NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION
Office of Public Affairs Telephone: 301/415-8200
Washington, D.C. 20555-0001
E-mail: opa@nrc.gov
Site: http://www.nrc.gov

S-08-015

"Report to the Convention on Nuclear Safety"

Remarks Prepared for NRC Chairman Dale E. Klein

Vienna, Austria
April 15, 2008

Thank you, Monsieur Saint Raymond. And my thanks to Ms. Ehold, Mr. Froats, Mr. Biro, and Mr. Lipar, for your efforts to bring together the Contracting Parties in Group 1 for an effective discussion of the members' National Reports during this week.

[SLIDE1]

On behalf of the government of the United States, I am truly proud to be here today to present the U.S. National Report to the 4th Review Meeting of the Convention on Nuclear Safety. During our presentation we will present some highlights from our National Report and discuss how the United States is meeting its obligations under the Articles of the Convention. We appreciate and encourage your questions. I hope that through meaningful discussion we may all gain insights into how to enhance nuclear safety, both in the United States and around the world.

[SLIDE 2]

This slide outlines our plan for this morning. I will provide an overview of our national report and discuss areas we want to highlight for you. I will also discuss areas of interest raised at the 3rd Review Meeting that we have addressed in our current report. Finally, I will briefly address our current challenges, what we view as our good practices, and actions we plan to take in the near future.

After my portion of the presentation, Jim Ellis, the president and chief executive officer of the Institute of Nuclear Power Operations, will discuss his organization's role in promoting excellence in nuclear safety.

Finally, my colleague, Luis Reyes, NRC's Executive Director of Operations, will discuss the National Report in more detail, including updates to the report and responses to the questions that you asked us during the peer review process.

At the end of our presentation we will be happy to address any follow-up questions you may have.

[SLIDE 3]

We identified three major themes based on issues we highlighted in the U.S. National Report, and the questions we were asked by other countries.

I will briefly highlight these themes for you, and then Luis will discuss these issues in more detail.

Safe operation of course is paramount in nuclear activities. In that portion of the presentation, we will touch on recent trends in safety and the generic safety issues that we are working to resolve in the U.S. nuclear fleet.

While keeping our current operating plants safe is our primary focus, the NRC also needs to prepare for the resurgence of nuclear power in the United States. We are ensuring safe long-term operation of the current fleet through our reviews of license renewal and power uprate applications. We are receiving applications for new light-water reactors, while also laying the groundwork to license advanced reactor designs that go beyond the current light-water technology. And we are dealing with workforce challenges by approaching training and knowledge management creatively.

Finally, we want to continue to emphasize the value of regulatory openness by ensuring that our decisions are made in consultation with the public, our Congress, and other stakeholders.

[SLIDE 4]

This slide depicts improving trends for two of our performance indicators.

The top right graph shows results from the Accident Sequence Precursor program, or ASP. The ASP program uses probabilistic safety assessment methodology to systematically evaluate U.S. nuclear power plant operating experience to identify, document, and rank the operating events that may be potential precursors leading to inadequate core cooling and severe core damage. Over the last several years, the ASP program indicates there is a statistically significant decreasing trend in precursor events.

The bottom left graph shows the number of automatic scrams per plant per year. These are determined by our Industry Trends Program based on information from Licensee Event Reports and plant Monthly Operating Reports. The long-term trend shows a significant decrease in the number of scrams, with the last few years holding steady at about one scram every two years. As we said at the last CNS review meeting, we don't expect these trends to ever get to zero, but we may continue to see incremental improvements. (Note: the increase in 2003 is the Northeast blackout, which tripped 11 plants.)

[SLIDE 5]

I would like to highlight three ongoing technical issues that were outlined in our report and resulted in multiple questions from several contracting parties.

The third U.S. National Report identified PWR containment sump performance as an issue. While this is still a concern, substantial progress has been made to resolve it. For example, U.S. plants have greatly enhanced the size of their suction strainers and removed problematic materials that could clog the strainers. However, one aspect of the issue, the potential for chemical effects on strainers and downstream components, has turned out to be particularly challenging. All planned NRC-sponsored research activities related to PWR sump clogging are now completed. The NRC is currently reviewing an industry report that supports evaluation and testing of chemical effects, and expects to receive another technical report addressing chemical effects inside the reactor vessel. Licensees are planning integrated tests of pump head loss due to sump issues that will include chemical effects.

