

# 2010 NEW REACTOR PROGRAM



## Cover

*New reactor construction activity at the Vogtle site near Augusta, GA, with operating Units 1 and 2 in the background.*

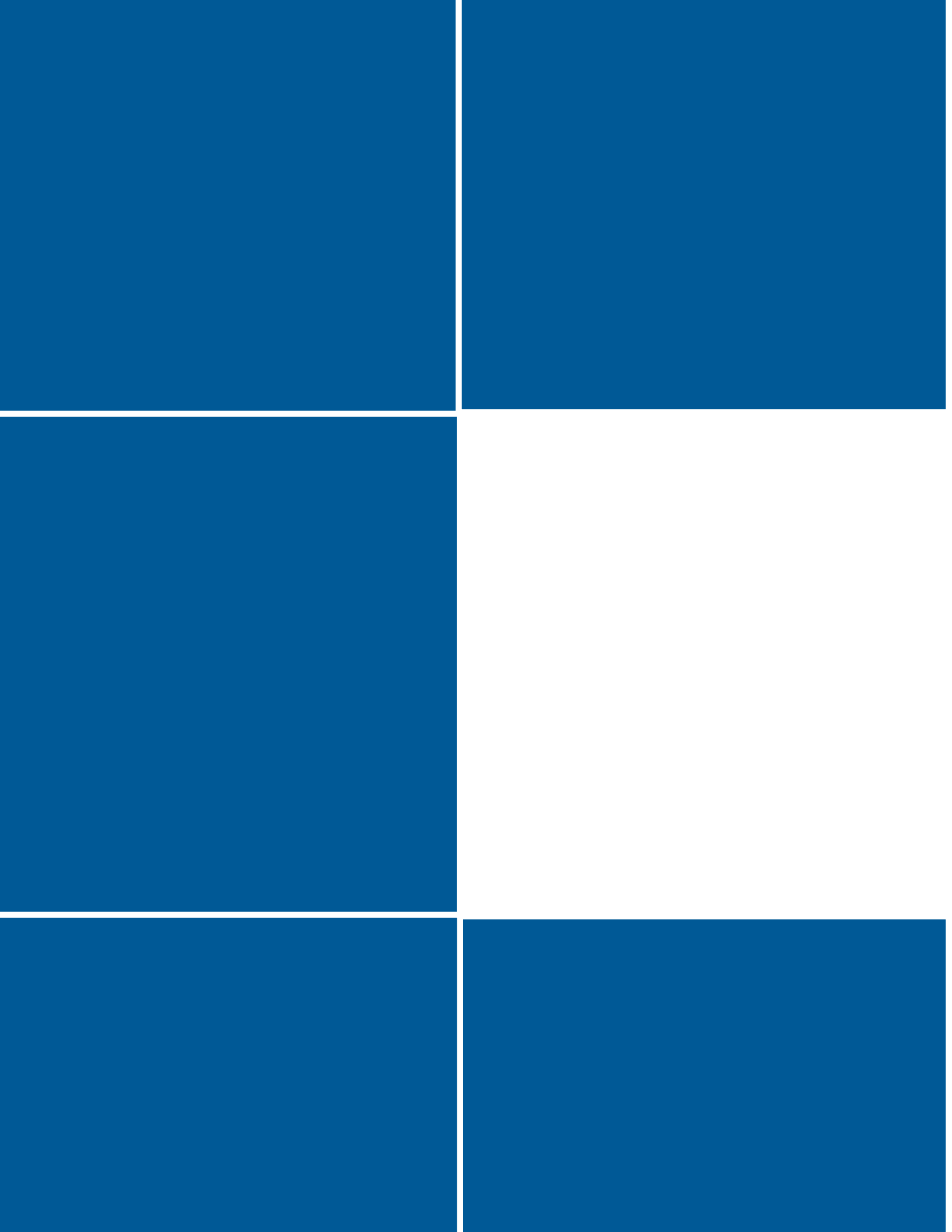
*Photo courtesy of Southern Company*

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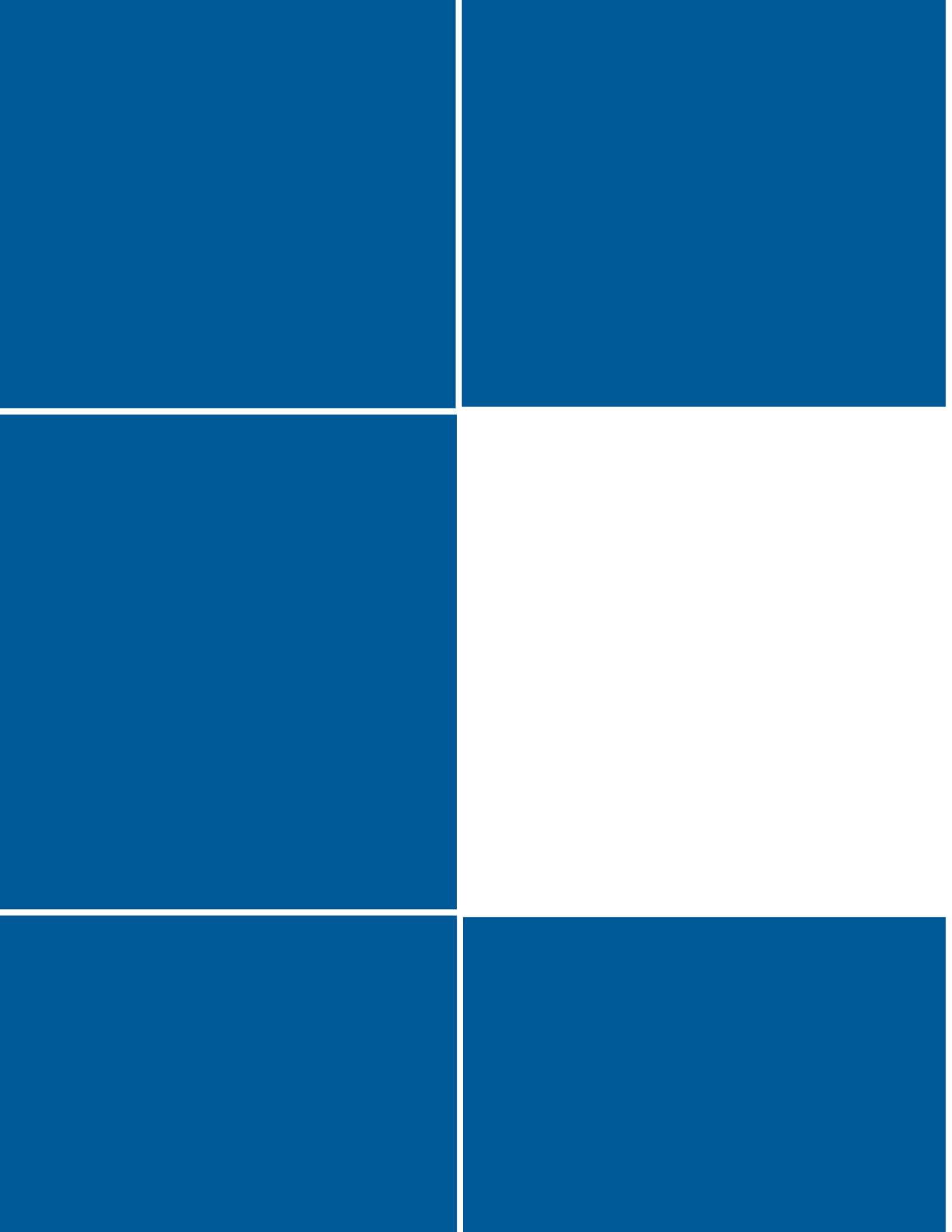
*Photo courtesy of Southern Company*

OFFICE OF NEW REACTORS



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## A Message from the Director



In many ways, 2010 was a hallmark year for the New Reactor Program. It was a year characterized by significant activities and accomplishments in our core responsibility areas of new reactor licensing, vendor and construction inspections, the agency's Advanced Reactor Program, and our growing international cooperation. We were presented with a host of opportunities and met these challenges by maintaining our focus on teamwork, execution, and planning for and adapting to change.

This 2010 New Reactor Program annual review is designed to clearly convey the full array of activities completed and accomplishments realized during the past year. While industry decisions required us to adjust some of our activities, the New Reactor Program moved in a timely and responsive way to appropriately balance its ever-increasing workload. The review is meant to provide our key stakeholders with accurate and useful information on our performance in 2010 and direction for the coming years.

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. In fulfilling this mission, we recognize the importance of enhancing and facilitating openness and stakeholder involvement, as well as fostering an open and collaborative working environment.

During the past year, we continued to support and implement the U.S. Nuclear Regulatory Commission's goals for reactor standardization and enhanced safety. Our focus in 2010 and going forward is on conducting licensing reviews and construction oversight activities necessary to address industry plans for near-term construction and establishing the necessary regulatory framework and infrastructure for advanced reactor reviews. In addition, we will continue to leverage international insights and experience to enhance our design reviews and construction oversight program.

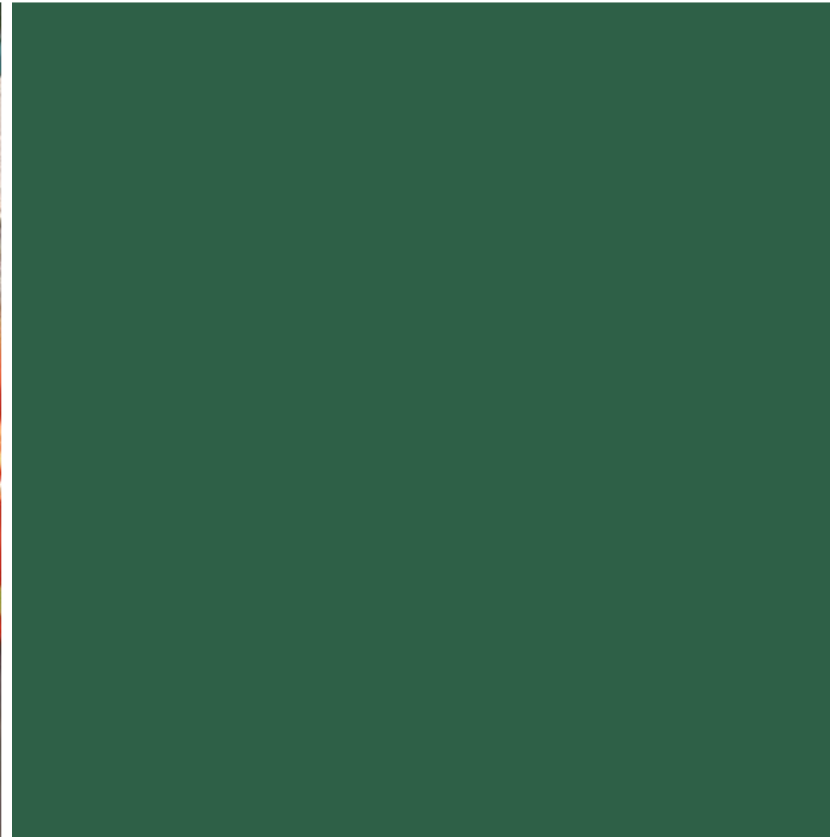
As we look forward to 2011 and beyond, mounting challenges and opportunities may further impact our workload, but our mission, vision of success, and top priority of safety will not change. We hope this annual review provides you with a thorough and thoughtful summary of the activities undertaken and the accomplishments achieved in the past year by the New Reactor Program, with the support of 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, and the Office of the General Counsel.

A handwritten signature in blue ink, appearing to read 'Michael R. Johnson', with a long horizontal line extending to the right.

