with several designers of small and medium-sized reactors. These interactions will be used to inform possible approaches for NRC reviews of plant design features as well as technical and policy issues associated with the siting of small and medium-sized reactors. Examples of siting issues include the possible co-location of small and medium-sized reactors with chemical, petroleum, or hydrogen production facilities, the construction of plants below ground, the inclusion of seismic isolators in some designs, and possible refinement of emergency planning requirements.

**Question 18:** To what extent does the review of ground water models consider the effects on flow of adjacent operating units? For example, construction begins with digging a large "sink" that can draw contaminated water "off-site". Such change of flow direction may impart validity of ports of REMP.

**Answer 18: (Hart)** Ground water models should account for impacts to existing flow directions due to construction. Typically, a construction excavation and site structure (e.g., power block, cooling tower, etc) installation removes a portion of the aquifer and the available source of recharge over the construction area. That is, the excavated areas may initially be a ground water sink with water flowing into the bottom and sides of the excavation while after construction, then the structures become a "no flow" zone with ground water flowing around,

between and beneath the structures. Therefore, ground water models should be tailored to each site to simulate construction impacts before, during and after construction.

Per guidance in SRP 2.4.12, the staff will review the applicant's combined license application for an evaluation of possible impacts of the plant on the groundwater flow at the proposed site and near adjacent operating units. This evaluation is performed because of the potential for construction and operation activities to change the direction, velocity and elevation of the groundwater near operating units. These changes may potentially impact the stability of structures and create new flowpaths which may impact the safety of public and environment in the event of a radiological release. The staff's review includes the short and long-term effects of construction and operation activities which may affect the site groundwater system including the construction of plant facilities, drainage ditches, water storage basins, and dewatering systems. If changes to groundwater flow direction created by construction and operation of new units have the potential to impact safety related monitoring programs for existing reactors, this should be evaluated and changes should be made to the monitoring locations of operating units after the site has been constructed and the potential effects on the flow system have been validated.

**Question 19:** Are the "challenges" experienced during the staff reviews a result of inadequate guidance in the ESRP or a misinterpretation of that guidance by the applicants?

**Answer 19: (Hart)** Most of the challenges are due to the changing environment that we are in. The industry prepared its first new plant applications in many years and the NRC is doing its first new plant licensing reviews in many years. Since we licensed the existing plants there have been a lot of changes. They include a number of new environmental laws and regulations, more involvement by state agencies, a new one-step licensing process, a revised definition of construction in the limited work authorization rule, and having the Army Corps of Engineers as a cooperating agency on most of our environmental reviews. The industry and the NRC staff are working our way through the review process the best we can and trying to adjust to all these changes. We are revising the ESRP to ensure that it is current. We revised about a third of the ESRP sections in 2007 – the ones that we thought were higher priority. We are currently revising many of those sections based on industry comments and lessons learned in the early stages of developing environmental impact statements. We are also reviewing and revising the remaining sections of the ESRP. Those sections will be issued for use and comment as we complete them over the next several months.

**Question 20:** To what extents are seismic analysis process and issues (e.g., source terms) resolved for sites in the West?

**Answer 20: (Chokshi)** The guidance (e.g., Regulatory Guide 1.208) and regulations for seismic siting are the same, whether for a site in the Central and Eastern U.S. (CEUS), or the Western U.S. (WUS). However, in the case of the CEUS, the NRC has endorsed, through Regulatory Guide 1.208, the use of the EPRI or LLNL seismic hazard models developed in the 1980's as a starting point in conducting a Probabilistic Seismic Hazard Analysis. For the WUS, there is no pre-existing seismic hazard model that has been developed and subsequently endorsed by the NRC.

For the CEUS, with the base model as a starting point, the PSHA still needs to consider post-1980's seismic source characterization information, but the existence of the base model makes conducting the PSHA (for the applicant) and reviewing the PSHA (for the NRC) much more

straightforward. It requires far fewer resources than reviewing an entirely new PSHA for a WUS site.

To facilitate the review of a WUS site, applicants are encouraged to interact with the NRC staff at least several months before the application is submitted for review so that the proper resources can be allocated for the review, and the approach for the seismic hazards analysis can be discussed.

**Question 21:** Does NUREG-6966 specify a height for a sea wall to mitigate the impact of a tsunami? It seems like the costs would be prohibitive for a sea wall that would be high enough for adequate protection. Please expand on the guidance in NUREG-6966.

**Answer 21: (Hart)** The purpose of NUREG/CR-6966, Tsunami Hazard Assessment at Nuclear Power Plant Sites in the United State of America, is to provide technical guidance in evaluating tsunami hazards from different tsunamigenic sources for assessing the safety of nuclear power plants. This document describes the process of identifying tsunami sources, hierarchical hazard assessment approach, impact of tsunamis on plant facilities, data collection, and assessing probable maximum tsunami. However, this document does not provide guidance for selecting the type of tsunami protection facilities or their design criteria. The method(s) used to mitigate the impact of a tsunami is site specific and determined by the applicant using best engineering practices and guidelines. Instead, Standard Review Plan Section 2.4.10 refers “Coastal Engineering Manual” published by the U.S. Army Corps of Engineer (latest version) as an appropriate guidance for designing the wave surge protection structures from hurricane or tsunami. NRC does not have a near-term plan to expand the guidance to include designing of tsunami protection facilities.

**Question 22:** Please review tsunami NUREG effect on COL applications already submitted. How many will have to be resubmitted?

