U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

2011 NEW REACTOR PROGRAM

Cover

Located near Augusta, GA, workers at Vogtle Unit 3 waterproof the facility's "nuclear island," the site where the containment vessel and associated nuclear components will be placed.

Photo courtesy of Southern Company

2011 NEW REACTOR PROGRAM

OFFICE OF NEW REACTORS

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A Message from the Director

Despite the unexpected challenges and dynamic environment facing the worldwide nuclear community during the past 12 months, 2011 continued to be a year of significant progress for the New Reactor Program. The year was marked by an unwavering focus and steady momentum best evidenced in the activities and accomplishments in our core areas of new reactor licensing, vendor and construction inspections, the agency's advanced reactor program, and our increasing level of international cooperation. Yet during it all, we continued to remain instrumental in helping fulfill the agency's primary responsibility of ensuring public health and safety in the United States.

The 2011 New Reactor Program annual review reflects the wide spectrum of activities completed and the accomplishments attained in the past year. These activities and accomplishments resulted largely from the vast expertise, dedication, and hard work of our highly professional staff. This second edition of our annual review is designed to update our key stakeholders by providing information on our 2011 performance and by taking a closer look at our overall direction in the next several years.

As it has since its inception in 2006, the New Reactor Program continues to fulfill its mission to serve the public interest by enabling the safe, secure, and environmentally responsible use of nuclear power in meeting the Nation's future energy needs. As we achieve our mission, we also remain highly focused on thoroughly and thoughtfully processing our new reactor licensing reviews. This focus is consistent with our efforts to ensure openness, encourage stakeholder involvement in the review process, and facilitate an open and collaborative working environment at the U.S. Nuclear Regulatory Commission.

In 2011, the New Reactor Program completed reviews of the first combined license applications, one design certification application, and two design certification amendments and began the first design certification renewal review. In addition, the agency began to address significant policy issues related to the licensing of advanced reactors and made significant progress on refining the processes for overseeing construction activities.

The New Reactor Program is preparing for a changing workload, which will shift in the coming years from licensing large, light-water reactors toward licensing advanced reactors and overseeing construction. We remain agile in meeting these new challenges.

Our focus in 2012 and beyond is on completing the licensing activities for the design certifications and combined license applications before the agency, beginning the review of applications for advanced reactor designs, and expanding implementation of our construction inspection program to oversee construction activities as the combined licenses are issued.

In looking forward to 2012, we recognize that—although the nature of our challenges and opportunities may change—our mission, vision of success, and top priority of safety remain the same. We hope that you will find this second annual review a clear and comprehensive summary of the activities and accomplishments during the past year by the New Reactor Program, with support from the agency's Region II Center for Construction Inspection, the Office of Nuclear Regulatory Research, the Office of Nuclear Security and Incident Response, the Office of Nuclear Reactor Regulation, the Office of Administration, the Office of the General Counsel, and the Office of the Chief Financial Officer. We are also grateful to the Office of the Secretary, the Office of Federal and State Materials and Environmental Management Programs, the Office of Commission Appellate Adjudication, and the Office of the Advisory Committee on Reactor Safeguards.

Michael R. Johnson
Director
Office of New Reactors

Overview

Top, the installation of the lower mudmat takes place at the Vogtle Unit 3 nuclear island.

Above, David Matthews, Director of the Division of New Reactor Licensing (DNRL), signs the ESBWR Final Safety Evaluation Report, as Office Director Michael Johnson looks on.

Right, Commissioner William Magwood shares his observations with staff at his first NRO All Hands Meeting.

Given the well-documented and dynamic challenges faced by the worldwide nuclear community in the past year, the U.S. Nuclear Regulatory Commission (NRC) maintained its vigilance and unyielding focus in its vital role as the Nation's nuclear safety regulator. Neither the dynamic activity surrounding the global nuclear resurgence nor the devastation of unforeseen events, such as the earthquake and tsunami in Japan, could prevent the agency from fulfilling its scope of regulatory responsibilities.

For the agency's New Reactor Program, 2011 was characterized by the accomplishment of significant milestones in new reactor licensing. The Office of New Reactors (NRO) continued to serve the public interest by enabling the safe, secure, and environmentally responsible use of nuclear power in meeting the Nation's future energy needs. From the agency's headquarters in Rockville, MD, NRO carried out its myriad of activities while maintaining its close working relationship with the agency's dedicated construction inspection organization located in Atlanta, GA. The NRC Center for Construction Inspection conducts day-to-day onsite inspections nationwide and specialized inspections to facilitate the agency's oversight of new nuclear power plant construction.

As it has since its creation 5 years ago, NRO continues to benefit from the support of other agency offices, including the Office of the General Counsel, the Office of Nuclear Security and Incident Response, the Office of Nuclear Regulatory Research, the Office of Nuclear Reactor Regulation, the Office of Public Affairs, the Office of Congressional Affairs, and others.

In 2011, the New Reactor Program remained focused on its essential safety and security mission as it monitored and oversaw a host of varied industry initiatives. For example, it continues to process existing new reactor license applications in accordance with established schedules. The staff continues to bolster its oversight activities associated with the Virgil C. Summer Nuclear Station, Units 2 and 3, located in Fairfield County, SC, and Vogtle Electric Generating Plant, Units 3 and 4, under construction in Burke County, GA. These combined license (COL) applicants have indicated that their construction plans will continue on their current schedules.

Meanwhile, activity in the advanced reactor area continues to increase. Work to prepare the regulatory infrastructure for advanced reactors moves forward, including the identification and resolution of policy and key technical issues, such as security and emergency planning. The staff is also exploring how best to use risk insights to enhance the safety focus of advanced reactor reviews. Pre-application work is ongoing for an anticipated construction permit for the Tennessee Valley Authority's (TVA's) Clinch River site under Title 10 of the Code of Federal Regulations (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," and for design certification applications for the Babcock & Wilcox (B&W) mPower design and a Westinghouse Electric Corporation advanced reactor design.

Licensing

By the end of 2011, the NRC had received a total of 18 COL applications to build and operate 28 new reactors at sites nationwide. Applicants have asked the agency to suspend reviews of five of these applications, and one application, the Victoria County Station COL application, was withdrawn and resubmitted as an early site permit (ESP) application in fiscal year (FY) 2010. NRO completed the technical review of the first two COL applications (Vogtle and V.C. Summer) in August 2011 and expects to complete the review of several more in 2012.

During 2011, the New Reactor Program continued its safety and environmental review of two ESP applications submitted the previous year. These include the Victoria County Station ESP application submitted by Exelon Nuclear Texas Holdings, LLC, for a site located in Victoria County, TX, and an ESP submitted by PSEG Power, LLC, and PSEG Nuclear, LLC, for a site adjacent to the Salem Nuclear Generating Station and Hope Creek Generating Station now operating in Lower Alloways Creek, Salem County, NJ.

The 2011 activities and accomplishments featured in the section of this annual review entitled, "New Reactor Licensing," includes the significant progress made this year in the AP1000 Design Center. The staff completed its technical review of the AP1000 design certification amendment (DCA) and issued the final safety evaluation report (FSER) in August 2011. Furthermore, the NRO staff published a proposed rule for the AP1000 DCA in the *Federal Register* for public comment. The NRC received over 13,000 public comments on the proposed rule; 62 of these comments were unique. The staff "binned" the comments into about 15 common categories, addressed them in a timely manner, and prepared the final rule package for

Overview

Top, Joe Donoghue, a branch chief in the Division of Safety Systems and Risk Assessment (DSRA), enjoys a lighter moment at a division meeting.

Above, a group of NRC employees stand over the Vogtle Unit 3 mechanically stabilized earth wall and nuclear island. From left to right, Region II Branch Chief Alan Blamey, Resident Inspector Coleman Abbott, Vogtle Units 3 and 4, NRO Branch Chief Tim Frye, and Tom Kozak, senior reactor operations engineer.

Right, Commissioner William Ostendorff praises the staff for its level of professionalism and technical knowledge at a quarterly staff meeting.

the Commission's review. The Commission approved an amendment to the ABWR design certification to address aircraft impacts. In addition, the NRO staff completed the review of the Economic Simplified Boiling Water Reactor (ESBWR) design review and continued work on the U.S. Evolutionary Power Reactor (U.S. EPR) and the U.S. Advanced Pressurized Water Reactor (US-APWR) design reviews.

Oversight

In 2011, the activities performed and accomplishments achieved by the construction oversight subprogram included the inspection of a new nuclear power plant applicant's activities related to the NRC's inspections, tests, analyses, and acceptance criteria (ITAAC); the development of a construction assessment process; and continued implementation of the vendor inspection program, engineering inspections, and the construction experience program.

In 2011, the New Reactor Program conducted 18 vendor inspections and 6 quality assurance implementation inspections. These inspections determine whether applicants for design certifications, ESPs, or COLs have effectively implemented quality assurance processes and procedures into activities related to their applications. These inspections focus on assessing compliance with the provisions of 10 CFR Part 21, "Reporting of Defects and Noncompliance," and selected portions of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50.

In addition, the staff is continuing its work to develop an agency approach to minimize the potential for counterfeit, fraudulent, and suspect items (CFSIs) to enter the nuclear supply chain. The staff is working with its international counterparts in this area, since components for U.S. reactors are built throughout the world.

Advanced Reactors

Continuing a trend in recent years, the current increased interest in advanced reactors has focused on the introduction of small modular reactors (SMRs) for domestic and foreign markets. The Office of New Reactors expects to receive applications for staff review and approval for some of these designs as early as 2013.

Accordingly, the Advanced Reactor Program staff is intensifying its efforts to prepare the agency to review applications related to the design, construction, and operation of advanced reactors. This heightened focus includes identifying and resolving significant technical and licensing issues related to advanced reactors; developing the regulatory framework to support efficient and timely licensing reviews of advanced reactor designs; engaging the Department of Energy (DOE), designers, and potential applicants in meaningful pre-application interactions; and coordinating activities with internal and external stakeholders.