Michael R. Johnson  
Director  
Office of New Reactors

# Overview

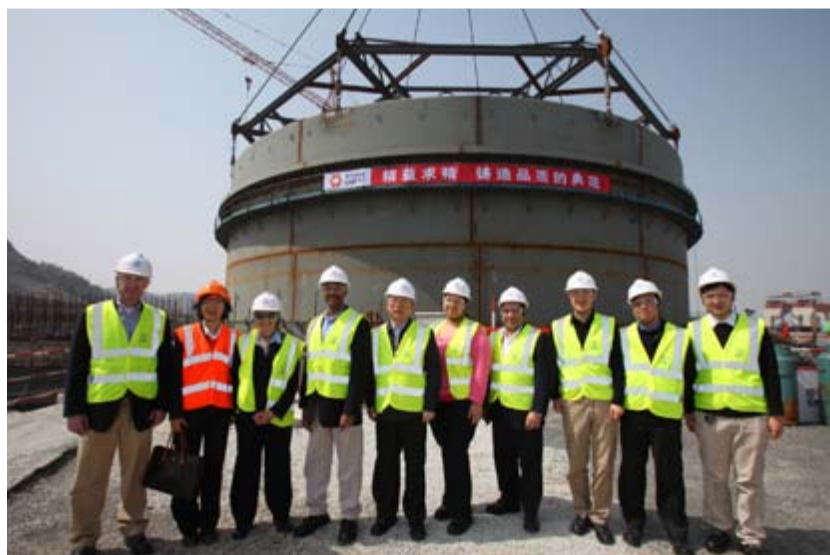
Photo courtesy of Southern Company



*Top, Batch Plant #1 at the Vogtle site.*

*Above, NRO Senior Geologist Dr. Gerry Stirewalt, center, reviews the geologic features of the V.C. Summer Unit 2 nuclear island rock with South Carolina Electric and Gas' geology consultants.*

*Right, NRO Director Mike Johnson, fourth from left, and other NRC staff members stand in front of the containment building at the construction site of the world's first AP1000 reactor in Sanmen, China.*





The much-anticipated and often-written about worldwide nuclear resurgence is underway. Throughout the year, the U.S. Nuclear Regulatory Commission (NRC) continued to serve as the Nation's nuclear safety regulator to meet the growing challenges generated by the resurgence.

Since its inception in 2006, the agency's Office of New Reactors (NRO), located at the NRC's Headquarters in Rockville, MD, has served the public interest by enabling the safe, secure, and environmentally responsible use of nuclear power in meeting the Nation's future energy needs. Additionally, the agency established a dedicated construction inspection organization in its Region II office in Atlanta, GA, that carries out construction inspection activities nationwide, including both the day-to-day onsite inspections and the specialized inspections as part of the agency's oversight of the construction of new nuclear power plants. The New Reactor Program carries out its activities with support from the agency's Office of the General Counsel (OGC), the Office of Nuclear Security and Incident Response (NSIR), the Office of Nuclear Regulatory Research (RES), the Office of Nuclear Reactor Regulation (NRR), the Office of Public Affairs (OPA), the Office of Congressional Affairs (OCA), and others.

In 2010, NRO actively engaged in the review of numerous new reactor licensing applications and continued to refine its construction inspection program. To date, the agency has received 18 applications to build and operate 28 new light-water reactor units. Of these, 12 applications for 20 units are under active review by the NRC, while the remaining applications have been suspended or deferred at the request of the applicants.

## Licensing

All of the large, light-water reactor combined license (COL) applicants are using the "one-step" licensing process specified in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," which is designed to provide more stability and predictability than the "two-step" process specified in 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." This new licensing process resolves the safety and environmental review areas, as well as emergency preparedness and security review areas, before a new nuclear power plant is constructed.

In 2010, the staff continued to review design certification applications for three new designs and two amendments to previously certified designs. During the year, the staff completed the technical reviews and prepared the rulemaking packages for concurrence for the Advanced Passive 1000 (AP1000) Design Certification Amendment application and the Economic Simplified Boiling-Water Reactor (ESBWR) Design Certification application. By certifying nuclear reactor designs, the agency resolves the majority of safety review areas in a design certification rulemaking. When an applicant submits an application for a new nuclear power plant using one of the certified designs, the license application review can proceed more efficiently in a manner that ensures safety while minimizing unnecessary regulatory burden and delays.

Also during the past year, the NRC received two applications for early site permits (ESPs), which address site safety, environmental impacts, and emergency preparedness review areas and allows the holder to bank the site for a future plant.

## Oversight

In the Construction Oversight Subprogram, the agency carefully monitored safety-related construction that officially began at Vogtle Unit 3, near Augusta, GA, with the start of engineered backfill operations authorized under a limited work authorization (LWA) issued in March 2010. The NRC has developed an inspection program and has put in place the structure and procedures required to conduct the new reactor construction oversight program for ongoing and near-term construction activities. This includes inspection of an applicant's activities related to the inspections, tests, analyses, and acceptance criteria (ITAAC). In addition, Region II has inspected portions of the Quality Assurance (QA) program, in accordance with the inspection procedures associated with LWA activities completed at the time of the inspection.

The NRC staff continues to refine concepts for ITAAC closure, as well as maintenance of closed ITAAC. It continues to hold regular public workshops to solicit input and to exchange views related to ITAAC completion, closure documentation, and ITAAC maintenance. The staff is currently pursuing a proposed rulemaking to codify ITAAC maintenance-related requirements.



*Top, Reactor Operations Engineer Andrea Johnson answers an inquiry at a staff meeting*

*Above, Division of Safety Systems & Risk Assessment (DSRA) Deputy Director Mark Lombard discusses construction inspection at a “Lunch & Learn” seminar.*

*Right, Division of Construction Inspection & Operational Programs (DCIP) Director Glenn Tracy fields a question at a Commission meeting*



Furthermore in 2010, NRO has continued to conduct oversight of manufacturers and suppliers of safety-related components through the NRC Vendor Inspection Program. The staff conducted 11 vendor inspections, 6 QA implementation inspections, and 3 aircraft impact assessment inspections.

### Advanced Reactors

During 2010, the NRC witnessed increased interest in the potential licensing of advanced reactor designs. Although a wide range of these designs are being discussed in the nuclear community, NRO's Advanced Reactor Program is focusing on preparing for the review of a high-temperature, gas-cooled reactor (HTGR) design in accordance with the Energy Policy Act of 2005 (EPAAct). Additionally, NRO is focused on the review of multiple integral pressurized-water reactor (iPWR) designs. This focus will require significant efforts on the part of the agency, NRO, and our external stakeholders.

Currently, the staff expects to receive its first design certification application for an advanced reactor design in the fiscal year (FY) 2012 timeframe. To fully engage early in the review process of multiple nuclear reactor

technologies, the NRC and the Nuclear Energy Institute (NEI) have established and sponsored periodic workshops to focus on the resolution of the generic issues that face advanced reactor design.

### International

In addition to working on domestic issues for new reactor construction, the NRC has been a leader in cooperating with other national nuclear regulatory authorities to address new reactor design reviews and oversight of construction. The NRC is participating in an international effort, the Multinational Design Evaluation Program (MDEP), to more effectively and efficiently review new reactor designs. As part of this program, NRC representatives communicate on a regular basis with the other members regarding the Evolutionary Power Reactor (EPR) design review, the AP1000 design review, vendor inspections, and specific regulatory and technical review areas such as digital instrumentation and controls.

Progress in 2010 in each of these areas—new reactor licensing, oversight, advanced reactors, and international cooperation—are explored in more detail in the following pages of this publication.



Photo courtesy of Southern Company

*The construction of Vogtle's Modular Assembly Building, located near Augusta in Burke County, GA., is underway.*

# Activities & Accomplishments



*Top, General Engineer Eric Miller, hand raised, participates in a division meeting*

*Above, from left to right, Justin Fuller, the senior resident inspector for Vogtle Units 3 and 4, Deputy Regional Administrator for Construction—Region II, Loren Plisco, the agency's Executive Director for Operations, Bill Borchardt, and Tim Chandler, resident inspector for Vogtle Units 1 and 2, visit the site.*

*Right, Mike Johnson presents Electrical Engineer Tania Martinez-Navedo with the office Vision of Success Award.*



## New Reactor Licensing

One of NRO's three subprograms or 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 LWAs, and new reactor preapplication activities. It also developed and maintained necessary technical and programmatic support for new reactor licensing activities, such as large-scale project management tools, scheduling and resource planning and tracking, and guidance development. The New Reactor Licensing Subprogram also had the lead for interactions with stakeholders on issues pertaining to new large, light-water reactors.

The NRC started to receive new large, light-water reactor license applications in 2007. These applications were submitted to the NRC under 10 CFR Part 52. As of the end of 2010, the NRC had received a total of 18 COL applications to build and operate 28 new reactors at the following sites:

- Calvert Cliffs (MD)
- South Texas Project (TX)
- Bellefonte (AL)
- North Anna (VA)
- William States Lee III (SC)
- Shearon Harris (NC)
- Grand Gulf (MS)
- Vogtle (GA)
- V.C. Summer (SC)
- Callaway (MO)
- Levy County (FL)
- Victoria County Station (TX)
- Fermi (MI)

- Comanche Peak (TX)
- River Bend (LA)
- Nine Mile Point (NY)
- Bell Bend (PA)

- Turkey Point (FL)

Applicants have withdrawn or requested the agency suspend reviews of six applications: Grand Gulf, Victoria County Station, Callaway, Nine Mile Point, River Bend, and Bellefonte. The Victoria County Station COL application was withdrawn and submitted as an ESP application in FY 2010.

The New Reactor Licensing Subprogram expects to complete the technical review of the first few COL applications in the FY 2011 and FY 2012 timeframe. In FY 2010, no COL applications were submitted.

To obtain information on the current review schedule for new reactor COL applications, access the NRC public Web site at: <http://www.nrc.gov/reactors/new-reactors/col.html>.

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

- System Energy Resources, Inc. (Entergy), for the Grand Gulf site in Mississippi
- Exelon Generation Company, LLC, for the Clinton 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 an LWA)

In 2010, the NRC received ESP applications from Exelon Nuclear Texas Holdings (Exelon) for the Victoria County Station site, located in Victoria County, TX, and PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG) for the PSEG site (the Salem and Hope Creek Generating Stations site) located in Salem County, NJ. Both applications use the plant

*“Activities under the New Reactor Licensing Subprogram include planning and scheduling, infrastructure development, environmental reviews, technical safety reviews, and proper management of new large, light-water reactor activities in support of licensing and rulemaking to include design certification application reviews, early site permit application reviews, combined license application reviews, interaction with stakeholders, and new reactor preapplication activities. Staff conducts these activities in a manner that develops trust and is consistent with NRC organizational values.”*



## Activities & Accomplishments



*Top, NRO Materials Engineer Tim Steingass, seated, discusses the South Texas Project license application submittal with Mohammed Abid, a reactor engineer in Region III.*

*Above, NRO geologists and geotechnical engineers, along with Progress Energy Florida, Inc., consultants, examine core to ascertain the volume of cavities in the foundation rock at the Levy County site in Florida.*

*Right, members of the staff are recognized for their efforts on the issuance of the Vogtle Early Site Permit and Limited Work Authorization.*



parameter envelope approach (no design specified at this time) and were accepted for docketing.

To obtain information on the current review schedule for new reactor ESP applications, access the NRC public Web site at: <http://www.nrc.gov/reactors/new-reactors/esp.html>.

To date, the NRC has issued design certifications for four reactor designs that can be referenced in an application for a nuclear power plant. These designs include the following:

- General Electric-Hitachi Nuclear Energy's (GEH's) Advanced Boiling-Water Reactor (ABWR)
- Westinghouse's System 80+
- Westinghouse's Advanced Passive 600 (AP600)
- Westinghouse's AP1000

Currently, the NRC is reviewing the following design certification applications:

- AREVA's U.S. Evolutionary Power Reactor (USEPR)
- Mitsubishi Heavy Industries' U.S. Advanced Pressurized Water Reactor (US-APWR)
- GEH's Economic Simplified Boiling-Water Reactor (ESBWR)
- Westinghouse's AP1000 Design Certification Amendment
- South Texas Project Nuclear Operating Company's (STPNOC) ABWR design certification amendment to address the aircraft impact rule

The NRC did not receive any new large, light-water reactor design certification applications or new large, light-water reactor design certification amendment applications in FY 2010. To obtain information on the current review schedule for new reactor design certification and design certification amendment applications, access the NRC public Web site at: <http://www.nrc.gov/reactors/new-reactors/design-cert.html>.