A second ongoing issue relates to recent power uprates granted to some of our licensees. In 2002 and 2003, steam dryer cracking and flow-induced vibration damage on components and supports for the main steam lines and feedwater lines occurred at some boiling water reactor (BWR) plants that had increased their power levels. The steam dryers at the Quad Cities and Dresden nuclear plants were replaced with improved units as a result of these discoveries. NRC has updated our regulatory guidance concerning power uprates.

Finally, we are ensuring safe operation by evaluating and dealing with materials degradation issues, especially weld cracking, at our fleet of nuclear power plants. In October 2006, the licensee for Wolf Creek reported the presence of long circumferential flaws in dissimilar metal butt welds on their pressurizer. Based on the staff's evaluation of these flaws, the NRC issued confirmatory action letters to licensees, asking them to confirm their commitment to inspect the pressurizer welds by the end of 2007. Nine plants would not have met this timeline because they planned to have refueling outages this spring. These licensees performed advanced finite element analyses to justify delaying the inspections until the spring 2008 outage. The NRC staff performed confirmatory analyses and agreed with the licensees' justification. The results of a recent inspection of a pressurizer that had been in use at a power plant led the NRC staff to question this justification for delaying the inspections until their spring outages. Subsequent inspections with advanced techniques revealed that the welds contained minor imperfections caused during initial construction, rather than cracks that could lead to rupture, as first thought. The NRC staff continues to closely follow operating experience to ensure that the inspection schedules are appropriate.

[SLIDE 6]

Let me now discuss how NRC is preparing for long-term operation of nuclear power plants in the United States Based on the Atomic Energy Act, the NRC issues licenses for commercial power reactors to operate for 40 years and allows these licenses to be renewed for an additional 20 years with the proper technical justification. An applicant for license renewal must

provide the NRC with an evaluation that addresses the technical aspects of plant aging and describes how those effects will be managed. The applicant must also prepare an evaluation of the potential impact on the environment if the plant operates for up to an additional 20 years. The NRC reviews the application and verifies the safety evaluations through inspections.

So far, over one-half of the licensed plants have either received or are under review for license renewal. The two graphs on this slide show quite dramatically how we have pushed the expiration dates of licenses beyond 2030.

[SLIDE 7]

U.S. utilities have used power uprates since the 1970s as a way to generate more electricity from their nuclear plants. As of January 2008, the NRC has approved 116 power uprates, resulting in a gain of approximately 5,200 MWe at existing plants. Collectively, these uprates have added generating capacity at existing plants that is equivalent to more than five new reactors. Another 2,500 MWe worth of uprates are under review or expected in the near future.

[SLIDE 8]

Although the "nuclear renaissance" is growing in popularity today, the NRC has been planning for new reactors since the 1980s.

In 1989, we published a new rule that allows nuclear plants to apply for new reactor licenses in stages, with the goal of dealing with safety and environmental issues early in the process. This rule, which we refer to as "Part 52" because of its place in the U.S. *Code of Federal Regulations*, includes the process for:

- certifying a design separate from a site,
- approving a site separate from a design,
- and licensing a plant for both construction and operation, possibly by referencing a previously certified design and site

We updated the rule last year to clarify the requirements and incorporate lessons learned. We also created an "Office of New Reactors" to handle the new work more efficiently while allowing the Office of Nuclear Reactor Regulation to focus on the safety of the existing operating reactors.

Long before any new license applications were expected, we were reviewing applications to certify new standardized designs. So far, we have issued design certifications for four designs: the General Electric ABWR, the Westinghouse System 80+ (formerly the Combustion Engineering System), the Westinghouse AP600, and the AP1000. Currently, we are working on two new designs, AREVA's U.S. EPR and Mitsubishi's US-APWR, as well as a revision to the AP1000 design certification. These reviews generally take three to four years to complete and culminate in a new regulation that certifies the design. Several of these designs are also of interest to other countries, such as the EPR in Finland and France and the APWR in Japan. We are closely monitoring the activities in other countries, especially through the Multinational Design Evaluation Program, or MDEP, to share the results of our licensing review and take advantage of the issues previously resolved by other countries.

The NRC can also issue an early site permit, or ESP, to approve one or more sites for construction before an application for a construction permit or combined license is submitted. Last year, we approved three early site permits at sites in Illinois, Mississippi, and Virginia.