The staff has focused its preparation activities for the review of four integral pressurized-water reactors (iPWRs) featured in this annual review's section entitled, "Advanced Reactor Program." One of the major activities is the development of a regulatory framework for these new categories of reactors.

International

This year proved to be one of international leadership, growth, and cooperation for the New Reactor Program. During the past year, the NRO staff was instrumental in the NRC's response to the tragic events in Japan, especially NRO's geology and seismology experts who were summoned repeatedly for consultation and to support international meetings as a result of the events at Fukushima.

NRO staff and management also played important roles in the NRC's international regulatory assistance program. Under the direction of the Office of International Programs, the NRO staff participates and leads international workshops on nuclear executive training and the siting of new nuclear power plants. These workshops are given to, and are hosted by, emerging nations, or nations that are just embarking on a nuclear power program.

Similar to 2011 initiatives in the oversight area, NRO and the agency assumed a leadership role in the international community on activities related to CFSIs. These efforts resulted in the establishment of an NRO-led Nuclear Energy Agency (NEA)/ Committee on Nuclear Regulatory Activities (CNRA) task group focused on CFSIs. During the past year, NRO continued to engage international counterparts in the area of construction and vendor oversight and inspection. NRO and the staff of the NRC's Center for Construction Inspection in Region II conducted bilateral and staff exchanges with the National Nuclear Safety Administration of China regarding the AP1000 construction site at Sanmen. NRO staff also participated in numerous vendor inspections that included participation or observation by foreign counterparts from China, Korea, France, and Japan. ■

Activities & Accomplishments

Top, Division of Construction Inspection and Operational Programs (DCIP) employees, left to right, Rick Rasmussen, Kerri Kavanagh and Rich McIntyre stand inside the Vogtle Unit 3 lower steam generator shell at Doosan Heavy Industries in Changwon, South Korea.

Above, Executive Director for Operations Bill Borchardt helps present Team Player Awards at an NRO quarterly session.

Right, DNRL Branch Chief Mark Tonacci suggests a new qualification process for project management at a division gathering.

NEW REACTOR LICENSING

One of NRO's three areas of major focus, the new reactor licensing subprogram, continued to lead, manage, and facilitate design certification application reviews, ESP application reviews, COL application reviews, and associated limited work authorizations. The subprogram also maintained the necessary technical and programmatic support for new reactor licensing activities through its large-scale project management tools for scheduling and resource planning and tracking and through guidance development. The new reactor licensing subprogram led interactions with stakeholders on issues pertaining to new large, light-water reactors (LWRs).

The NRC started receiving new large LWR license applications in 2007. These applications were submitted to the NRC under 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." As of the end of calendar year 2011, the NRC had received a total of 18 COL applications to build and operate 28 new reactors at the following sites:

- Calvert Cliffs Nuclear Power Plant in Maryland
- South Texas Project in Texas
- Bellefonte Nuclear Station in Alabama
- North Anna Power Station in Virginia
- William States Lee III Nuclear Station in South Carolina
- Shearon Harris Nuclear Power Plant in North Carolina
- Grand Gulf Nuclear Station in Mississippi
- Vogtle Electric Generating Plant in Georgia
- Virgil C. Summer Nuclear Station in South Carolina
- Callaway Plant in Missouri
- Levy County Nuclear Plant in Florida
- Victoria County Station in Texas
- Fermi in Michigan
- Comanche Peak Nuclear Power Plant in Texas
- River Bend Station in Louisiana
- Nine Mile Point Nuclear Station in New York
- Bell Bend Nuclear Power Plant in Pennsylvania
- Turkey Point Nuclear Generating in Florida

Applicants for Grand Gulf, Callaway, Nine Mile Point, River Bend, and Bellefonte have asked the agency to suspend reviews of their applications. In addition, Exelon Nuclear Texas Holdings, LLC, withdrew its Victoria County Station COL application and subsequently submitted an ESP application in FY 2010. The new reactor licensing subprogram completed the technical review of the first two COL applications in 2011. In 2011, the NRC received no new COL applications. The current review schedule for new reactor COL applications appears on the NRC public Web site at http://www.nrc.gov/reactors/new-reactors/col.html.

By issuing an ESP, the NRC approves a site for a nuclear plant, independent of an application for a COL, based on its review of site safety, environmental protection, and some aspects of emergency planning.

To date, the NRC has issued 4 ESPs to the following applicants:

- System Energy Resources, Inc. (Entergy), for the Grand Gulf site in Mississippi
- Exelon Generation Company, LLC, for the Clinton Power Station site in Illinois
- Dominion Nuclear North Anna, LLC, for the North Anna site in Virginia
- Southern Nuclear Operating Company for the Vogtle site in Georgia (includes a limited work authorization)

In 2011, the NRC began its safety and environmental reviews of an ESP application submitted by Exelon Nuclear Texas Holdings, LLC, for a site in Victoria County, TX, and an application submitted by PSEG Power, LLC, and PSEG Nuclear, LLC, for a site adjacent to the Salem and Hope Creek stations now in operation in Lower Alloways Creek, Salem County, NJ.

Activities & Accomplishments

Top, DNRL Deputy Director Frank Akstulewicz helps field an inquiry at an office All Hands Meeting.

Above, Office Director Michael Johnson, Scott Flanders, Director of the Division of Site Safety and Environmental Analysis (DSEA), and DNRL's Frank Akstulewicz participate in a Commission mandatory hearing on South Carolina Electric & Gas Company's combined license application to build and operate V.C. Summer Units 2 and 3.

Right, led by NRO Senior Geologist Gerry Stirewalt, kneeling, a team of headquarters and Region II employees participate in a V.C. Summer Unit 2 excavation. Stirewalt examines a vein that crosscuts foundtion grade-level rock units.

In 2011, the NRC initiated prelicensing activities for the Blue Castle Generation Project ESP application that the agency expects to receive in FY 2012 or FY 2013.

The current review schedule for new reactor ESP applications appears on the NRC public Web site at http://www.nrc.gov/reactors/new-reactors/esp.html. The NRC did not receive any new ESP applications in 2011.

A design certification approves a plant design independent of an application to construct or operate a plant. To date, the NRC has issued design certifications for the following four reactor designs that can be referenced in an application for a nuclear power plant:

- General Electric-Hitachi Nuclear Energy's (GEH's) advanced boiling-water reactor (ABWR)
- Westinghouse's System 80+
- Westinghouse's Advanced Passive 600
- Westinghouse's AP1000

The NRC completed the safety reviews for the ESBWR design, the ABWR aircraft impact assessment rule amendment, and the AP1000 design amendment in 2011. These certifications and amendments are currently in the rulemaking process.

The NRC continues to review the following design certification applications:

- AREVA's U.S. EPR
- Mitsubishi Heavy Industries' US-APWR

The NRC did not receive any new large LWR design certification applications or any new large LWR DCA applications in 2011. The NRC received two design certification renewal applications for the ABWR in late 2010. GEH submitted one application, and Toshiba American Nuclear Energy submitted the other.

The current review schedule for new reactor design certification applications and DCA applications appears on the NRC public Web site at http://www.nrc.gov/reactors/new-reactors/design-cert.html.

During 2011, the NRO staff made significant progress on projects in the AP1000 Design Center. Once approved, the amended AP1000 design will be the first of its kind to be constructed in the United States in the near future. The NRO staff completed the technical review of the AP1000 DCA and issued the FSER on August 5, 2011.

Further, the NRO staff published a proposed rule for the AP1000 DCA in the *Federal Register* for public comment. The 75-day comment period ended on May 10, 2011. The NRC received over 13,000 public comments on the proposed rule; 62 of these comments were unique. The staff "binned" all comments into approximately 15 common categories. The staff resolved these comments in a timely manner and prepared the final rule package for the Commission's review.

"One of NRO's three areas of major focus, the new reactor licensing subprogram, continued to lead, manage, and facilitate design certification application reviews, ESP application reviews, COL application reviews, and associated limited work authorizations."

In 2011, the NRO staff also effectively addressed three nonconcurrences filed by the staff on the FSER for the AP1000 DCA. Management engaged the staff proactively, welcomed the alternative viewpoints, and discussed the issues openly. The staff presented its viewpoints to agency senior managers and to the Advisory Committee on Reactor Safeguards (ACRS).

The NRO staff completed the V.C. Summer and Vogtle advanced FSERs. ACRS concluded that there is reasonable assurance that the proposed units can be built and operated without undue risk to public health and safety. The NRO staff has issued the final environmental impact statement (FEIS) for the V.C. Summer COL application and the supplemental FEIS for the Vogtle COL application and completed the mandatory hearings for these projects.

The staff developed its first COL SECY paper template and submitted the first two COL SECY papers on the Vogtle and V.C. Summer COL applications to the Commission.