**Answer 22: (Hart)** The COL application must contain all of the information required by 10 CFR 50.33 or 10 CFR 52.77, “Contents of Applications; General Information,” and 10 CFR 100.20. Various regulatory guides (e.g., RGs, NUREGs) provide necessary guidance in preparing the COL application, however they are not substitute for regulations and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission. NUREG/CR-6966 does not have any back-fitting provisions on its use; therefore NRC doesn’t anticipate the need for the resubmission of already docketed COL applications based on NUREG/CR-6966. However, the staff may request additional information if the relevant information provided by a COL application is not sufficient. Tsunami experts provided by the U.S. Geological Survey (USGS) have been working with NRC and PNNL in addressing tsunami hazards starting with the initial COL applications.

**Question 23:** Currently SRP 2.4.12 is silent on conceptual site model, yet RAIs seek this information. Will the ISG work update SRP 2.4.12 to better document this staff expectation?

**Answer 23: (Hart)** Answer: A discussion of the purpose of conceptual site models and alternate conceptual site models of a hydrogeologic system as it relates to NRC staff review of a COLA is described in SRP 2.4.13 of NUREG-0800. The staff is currently developing an Interim Staff Guidance (ISG) that will provide direction on how conceptual site models for groundwater flow (SRP Section 2.4.12) and contaminant transport (SRP Section 2.4.13) are developed. The

ISG will also include guidance for developing or reviewing a numerical groundwater flow model. Fundamental technical guidance for developing conceptual site models could be found in the following:

- NUREG/CR-6805 (2002), "A Comprehensive Strategy of Hydrogeologic Modeling and Uncertainty Analysis for Nuclear Facilities and Sites," and
- NUREG/CR-6940 (2007), "Combined Estimation of Hydrogeologic Conceptual Model, Parameter, and Scenario uncertainty with Application to Uranium Transport at the Hanford Site 300 Area.

**Question 24:** Can you explain some specific site issues that are affecting the delay in COL reviews due to the DC issue or engineering change?

**Answer 24: (Hart)** As an example, some AP1000 Revision 16 changes to the design basis accident dose analyses were found not acceptable by the staff. Therefore, Westinghouse submitted Revision 17 with lower offsite atmospheric dispersion factors ( $\Pi/Qs$ ) to compensate. All COL sites incorporating the AP1000 design need to address this change because the COL applications each incorporated Revision 16. Some sites, most notably the reference COL, did not have site-specific  $\Pi/Qs$  within the new site parameters for AP1000 Revision 17. So, calculations or site changes were needed to address this. The process of identifying issues and resolving them in a revision to the COL application adds additional time to each review that was not necessarily figured into the original COL review schedule.

**Question 25:** SRP 2.2.3 screening of chemicals has typically not been discussed in detail in older FSARs. RG 1.206 did not change this standard. Is the staff considering updating this guidance, RG or SRP to better document/clarify the staff's review needs?

**Answer 25: (Hart)** The staff will always consider updating guidance to better document and clarify the staff review needs. The current RG 1.206 (June 2007) and NUREG 0800 (March 2007) demonstrate this. For example RG 1.206 C.I.2.2.2.2 Description of Products and Materials specify that the COLA specifically identify hazardous chemicals stored on or near the facility and identify the quantities including their toxicity limits. In addition, C.I.2.2 second paragraph states that the applicant should identify the regulatory guidance followed and explain and justify any deviations from this guidance and for any alternative methods that are used. They (the applicant) should also describe the data collected, analyses performed, results obtained, and any previous analyses and results cited to justify any of the conclusions presented in the conclusions of the FSAR. NUREG 0800 (SRP) further requires the NRC staff to independent confirm the information and analysis presented in the COLA.

**Question 26:** What is the extent of the design information needed for the ESP and in particular, the dose assessment?

**Answer 26: (Hart)** The ESP applicant is required to show compliance with 10 CFR Part 52 Subpart A, as well as the siting criteria in 10 CFR Part 100. 10 CFR 52.17 identifies the required ESP application contents, which includes a safety assessment with "an analysis and evaluation of the major structures, systems and components of the facility that bear significantly on the acceptability of the site under the radiological consequence evaluation factors" for the exclusion area boundary (EAB) and low population zone (LPZ) as given in section

52.17(a)(1)(ix)(A) and 52.17(a)(1)(ix)(B), respectively. RS-002, "Processing Applications for Early Site Permits," gives guidance on the information the NRC staff will be looking for in an ESP application, including one that uses the plant parameter envelope (PPE) approach.

In the design basis accident (DBA) dose assessment calculations, the information that is design related is the hypothetical accident radioactivity release from the facility to the environment, in terms of the isotopic quantities of fission product activities released to the environment and the rates of fission product release to the environment. The applicant should provide a basis for the hypothetical releases. Although the NRC staff does not review PPE values for correctness, the staff will be evaluating whether the PPE radioactivity release values are not unreasonable for showing that a nuclear power reactor may be sited at the referenced location without undue risk to the health and safety of the public. Description of some basic design information for the likely facility at the ESP site, such as type of reactor (light-water PWR or BWR, heavy water, liquid metal, etc) and maximum thermal power level would be helpful for the staff to use in its assessment of the application. For a plant design not previously reviewed by the staff that was used in development of the radioactivity release PPE, some description of design basis accident selection, accident progression, and accident mitigation features to reduce radioactivity release to the environment could also be useful in determining that the radioactivity releases are not unreasonable.