In addition to continuing the review of 12 COL applications, three design certification applications, and two design certification amendments, the New Reactor Licensing Subprogram accomplished the following in 2010:

- Worked collaboratively across the agency toward resolution of the technically challenging and highly visible issues related to the AP1000 shield building. In addition, proactively employed a full range of regulatory tools including audits and public meetings to advance the review of technically complex issues such as ESBWR hydrogen accumulation, sump strainer adequacy, and probabilistic risk assessment.
- Issued the final supplemental environmental impact statement for the North Anna COL application and the draft environmental impact statements for the South Texas Project, Calvert Cliffs, Comanche Peak, Levy, and V.C. Summer COL applications, and the supplemental environmental impact statement for the Vogtle COL application.
- Conducted environmental scoping meetings for Turkey Point and Lee COL applications and Victoria County Station and PSEG ESP applications in accordance with the National Environmental Policy Act requirements outlined in 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."
- Issued three license amendments, and associated environmental assessments and findings of no significant impact, for the Vogtle ESP and limited work authorization related to the limited scope approvals for a subset of onsite locations for use of backfill material.
- Continued to develop and implement Enterprise Project Management and developed schedule improvement data quality initiative, including: (1) standardized project performance reporting; (2) centralized business intelligent database development; and (3) provision of project management and earned value training to NRO staff, management, and project managers.
- Assessed the revised North Anna COL application that addressed the applicant's change in reactor technology from ESBWR to US-APWR technology. The staff determined how it will proceed and began developing a new review schedule to accommodate the new technology for review of the North Anna COL application.
- Conducted various public meetings to maintain stakeholder awareness and technical understanding of the status of new reactor technical activities including meetings with Westinghouse on the AP1000 shield building review, with NEI on the aircraft impact assessment methodology, with

New Nuclear Power Plant Applications Updated December 20, 2010							
Company (Project or Docket Numbers)	Date of Application	Design	Date Accepted	Site Under Consideration	Number of Units	State	Status
Calendar Year (CY) 2007 Applications							
NRG Energy (52-012/013)	09/20/07	ABWR	11/29/07	South Texas Project	2	TX	Accepted/Docketed
UNISTAR (52-016)	07/13/07 (Envir.) 03/13/08 (Safety)	EPR	01/25/08 06/03/08	Calvert Cliffs	1	MD	Accepted/Docketed Accepted/Docketed
Dominion (52-017)	11/27/07	ESBWR	01/28/08	North Anna	1	VA	Accepted/Docketed
Duke (52-018/019)	12/13/07	AP1000	02/25/08	William Lee Nuclear Station	2	SC	Accepted/Docketed
2007 Total Number of Applications = 4 Total Number of Units = 6							
Calendar Year (CY) 2008 Applications							
Progress Energy (52-022/023)	02/19/08	AP1000	04/17/08	Harris	2	NC	Accepted/Docketed
Southern Nuclear Operating Co. (52-025/026)	03/31/08	AP1000	05/30/08	Vogtle	2	GA	Accepted/Docketed
South Carolina Electric & Gas (52-027/028)	03/31/08	AP1000	07/31/08	Summer	2	SC	Accepted/Docketed
Progress Energy (52-029/030)	07/30/08	AP1000	10/06/08	Levy County	2	FL	Accepted/Docketed
Detroit Edison (52-033)	09/18/08	ESBWR	11/25/08	Fermi	1	MI	Accepted/Docketed
Luminant Power (52-034/035)	09/19/08	USAPWR	12/02/08	Comanche Peak	2	TX	Accepted/Docketed
PPL Generation (52-039)	10/10/08	EPR	12/19/08	Bell Bend	1	PA	Accepted/Docketed
2008 Total Number of Applications = 7 Total Number of Units = 12							
Calendar Year (CY) 2009 Applications							
Florida Power and Light (763)	06/30/09	AP1000	09/04/09	Turkey Point	2	FL	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							



Mitsubishi Heavy Industries on digital instrumentation and control, and with AREVA on seismic design issues. Also, the New Reactor Licensing Subprogram staff conducted a meeting between the NRC and Westinghouse on the AP1000 shield building to identify dates for specific technical meetings associated with the testing and benchmarking plans. NRO arranged a technical meeting on test program setup and criteria and analysis and other followup meetings.

- Provided continued support to the Advisory Committee on Reactor Safeguards. The staff proactively employed a full range of regulatory tools to advance the review of technically complex issues to assist the Commission with independent and timely technical advice on issues of public safety. Staff participated in numerous audits and public meetings on topics including AP1000 Generic Safety Issue (GSI)-191 and containment, USEPR realistic large-break loss-of-coolant accidents and fuel design, ESBWR hydrogen accumulation, US-APWR sump strainer, ABWR spent fuel pool criticality and probabilistic risk assessment, and STPNOC's request to amend the ABWR design certification to comply with the aircraft impact assessment rule. Staff made considerable progress on design certification and combined license reviews and completed numerous safety evaluation inputs and successful presentations to the Advisory Committee on Reactor Safeguards on schedule to support published milestones. In FY 2010, the New Reactor Licensing Subprogram staff submitted 55 design certification safety evaluation report chapters covering four design centers and 38 COL application chapters covering two design centers to the applicants and to the Advisory Committee on Reactor Safeguards. The staff also presented 66 safety evaluation report chapters to the Committee.
- Issued interim staff guidance for comment on the design reliability assurance program, loss of large areas, gas accumulation, and standby emergency

*“The New Reactor Licensing Subprogram also has lead for interactions with stakeholders on issues pertaining to new large, light-water reactors.”*

alternating current power and ground water flow. We also issued final interim staff guidance on post-COL commitments, soil structure interaction, and seismic margin analysis. Additionally, the New Reactor Licensing Subprogram provided

extensive technical expertise for the development and review of technical guidance and rulemaking documents including: the Cybersecurity Plan Template (NEI 08-09); a draft NUREG/CR on seismic tests of degraded piping; Regulatory Guide (RG) 1.62, “Manual Initiation of Protective Actions”; RG 1.65, “Materials and Inspections for Reactor Vessel Closure Studs”; and a proposed rulemaking under 10 CFR 50.55a, “Codes and Standards,” to reflect changes in the American Society of Mechanical Engineers (ASME) Code. We also issued RG 1.215, “Guidance for Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) Closure Under 10 CFR Part 52,” for use in satisfying the requirements for documenting

the completion of ITAAC. In FY 2010, the New Reactor Licensing Subprogram finalized six interim staff guidance documents and issued five interim staff guidance documents for comment.

- Developed an approach to resolve alternate vendor issues for ABWR Design Certification Rule rulemaking issues and reach a resolution on how to treat the South Texas Project ABWR Aircraft Impact Assessment amendment (technical qualifications).
- Developed and began implementation of a streamlined approach for scheduling the ABWR aircraft amendment rulemaking that targets a completion date of August 2011. This will be the first rulemaking prepared for a design certification amendment project.
- Assembled rulemaking teams for AP1000 and ESBWR design certifications and is in the process of preparing proposed rules for the design certification amendments and design certifications in parallel with completion of the final safety evaluation.



## Activities & Accomplishments



*Top, employees participate in a simulated inspection at Vogtle as part of the ITAAC Closure and Verification Demonstration.*

*Above, DCIP Deputy Director John Tappert, right, and Branch Chief Juan Peralta lead a vendor inspection at a manufacturing facility in South Korea.*



## Oversight

### Construction Inspection Program

The NRC conducts inspections of nuclear power plant construction activities to verify compliance with the agency's regulations and to ensure that the new plants are constructed in a way that protects public health and safety and the environment. The NRC anticipated that future applicants of a nuclear power plant will apply for a combined license under 10 CFR Part 52 and has developed an inspection program for the construction activities of these plants. The new inspection program incorporates the elements in 10 CFR Part 52, such as ITAAC, incorporates lessons learned from the inspection program used in the previous construction era (1970-1980) for plants licensed under 10 CFR Part 50, and considers modular construction at remote locations.

The NRC inspection program provides for inspectors to track and inspect construction activities at the site. Most of the activities will be conducted by resident inspectors and supplemented with regional inspectors. It is expected that the peak resident staffing will be around five inspectors at sites with one unit and seven at construction sites with two units. During construction, inspectors sample the spectrum of the applicant's activities related to the ITAAC in the design-basis document to confirm that the applicant is adhering to quality and program requirements. The NRC staff will review all ITAAC closure letters to verify completion by the licensee, and will verify successful ITAAC completion on a sampling basis. NRC inspection results, together with the information submitted by the licensee will be the foundation of the staff's recommendation to the Commission in support of its finding on whether all ITAAC in the combined license have been met. The NRC will publish notices in the *Federal Register* of those ITAACs that have been completed. 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 put in place the structure and procedures required to conduct necessary oversight for ongoing and near-term construction activities. The process for oversight of new reactor construction has been documented in inspection manual chapters (IMCs) and inspection procedures. All inspection procedures that are required to implement inspections of licensee activities related to ITAAC have been approved and issued for use. The NRC continues to make significant progress in the development and improvement of programs and procedures to support inspection of activities occurring later in construction. These include procedures such as those required for inspection of licensee operational readiness. These remaining procedures are in development and their planned completion in FY 2011 will fully support the inspection requirements for those applicants with the earliest construction schedules.

The NRC has begun executing construction inspection activities associated with the Vogtle LWA. In March 2010, safety-related construction officially began at Vogtle Unit 3 with the start of engineered backfill operations authorized under the LWA. Safety-related activities have also begun on 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 selected the construction senior resident inspector and resident inspector for Vogtle and opened the resident office in the summer of 2010.

The NRC staff continues to refine concepts for ITAAC closure and maintenance of closed ITAAC. The NRC staff conducted numerous public meetings over the past year to provide a forum for stakeholders to participate in and comment on NRC staff proposals for ITAAC closure, ITAAC maintenance, and other construction inspection program issues. The NRC staff issued RG 1.215 in October 2009. This guide endorses the industry guidance for ITAAC closure as documented in NEI 08-01, Revision 3, "Industry Guideline for the

*“The NRC conducts oversight activities to ensure that a plant is constructed in accordance with approved design and safety regulations, to determine plant readiness for operations, and to ensure an effective transition to the Operating Reactor Oversight Program.”*



Photo courtesy of Southern Company



## Activities & Accomplishments

*Top, Mechanical Engineer Yuken Wong and Pat Sekerak, a senior mechanical engineer, attend an All Hands Meeting for NRO's Division of Engineering.*

*Above, construction work continues at Vogtle.*

*Right, NRO staff member, Chuck Rosselle, a management analyst, discusses coordination for the scheduling of multiple projects with Project Manager Mike Canova.*



ITAAC Closure Process Under 10 CFR Part 52,” issued January 2009.

The staff continues to hold regular public workshops to solicit input and exchange views on issues related to ITAAC completion, closure documentation, and ITAAC maintenance. The NEI, industry representatives, and other external stakeholders participate in these public workshops. Through these workshops, the NRC staff has developed an enhanced approach to address ITAAC maintenance. The NRC staff is currently pursuing a proposed rulemaking to codify ITAAC maintenance-related requirements and plans to issue a proposed revision to RG 1.215, shortly after publication of the proposed rule.

## Construction Reactor Oversight Process

A construction assessment process has been established and is in place as described in IMC 2505, “Periodic Assessment of Construction Inspection Program Results,” issued December 2009. This process was first implemented in July 2010 to assess licensee performance related to construction activities at the Vogtle site. The first assessment period will cover the time between July 1, 2010, and June 30, 2011.

The Construction Reactor Oversight Process (cROP) Working Group was formed in December 2009 to respond to Commission direction to develop construction assessment program options for its consideration. Development efforts have been focused on the inclusion in the Reactor Oversight Process (ROP) of objective elements such as construction program performance indicators (PIs) and significance determination processes (SDPs) analogous to those used in the ROP. To date, the working group has developed a regulatory framework, including strategic performance areas and cornerstones, comprising objectives, attributes, and areas to measure. The working group continued to meet periodically with stakeholders during Category II and III public meetings to solicit their input. It developed a paper with assessment program options for Commission consideration. The assessment program will be updated based on Commission direction.

## Vendor Inspection Program

The NRC conducts oversight of manufacturers and suppliers of safety-related components through the NRC vendor inspection programs, which inspect compliance with QA and defect reporting requirements. Vendor inspections are conducted at manufacturers’ and suppliers’ shops principally to examine their compliance with Appendix B, “Quality Assurance Criteria for Nuclear Power Plants,” to 10 CFR Part 50, of the *Code of Federal Regulations* (10 CFR Part 50), as required by procurement contracts with licensees. Notices of Nonconformances or Notices of Violations are issued to manufacturers and suppliers for failures to meet quality commitments or the requirements of 10 CFR Part 21, “Reporting of Defects and Noncompliance,” respectively. In addition, the NRC observes licensees’ oversight of manufacturers and suppliers. However, the primary responsibility for oversight rests with licensees, who typically perform their oversight audits through participation in the Nuclear Procurement Issues Committee.

As a result of the development of the enhanced vendor inspection program in 2007, and within the framework of IMC 2507, “Construction Inspection Program: Vendor Inspections,” the NRO staff currently conducts a minimum of 10 routine and reactive vendor inspections annually. Furthermore, the staff plans for further expansion of the oversight of manufacturers and suppliers, based on the potential increase of activities within the nuclear industry associated with the construction of new plants. During FY 2010, 11 vendor inspections, 6 QA implementation inspections, and 3 aircraft impact assessment inspections were conducted.

## Vendor Inspections:

### October 14, 2010

Black and Veatch (B&V), Overland Park, KS—Inspection of selected portions of B&V’s QA program and 10 CFR Part 21 program.