New Nuclear Power Plant Applications Updated December 8, 2011								
Company (Project or Docket Numbers)	**Date of Application**	**Design**	**Date Accepted**	**Site Under Consideration**	**Number of Units**	**State**	**Existing Operating Plant**	**Status**
Calendar Year (CY) 2007 Applications								
NRG Energy (52-012/013)	09/20/07	ABWR	11/29/07	South Texas Project	2	TX	Y	Accepted/Docketed
NuStart Energy (52-014/015)	10/30/07	AP1000	01/18/08	Bellefonte	2	AL	N	Suspended
UNISTAR (52-016)	07/13/07 (Envir.) 03/13/08 (Safety)	EPR	01/25/08 06/03/08	Calvert Cliffs	1	MD	Y	FEIS Published Accepted/Docketed
Dominion (52-017)	11/27/07	USAPWR	01/28/08	North Anna	1	VA	Y	Accepted/Docketed
Duke (52-018/019)	12/13/07	AP1000	02/25/08	William Lee Nuclear Station	2	SC	N	Accepted/Docketed
2007 Total Number of Applications = 5 **Total Number of Units = 8**								
Calendar Year (CY) 2008 Applications								
Progress Energy (52-022/023)	02/19/08	AP1000	04/17/08	Harris	2	NC	Y	Accepted/Docketed
NuStart Energy (52-024)	02/27/08	ESBWR	04/17/08	Grand Gulf	1	MS	Y	Suspended
Southern Nuclear Operating Co. (52-025/026)	03/31/08	AP1000	05/30/08	Vogtle	2	GA	Y	Review Complete
South Carolina Electric & Gas (52-027/028)	03/31/08	AP1000	07/31/08	Summer	2	SC	Y	Review Complete
Progress Energy (52-029/030)	07/30/08	AP1000	10/06/08	Levy County	2	FL	N	Accepted/Docketed
Exelon Nuclear Texas Holdings, LLC	09/03/08	ESBWR	10/13/08	Victoria County Station	2	TX	N	Withdrawn
Detroit Edison (52-033)	09/18/08	ESBWR	11/25/08	Fermi	1	MI	Y	Accepted/Docketed
Luminant Power (52-034/035)	09/19/08	USAPWR	12/02/08	Comanche Peak	2	TX	Y	Accepted/Docketed
Entergy (52-036)	09/25/08	ESBWR	12/04/08	River Bend	1	LA	Y	Suspended
AmerenUE (52-037)	07/24/08	EPR	12/12/08	Callaway	1	MO	Y	Suspended
UNISTAR (52-038)	09/29/08	EPR	12/11/08	Nine Mile Point	1	NY	Y	Suspended
PPL Generation (52-039)	10/10/08	EPR	12/19/08	Bell Bend	1	PA	Y	Accepted/Docketed
2008 Total Number of Applications = 12 **Total Number of Units = 18**								
Calendar Year (CY) 2009 Applications								
Florida Power and Light (763)	06/30/09	AP1000	09/04/09	Turkey Point	2	FL	Y	Accepted/Docketed
2009 Total Number of Applications = 1 **Total Number of Units = 2**								
Calendar Year (CY) 2010 Applications								
No Letters of Intent have been received from applicants expressing their plans to submit new COL applications in CY 2010								
2010 Total Number of Applications = 0 **Total Number of Units = 0**								
Calendar Year (CY) 2011 Applications								
No applicants submitted new COL or ESP applications in CY 2011								
2011 Total Number of Applications = 0 **Total Number of Units = 0**								

The NRO staff also made significant progress on other design certification activities. The staff completed its safety review of the ESBWR and issued the FSER and final design approval in March 2011. The staff completed its review of an amendment to the certified ABWR design in late 2010 and published the proposed rule in January of 2011. The NRC expects to issue the final rule for the ABWR amendment in the near future. The NRO staff is reviewing one COL application (South Texas Project) that references the amended ABWR design certification. The staff issued the FEIS for the South Texas Project COL application in February 2011.

In the U.S. EPR Design Center, the staff evaluated several key technical challenges, such as the U.S. EPR cooling water systems, and issued the FEIS for the Calvert Cliffs COL application.

In the US-APWR Design Center, the NRO staff issued the FEIS for the Comanche Peak COL application. In addition, with regard to the US APWR design certification review, the NRO staff made substantial progress on the difficult technical topics of digital instrumentation and control system, seismic and structural analysis, and the Generic Safety Issue 191, "Assessment of Debris Accumulation on PWR Sump Performance," analysis for the US-APWR design control document.

Other noteworthy new reactor licensing subprogram accomplishments in 2011 include the following:

- The staff communicated a new process for "changes during construction," providing insights from a regulatory, industry, and applicant perspective on the importance of planning for post-COL license activities.

- The staff developed process recommendations for the Commission to consider to effectively and efficiently address new 10 CFR Part 52 activities. The staff developed new hearing schedule models to include contested/mandatory hearing activities and SECY paper development tasks for end-of-project phases.

- The staff standardized and deployed an automated project performance reporting system that increased staff effectiveness and efficiency and resulted in cost savings of over $1 million.

Ralph Landry, a senior level advisor, and John McKirgan, Chief, Containment and Ventilation Branch, participate in a divisional meeting on safety systems.

Activities & Accomplishments

Top, Reactor Operations Engineer James Gaslevic discusses licensee commitments to utilizing the Inspections, Tests, Analyses, and Acceptance Criteria, or ITAAC, closure guidance in NEI 08-01 and Regulatory Guide 1.215.

Above, the NRC inspection team joins members of the Obayashi Corporation, Westinghouse, and observers from the Japan Nuclear Energy Safety Organization at a Obayashi facility in Tokyo, Japan.

Right, the Vogtle Unit 3 containment vessel bottom head plate.

OVERSIGHT

Construction Inspection Program

In 2011, the NRC continued to inspect nuclear power plant construction activities to verify compliance with the agency's regulations and to ensure that the new plants are constructed to protect public health and safety and the environment. For these inspections, the NRC staff continued to follow the inspection program developed for the construction activities of these plants licensed under 10 CFR Part 52.

The new reactor inspection program incorporates the elements in 10 CFR Part 52, such as ITAAC that are included in the COL license and that provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria are met, the facility has been constructed and will operate in conformity with the COL and the NRC's regulations. The inspection program also incorporates lessons learned from the inspection program used in previous construction for plants licensed under 10 CFR Part 50 and considers modular construction at remote locations.

"The construction experience program provides NRC inspectors and NRO technical reviewers with insights on the design, construction, and preoperational testing of new reactors. The program supports the issuance of information notices, operating experience communications on construction-related insights and lessons learned, and construction experience issues for resolution of events that require further technical evaluation."

The NRC inspection program is the means by which inspectors track and inspect construction activities at the site. Most of the activities will be conducted by resident inspectors, supplemented when necessary with regional inspectors. Over time, the number of resident inspectors working full time at the site will increase to about five inspectors at sites with one unit and seven inspectors at construction sites with two units. During construction, inspectors sample the spectrum of the licensee's activities related to the ITAAC in the license to confirm that the licensee is adhering to quality and program requirements. Inspectors will also perform additional inspections of operational programs to provide assurance that these activities and programs are in compliance with program requirements.

The agency has in place the structure and procedures required to conduct necessary oversight for ongoing and near-term construction activities. Inspection manual chapters and inspection procedures document the process for oversight of new reactor construction. The NRC has approved all inspection procedures that are necessary to implement inspections of licensee activities related to ITAAC and has issued them for use. The NRC continues to make significant progress in the development and improvement of programs and procedures to support inspection of activities that occur later in construction. The procedures include those necessary for inspection of licensee operational readiness. These remaining procedures are in development, and their planned completion in 2012 will fully support the inspection requirements for those applicants with the earliest construction schedules.

The NRC has been executing construction inspection activities associated with the Vogtle limited work authorization. In 2010, safety-related construction officially began at Vogtle Unit 3, with the start of engineered backfill operations authorized under the limited work authorization. Safety-related activities are also taking place at Vogtle Unit 4. NRC Region II construction inspectors were present to view the initial activities and to begin the first onsite ITAAC inspection.

Additionally, Region II has placed the construction senior resident inspector and resident inspector for Vogtle Units 3 and 4. It has also inspected portions of the quality assurance program associated with the limited work authorization activities that the licensee had completed at the time of the inspection. The inspections did not identify any significant issues.

Inspections, Tests, Analyses, and Acceptance Criteria

The NRC staff continues to refine its approach to ITAAC closure and to ensure the maintenance of closed ITAAC. The staff held several public workshops to solicit input and exchange views related to ITAAC completion, closure documentation, and ITAAC maintenance. The Nuclear Energy Institute (NEI), industry representatives, and other external stakeholders participated in these public workshops. Based on the discussions in these workshops, the NRC

Activities & Accomplishments

Top, Justin Fuller, the Senior Construction Resident Inspector Vogtle Units 3 and 4, checks the storage and handling of waterproofing membrane.

Above, workers install waterproofing membrane at the Vogtle Unit 3 nuclear island.

The time-lapse series of photos at the bottom of this page and the next illustrate the various stages of construction of the Vogtle Unit 3 modular assembly building, in which large components will be assembled before being placed inside the nuclear facility.

staff developed and issued Regulatory Guide 1.215, "Guidance for ITAAC Closure under 10 CFR Part 52," which endorses the industry guidance for ITAAC closure as documented in NEI 08 01, "Industry Guideline for the ITAAC Closure Process under 10 CFR Part 52." This year, the staff also issued for public comment Draft Regulatory Guide 1250, "Guidance for ITAAC Closure under 10 CFR Part 52," to incorporate the reporting requirements in the proposed amendment to 10 CFR Part 52 related to ITAAC maintenance.

The NRC staff and various industry stakeholders recently participated in a simulated ITAAC closure and verification demonstration project. The demonstration was intended to verify that both the industry ITAAC closure process and the NRC ITAAC verification process could reliably and efficiently support ITAAC closure. In addition to the NRC, participants in this exercise included DOE as project sponsor, NEI, Westinghouse, and Southern Nuclear Company. The demonstration began in July 2010 and concluded in April 2011.

Based on the results of the demonstration and interactions among participants, several lessons learned and next steps were identified and documented in a summary report that was issued in July 2011. The lessons learned from the demonstration have already proven valuable in the resultant changes and refinements to the processes that staff members follow to determine that all acceptance criteria are met and to send their recommendations to the Commission that the loading of fuel into the reactor is acceptable.

The staff expects to review and discuss the additional ITAAC closure examples submitted by industry during the construction inspection program workshop series throughout 2012.