The ESP applications previously submitted took different approaches to the evaluation of design basis accidents, with one (Vogtle) not using a PPE, but instead identifying a particular design as the basis for its DBA dose assessment, and others developing a bounding PPE by evaluating several designs, including some designs not yet certified. So far, the ESP applications using a PPE have provided the bounding plant design source terms for each DBA evaluated, with exception to the LOCA which may have more than one plant evaluated. The staff does not prefer any particular approach over another in the development of the radioactivity release for the PPE.

**Question 27:** Do you use the Delphi decision process when selecting weighting factors described in the EPRI siting guide? If yes, what problems or lessons learned do you have? If no, what do you use?

**Answer 27: (Moorer )** Yes. We used a modified version of the Delphi process discussed in the EPRI Siting Guideline. We saw great value in creating a matrix that would utilize numerical scoring to help rank order potential sites so that we could screen the inventory down to the candidate site level. The down side of the process is that it is only as good as the inputs provided and the determination of weighting factors can be somewhat arbitrary. We used great care to make sure we were not introducing some artificial bias into the process. At the candidate level, we use a combination of numerical scores and a subjective assessment using our subject matter experts (SME's) to interject the "softer" inputs into the process. We use Siting Committee and all siting decisions are made by the committee to ensure we considered all inputs and used a robust, fair process. As far as "lessons learned", I would say that one of the most important is to make sure input is given in all areas and that definitive guidance must be developed for how to use the process. At first, we saw a wide array of input level of detail, documentation, etc. We developed some guidance for the process and the input was much improved after the guidance was put in place.

**Question 28:** When does Southern expect to submit the first of the next wave of their applications?

**Answer 28: (Moorer)** I apologize, but I cannot share that information at this time.

**Question 29:** Has Southern Company modified their site selection process to address Corps needs for their LEDPA analysis. If not, are there plans to do so?

**Answer 29: (Moorer)** Not specifically. Wetlands are one of the heavily weighted topic areas in the matrix and have a significant role in the ranking of a site. The screening process really does not rise to the level of detail such that factors like LEDPA are factored into the scoring process. At the candidate site level, these factors are considered and would likely be included in the subjective portion of the process. Since LEDPA is implemented during the 404 permitting process and requires great detail to implement, it seems very difficult to make a definitive judgment in the alternatives analysis stage unless a site had obvious problems.

**Question 30:** Without breaching confidentiality, can you say how many times this process has been used? (i.e., is it a demonstrated process or a theoretical one?)

**Answer 30: (Moorer)** The process of ranking sites in our service territory to determine which sites represent the best sites for further investigation has been used a number of times. It is very much a demonstrated process and not merely theoretical. In fact, this process in its early stages was used to make the decision to use Vogtle as the first Southern Company new nuclear site.

**Question 31:** When Southern chooses a site, are the sites truly suitable for alternative technologies like coal or gas?

**Answer 31: (Moorer)** The process described is used to investigate “generation sites” including coal, gas, and nuclear. As such, the process selects sites that are suitable for all of the generation alternatives. Since the process gathers information that is particular to nuclear, such as emergency planning information, it looks like a nuclear process to the casual observer. At the screening level, we select a type of site (e.g., nuclear) when we compare sites to keep things on a like-for like comparison. Typically, if a site is suitable for nuclear, it is generally suitable for coal or gas. However, things like air non-attainment areas, etc. may be large factors for certain sites.

**Question 32:** How does the type of technology (AP1000, ABWR, etc.) affect your site selection?

**Answer 32: (Moorer)** We have used a minimum of two technologies to address each potential site. There are several reasons for this – one is maintaining competition between vendors as we move forward, one is associated with the active need – different vendors have different MW output. We have discussed use of a PPE approach as well, but have not used it yet. We have used AP1000, ESBWR, and ABWR in the past.

**Question 33:** Does Southern Company attempt to keep potential sites a secret from public to preclude driving up the cost of the property?

**Answer 33: (Moorer)** We attempt to be discrete in the early stages but for reasons other than price. There is a defined process in each state we work in that allows “eminent domain”; i.e.,

condemnation of property for utility use. For obvious reasons, this is not the preferred route. We have a very clearly defined process for pricing land and we follow it religiously.

**Question 34:** Can you talk in more detail about when and how wetlands are considered in the siting process.

**Answer 34: (Moorer)** Early in the process, we bring in our wetlands expert and develop a preliminary wetlands map. If there are significant wetlands onsite, we would develop a preliminary wetland delineation map and meet with USACE to discuss the Jurisdiction Determination process and the relative value of the wetlands onsite. The mitigation process varies from state-to-state, but a clear understanding helps define the ranking of the site in the wetlands category. Wetlands is one of the higher weighted categories in the Delphi process, so it is very important that we get the best information available for each site we evaluate to ensure good decisions. We believe that investing resources to understand wetland impacts early in the process is money well spent. In the South, wetlands occur on every site, but the values of the wetlands can vary widely. Since many Threatened and Endangered Species in the South utilize aquatic habitats including wetlands, due diligence merits identifying the quality and extent of wetlands early.

**Question 35:** When you are involved in Phase I of siting, after screening; have you installed meteorological towers and done fatal flaw borings on two or more sites, or have you forced a decision to the most preferred site, then doing meteorological towers and borings on one site?

**Answer 35: (Moorer)** We have done preliminary borings on several sites to confirm if fatal flaws exist. We have held back typically on meteorological tower installation until we are reasonably sure the site has no fatal flaws. In two cases, we have conducted additional borings after the preliminary stage to confirm subsurface conditions. We use great care to avoid “forcing” a site to fit the process. That is one of the values of using the Delphi approach. When it is used correctly, sites are selected on their merits and not based on some pre-determined preference for a certain site.