### September 29, 2010

Mangiarotti S.p.A., Sedegliano(UD) Italy—Inspection of selected portions of Mangiarotti’s QA program and 10 CFR Part 21 program.

### July 15, 2010

Sandvik Materials Technology (SMT), Sandviken, Sweden—Inspection of selected portions of SMT’s QA program and 10 CFR Part 21 program.



# Activities & Accomplishments

*Top, employees enjoy discussion during a quarterly division meeting*

*Above, NRO Deputy Director Gary Holahan, right, shares a laugh during a weekly program meeting*

*Right, Branch Chief Terry Jackson, left, and his team perform an audit at CS Innovations in Phoenix, AZ.*



**July 8, 2010**

International Quality Consultants, Inc.(IQC), Butler, PA—Inspection of selected portions of IQC’s QA program and 10 CFR Part 21 program.

**May 3, 2010**

Sulzer Pumps (US) Inc., Chattanooga, TN—Inspection of selected portions of Sulzer’s QA program and 10 CFR Part 21 program.

**April 22, 2010**

Shaw Nuclear Services, Charlotte, NC—Inspection of selected portions of Shaw’s QA program and 10 CFR Part 21 program.

**February 22, 2010**

DuBose National Energy Services, Inc., Clinton, NC—Inspection of DuBose’s 10 CFR Part 21 program.

**December 23, 2009**

Namco Controls Corporation, Elizabethtown, NC—Followup inspection of selected portions of Namco’s QA program and 10 CFR Part 21 program.

**December 8, 2009**

Energy Steel and Supply Company, Lapeer, MI—Followup inspection of selected portions of Energy Steel’s QA program and 10 CFR Part 21 program.

**December 4, 2009**

Curtiss Wright Flow Control Company, Electro-Mechanical Division (Curtiss Wright-EMD), Cheswick, PA—Inspection of selected portions of Curtiss Wright-EMD’s QA program and 10 CFR Part 21 program.

**November 16, 2009**

Sumitomo Metal Industries, Ltd., Higashi-Mukojima Amagasaki, Japan—Inspection of selected portions of Sumitomo’s QA program and 10 CFR Part 21 program.

## Quality Assurance Inspections:

**July 2010**

STPNOC amendment application to the design certification rule for the ABWR—Inspection of the implementation of the QA program to support STPNOC’s amendment application in accordance with the requirements of Appendix B to 10 CFR Part 50 and 10 CFR Part 21 at the STPNOC facilities in Bay City, TX. An additional purpose of the QA implementation inspection was to determine if STPNOC

was technically qualified to engage in the proposed activities related to the amendment of the ABWR design certification rule in accordance with the regulations in 10 CFR 52.47, “Contents of Applications; Technical Information.”

**July 2010**

Westinghouse Electric Company – Purdue University in West Lafayette, IN—Inspection of the Westinghouse Electric Company oversight and dedication of the testing conducted at Purdue University related to the design of the AP1000 shield building in accordance with the requirements of 10 CFR Part 21 and Appendix B to 10 CFR Part 50.

**July 2010**

Tennessee Valley Authority (TVA), Bellefonte Units 3 and 4 COL application—Inspection of the implementation of the QA program and followup of the 2008 NRC limited-scope inspection on the Simulated Open Channel Hydraulic code to support the Bellefonte Units 3 and 4 COL application in accordance with the requirements of Appendix B to 10 CFR Part 50 and 10 CFR Part 21 at the TVA facilities in Chattanooga, TN.

**June 2010**

Westinghouse Electric Company facility in Cranberry Township, PA—Assessment of quality activities implemented to control use of a macro code used in the design of nuclear island structures of AP1000 design.

**June 2010**

Progress Energy, Inc., Harris Units 2 and 3 COL application—Inspection of the implementation of the QA program to support the Harris Units 2 and 3 COL application in accordance with the requirements of Appendix B to 10 CFR Part 50 and 10 CFR Part 21 at the Progress Energy facilities in Raleigh, NC.

**June 2010**

Progress Energy, Inc., Levy County Units 1 and 2 COL application—Inspection of the implementation of the QA program to support the Levy County Units 1 and 2 COL application in accordance with the requirements of Appendix B to 10 CFR Part 50 and 10 CFR Part 21 at the Progress Energy facilities in Raleigh, NC.



# Activities & Accomplishments

*Top, with a new steam generator in the background, NRO and Region II employees, along with Japanese regulators, participate in a vendor inspection at a manufacturing plant in Kobe, Japan.*

*Above, Division of Site and Environmental Reviews (DSE) Acting Deputy Division Director Rebecca Karas discusses career development with Luisette Candelario, a geotechnical engineer.*

*Right, NRO and Region II staff members gather at the V.C. Summer Unit 2 excavation site.*

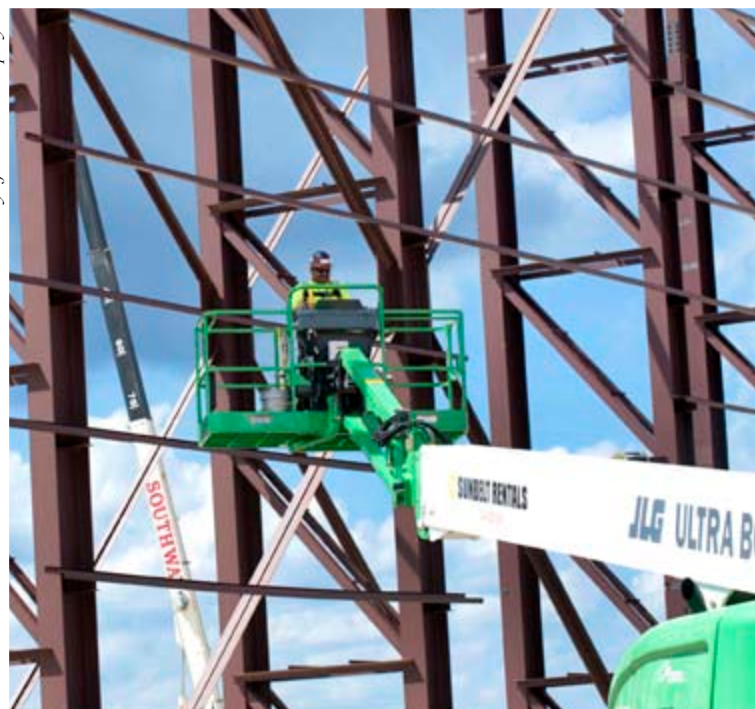




On June 17, 2010, NRO hosted the 2nd NRC Workshop on Vendor Oversight for New Reactor Construction in New Orleans, LA. The workshop was widely attended and included discussions on such issues as vendor oversight for new reactors; the ASME nuclear survey process; the NRC enforcement policy as it applies to vendors; counterfeit, fraudulent, or suspect items; and vendor insights on third-party oversight. The workshop was attended by about 550 individuals, representing companies and organizations from 11 countries. They included 233 vendors, 3 industry groups, 10 Government regulatory agencies, and 45 foreign and domestic utilities, including NRC license applicants (for design certification, COLs, and fuel cycle facility licenses).

### Engineering Inspections:

The NRC staff is developing an effective and viable design acceptance criteria (DAC) inspection process, including process framework and DAC inspection procedures. These criteria are defined as a set of prescribed limits, parameters, procedures, and attributes on which the agency relies, in a limited number of technical areas, to make a final safety determination to support a design certification. They are objective and must be verified as part of the ITAAC performed to demonstrate that the as-built facility conforms to the certified design. The staff expects to complete the inspection procedure by the end of 2010. It conducted the first inspection of the South Texas Project (STP) Units 3 and 4 Digital Instrumentation and Control DAC in May 2010. Concurrent with ongoing initiatives, an integration plan is under development to expand the working group charter beyond the STP effort, incorporate elements of the STP initiative into a generic DAC inspection methodology, and set the stage for revisions to RG 1.215.



Photos courtesy of Southern Company

New reactor construction specialists complete tasks at the Vogtle site.



Illustration courtesy of GE Hitachi

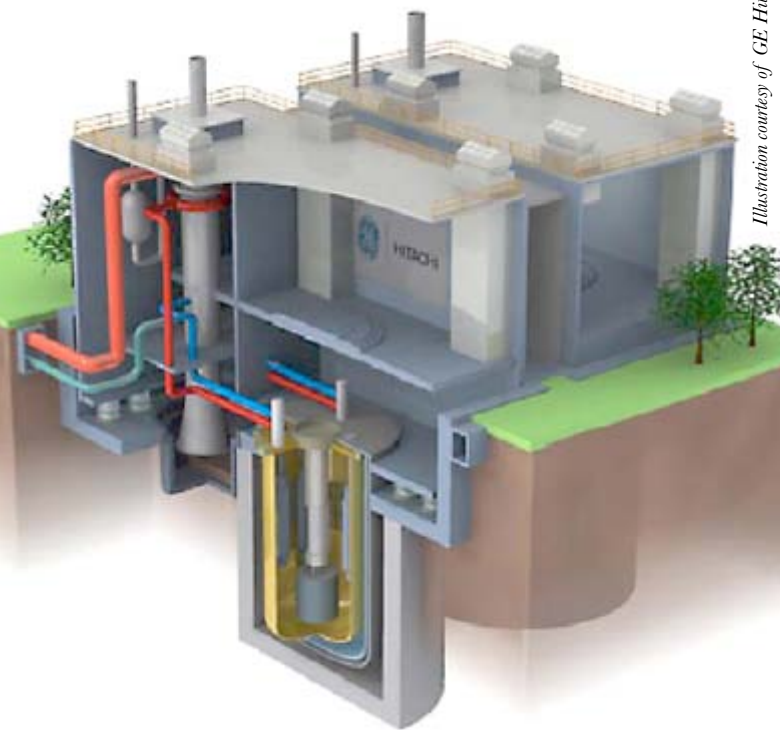
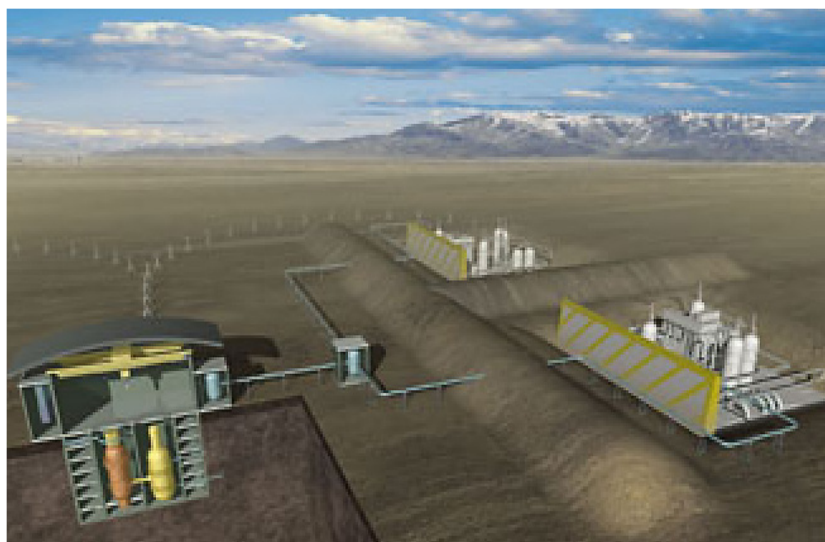


Illustration courtesy of GE Hitachi



Top, Project Manager Samina Shaikh presents an overview of the advanced reactor program at an office meeting.

Above, Power Reactor Innovative Small Module (PRISM) representation.

Right, Next Generation Nuclear Plant (NGNP) illustration.

## Advanced Reactor Program

The development of advanced reactor designs in the United States and abroad has been supported by various Government efforts such as the Generation IV International Forum, as well as by private companies and governments seeking to introduce an alternative to large, light-water reactors. The NRC has had experience in the area of advanced reactors in the past—Peach Bottom 1 in Pennsylvania and Fort St. Vrain in Colorado—but the programs were not pursued because of changes in Government policies or private sector initiatives. The existing new reactor licensing program has benefited from previous advanced reactor programs that led to the certification of the AP600 passive design and preapplication reviews of gas-cooled and sodium-cooled reactors.

The current increased interest in advanced reactors resulted from a number of developments such as the inclusion of a requirement in the EAct for the NRC to license an HTGR as part of the U.S. Department of Energy's (DOE's) Next Generation Nuclear Plant (NGNP) project; the introduction of small modular reactors (SMRs) for domestic and foreign markets; and the possible use of fast reactors as part of a solution to close the nuclear fuel cycle. The Advanced Reactor Program (ARP) was created within NRO in January 2009 to provide a focused project management function for technologies beyond large, light-water reactors.