Finally, we are now being asked to review a large number of combined license applications. By 2010, we think we will receive twenty or more applications for 30 or more new nuclear power units. We have already received nine of those license applications and have started detailed work on five of them.

[SLIDE 9]

In addition, we are beginning to plan for advanced reactors.

The Energy Policy Act of 2005 initiated the Next Generation Nuclear Plant (NGNP) project. The NGNP is intended to demonstrate hydrogen production through high-temperature processes supported by an advanced gas-cooled reactor design. In addition, these new reactor designs can offer additional safety improvement over the already improved safety of the latest light water reactor designs now expected to be built in the United States. U.S. The NRC is working with the U.S. Department of Energy to develop a licensing framework to meet this unique licensing need. However, it has been many years since the NRC licensed a gas-cooled reactor and, combined with advances in materials science during that time, this means that we must re-learn and focus on the applicable science needed to perform our safety reviews.

We are also beginning work with the Global Nuclear Energy Partnership, which is intended to develop the systems, technologies, and policies to provide nuclear power options to interested countries without the need for each country to develop and build nuclear enrichment and nuclear recycling facilities. It could also achieve the goals of waste reduction, fuel supply growth, and further improved reactor designs. I should note that the direction of this program and its level of Congressional support are unclear at this time.

On these advanced reactor issues, we have already begun to consider a path forward, including modification of existing regulations and possible new rulemaking to address the safety and security requirements needed for these new non-light water reactor technologies.

[SLIDE 10]

One of our major challenges right now is to develop a workforce that will help us meet our safety mission over the coming decades. Over the next five years, our federal government's Office of Personnel Management projects that more than 550,000 federal employees—one-third of the entire workforce—will leave the government.

At the NRC, we exceeded our FY 2007 goal of a net gain of about 200 staff by bringing on board 441 new employees, for a net gain of 216. Each year, we send staff to approximately 80 recruiting activities at career fairs and conferences across the country. We are helped in our efforts by a recent ranking of the NRC as the "best place to work" in the federal government. In this independent ranking, we were also recognized as "best in class" for matching our

employees' skills with our mission, strategic management, effective leadership, performance-based advancement, training development, support for diversity, work-life balance, and satisfaction of employees under 40.

Once we hire these new employees, we have to make sure they are ready to do the work. For this purpose, we have developed detailed qualification programs in both our operating reactor and new reactor offices; as well as similar programs for our inspectors in the regional offices. These qualification programs provide a structured process for new employees to learn about the NRC and their specific job function (such as project management, technical reviews, or construction inspection) through study activities, training courses, and on-the-job training. At the end of the qualification program, the staff members demonstrate their knowledge at an oral qualification board examination.

We also have development programs for certain groups of staff. The Nuclear Safety Professional Development Program is a good recruitment tool for college and graduate-level students, and helps our entry-level hires learn about the agency through training and rotations. The Team Leader Development Program, Leadership Potential Program, and Senior Executive Service Candidate Development Program provide a path to develop the future leaders of the agency.

To support these activities, NRC has a knowledge management program. This is an agency-wide effort to capture and transfer knowledge through a variety of tools, such as formal and informal training, databases, electronic reading rooms, interviews, procedures, desk references, communities of practice, and Web sites.

[SLIDE 11]

The last subject I would like to highlight is regulatory openness, which is a major objective of our agency.

We view nuclear regulation as the public's business and, as such, we believe it should be transacted as openly and candidly as possible—while at the same time controlling sensitive information and maintaining appropriate security. The public needs to be informed about our regulatory processes in order to participate. For example, last year we had more than 800 public meetings on a variety of technical topics.

Since the last time we spoke at this meeting, we have done a lot of work to improve our openness, including:

- Improved our public Web site, with more pictures, clearer access to high-interest information, a photo gallery, and a much more powerful Google search capability;
- Launched a new "Regulations.Gov" website to make all of our rulemaking documents more accessible and uniform with other agencies;
- Released an updated strategic plan for 2008-2013 that focuses on safety and security;
- Revised and added to our collection of dozens of fact sheets and brochures to educate the public about the NRC;

- We have also added the tagline “Protecting People and the Environment” beneath the logo on many of our official publications and documents.