**Question 36:** What NRC regulatory guides, positions, etc., do you use for site screening? Or do you develop your own?

**Answer 36: (Moorer)** We used RG 4.7 and the EPRI siting guide to develop our own process. It is very similar to the process described in the EPRI guide modified to fit our needs. We use a modified version of the Delphi Process that is defined in the EPRI guide, and we’re fairly similar to the EPRI guide, although we have made the process a little more specific to our needs. We have tailored it to focus the decision at the potential site stage on an objective, metric-driven process. As we moved to the candidate sites, we expanded the process into a more subjective, higher level of detail process to look at the candidate sites, and we did a lot more preliminary work to support the decision process. We actually get out in the field and do some field work on wetlands, T & E Species and even do some preliminary borings to determine subsurface conditions. In some cases we might have available borings to look at the subsurface conditions and we would use all information available to us.

**Question 37:** Why is the water availability so important? If closed cycle cooling will presumably be used, will surface water location – river, lake, etc. be required?

**Answer 37: (Moorer)** Yes. Even though closed cycle cooling is defined as Best Available Technology (BAT), there has been a growing shift in concern from local thermal and intake impacts traditionally addressed under Clean water Act Section 316 – B to concern over consumptive use. Cooling towers in the southeast can consume up to 75% of the water withdrawn. Since the ESP/COL process is a NEPA process, all impacts must be disclosed, defined and evaluated; – simply relying on EPA 316 rules is not enough. In addition, the southeast has been in a major drought for three years and a “water war” has been on going between Alabama, Florida, and Georgia for over 15 years. The availability of adequate cooling water is one of the most important siting factors considered.

**(Hart)** Nuclear power plants require water for cooling and operational uses. Primary water consumption in nuclear power plants is for turbine condenser cooling. Even for a closed cycle cooling, a large amount of water is still needed for initial filling and occasional making up for cooling systems. In addition, nuclear power plants need water for cooling other systems, potable and sanitary uses, and effluent discharge. Dry cooling could be an alternative option but it may not be effective under certain severe weather conditions. Water could be obtained from surface water bodies (river, lake, ocean, etc) or groundwater, or a combination of both sources. Subsurface aquifers, which often provide good quality water, have limited capacity with often conflicting water appropriation issues. These are the reasons why surface water is preferred for siting of nuclear power plants.

**Question 38:** The PSEG slides seem to say “characteristics” pertain to site matters. Are there not design characteristics defined by the DCD?

**Answer 38: (Pantazes)** The COL application will address any “characteristics” specific to the DCD for the technology selected. The COL application and review process will reconcile any differences between the ESP Plant Parameters Envelope and any subsequent submittals.

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**Session Number:** TH29

**Session Day and Time:** Thursday, 8:30 a.m. – 10:00 a.m.

**Session Title:** New Reactor Technical Issue: Sumps – Operating Reactor Status and New Reactor Challenges

**Session Chair:** Frank Akstulewicz, NRC/NRO

**Session Coordinator:** John Lai, NRC/NRO, tel: (301) 415-5197, E-mail: [John.Lai@nrc.gov](mailto:John.Lai@nrc.gov)

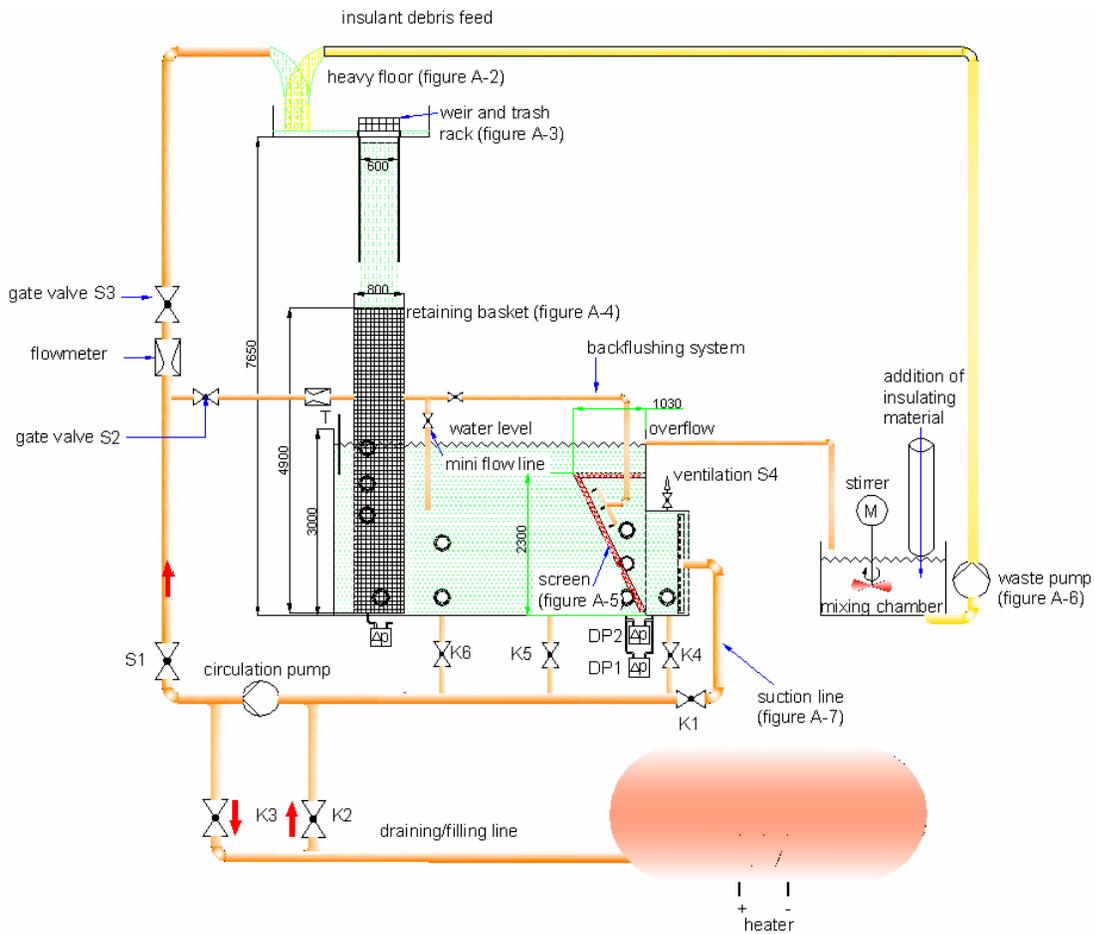
**Question 1:** “A bit more on Headloss”