A clear indication of the interest in the development and deployment of advanced reactors designs is a host of several draft legislative proposals directing DOE and NRC to coordinate the licensing of an SMR. In light of this congressional interest in SMRs, on December 15, 2009, the Director of NRO provided testimony to the Senate Committee on Energy and Natural Resources on the status of the staff's preparation activities. In addition, NRO staff and managers have participated in SMR-related conferences sponsored by DOE, NEI, the American Nuclear Society, and numerous other companies and organizations.

The staff is focusing its efforts on preparing the NRC for reviews of applications related to the design, con-

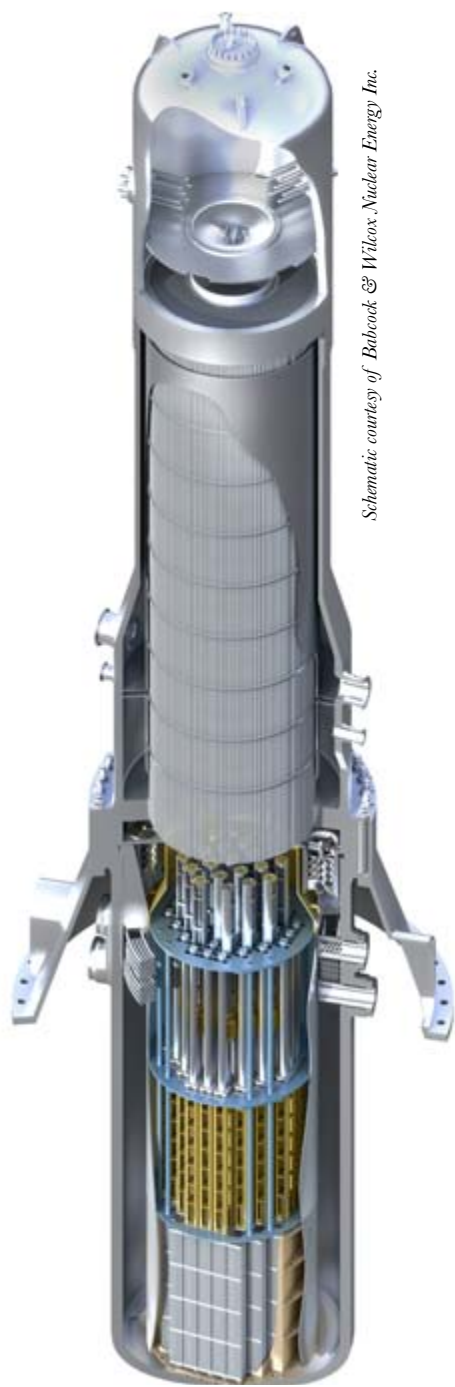
struction, and operation of advanced reactors. This includes the following:

- Building a knowledgeable and capable organization, through a combination of hiring, training, and contractor support, ready to conduct reviews of advanced reactor designs.
- Developing the regulatory framework to support efficient and timely licensing reviews of advanced reactor designs.
- Engaging DOE, designers, and potential licensees in meaningful preapplication interactions and coordinating activities with internal and external stakeholders.

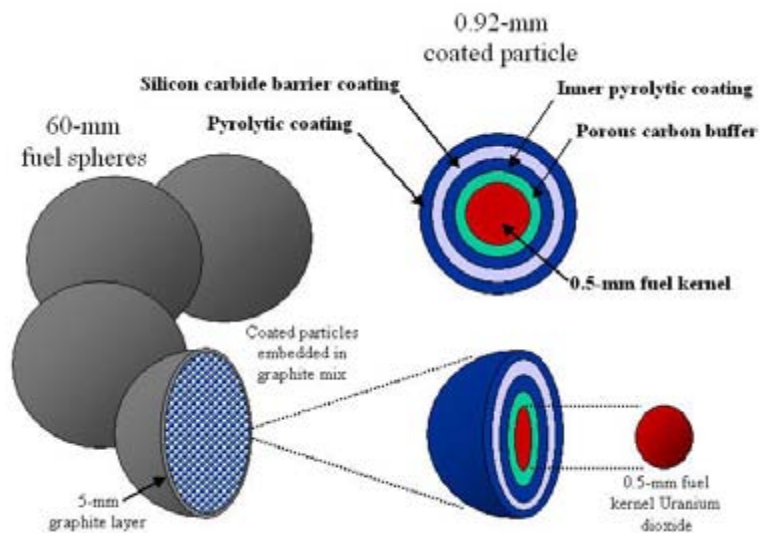
A range of different technologies are being discussed with the NRC staff. Currently the staff is implementing a structured approach in preparing for the review of these various designs. Specifically, the staff has been focusing on preparation activities for the review of an HTGR design in accordance with the EAct of 2005, as well as for the review of iPWR designs. The staff is also maintaining an awareness of other designs and technologies but is not investing significant resources in these activities so that it can focus on NGNP and iPWRs. This structured approach is consistent with the timelines for the various technologies discussed by DOE representatives.

*“The staff is focused on ensuring that the agency is prepared to address the multiple new technologies being proposed.”*

The current regulatory framework is primarily geared towards large, light-water reactors. To facilitate efficient and timely licensing reviews of other technologies, such as SMRs, the staff has embarked on an initiative to develop a regulatory framework for these new classes of reactors. The NRC expects to receive its first SMR application in FY 2012. To support development of a regulatory framework for iPWRs and HTGRs, and ultimately to be ready to conduct licensing reviews during this timeframe, it is essential that major policy, technical, and licensing issues be identified and progress made on their resolution prior to receiving applications. The staff, with support from the national laboratories, is identifying technical issues for the various advanced reactor technologies (e.g., different fuel forms, coolants, and materials) and preparing revised guidance



*Schematic courtesy of Babcock & Wilcox Nuclear Energy Inc.*



*Illustration courtesy of Babcock & Wilcox Nuclear Energy Inc.*

# Activities & Accomplishments

*Above, Babcock & Wilcox Company's mPower schematic.*

*Top right, fuel element design for a high-temperature, gas-cooled reactor.*

to support applicants and the NRC staff. Some issues have the potential to influence design decisions and leaving them unaddressed prior to receipt of the applications would greatly complicate the licensing process, reduce the efficiency of the staff, and likely extend the review schedules.

To ensure early communication with internal and external stakeholders, the staff held two well-attended public workshops (February 3, 2010, and October 8, 2010) focusing on the identified potential policy, technical, and licensing issues. These issues were summarized in an information paper to the Commission, SECY-10-0034, “Potential Policy, Licensing, and Key Technical Issues for Small Modular Nuclear Reactor Designs,” issued on March 28, 2010, and were also the subject of a Commission meeting held on April 6, 2010. The staff has developed plans to address these major policy issues (e.g., financial and insurance requirements, control room staffing and human factors requirements, emergency preparedness requirements, and security requirements) by evaluating possible changes in regulatory positions and recommending courses of action for Commission consideration. The implementation of these plans will require significant coordination from both internal and external stakeholders to support proposed application schedules. For example, in addition to industry stakeholders, the NRC will need to communicate and coordinate with the following Federal agencies:

- DOE and its programs related to the NGNP, SMRs, fuel cycle research and development, and technology development. Other interactions will be required for matters such as possible revisions to the Price Anderson Act and evaluations of proliferation resistance and physical protection.
- U.S. Department of Homeland Security and especially the Federal Emergency Management Agency regarding proposed changes to requirements related to emergency management.

- U.S. Environmental Protection Agency regarding process heat applications, jurisdictional issues for collocated nuclear and chemical facilities, and introduction of tritium into commercial products (e.g., hydrogen).

Continued interactions also will be needed for agencies such as the U.S. Department of State, U.S. Department of Commerce, and other agencies (e.g., Army Corps of Engineers, U.S. Geological Survey).

To ensure close coordination between the NRC and its stakeholders, and timely resolution of the issues, the ARP and the NEI have established routine public meetings to discuss generic approaches to resolving the policy, licensing, and key technical issues for the spectrum of advanced reactor technologies. These meetings were kicked off on July 22, 2010, and will continue to occur approximately every 6 weeks.

*“We will actively seek information from vendors so that potential policy issues can be addressed, and review guidance can be developed to support future reviews.”*

The interest in advanced reactor designs also has led to increased international activities by organizations such as the International Atomic Energy Agency (IAEA), Organization for Economic Cooperation and Development, and Generation IV International Forum. NRO participated in several conferences and meetings to ensure the NRC remained cognizant

of advanced reactor development and deployment around the world and to share NRC insights with the regulators in other countries. ARP staff and management provided information at IAEA conferences, bilateral and multilateral meetings, and infrastructure development meetings organized by DOE.

As noted previously, the NRC is focusing on preparation activities for both the NGNP and expected iPWR applications. A summary of the designs being proposed and ongoing preapplication activities follows:



# Activities & Accomplishments

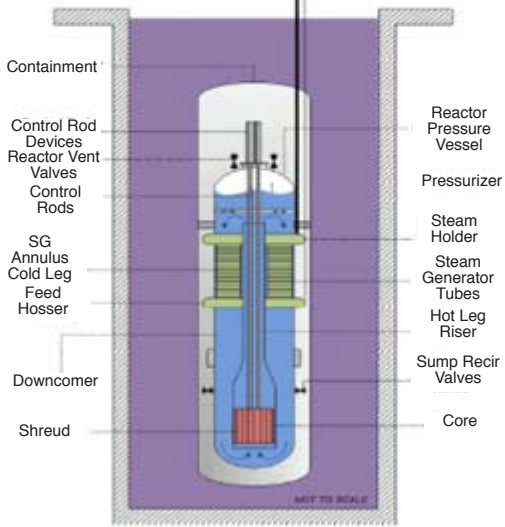
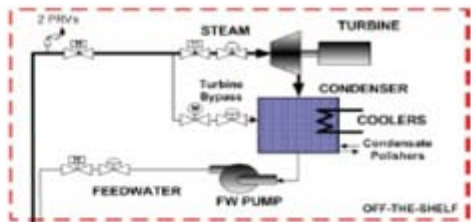


Image courtesy of NuScale Power, Inc.

Top, employees attend a U.S. Department of Energy-sponsored training seminar on high-temperature, gas-cooled reactor technology.

Above, NuScale Small Modular Reactor design.

Right, fuel element design for Pebble Bed Modular Reactor.

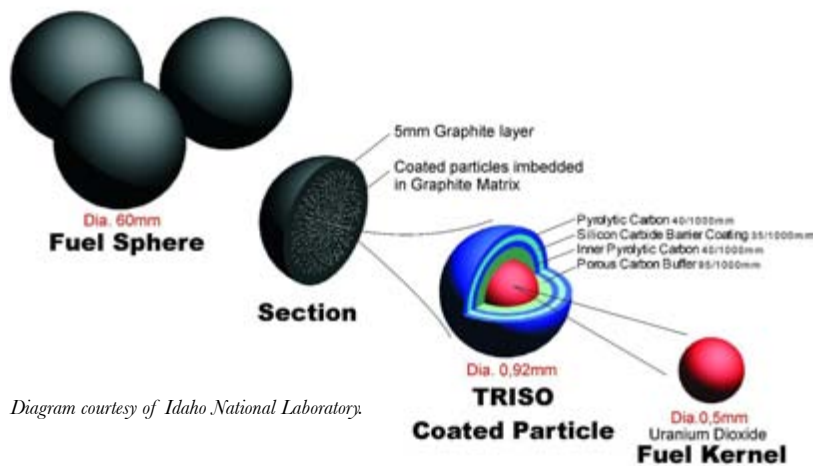


Diagram courtesy of Idaho National Laboratory.

## Integral Pressurized-Water Reactors

### NuScale Power, Inc.

- The NuScale modular reactor is a 160 megawatt thermal (MWt) (45 megawatt electric (MWe)), natural circulation pressurized-water reactor design that consists of an integrated reactor vessel assembly which 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 totally independent modules (reactor vessel and containment) for a total plant electrical capacity of up to 540 MWe.

NuScale is currently in the preapplication review phase with the NRC and is scheduled to file its formal request for design certification in early 2012. In advance of its design certification application, NuScale informed the NRC of its intent to submit 15 licensing topical reports. The NRC has received two topical reports and is establishing review schedules for these reports.

### Babcock and Wilcox mPower™

- The Babcock and Wilcox (B&W) mPower reactor is a 400 MWt (125 MWe) light-water reactor that consists of a self-contained module with the reactor core, reactor coolant pumps, and steam generator located in a common reactor vessel installed in an underground containment. The module uses a conventional core with standard light-water reactor fuel and no external pressurizer. Systems rely on existing light-water reactor technology and off-the-shelf components. The modules would be manufactured at a single centralized B&W facility in the United States and transported by rail, road, and or ship. Each module has a proposed 48-month refueling cycle.