[SLIDE 12]

Now I’d like to briefly discuss four areas that were of interest to you at the third review meeting and share what we’ve accomplished in those areas over the last three years.

[SLIDE 13]

The third review meeting concluded that one NRC challenge was to ensure that the post-September 11, 2001, emphasis on security does not adversely affect operational safety.

One way the NRC is meeting this challenge is by proposing to amend our regulation on physical protection to explicitly require licensees to assess and manage the safety/security interface at commercial power reactors. Under the proposed amendment:

- Licensees must determine whether plant changes, such as physical modifications, procedure changes, or maintenance, could adversely affect safety or security.
- If licensees identify possible adverse interactions, they must take corrective or compensatory actions to maintain both safety and security.

The public comment period on this rule closed last year, and we expect to have the final rule completed in 2008.

[SLIDE 14]

Safety culture was also identified as an important subject at the last review meeting, and we have taken several actions to respond to this concern.

We have improved our Reactor Oversight Process to incorporate safety culture more clearly in our inspections. These changes to the inspection program were designed to give us better opportunities to consider weaknesses in safety culture, and to encourage licensees to take appropriate actions before significant degradation in performance occurs.

Now, for each deficiency that an inspector finds (what we call a “finding”), the inspector identifies whether the licensee’s safety culture was a significant cause of the finding. If, over 18 months of inspection, a licensee has another safety culture issue with the same common theme, we may ask the licensee to conduct a safety culture self-assessment. For licensees with more significant performance degradation, we will expect the licensee to conduct an independent assessment of its safety culture by a third party. Then, we will conduct an independent assessment of the licensee’s safety culture. This process was first tested at the Palo Verde plant at the end of 2007.

We also revised the inspection procedure that focuses on problem identification and resolution to allow NRC inspectors to have the option to review licensee self-assessments of safety culture when selecting samples for their problem identification and resolution inspection.

Finally, when inspection teams review licensees' responses to operational events, they now consider contributing causes related to safety culture as part of their efforts to fully understand the circumstances surrounding an event.

We have also made improvements in our own safety culture. In the fall of 2005, the NRC's Inspector General, with the assistance of a contractor research firm, conducted the Safety Culture and Climate Survey to evaluate the NRC's internal safety culture and compare the results with the 2002 survey and Government and national benchmarks. Compared to the 2002 survey, the NRC improved in essentially all areas, with the largest gains realized in communication, mission and strategic planning, employee engagement, recruiting, developing and retaining staff, and management leadership. Areas we still need to work on include: workload and stress, knowledge transfer, and the use what the NRC calls the Differing Professional Opinions Program. I have already discussed some of our activities in knowledge transfer.

We have also increased our efforts to maintain an open, collaborative working environment that encourages all employees and contractors to promptly raise differing views without fear of retaliation. For example, our new non-concurrence process is designed to promote discussion and consideration of differing views on documents in the concurrence process before the prevailing staff view is fully developed, or management or policy decisions are made. This process complements the Differing Professional Opinions Program, a formal process that allows all employees and contractors to have their differing views on established, mission-related issues considered by the highest level managers in their organizations. And of course, we have an open door policy by which employees can raise their concerns with any level of management at any time.

[SLIDE 15]

You also expressed an interest, both at the last review meeting and in your questions, in our use of risk-informed regulation. The NRC's policy is to increase the use of probabilistic risk assessment, or PRA, in all regulatory matters to the extent supported by the state of the art, and in a manner that complements the NRC's deterministic approach and supports the NRC's traditional defense-in-depth philosophy. We use risk information to focus attention on areas that are most risk-significant, and sometimes to reduce our requirements in non-risk-significant areas.

Since the last review meeting, we have accomplished a few major items concerning risk-informed regulation.

- **Risk-informed technical specifications**

  The NRC recently approved a method to allow nuclear power plant operators to modify the amount of time a piece of equipment can be out-of-service while the plant is operating at power conditions. Instead of using a predetermined time limit, the new risk-informed Technical Specifications would allow the licensee to use the plant's real-time, computerized risk-monitoring capability to determine how long a piece of equipment can be out-of-service, by taking into account the overall plant risk during that time window. The first pilot application for this initiative was approved for South Texas Project in July 2007. We expect many other plants to follow this approach if the pilot is successful.