**Answer 1:** By: Fariba Gartland

It is unclear as to what this question is referring to. However, we assume that the question relates to headloss testing and evaluation of the ECCS strainers.

Test loop is shown below. Scaling ratio for the test and general conclusion was presented in the RIC presentation.

The Headloss values measured across the ECCS strainer with conservative full debris load amount were within acceptable system margins.



**Question 2:** Is the strainer taking suction from the lowest point in the IRWST? Wouldn't the heavy sediments cause serious blockage? Could you not raise the suction point 1-2 feet above the lowest point?

**Answer 2:** By: Fariba Gartland

The strainer is taking suction from the lowest point in the IRWST. The U.S. EPR ECCS sump design with regard to GSI 191 is such that we do not anticipate any heavy sediment that can cause serious blockage. Any minor amounts of sediment will settle on the IRWST floor and not expected to accumulate at the strainer location due to very low water velocity in the IRWST. In addition, the SIS strainer contains a lip around its perimeter base that can act as a weir and prevent any sediment from making direct contact with the screen surface.

Raising the suction point 1-2 feet above the lowest point would create a standpipe effect resulting in a significant amount of unusable IRWST water.

**Question 3:** Can an applicant get credit on non-safety related backflush?

**Answer 3:** By Christopher Jackson

No

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**Session Number:** TH30

**Session Day and Time:** Thursday, 8:30 a.m. – 10:00 a.m.

**Session Title:** NRC and Licensee Safety Culture Activities

**Session Chair:** Martin Virgilio, NRC/OEDO

**Session Coordinator:** Isabelle Schoenfeld, NRC/OE, tel: (301) 415-3280, E-mail:

[Isabelle.Schoenfeld@nrc.gov](mailto:Isabelle.Schoenfeld@nrc.gov)

**Questions for panelist Tom Houghton, Nuclear Energy Institute (NEI):**

**Question 1:** What leading indicators of safety culture trends have been identified or are being used by industry?

**Answer 1:** At this time, there are no industry wide approaches to identifying leading indicators of safety culture trends. Each station or company has its own approach. Industry is developing a guideline on how to continuously assess nuclear safety culture. This guideline will discuss the process inputs to the assessment, and these will include monitoring and trending of such items as corrective action program root and apparent causes, employee concerns and safety conscious work environment data, self assessments and benchmarking, QA audits, safety culture assessments, NRC violation information, site specific performance trends, operating experience. These process inputs, which according to Edward Schein, are artifacts, or outward signs, of underlying safety culture can be reviewed to provide indications that there may be an underlying safety culture weakness. Of course, there are also safety culture assessments, conducted biennially, as required by INPO.

**Question 2:** Has NEI looked at expanding the USA assessments to fuel cycle facilities?

**Answer 2:** The industry first wants to develop and pilot the USA assessment methodology in the commercial power generation industry. The general approach could be applied at fuel cycle facilities (survey, interviews, observations, etc.). However, the assessment uses the INPO Principles for a Strong Nuclear Safety Culture, which is a set of principles and attributes which apply to power reactors. While many of the principles and attributes would also be applicable to fuel cycle facilities, some of them probably are not applicable. They also may be some principles or attributes applicable to fuel cycle facilities which are missing from the INPO document.

**Questions for panelist Rani Franovich, Office of Nuclear Reactor Regulation, NRC:**

**Question 1:** In answering an earlier question on Palo Verde, you said "The program does not allow you to catch problems earlier." Can you explain what you meant by that, and how the ROP can be changed to allow you to catch problems earlier?

**Answer 1:** I believe what I said was that the program does not always provide for a plant to move across the columns of an Action Matrix in a gradual manner, and that it is possible for a plant to move from Column 1 to Column 3 or 4 without having resided in Column 2 first. I also indicated that this did not represent a failure of the ROP. The ROP was developed to ensure that a plant does not enter Column 5 (Unacceptable Performance) of the Action Matrix without

the opportunity for regulatory intervention to correct the performance decline before it becomes unacceptable.

Subsequent to the RIC Session on Safety Culture, a member of the NRC's staff who was familiar with Palo Verde's performance late in 2004 and early in 2005 approached me and provided insights that I did not have. He explained that there were indications of declining performance before Palo Verde entered Column 3 of the action matrix, and that the NRC was engaged as a result - even though the plant was in Column 1. In 2004, the NRC's Region IV office noted a steady decline in performance throughout the licensee's organization. From 2003 to 2004 the number of inspection findings increased from approximately 5 to over 50. Specific areas of concern involved latent failures manifested through plant events, human performance, problem identification and resolution, refueling operations, and engineering controls. In its 2004 end-of-cycle letter, the NRC opened substantive cross cutting issues in the areas of Human Performance and Problem Identification & Resolution. On May 3, 2005, the NRC issued a follow-up assessment letter to Palo Verde and placed the site in Column 3 of the action matrix.