NRO has been engaged in preapplication activities with B&W since mid-2009 following receipt of the company's letter of intent to submit an application for design certification for the B&W mPower™ commercial advanced light-water reactor. In July 2010, B&W provided a letter to the NRC that detailed its plans to

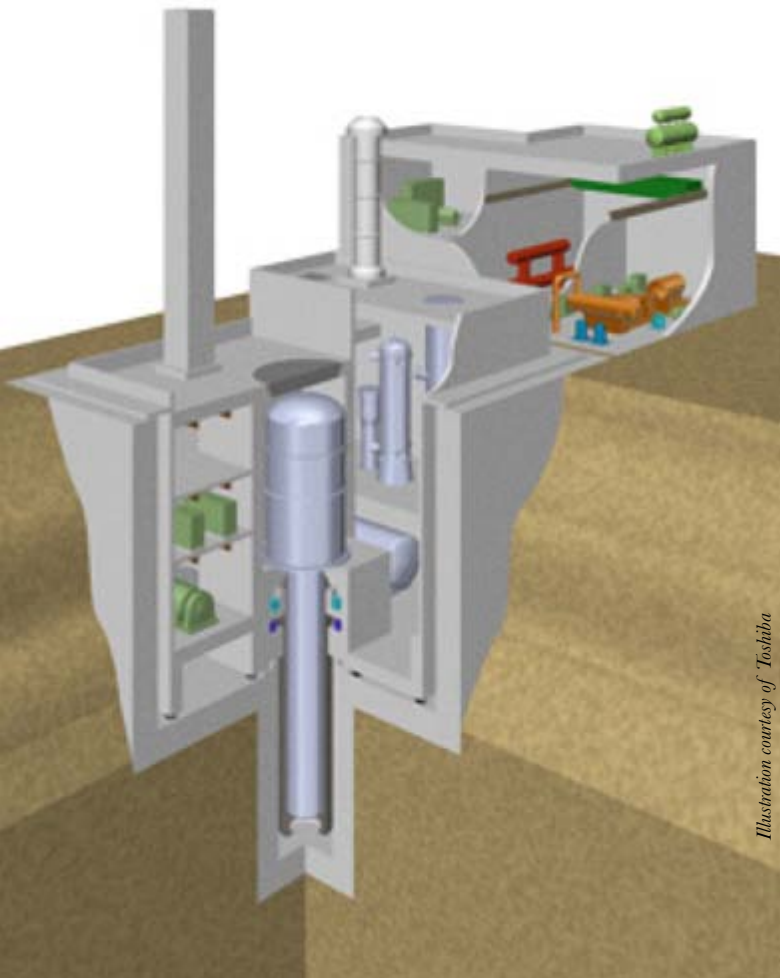
submit 12 topical reports between now and submittal of its design certification application, expected in late FY 2012. The NRC staff has received four topical reports and is establishing review schedules for these reports. Recent submittals include QA program description, design description, critical heat flux testing plan, and integrated system testing plan. Additional reports are expected through FY 2012.

## Next Generation Nuclear Plant

The NGNP project was established in accordance with Subtitle C of the EAct. As defined by the EAct, the NGNP will be a full-scale prototype plant that will be reliable, safe, proliferation resistant, and economical and will demonstrate the commercial potential of the design and associated technologies. The mission of the NGNP includes providing high-temperature process heat for the chemical industry, refining petroleum, extracting oil from shale and tar deposits as an alternative to natural gas, producing hydrogen, and serving 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 selecting and validating the appropriate technology and supporting research and development activities. It is expected that DOE will select a specific design for further development in early 2011. Phase 2 covers development of a final design for the NGNP prototype, application for a combined license to construct and operate the nuclear reactor from NRC, and construction and startup operations. Presently, a COL application is expected in FY 2014.

DOE's contractor for NGNP, Idaho National Laboratory, has submitted several white papers addressing aspects of HTGR technology for NRC review. Recent submittals include papers addressing defense-in-depth for the reactor design, high-temperature materials, mechanistic radiation source term, fuel qualification, modular plant licensing, and QA. Additional submittals are expected through FY 2011.



## Activities & Accomplishments

*Top, Advanced Reactor Program Branch Chief Stewart Magruder briefs the staff on the latest developments in the program.*

*Above, Super-Safe, Small and Simple (4S) Reactor by Toshiba.*

*Right, General Engineer Wes Held makes a point about advanced reactor designs at a staff meeting.*





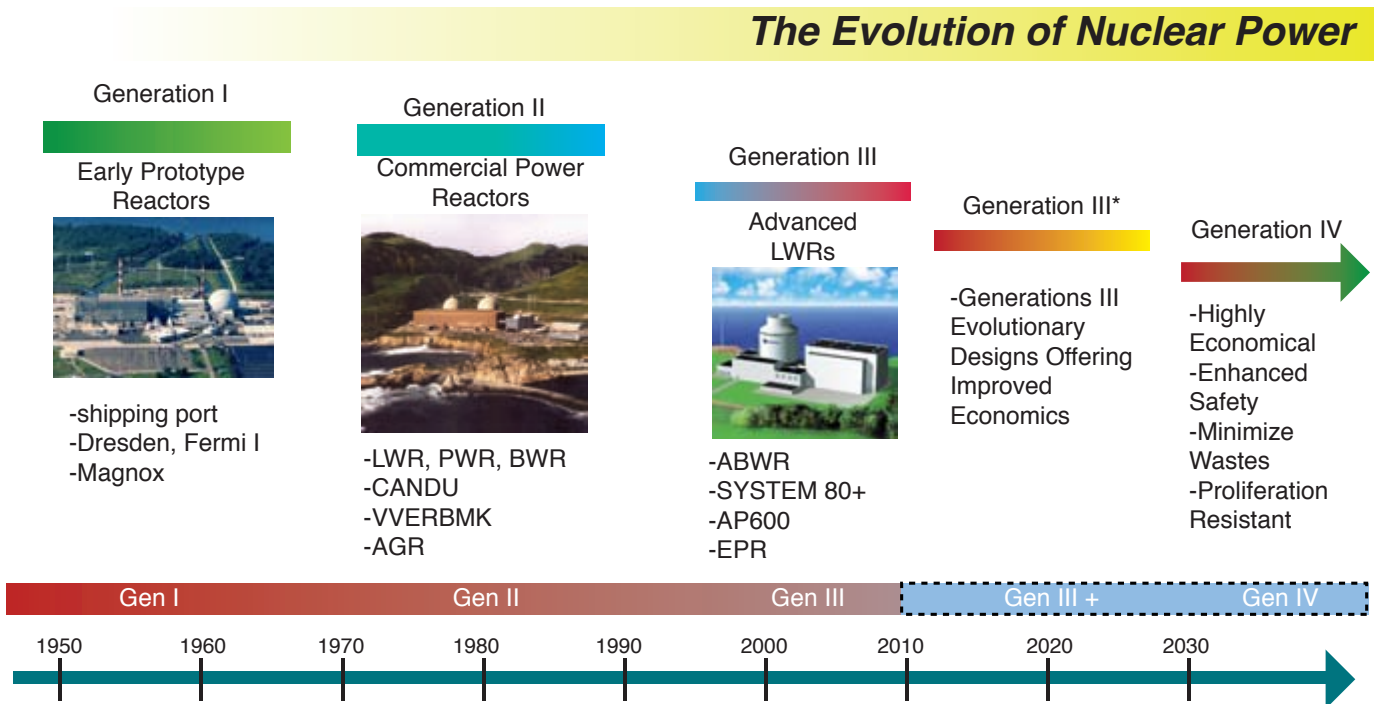
## Other Advanced Reactor Designs

The NRC staff is aware of various efforts that could lead to other reactor technologies and designs coming forward for technical review, certification, or licensing. The staff is currently participating in limited preapplication activities with the designers of four fast reactor designs: GEH PRISM; the Toshiba Corporation (Toshiba) Super-Safe, Small and Simple (4S) Reactor; the Advanced Reactor Concepts, LLC ARC-100 Reactor, and the Hyperion Power Generation, Inc., Hyperion Power Module design.

Additional designs are being considered within the industry. For example, the staff is aware that companies are currently engaged in design work for an advanced recycling reactor, the traveling wave reactor, and the Sandia National Laboratory-initiated “right-sized” reactor.

Other reactor designs being developed include the following:

- Several Generation IV designs such as the molten salt reactor, supercritical-water-cooled reactor, lead-cooled fast reactors, and gas-cooled fast reactors.
- Several fission reactor designs not included in Generation IV but developed for defense, space propulsion, or other programs that may be deployed for commercial applications.
- Fission-Fusion hybrid reactors (e.g., Laser Inertial Fusion Engine).
- Fusion energy devices (e.g., ITER-derived machines, inertial confinement systems, and TriAlpha plasma electric generator).





# Activities & Accomplishments

*Top, NRC staff visit the Sandvik Materials Technology facility in Sweden to inspect steam generator tubes.*

*Above, DCIP employees inspect a reactor vessel head at Japan Steel Works in Muroran, Japan.*

*Right, the Digital Instrumentation and Controls Working Group of the Multinational Design Evaluation Program meet in Paris, France.*



## International Cooperation

Since its inception, NRO has been an active and robust participant in the worldwide nuclear regulatory community. Prime examples are recent NRO staff and management participation in multilateral and bilateral exchanges of information, attendance at and the presentation of information at global conferences, and support of cooperative and assistance activities organized by the IAEA.

Multilateral exchanges were conducted as part of MDEP, Nuclear Energy Agency (NEA), and IAEA committees and working groups, and established conferences.

Throughout 2010, NRO and the NRC's Center for Construction Inspection in Region II engaged in several bilateral exchanges with the Chinese nuclear regulator, who is overseeing the world's first construction of an AP1000 reactor. As part of the effort, an NRC regional inspector spent 6 weeks inspecting and observing construction activities at the AP1000 construction site at Sanmen (*see page 2*). This provided a unique opportunity to test NRC's construction inspection procedures. The NRC also hosted six staff members from the Chinese regulator who were performing short-term exchange assignments. An NRO inspector also spent a year with the French nuclear regulator performing vendor inspection activities.

The staff conducted a number of vendor inspections worldwide, including in Japan, France, Germany, Italy, and Sweden. Because the supply stream for nuclear components is global in nature, the NRC conducts many inspections of foreign component manufacturers. One of our highest priorities and biggest challenges is to instill nuclear-grade QA and a strong safety culture in suppliers, particularly those that are new to the nuclear field. These inspections focus on vendors' QA programs and the reporting of defects, as well as noncompliance programs.

In 2010, NRO supported bilateral international exchanges on technical specifications and operator licensing with the French nuclear regulator and on aircraft impact assessment with the Canadian regulator.

Meanwhile, the MDEP continues to develop innovative approaches to leverage the resources and knowledge of mature, experienced national regulatory authorities who are, or will shortly be, undertaking the review of new reactor power plant designs. NRO plays a leading role in the program, which includes the regulatory authorities of nine other countries: Canada, China, Finland, France, Japan, Korea, Russian Federation, South Africa, and the United Kingdom.

In 2010, significant progress was evidenced in fulfilling the overall MDEP goals of increased cooperation and enhanced convergence of requirements and practices. NRO stood at the crossroads of that progress,

as it witnessed particularly noteworthy accomplishments including: the completion of 13 vendor inspections with multinational cooperation; development of common positions in the area of digital instrumentation and controls; agreements with standards development organizations regarding cooperation in pursuing convergence; and the completion of a comparison of the Korean, Japanese, and French codes for Class I pressure vessels against the ASME Code.