Construction Reactor Oversight Process

Inspection Manual Chapter 2505, "Periodic Assessment of Construction Inspection Program Results," dated September 9, 2010, describes the NRC's construction assessment process. Implementation of the process began in July 2010 with an assessment of performance related to construction activities at the Vogtle site. In 2011, the NRC completed the first semiannual performance review of Vogtle Units 3 and 4, which covered the period between July 1, 2010, and December 31, 2010. The NRC transitioned to an annual performance review cycle on January 1, 2011. The NRC completed a midcycle review that covered the period from January 1, 2011, through June 30, 2011. Plant performance for Vogtle Units 3 and 4 for both review periods was within the baseline program column of the NRC's construction action matrix, based on the categorization of all inspection findings at Severity Level IV (i.e., minor violations).

In early 2011, the Commission directed the staff to develop a construction assessment program that includes a regulatory framework, the use of a construction significance determination process to determine the significance of findings identified during the construction inspection program, and the use of a construction action matrix to determine the appropriate NRC response to degrading licensee performance. The staff routinely met with external stakeholders to finish the developmental work for this task and to pilot the new construction assessment program in parallel with the current assessment process for 12 months beginning January 1, 2012. The staff will update the Commission and brief ACRS as directed in SRM SECY-10-0140, "Staff Requirements—SECY-10-0140—Options for Revising the Construction Reactor Oversight Process Assessment Program," dated March 21, 2011.

(Photos courtesy of Southern Company)

Activities & Accomplishments

Top, foundation construction continues for the Vogtle Unit 3 cooling tower.

Above, NRC Chairman Gregory Jaczko, the agency's other Commissioners, and NRO officials discuss ITAAC-related issues at a information briefing for the Commission.

Right, Frankie Vega, a geotechnical engineer in DSEA, takes a closer look at weathered rock, while standing on the foundation-bearing layer at the V.C. Summer Unit 2 excavation site.

Enforcement Program

NRO enforcement activities include processing enforcement actions associated with 10 CFR Part 52 licenses and coordinating reviews with the Office of Enforcement and the regional offices. Recently, the NRO staff developed and issued Enforcement Guidance Memorandum 11 002, "Enforcement Discretion for Licensee Identified Violations at Power Reactor Construction Sites pursuant to Title 10 of the Code of Federal Regulations Part 52," dated June 3, 2011, to encourage licensees to identify and correct performance issues. This document provides guidance to the staff to exercise enforcement discretion when dispositioning Severity Level IV licensee identified violations at power reactors that are under construction as noncited violations.

Furthermore, the NRO staff continues to work with the Office of Enforcement to revise the NRC Enforcement Policy to address recent lessons learned at reactors under construction as directed by the Commission. The staff is continuing its work to develop an agency approach to exercise enforcement discretion during construction.

Construction Experience Program

The construction experience program provides NRC inspectors and NRO technical reviewers with insights on the design, construction, and preoperational testing of new reactors. The construction experience program supported the issuance of 4 information notices, 11 operating experience communications on construction-related insights and lessons learned, and 11 construction experience issues for resolution of events that required further technical evaluation. In addition, the agency is incorporating lessons learned from the construction experience program's event evaluations and reviews into NRC programs. For example, the NRC is revising two inspection procedures and developing a new ITAAC for the ABWR turbine building seismic design.

NRO Allegations Program

In accordance with Management Directive 8.8, "Management of Allegations," dated November 15, 2010, the NRC must review and resolve allegations and consider appropriate enforcement action, when warranted.

With support from the Office of Nuclear Reactor Regulation allegations team, the NRO allegations team coordinates the review of allegations related to new reactors, specifically those concerning 10 CFR Part 52 vendors and generic technical and licensing matters. The NRO allegations team serves as the main point of contact for NRO allegations to ensure that followup actions, such as inspections, audits, and technical reviews, are completed in a timely manner to establish the validity of the allegation. Additionally, the NRO allegations team works closely with the Office of Investigations and Office of the General Counsel when allegations involve wrongdoing or discrimination.

Vendor and Quality Assurance Inspections

The construction oversight subprogram also conducts oversight of manufacturers and suppliers of safety-related components. As in previous years, in 2011, NRC inspectors investigated licensees' appropriate implementation of technical requirements and their compliance with quality assurance and defect reporting requirements. The NRC conducts vendor inspections at manufacturer and supplier facilities principally to examine, through observation of safety-significant activities, their compliance with Appendix B to 10 CFR Part 50, as required by procurement contracts with licensees.

The NRC issues notices of nonconformance violations to manufacturers and suppliers for failures to meet quality commitments or the requirements in 10 CFR Part 21. In addition, the NRC observes licensees' oversight of manufacturers and suppliers. Licensees typically perform their oversight audits through participation on the Nuclear Procurement Issues Committee.

Meanwhile, NRO continues to perform inspections to determine whether applicants for design certifications, ESPs, or COLs have effectively implemented quality assurance processes and procedures for activities related to their applications. The inspection focuses on assessing applicant compliance with the provisions of 10 CFR Part 21 and selected portions of Appendix B to 10 CFR Part 50.

In 2011, the staff conducted 18 vendor inspections and 6 quality assurance implementation inspections.

The staff is continuing its work to develop an agency approach for minimizing the potential for CFSIs to enter the nuclear supply chain. The staff established four working groups to evaluate agency requirements

Activities & Accomplishments

Top, Sarah Alexander, Region II Construction Inspector, and Rahsean Jackson, Senior Construction Resident Inspector V.C. Summer, staff the night shift at the Vogtle Unit 3 nuclear island to observe waterproofing membrane installation activities.

Above, Gerry Stirewalt, a senior geologist, carefully studies a discontinuous layer of weathered rock as part of the V.C. Summer Unit 2 excavation.

Right, Justin Fuller, Senior Construction Resident Inspector Vogtle Units 3 and 4, inspects the mudmat surface preparation for the Vogtle Unit 3 nuclear island.

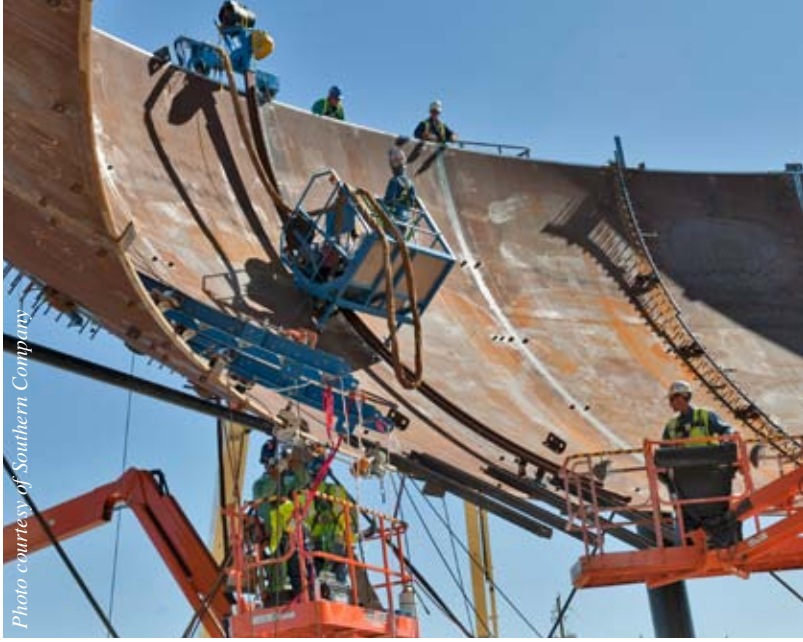
and guidance, nuclear industry practices, the practices of other industries, and other information related to CFSIs. Based on the efforts of the working groups and on information obtained at a public meeting, the staff developed a list of gaps or areas for improvement and recommended actions and provided the Commission with this list and actions and an implementation plan in October 2011.

The staff began work on rulemaking to clarify 10 CFR Part 21. The staff formed an interoffice working group to develop areas for improvement and recommendations. The working group focused on reporting and evaluating defects and commercial grade dedication. The staff expects extensive stakeholder involvement in this process and hosted a public meeting on August 1, 2011, to seek early input. To date, the staff has presented the preliminary rulemaking issues to industry groups and at the 2011 Regulatory Information Conference. The staff issued a Commission paper on 10 CFR Part 21 rulemaking in September 2011.

Engineering Design Verification Inspections

In 2011, the NRC staff conducted the first of its engineering design verification inspections for the AP1000 design. Through a detailed technical review of selected systems, the engineering design verification inspection provides the NRC with an opportunity to assess the design authority's implementation of its processes for completing and controlling the detailed design. This inspection provides reasonable assurance that the design authority's processes are sufficient to result in the complete and accurate transfer of the high-level design information in the final safety analysis report to detailed engineering, procurement, and construction documents consistent with NRC requirements.

Successful completion of these inspections will provide confidence in the validity of the resulting detailed design information that COL holders may ultimately use to support the closure of ITAAC. The results of these inspections could also inform the staff of areas that could require further licensing actions.



Above, welding on some of the 58 steel plates that will form the Vogtle Unit 3 containment vessel bottom head.

Aircraft Impact Assessment Inspections

The agency amended its regulations to require applicants for new nuclear power reactors to perform a design-specific assessment of the effects of the impact of a large commercial aircraft on the facility. The rule in 10 CFR 50.150, "Aircraft Impact Assessment," requires each applicant to use realistic analyses to identify and incorporate design features and functional capabilities to show, with a reduced use of operator actions, that either the reactor core remains cooled or the containment remains intact and that either spent fuel cooling or spent fuel integrity is maintained.

The NRC performs inspections to verify that applicants for new nuclear power plant designs have effectively implemented the aircraft impact regulations such that, with a reduced use of operator action, their design can withstand the effects of a large commercial aircraft impact. During 2011, the NRC staff revised the aircraft impact inspection procedure, continued an inspection initiated in 2010, and performed a detailed engineering review on the structural design of the AP1000 shield building and other safety-related structures.