**Question 2:** Will revisions to the ROP consider earlier monitoring of safety culture prior to current criteria for 95003 employment?

**Answer 2:** Since 2006, the ROP framework has enabled the staff to monitor areas important to safety culture of all plants, including those in Column 1 of the action matrix. For plants in Column 1 of the action matrix, this has been accomplished through the identification of inspection findings with cross-cutting issues, particularly those associated with safety conscious work environment. As such, the ROP framework allows for monitoring areas important to safety culture before supplemental inspections are conducted in accordance with inspection procedures 95001, 95002, and 95003.

**Question 3:** Can the strong focus on corrective action programs contribute to "normalization of deviation" (we have identified the problem, we are working the problem, it is not a problem anymore)?

**Answer 3:** I believe the question relates to whether or not a strong corrective action program can offset deviations from good safety performance. It is my view that a strong corrective action program can certainly assist in recovering from a performance issue, but a strong program is not always sufficient. Corrective actions are effective to the extent that a licensee implements and follows the corrective action program (with the intent of identifying safety issues, determining the root or apparent cause(s), and following through on implementation of appropriate corrective actions that are commensurate with the significance of the performance issue). In short, a strong corrective action program is only as effective as the proper implementation of that program.

**Question 4:** The real issue is the proper rigor and quality in implementing the required programs. Measuring this is objective vs. subjective, i.e., Davis-Besse implementation of boron control program. Shouldn't the focus be effectiveness of program assessment and evaluation?

**Answer 4:** I do not disagree with the commenter here. I would suggest, however, that proper rigor and quality in implementing required programs may be driven (or not) by organizational factors, including safety culture. The NRC maintains a focus on both: (1) effectiveness of program assessment and evaluation, and (2) underlying dynamics that influence safety culture.

**Question 5:** What is the staff's basis for saying the ROP cross-cutting issue process has been effective?

**Answer 5:** As I indicated in my presentation, I think we all can acknowledge that determinations regarding safety culture by their intrinsic nature warrant some degree of subjective judgment. By contrast, the ROP was designed to be an objective, risk-informed performance assessment process. Within this context, I consider the "cross-cutting issue process" effective for a number of reasons:

- It is consistent with the Commission's direction to more fully address areas important to safety culture through the use of cross-cutting issues.
- It provides indications of performance in cross-cutting areas within the framework of the ROP. As such, those indications are developed and characterized as performance deficiencies in accordance with the fundamental regulatory principles of the ROP - they transparent, understandable, predictable, risk-informed and performance-based.
- It ensures that findings with safety culture aspects are developed and characterized in a manner that is as objective as is practicable within the ROP.
- The issues are of more than minor significance and they are risk-informed if they are documented in an NRC inspection report.
- The issues are transparent to internal and external stakeholders... in particular, the public.

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**Session Number:** TH31

**Session Day and Time:** Thursday, 8:30 a.m. - 10:00 a.m.

**Session Title:** Ongoing Research at the Organization for Economic Cooperation and Development - Halden Reactor Project

**Session Chair:** Nathan Siu, NRC/RES

**Session Coordinator:** Darren Piccirillo, NRC/RES, tel: (301) 251-7567, E-mail: [Darren.Piccirillo@nrc.gov](mailto:Darren.Piccirillo@nrc.gov)

All questions were answered during the session.

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**Session Number:** TH32

**Session Day and Time:** Thursday, 8:30 a.m. - 10:00 a.m.

**Session Title:** Thermal Hydraulics and Severe Accident Code Development and Application

**Session Chair:** Jennifer Uhle, NRC/RES

**Session Coordinator:** Matthew Bernard, NRC/RES, tel: (301) 251-7550, E-mail: [Matthew.Bernard@nrc.gov](mailto:Matthew.Bernard@nrc.gov)

For questions and answers from the RIC as well as additional information on this topic, please contact the Session Coordinator listed above.

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**Session Number:** TH33

**Session Day and Time:** Thursday, 10:30 a.m. - 12:00 p.m.

**Session Title:** Committee to Review Generic Requirements - Backfit Workshop

**Session Chair:** James Lyons, NRC/RES

**Session Coordinator:** Les Cupidon, NRC/RES, tel: (301) 251-7684, E-mail:

[Les.Cupidon@nrc.gov](mailto:Les.Cupidon@nrc.gov)

**Question 1:** Are there any actions being taken or proposed to "inform" the Commissioners on the importance and relevance of 10 CFR 50.109, "Backfitting."

**Answer 1:** The NRC as an agency undertakes many activities and actions to ensure that the Commission - and individual Commissioners - is informed of the NRC's backfitting responsibilities, and of significant backfitting issues associated with major NRC activities. The NRC staff informs the Commission of any identified backfitting issues in its communications with the Commission, for example, in rulemaking plans and in requests for Commission approval of proposed and final rules. The CRGR also has the authority to communicate directly with the Commission should it identify a backfitting issue which it feels has not been adequately addressed by the staff, or to advise the Commission on overall backfitting management issues. OGC responds to all Commission inquiries on all backfitting matters. Furthermore, each new Commissioner is briefed on the full range of NRC authorities and issues, including backfitting. The Commissioner's legal assistants, who are drawn from OGC, were provided with backfitting training as part of their developmental training.