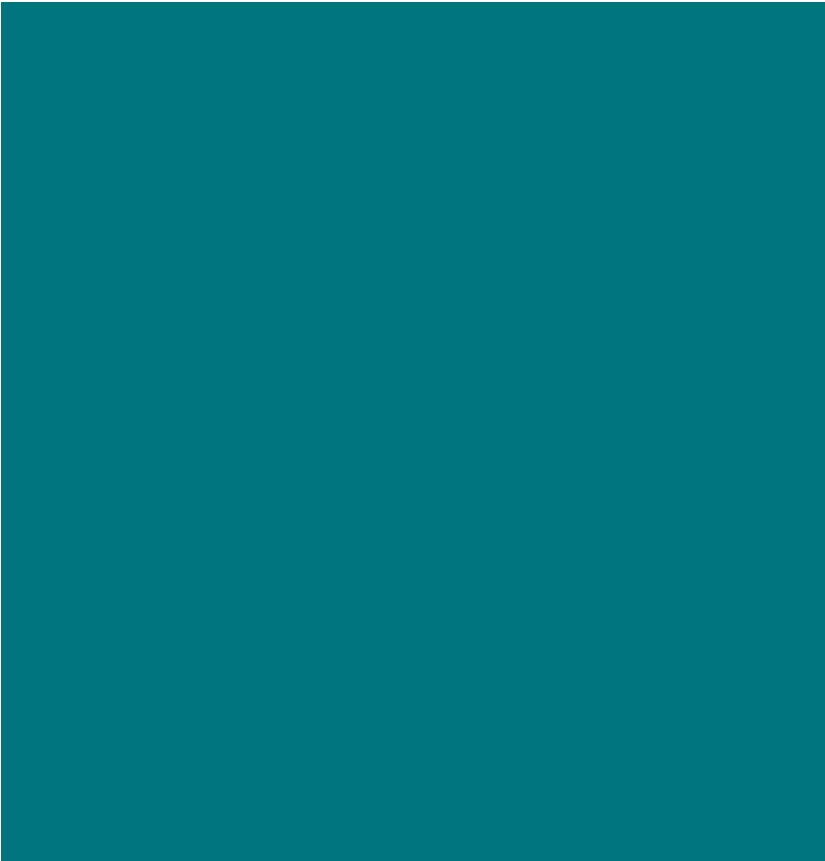
NRO staff members shared information with their regulatory counterparts on design reviews through participation in MDEP design-specific working groups for the EPR and the AP1000. In addition, the NRO staff participated in an IAEA-sponsored siting training program for countries that are interested in developing a nuclear program.

NRO can point to several accomplishments to date that provide confidence that the MDEP structure and process is an effective method of accomplishing increased cooperation in regulatory design reviews. Additional information on MDEP, including the annual report, can be found at the NEA Web site: [www.oecd-nea.org](http://www.oecd-nea.org).

NRO also plays a leading role in the recently formed Working Group on the Regulation of New Reactors, made up of the members of NEA's Committee on Nuclear Regulatory Activities who are interested in sharing information on new reactor licensing and construction oversight.

*“NRC will partner with the international community and incorporate construction experience gained from around the world into our knowledge base.”*

# A Look Ahead



*Photos courtesy of Southern Company*

For the New Reactor Program, 2011 and beyond will be pivotal years. Within the next 2 years, we expect to issue design certifications for evolutionary, passive reactor designs; issue the first combined licenses, and continue to oversee the first new reactor construction in this country in decades.

Guided by an unwavering commitment to safety, the New Reactor Program continues to meet the challenging goals posed by its primary program areas of licensing, oversight of vendor and construction inspection, and advanced reactors. In doing so, it is contributing substantially to the fulfillment of the agency's mandate to protect the public health and safety, the environment, and to promote the common defense and security.

As we look forward, it is clear that NRO is strategically positioned to successfully complete our increasing and changing workload in a timely and responsive manner. While we anticipate mounting challenges and opportunities, we are poised to achieve significant accomplishments in terms of volume, overall scope, and quality of work.

In the area of licensing, the New Reactor Subprogram will continue to sustain steady progress as our comprehensive review process serves us well. Part 52 and the design-centered review approach will enable us to achieve COL standardization around selected designs while maintaining both a strong safety focus and resource savings. We will continue to be flexible and responsive to the challenges presented by the evolving needs of designers and COL applicants. In addition, we will continue to evaluate plans and schedules of ongoing reviews based on an applicant's construction and commercial building plans as well as its support for issue resolution. We expect to complete our reviews of the majority of docketed COL applications in 2011 and 2012 and expect to receive two additional COL applications by the end of 2012. We also received design certification renewal applications for the ABWR from GEH and Toshiba before the end of 2010.

*“While we anticipate mounting challenges and opportunities, we are poised to achieve significant accomplishments in terms of volume, overall scope, and quality of work.”*

Meanwhile, construction activities will increase and we will aggressively implement our construction inspection activities for the first new reactors. We will continue to enhance our oversight program, with enhancements including additional guidance on ITAAC maintenance; additional guidance on DAC closure; improving information technology infrastructure; and the continued recruitment, training, and qualification of new inspectors. In fact, resident inspectors will begin to be placed at new reactor sites under construction.

Elsewhere, vendor inspection activities to verify the integrity of the supply chain, internationally as well as domestically, will increase. We will continue to partner with the international community and incorporate construction experience gained worldwide into our knowledge base.

Our Advanced Reactor Subprogram will continue its preparation to meet the rapidly growing interest in design and possible licensing applications for these advanced reactor designs. In light of our mandate from Congress, we will fulfill our obligations to complete a licensing review of an HTGR as part of DOE's next generation nuclear plant.

Furthermore, we are ready to review the applications submitted for the multiple new technologies now being proposed. Accordingly, NRO will continue to develop plans for policy and key technical issues associated with various reactor technologies and designs.

NRO will continue to actively seek information to keep informed of industry activities and plans so we can budget and prepare for them, as well as seek information from vendors so that potential policy issues can be addressed and review guidance can be developed to support future reviews.

As we move forward, our top priority is safety—a priority that will remain steadfast as new applications are submitted and reviewed and nuclear reactor technologies emerge.

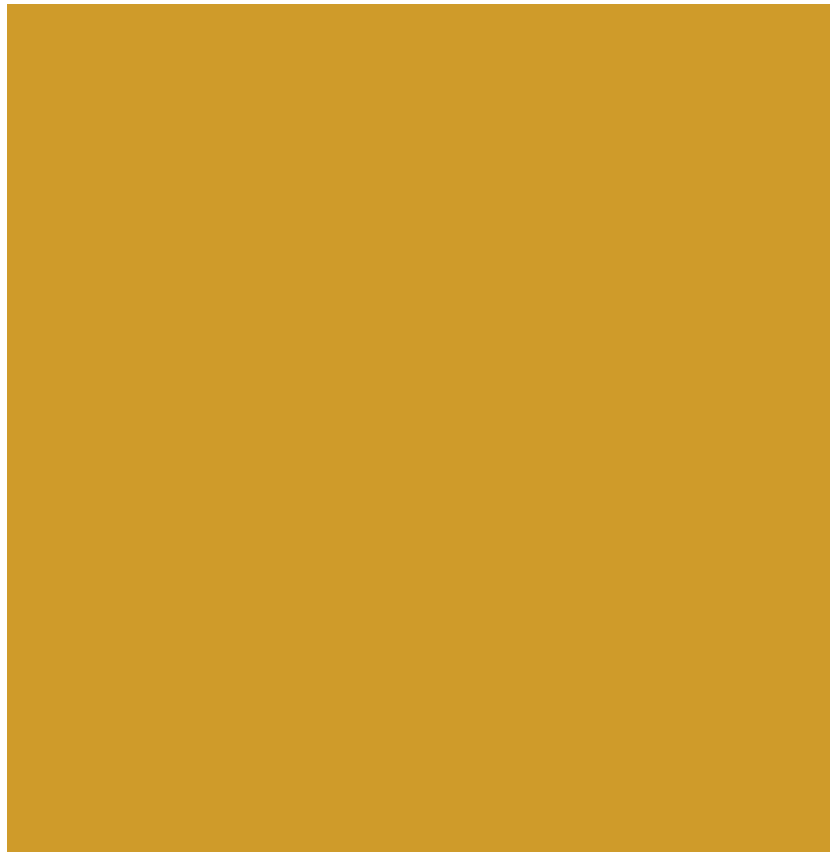
# At a Glance



*Top, DCIP Director Glenn Tracy addresses the audience at NRC's Workshop on Vendor Oversight for New Reactor Construction in New Orleans, LA.*

*Above, Division of Engineering Director Tom Bergman speaks at a division meeting.*

*Right, attendees listen intently at a quarterly accomplishments review session.*



NRO is responsible for 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. NRO works with other NRC offices to accomplish that mission.

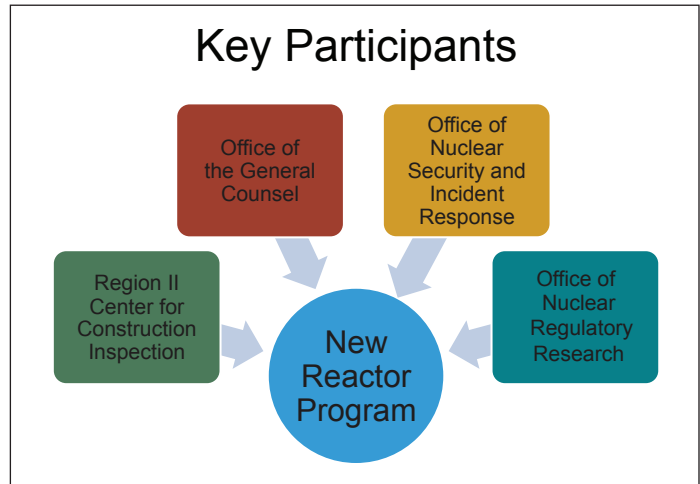
For example, NRO works closely with the Center for Construction Inspection in NRC’s Region II, located in Atlanta, GA. The center’s mission is to provide assurance in the safety of future operations at new nuclear facilities by ensuring that licensees construct the facilities according to approved designs,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

### Advanced Reactor Program (ARP)

ARP leads, manages, and facilitates advanced reactor activities including: preapplication activities, design approval application reviews, design certification application reviews, manufacturing license application reviews, COL application reviews, and ESP application reviews. ARP also develops and maintains the necessary technical and programmatic support for advanced reactor licensing activities; guidance development; interaction with stakeholders on issues pertaining to advanced reactors; implementation of large-scale project management tools; schedule



and resource planning and tracking; and issuance of design approvals, design certifications, manufacturing licenses, and combined licenses. The division serves as the lead organization for interactions with Government agencies pertaining to SMRs.

### Branches

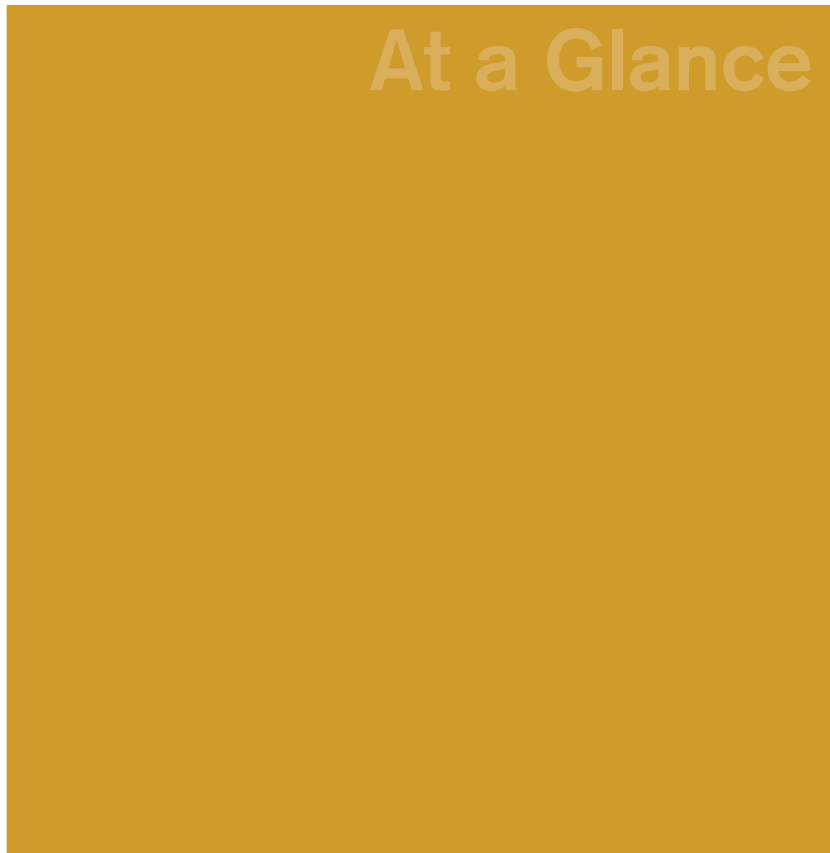
- Advanced Reactors Branch 1 (ARB1)
- Advanced Reactors Branch 2 (ARB2)

### Program Management, Policy Development, & Analysis Staff (PMDA)

PMDA provides administrative and management support for the New Reactor Program budgeting 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 of office activities. It also provides and enhances communication to internal and external stakeholders. PMDA provides oversight and support of information management and technology and administrative and management support in areas including human resource management, knowledge management, tracking and coordination of correspondence and action items, space management, training coordination, and Freedom of Information Act coordination. In addition, PMDA facilitates continuous organizational improvement by developing and improving office instructions, represents the office in special projects in areas of responsibility, and completes special projects assigned by office-level management.