We also endorsed a risk-informed method for optimizing the frequency of performing equipment surveillance. The pilot application for this initiative was approved for the Limerick plant in September 2006. Again, we expect many other plants to follow along if the pilot is successful.

- **Risk-informed fire protection**

  We recently endorsed an alternative performance-based and risk-informed fire protection rule for operating nuclear power plants, and developed a guidance document for this approach. This rule represents an opportunity to establish a more safety-focused and better-defined regulatory framework for fire protection. Over 40 nuclear power plants have expressed an interest in adopting this alternative rule, and our staff has been conducting public meetings to support these changes.

- **PRA technical adequacy**

  We continue to work with the industry to ensure that the plant probabilistic risk assessments have the appropriate technical adequacy for application in regulatory matters. In January 2007, we published a new revision to the relevant regulatory guide to incorporate lessons learned from the development and application of PRA technology over the last several years. We are currently working on another revision to that regulatory guide to endorse the industry's combined standard on PRA and provide clarifications on our position.

- **Plan for risk-informed performance-based regulatory structure**

  In 2007, the Commission directed our staff to improve the agency's Risk-Informed Regulation Implementation Plan and create a more integrated master plan for initiatives designed to help the agency achieve the goal of a holistic, risk-informed and performance-based regulatory structure. Our staff developed the "Risk-informed Performance-based Plan" in 2007 that outlines the goals and objectives for all areas of our work and defines criteria for pursuing and reviewing the effectiveness of initiatives. Along with this plan, we revised the information on our risk-informed activities on our public website to make it more user-friendly.

[SLIDE 16]

At the third review meeting of the Convention, the United States committed to perform an Integrated Regulatory Review Service, or IRRS, self-assessment.

In the fall of 2006, we formed an inter-office IRRS self-assessment team of about 14 people. The IRRS self-assessment questionnaire was developed in collaboration with the Canadian Nuclear Safety Commission and the IAEA. It was based on an IAEA draft self-assessment tool, with supplemental questions added to assess readiness for new reactor licensing. In total, the IRRS self-assessment questionnaire consists of over 275 questions. The team reviewed the results of the IRRS self-assessment responses and developed high-level recommendations.

In June 2007, the Commission approved the staff's recommendation to invite an IRRS mission focused on power reactors to the United States in 2010, and preparations for this mission are underway. The Commission also approved the staff's recommendation to invite a small, international peer review group to review our ongoing self-assessment activities before the IRRS is conducted.

[SLIDE 17]

I will close my portion of the presentation by reviewing three of our major challenges and how we plan to meet them. All three are topics that I already discussed.

- Responding to generic safety issues, including materials degradation and sump performance.

  We continue to identify and deal with issues as soon as possible; review licensees' results in chemical effects testing for sump performance and pressurizer nozzle weld inspections

- Developing a qualified work force for the future, given the competing challenges of retirement and new work.

  We will continue to fill gaps in scientific and technical capabilities, and increase recruiting efforts and training budgets.

- Licensing new reactors while ensuring the safety of the operating fleet.

  We continue to hire and develop qualified staff in both offices, and ensure technical consistency through peer-level discussions.

Now I am pleased to introduce Admiral James O. Ellis, Jr., the President and Chief Executive Officer of the Institute of Nuclear Power Operations, or INPO. INPO is an independent, nonprofit organization—sponsored by the commercial nuclear industry—whose mission is to promote the highest levels of safety and reliability in the operation of nuclear electric generating plants. Because it is not part of the government, it can offer incentives and provide encouragement in ways that the NRC cannot. However, INPO and NRC do cooperate to promote excellence in the commercial nuclear power sector, through a Memorandum of Agreement.

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United States of America

Country Group 1

4th Review Meeting of the
Convention on Nuclear Safety
April 15, 2008

INPO

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

SLIDE 1

Presentation Outline

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- U.S. Nuclear Regulatory Commission (NRC)
  - ★ Highlights and Themes
  - ★ Follow-up from the 3rd Review Meeting
  - ★ Challenges, Good Practices, and Planned Measures
- Institute of Nuclear Power Operations (INPO)
- NRC
  - ★ Questions Asked of the US
  - ★ Conclusions