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**Session Number:** TH34

**Session Day and Time:** Thursday, 10:30 a.m. – 12:00 p.m.

**Session Title:** Emergency Preparedness and Incident Response – FEMA Activities at Nuclear Power Plants

**Session Co-Chairs:** Mel Leach, NRC/NSIR and James Kish, DHS/FEMA/THD

**Session Coordinator:** Walter Lange, NRC/NSIR, tel: (301) 415-8028, E-mail:

[Walter.Lange@nrc.gov](mailto:Walter.Lange@nrc.gov)

All questions were answered during the session.

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**Session Number:** TH35

**Session Day and Time:** Thursday, 10:30 a.m. – 12:00 p.m.

**Session Title:** Next Generation Nuclear Plant

**Session Chair:** Michael Mayfield, NRC/NRO

**Session Coordinator:** William Reckley, NRC/NRO, tel: (301) 415-7490, E-mail:

[William.Reckley@nrc.gov](mailto:William.Reckley@nrc.gov)

All questions were answered during the session.

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**Session Number:** TH36

**Session Day and Time:** Thursday, 10:30 a.m. – 12:00 p.m.

**Session Title:** Revising Title 10 of the Code of Federal Regulations (10 CFR 50.46(b)), "Emergency Core Cooling System Performance Criteria"

**Session Chair:** William Ruland, NRC/NRR

**Session Coordinator:** Paul Clifford, NRC/NRR, tel: (301) 415-4043, E-mail:

[Paul.Clifford@nrc.gov](mailto:Paul.Clifford@nrc.gov)

**Question 1:** What will NRR be looking for from RES to support the rulemaking?

**Answer 1:** In a memorandum to the Commission dated December 19, 2008 (ADAMS ML083440156), the staff identified three additional research activities to enhance the technical basis documented in NUREG/CR-6967 and RIL-0801. These three activities, (1) comprehensive test procedures, (2) post-quench ductility (PQD) tests at intermediate hydrogen levels, and (3) breakaway oxidation tests with varying temperature profiles, were completed according to schedule (April 1, 2009).

**Question 2:** Will new regulatory guidance be required? And, if so, what is the schedule?

**Answer 2:** Yes. It is anticipated that regulatory guidance document(s) capturing the comprehensive testing protocols and guidance will be needed to support future cladding testing. The staff will seek public comment on a draft version of these testing procedures as part of the Advance Notice for Proposed Rulemaking (ANPR) in August 2009.

**Question 3:** Will the rulemaking schedule be delayed to wait for future tests from Westinghouse, EPRI, and/or NRC- RES?

**Answer 3:** No. A sufficient technical basis exists to support revising the 10 CFR 50.46(b) ECCS cladding acceptance criteria and the rulemaking is proceeding according to the schedule provided in the December 19, 2008 memorandum to the Commission (ADAMS ML083440156). The conceptual rule being proposed would allow fuel vendors and licensees to conduct independent LOCA tests (following an acceptable test program) and develop alternative acceptance criteria. With this flexibility embedded within the rule, rulemaking may proceed without awaiting further test results.

**Question 4:** Given the ongoing Continuing Resolution (CR), why would the NRC use valuable time and resources at this time on a non-mandatory rule that needs additional work before the industry would implement it?

**Answer 4:** The LOCA research program identified new embrittlement mechanisms which are not accounted for in the current rule, and are non-conservative. This necessitates rule changes. It is an appropriate expenditure of time and resources to re-establish adequate safety margins within 10 CFR 50.46(b). The revised rule would be mandatory.

**Question 5:** What are the performance parameters that would be prepared for monitoring?

**Answer 5:** The ANPR seeks input from the public related to monitoring and pool-side measurements which could be used to validate inputs and initial conditions in the ECCS performance analyses. For example, could primary water chemistry be used as an indication of CRUD levels on fuel rods?

**Question 6:** Current compliance to 50.46(b) is demonstrated by an analytical solution prior to licensing but not confirmed by any subsequent inspection. Given the perceived importance of hydrogen and oxygen, will the NRC be requiring refueling inspections to confirm hydrogen uptake versus expected burnup?

**Answer 6:** It is anticipated that cladding corrosion and hydrogen uptake models will need to be developed for each cladding alloy and NRC reviewed and approved in order to properly implement the proposed hydrogen-based PQD criterion. The validation of such hydrogen models will require extensive post-irradiation measurements (e.g., hot cell destructive measurements). The hydrogen database will probably be correlated to local cladding corrosion (e.g., oxide thickness) which in turn will be calibrated to local burnup or fuel duty. Each of these approximations will lead to uncertainties which need to be properly accounted for in the implementation of the new rule. An ongoing surveillance program, involving additional post-irradiation measurements, may be required (depending on hydrogen pickup sensitivities and variability). The ANPR seeks input from stakeholders on this topic.

**Question 7:** The presentation indicates that twice burned fuel cannot reach high temperatures so the rule is not needed. However, this claim is due to current core loading designs. High temperatures could be seen by twice burned fuel if surrounded by fresh fuel. Should the NRC rely solely on the industry's voluntary measures to ensure that these loadings will not allow twice burned fuel to reach high temperatures? Is this a viable/realistic regulatory approach?

**Answer 7:** Second cycle fuel bundles are predicted to experience high temperatures during postulated LOCAs. The NRC does not intend to rely on industry's voluntary measures and is actively pursuing rulemaking to revise the ECCS acceptance criteria based on findings from the extensive LOCA research program. The industry will be required to demonstrate compliance to the revised 10 CFR 50.46(b) criteria for all fuel bundles in their cores.