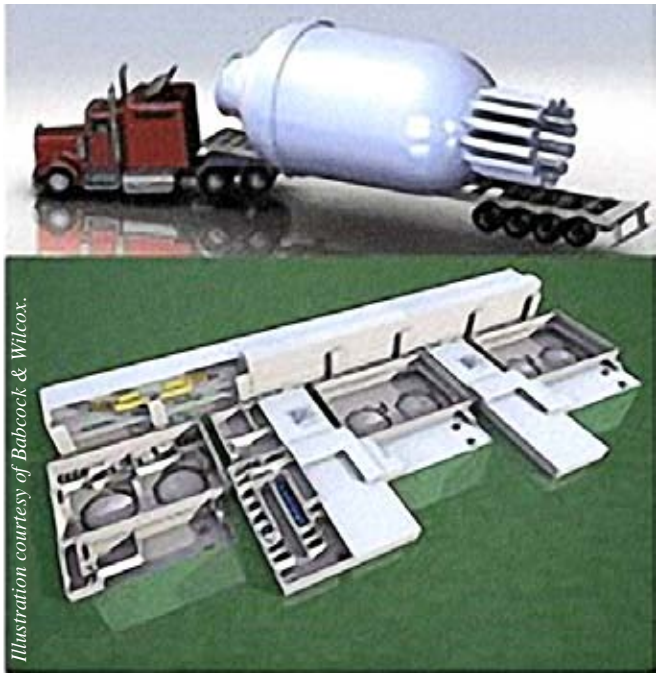


Illustration courtesy of Babcock & Wilcox.

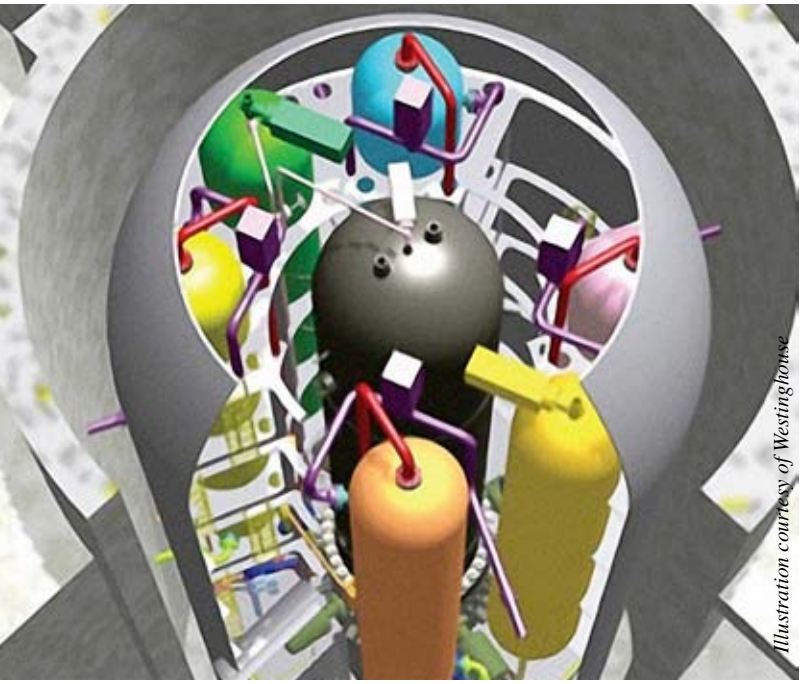


Illustration courtesy of Westinghouse

Activities & Accomplishments

Top and above, the illustrations convey the size differential, transportability, and the overall flexibility of a small modular reactor.

ADVANCED REACTOR PROGRAM

Reactor designers are developing a number of small LWR and non-LWR designs that apply innovative solutions to technical nuclear power issues. In addition to the traditional role of providing base load electricity, these advanced reactor designs could be used for generating electricity in isolated areas or for producing high-temperature process heat for industrial purposes. The current increased interest in advanced reactors is focused on the introduction of small LWRs for both domestic and foreign markets. These small LWRs and some of the non-LWR designs are often referred to as SMRs. The Office of New Reactors expects to receive an application for the staff's review and approval of a small LWR design as early as 2012 and additional applications for other small LWR designs in the following years.

Accordingly, the NRC's advanced reactor program is intensifying its efforts to prepare the agency for reviews of applications related to the design, construction, and operation of advanced reactors. These efforts include the following actions:

- Identify and resolve significant technical and licensing issues related to advanced reactors.
- Develop the regulatory framework to support efficient and timely licensing reviews of advanced reactor designs.
- Engage DOE, designers, and potential applicants in meaningful pre-application interactions and coordinate activities with internal and external stakeholders.

In preparing for prospective applications, the staff has developed and implemented a series of issue identification and ranking projects that have helped identify and prioritize issues under NRC control that could impede the design, licensing, construction, operation, or export of SMRs. The staff has completed issue identification and ranking projects for emergency planning, operator staffing, security, and source term issues. The advanced reactor program has solicited the assistance of other NRC offices to examine all possible concerns with each issue.

"The NRC's advanced reactor program is intensifying its efforts to prepare the agency for reviews of applications related to the design, construction, and operation of advanced reactors, including identifying and resolving significant technical and licensing issues related to these reactors."

In 2011, the advanced reactor program staff, with support from several national laboratories, identified technical issues for the various advanced reactor technologies and is preparing revised guidance to support applicants and the NRC staff. Some technical issues have the potential to influence design decisions. Leaving these issues unaddressed before receipt of the applications would greatly complicate the licensing process, reduce the efficiency of the staff, and likely extend the review schedules.

In order to ensure close coordination between the NRC and its stakeholders and the timely resolution of the issues, the staff and NEI have established regularly held public meetings to discuss generic approaches for resolving the policy, licensing, and key technical issues for the spectrum of advanced reactor technologies. These issues include the annual fee structure, the requirements for staffing, and the use of risk insights in reviews.

Fee Structuring

The staff initiated the review of fee structuring to examine whether the existing single annual fee structure for power reactors was appropriate in view of the potential for the future licensing of SMRs. As a result of the review, the staff proposed the development of a variable annual fee structure for SMRs. The staff will change the rules for collecting annual fees in the future, as necessary.

Staffing

Presently, NRC regulations dictate specific staffing requirements (e.g., the number of control room operators) based on the number of reactors in a plant. These regulations are based on assumptions and operating experience from large LWRs. Vendors of small LWRs believe that the use of fewer members can be justified because the operation of their designs is simpler and relies on more passive and automatic controls. The NRC staff agrees that the potential exists for different tasks for the operators and that ultimately the roles, responsibilities, composition, and size of the crews necessary to control plant operations may be different. The staff is developing additional guidance and working with various industry groups to resolve this issue.

Courtesy of Tennessee Valley Authority, Inc.

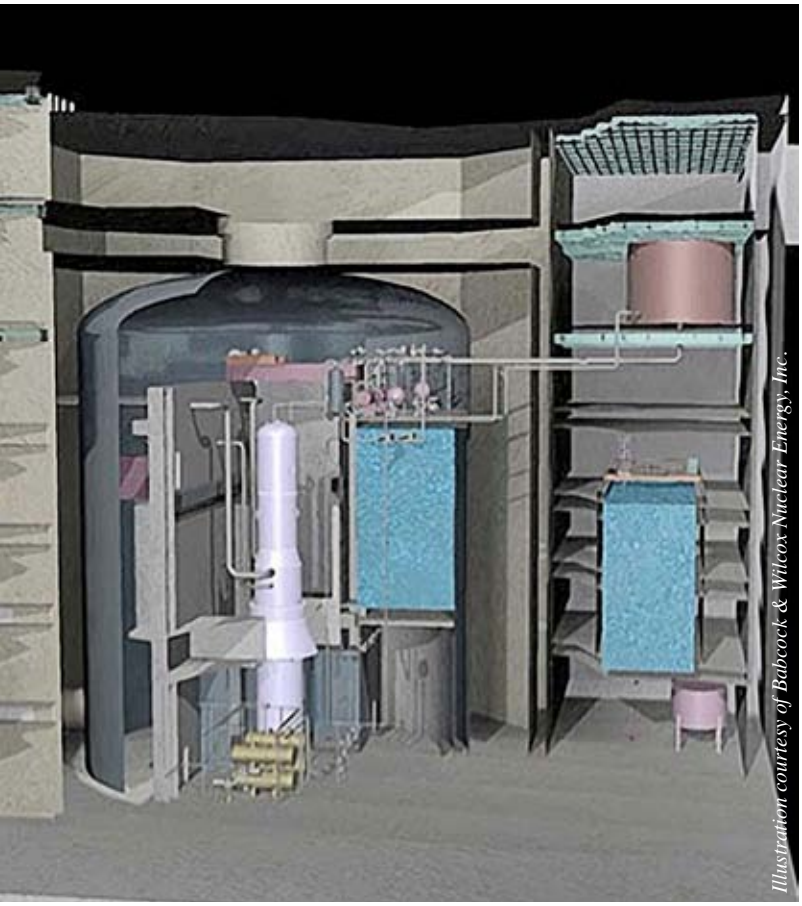


Illustration courtesy of Babcock & Wilcox Nuclear Energy, Inc.

Activities & Accomplishments

Top, the illustration shows an aerial view of the proposed Tennessee Valley Authority facility at Clinch River that will house a Babcock & Wilcox mPower™ small modular reactor.

Above, a look inside the Babcock & Wilcox mPower™ containment building.

Use of Risk Insights for Integral Pressurized-Water Reactor Reviews

The Commission directed the NRC staff to integrate the use of risk insights more fully into pre-application activities and the review of SMR applications, with near-term focus on iPWR designs. The Commission's objective is to align the review focus and resources with the risk significant structures, systems, and components and other aspects of the design that contribute the most to safety. This approach would enhance the efficiency of the review process while ensuring the safety of the design. The Commission directed the staff to develop a design-specific, risk-informed review plan for each SMR to address pre-application and application review activities. In response, the staff proposed a framework for reviewing iPWR designs and has begun to develop the review plan for the first small LWR design.

