Current Regulatory and Safety Issues

John W. Craig
Associate Director for Inspection and Programs
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
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Current Regulatory and Safety Issues

- Reactor Materials Issues
- Pressurized Water Reactor Containment Sump Performance
- Electric Grid Reliability
- Emergency Preparedness and Security

Reactor Materials Issues

- **Primary Water Stress Corrosion Cracking, Alloy 600/82/182**
  - **Reactor Vessel Upper Head Penetrations**
  - **Reactor Vessel Lower Head Penetrations**
  - **Other Locations in the RCS**

Reactor Materials Issues, cont.

- **Degradation of Mill Annealed Steam Generator Tubes**
  - **27 plants currently have this tube material**
  - **Approximately 8 plants plan to replace in the next 3 years**

Reactor Materials Issues, cont.

- Immediate corrective or compensatory actions taken prior to catastrophic failures
- Materials degradation being factored into license renewal and power uprate reviews as applicable
- Challenge for both PWRs and BWRs
- Recent media interest – Davis Besse

Reactor Materials Issues, cont.

- Challenge: to anticipate materials issues and to address proactively through well thought out inspection and repair/replacement strategies
  - NRC Responsibility
  - Industry Responsibility

Reactor Materials Issues, cont.

- Industry Actions
  - BWR Vessel and Internals Program group has been more proactive
  - Other industry groups have been reactive
  - Institute of Nuclear Power Operations (INPO) has adopted a role in reviewing licensee programs in materials area
  - Improved non-destructive examination techniques

Reactor Materials Issues, cont.

- Regulatory Response
  - Issued Generic Communications (Information Notices, Bulletins, Orders)
  - Working with Codes and Standards Committees
  - Implementing Action Plan from Davis-Besse Lessons Learned Task Force report
  - Seeking International Operating Experience

Reactor Materials Issues, cont.

- Regulatory Response, cont.
  - Training NRC Inspectors on inservice-inspection procedures
  - Conducting research to address known degradation mechanisms

Reactor Materials Issues summary

- In summary,
  - Materials issues will continue to be a challenge as industry ages
  - Industry is positioning itself to provide more comprehensive approaches to address issues in a timely manner
  - NRC is continuing to verify the safety of our operating reactors.

PWR Containment Sump Performance

- Office of Nuclear Regulatory Research confirms generic concern for PWRs
  - Study used combination of plant-specific and generic data
  - Incorporated many conservatisms
  - Overall study not intended to be applied on a plant-specific basis
  - Concluded that sump screen blockage is a credible generic concern for PWRs

PWR Containment Sump Performance, cont.

- NRC Actions
  - Issued Bulletin 2003-01 in June 2003
  - Licensees were asked to describe plans to reduce risks associated with this issue
  - NRC is reviewing responses to the Bulletin
  - Compensatory measures should provide additional assurance of plant safety
  - Regional offices will perform inspections to determine adequacy of licensee's actions

PWR Containment Sump Performance, cont.

- Challenges
  - NRC review and approval of industry guidance for evaluating susceptibility to sump clogging
  - Completion and assessment of ongoing research.
  - Increased concerns from stakeholders and members of the public

PWR Containment Sump Performance summary

- In summary,
  - the NRC is following a deliberate process that will resolve the sump issue for pressurized water reactors, on a plant-specific basis, while maintaining public health and safety.

Electric Grid Reliability

- Background
  - NRC regulations provide requirements for having reliable electric power supplies at nuclear plants
    - 10 CFR 50, App. A, General Design Criterion 17, Electric Power Systems
    - 10 CFR 50.63, Station Blackout Rule
    - 10 CFR 50.65, Maintenance Rule

Electric Grid Reliability, cont.

- Deregulation of electric utility industry in mid-1990s
  - 1992 National Energy Policy Act (NEPA)
  - 1996, FERC issued orders requiring open access to the electric power transmission system
  - 50% of states now sell power in an open market

Electric Grid Reliability, cont.

- What Has Changed on the Grid?
  - Higher transmission system loading.
  - Lower grid reactive capabilities.
  - Lower grid operating voltage limits and action levels.
  - Increase in transmission line relief requests during summer.
  - Increase in coordination times to recover from grid disturbance

Electric Grid Reliability, cont.

- Challenging Safety Issues
  - Most losses-of-offsite-power (LOOP) occur in summer months.
  - Increase in induced LOOPs during summer.
  - Recovery from LOOP longer.
  - Risk from low voltage conditions.
  - Risk from on-line EDG maintenance

Electric Grid Reliability, cont.