**Question 8:** Does this work focus on or assume LB-LOCA? If yes, then risk insights tell us that LB-LOCA is not dominant, SB-LOCA is significantly more important. Why is this work (LB-LOCA) being pursued?

**Answer 8:** From the cladding's point of view, it doesn't matter whether the temperatures are caused by an SBLOCA or an LBLOCA. The embrittlement criteria are the same for both. There might be some differences in heating and cooling rates that could make a small difference in the criteria between SBLOCA and LBLOCA, but the results of this work allow for this difference are equally applicable to both types of LOCA.

**Question 9:** What is the NRC position on the French approach, aiming at introducing a new embrittlement criterion?

**Answer 9:** In the IRSN presentation, Slide #4 says that post-quench ductility appears to be an inappropriate parameter to define embrittlement because no criteria have been found that would ensure ductility in the balloon. This is the wrong conclusion to reach from a premise that is technically correct. Although full ductility cannot be maintained in the balloon, oxygen causes this embrittlement and using post-quench ductility provides a limit on the amount of oxygen. We have relied on this approach for 35 years. It is now possible to account for the effect of burnup on ductility, and the research to date does not suggest any change beyond accounting for burnup.

**Question 10:** If oxygen is what reduces ductility, why do we track hydrogen instead of oxygen?

**Answer 10:** Oxygen is in fact tracked as the primary, or dependent, variable, but its distribution in the metal is just not quantified explicitly. Embrittlement is caused by oxygen getting into the cladding metal. Oxygen's ability to get into the metal depends on the temperature of the metal,

time that the metal is held at temperature, and the hydrogen concentration in the metal. Temperature and time are bundled together in the oxidation parameter (CP-ECR). Therefore, in the plot of CP-ECR versus hydrogen concentration, all three of these independent variables are represented. A point on the plotted line thus gives the conditions that correspond to sufficient oxygen ingress to embrittle the metal.

**Question 11:** Will any of the future work on fuel cladding include consideration of GSI-191 effects (e.g. chemical effects and crud buildup creating local hot spots)?

**Answer 11:** NRC's LOCA fuel research program does not include any further work related to the possible presence of crud. We have already considered the possible chemical effects of crud on embrittlement and concluded that there are none. The main elements in crud are typically Fe, Ni, Cu, and Cr. Of these, only Cr might be able to get into the oxide (and then into the metal) because of the relatively low affinity for oxygen of the others compared with Zr. Because Cr is already a constituent in most of the cladding alloys, and since we have found no sensitivity of embrittlement to these alloy constituents, Cr from crud would have no impact.

The presence of crud on the cladding could alter heat transfer between the cladding and the coolant during normal operation and during a LOCA. Resulting temperature changes would alter the outcome of an analysis, but they would not affect the embrittlement criteria themselves, which are the subject of this research.

**Question 12:** What is the extent of the research program remaining to support the rulemaking?

**Answer 12:** All of the experimental work has been completed. The last three parcels of work addressed breakaway oxidation under non-isothermal conditions, embrittlement at intermediate hydrogen concentrations (viz., 300 wppm), and test procedures. Documentation of these results is being prepared at the present time, but none of the findings alter the picture that has already been presented.

A discrepancy remains between some breakaway oxidation times measured by Westinghouse and ANL. ANL has completed all its re-testing and results will be made available after Westinghouse completes its work. We are confident that the explanation will be found once the Westinghouse results are reviewed, and we do not expect this resolution to alter any of the procedures or results that have been prepared by ANL.

Additional LOCA-related research is being conducted for NRC in four areas: (1) axial fuel relocation into a balloon, (2) loss of fuel particles through a rupture opening, (3) ballooning and flow-blockage dimensions, and (4) mechanical behavior of a balloon. No results from these areas will affect the accommodation of burnup effects on the embrittlement criteria, which is the purpose of the revision of 50.46(b).

**Question 13:** Since there doesn't appear to be a significant safety issue, why is rulemaking needed before significant issues are resolved?

**Answer 13:** A sufficient technical basis exists to support revising the 10 CFR 50.46(b) ECCS cladding acceptance criteria and the rulemaking is proceeding according to the schedule provided in the December 19, 2008 memorandum to the Commission (ADAMS ML083440156). The conceptual rule being proposed would allow fuel vendors and licensees to conduct independent LOCA tests (following an acceptable test program) and develop alternative

acceptance criteria. With this flexibility embedded within the rule, rulemaking may proceed without awaiting further test results.

**RIC Follow-up Questions Pending Answers:** (For information regarding the questions that follow, please contact the Session Coordinator listed above):

**Question 14:** Most of the BE calculations lead to PCT < 1100° C. Do these BE calculations take in to account evidence such as fuel relocation or high flow blockage obtained with high burn-up fuel?

**Question 15:** Please describe how the realistic LOCA analysis codes for high burn-up fuel that show there is no cause for concern have been validated with experimental data. Do these codes take into account relocation impact on PCT? (Halden test).

**Question 16:** Do vendors have codes which track individual pin oxide values?

**Question 17:** Is there a correlation which relates oxide thickness to oxygen (hydrogen) uptake?

**Question 18:** Appendix K has conservatisms but also significant non-conservatisms, including lack of relocation effects. Have you done detailed assessment to demonstrate your claim that no fuel in reactors today could become embrittled if the design basis LOCA (as documented in the FSAR) occurs?