SLIDE 2

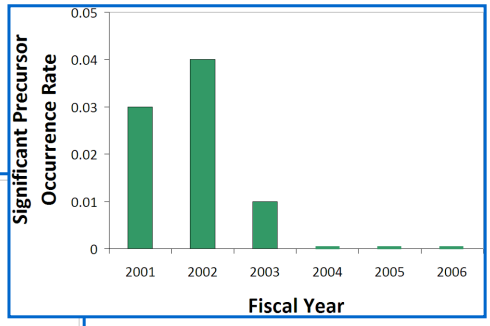
Highlights and Themes

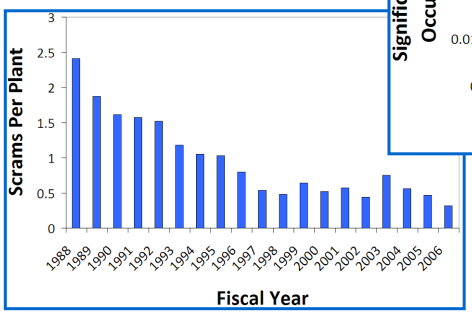
- Safe Operation
  - ★Trends in Safety
  - ★Generic Issues
- Preparation for the Future
  - ★Long-Term Operation
  - ★New/Advanced Reactors
  - ★Training and Knowledge Management
- Regulatory Openness

SLIDE 3

Safe Operation: Trends in Safety

A smaller number of events reflects a focus on safety.



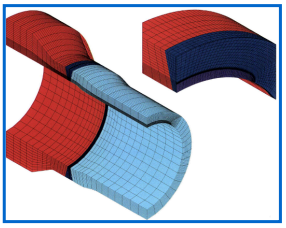


SLIDE 4

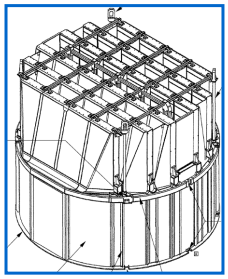
Safe Operation: Generic Issues

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

The NRC works with industry to identify safety issues early and resolve them quickly.



Materials Degradation Issues



Power Uprate Effects

Containment Sump Performance

SLIDE 5

Preparation for the Future: Long-Term Operation

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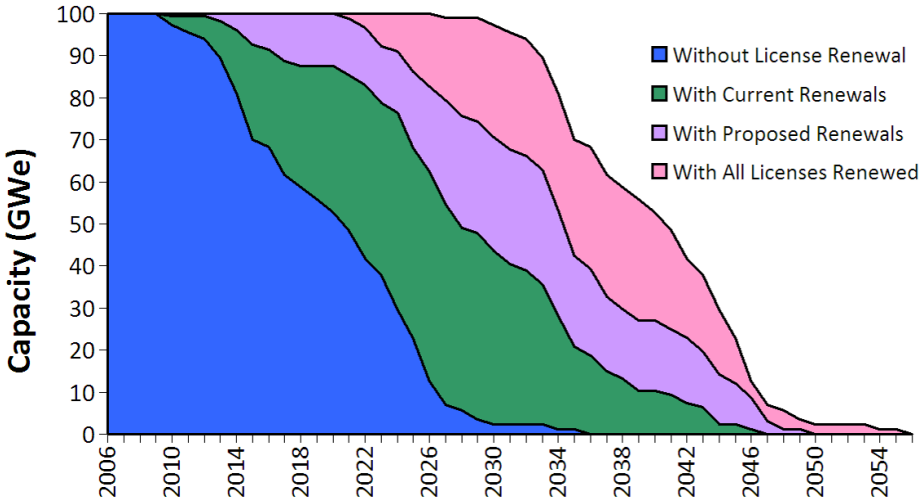
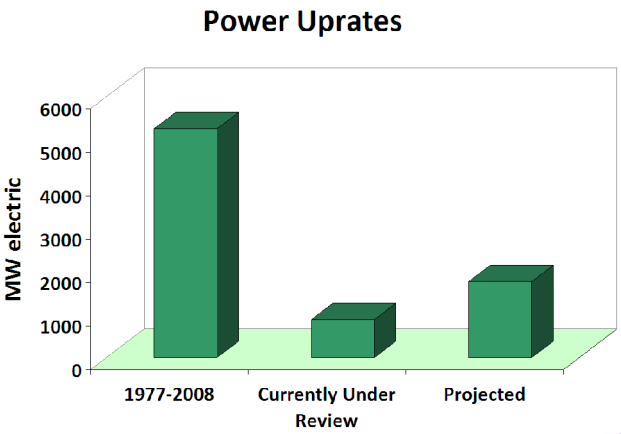
Protecting People and the Environment



SLIDE 6

Preparation for the Future: Long-Term Operation

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment



Power uprates have added the equivalent of five new reactors to the U.S. power grid.