In addition to its work on generic issues, the staff has focused on preparation activities for the review of two small LWRs and is continuing to support the Next Generation Nuclear Plant (NGNP) program in cooperation with DOE.

The sections to follow briefly summarize the advanced reactor designs for which the NRC staff is currently engaging in pre-application activities.

Next Generation Nuclear Plant

The NGNP project was established in accordance with the Energy Policy Act of 2005, which defines the NGNP as a full-scale prototype plant that will be reliable, safe, proliferation resistant, and economical and that will demonstrate the commercial potential of the plant's design and associated technologies. The NGNP's mission is to provide high-temperature process heat for the chemical industry, refine petroleum, extract oil from shale and tar deposits as an alternative to natural gas, produce hydrogen, and serve as a central electric power station.

To meet this mission, DOE has concluded that the NGNP should be a gas-cooled, very high-temperature reactor. DOE is conducting the NGNP project in two phases. Phase 1 includes the selection and validation of the appropriate technology and the support of research and development activities. DOE will determine whether to proceed with Phase 2 in early FY 2012. The NRC is presently reviewing white papers that address aspects of gas-cooled, very high-temperature reactor technology, including a risk-informed, performance-based framework; high-temperature materials; mechanistic source term; and fuel qualification. Prospective vendors can use review findings to assist in the development of a detailed NGNP design.

NuScale Power, Inc.

The NuScale modular reactor is a 160 megawatts thermal (MWt) 45 megawatts electric (MWe), natural circulation, small LWR design that consists of an integrated assembly that includes the reactor core, pressurizer, control rods, and two helical steam generators—all located within the reactor vessel. NuScale is proposing that each plant be designed to accommodate up to 12 completely independent modules (reactor vessel and containment) for a total plant electrical capacity of up to 540 MWe.

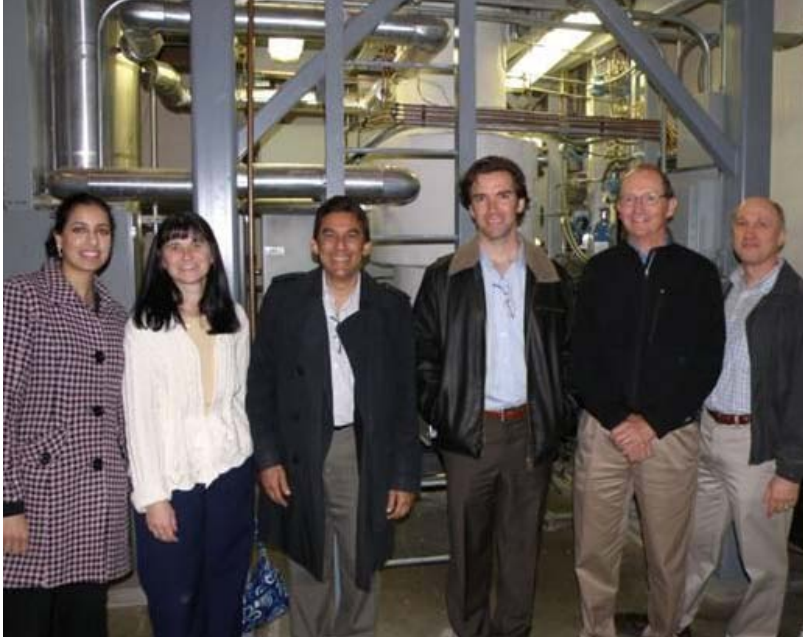
NuScale is currently in the pre-application review phase with the NRC and is scheduled to file its formal application for design certification in late 2012. The NRC has received topical reports in areas such as quality assurance, human factors, and codes and methodologies. NuScale and the NRC also have discussed aspects of the plant design at various public meetings.

In January 2011, the U.S. Securities and Exchange Commission initiated a civil action against NuScale's principal investor. This action forced NuScale to significantly reduce its spending and staffing level. In May 2011, the NRC received a progress status report from NuScale indicating that the company has been successful in attracting additional investors to provide the stable long-term funding that will allow NuScale to commence pre-application activities and to rehire its employees. NuScale expects to resume pre-application activities with the NRC early in 2012.

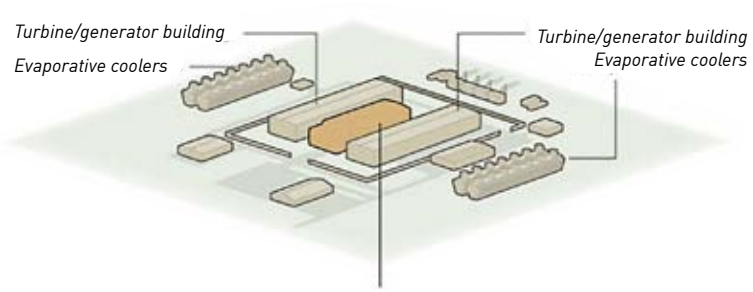
Babcock & Wilcox mPower™

The B&W mPower reactor is a 500 MWt (150 MWe) LWR that consists of a self-contained module with the reactor core, reactor coolant pumps, and steam generator located in a common reactor vessel that is installed in an underground containment. The module uses a conventional reactor core with standard LWR fuel and no external pressurizer. Systems rely on existing LWR technology and off-the-shelf components.

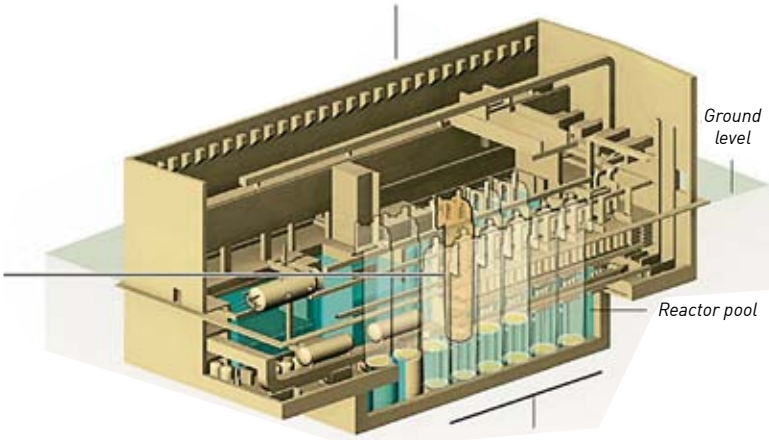
NRO has conducted pre-application activities with B&W since mid-2009. During 2011, the staff



NUSCALE MODULAR POWER PLANT



NUSCALE REACTOR BUILDING
Twelve small reactors together generate 540 megawatts, about the same capacity as some smaller conventional reactors.



12 nuclear reactor modules
NUSCALE PLANT
Reactors are underground.

Illustration courtesy of NuScale

Activities & Accomplishments

Top, NRC staff members participated in a meeting with NuScale officials at the company's facilities in Corvalis, OR, to discuss pre-application activities for the NuScale small modular reactor design.

Left to right, Samina Shaikh and Joelle Starefos of NRO, Jose Reyes of NuScale, John Smith (former NRC employee), and NRO's Greg Cranston and Stewart Magruder.

Above, a schematic of a NuScale modular reactor power plant.

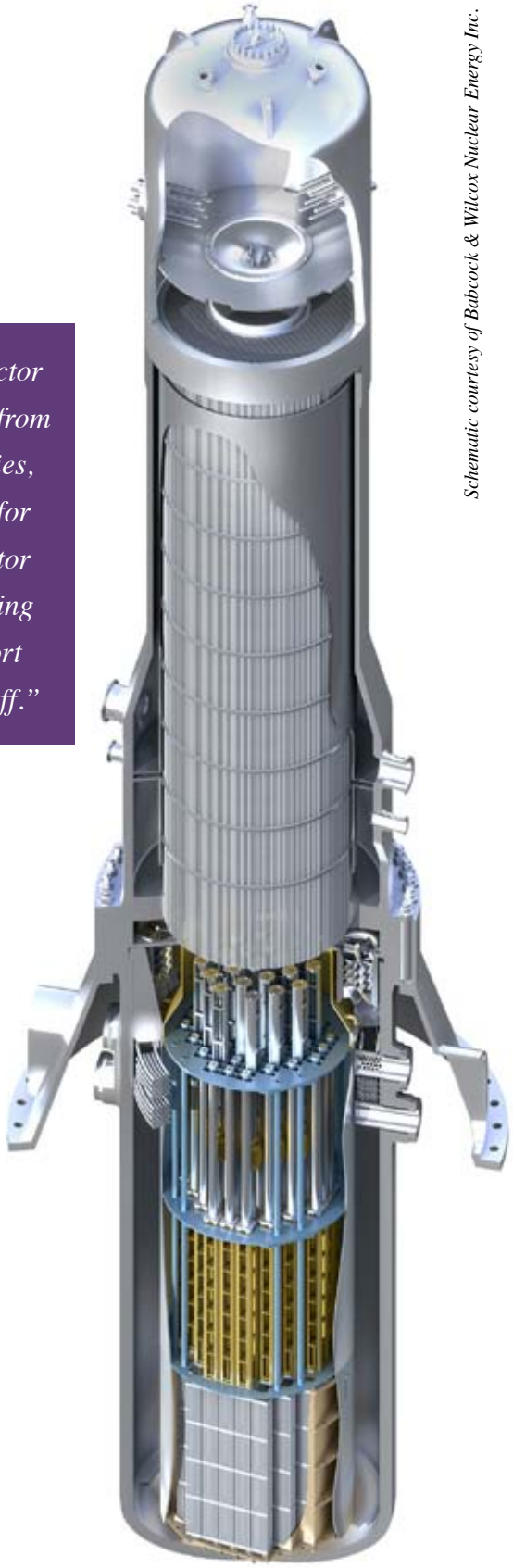
engaged B&W through multiple public meetings on various aspects of the company's mPower design. In March 2011, B&W informed the NRC that it plans to submit about 20 technical reports before the submittal of its design certification application in 2013. To date, the NRC staff has reviewed reports on topics such as core and fuel design, instrumentation and control design, and an integrated test program and has approved the B&W mPower quality assurance program.