- The August 14, 2003, blackout affected 10 nuclear plants, requiring nine of them to shut down (Davis-Besse was already shutdown)
- Multi-national Power System Outage Task Force headed by Secretary of Dept. of Energy, Spencer Abraham.
  - Nuclear Working Group headed by USNRC Chairman, Nils Diaz

Electric Grid Reliability, cont.

- Other recent operating experiences have demonstrated need for continued attention in this area
  - Peach Bottom dual-unit scram – Sept. 15
  - NRC Augmented Inspection Team ongoing
- Best Practices as recommended by the USNRC Office of Research

Electric Grid Reliability summary

- In summary,
  - Changes in grid performance have occurred since operating in a deregulated environment.
  - Grid performance can impact NPPs:
    - Response to accidents and transients
    - Blackout (coping) duration
    - Challenge safety equipment
  - Need to seek a better understanding of grid performance.

Emergency Preparedness and Plant Security

- Emergency Preparedness incorporates the following strategies:
  - Successful Planning (Emergency Planning)
    - Planning and coordination meetings
    - Procedure development/implementation
    - Training
    - Drills and exercises
    - Pre-positioning/maintenance of equipment
  - Successful Response to Events (Emergency Response)

Emergency Preparedness and Plant Security, cont.

- Emergency Planning is an important part of NRC's defense-in-depth safety philosophy:
  - High quality in design, construction and operation of plants
  - Safety systems to reduce chances of malfunctions
  - Containment structures to prevent release of fission products offsite
  - **Emergency Planning**

Emergency Preparedness and Plant Security, cont.

- EP and security of U. S. nuclear power plants have received significant attention since 9/11/01
  - Indian Point and public concern
  - James L. Witt study commissioned by the State of New York
  - Emergency Plans are not dependent on initiating scenario (whether terrorist related or not).

Emergency Preparedness and Plant Security, cont.

- Emergency Planning in the news
  - Significant Misinformation in Public Domain
  - Such misinformation is a disservice to the public, instilling unwarranted fears.
  - Even the J. L. Witt report stated: “harm to the public could arise from misuse of data”

Emergency Preparedness and Plant Security, cont.

- Emergency Response was considered robust even before 9/11/01
- It has been enhanced since then, particularly the security aspects:
  - Interagency/interstate terrorism exercise (TOPOFF 2) in May 2003
  - NRC continues to work with Dept. of Homeland Security and other Federal agencies

Emergency Preparedness and Plant Security, cont.

- NRC response to new threat environment
  - The NRC has issued a number of requirements since 9/11/01 to enhance security of nuclear plants
  - Inspections of licensees' implementation of new security requirements continues

Emergency Preparedness and Plant Security summary

- In summary,
  - Clarification of myths in public domain about emergency preparedness and security remains a challenge
  - A robust emergency preparedness program exists and is continuing to improve
  - A number of new security enhancements have been implemented since 9/11/01

Discussion of Key NRR Programs in the Reactor Arena

- Reactor Oversight
- Power Uprates
- License Renewal
- New Reactor Licensing

Reactor Oversight

- The current risk-informed Reactor Oversight Program is nearly four years old
- The Davis-Besse issue has been a significant challenge
- Browns Ferry Unit 1 restarting after 18 years
- Construction Inspection Program development is gaining traction
- Stakeholders are key to program's success

Reactor Power Uprates

- This NRR program continues to be a high priority with the Commission
  - To date, 99 power uprates have been approved for a total of ~4000 Mwe added to the U.S. grid
  - Technical Challenges arose recently with the Quad Cities Dryer Cracking Issue
  - Process Improvements have been made
- The Power Uprate program is a success

License Renewal

- Extends 40-year license by 20 years
- 18 units at 9 plant locations completed
- Currently 8 applications under review for 15 more units at 10 plants
- More applications are expected: 19 applications for 30 units over next three years

License Renewal, cont.

- License renewal focuses on licensees' equipment aging management programs
- NRR project managers are assigned (and dedicated) to each renewal package for the entire 22 to 30-month process
- Public Involvement is Important
- Process Improvements
- Program has been successful

New Reactor Licensing

- Key activities include:
  - Design Certification review for the Westinghouse AP-1000 advanced design
  - Preapplication reviews for the GE ESBWR design and the AECL, Ltd. ACR-700 design
- Recent milestone:
  - Received two applications for an early site permit under 10 CFR 52

New Reactor Licensing, cont.

- Challenges
  - Regulatory Infrastructure Development work
  - Schedule delays for ESP applications due to continued studies involving seismic modeling for affected locations
  - Differences in design from previous reviews require infrastructure improvements related to the ACR-700 review
  - Combined License Applications – the first could be received in 2006 timeframe