SLIDE 7

Preparation for the Future: New/Advanced Reactors

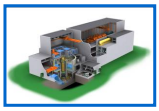
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment


Clinton

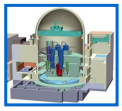

Grand Gulf

North Anna

Vogtle


ESBWR


ABWR


US-APWR


U.S. EPR


AP1000

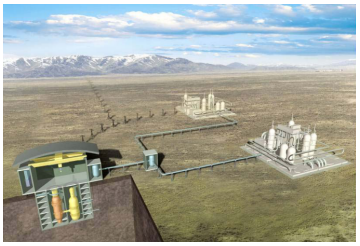
The NRC is enabling a new generation of safe, secure nuclear reactors by reviewing applications for design certifications, early site permits, and combined licenses.

SLIDE 8

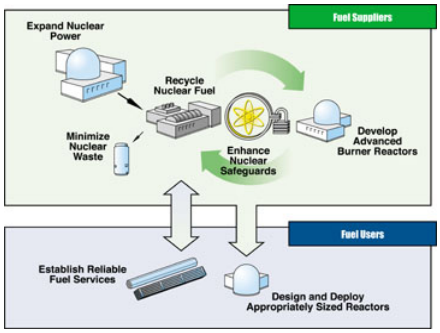
Preparation for the Future: New/Advanced Reactors

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

We are developing new regulatory structures and technical expertise to license <u>advanced reactors</u>.



Next Generation Nuclear Plant



Global Nuclear Energy Partnership

SLIDE 9

Preparation for the Future: Training & Knowledge Management

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The NRC's challenge is to <u>hire and train new staff</u>, both to support new work and to replace retirees.

New Employee Qualifications

Recruiting and Hiring

Development Programs

SLIDE 10

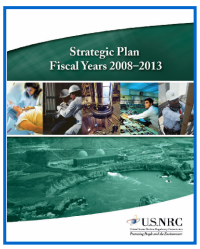
Regulatory Openness

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Improved Website

We want to communicate clearly with people who are affected by the work we do.

Fact Sheets & Brochures



Updated Strategic Plan

Regulations.gov
Your voice in Federal decision-making

New Rulemaking Site

SLIDE 11

Follow-up from 3rd Review Meeting

U.S.NRC
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- Safety-Security Interface
- Safety Culture/Management Improvements
- Risk-Informed Regulation
- IRRS Self-Assessment

SLIDE 12

Follow-up: Safety-Security Interface

U.S.NRC
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New requirements will ensure that the increased emphasis on security does not adversely affect operational safety.

SLIDE 13

Follow-up: Safety Culture Improvements

U.S.NRC
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Protecting People and the Environment

- Reactor Oversight Process
  - ★Trends in individual inspection findings
  - ★Safety culture assessments
  - ★Problem identification and resolution
  - ★Event response inspections
- NRC Internal Safety Culture
  - ★Differing Professional Opinions
  - ★Non-concurrence
  - ★Open door policy

SLIDE 14

Follow-up: Risk-Informed Regulation

- Risk-Informed Technical Specifications
  - ★Completion times
  - ★Surveillance frequencies
- Risk-Informed Fire Protection
- PRA Technical Adequacy
- Risk-Informed Performance-based Plan

SIDE 15

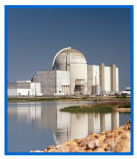
Follow-up: IRRS Self-Assessment

- Questions developed with Canada and IAEA
- 12 high-level findings by self-assessment team
- Peer review of self-assessment planned before IRRS mission
- 2010 mission will focus on operating power reactor safety

SLIDE 16

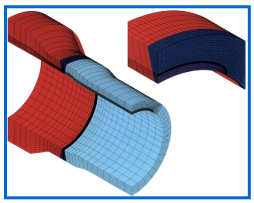
Challenges, Good Practices, and Planned Measures

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment




Licensing new reactors while ensuring the safety of the operating fleet.

Developing a qualified work force for the future.



Responding to generic issues, especially materials degradation.

SLIDE 17