Tennessee Valley Authority

By letter dated November 5, 2010, TVA indicated its interest in building up to six B&W mPower design SMR modules at the Clinch River site in Roane County, TN. TVA indicated that it would request a construction permit for two to six modules by submitting a preliminary safety analysis report to the NRC. TVA expects to submit its request for a construction permit before the mPower design certification application.

"In 2011, the advanced reactor program staff, with support from several national laboratories, identified technical issues for the various advanced reactor technologies and is preparing revised guidance to support applicants and the NRC staff."

TVA plans to develop and submit letters addressing key licensing assumptions and a detailed regulatory framework for one or more SMR modules. Related activities are underway and will continue through FY 2012, with the submittal of a construction permit application in 2013.



Schematic courtesy of Babcock & Wilcox Nuclear Energy Inc.

Babcock & Wilcox mPower™ small modular reactor schematic.

Activities & Accomplishments

Top, NRO staff members Cindy Rosales-Cooper, Ed Fuller, Michael Johnson and Dan Pasquale meet with representatives of the Czech Republic nuclear regulator and plant management during a visit to the Dukavonay Nuclear Power Plant.

Above, NRC members of the Multinational Design Evaluation Programme (MDEP) Joint Inspection Team, led by the Korean Institute of Nuclear Safety (KINS), with representatives of Doosan Heavy Industries, KINS, Westinghouse, Southern Company, and South Carolina Electric and Gas Company in front of the Vogtle Unit 3 steam generator prior to installation of the steam generator tubes. The group met at the Doosan facility in Changwon, South Korea.

Right, Division of Engineering (DE) employees Bret Tegeler and Mohamed Shams discuss civil and structural calculations for the AP1000 with Obayashi engineers in Tokyo.

INTERNATIONAL COOPERATION

Since its creation in 2006, the New Reactor Program has played a key role in the NRC's international cooperative activities. Its inception paralleled the creation of the Multinational Design Evaluation Programme (MDEP), which comprises 10 countries that cooperate on the design and licensing review for new reactors. The New Reactor Program's creation 5 years ago also paralleled the NRC's full cooperative program with China and several other countries that are embarking on a new reactor initiative. NRO's mission in the international community is to leverage resources and knowledge with the experiences of national regulatory authorities both in bilateral and multilateral settings. Accordingly, through NRO, the NRC partners with the international community through mutually beneficial exchanges on information related to the design, siting, and construction of new reactors.

Multilaterally, NRO engages counterparts under MDEP, the International Atomic Energy Agency, and the Nuclear Energy Agency (NEA)/Committee on Nuclear Regulatory Activities (CNRA). Bilaterally, NRO continues to meet individually with nuclear safety regulatory authorities for the reactor fleets in France, Canada, the United Kingdom, Finland, Japan, and Korea, and it assists countries such as Indonesia, Vietnam, and various countries in Africa in the development of nuclear programs.

During the past year, the NRO staff was instrumental in the NRC's response to the tragic events in Japan. NRO staff and management worked long shifts at the NRC's Operations Center in Rockville, MD; traveled to Japan; and responded to, or coordinated responses on, Freedom of Information Act requests concerning the overseas disaster. Furthermore, the siting, geology, and seismology experts in NRO were summoned repeatedly for consultation and to support international meetings as a result of the events at Fukushima.

The NRO staff and management play important roles in the NRC's international regulatory assistance program. Under the direction of the Office of International Programs, the NRO staff frequently participates and leads international workshops on nuclear executive training and the siting of new nuclear power plants. These workshops are given to, and hosted by, emerging nations, or nations that are just embarking on a nuclear power program. For example, in 2011, the NRO staff participated in workshops in Indonesia, Argentina, and South Africa. Additionally, the NRO staff and management provide on-the-job training to selected foreign assignees in the assistance program.

In 2011, NRO assumed a leadership role in the international community for activities relating to CFSIs. The NRC delivered its mandate for increased regulatory oversight and guidance on CFSIs to international counterparts in both bilateral and multilateral settings. These efforts resulted in the establishment of an NRO-led NEA/CNRA task group focused on CFSIs. NRO also established bilateral initiatives on CFSIs with the Czech Republic in 2011 and continues outreach on CFSIs with the United Kingdom, Canada, and Finland.

During the past year, NRO continued to engage international counterparts in the area of construction and vendor oversight and inspection. NRO and the staff of the NRC's Center for Construction Inspection in Region II conducted bilateral and staff exchanges with the National Nuclear Safety Administration of China on the AP1000 construction site at Sanmen. NRO staff also participated in numerous vendor inspections that included participation or observation by foreign counterparts from China, Korea, France, and Japan.

In addition, NRO is a major player in the NRC's bilateral cooperation with China and India. Office Director Michael Johnson leads the NRC/National Nuclear Safety Administration of China annual steering committee initiative and the broader U.S.-China Joint Commission Meeting on Science and Technology Cooperation, which is organized by the Office of Science and Technology and the U.S. Department of State. Thomas Bergman, Director of the Division of Engineering, assumed the NRC leadership role for the coordination of bilateral activities with India. This includes a semiannual bilateral meeting and coordination with DOE and the U.S. Department of State.

Elsewhere, the NRO staff continues to maintain a leadership role in MDEP by chairing the MDEP steering technical committee, the digital instrumentation and control working group, and the AP1000 design-specific working group and by participating in all MDEP design- and issue-specific working groups. Accomplishments under MDEP and a detailed description of the working groups, including the annual report, appear on the NEA Web site at http://www.oecd-nea.org.

NRO also plays a vital role in CNRA's working group on the regulation of new reactors. In 2011, NRO continued to promote and use the database on construction and operating experience, which was established under the working group. ■

A Look Ahead

Photo courtesy of Westinghouse

As the New Reactor Program moves into 2012 and the ensuing years, the staff anticipates issuing the first COLs, reviewing additional design certification applications for large LWRs and advanced reactors, and reviewing COLs and ESPs. In addition, it expects to oversee the first new reactor construction in more than 30 years.

With the top priority of safety shaping its activities and accomplishments, the New Reactor Program will maintain its unyielding focus on its primary program areas of licensing, the oversight of vendor and construction inspection, and advanced reactors. The program is also poised to bolster the NRC's international partnerships to ensure that the agency continues to weave global experience into the fabric of its knowledge base.

By pursuing and achieving these goals, the New Reactor Program contributes significantly to the realization of the agency's mission to protect public health and safety and the environment and to promote the common defense and security. Even as the agency's response to the tragic events in Japan continued to unfold, NRO remained vigilant in ensuring that staff members were appropriately tasked to support these initiatives while minimizing the impact on the office's existing work.

"Our mission in the international community is to leverage resources and knowledge with the experiences of national regulatory authorities both in bilateral and multilateral settings."

In the new reactor licensing area, NRO continues to process existing applications for new licenses. Current applicants remain steadfast in their plans to obtain licenses and design certifications. The staff continues to believe that the agency's regulatory framework and requirements provide for a rigorous and comprehensive license review process that examines the full extent of siting, system design, and operations of new nuclear power facilities.

Meanwhile, in the construction oversight area, the New Reactor Program has in place the structure and procedures required to conduct necessary oversight for ongoing and near-term construction activities. The staff will continue to make significant progress in the development and improvement of programs and procedures to support the inspection of activities that occur later in the construction process. The procedures include those necessary for the inspection of licensee operational readiness. These remaining procedures are in development, and their planned completion date in FY 2012 will fully support the inspection requirements for those applicants with the earliest construction schedules.

Elsewhere, the advanced reactor area has witnessed a flurry of activities. The staff is continuing its efforts to prepare the regulatory infrastructure for advanced reactors. This includes the identification and resolution of policy and key technical issues, such as security and emergency planning. Furthermore, the staff is exploring how best to use risk insights to enhance the safety focus of advanced reactor reviews. Pre-application work is ongoing for an anticipated 10 CFR Part 50 construction permit for TVA's Clinch River site and design applications for the B&W mPower design and a Westinghouse advance reactor design.

In the international arena, the New Reactor Program will work to maintain a leadership role in the agency's cooperative global activities. By leveraging resources and knowledge gained throughout years of cooperation with other worldwide national regulatory authorities in biliteral and multilateral agreements, the staff will continue to grow both the number of international partners and mutually beneficial information about the design, siting, and construction of new reactors.

Moving forward, the New Reactor Program's critical mandate will remain challenging. However, NRO's values will steadfastly guide the staff as it fulfills its wide range of regulatory responsibilities. The staff is confident that the Commission is fully committed to its work. NRO is equally as confident that the New Reactor Program team is fully committed to its essential safety and security mission. ■

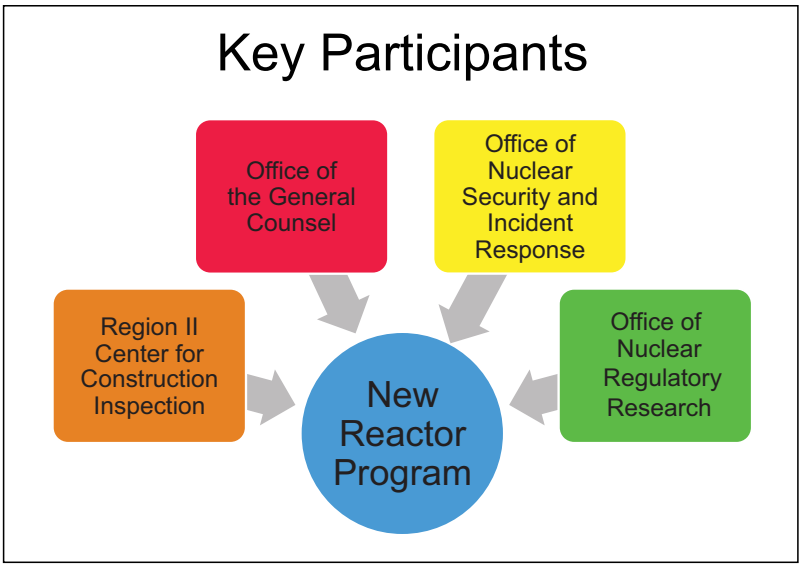
At a Glance

Top, Project Manager Earl Libby provides an update on the activities of the Changes During Construction Working Group at a public meeting.