### Branches

- Financial and Performance Management Branch (FPMB)



*Top, NRO's Donna Williams, far left, participates in an agency emergency exercise.*

*Above, Office Director Mike Johnson and Commissioner Kristine Svinicki during an NRO All Hands Meeting*

*Right, members of PMDA's Human Capital Management Branch review the office's strategic workforce planning initiative.*





Human Capital Management Branch (HCMB)  
Information and Infrastructure Management Branch  
(IIMB)  
Information Technology Management Branch  
(ITMB)

## Division of New Reactor Licensing (DNRL)

DNRL leads, manages, and facilitates design certification application reviews, ESP application reviews, COL application reviews, and new reactor preapplication activities. It also develops and maintains the necessary technical and programmatic support for new reactor licensing activities, guidance development, interaction with stakeholders on issues pertaining to new reactors, large-scale project management tools, schedule and resource planning and tracking, and issuance of design certifications and COLs. Based on the DNRL reorganization of August 6, 2007, the division was divided into the licensing operations and the infrastructure and policy organizations. Branches that fall within these two organizations are listed below:

### Branches

#### Licensing Operations

AP1000 Projects Branch 1 (NWE1)  
AP1000 Projects Branch 2 (NWE2)  
BWR Projects Branch 1 (NGE1)  
BWR Projects Branch 2 (NGE2)  
EPR Projects Branch (NARP)  
USAPWR Projects Branch (NMIP)

#### Infrastructure and Policy

Planning and Scheduling Projects Branch (NPLS)  
Contract Planning and Management Branch (NCPM)  
Organizational Effectiveness and Productivity Branch  
(NOEP)  
Rulemaking, Guidance and Development Branch  
(NRGA)

## Division of Safety Systems & Risk Assessment (DSRA)

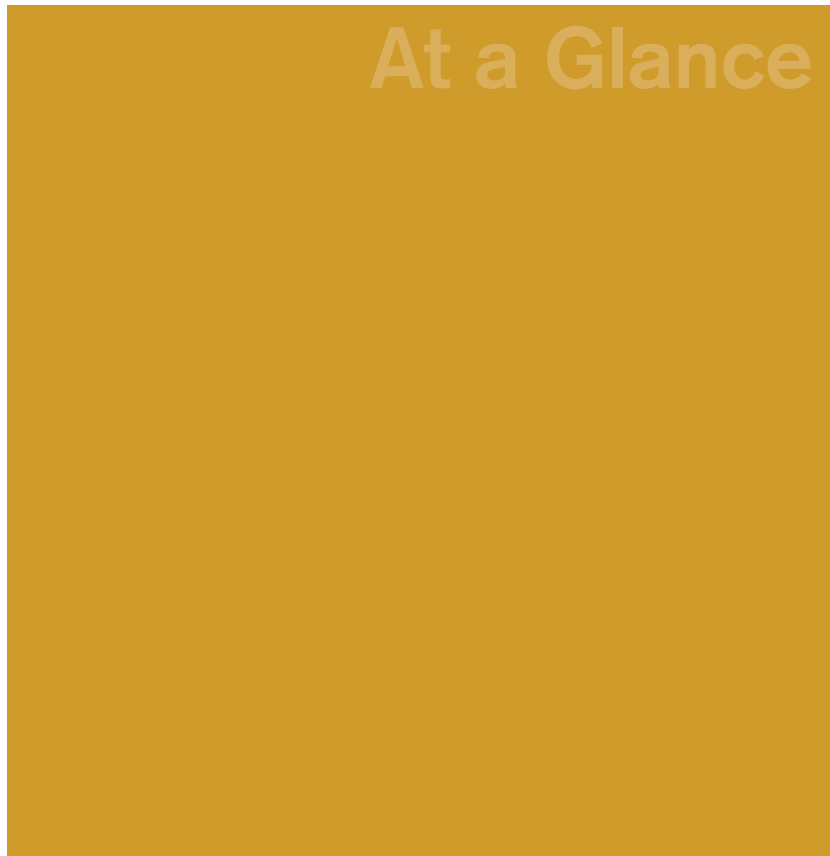
DSRA performs systems-related safety evaluations of applications for new facilities or designs and provides technical support and expertise for special projects, programs, and policy activities and reviews and evaluates design-basis and severe accident issues as they relate to advanced plant designs and combined licenses. It also develops and implements policies and guidance for the use of probabilistic risk assessments and associated analyses in regulatory decisionmaking for new reactors. In addition, it applies risk-informed methods to support resolution of regulatory issues and reviews probabilistic risk assessment submittals and severe accident design features related to the certification and licensing of advanced designs. Furthermore, DSRA provides risk assessment support in areas of plant security and utility actions to reduce potential vulnerabilities.

### Branches

Balance of Plant Branch 1 (SBPA)  
Balance of Plant Branch 2 (SBPB)  
Containment and Ventilation Branch 1 (SPCV)  
Containment and Ventilation Branch 2 (SBCV)  
PRA and Severe Accidents Branch (SPRA)  
Reactor System, Nuclear Performance, and Code  
Review (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 (NRR), 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 followup of construction-related issues, and recommends corrective plant-specific and generic actions. DCIP also reviews the quality assurance programs at vendors, fabricators, applicants, and construction licensees, and develops and implements the quality assurance and vendor inspection programs. Additionally, DCIP reviews applicant radiation protection programs and develops and oversees the radiation protection inspection programs. The division reviews licensee submittals and develops programs and guidelines



*Top, employees visit the Westinghouse AP1000 simulator in Cranberry Township, PA.*

*Above, NRO and NRR staffers join forces at a Balance of Plant Counterparts Meeting*

*Right, NRO Geologist Meralis Plaza-Toledo examines rocks at the V.C. Summer Unit 2 excavation site in Fairfield County, SC.*



for technical specifications and provides interpretations of technical specification requirements. It develops policies and guidance and implements the national program for the licensing of new nuclear reactor operators. DCIP develops programs and conducts reviews to ensure the effective consideration of human factors engineering in new nuclear power plant design and operation. In addition, it assesses the adequacy of facility personnel training programs and emergency operating procedures.

### Branches

Construction Assessment, Enforcement, and Allegations Branch (CAEB)  
Health Physics Branch (CHPB)  
Construction Inspection Program Branch (CIPB)  
Operator Licensing & Human Performance Branch (COLP)  
Quality & Vendor Branch 1 (AP1000/EPR Projects) (CQVA)  
Quality & Vendor Branch 2 (ESBWR/ABWR) (CQVB)  
Technical Specifications & ITAAC Branch (CTSB)

### Division of Site & Environmental Reviews (DSER)

DSER is responsible for the project management and assessment of the environmental impacts and the technical evaluation of the site safety portions of design certification, ESP, and COL application reviews. It also develops and maintains the environmental and site safety regulatory infrastructure necessary to support issuance of DCs, ESPs and COLs. The division is also responsible for interactions with internal and external stakeholders on issues related to siting and environmental review activities.

### Branches

Environment Projects Branch 1 (RAP1)  
Environment Projects Branch 2 (RAP2)  
Environment Projects Branch 3 (RAP3)  
Environmental Technical Support Branch (RENV)  
Geosciences & Geotechnical Engineering Branch 1 (RGS1)  
Geosciences & Geotechnical Engineering Branch 2 (RGS2)  
Hydrologic Engineering Branch (RHEB)  
Siting & Accident Consequences Branch (RSAC)

### Division of Engineering (DE)

DE performs engineering-related safety reviews of applications for design certification, COLs, and new

reactor preapplication activities. It provides technical expertise to support regional activities, special projects, programs, and policy activities. DE reviews may be performed in support of topical reports, consensus standard changes, or new reactor designs.

### Branches

Component Integrity, Performance, & Testing Branch 1 (AP1000/EPR Projects) (CIB1)  
Component Integrity, Performance, & Testing Branch 2 (ESBWR/ABWR Projects) (CIB2)  
Electrical Engineering Branch (AP1000/EPR/ESBWR/ABWR Projects) (EEB)  
Engineering Mechanics Branch 1 (AP1000/EPR Projects) (EMB1)  
Engineering Mechanics Branch 2 (ESBWR/ABWR Projects) (EMB2)  
Instrumentation, Controls & Electrical Engineering 1 (AP1000/EPR Projects) (ICE1)  
Instrumentation, Controls & Electrical Engineering 2 (ESBWR/ABWR Projects) (ICE2)  
Structural Engineering Branch 1 (AP1000/EPR Projects) (SEB1)  
Structural Engineering Branch 2 (ESBWR/ABWR Projects) (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

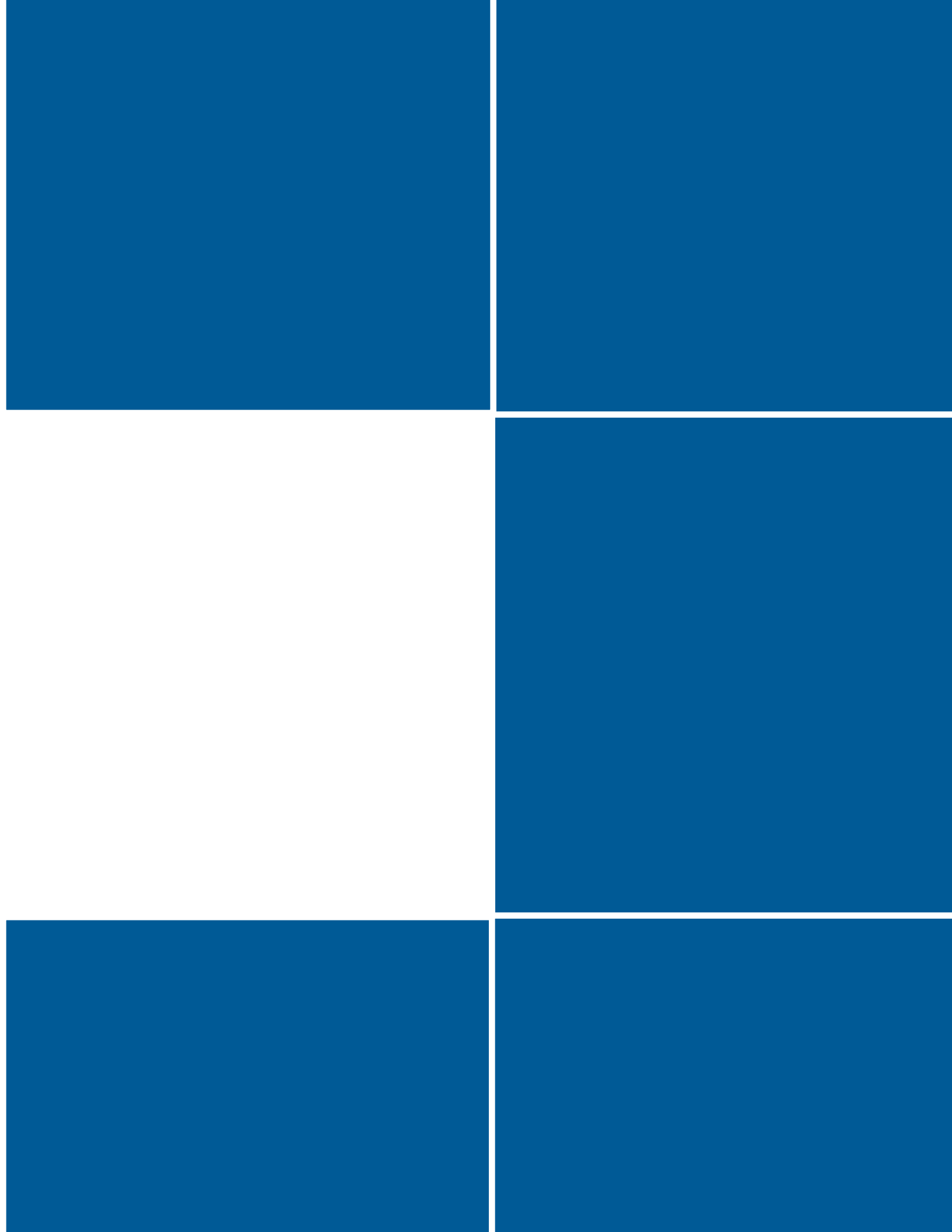
Division of Construction Inspection (DCI)  
Inspection Branch 1  
Inspection Branch 2  
Inspection Branch 3  
  
Division of Construction Projects (DCP)  
Projects Branch 1  
Projects Branch 2  
Projects Branch 3  
Projects Branch 4





# **2010 NEW REACTOR PROGRAM**

## OFFICE OF NEW REACTORS





U. S. Nuclear Regulatory Commission  
NUREG/BR-0476  
December 2010