Above, a team of Region II and NRO staff visit the Vogtle 3 site to discuss ITAAC closure program activities and ITAAC scheduling. From left to right, Rich Laura, NRO, Alan Blamey, Region II, Patrick Heher, Region II, and Mark Kowal, Mahmoud Jardaneh, and Jim Gaslevic, all of NRO.

Right, DSRA Branch Chief Sam Lee offers some insight at a quarterly division meeting.

NRO is responsible for the licensing and oversight of construction of the NRC's nuclear reactor safety mission for licensed new reactor facilities. As such, NRO is responsible for regulatory activities in the primary program areas of siting, licensing, and oversight for new commercial nuclear power reactors to protect the public health, safety, and the environment and to promote the common defense and security. It works with other NRC offices to accomplish this mission.



For example, NRO works closely with the Center for Construction Inspection in NRC's Region II, located in Atlanta, GA. The center's mission is to provide assurance in the safety of future operations at new nuclear facilities by ensuring that licensees construct the facilities according to approved designs, using appropriate practices and quality materials.

NRO also coordinates activities with OGC; NSIR, which works to prevent nuclear security incidents and prepare for and respond to safety and security events; and RES. The mission of RES furthers the regulatory mission of the NRC by providing technical advice, technical tools, and information for identifying and resolving safety issues, and promulgating rules and guidance. RES also conducts independent experiments and analyses, develops technical bases for supporting realistic safety decisions by the agency, and prepares the NRC for the future by evaluating safety issues involving current and new designs and technologies. RES develops its program with consideration of Commission direction and input from program offices, including NRO, and other stakeholders.

NRO consists of the following divisions:

Division of Advanced Reactors & Rulemaking (DARR)

DARR leads, manages, and facilitates advanced reactor projects (safety and environmental) including: pre-application activities, design approval application reviews, design certification application reviews, manufacturing license application reviews, construction permit/operating license reviews, and combined license application reviews. DARR also leads stakeholder actions on issues pertaining to advanced reactor projects. Leads, manages, and facilitates the development of policy, rulemaking, and guidance for all activities involving the licensing of new and advanced reactors nuclear power plants. Leads stakeholder interactions on issues pertaining to new and advanced reactor policy, rulemaking, and guidance. Manages the internal guidance developed to support the licensing process. Acts as liaison with other offices for other rulemakings.

Branches

Projects Branch (APRB)
Policy Branch (APOB)

Division of Program Management, Policy Development, and Analysis (PMDA)

PMDA provides administrative and management support for the office that includes all corporate functions, project management activities associated with planning and scheduling for licensing reviews of new reactors, contract management activities, and organizational process improvements. Leads, manages, and facilitates the office budget through the planning, budgeting, and performance management process; resource allocation through the staffing plan; analysis of office performance through coordination of the operating plan; and internal controls for financial management. Provides and enhances communication for internal and external stakeholders. PMDA provides oversight and support of information management and technology, including strategies for implementation, large-scale project management tools, schedule and resource planning, and tracking.

At a Glance

Top, General Engineer (NSPDP) Diego Saenz receives his technical reviewer qualification certificate from DSRA Director Charlie Ader, Deputy Director Mark Lombard and Branch Chief Joe Donoghue.

Above, DE Branch Chief Terry Jackson discusses digital I&C issues and challenges at an All Hands Meeting.

Right, Reactor Operator Engineer Al Issa provides his input at a quarterly division meeting.

Branches

Financial and Performance Management Branch (FPMB)
Planning & Scheduling Branch (PSB)
Business Services Management Branch (BSMB)
Contract Management Branch (CMB)
Information Technology Management Branch (ITMB)

Division of New Reactor Licensing (DNRL)

DNRL leads, manages, and facilitates design certification application reviews, early site permit application reviews, combined license application reviews, and new reactor pre-application activities. It is responsible for the project management (safety and environmental) of those applications. Develops and maintains the necessary technical and programmatic support for new reactor licensing activities, interaction with stakeholders on issues pertaining to large, light-water reactors, and issuance of design certifications and COLs.

Branches

Licensing Branch 1 (LB1)
Licensing Branch 2 (LB2)
Licensing Branch 3 (LB3)
Licensing Branch 4 (LB4)
Environmental Projects Branch 1 (EPB1)
Environmental Projects Branch 2 (EPB2)

Division of Safety Systems & Risk Assessment (DSRA)

DSRA performs technical reviews focused on safety-related and non-safety related systems (e.g., containment, ventilation, and balance of plant), probabilistic risk assessment (PRA), technical specifications, design basis and severe accidents, core physics, and core thermal hydraulic performance for new and advanced reactor plant designs, license applications and amendments, and construction oversight. DSRA provides technical support and expertise for special projects, programs, and policy activities; and develops and implements policies and guidance for the use of PRA and associated analyses in regulatory design making for new and advanced reactors.

Branches

Balance of Plant & Fire Protection Branch 1 (BPFP)
Balance of Plant & Technical Specifications Branch (BPTS)
Containment and Ventilation Branch (SCVB)
PRA and Severe Accidents Branch (SPRA)
Reactor System, Nuclear Performance, and Code Review Branch (SRSB)

Division of Construction Inspection & Operational Programs (DCIP)

DCIP develops policy and provides overall program management and planning for the construction inspection program for new commercial nuclear power plants. It also coordinates with Region II, the Office of Nuclear Reactor Regulation, and other offices on program implementation, including licensee performance assessment, allegations, and enforcement activities. It implements programs and procedures to systematically assess and coordinate the follow-up of construction-related issues, and recommends corrective plant-specific and generic actions. DCIP also develops and implements the quality assurance and vendor inspection programs, and reviews the quality assurance programs at vendors, fabricators, applicants, and construction licensees. DCIP also develops policies and guidance and implements the national program for the licensing of new nuclear reactor operators. Develops programs and conducts reviews to ensure the effective consideration of human factors engineering in new nuclear power plant design and operation. DCIP assesses the adequacy of facility personnel training programs and emergency operating procedures.

Branches

Construction Assessment & Enforcement Branch (CAEB)
ITAAC Branch (CITB)
Construction Inspection Program Branch (CIPB)
Operator Licensing & Human Performance Branch (COLP)
Construction Electrical Vendor Branch (CEVB)
Construction Mechanical Vendor Branch (CMVB)
Quality Assurance Branch (CQAB)

At a Glance

Top, DNRL Director Dave Matthews recognizes the accomplishments of each branch in the division and their impact on the success of the office mission.

Above, left to right, NRO's Joseph Sebrosky, senior project manager, Michelle Hayes, reactor systems engineer, and John Segala, Chief, Balance of Plant Branch 1, testify before the Commission at a mandatory hearing on South Carolina Electric & Gas Company's combined license application to build and operate V.C. Summer Units 2 and 3.

Right, Michael Johnson presents the ESBWR Final Safety Evaluation Report on a compact disc to Caroline Reda, President and CEO of GE Hitachi Nuclear Energy.

Division of Site Safety & Environmental Analysis (DSEA)

DSEA performs site safety evaluations of site characteristics, site-related design parameters, and transient and accident analyses of large light-water and advanced reactor licensing applications. Specifically, reviews probabilistic seismic hazard analyses; site hazards from nearby transportation, military, and industrial facilities; effects of natural phenomena on plant design (i.e., average and extreme rainfall, snowfall, wind, flooding, and other weather conditions); postulated accidents for siting and environmental reviews; plant occupational radiation safety; and public radiation safety due to radiological effluents. Provides site safety and health physics technical support for large, light-water and advanced reactor environmental reviews. Develops and maintains the site safety and environmental regulatory infrastructure necessary to support applications for new facilities and designs.

Branches

Hydrology & Meteorology Branch (RHMB)
Environmental Technical Support Branch (RENV)
Geosciences & Geotechnical Engineering Branch 1 (RGS1)
Geosciences & Geotechnical Engineering Branch 2 (RGS2)
Radiation Protection & Accident Consequences Branch (RPAC)

Division of Engineering (DE)

DE performs engineering-related safety reviews of applications for design certification, combined licenses, construction oversight, and new reactor pre-application activities. It provides technical expertise to support regional activities, special projects, international programs, rulemaking, regulatory, and policy activities. DE reviews may be performed in support of topical reports, consensus standard changes, or new reactor designs.

Branches

Component Integrity Branch (CIB)
Engineering Mechanics Branch (EMB)
Instrumentation & Controls Branch (ICB)
Instrumentation & Controls & Electrical Engineering (ICE)
Structural Engineering Branch 1 (SEB1)
Structural Engineering Branch 2 (SEB2)

Region II – Center for Construction Inspection (CCI)

Major responsibilities for CCI include: serve as the agency center of excellence for nuclear facility construction inspection activities; manage the construction inspection program; develop infrastructure for construction inspection program and staff; carry out construction inspections at new facilities and associated vendors; evaluate performance of applicants; and provide regulatory bases for agency decisions.

Divisions and Branches

Division of Construction Inspection (DCI)
Inspection Branch 1
Inspection Branch 2
Inspection Branch 3

Division of Construction Projects (DCP)
Projects Branch 1
Projects Branch 2
Projects Branch 3
Projects Branch 4 ■

2011 NEW REACTOR PROGRAM

OFFICE OF NEW REACTORS

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